

# Exhibit 3

**UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF NEW YORK**

**SECOND AMENDED EXPERT REBUTTAL REPORT OF [REDACTED]**

**FEBRUARY 24, 2022**

*U.S. Securities and Exchange Commission v. Ripple Labs, Inc., Bradley Garlinghouse, and  
Christian A. Larson*

**TABLE OF CONTENTS**

**1. INTRODUCTION.....2**

    1.1. *Qualifications* .....2

    1.2. *Background*.....4

    1.3. *Documents Considered*.....4

**2. REBUTTAL REGARDING DEFENDANTS’ EXPERTS’ OPINIONS RELATED TO ODL .....5**

    2.1. *Assignment*.....5

    2.2. *Summary of Findings*.....5

    2.3. *Defendant Experts’ Methodology, Findings, and Shortcomings Related to ODL* .....7

    2.4. *Overview of Methodology Used in this Rebuttal Section* .....11

    2.5. *Overview of ODL*.....12

    2.6. *Main Findings* .....16

**3. REBUTTAL TO PROFESSOR ADRIAENS’ REPORT .....35**

    3.1. *Assignment*.....35

    3.2. *Summary of Findings*.....36

    3.3. *Professor Adriaens’ Methodology*.....38

    3.4. *Methodology Used in this Rebuttal to the Report of Professor Adriaens* .....40

    3.5. *Main Findings* .....41

**4. REBUTTAL TO PROFESSOR YADAV’S REPORT .....55**

    4.1. *Assignment*.....55

    4.2. *Summary of Findings*.....55

    4.3. *Professor Yadav’s Report’s Methodology and Findings*.....59

    4.4. *Overview of Methodology Used for this Rebuttal* .....60

    4.5. *Main Findings* .....61

**5. APPENDIX A – METHODOLOGY FOR TRACING THE FLOW OF XRP FROM FOREIGN-CLASSIFIED PLATFORMS TO US-CLASSIFIED PLATFORMS .....93**

**6. APPENDIX B – METHODOLOGY FOR IDENTIFYING GSR PROGRAMMATIC SALES OF XRP ON BEHALF OF RIPPLE THAT WERE CONDUCTED ON THE XRP LEDGER.....98**

**7. APPENDIX C – METHODOLOGY FOR DETERMINING THE LOCATION OF XRL LEDGER VALIDATORS.....106**

**8. APPENDIX D – LIST OF DOCUMENTS AND DATA SOURCES CONSIDERED FOR THIS REPORT.....108**

**9. APPENDIX E – CV.....125**

**10. APPENDIX F – ANALYSIS OF “91 BUSINESSES” IN PROFESSOR ADRIAENS’ REPORT .....127**

## 1. INTRODUCTION

### 1.1. Qualifications

1. [REDACTED] [REDACTED] assisting various government agencies with investigating possible securities violations and financial fraud in the digital assets space. This experience includes analyzing fraudulent blockchain investment schemes, tracking money laundering on the blockchain, and discovering and proving manipulative trading activity related to digital assets. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

I have provided expert consulting in blockchain, digital assets, and forensic data analytics for private companies, federal agencies, and foreign securities regulators. My work providing expert consulting related to digital assets has ranged from examining documents and representations related to initial coin offerings to providing detailed analysis of blockchain data, including flows of funds on the blockchain, smart contract activity, on-blockchain trading data, and decentralized finance platforms. I have also developed and managed the development of scripts and algorithms to process and analyze large collections of blockchain data.

2. In addition, I am the [REDACTED] of an investment partnership [REDACTED] began operating in [REDACTED] and legally formed in [REDACTED] was primarily focused on making investments in the digital asset space, and since its founding I have profitably allocated capital to many digital asset investments.

In addition to analyzing hundreds of companies, projects, coins, and tokens in the digital asset space, I have developed and executed successful cryptocurrency arbitrage strategies. These activities have given me an intimate familiarity with many different participants in the digital asset space including retail users and traders, institutional investors, cryptocurrency miners, software developers, entrepreneurs, and venture capital investors. I have practical firsthand experience with using blockchains as well as the trading platforms, software platforms, and institutional products built on top of them. In addition to my experience in digital asset investments, I have [REDACTED] of experience evaluating and investing in companies, public equities, commodities, bonds, currencies, and derivatives of those asset classes. I have managed automated quantitative strategies as well as discretionary investment strategies across many different asset classes, with emphasis on equities and equity options. As part of this work, I routinely analyze the investment thesis that is, the relative risks and rewards of an investment and the circumstances in which the investment makes the most sense for hundreds of investments, including digital assets. I received a [REDACTED] [REDACTED] and an [REDACTED]

3. Appendix E to this report contains my curriculum vitae with more details about my professional background. [REDACTED] [REDACTED]

[REDACTED] a rate of \$435 per hour for the time I spend on this matter. I have been assisted by additional staff members of Integra to analyze data and documents related to this matter. My conclusions are my own and are based on my independent analysis and review of their work. Integra is compensated by the SEC at a rate of \$520 per hour (Engagement Director), \$330 per hour (Data Scientist), and \$235 per hour (Data Analyst) for their work.

## **1.2. Background**

4. I have been engaged by the SEC to provide expert testimony in the matter of *Securities and Exchange Commission v. Ripple Labs, Inc., et al.* pending in the United States District Court for the Southern District of New York. On October 4, 2021, I submitted a report to this Court titled “Expert Report of [REDACTED]” (“Original Report”), which independently analyzed and rendered opinions on the perspective of a reasonable purchaser of XRP on Ripple’s statements, actions, and product offerings throughout the period from 2013 to the filing of the SEC’s Complaint on December 22, 2020 (“Issuance Period”). The SEC has now retained me to review and offer an opinion in this report (“Rebuttal”) regarding certain expert reports that were also submitted on October 4, 2021 by experts engaged by Defendants. The specific matter for which I have been retained by the SEC to offer a rebuttal opinion is described in the “Assignment” subsection at the beginning of each Section of this Rebuttal.

## **1.3. Documents Considered**

5. Appendix D to this report contains a complete list of documents and data sources I considered, including those I relied upon, in completing the analysis in this report. Included in that list are public statements and press releases from Ripple and company insiders, transaction data related to what Ripple advertises as its core software product a product for financial institutions which Ripple calls On-Demand Liquidity ("ODL") (formerly known as xRapid), and publicly available blockchain data for the XRP Ledger.

## **2. REBUTTAL REGARDING DEFENDANTS' EXPERTS' OPINIONS RELATED TO ODL**

### **2.1. Assignment**

6. In this Section, I have been asked by the SEC to review and comment on the opinions in Professor Osler's Report, Professor Ferrell's Report, and Professor Adriaens' Report as they relate to Ripple's ODL product. Specifically, I have been asked to opine on their opinions related to ODL that during the Issuance Period: i) ODL transaction volume was growing and ODL transaction costs were "decreas[ing] over time" (Professor Ferrell), ii) ODL was a "less costly" substitute for traditional, fiat cross-border payments and a "viable option" for cross-border payments (Professor Osler), and iii) Ripple's payment of rebates and incentives to ODL customers was consistent with strategies employed by technology companies to grow their customer base (Professor Ferrell and Professor Adriaens).

### **2.2. Summary of Findings**

7. Based on my analysis of documents related to ODL, the Ferrell Report's analysis of ODL economics, and my professional experience as a trader and investor in both digital asset and conventional markets, my opinion is that none of the Defendants' experts' opinions listed above in Section 2.1 are correct, for reasons set forth below in this Section.

8. First, while ODL volume grew from its inception in October 2018 to its peak in May 2020, it fell precipitously in June 2020 by over 60% and did not recover by the end of the Issuance Period. Additionally, while ODL transaction costs a critical factor for whether ODL was economical for money transmitters such as MoneyGram initially decreased, they increased substantially in the most recent quarter of the Issuance Period.

9. Second, it is uneconomical for financial institutions to use ODL for cross-border payments absent significant subsidies provided by Ripple. Applying ODL cost figures from

Professor Ferrell’s own report, it is far more expensive for a money transmitter to send cross-border payments using ODL as compared to using traditional fiat channels. In addition, the true and unsubsidized costs of using ODL are even higher than the figures presented in the Ferrell Report because his analysis i) incorrectly calculates foreign exchange (“FX”) spread data and thereby underestimates FX costs, ii) underestimates exchange trading fees due to the existence of subsidies paid by Ripple, iii) ignores the impact of additional significant subsidies paid by Ripple to market makers, and iv) neglects the effects of other financial benefits to ODL participants paid by Ripple such as compensation for “slippage”<sup>1</sup> encountered by money transmitters. Combined with the upward trajectory of ODL costs at the end of the Issuance Period, this suggests that during the Issuance Period there was no indication that ODL costs were likely to decrease to a point where money transmitters would have an economic reason to adopt ODL, absent receiving incentives and subsidies from Ripple. That ODL was uneconomical during the Issuance Period was confirmed by the example of MoneyGram, a U.S.-based cross-border money transmitter that accounted for 95% of all ODL volume during ODL’s peak volume in May 2020. MoneyGram’s Chief Financial Officer testified that ODL “would not have been viab[le] without subsidies.”<sup>2</sup>

10. Third, while Ripple’s use of subsidies and incentives to grow its ODL user base had short-term success in increasing ODL transaction volume, this volume was not sustained because ODL does not have an economically compelling value proposition for cross-border payments. For example, MoneyGram ramped up ODL transactions due to incentives from Ripple<sup>3</sup> and accounted for 95% of ODL volume at its peak in May 2020, but then dramatically

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<sup>1</sup> “Slippage” is a trading term referring to trading losses incurred from executing trades against a bid-ask spread; it is the difference between the displayed market price of a trade and the actual price upon which the trade was executed.

<sup>2</sup> Deposition of MoneyGram CFO Lawrence Angelilli, August 3, 2021 at 207-208.

<sup>3</sup> Deposition of MoneyGram CFO Lawrence Angelilli, August 3, 2021 at 209-210; Mr. Angelilli states, “MoneyGram was extremely interested in the earning stream that would come from this [incentives] in the short term.”

reduced its ODL transactions thereafter.<sup>4</sup> As long as ODL-related costs remain high compared to the cost of using traditional fiat payment solutions, Ripple's use of subsidies and incentives will not help it to achieve a profitable product offering, although it may provide a narrative that could increase the speculative demand for and price of XRP.

### **2.3. Defendant Experts' Methodology, Findings, and Shortcomings Related to ODL**

#### ***2.3.1. Summary and Shortcomings of the Methodology and Findings Related to ODL in the Report of Professor Ferrell***

11. In Section IV.B., the Ferrell Report makes four findings related to MoneyGram's involvement with ODL: i) MoneyGram transferred a significant and increasing amount of XRP across payment corridors using ODL, ii) ODL is "Technically Feasible," and its efficiency improved over time, iii) the cost of MoneyGram's cross-border transactions through ODL decreased over time, and iv) Ripple's incentives and subsidies to ODL customers to encourage their adoption of ODL are consistent with how other companies use incentives to grow their customer base.

12. To support his first three points regarding ODL, Professor Ferrell cites and summarizes various statistics about ODL but in some instances he omits key information that casts significant doubt on his assertions. For example, Professor Ferrell argues, "MoneyGram's use of ODL increased over time, reaching a high of \$410 million transferred in April 2020."<sup>5</sup> However, the reality is that while MoneyGram's ODL volume increased from July 2019 to May 2020, it dropped precipitously in June 2020 and did not recover during the Issuance Period, as seen in Figure 2 in Section 2.5.2.

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<sup>4</sup> See Figure 2; ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162.

<sup>5</sup> Expert Report of Allen Ferrell, October 4, 2021 at 74.

13. In a similar manner, to support the assertion that “The Cost of Using ODL Decreased Over Time as the XRP Market Liquidity Improved,”<sup>6</sup> Professor Ferrell created a list of the average change in ODL costs across different payment corridors<sup>7</sup> over a 16-month period, August 2019 to December 2020.<sup>8</sup> While the average costs of ODL transactions decreased during that time period, ODL costs actually increased in all the payment corridors analyzed during the last quarter of 2020, the most recent period of Professor Ferrell’s analysis (see Table 3 in Section 2.6.2). To provide a clearer picture, Professor Ferrell should have acknowledged that the cost of ODL decreased initially, but reversed course and started to increase in Q4 2020. This fuller description, among other things, casts doubt on the prospect that ODL costs can decrease to the point where money transmitters will ever find ODL to provide an economically viable value proposition for them to adopt ODL without subsidies, as discussed in Section 2.6.2.

14. The Ferrell Report provides justification for his final point regarding ODL that Ripple’s ODL rebates and incentives to MoneyGram were “not unique and generally used to encourage the adoption of new technology/products”<sup>9</sup> using analogies from other industries such as payment processors, trading platforms, and online retailers.<sup>10</sup> However, even though it can be rational for some businesses to offer incentives to drive adoption of particular products, this does not necessarily apply to all products in all circumstances. Defendants’ own expert Professor Adriaens opines that a prerequisite for scaling a product through price discounts is for it to have a strong value proposition, which includes having favorable economics to the alternative solution, which ODL does not have, as discussed in Section 2.6.4.

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<sup>6</sup> id. at 75.

<sup>7</sup> Professor Ferrell assumes the reader understands the term “payment corridor” which refers to simultaneously exchanging currency (e.g. USD to EUR) and moving currency (e.g. from the US to Europe).

<sup>8</sup> id. at Exhibit 20.

<sup>9</sup> id. at 77.

<sup>10</sup> id. at 77-80.

**2.3.2. Summary and Shortcomings of the Methodology and Findings Related to ODL in the Report of Professor Osler**

15. The Osler Report claims that “Ripple’s ODL product provides an economically sound option for making cross-border and cross currency payments.”<sup>11</sup> Specifically, Professor Osler writes, “ODL provides fast, secure, transparent, and *low-cost* cross-border and cross-currency payments [emphasis added],”<sup>12</sup> and specifies that “[r]elative to current payment systems with fiat money, ODL is faster, more transparent, and **less costly** [emphasis added].”<sup>13</sup>

16. However, Professor Osler provides no justification nor uses any methodology to explain why she believes that ODL is “less costly” than traditional cross-border payments using fiat currency. The reality, as shown in Section 2.6.1, is that even Defendants’ expert Professor Ferrell’s own calculations show that ODL is not cost effective for financial institutions such as MoneyGram.

17. Professor Osler also argues, “ODL can be (and in my opinion is) a viable option for making cross-border payments even if it is not currently profitable.”<sup>14</sup> To justify her opinion, she provides examples of technology firms such as Airbnb and Pinterest that took time to reach profitability and which currently have high valuations. However, merely citing examples of previously unprofitable companies which now have high valuations is insufficient for determining whether a company has a viable business model. One could just as easily point to unprofitable companies such as Webvan and MoviePass which spent a lot of money to grow their businesses but which resulted in significant losses to investors because they did not have sound business models.

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<sup>11</sup> Expert Report of Carol Osler, October 4, 2021 at 9.

<sup>12</sup> *id.* at 18.

<sup>13</sup> *ibid.*

<sup>14</sup> *id.* at 28.

18. Professor Osler critiques the SEC: “I understand that the SEC has argued that ODL is unprofitable or earns Ripple only *de minimis* revenue. Assuming that is true, *it provides no information on the firm’s ability to compete as a payments service provider using ODL* [emphasis added].”<sup>15</sup> In a similar manner, Professor Osler does not supply any such information suggesting Ripple was able to provide an attractive value proposition for ODL in order to “compete as a payments service provider.” This Rebuttal Section conducts analysis regarding the economic value proposition for ODL customers and finds no economic reasons for them to adopt ODL apart from receiving significant subsidies and incentive payments from Ripple.

### **2.3.3. Summary and Shortcomings of the Methodology and Findings Related to ODL in the Report of Professor Adriaens**

19. The Adriaens Report i) describes various ways that technology startups seek to develop their business models and grow their user base and ii) argues that Ripple has followed a similar path in its attempt to grow its business. For example, he asserts that “Ripple’s Business Model Development Is Consistent With That of a Startup in a High Technology Industry.”<sup>16</sup>

20. Regarding ways to scale a business, the Adriaens Report describes how tech companies “will deploy aggressive product marketing and pricing strategies for optimal and rapid scaling, and adoption, of their product.”<sup>17</sup> Such strategies include price discounts, and Professor Adriaens writes about such discounts, “Well-known tech companies that have deployed one or more of these discounting strategies before they became established, and their *value proposition* became accepted by the market, include Netflix, Lending Club, LinkedIn and others [emphasis added].”<sup>18</sup> Earlier in his Report, Professor Adriaens recognizes the importance

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<sup>15</sup> *ibid.*

<sup>16</sup> Expert Report of Peter Adriaens, October 4, 2021 at 37.

<sup>17</sup> *id.* at 43.

<sup>18</sup> *id.* at 44.

for a company to have a strong value proposition and defines what a value proposition means: “The number one reason for success is delivering a superior value proposition to the customer in other words, a product or service that delivers a superior benefit over the incumbent solution.”<sup>19</sup> What the Adriaens Report thus implies is that in order for the deployment of price discounting strategies to be effective in scaling a business, the business must first have a strong value proposition that is attractive to customers. In the case of Ripple’s ODL product, the pricing strategy went far beyond discounting. Ripple generated zero revenue from ODL and paid significant incentives and subsidies to convince companies to use the product.

21. In the case of Ripple, its core product ODL has a negative value proposition, since ODL does not offer “superior benefit over the incumbent [fiat] solution” but rather is much more expensive, as shown in Section 2.6.4. Therefore, any efforts invested in scaling ODL (such as through 100% discounts, incentive payments, and subsidies) may achieve short-term growth, but cannot be sustained because ODL does not provide a positive value proposition to customers such as MoneyGram, absent subsidies. This result is evident in Figure 2 in Section 2.5.2, which shows how ODL volume increased temporarily during the period where Ripple provided incentive payments to MoneyGram, but nonetheless eventually MoneyGram greatly reduced its usage of ODL, and as a result ODL volume decreased significantly.<sup>20</sup>

#### **2.4. Overview of Methodology Used in this Rebuttal Section**

22. This Rebuttal Section first starts with a review of ODL payment flows, as well as a high-level summary of ODL transaction volume. Next, the value proposition for a financial institution such as MoneyGram to use ODL is evaluated versus the use of traditional fiat

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<sup>19</sup> id. at 40.

<sup>20</sup> On June 16, 2020, Ripple and MoneyGram signed a letter of amendment which reduced the previously agreed to “maximum Market Development Fee” by \$10,000,000. (MONEYGRAM SEC 0005825-0005826).

channels for cross-border payments. Specifically, this Rebuttal Section examines whether there is any economic rationale for using ODL without subsidies. The Rebuttal Section then proceeds to consider other subsidies, incentives, and rebates provided by Ripple to increase the adoption of its ODL product.

## **2.5. Overview of ODL**

### ***2.5.1. Overview of ODL Payment Flows***

23. For the majority of transactions during the Issuance Period, an ODL transaction involved three steps.<sup>21</sup> First, the originating enterprise customer (e.g. a financial institution such as MoneyGram, which is a money transmitter), which had a supply of fiat currency bundled together from either its treasury or many individual retail transfer requests, traded that source fiat currency (e.g. U.S. Dollars) for XRP on a digital asset trading platform in the originating country. Second, using the XRP Ledger, the XRP was sent to that financial institution's account at another digital asset trading platform in the destination country. Third, this XRP was traded for a different fiat currency (e.g. Mexican Pesos) so that the financial institution could receive the local currency to its bank account in order to fund its retail withdrawal needs.

24. The money transmitter is exposed to at least three types of costs in executing an ODL transaction:

- 1) Each trade between a fiat currency and XRP incurred an exchange trading fee. This is the commission charged by a digital asset trading platform to facilitate the trade. ODL transactions involved two trades on digital asset trading platforms. Therefore, two exchange trading fees were charged.

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<sup>21</sup> In May 2020, Ripple began a program to sell XRP directly to ODL customers, which eliminated the need to trade XRP for fiat on the sending digital asset platform. VIAMERICAS SEC00013519.

- 2) The ODL transaction, starting with one fiat currency and ending with another fiat currency, created an implied exchange rate<sup>22</sup> that, at times, might be significantly worse than the market exchange rate for those fiat currencies. This difference comprised a foreign exchange spread (“FX spread”) to be paid by the money transmitter. The FX spread represents the percentage difference between the current market exchange rate of a traditional foreign exchange transaction (as denoted by the Reuters Benchmark) and the current market exchange rate implied by using prices on ODL trading platforms and XRP trades to convert between the fiat currencies.
- 3) Executing these XRP trades could induce an additional cost due to slippage. Slippage is the amount by which orders are executed at prices inferior to the quoted price at the time of order receipt. In the case of ODL, slippage occurred as a result of placing market orders on the originating and destination trading platforms and price fluctuations between the time of the first trade and the second trade. In other words, the final price paid above and beyond the Reuters Benchmark might be even worse than the calculated FX spread due to the actual prices received when the trades are executed.

25. Multiple types of market participants were involved in an ODL transaction from start to finish during the Issuance Period: i) the money transmitter – a financial institution using ODL to complete a cross-border transfer payment, ii) trading counterparties which were often a market maker – an entity that provides liquidity by creating a bid-ask spread and constantly offering to both buy and sell XRP on a trading platform, and iii) the trading platforms – the venues where the trades are posted, processed, and matched. Ripple subsidized companies from

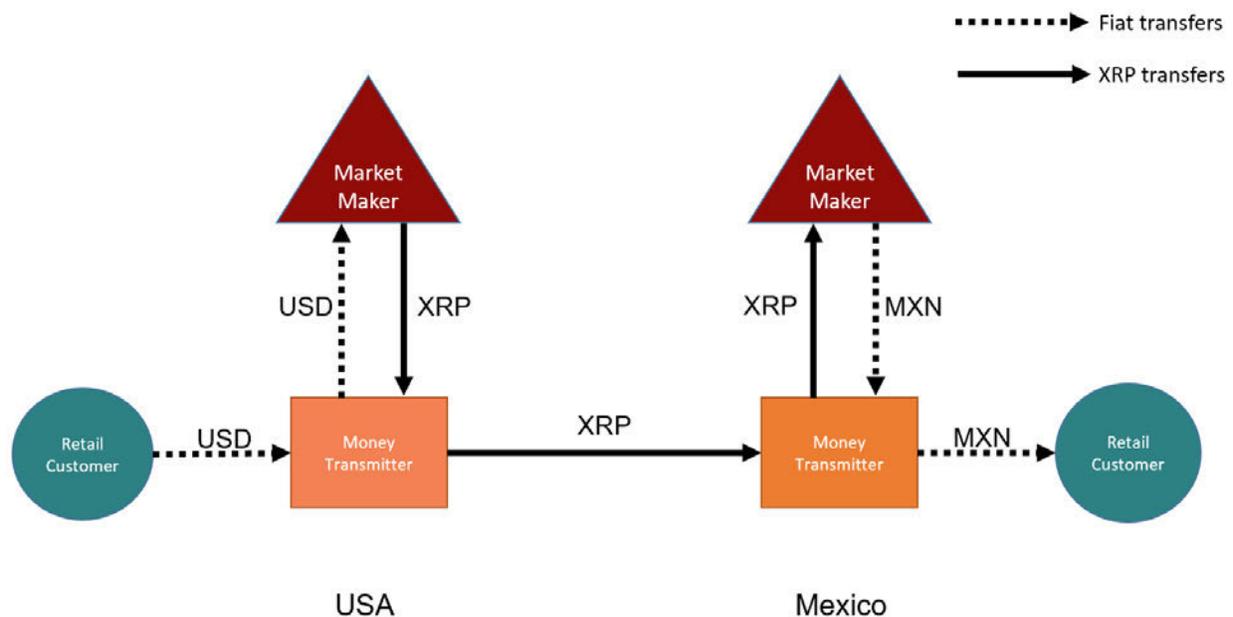
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<sup>22</sup> “Implied exchange rate” refers to the effective price or ratio to convert between two fiat currencies such as U.S. Dollars and Mexican Pesos by trading from Dollars to XRP and then from XRP to Pesos at current market prices.

each of these three categories in order to encourage market participants to offer artificially low fees or to compensate market participants for financial losses due to the natural inefficiencies embedded into the mechanics of an ODL transaction such as paying exchange fees, a high FX spread, and slippage.

26. A visual description of an ODL transaction appears below in Figure 1. This example depicts a transaction in which a money transmitter in the U.S. sends U.S. Dollars to Mexico and converts the money into Mexican Pesos. The ODL customer in this scenario is a money transmitter such as MoneyGram. As seen in this image, two separate trades must be executed between the money transmitter (MoneyGram) and typically market makers on the originating and destination digital asset platforms.<sup>23</sup>

**Figure 1. Example of ODL Transaction for Transfer Payment Between U.S. and Mexico.**



<sup>23</sup> Market makers are used in the illustrative figure because they typically, although not necessarily always, were the counterparties to these trades.

27. One alternative to ODL is to use the traditional financial system. This involves using an international wire transfer, including a single trade on the foreign exchange interbank market. This foreign currency exchange is very cheap due to being some of the deepest and most liquid markets for any asset class.<sup>24</sup>

28. Not shown on Figure 1 are the eventual rebalancing transactions that the market maker must complete to replenish its supply of XRP on the U.S. platform and its supply of Pesos on the Mexican platform. To accomplish this the market maker at times needed to execute a traditional international wire transfer to convert U.S. Dollars into Mexican Pesos and send them across the border to its account in Mexico.<sup>25</sup> Ironically, this traditional international wire transfer is the very type of transaction that the entire ODL system is purportedly designed to avoid. These rebalancing transactions carried out by market makers using traditional wire transfers played the same role as wire transfers do for MoneyGram's traditional payments business—sending money slowly, cheaply, and infrequently in order to support much more expensive but instantaneous transactions as they are needed by counterparties.

### ***2.5.2. ODL Volume Over Time***

29. My Original Report charted the total monthly ODL transaction volumes during the Issuance Period,<sup>26</sup> and the chart is reproduced here in Figure 2. The figure charts total ODL transaction volumes as well as MoneyGram ODL transaction volumes. Figure 2 shows that

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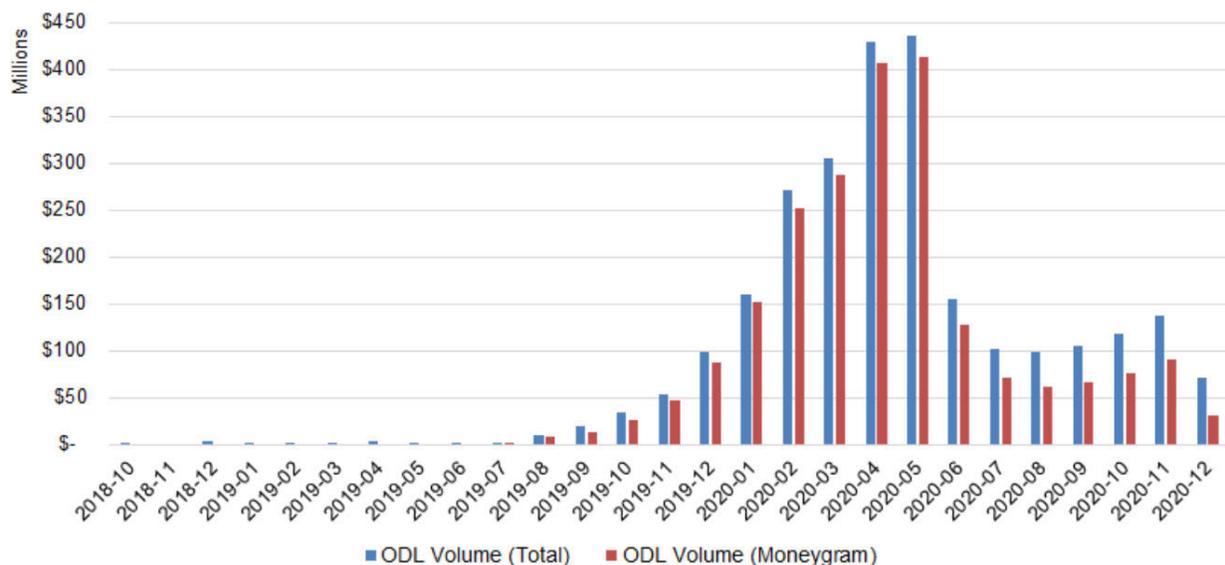
<sup>24</sup> Journal of Banking and Finance. Order flow, Bid-Ask Spread and Trading Density in Foreign Exchange Markets (2012) at 600.

<sup>25</sup> Email from ██████████, February 20, 2019 (SEC-██████████-E-0048808), email from Dinuka Samarasinghe, Ripple XRP Markets Team, July 2, 2019 (SEC-██████████-E-0048590), and Ripple, "Bi-Directional Flow" Presentation, October 2019, (RPLI SEC 0929853) at Slide 5, "Background, Why Does Ripple Need to Pay MMs [market makers] to Support ODL?"

<sup>26</sup> ODL was launched in October 2018. Ripple. The Ripple Drop: On the Ground at Swell 2019 (2020). <https://ripple.com/insights/the-ripple-drop-on-the-ground-at-swell-2019/>.

MoneyGram was responsible for nearly all ODL activity during the Issuance Period. Starting in June 2020, MoneyGram's ODL volume fell significantly together with overall ODL volumes.

**Figure 2. Monthly ODL Volumes of All Transactions and MoneyGram Transactions<sup>27</sup>**



## 2.6. Main Findings

### 2.6.1. *Professor Ferrell's Own Calculations Show that ODL, without Subsidies, Is Uneconomical for Financial Institutions such as MoneyGram*

30. Section IV.B. of Professor Ferrell's Report identifies two categories of fees paid to complete an ODL transaction: i) exchange fees and ii) the FX spread. The exchange fees refer to fees charged by digital asset trading platforms and paid by the ODL customer and are reflected as a percentage of the total amount of the trade. The FX spread refers to the difference between the Reuters Benchmark exchange rate and the implied exchange rate using the current ODL market prices. The FX spread will tend to be worse when (i) XRP markets are less liquid,<sup>28</sup> (ii)

<sup>27</sup> ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162.

<sup>28</sup> "Liquidity" in the context of this report refers to the ability of an asset to be bought or sold without creating a large impact on the price of the asset. A liquid market is one that has many standing offers to buy or sell the asset traded in that market and where large market orders are easily and instantly absorbed by market makers.

the bid-ask spread is wider, or (iii) there is a persistent imbalance of supply and demand of XRP across different markets due to one-way payments dominating the trading.<sup>29</sup>

31. However, the cumulative total costs incurred along each leg of an ODL transaction included three categories of fees: i) exchange fees, ii) the FX spread, and iii) an additional potential source of loss not identified by Professor Ferrell – slippage. Together these costs determine whether ODL is economically viable as a payment solution while unsubsidized as compared to using traditional wire transfers and foreign exchange trades.

32. The Ferrell Report calculates the amount of just two of the three fee categories for both an ODL transaction and a traditional cross-border fiat transaction for several different transaction sizes under different market conditions. Specifically, Professor Ferrell’s spread calculations relate to transactions between U.S. Dollars and Mexican Pesos (“USD-MXN”) across the U.S. to Mexico payment corridor. It is noteworthy that this payment corridor, which the Ferrell Report uses exclusively for these comparative calculations, is the corridor that Ripple had developed the most – with significantly lower costs than many of the other payment corridors that Ripple has sought to develop for ODL.<sup>30</sup> Table 1 reproduces Exhibit 21 from the Ferrell Report which depicts the spreads under “lower market liquidity” conditions, as defined by Ferrell, which in turn cause the ODL FX spread to be higher. According to Ferrell’s own analysis, the excess cost of carrying out a large international transfer using ODL is extraordinary under market conditions with low XRP liquidity. A \$1 million transfer under these conditions

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<sup>29</sup> A capital flow imbalance across two countries could create a constant demand to buy XRP in one country and a constant demand to sell it in another country, causing XRP to become more valuable in one location compared to the other. The result would be significant additional costs for a money transmitter to use ODL. This imbalance and cross-border price difference has happened historically with certain digital assets when strict capital controls were in place, meaning there were heavy restrictions on the attempted movement of capital out of a country.

<sup>30</sup> Ripple, “Natural Liquidity” Presentation (January 2020), (RPLI SEC 0807905 and 0807916); email from Matt Curcio, January 31, 2020 (RPLI SEC 07719909); and ODL transaction volume records (RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162). From ODL transaction volume records, the USD-MXN corridor had the highest volume in 2020 among all corridors.

costs an additional \$6,852.58 with ODL compared to a traditional wire transfer (\$6,967.58 for ODL and only \$115 for the wire transfer), as seen in the bottom right corner of the table.

**Table 1. Ferrell Report’s USD-MXN Cost Calculations from Lower Market Liquidity Condition on ODL.<sup>31</sup>**

	Average Percentage Fees	Notional Amount of Remittance in USD				
		[1]**	[2]	[3]	[4]	[5]
Notional Amount		\$2,184.18	\$10,000.00	\$22,477.95	\$50,000.00	\$1,000,000.00
<b>Transfer using ODL</b>						
Bitstamp Fee <sup>[1]</sup>	0.10%	\$2.18	\$10.00	\$22.48	\$50.00	\$1,000.00
Bitso Fee <sup>[1]</sup>	0.05%	\$1.09	\$5.00	\$11.24	\$25.00	\$500.00
Average ODL FX Spread <sup>[2]</sup>	0.55%	\$11.94	\$54.68	\$122.90	\$273.38	\$5,467.58
ODL Notional (with fees)		\$2,199.39	\$10,069.68	\$22,634.57	\$50,348.38	\$1,006,967.58
Total Cost Incurred (ODL)		\$15.22	\$69.68	\$156.62	\$348.38	\$6,967.58
<b>Transfer using Traditional</b>						
Notional Amount		\$2,184.18	\$10,000.00	\$22,477.95	\$50,000.00	\$1,000,000.00
Bank Transfer Fee <sup>[3]</sup>		\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Average FX Spread <sup>[2]</sup>	0.01%	\$0.22	\$1.00	\$2.25	\$5.00	\$100.00
Traditional Notional (with fees)		\$2,199.39	\$10,016.00	\$22,495.20	\$50,020.00	\$1,000,115.00
Total Cost Incurred (Traditional)		\$15.22	\$16.00	\$17.25	\$20.00	\$115.00
<b>Cost Difference (ODL - Traditional)</b>		<b>\$0.00</b>	<b>\$53.68</b>	<b>\$139.37</b>	<b>\$328.38</b>	<b>\$6,852.58</b>

33. Since money transmitters are financially incentivized to minimize cost by batching many retail customer transfers together into a small number of very large international transfers,<sup>32</sup> the largest transfer category for traditional fiat transfers is the most relevant in Professor Ferrell’s ODL cost tables. MoneyGram’s CFO Lawrence Angelilli confirmed that MoneyGram indeed typically covers their entire daily transfer needs with one to three large transactions using the traditional financial system, implying typical transfer sizes of up to \$10 million at a time.<sup>33</sup> While MoneyGram’s 2020 daily ODL average volume for the USA to

<sup>31</sup> Expert Report of Allen Ferrell, October 4, 2021 at 104.

<sup>32</sup> Financial institutions are incentivized to batch transactions together because the fixed-costs per transaction becomes much more expensive as a percentage of total transaction size as transactions become smaller.

<sup>33</sup> Deposition of MoneyGram CFO Lawrence Angelilli, August 3, 2021 at 48: “We’ll stay on Mexico -- assuming we were going to do \$10 million in trades a day, we might do two trades, maybe three, sometimes one. With Ripple we were doing -- we had a bot that actually was directly integrated with their system, and was going out and doing \$30,000 trades in rapid succession, to get us to the amount of trading that we needed.”

Mexico payment corridor was \$3.2 million,<sup>34</sup> its actual average daily volume for payments from USA to Mexico are closer to \$10 million.<sup>35</sup> Angelilli also confirmed that MoneyGram does not make a cross-border payment for each retail money transfer, but rather batches transactions over a 24-hour period.<sup>36</sup> Therefore, while Professor Ferrell's analysis of MoneyGram's ODL activity finds that the average size of its ODL transfers was "approximately \$12,000" from July 2019 to December 2020, it is not appropriate to use this low transaction size for traditional transfers to calculate breakeven costs for ODL, since MoneyGram would normally have batched transfers in much larger sizes absent ODL. According to MoneyGram's CFO, virtually all other money transmitters batch their payments, and thus even smaller money transmitters would not find ODL to be economically viable relative to the traditional financial system.<sup>37</sup>

34. An analysis of MoneyGram's actual ODL transfers further highlights how it is not appropriate to apply MoneyGram's low average transfer amount ("approximately \$12,000") while using ODL as a basis for determining the appropriate transaction size to use for a cost comparison between ODL and the traditional payment system. While using ODL, MoneyGram continued to aggregate its daily needs for money transfers, but executed that daily transfer by using a trading bot<sup>38</sup> to break up the transaction into many small and equally-sized portions throughout the day that could likely be absorbed by market makers more easily and reduce

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<sup>34</sup> MoneyGram. ODL Transaction Details (2020) (MONEYGRAM SEC 0017277).

<sup>35</sup> Deposition of MoneyGram CFO Lawrence Angelilli, August 3, 2021 at 30.

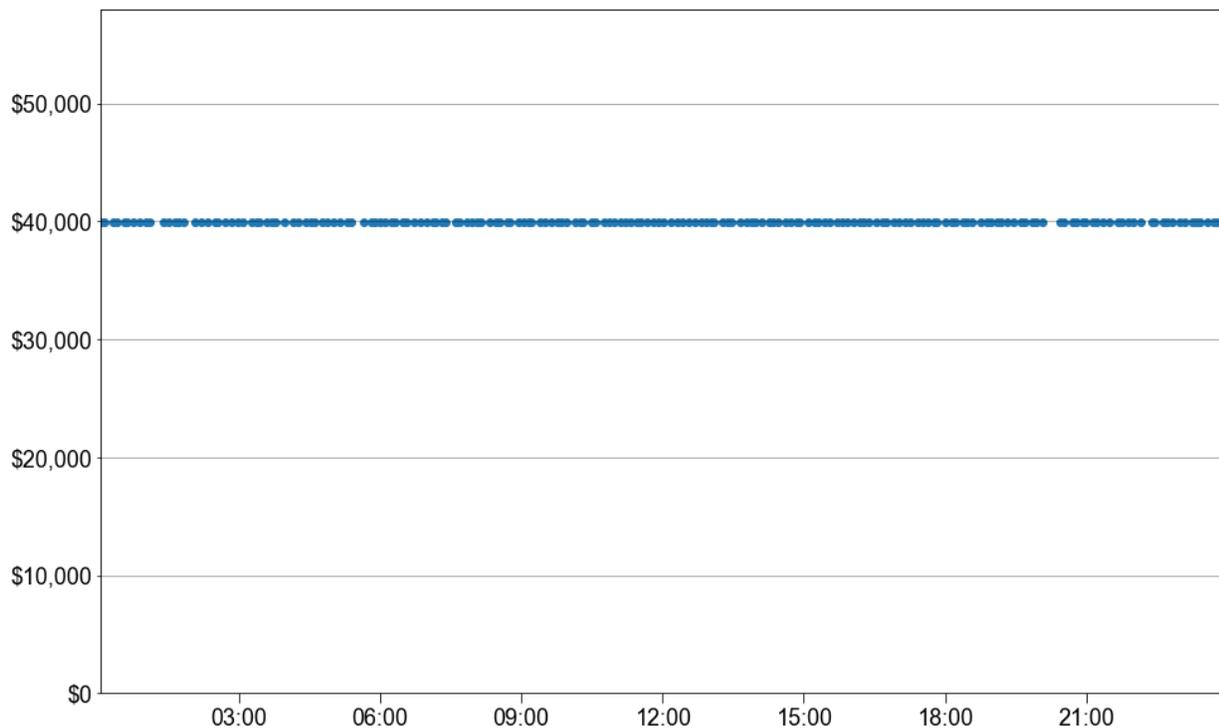
<sup>36</sup> Deposition of MoneyGram CFO Lawrence Angelilli, August 3, 2021 at 32-33: "Q.: [Defendant counsel Mr. Ceresney] You don't transfer funds for each one of those money transfer -- money remitters -- money transfers; is that fair? A. [MoneyGram CFO, Mr. Angelilli] Correct. Q. How do you go about conducting your operations to transfer money between jurisdictions? A. So the business is open 24/7, and we have a system that records all of the transactions real-time from our agents all over the world. We have cutoffs during the day where we are able to aggregate those transactions and either buy or sell the currencies that we need to settle with the agents in those -- in those countries. So specifically for Mexico, we know when we come in in the morning what transactions have been completed over the last 24 hours...Q. So you aggregate all of the money transfers in a particular day, and you make sure that you have the money in that jurisdiction to cover all of those transfers; is that fair? A. Correct.

<sup>37</sup> Deposition of MoneyGram CFO Lawrence Angelilli, August 3, 2021 at 81-82.

<sup>38</sup> *id.* at 48.

trading costs due to slippage. MoneyGram's daily ODL activity<sup>39</sup> for May 5, 2020 is visible in Figure 3 below. Each dot represents a distinct trade, and the specific U.S. Dollar trade size, \$39,898.99 was repeated 191 times throughout the day for a total of \$7,620.707.09. This pattern illustrates that these trades were not executed in response to individual retail payments but rather as part of a daily treasury payment. All of this activity suggests that large, daily treasury payments are the norm for MoneyGram, and therefore a \$1 million payment for traditional financial transfers is an appropriate payment size to calculate and compare costs. The \$12,000 average payment size used by Professor Ferrell is not representative of how MoneyGram typically operates with traditional payments.<sup>40</sup>

**Figure 3. MoneyGram USD-MXN ODL Transactions on May 5, 2020.**<sup>41</sup>



<sup>39</sup> MoneyGram. ODL Transaction Details (2020) (MONEYGRAM SEC 0017277).

<sup>40</sup> When comparing costs between traditional transfers and ODL transfers, the ODL transaction size can be small or large without impacting the results. ODL transaction size does not affect the comparison at all since ODL has no fixed costs. Only the size of the traditional payment makes a difference to cost calculations on a per-dollar basis.

<sup>41</sup> MoneyGram. ODL Transaction Details (2020) (MONEYGRAM SEC 0017277).

35. The Ferrell Report also outlines the fees paid in a “higher market liquidity” environment. These calculations are in the Ferrell Report’s Exhibit 22 which is reproduced in Table 2 below. The main difference between the results shown in this table and the previous table is that the hypothetical FX spread in Ferrell’s “higher market liquidity” scenario has decreased dramatically from 0.55% to 0.11% (or 11 basis points<sup>42</sup>). The exchange fees also decreased from 0.15% to 0.10%. Nevertheless, as seen in Table 2, despite the decrease in the FX spread and exchange fees for this second and more favorable scenario, the overall costs of ODL transactions are still more expensive than traditional finance transfers for all but the smallest transaction sizes. A \$1 million transfer, which is much smaller than MoneyGram’s average daily transfers from U.S. to Mexico, would cost \$1,986.38 more using ODL compared to using traditional methods.<sup>43</sup> **As such, the Ferrell Report’s own optimistic scenario for ODL costs demonstrates that it was not economically viable for financial institutions like MoneyGram to use ODL given their ability to batch transactions and access incredibly cheap transfers through the traditional financial system.** Moreover, as will be discussed in the following Section, the Ferrell Report uses incorrect calculations and assumptions that underestimate the actual ODL costs.

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<sup>42</sup> A single “basis point” equals 0.01%, while 100 basis points equal 1%.

<sup>43</sup> ODL has no fixed-fee component and the market impact of a trade is not as severe with smaller trades, so for ODL transactions, MoneyGram began to use many smaller and equally-sized transfers to cover its daily treasury transfer needs. The size and frequency of those transactions make it clear that they do not correspond to individual retail orders. The cheapest option for MoneyGram would be large and less frequent batch transactions through the traditional fiat financial system.

**Table 2. Ferrell Report’s USD-MXN Spread Calculations from Higher Market Liquidity Condition on ODL.<sup>44</sup>**

	Average Percentage Fees	Notional Amount of Remittance in USD				
		[1]**	[2]	[3]	[4]	[5]
Notional Amount		\$7,494.82	\$10,000.00	\$22,477.95	\$50,000.00	\$1,000,000.00
<b>Transfer using ODL</b>						
Originating Exchange Fee <sup>[1]</sup>	0.05%	\$3.76	\$5.01	\$11.27	\$25.07	\$501.38
Receiving Exchange Fee <sup>[1]</sup>	0.05%	\$3.75	\$5.00	\$11.24	\$25.00	\$500.00
Average ODL FX Spread <sup>[1]</sup>	0.11%	\$8.24	\$11.00	\$24.73	\$55.00	\$1,100.00
ODL Notional (with fees)		\$7,510.57	\$10,021.01	\$22,525.18	\$50,105.07	\$1,002,101.38
Total Cost Incurred (ODL)		\$15.75	\$21.01	\$47.23	\$105.07	\$2,101.38
<b>Transfer using Traditional</b>						
Notional Amount		\$7,494.82	\$10,000.00	\$22,477.95	\$50,000.00	\$1,000,000.00
Bank Transfer Fee <sup>[2]</sup>		\$15.00	\$15.00	\$15.00	\$15.00	\$15.00
Average FX Spread <sup>[3]</sup>	0.01%	\$0.75	\$1.00	\$2.25	\$5.00	\$100.00
Traditional Notional (with fees)		\$7,510.57	\$10,016.00	\$22,495.20	\$50,020.00	\$1,000,115.00
Total Cost Incurred (Traditional)		\$15.75	\$16.00	\$17.25	\$20.00	\$115.00
<b>Cost Difference (ODL - Traditional)</b>		<b>\$0.00</b>	<b>\$5.01</b>	<b>\$29.99</b>	<b>\$85.07</b>	<b>\$1,986.38</b>

### ***2.6.2. The Ferrell Report Incorrectly Calculates and Underreports ODL FX Spread Costs***

36. The average ODL FX spread of 11 basis points used by Professor Ferrell for the “higher market liquidity” scenario is incorrect. The explanation provided by Professor Ferrell for the 11 basis points is that the “ODL FX Spread [used is] the average of the USD-MXN fees over the period October through December 2020” and such fees are obtained from “Detailed ODL transaction data received from MoneyGram.”<sup>45</sup> After my own analysis of the same data set used by Professor Ferrell, I conclude that the average ODL FX spread paid by MoneyGram for October, November, and December 2020 were 11.9, 17.6, and 32.4 basis points, respectively. The volume-weighted average of the ODL FX spreads paid over that entire three-month time period was 16 basis points, as opposed to the 11 basis points reported by Professor Ferrell

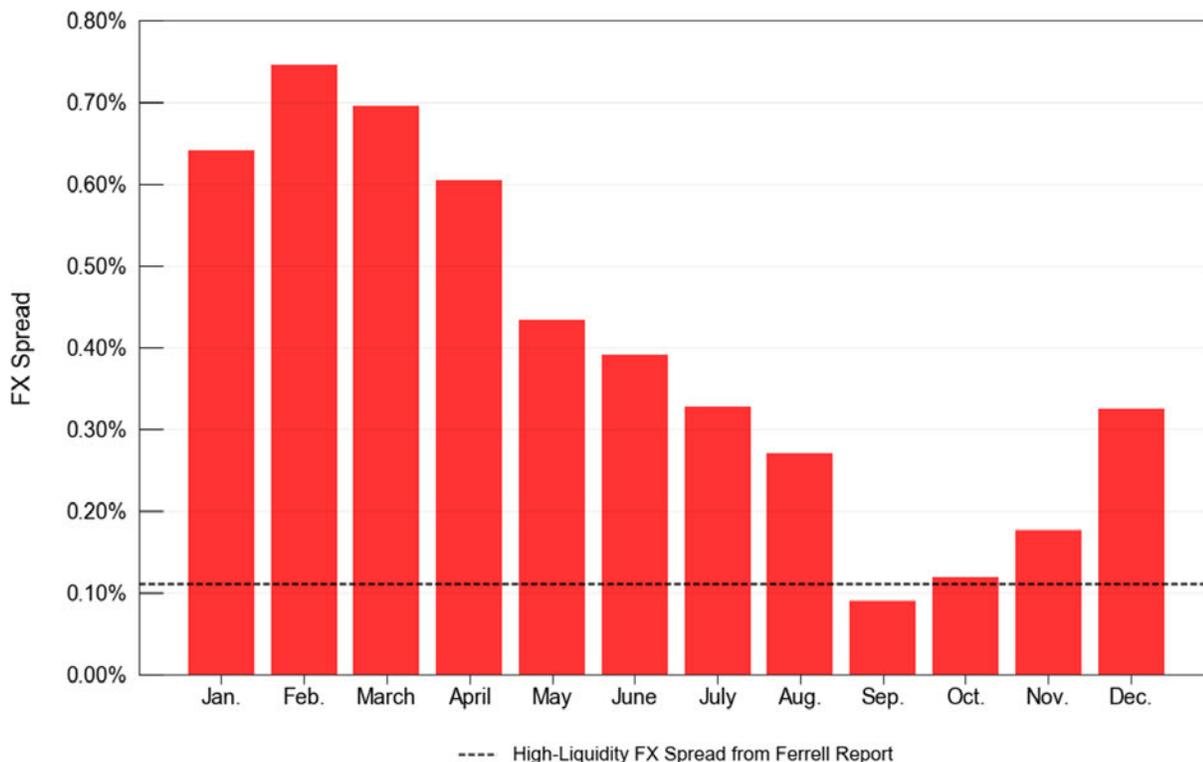
<sup>44</sup> Expert Report of Allen Ferrell, October 4, 2021 at 105.

<sup>45</sup> Expert Report of Allen Ferrell, October 4, 2021 at 104.

derived from the same data set. In fact, the result given by Professor Ferrell is lower than any of the three months individually in that time period.

37. Professor Ferrell’s methodology of using the average ODL FX spreads from October to December 2020 for the ‘higher market liquidity’ scenario is also misleading because it used a spread value that was lower than the average monthly value for all but one of the months during the last year of the Issuance Period even though spreads were clearly rising again in late 2020. Figure 4 shows a more complete picture of the FX spreads paid by MoneyGram in the U.S. to Mexico payment corridor for each month in 2020. The dotted line on this chart shows the ODL FX spread value that was given by Professor Ferrell. As discussed in the prior paragraph, Professor Ferrell represented that this value was the average for the last three months of 2020, which is incorrect.

**Figure 4. Average Monthly FX Spread Using ODL in the USD-MXN Corridor in 2020.**



38. This reversing upward trend in the ODL FX spread in the last quarter of 2020 is consistent across all the payment corridors analyzed by Professor Ferrell. However, to support his assertion that “The Cost of Using ODL Decreased Over Time as the XRP Market Liquidity Improved,”<sup>46</sup> Professor Ferrell fails to mention this increase in ODL FX spreads during the last three months of the Issuance Period. Exhibit 20 shown in Professor Ferrell’s report provides a table with the average monthly change in “FX Disadvantage,” where “FX Disadvantage” is the higher cost of running a cross-border payment through ODL versus through traditional fiat channels. Table 3 below reproduces the results from Professor Ferrell’s Exhibit 20 and adds an additional row, which is the average monthly change in “FX Disadvantage” for the last quarter of 2020, based on Professor Ferrell’s own numbers as reported in Exhibit 19. As can be seen in Table 3, while the “FX Disadvantage” for ODL decreased on average from August 2019 to December 2020, it increased from October 2020 to December 2020. This reversing trend also was previously displayed in Figure 4 above.

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<sup>46</sup> Expert Report of Allen Ferrell, October 4, 2021 at 75.

**Table 3. Comparison Between Ferrell Report Average ODL "FX Disadvantage" Versus Average for Last Quarter of 2020.<sup>47</sup>**

<b>Average Monthly Cost Reduction (BPS)</b>	<b>AUD-PHP</b>	<b>AUD-USD</b>	<b>EUR-USD</b>	<b>USD-MXN</b>	<b>USD-PHP</b>
Ferrell Report Exhibit 20 (August 2019 - December 2020)	-3.67	-2.90	-4.04	-3.59	-2.23
Most Recent Trend (October 2020 - December 2020)	n/a <sup>48</sup>	+10.23	+2.37	+10.36	+7.4

39. This reversing trend where the cost of using ODL increased in the most recent part of the Issuance Period is relevant and notably absent from Professor Ferrell's discussion of ODL costs. The trajectory of ODL costs for money transmitters at the end of the Issuance Period gave no indication that ODL would have an economical value proposition for financial institutions to continue to adopt ODL, absent subsidies provided by Ripple.

### ***2.6.3. Trading Fees on Digital Asset Platforms***

40. The trading fees for digital asset platforms ("exchange fees") used in the Ferrell Report's "higher market liquidity" scenario, as shown in Table 2, are higher than the exchange fees that were specified on the websites of the digital asset platforms used in these cross-border transactions during the Issuance Period. USD-MXN transactions on ODL use the Bitstamp

<sup>47</sup> Values reproduced from and calculated from Exhibits 19 and 20 of Expert Report of Allen Ferrell, October 4, 2021. The average monthly cost reduction for October 2020 to December 2020 was calculated by applying a least squares fit to the FX disadvantages from Exhibit 19 for October 2020, November 2020, and December 2020, which is the methodology provided by Ferrell's Ex. 17, 19, 20 backup file. The listed currency pairs are as follows: AUD-PHP (Australian Dollars to Philippine Pesos), AUD-USD (Australian Dollars to U.S. Dollars), EUR-USD (Euros to U.S. Dollars), USD-MXN (U.S. Dollars to Mexican Pesos), USD-PHP (U.S. Dollars to Philippine Pesos).

<sup>48</sup> Exhibit 19 of Expert Report of Allen Ferrell, October 4, 2021 does not have any entries for the AUD-PHP corridor for Q4 2020.

digital asset platform for payments originating in the U.S. and the Bitso digital asset platform for payments terminating in Mexico. Figure 5 and Figure 6 show screenshots of a 2020 version of the websites for Bitstamp and Bitso respectively. These websites specified the exchange fees for different volume tiers. These two platforms, like most digital asset platforms, charge different fee rates to different customers depending on how much volume they have traded over the previous 30 days and whether the customer is a “maker” or a “taker” on a given trade. For each trade, the “maker” posts an order to buy or sell an asset, while the “taker” decides to accept the posted order. The names refer to the fact that one side makes liquidity and the other side takes liquidity. In the context of XRP trades for ODL transactions, a market maker is going to be the “maker,” just as their name suggests. MoneyGram will be the “taker” in these transactions because MoneyGram would typically desire to transact immediately and would be willing to accept the current market price to do so. MoneyGram averaged \$73 million<sup>49</sup> in monthly transactions in 2020 for the U.S. to Mexico payment corridor. This transaction volume, while paying the “taker” rate, corresponds to exchange fees of 7 basis points for Bitstamp and 13 basis points for Bitso.<sup>50</sup> The total exchange fees should therefore be 20 basis points instead of the 10 basis points used in the Ferrell Report’s “higher market liquidity” scenario shown in Table 2.

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<sup>49</sup> MoneyGram ODL Transactions. 00 2020.01.02 - 12.09 - MONEYGRAM SEC 0017277.

<sup>50</sup> To conservatively estimate the lowest possible fee category on Bitso as shown in Figure 6, I take the highest exchange rate between USD to MXN in 2020, which was 24.88 MXN per USD. Using this rate, MoneyGram’s \$73 million average monthly transaction volume would have been MXN 1.8 billion, which corresponds to a lowest possible Bitso fee category of 13 basis points in Figure 6. Exchange rate obtained from Yahoo Finance, <https://yhoo.it/3uYZyIm>.

**Figure 5. Bitstamp Transaction Fees.**<sup>51</sup>

TRADING FEES (ALL PAIRS)	
Fee %	30 days USD volume
0.50%	< \$10,000
0.25%	< \$20,000
0.24%	< \$100,000
0.22%	< \$200,000
0.20%	< \$400,000
0.15%	< \$600,000
0.14%	< \$1,000,000
0.13%	< \$2,000,000
0.12%	< \$4,000,000
0.11%	< \$20,000,000
0.10%	< \$50,000,000
0.07%	< \$100,000,000
0.05%	< \$500,000,000
0.03%	< \$2,000,000,000
0.01%	< \$6,000,000,000
0.005%	< \$10,000,000,000
0.0%	> \$10,000,000,000

<sup>51</sup> Bitstamp. Bitstamp Fee Schedule (Archived on May 31, 2020)  
<https://web.archive.org/web/20200531102031/https://www.bitstamp.net/fee-schedule/>.

**Figure 6. Bitso Transaction Fees.**<sup>52</sup>

Markets vs Mexican Peso (MXN)

MAKER %	TAKER %	YOUR VOLUME MXN
0.500%	0.650%	< 1,500,000
0.490%	0.637%	> 1,500,000
0.480%	0.624%	> 2,000,000
0.440%	0.572%	> 5,000,000
0.420%	0.545%	> 7,000,000
0.400%	0.520%	> 10,000,000
0.370%	0.481%	> 15,000,000
0.300%	0.389%	> 35,000,000
0.200%	0.260%	> 50,000,000
0.100%	0.130%	> 150,000,000
0.000%*	0.130%	> 250,000,000

\* The fees for the top tier will apply to all MXN books except for XRP/MXN, where the fee would be applied based on the 150 million volume fees.

41. One reason for the discrepancy related to trading fees is that Ripple has provided subsidies to trading platforms in order to reduce the trading fees charged for XRP trades involved with ODL, which had the effect of artificially improving the costs for ODL users. For example, with respect to [REDACTED] Ripple entered into an agreement whereby [REDACTED] agreed to keep

<sup>52</sup> Bitso. Bitso Fees (Archived on November 12, 2020).  
<https://web.archive.org/web/20201112041112/https://bitso.com/fees>.

exchange fees at ██████% or below and in return Ripple would pay ██████ an upfront fee of ██████ plus monthly payments up to ██████ based on the volume of ODL transactions on ██████.<sup>53</sup> The artificially low ██████% exchange fee on ██████ for ODL customers was brought about through subsidies, and there is no guarantee that the fees will stay at that low rate since Ripple's agreement with ██████ has a term, albeit renewable, of one year.<sup>54</sup> Unsubsidized exchange fees that apply to typical market participants are the most accurate reflection of the underlying cost of making a transfer with ODL. These fee rates would be the higher total aggregate rate of 20 basis points, comprised of 7 basis points for Bitstamp and 13 basis points for Bitso.

***2.6.4. Corrected Cost Calculations for ODL Further Demonstrate that ODL is Uneconomical for Financial Institutions like MoneyGram***

42. Table 4 below replicates Professor Ferrell's "Higher Market Liquidity" scenario but uses the corrected results for ODL fees as described in Sections 2.6.2 and 2.6.3. A comparison of the costs for an ODL transfer versus the costs for a transfer using the traditional financial system is also provided.

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<sup>53</sup> Ripple. Exchange Support Agreement with ██████ (2018) (RPLI SEC 0296294-0296303).

<sup>54</sup> *ibid.*

**Table 4. Corrected USD-MXN Cost Calculations from Higher Market Liquidity Condition.**

	Average Percentage Fees	Notional Amount of Remittance in USD				
		[1]	[2]	[3]	[4]	[5]
Notional Amount		\$7,494.82	\$10,000.00	\$22,477.95	\$50,000.00	\$1,000,000.00
<b>Transfer using ODL</b>						
Bitstamp Fee	0.07%	\$5.25	\$7.00	\$15.73	\$35.00	\$700.00
Bitso Fee	0.13%	\$9.74	\$13.00	\$29.22	\$65.00	\$1,300.00
Average ODL FX Spread	0.16%	\$11.98	\$15.98	\$35.92	\$79.90	\$1,598.00
ODL Notional (with fees)		\$7,521.79	\$10,035.98	\$22,558.83	\$50,179.90	\$1,003,598.00
Total Cost Incurred (ODL)		\$26.97	\$35.98	\$80.88	\$179.90	\$3,598.00
<b>Transfer using Traditional</b>						
Notional Amount		\$7,494.82	\$10,000.00	\$22,477.95	\$50,000.00	\$1,000,000.00
Bank Transfer Fee		\$15	\$15	\$15	\$15	\$15
Average FX Spread	0.01%	\$0.75	\$1.00	\$2.25	\$5.00	\$100.00
Traditional Notional (with fees)		\$7,510.57	\$10,016.00	\$22,495.20	\$50,020.00	\$1,000,115.00
Total Cost Incurred (Traditional)		\$15.75	\$16.00	\$17.25	\$20.00	\$115.00
<b>Cost Difference (ODL - Traditional)</b>		\$11.22	\$19.98	\$63.63	\$159.90	\$3,483.00

43. The figures presented in Professor Ferrell’s “Higher Market Liquidity” scenario are incorrect. ODL transactions are even more expensive than the results produced by Professor Ferrell in the “higher market liquidity scenario.” Between the error in the ODL FX spread figure and the higher actual unsubsidized exchange fees, I conclude even the ‘higher market liquidity’ ODL transactions are more expensive by at least 15 basis points over and above the values presented by Professor Ferrell.

44. To compare the difference in ODL transaction costs between my corrected “higher market liquidity” scenario and Professor Ferrell’s scenarios, I compare the costs incurred under each of those scenarios for a daily batch transaction size of \$1 million (Figure 7), which is conservatively low because it is only roughly one-third of the average daily ODL transactions MoneyGram completed in the U.S.-Mexico payment corridor in 2020. I also include the cost for completing the transaction using the traditional financial system.

**Figure 7. Comparison of Costs Under Various Scenarios for a \$1 Million Cross-Border Transfer.**



45. The analysis in Figure 7 shows that under any of the above market conditions, ODL is uneconomic compared to simply executing a traditional cross-border transaction using fiat currency. Indeed, based on my analysis, and using the example transaction sizes proposed by the Ferrell Report, ODL costs between 71% to 3,029% more as compared to using traditional financial payments. The key reason for the higher costs are threefold. First, a transfer using the traditional financial system only utilizes a single trade charging a single fee. In contrast to traditional wire transfers, ODL transactions include two trades (first at the originating platform and then at the destination platform), with each trade involving a separate fee, totaling 0.20%. Second, for a traditional financial transfer the foreign exchange trade is executed in a liquid market with extremely low typical FX spreads of around 0.01%. ODL transactions involve much higher ODL FX spreads, whether 0.11% under Ferrell's incorrect "higher market liquidity" scenario or 0.16% under my report's corrected "higher market liquidity" scenario. Thus, the

variable fees of cross border transactions are at least 0.21%-0.36%, which is over 20 times higher than using a traditional fiat transfer. Third, once the trades are actually executed, slippage can make these costs go up even more.

**2.6.5. To Promote Adoption of ODL, Ripple Paid Additional Subsidies and Incentives**

46. The cost analysis in the Ferrell report only calculated a portion of the actual unsubsidized costs borne by ODL users, i.e., the exchange fees and FX spread fees. A third category of cost was not discussed—slippage. Slippage was directly refunded with additional subsidies paid by Ripple. The costs due to slippage that were ignored by Professor Ferrell were tracked by MoneyGram and Ripple. According to an agreement between Ripple and MoneyGram, a “slippage pool” was created to compensate MoneyGram any time that the quoted prices deviated from their realized trade prices.<sup>55</sup> The slippage pool subsidy was paid in XRP at least every three days.

47. In addition, the full extent of the unsubsidized costs of using ODL were sometimes hidden from view due to Ripple payments made to other market participants. The ODL FX spreads incurred by financial institutions such as MoneyGram were artificially low because Ripple also paid fixed and variable fees to market makers<sup>56</sup> to minimize the FX spreads for the XRP trading pairs at ODL corridors, e.g., the XRP-MXN trading pair at Bitso. Without these payments to market makers, the ODL FX spreads reported in Tables 2 and 4 would be much higher. A Ripple internal document calculates that the payments to market makers for artificially reducing ODL FX spreads cost an additional 0.73% of transaction volume in the case

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<sup>55</sup> Ripple. Ripple Work Order (MoneyGram, 2019). (MONEYGRAM SEC 0000662).

<sup>56</sup> Email from [REDACTED], Ripple Employee, January 1, 2019. (RPLI SEC 0550287).

of MoneyGram's usage of ODL.<sup>57</sup> Ripple also lent XRP to market makers which enabled them to cheaply source XRP to perform their market making activities.<sup>58</sup>

48. Ripple was aware of the high total payments it made to all of its partners in order to directly or indirectly subsidize ODL activity. In January 2020, members of its XRP Markets and Data teams developed an "Average Cost of Liquidity" metric to track the cost of Ripple subsidies needed to enable each ODL transaction, for the purpose of "Controlling costs as we scale ODL."<sup>59</sup> This metric included costs to: i) keep exchange fees low, ii) compensate ODL users for having to pay higher FX rates and slippage while using ODL, and iii) incentivize market makers to keep ODL FX spreads low. Table 5 reproduces analysis conducted by Ripple that analyzed its cost to service various ODL payment corridors. It should be noted that the "Average Cost of Liquidity" metrics excluded Ripple's significant costs incurred by paying ODL customers transaction-based volume incentives since Ripple's XRP Markets and Data teams considered those costs to be "more related to cost of sales."<sup>60</sup>

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<sup>57</sup> Ripple. ODL Account Review (2020). (RPLI SEC 0688736).

<sup>58</sup> 2019-09-10 GSR Master lease agreement (GSR00000039).

<sup>59</sup> Email from [REDACTED], Ripple Employee, January 1, 2019. (RPLI SEC 0550287).

<sup>60</sup> *ibid.*

**Table 5. Ripple Internal Table Summarizing Ripple’s Cost to Service Various ODL Payment Corridors.<sup>61</sup>**

49. Ripple’s “liquidity costs” to enable ODL, shown in Table 5, are extremely high. For the USD/MXN corridor, the corridor with the highest ODL volume, the “Average Liquidity Cost” per dollar was [REDACTED]. In other words, despite generating no revenue from ODL transactions, Ripple incurred a cost of [REDACTED] of each ODL transaction, or [REDACTED] basis points, in order to provide a partial incentive for ODL users in the USD/MXN corridor.<sup>62</sup> This extraordinary cost, which does not include volume incentive payments to ODL users, is over [REDACTED] times the approximately [REDACTED] to [REDACTED] in FX spread and wire transfer fees that would be incurred by a money transmitter using traditional fiat for a cross-border payment.

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<sup>61</sup> *ibid.*

<sup>62</sup> The “Average Liquidity Cost” includes a subsidy not previously discussed in this report, nor in the Ferrell Report, which is that Ripple paid an FX rebate that made it such that ODL users would pay a maximum of 0.05% in total exchange fees and ODL FX spreads.

### 3. REBUTTAL TO PROFESSOR ADRIAENS' REPORT

#### 3.1. Assignment

50. In Section IV.C. of his report (the “Adriaens Report”), Professor Adriaens identifies 91 businesses (the “91 Businesses”) that raised over \$6 billion in equity investment and, in Professor Adriaens’ opinion, demonstrate “use cases” of XRP or the XRP Ledger.<sup>63</sup> In Professor Adriaens’ opinion, these 91 Businesses and their total equity investment demonstrate i) “the breadth and depth of the commercial value of the XRP Ledger and XRP,” and ii) the “plethora of new products/services and use cases leveraging the XRP Ledger or XRP.”<sup>64</sup> According to Professor Adriaens, these 91 Businesses were not “developed or enabled directly by Ripple”<sup>65</sup> and “result from third-party developers.”<sup>66</sup>

51. In this Section, I have been asked by the SEC to examine and comment on these opinions and Professor Adriaens’ related opinion that “[t]he XRP Ledger and its native currency, XRP, have commercial utility that third parties have leveraged in the creation or advancement of their business models<sup>67</sup>, ”<sup>68</sup> and to determine whether they are sufficiently supported by his methodology and available data regarding the 91 Businesses.<sup>69</sup>

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<sup>63</sup> Professor Adriaens frequently refers to the businesses he describes, including the 91 Businesses, as “use cases.” This description is inaccurate for the reasons set forth in this report.

<sup>64</sup> Expert Report of Peter Adriaens, October 3, 2021 at 63.

<sup>65</sup> Products and services developed or “enabled” by Ripple are treated by Professor Adriaens in Section IV.A and Section IV.B of his report, respectively, although some businesses identified as being “enabled” by Ripple are erroneously included in the list of the 91 Businesses.

<sup>66</sup> Expert Report of Peter Adriaens, October 3, 2021 at 59.

<sup>67</sup> Professor Adriaens further opines that the supposed “commercial utility” of XRP and the XRP Ledger “that third parties have leveraged in the creation or advancement of their business models” directly demonstrate the “decentralized nature of the XRP Ledger.” (Expert Report of Peter Adriaens, October 3, 2021 at 9). I have not been asked to opine, and am not opining, on the question of whether the XRP Ledger is decentralized or whether the supposed “commercial utility” of XRP or the XRP Ledger demonstrates that the XRP Ledger is decentralized.

<sup>68</sup> Expert Report of Peter Adriaens, October 3, 2021 at 9.

<sup>69</sup> I have not been asked to review and do not express any opinion in this Section of this Rebuttal report on any other portion of Professor Adriaens’ report.

### 3.2. Summary of Findings

52. To arrive at the opinions set forth above, Professor Adriaens employs a methodology that is significantly flawed. Specifically, he fails to assess the extent to which the equity investment raised by the 91 Businesses was actually related to their purported “use” of XRP or the XRP Ledger. Indeed, he fails to provide *any* evidence that the 91 Businesses received investment funding because of XRP or XRP Ledger technology. Thus, he fails to provide any basis for his conclusion that the equity investment received by the 91 Businesses reflects an endorsement of the value of XRP or the XRP Ledger.

53. Based on my analysis, for all but three of the 91 Businesses, XRP and the XRP Ledger are at most a small, ancillary part of their business model, and in certain cases XRP and the XRP Ledger play no discernable role in the company’s business. These 88 businesses do not require the XRP Ledger or XRP for their core operations and there is no reason to believe they would not have received investment funding if the XRP Ledger or XRP did not exist. As such, in my opinion, the amount of funding received by the majority of the 91 Businesses does not in any way demonstrate the “breadth and depth” of the commercial value of XRP and the XRP Ledger.

54. In addition, several of the 91 Businesses that Professor Adriaens includes do not even meet the criteria Professor Adriaens provides in his own methodology. One of Professor Adriaens’ criteria for the 91 Businesses is that the company needs to have been founded after the launch of XRP in order to exclude “companies that could not have been started as the result of

adopting the XRP Ledger or XRP.”<sup>70</sup> However, his list of 91 Businesses includes eight companies that were founded before XRP or the XRP Ledger were created.<sup>71</sup>

55. Professor Adriaens also characterizes the 91 Businesses as having “leveraged” the “commercial utility” of XRP or the XRP Ledger.<sup>72</sup> Although Professor Adriaens does not define the term, I understand based on my expertise in digital asset technology that “leveraging” a technology refers to using that technology to add significant value to a business’s products, services, or operations. However, included in the 91 Businesses are companies that clearly do not leverage XRP or the XRP Ledger. For example, Professor Adriaens classifies Worldcore as an “Online Payment Service Provider,” but the URL he provides contains no reference to XRP or the XRP Ledger and appears instead to be an Initial Coin Offering (ICO) for an unrelated token.<sup>73</sup> Also, in at least two cases, Professor Adriaens mistakenly attributes the equity investment received by companies with the same or similar names to companies that supposedly used XRP or the XRP Ledger. These errors result in further misattribution of equity investment to the supposed value of XRP or the XRP Ledger.

56. The analysis in this Rebuttal identifies only three out of the 91 Businesses for which XRP or the XRP Ledger conceivably could have been core to those companies’ business operations when they received equity investment. However, all three received additional funding, incentive payments, and/or subsidies from Ripple, suggesting that these three businesses were

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<sup>70</sup> Expert Report of Peter Adriaens, October 3, 2021 at 64. Specifically, Professor Adriaens writes, “Second, I determined, using the same databases, the founding date of the companies behind those use cases. This step identifies and eliminates companies that could not have been started as the result of adopting the XRP Ledger or XRP. However, some companies founded prior to this cutoff date may have implemented some use case for XRP or the XRP Ledger.”

<sup>71</sup> Expert Report of Peter Adriaens, October 3, 2021 at Appendix D and Crunchbase. <https://www.crunchbase.com>. The eight companies founded before Ripple are BitPay (2011), Bitstamp (2011), Ecwid (2009), Plus500 (2008), Shopify (2004), Viamericas (1999), WeMakePrice (2010), and ZB (2004).

<sup>72</sup> Expert Report of Peter Adriaens, October 3, 2021 at 9.

<sup>73</sup> Worldcore. Worldcore ICO. <https://worldcore.com/>

“enabled” by Ripple’s substantial efforts. Based on my experience in digital asset technology, I would expect a technology with a “breadth and depth of commercial value,” as Professor Adriaens attributes to XRP and the XRP Ledger, to generate adoption by third-party businesses beyond those who are subsidized, incentivized, or funded by Ripple.

### **3.3. Professor Adriaens’ Methodology**

57. Professor Adriaens identifies the list of 91 Businesses as follows: First, Professor Adriaens begins with a list of 660 entities, listed in Appendix C to his Report, which he describes as “660 use cases for XRP or the XRP Ledger.” This list was provided to Professor Adriaens by defense counsel.<sup>74</sup>

58. Professor Adriaens appears to have accepted without any inquiry that the list of 660 entities identified by defense counsel in fact employ XRP or the XRP Ledger in some way. Based on this assumption, Professor Adriaens appears to conclude that these entities reflect “use cases” for XRP or the XRP Ledger.

59. Professor Adriaens does not define the phrase “use case” in his report. In my opinion, and in the context of Professor Adriaens’ report, a “use case” would entail a distinct way of using XRP or the XRP Ledger within a product or service that provides value to its users. The businesses that might develop such products and services are not necessarily themselves “use cases,” however. For example, Ripple touts the “use case” of XRP as a bridge asset for cross-border transfers.<sup>75</sup> But the companies that have in the past employed XRP as part of cross-border transactions, e.g., MoneyGram, are money transmitters whose businesses exist separate and apart from any connection with XRP. Professor Adriaens conflates the two concepts,

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<sup>74</sup> *ibid.*

<sup>75</sup> Expert Report of Peter Adriaens, October 3, 2021 at 70.

describing the 91 Businesses as “use cases,” but this Rebuttal report appropriately distinguishes between the two.

60. Professor Adriaens begins his inquiry by applying the following three criteria to filter the list of 660 entities down to the 91 Businesses:

- i. whether the company received equity investment funding according to Crunchbase, a website that tracks the investments received by startups and technology firms;<sup>76</sup>
- ii. whether the company was founded before XRP came into existence, in order to exclude “companies that could not have been started as the result of adopting the XRP Ledger or XRP;”<sup>77</sup> and
- iii. whether the company should be classified as being “powered by the XRP Ledger” or, alternatively, “support[ing] the cryptocurrency XRP for payments or other commercial uses.”<sup>78</sup>

61. Professor Adriaens does not appear to have assessed whether any of these 660 entities should be excluded from this analysis on the basis of being “enabled by Ripple,” which by his own definition includes businesses that have benefited from Ripple’s “developer tools and their partnerships, investments, and acquisitions.”<sup>79</sup>

62. Finally, Professor Adriaens computes a total amount of \$6 billion in equity investment (which Professor Adriaens later erroneously refers to as “venture capital,”<sup>80</sup> even though not all funding originated through a venture capital round) raised by these 91 Businesses

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<sup>76</sup> Crunchbase. <https://www.crunchbase.com>

<sup>77</sup> Expert Report of Peter Adriaens, October 3, 2021 at 64.

<sup>78</sup> *ibid.*

<sup>79</sup> Expert Report of Peter Adriaens, October 3, 2021 at 62.

<sup>80</sup> Expert Report of Peter Adriaens, October 3, 2021 at 65.

up until June 2021.<sup>81</sup> Professor Adriaens suggests that this equity investment figure “provide[s] information on the value proposition of” XRP and the XRP Ledger.<sup>82</sup>

### **3.4. Methodology Used in this Rebuttal to the Report of Professor Adriaens**

63. To test Professor Adriaens’ opinion that the 91 Businesses provide evidence of “the value proposition” or “commercial utility” of XRP or the XRP Ledger, this Rebuttal Section seeks to examine whether any link exists between equity investment received by the 91 Businesses and their purported use of XRP or the XRP Ledger. To do this, I assessed the extent to which the 91 Businesses cited by Professor Adriaens are “powered by the XRP Ledger” or support XRP for “payments or other commercial uses” in a manner core to the business model of each company. I considered XRP or the XRP Ledger core to a business model if its major products, services, or operations rely on XRP or the XRP Ledger to function. Where possible, I also considered the extent to which equity investment raised, the metric chosen by Professor Adriaens, was likely to be driven by XRP or XRP Ledger-related products or services, such that the equity investment reasonably could be interpreted as a recognition of the “breadth and depth” of the value of XRP and the XRP Ledger.

64. To make the determinations described above, I reviewed each of the 91 Businesses which Professor Adriaens asserts represents a “use case,” including visiting websites provided by Professor Adriaens, reviewing the Crunchbase investment data on which he relied, performing additional research on the companies as necessary such as reviewing press releases and relevant public representations, and, based on the foregoing sources, evaluating the business model and practices of each business. I then assessed whether, based on my expertise in digital

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<sup>81</sup> Expert Report of Peter Adriaens, October 3, 2021 at 64.

<sup>82</sup> Expert Report of Peter Adriaens, October 3, 2021 at 66.

asset markets and digital asset technologies, XRP or the XRP Ledger were core to the business model of each company such that it would be appropriate to interpret venture capital and other funding as an endorsement of the “value” of XRP or the XRP Ledger, as Professor Adriaens opines. For organizational purposes, I also identified four overarching categories to which the 91 Businesses belong payments, trading/financial services, blockchain technology, and money transfer and classified each into the appropriate category. A complete review of each of the 91 Businesses, including the information I used to determine its relationship to XRP or the XRP Ledger is provided in Appendix F.

### **3.5. Main Findings**

65. Based on my review of the 91 Businesses, as described above, and on my expertise in evaluating digital assets and their possible “use cases,” I conclude that XRP and the XRP Ledger are not core to the business model of the vast majority of the 91 Businesses such that funding raised by these businesses can support Professor Adriaens’ opinions. As can be seen in Table 6, for 88 out of the 91 Businesses, XRP or the XRP Ledger are not core to their business. My rationale for making this determination involves, among other things, several different ways in which Professor Adriaens erred in attributing the equity investment raised by these businesses to the “breadth and depth” of the commercial value of the XRP Ledger and XRP. For example, eight of the 91 Businesses were companies founded before 2012, and thus should have been excluded according to Professor Adriaens’ own methodology.<sup>83</sup> Inexplicably, four of the 91 Businesses were companies that Professor Adriaens previously discussed in Section IV.B of his report, which pertained to businesses “enabled” primarily by Ripple’s

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<sup>83</sup> Expert Report of Peter Adriaens, October 3, 2021 at Appendix D and Crunchbase. <https://www.crunchbase.com>. The eight companies founded before Ripple are BitPay (2011), Bitstamp (2011), Ecwid (2009), Plus500 (2008), Shopify (2004), Viamericas (1999), WeMakePrice (2010), and ZB (2004).

“partnerships, investments, and acquisitions.”<sup>84</sup> Four were companies that are no longer in business and/or had websites that were inactive.<sup>85</sup> For at least two of the 91 Businesses, the URL listed by Professor Adriaens in Appendix D of his report links to the wrong company, albeit with the same or similar name, which indicates that Professor Adriaens misattributed the equity investment raised by another company to the company purported to be using XRP or the XRP Ledger.<sup>86</sup> Finally, 46 of the 91 Businesses were exchanges and other platforms for which XRP was one of many digital and other assets available to trade, as I discuss in the following Sections.

66. It is important to note here that the three out of the 91 Businesses which may have actually had XRP or the XRP Ledger as part of their core business model all received funding, incentives, and/or subsidies from Ripple. Two of these companies, Coil (classified as payments for goods and services) and Flare Networks (classified as blockchain technology), have received significant investments from Ripple.<sup>87</sup> In addition, in 2019, Coil, which is led by Ripple’s former Chief Technology Officer, Stefan Thomas, also received a 1 billion XRP grant from Ripple, equivalent to \$265 million at the time the grant was announced.<sup>88</sup> The other remaining company classified as potentially having XRP or the XRP Ledger as core to its business model is SendFriend. SendFriend’s agreements to adopt ODL included volume incentives and rebates,<sup>89</sup> but I was not able to verify whether SendFriend is still using ODL or whether ODL is core to its

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<sup>84</sup> Expert Report of Peter Adriaens, October 3, 2021 at 64. The four companies which Professor Adriaens had previously discussed as being “enabled by Ripple” are BitPay, BRD Wallet, Chainalysis, and Anchorage.

<sup>85</sup> Expert Report of Peter Adriaens, October 3, 2021 at Appendix D. The four companies which were defunct or had inactive websites were Tripio, Bpay, Crumbsapp, and SendFriend.

<sup>86</sup> *ibid.* The two companies with apparently incorrect URLs are STYRA Technologies and Harbor (in the latter case, the apparently intended company was SecureBlockchains which had a now-defunct product called Harbor).

<sup>87</sup> Ripple’s general ledger includes a payment to Coil Technologies of \$2,000,000 on November 5, 2018, with the description, “Investment - Coil 11.2018,” and a payment to Flare Networks of \$95,160.30 on December 24, 2020, with the description, “Flare Networks Limited - follow-on investment in ordinary shares.” (Ripple. Cash Accounts Ripple Labs all years GL report (2014-2020). (RPLI SEC 1102015)).

<sup>88</sup> Coindesk. Ripple to Give Away 1 Billion XRP in Massive Bid to Fund Online Content (2019).

<https://www.coindesk.com/ripple-is-giving-away-1-billion-xrp-in-massive-bid-to-fund-online-content>.

<sup>89</sup> Ripple, XRP Volume Incentive Agreement with SendFriend Inc.(2019). (RPLI SEC 0296868). Ripple, Ripple Work Order (for Send Friend Inc.’s implementation of xRapid) (2018) (RPLI SEC 0233518).

operations because its website is currently inactive.<sup>90</sup> According to Professor Adriaens’ own methodology, companies “enabled” by Ripple’s “partnerships, investments, and acquisitions” should have been discussed in Section IV.B of his report, rather than as part of his analysis of “other individuals and companies” by which he defined the list of 91 Businesses considered in this report.

67. The proceeding Sections will discuss these findings for each category of the 91 Businesses.

**Table 6. Categorization of 91 Businesses**

<b>Category</b>	<b>XRP(L) Potentially Core to Business</b>	<b>XRP(L) Not Core to Business</b>
Payments for goods and services	1	37
Trading platforms/financial services	0	32
Blockchain technology	1	14
Money transfer	1	5
<b>Total</b>	<b>3</b>	<b>88</b>

### ***3.5.1. Payments for Goods and Services***

68. Payments for goods and services is the largest category among the 91 Businesses listed by Professor Adriaens. This category consists of i) goods and services vendors, and ii) payment processors that partner with vendors to allow customers to purchase goods and services using digital assets.

69. None of the goods and services vendors I analyzed exclusively accept XRP as a form of payment. For example, LuckyFish is an online casino that currently accepts 22 different digital assets as payment types.<sup>91</sup> Bitgild enables customers to buy gold using 18 different digital assets. Tapjets, one of the businesses highlighted by Professor Adriaens, accepts four other

<sup>90</sup> SendFriend. <https://www.sendfriend.io/>.

<sup>91</sup> LuckyFish. About LuckyFish. <https://luckyfish.io/faq#aboutLuckyFish>.

digital assets<sup>92</sup> and also accepts payment in fiat (prices on its homepage are displayed in U.S. Dollars).<sup>93</sup> It is inappropriate to attribute the “commercial value” of XRP and the XRP Ledger to the equity investment raised by businesses such as these because there is no basis to conclude that their operations or revenues are reliant in any way on their acceptance of XRP as payment.

70. It is similarly inaccurate to attribute the total equity investment raised by payment processors as demonstrating the value of XRP and the XRP Ledger. The payment processors listed by Professor Adriaens all support payments using a wide range of digital assets. For example, Crypto.com’s “Pay for Business” product allows customers to pay in over 30 digital assets, while for CoinPayments this number exceeds 100.<sup>94</sup>

71. Other payment processing companies listed by Professor Adriaens have little or no connection to XRP whatsoever. For example, Professor Adriaens cites the payment processing business SpotOn, which received \$315 million in venture capital funding<sup>95</sup> yet does not appear to support XRP for “payments or other commercial services.” SpotOn provides technology for small businesses, including mobile payments, loyalty and reward programs, restaurant management systems, appointment scheduling, and online ordering.<sup>96</sup> SpotOn’s website, listed in Appendix D of the Adriaens Report, has no mention of XRP or any application of XRP Ledger technology to its products.<sup>97</sup>

72. A potential connection to XRP identified by my analysis is that SpotOn announced in 2018 that it “will soon” launch a partnership with VaultBank that “empowers the

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<sup>92</sup> TapJets. TapJets Instant Booking Platform Now Accepts Monero. <https://www.tapjets.com/article/private-jet-pay-with-monero>.

<sup>93</sup> TapJets. TapJets Home Page. <https://www.tapjets.com/>

<sup>94</sup> Crypto.com. Merchant Platform Info. <https://crypto.com/us/pay-merchant>; CoinPayments. List of Supported Cryptocurrencies. <https://www.coinpayments.net/supported-coins>.

<sup>95</sup> Expert Report of Peter Adriaens, October 3, 2021 at Appendix D – List of Third-Party Use Cases.

<sup>96</sup> SpotOn. SpotOn Home Page. <https://www.spoton.com/>.

<sup>97</sup> There is no mention of XRP or digital assets on SpotOn’s homepage, and a Google search of SpotOn’s site for the term “XRP” returns no web pages, as seen at: <https://www.google.com/search?q=site%3Aspoton.com+xrp>.

customer to pay in whatever digital currency they want, while the merchant gets paid in what they want, dollars.”<sup>98</sup> However, I see no evidence that this feature was ever released given that VaultBank is now defunct and that there is no mention of digital assets in SpotOn’s list of products.<sup>99</sup><sup>100</sup>

### ***3.5.2. Trading Platforms and Financial Services***

73. The next most frequently occurring type of business cited by Professor Adriaens is trading platforms and financial services providers, which generally involve the purchase, sale, trading, or lending of digital assets such as XRP. In this category are digital asset trading platforms such as Bitstamp and Liquid, which advertise on their homepages the ability for investors to “Buy & trade” or “Buy, Sell & Trade” digital assets.<sup>101</sup> These trading platforms typically offer investors the ability to place different types of orders to buy and sell assets. In my experience, the primary applications of digital assets (including, presumably, XRP) on these platforms are the purchase of such assets as an investment and the trading of such assets for fiat and other digital assets. There is no indication that these platforms are “powered by the XRP Ledger” or use XRP for “payments or other commercial services” to add significant value to the trading platforms’ products, services, or operations.

74. The financial services businesses offer a somewhat broader range of products or services that in some cases involve XRP, and also commonly relate to investment purposes.

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<sup>98</sup> SpotOn. SpotOn press release (2018). <https://spoton.com/blog/spoton-enables-merchants-to-accept-cryptocurrency-with-vaultbank-partnership/>

<sup>99</sup> The URL to VaultBank’s website provided in the 2018 SpotOn press release, <http://www.vaultbank.io/>, results in a “Server not found” message.

<sup>100</sup> Ripple apparently provided SpotOn with marketing incentives and incentives to use ODL, but evidence was not found that SpotOn actually used ODL: RippleNet Marketing Incentive Agreement with SpotOn Money Limited, (RPLI SEC 0716185); Ripple Work Order with SpotOn Money Limited, March 22, 2019 (RPLI SEC 0075376); and ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162.

<sup>101</sup> Language taken from the homepage of two of the trading platform businesses: Bitstamp. Bitstamp Home Page. <https://www.bitstamp.net/>, and Liquid. Liquid Home Page. <https://www.liquid.com/>.

These include earning interest on XRP deposits on CoinLoan,<sup>102</sup> gaining exposure to “alternative investments” with Securitize, Inc.,<sup>103</sup> and simply buying and holding digital assets, including XRP, as an “investment tool” to “grow your wealth” as advertised by Revolut.<sup>104</sup> Neither XRP nor the XRP Ledger are core to the operation of these trading platforms and financial services businesses which offer identical products and services for any number of digital assets, not just XRP and thus there is no reason to believe these businesses would not have received equity investment if the XRP Ledger or XRP did not exist.

75. As mentioned above, in this category is Revolut, the largest recipient of equity investment among the 91 Businesses. According to Appendix D in the Adriaens Report, Revolut raised \$905.5 million (according to Crunchbase, as of June 2021, Revolut had raised \$901.3 million).<sup>105</sup> On Revolut, customers use different financial services including budgeting, single-use payment cards,<sup>106</sup> and personal vaults to set money aside for saving up for larger purchases.<sup>107</sup> With respect to digital assets, Revolut supports buying and selling over 50 different digital assets, including XRP, as an investment. For example, in the “Grow your wealth with investment tools” section on Revolut’s homepage, as shown in Figure 8, Revolut advertises in particular the ability to trade digital assets.

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<sup>102</sup> Coinloan. Earn With Coinloan. <https://coinloan.io/earn-interest/>.

<sup>103</sup> Securitize. Securitize Home Page. <https://securitize.io/>.

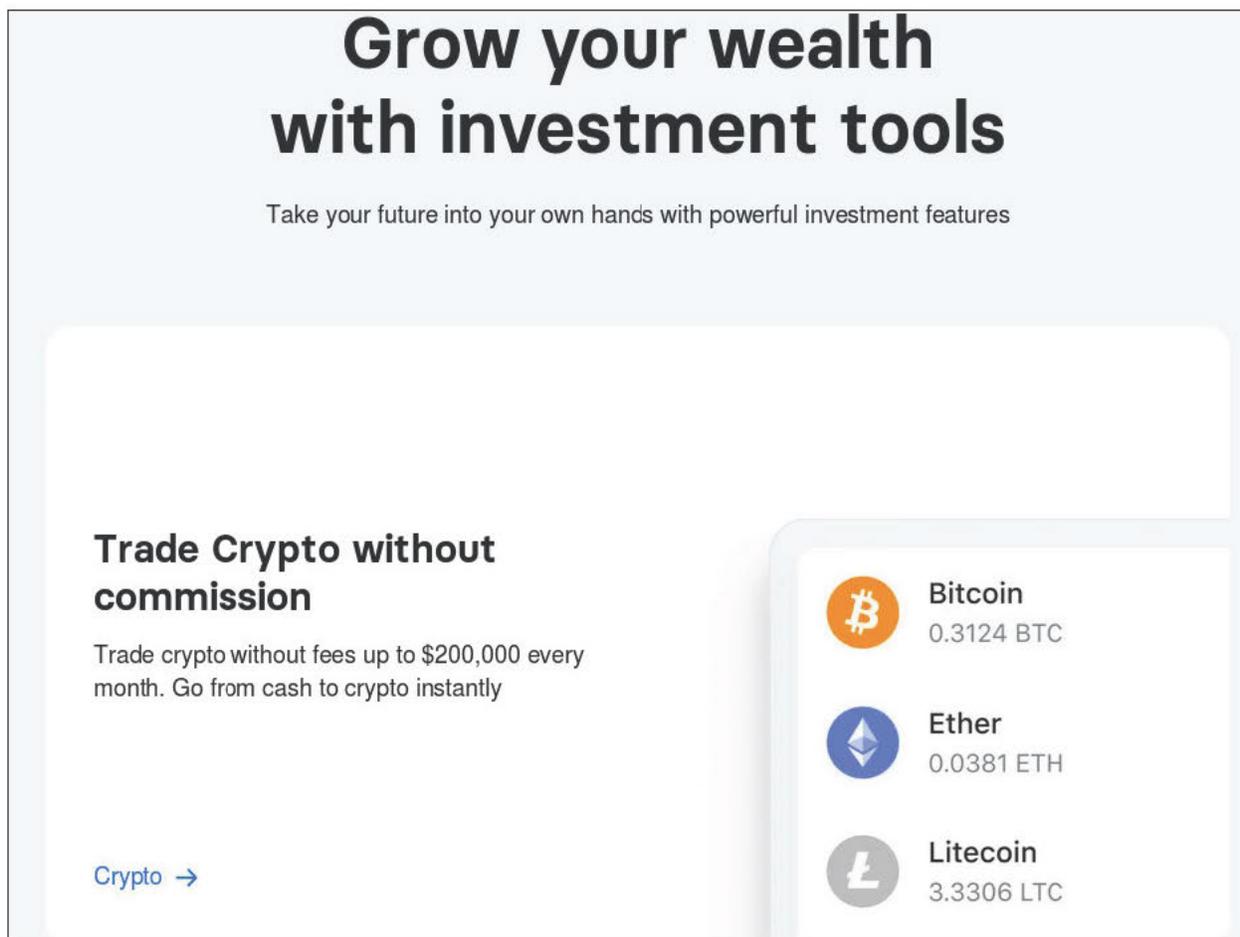
<sup>104</sup> Revolut. Revolut Home Page. <https://www.revolut.com/en-US>.

<sup>105</sup> Crunchbase. Revolut Company Financials. [https://www.crunchbase.com/organization/revolut/company\\_financials](https://www.crunchbase.com/organization/revolut/company_financials).

<sup>106</sup> This is a feature to prevent fraudsters from reusing credit card numbers when customers shop online.

<sup>107</sup> Revolut. Revolut Home Page. <https://www.revolut.com/en-IT>.

**Figure 8. Excerpt from Revolut Homepage.**<sup>108</sup>



76. Given that Revolut offers a wide range of financial services and investment-related activities, including trading of at least 50 digital assets, I have seen nothing to suggest that trading of XRP specifically is core to its business model. Moreover, as discussed previously, trading does not evidence that Revolut is “leveraging” XRP or the XRP Ledger.

77. Finally, it appears that even Revolut’s minimal connection to XRP was promoted and enabled by Ripple, which sold XRP to Revolut at discounted rates as part of what Ripple

<sup>108</sup> Revolut. Revolut Home Page. <https://www.revolut.com/en-US>.

characterized as a “strategically important” relationship between the two companies that promised “significant mutual future value.”<sup>109</sup>

78. Plus500, another business cited by Professor Adriaens,<sup>110</sup> is a trading platform where investors can trade 15 digital assets, 25 currencies, 29 indices, 22 commodities, 1,635 stocks, 532 options, and 95 ETFs.<sup>111</sup> Professor Adriaens also overlooks that Plus500 was founded in 2008, five years before the launch of the XRP Ledger, and did not even list XRP until 2017.<sup>112</sup> Based on the limited role that XRP played (as one of over two thousand tradeable investments) on Plus500, I see no evidence that the \$152 million in post-IPO equity that the company raised<sup>113</sup> represents any endorsement of the value of XRP or the XRP Ledger. The other trading platform and financial services businesses cited by Professor Adriaens similarly allow trade and deposit of many other assets and are not dependent on XRP for their operations (which primarily involve investment-related activities).

79. Another of the 91 Businesses, Celsius Network, which has received \$93.8 million in venture funding according to Professor Adriaens, enables investors to earn interest on over 40 digital assets.

### **3.5.3. Blockchain Technology**

80. I next consider companies within the 91 Businesses that are related to blockchain technology more broadly, providing products or services related to the blockchain which do not

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<sup>109</sup> Email from Markus Infanger, Ripple Senior Director of Institutional Markets – EMEA, December 23, 2018 (RPLI SEC 0981977); Email from Miguel Vias, Head of XRP Markets, October 22, 2018 (RPLI SEC 0116040); and Summary of XRP Purchase by Revolut Ltd., December 20, 2018 (RPLI SEC 0263043).

<sup>110</sup> Expert Report of Peter Adriaens, October 3, 2021 at Appendix D – List of Third Party Use Cases.

<sup>111</sup> Plus500. Plus500 All Instruments. <https://www.plus500.com/en-US/Instruments>. At the time of this report, XRP was not listed on Plus500.<sup>111</sup>

<sup>112</sup> XRP Chat. Discussion of XRP listing for short term trading on Plus500. <https://www.xrpchat.com/topic/6549-ripple-xrp-added-to-plus500-trading-platform/>

<sup>113</sup> CrunchBase.Plus500 Company Financials.

[https://www.crunchbase.com/organization/plus500/company\\_financials](https://www.crunchbase.com/organization/plus500/company_financials)

fall under the previously discussed payment processing and exchange/financial services categories. Of the 15 such companies cited by Professor Adriaens in his report, seven are digital asset wallets, which are software or physical devices that allow one to receive, send, and maintain custody of digital assets. Based on my analysis, all of the wallets offered by businesses in this category provide custody of multiple digital assets, not just XRP. For example, Exodus and BRD support over 150 and over 75 digital assets respectively.<sup>114</sup> There is no reason to believe that XRP specifically is core to the function or success, including in raising investment, of any of these businesses. BRD, which raised \$54.8 million between 2015 and 2019 according to Crunchbase, did receive a \$750,000 investment from Xpring in 2019.<sup>115</sup> As part of their partnership, BRD and Ripple discussed joint marketing efforts to “promot[e] XRP on a global basis.”<sup>116</sup>

81. Also in this category is Chainalysis, which licenses a digital asset “investigation and transaction monitoring” software that is used by government agencies and compliance teams to track the flow of digital assets.<sup>117</sup> XRP and the XRP Ledger technology are not core to Chainalysis’ business model; rather, Chainalysis provides a software tool that its customers, such as law enforcement agencies, can employ to use public blockchain data to trace the flow of digital assets under various scenarios, such as money laundering.<sup>118</sup> As seen in Figure 9, XRP is one of many digital assets which can be traced using Chainalysis’ software. In fact, support for XRP was only added in February 2020,<sup>119</sup> six years after the company was founded and after it

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<sup>114</sup> Exodus. Exodus Home Page. <https://www.exodus.com/> and BRD. BRD Home Page. <https://brd.com/>.

<sup>115</sup> CrunchBase. BRD Company Financials. [https://www.crunchbase.com/organization/brd/company\\_financials](https://www.crunchbase.com/organization/brd/company_financials)

<sup>116</sup> Email from Spencer Chen, BRD Chief Marketing Officer, November 5, 2019 (RPLI SEC 0470368).

<sup>117</sup> Chainalysis. Chainalysis Home Page. <https://www.chainalysis.com/>.

<sup>118</sup> Reuters. Roughly \$400 million of Ripple tokens tied to illegal activity: ██████████  
<https://www.reuters.com/article/us-crypto-currencies-ripple/roughly-400-million-of-ripple-tokens-tied-to-illegal-activity-██████████-idUSKBN1XU1NJ>

<sup>119</sup> XRP Arcade. Chainalysis adds support for XRP (2020). <https://www.xrparcade.com/news/chainalysis-adds-support-for-xrp/>

had already completed five rounds of venture funding.<sup>120</sup> As such, Professor Adriaens again misattributes the equity investment received by Chainalysis to the “breadth and depth of value” of XRP and XRPL technology.

**Figure 9. Examples of Digital Assets Traced by Chainalysis Software.<sup>121</sup>**

82. Blockchain technology businesses also include software companies that in the past have had a financial relationship with Ripple, but do not currently appear to use XRP or the XRP Ledger. For example, in 2019 Ripple invested in Agoric to build smart contracts;<sup>122</sup> however, analysis of Agoric’s website reveals that they currently use the Tendermint consensus engine (not the XRP Ledger) as their consensus mechanism.<sup>123</sup> Another blockchain technology business, Bluzelle, also uses Tendermint for consensus and has no mention of XRP on its website.<sup>124</sup>

83. Similarly, in 2016, Ripple partnered with R3 a provider that helps financial institutions adopt blockchain technology<sup>125</sup> to conduct a trial run of using XRP for cross-border

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<sup>120</sup> Crunchbase. Chainalysis Organization Info. <https://www.crunchbase.com/organization/chainalysis>

<sup>121</sup> Chainalysis. Chainalysis Data. <https://www.chainalysis.com/chainalysis-data/>.

<sup>122</sup> Ripple. Ripple Investing in Agoric. <https://ripple.com/insights/investing-in-agoric/>.

<sup>123</sup> Agoric. Agoric Under the Hood. <https://agoric.com/tech/>.

<sup>124</sup> Bluzelle. Bluzelle Home Page. <https://bluzelle.com/>; a google search for “XRP” on its website does not return any pages, as seen at: <https://www.google.com/search?q=site%3Abluzelle.com+xrp>.

<sup>125</sup> R3. R3 History. <https://www.r3.com/history/>.

payments,<sup>126</sup> and Ripple provided significant compensation to R3 for its efforts. However, today it does not appear that R3 is “powered by the XRP Ledger” or supports XRP “for payments or other commercial uses.” None of the 14 case studies profiled on its website feature any use case involving XRP or the XRP Ledger.<sup>127</sup>

84. In addition, Professor Adriaens includes STYRA Technologies in his list of 91 Businesses, designating it an “Interledger gateway provider,” and in Appendix D of his report he states that the company raised \$50 million in equity investment and has the URL [www.styra.com](http://www.styra.com).<sup>128</sup> However, the Report conflates “STYRA Technologies” with “Styra,” a different company that provides authorization solutions for cloud applications<sup>129</sup> and that raised over \$50 million in venture funding.<sup>130</sup> The actual “STYRA Technologies” was an early stage technology startup that sought to develop solutions in conjunction with Ripple’s Interledger Protocol and that had the URL [www.styra.co](http://www.styra.co).<sup>131</sup> It is now apparently defunct.<sup>132</sup>

#### **3.5.4. Money Transfer**

85. The final category that I identify are companies whose core product offering relates to money transfer. All six of the money transfer companies listed by Professor Adriaens in his report received significant funds from Ripple, either in the form of direct investment by Ripple or incentives and subsidies for using Ripple’s ODL product.

86. Five out of the six companies primarily involve money transfer companies using ODL to facilitate cross-border payments. For four of these five (Azimo, MoneyMatch,

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<sup>126</sup> Ripple. Ripple and R3 Team Up with 12 Banks to Trial XRP for Cross-Border Payments. (2016). <https://ripple.com/insights/ripple-and-r3-team-up-with-12-banks-to-trial-xrp-for-cross-border-payments/>.

<sup>127</sup> R3. R3 Case Studies. <https://www.r3.com/case-studies/>.

<sup>128</sup> Expert Report of Peter Adriaens, October 3, 2021 at Appendix D – List of Third Party Use Cases.

<sup>129</sup> Styra. Styra Home Page. <https://www.styra.com/>.

<sup>130</sup> Crunchbase. Styra Organization Info. <https://www.crunchbase.com/organization/styra>.

<sup>131</sup> SlideShare. Styra Slides from NOAH Conference (2019). <https://www.slideshare.net/NOAHAdvisors/styra-technologies-noah19-berlin>.

<sup>132</sup> *ibid*; the URL listed in the STYRA Technologies presentation, [styra.co](http://styra.co), returns a message, “Server not found.”

TransferGo, and Viamerica), ODL and by extension XRP and the XRP Ledger is not core to their business model because they enable cross-border payments between many other payment corridors in addition to the few supported by ODL. For example, Azimo enables its customers to make cross-border payments to “200+ countries and territories,”<sup>133</sup> and only uses ODL to enable its transfers on a single corridor (USD-PHP).<sup>134</sup> It was not possible for me to determine whether ODL is core to the business operations of the fifth purported “use case” involving ODL, SendFriend, because its website was inactive at the time of this Rebuttal report’s writing.

87. Also, Professor Adriaens claims that his methodology “eliminates companies that could not have been started as the result of adopting the XRP Ledger or XRP.”<sup>135</sup> Yet, of these five, Azimo, TransferGo, and Viamericas were all founded prior to 2013; for example, Viamericas was founded in 1999, and its last reported funding round was in 2014,<sup>136</sup> five years before it started using ODL.<sup>137</sup> Even if these companies eventually used ODL, it is inappropriate to conclude that they could have been “started as the result of adopting the XRP Ledger or XRP” (since they were founded before XRP existed) or that their total equity investment raised (much of which predates any use of ODL as discussed above)<sup>138</sup> is an assessment of the “breadth and depth of the commercial value” of ODL, XRP or the XRP Ledger.

88. Moreover, companies using ODL are subsidized by Ripple, and it would not be economically viable for them to use ODL without subsidies (without which, payment using traditional fiat channels is cheaper as discussed in Section 2.6). Table 7 provides a summary of

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<sup>133</sup> Azimo. Azimo Home Page. <https://azimo.com/en/countries>.

<sup>134</sup> ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162.

<sup>135</sup> Expert Report of Peter Adriaens, October 3, 2021 at 64.

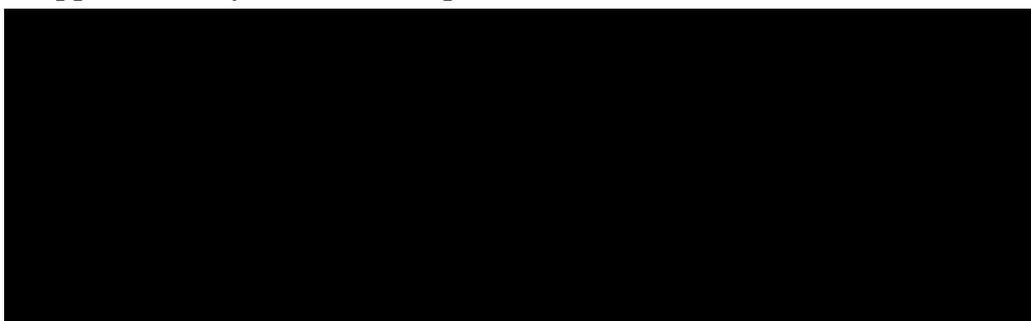
<sup>136</sup> Crunchbase. Viamericas Organization Info. <https://www.crunchbase.com/organization/viamericas>.

<sup>137</sup> Ripple. RippleNet Growth: Announcing More Than 300 Customers (2019). <https://ripple.com/insights/rippletnet-growth-announcing-more-than-300-customers> and Ripple. Ripple Work Order (Viamericas, 2019). (RPLI SEC 0187130).

<sup>138</sup> ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162.

the incentives and subsidies paid in XRP by Ripple to these five ODL “use cases” in 2020. In my opinion, this demonstrates that any “use” by these companies of ODL, XRP or the XRP Ledger was “enabled” by Ripple and thus, once again, does not reflect the “breadth and depth of the commercial value” of ODL, XRP, or the XRP Ledger.

**Table 7. XRP Incentive Payments and Subsidies Paid by Ripple, as Recorded in 2020  
Ripple XRP Payment Details Spreadsheet.<sup>139</sup>**



89. The remaining money transfer company is MoneyTap, which is a mobile app developed for the Japanese market that facilitates domestic payments.<sup>140</sup> The MoneyTap app does not “leverage” XRP or the XRP Ledger; rather, it uses Ripple’s xCurrent technology which operates apart from the XRP Ledger<sup>141</sup> to facilitate the settlement of domestic payments in Japanese Yen between Japanese banks.<sup>142</sup> MoneyTap was launched by SBI Ripple Asia, a joint venture between Ripple and SBI (a Japanese financial services company),<sup>143</sup> and Ripple is a large investor in MoneyTap,<sup>144</sup> which means that MoneyTap’s existence is not independent of

<sup>139</sup> Ripple, Ripple XRP Payment Details Spreadsheet (2020), (RPLI SEC 0304725). 2020 XRP payments tabulated from “TX” tab in the spreadsheet for ODL customers if “USE OF FUNDS” listed “Adoption marketing,” “Fx rebate,” or “Incentive.” U.S. Dollar equivalent calculated using the USD-XRP exchange rate on the date the XRP was noted as transferred in the “TX” tab of the spreadsheet. USD-XRP exchange rate used is the daily closing price from [www.coinmarketcap.com](http://www.coinmarketcap.com).

<sup>140</sup> *ibid.*

<sup>141</sup> xCurrent runs on Ripple’s Interledger Protocol (ILP), not the XRP Ledger. Ripple. Ripple xCurrent Brochure (2017). [https://ripple.com/files/xcurrent\\_brochure.pdf](https://ripple.com/files/xcurrent_brochure.pdf).

<sup>142</sup> *ibid.*

<sup>143</sup> CoinDesk. Ripple to Invest in Japan’s SBI Subsidiary MoneyTap (2020). <https://www.coindesk.com/markets/2020/10/29/ripple-to-invest-in-japans-sbi-subsidiary-moneytap/>.

<sup>144</sup> SBI Holdings. Notice of the Completion of Ripple’s Investment in Money Tap Co., Ltd. (2021). [https://www.sbigroup.co.jp/english/news/pdf/2021/0129\\_c\\_en.pdf](https://www.sbigroup.co.jp/english/news/pdf/2021/0129_c_en.pdf).

Ripple's efforts and thus MoneyTap is not a "third-party use case"<sup>145</sup> that can support Professor Adriaens' argument.

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<sup>145</sup> Expert Report of Peter Adriaens, October 3, 2021 at Appendix D – List of Third Party Use Cases.

## 4. REBUTTAL TO PROFESSOR YADAV'S REPORT

### 4.1. Assignment

90. In this Section, I have been asked by the SEC to review and comment on Professor Yadav's opinion that, for the majority of the digital asset platforms she discusses in her report, there is no indication that any offers to sell, and subsequent sales of, digital assets on those platforms were made or became final in the United States.<sup>146,147</sup> In particular, I was asked to analyze the extent to which Ripple's offers and sales of XRP involved entities, individuals, and actions in the U.S.<sup>148</sup> As Professor Yadav spends a considerable portion of her report discussing the location of digital asset platforms, for simplicity I will refer to Professor Yadav's classification of digital asset platforms with "some indicia of a U.S. presence" as "U.S.-Classified Platforms" and the remaining digital asset platforms as "Foreign-Classified Platforms." However, this report's use of these terms to reflect Professor Yadav's conclusions does not signify my adoption or endorsement of those conclusions.

### 4.2. Summary of Findings

91. Based on my review and analysis of Professor Yadav's Report, Ripple's public statements made throughout the Issuance Period, documents produced by Ripple and related parties, blockchain analysis of the XRP Ledger, and on my professional experience in the digital asset space, I conclude the following:

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<sup>146</sup> Expert Report of Yesha Yadav, October 4, 2021 at 54.

<sup>147</sup> This report uses the term "digital asset platform" to refer to the off-blockchain trading venues where investors can trade digital assets in exchange for fiat currency or other digital assets. When Yadav uses the term "cryptocurrency exchange," I understand her to refer to the same off-blockchain trading venues. "Off-blockchain" trading venues are those that operate on private servers and are in contrast to the on-ledger platform on the XRP Ledger where investors can trade digital assets in exchange for fiat currency or other digital assets.

<sup>148</sup> Professor Yadav does not limit her opinion to offers and sales of XRP, but her opinion encompasses such offers and sales that take place on digital asset platforms and she references XRP and XRP trading on digital asset platforms throughout her report, as seen in paragraphs 59, 69, 70, 71, 72, 73, 91, and 110.

92. First, Professor Yadav takes an extremely narrow view of where *offers* for the sale of a digital asset are made by focusing solely on where trade *orders* are placed and executed. Professor Yadav ignores the entire process whereby a digital asset is offered for sale. As it relates to Ripple's programmatic sales of XRP, Ripple's offering of XRP for sale includes far more than any particular consummated trade order; its offering involved entities and individuals located in the United States, and much of the offering process involved actions from within the United States. The offering process for Ripple's sales of XRP on digital asset platforms: i) involved sales by Ripple, a U.S. company, ii) included promotional activity in the U.S., iii) targeted purchasers worldwide including those in the U.S., iv) were offered to U.S. purchasers both at U.S.-Classified Platforms and at Foreign-Classified Platforms, and v) involved sales proceeds that were pooled into Ripple's U.S.-based bank account to fund Ripple's operations, including those in the U.S.

93. Second, a review of Foreign-Classified Platforms reveals that U.S. purchasers either directly or indirectly bought XRP on Foreign-Classified Platforms where Ripple sold XRP. The three Foreign-Classified Platforms where Ripple sold the most XRP, Bitstamp, Binance, and Bithumb, did not prohibit U.S. purchasers from using their platforms and by extension from transacting in XRP until the fall of 2020, at the earliest. As such, known U.S. residents and entities have traded XRP on Foreign-Classified Platforms where Ripple sold XRP, including Chris Larsen, Brad Garlinghouse, and [REDACTED], one of Ripple's U.S.-based market makers. In addition, at least \$6 billion worth of XRP has flowed from Foreign-Classified Platforms where Ripple sold XRP to U.S.-Classified digital asset platforms.

94. Third, Professor Yadav’s assessment of digital asset platforms with “some indicia of a U.S. presence”<sup>149</sup> is inconsistent and unreliable. For U.S.-Classified Platforms only, Professor Yadav introduces two new indicia for determining the location of a digital asset platform: i) the presence of a foreign-affiliated company, and ii) different terms of service or separate stipulations for residents in a different country. She selectively uses these two indicia to argue that it is not possible to conclude that trades occurring on U.S.-Classified Platforms are located in the U.S. because U.S. Classified Platforms may have foreign affiliates or separate terms of services for foreign residents. However, she does not apply these two other indicia to Foreign-Classified Platforms, and thus cannot definitively conclude that trades occurring on those platforms took place outside of the U.S. Indeed, two of the Foreign-Classified Platforms where Ripple sold the most XRP, Binance and Bitstamp, either have a U.S.-affiliate (Binance.US) or separate terms of service for U.S. residents (Bitstamp USA Inc.). In another instance, also as it relates to her assessment of U.S.-Classified Platforms, Professor Yadav ignores her own methodology by relying on the conjecture of one individual to argue that a U.S.-Classified Platform might be located overseas, instead of on her own criteria which clearly refute such an opinion.

95. Fourth, the four indicia used by Professor Yadav to determine the geographic location of digital asset trading platforms critically omit a key factor – the location of a digital asset platform’s servers. Professor Yadav actually mentions a digital asset platform’s servers as a “potential indicia of location,” and gives weight to this indicium by listing it alongside other indicia that were actually employed in determining the location of a digital asset platform. For example, she provides the example of Bitstamp as an exchange with indicia pointing to different

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<sup>149</sup> Expert Report of Yesha Yadav, October 4, 2021 at 54.

locations, since the location of its registered office, its principal place of business, and its servers are all in different countries.<sup>150</sup> However, while the location of a digital asset platform's registered office and principal place of business are included among the four indicia used by Professor Yadav to determine the location of a digital asset platform, her report excludes the location of a platform's servers in the analysis that is summarized in Table A of her report. Importantly, Professor Yadav does not opine that every server belonging to a Foreign-Classified Platform is located outside of the U.S., and she thus does not show that any trade involving Ripple's sales of XRP on digital asset platforms did not take place in the U.S.<sup>151</sup>

96. Fifth, in Table A of her report, Professor Yadav critically ignores another platform used by Ripple to sell XRP, which is the XRP on-ledger trading platform hosted in the XRP Ledger.<sup>152</sup> The XRP Ledger is validated and recorded by servers which were exclusively located in the U.S. until 2018 and the majority of which continued to be located in the U.S. during the Issuance Period. Thus, Ripple's sales of XRP on the XRP on-ledger platform were submitted, traded and finalized on servers in the U.S.

97. Lastly, Ripple also offered XRP for sale through over the counter ("OTC") sales. Ripple's OTC sales involved selling XRP from XRP II LLC, a company registered in both South Carolina and New York during the Issuance Period, to institutions and individuals, including those based in the U.S., and did not include any restrictions to prevent resale to U.S. purchasers, including on digital asset platforms.

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<sup>150</sup> Expert Report of Yesha Yadav, October 4, 2021 at 55.

<sup>151</sup> Professor Yadav mentions that Bitstamp has servers in Ireland and Germany but does not provide any citation (Expert Report of Yesha Yadav, October 4, 2021 at 71).

<sup>152</sup> Expert Report of Yesha Yadav, October 4, 2021 at 59-67.

### 4.3. Professor Yadav's Report's Methodology and Findings

98. Professor Yadav refers to her assignment as follows: “to provide an opinion on whether offers to buy and sell cryptocurrencies like XRP, trading on an exchange, take place on the exchange itself or elsewhere.”<sup>153</sup> The methodology used by Professor Yadav involves first examining the process whereby digital asset orders and trades are placed and executed on digital asset platforms. She finds that such trades “become final and binding [] where exchanges match buy and sell orders in accordance with the rules of the exchange.”<sup>154</sup> She then concludes that “this” seemingly, that the rules of a digital asset platform determine when a trade becomes final and binding<sup>155</sup> determines where the trade becomes final and binding, which is, in Professor Yadav's view, “the jurisdiction where an exchange is geographically located to match trades.”<sup>156</sup> Notably, despite extensive discussion of the mechanics of the trading process and the electronic trading systems employed by digital asset platforms, she does not offer an opinion on where trades are submitted, processed, matched, or recorded. Instead, Professor Yadav provides a set of four “indicia” which she argues should be used to determine the location of a digital asset platform: i) the digital asset platform's “place of business, registered office and domicile,” ii) the location mentioned in the digital asset platform's terms of service, iii) the location that “market participants and the public believe the [digital asset platform] does business,” and iv) the location that “regulators believe [a digital asset platform] is located.”<sup>157</sup> Without further explanation or evidence, she assumes that the trades on a digital asset platform take place where the digital asset platform is purportedly located, using her indicia. She then she concludes that for 21 of the 25

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<sup>153</sup> Expert Report of Yesha Yadav, October 4, 2021 at 39.

<sup>154</sup> *id.* at 54-55.

<sup>155</sup> *ibid.*

<sup>156</sup> *ibid.*

<sup>157</sup> Expert Report of Yesha Yadav, October 4, 2021 at 55-56.

digital asset platforms she was assigned to examine, “[t]here is no indication that trades on the [digital asset platform] become final and binding in the United States.”<sup>158</sup>

99. In her analysis, Professor Yadav takes an extremely narrow view of where *offers* for the sale of a digital asset are made – one of the central questions she was asked to address by focusing only on where trade *orders* are executed. Professor Yadav ignores the entire process whereby a digital asset is offered for sale, including the location of the entity or individual that offered the digital asset for sale, the location where promotional activity related to the sale of the digital asset occurred, and the location of the trader who placed the order.

#### **4.4. Overview of Methodology Used for this Rebuttal**

100. The methodology used in this Rebuttal is as follows: First, I examine the entire offering process whereby Ripple offered XRP for sale on digital asset platforms, including the location of entities, individuals and actions involved in that offering process. Second, I examine Professor Yadav’s contention that she cannot “conclusively determine” that “any trade” on U.S.-Classified Platforms “became final in the U.S.”<sup>159</sup> Third, I consider a key factor in determining the location of a digital asset trade mentioned, but not assessed by Professor Yadav, which is the location of a digital asset platform’s servers. Fourth, I examine the process whereby Ripple offered XRP for sale on the on-ledger trading platform on the XRP Ledger and I assess the location where those XRP sales were made. Lastly, I review Ripple’s offers to sell XRP through OTC transactions, again giving consideration to the location where those sales were made.

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<sup>158</sup> *id* at 54.

<sup>159</sup> Expert Report of Yesha Yadav, October 4, 2021 at 69.

## 4.5. Main Findings

### ***4.5.1. The Offering Process Involved Ripple, a U.S. Company, that Promoted XRP to U.S. Purchasers and Directed them to Purchase XRP on Both U.S.-Classified and Foreign-Classified Digital Asset Trading Platforms***

101. Professor Yadav takes an extremely narrow view of the process whereby “offers to buy and sell cryptocurrencies like XRP, trading on an exchange, take[s] place.”<sup>160</sup> In the case of Ripple’s programmatic sales of XRP, however, Ripple’s offering of XRP includes far more than the consummation of a digital sale on a digital asset platform. As shown below, Ripple’s offering of XRP involved entities and individuals located in the U.S., and much of the offering process involved actions from within the U.S.

#### ***4.5.1.1. Ripple is a U.S. Company***

102. Ripple has been a U.S. company since its inception. The company’s first registration was with the Secretary of State in California when it filed its Articles of Incorporation in September 2012 under the name NewCoin, Inc.<sup>161</sup> In October 2012, the company changed its name to OpenCoin Inc., filing its Certificate of Amendment to its Articles of Incorporation again to the Secretary of State in California.<sup>162</sup> The following year, in October 2013, the company again changed its name, this time to Ripple Labs Inc., and again filed with the California Secretary of State.<sup>163</sup> Finally in August 2014, Ripple’s Board of Directors approved its reincorporation as a Delaware corporation, and the new entity was recognized by the Delaware Secretary of State.<sup>164</sup>

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<sup>160</sup> Expert Report of Yesha Yadav, October 4, 2021 at 39.

<sup>161</sup> Newcoin Articles of Incorporation (2012).  
<https://businesssearch.sos.ca.gov/Document/RetrievePDF?Id=03505635-15448921>.

<sup>162</sup> Amendment to Articles of Incorporation of Newcoin, Inc. (2012).  
<https://businesssearch.sos.ca.gov/Document/RetrievePDF?Id=03505635-15500880>.

<sup>163</sup> Amendment to Articles of Incorporation of Opencoin, Inc. (2013).  
<https://businesssearch.sos.ca.gov/Document/RetrievePDF?Id=03505635-16985455>.

<sup>164</sup> Certificate of Ownership and Merger (2014).  
<https://businesssearch.sos.ca.gov/Document/RetrievePDF?Id=03505635-18231036>.

103. Ripple registered other U.S.-based entities to conduct its business operations. For example, its agreements with the market makers who programmatically sold XRP on digital asset platforms on its behalf were signed by Ripple Markets Inc., which was registered both as a California and a Delaware corporation.<sup>165,166,167</sup>

**4.5.1.2. *Ripple Promoted XRP in the U.S.***

104. Ripple promoted XRP sales to investors worldwide, including in the United States. As discussed in my original expert report submitted on October 4, 2021, multiple Ripple executives, including CEO Brad Garlinghouse, Head of XRP Markets Miguel Vias, and VP of Global Institutional Markets Breanne Madigan, spoke at U.S. events targeting investors interested in digital assets. Garlinghouse was a featured speaker at the Yahoo Finance All Markets Summit: Crypto, which was introduced as an event for “discuss[ing] crypto investing with CEOs,” held on February 7, 2018 in New York City.<sup>168</sup> As shown in Figure 10, Vias was a panel speaker at the 2017 CoinDesk Consensus: Invest conference, advertised as “the world’s first digital asset investor outlook event,” on November 28, 2017, also held in New York City.<sup>169</sup> And Madigan was a panel speaker on the investment topic, “Weighting Crypto in a Portfolio,” at the Barron’s Cryptocurrency Investors Forum held on December 3, 2020. The Barron’s event was virtual, but it similarly had a strong U.S. nexus since it was hosted by Barron’s, a U.S. media company providing financial news to investors; sponsored by Grayscale, a U.S. asset

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<sup>165</sup> Ripple Markets Inc. Market Maker and Programmatic Market Activity Agreement (2017). [REDACTED] 006551-006554.

<sup>166</sup> Ripple Markets Inc. Programmatic Market Activity Agreement (2017). (GSR00017429)

<sup>167</sup> Ripple Markets Inc. Amendment to Programmatic Market Activity Agreement (2017). (GSR00018580).

<sup>168</sup> Yahoo Finance. Yahoo Finance All Markets Summit: Crypto (2018). <https://www.yahoo.com/news/yahoo-finance-markets-summit-crypto-february-7-2018-223531903.html>.

<sup>169</sup> Bizzabo. Consensus: Invest (2017). <https://events.bizzabo.com/consensusinvest>.

management firm specializing in digital assets; and featured speakers who all worked for U.S. companies at the time of the conference.<sup>170</sup>

**Figure 10. Ripple Head of Markets Miguel Vias Speaking at the Consensus: Invest Conference in New York City<sup>171</sup>**

105. At each of the events mentioned above, the Ripple executives touted the strengths of Ripple and XRP to U.S. investors. For example, when asked by the moderator to share “a few tokens or crypto assets...that have some really interesting tech behind them,” Vias’ answer included a strong pitch for Ripple and XRP:

*I could never own anything but XRP...if we’re going to talk about a coin that has actual traction and has a company behind it, that’s well funded and is really sort of starting to get that escape velocity, good luck finding something better than XRP.<sup>172</sup>*

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<sup>170</sup> Barrons. The Cryptocurrency Investor Forum. <https://barronscustomevents.com/grayscale>.

<sup>171</sup> YouTube. Trade Desk: Advancing the Asset (2017). <https://youtu.be/jdFuiRVNUoM?t=2606>.

<sup>172</sup> YouTube. Trade Desk: Advancing the Asset (2017). <https://youtu.be/jdFuiRVNUoM?t=2587>.

106. In addition Ripple CEO Brad Garlinghouse has also made regular appearances on U.S. media that provide financial and investment news. From 2017 to 2020, Garlinghouse has been interviewed by CNBC at least seven times,<sup>173</sup> Bloomberg at least nine times,<sup>174</sup> and Fox Business at least four times.<sup>175</sup> On multiple occasions, Garlinghouse made the case to investors using these U.S. media platforms as to why XRP would be an attractive investment. For example, on September 11, 2017, Garlinghouse was interviewed by CNBC and asked, “Many investors are trying to determine how to properly value cryptocurrencies. What do you think is the right way to value a cryptocurrency?” In his reply, Garlinghouse answered:

*People are looking at the success Ripple has been having as a company, and I think that’s increased the value of XRP. We want to keep focusing on making XRP a valuable payments tool, and that value will increase accordingly.*<sup>176</sup>

In an interview with Bloomberg TV on September 15, 2017, Garlinghouse similarly made the case for XRP because of how it solves “real-world problems”:

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<sup>173</sup> CNBC. Interviews with Brad Garlinghouse. <https://www.cnbc.com/2017/09/11/ripple-ceo-brad-garlinghouse-on-bitcoin-and-xrp.html>; <https://www.cnbc.com/2017/11/17/many-icos-are-fraud-according-to-ethereum-co-founder-and-ripple-ceo.html>; <https://www.cnbc.com/video/2017/12/27/full-interview-with-brad-garlinghouse.html>; <https://www.cnbc.com/video/2018/03/07/ripple-ceo-brad-garlinghouse-on-fast-money.html>; <https://www.cnbc.com/2018/05/30/bitcoins-influence-over-cryptocurrency-prices-could-end-soon-says-ripple-ceo.html>; <https://www.cnbc.com/video/2018/06/04/ripple-ceo-expect-dozens-of-banks-to-use-our-cryptocurrency-next-year.html>; <https://www.cnbc.com/video/2019/07/18/ripple-ceo-on-libra-perhaps-some-silicon-valley-arrogance-with-cryptocurrency-rollout.html>.

<sup>174</sup> Bloomberg. Interviews with Brad Garlinghouse. <https://www.bloomberg.com/news/videos/2017-01-27/will-tech-titans-enter-payment-industry?sref=FBNDzWSI>; <https://www.bloomberg.com/news/videos/2017-07-27/ripple-ceo-regulation-may-be-good-for-crypto-coins-video>; <https://www.bloomberg.com/news/videos/2017-09-15/ripple-ceo-garlinghouse-sees-real-value-in-bitcoin-video>; <https://www.bloomberg.com/news/videos/2017-12-27/ripple-s-big-bet-on-blockchain-technology-video?sref=FBNDzWSI>; <https://www.bloomberg.com/news/videos/2018-02-13/ripple-ceo-favors-more-regulation-of-the-crypto-market-video?sref=FBNDzWSI>; <https://www.bloomberg.com/news/videos/2019-06-17/moneygram-partnership-is-a-big-step-for-blockchain-ripple-ceo-says-video?sref=FBNDzWSI>; <https://www.bloomberg.com/news/videos/2019-07-23/libra-s-effect-on-the-crypto-world-video>; <https://www.bloomberg.com/news/videos/2020-04-21/covid-scammers-are-taking-advantage-of-big-tech-platforms-says-ripple-ceo-video>; <https://www.bloomberg.com/news/videos/2020-11-19/ripple-ceo-concerned-china-will-win-crypto-video>.

<sup>175</sup> Fox Business. Interviews with Brad Garlinghouse. <https://www.foxbusiness.com/markets/ripple-ceo-overnight-price-drop-part-of-early-stage-volatility>; <http://video.foxbusiness.com/v/6093251471001/>; <http://video.foxbusiness.com/v/6097036189001/>; <http://video.foxbusiness.com/v/6200546415001/>.

<sup>176</sup> CNBC. Ripple CEO Brad Garlinghouse on Bitcoin and XRP. <https://www.cnbc.com/2017/09/11/ripple-ceo-brad-garlinghouse-on-bitcoin-and-xrp.html>.

*I think the extent you're solving a real-world problem there's real value in those tokens...when Ripple uses XRP, we're solving a payments problem. I believe that the more utility you draw, the more demand you're going to drive, and for most of these digital assets you have fixed supply. If you have fixed supply and increasing demand, right, it's going to drive price up.<sup>177</sup>*

Garlinghouse also appeared on Fox Business News, as seen in Figure 11, to discuss XRP's historic growth and the role of Ripple behind it:

*I think the performance of XRP is really just a reflection of the problem it's solving. It's solving a real problem at scale and so the value that's been created, I think, is all about solving that real problem solving at scale...For Ripple that's using XRP to solve a global payments problem.<sup>178</sup>*

**Figure 11. Garlinghouse Interview on Fox Business News<sup>179</sup>**

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<sup>177</sup> Bloomberg. Ripple CEO Garlinghouse Sees Real Value in Bitcoin (2017). <https://youtu.be/akLQEacOT3w?t=91>.

<sup>178</sup> Fox Business. Ripple CEO: Overnight price drop part of early-stage volatility (2018). <https://www.foxbusiness.com/markets/ripple-ceo-overnight-price-drop-part-of-early-stage-volatility>.

<sup>179</sup> *ibid.*

**4.5.1.3. Ripple Directed Buyers in the U.S. to Purchase XRP at U.S.-Classified and Foreign-Classified Digital Asset Platforms**

107. In this Section, I demonstrate that as part of its offering of XRP for sale, Ripple made efforts, aimed at persons including those in the U.S., to direct prospective purchasers of XRP to purchase XRP at digital asset platforms, including U.S.-Classified and Foreign-Classified Platforms. Ripple directed potential purchasers of XRP to its “Buy XRP” page which provided a list of Foreign-Classified and U.S. Classified Platforms where they could purchase XRP. This “Buy XRP” page, hosted at *ripple.com/xrp/buy-xrp/*, was promoted by Ripple through a variety of marketing and customer support channels including search engine optimization (“SEO”), responses to inbound requests for information on how to buy XRP, Ripple’s blog, and Twitter.

108. On Ripple’s “Buy XRP” webpage, which was hosted on a U.S. server for the entire Issuance Period,<sup>180</sup> interested buyers were provided the links to U.S.-Classified and Foreign-Classified Platforms, and were shown the different fiat currency/digital asset pairs available at each platform, as seen in Figure 12. For example, a prospective purchaser seeking to use U.S. Dollars to purchase XRP would be directed by Ripple to the U.S.-Classified Platforms Bittrex, Coinbase, and Kraken as well as the Foreign-Classified Platform Bitstamp, among other platforms.<sup>181</sup> From 2017 to 2020, there were multiple versions of the “XRP Buying Guide” page, but the platform that was always in the first position (i.e., the top left) among recommended platforms is Bitstamp. In this manner, Ripple prioritized sending prospective XRP purchasers, including those in the U.S. (discussed below), to Bitstamp which is among the top three Foreign-

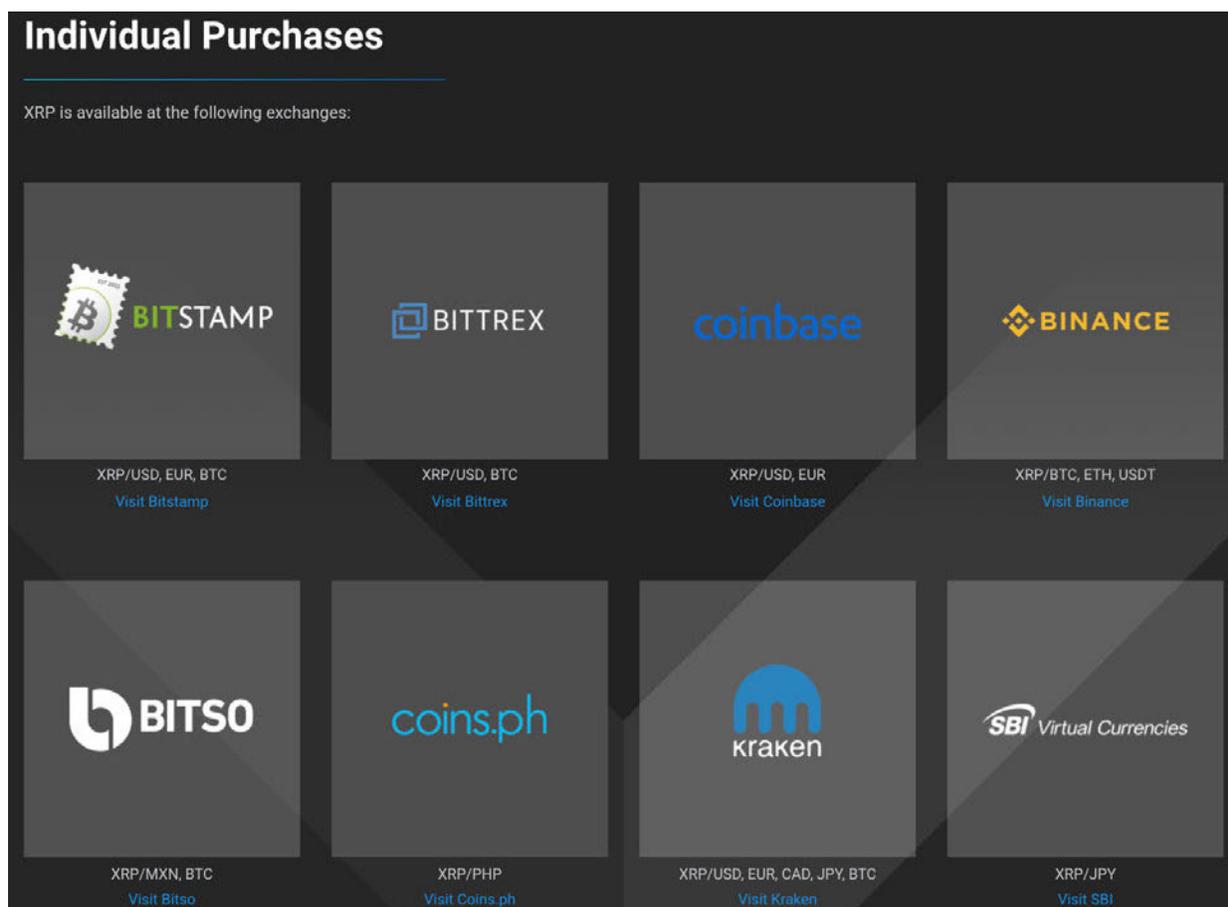
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<sup>180</sup> The ripple.com domain has been hosted on a server based in the U.S. for the entire Issuance Period: ViewDNS. View DNS info for Ripple.com. <https://viewdns.info/iphistory/?domain=ripple.com>.

<sup>181</sup> There are other digital asset platforms with XRP/USD trading pairs that are not shown in the excerpt in Figure 12: Ripple. XRP Buying Guide (Archived March 13, 2020). <https://web.archive.org/web/20200313123712/https://ripple.com/xrp/buy-xrp/>.

Classified Platforms with the most programmatic sales of XRP by Ripple.<sup>182</sup> This is important to note because Bitstamp – Ripple’s top-recommended Digital Asset Platform – allowed U.S. investors to use its platform to purchase XRP during the Issuance Period and only halted trading of XRP by its U.S. customers on January 8, 2021.<sup>183</sup>

**Figure 12. Excerpt from "Buy XRP" Page on March 13, 2020.<sup>184</sup>**



109. Ripple directed purchasers in the U.S. to the “Buy XRP” page using a variety of channels. First, it used an SEO campaign, which is a strategy to increase the search engine

<sup>182</sup> Refer to discussion of this in the next Section 4.5.1.4.

<sup>183</sup> Bitstamp. XRP trading and deposits to be halted for US customers (2020). <https://blog.bitstamp.net/post/xrp-trading-and-deposits-be-halted-us-customers>.

<sup>184</sup> Ripple. XRP Buying Guide (Archived March 13, 2020). <https://web.archive.org/web/20200313123712/https://ripple.com/xrp/buy-xrp/>.

ranking for web pages that are returned as responses when a user inputs a search for a specific set of key words. Details of Ripple’s SEO campaign can be seen in the “SEO Tracking” tab in Ripple’s “2018 Master Editorial Calendar” spreadsheet, which contains information regarding Ripple’s marketing campaigns across multiple platforms, including its blog and social media account. An excerpt from the “SEO Tracking” tab is provided in Figure 13.

**Figure 13. Excerpt from the "SEO Tracking" Tab in Ripple's "2018 Master Editorial Calendar"<sup>185</sup>**

Rankings by Engine Variant Report for ripple				
GOOGLE DESKTOP SEARCH RANKINGS				
Keyword	Google en-US Rank	Google en-US Change (vs previous date)	Google en-US SERP Date	Google en-US URL
how do you buy ripple	2	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
how buy ripple	2	-1	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
how to buy ripple cryptocurrency	1	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
kraken xrp	1	0	2018-02-12	<a href="https://ripple.com/xrp/how-to-buy-xrp-on-kraken/">https://ripple.com/xrp/how-to-buy-xrp-on-kraken/</a>
ripples	1	0	2018-02-12	<a href="https://ripple.com/">https://ripple.com/</a>
ripple.com	1	0	2018-02-12	<a href="https://ripple.com/">https://ripple.com/</a>
what is xrp	3	0	2018-02-12	<a href="https://ripple.com/xrp/">https://ripple.com/xrp/</a>
how to buy ripple with usd	1	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
swell by ripple	1	0	2018-02-12	<a href="https://ripple.com/insights/news/announcing-swell-ripple">https://ripple.com/insights/news/announcing-swell-ripple</a>
ripple	1	0	2018-02-12	<a href="https://ripple.com/">https://ripple.com/</a>
ripple chart	1	0	2018-02-12	<a href="https://xrpcharts.ripple.com/">https://xrpcharts.ripple.com/</a>
buy ripple xrp	1	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
how to buy ripple	2	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
where to buy ripple	1	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
ripple xrp chart	1	0	2018-02-12	<a href="https://xrpcharts.ripple.com/">https://xrpcharts.ripple.com/</a>
ripple careers	1	0	2018-02-12	<a href="https://ripple.com/company/careers/">https://ripple.com/company/careers/</a>
ripple address lookup	2	0	2018-02-12	<a href="https://xrpcharts.ripple.com/#/graph/">https://xrpcharts.ripple.com/#/graph/</a>
how to buy xrp	1	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
xrp trading	1	0	2018-02-12	<a href="https://xrpcharts.ripple.com/">https://xrpcharts.ripple.com/</a>
ripple buy	1	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
digital currency	not in top 50		2018-02-12	
ripple account	1	0	2018-02-12	<a href="https://ripple.com/build/accounts/">https://ripple.com/build/accounts/</a>
ripple crypto	2	0	2018-02-12	<a href="https://ripple.com/">https://ripple.com/</a>
xrp purchase	1	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
how to buy ripple in usa	3	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
ripple transactions per second	1	0	2018-02-12	<a href="https://ripple.com/xrp/">https://ripple.com/xrp/</a>
where to buy xrp	1	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
kraken ripple	1	0	2018-02-12	<a href="https://ripple.com/xrp/how-to-buy-xrp-on-kraken/">https://ripple.com/xrp/how-to-buy-xrp-on-kraken/</a>
ripple escrow	1	0	2018-02-12	<a href="https://ripple.com/insights/ripple-escrows-55-billion-the-real-deal-with-digital-assets">https://ripple.com/insights/ripple-escrows-55-billion-the-real-deal-with-digital-assets</a>
the real deal with digital assets	1	0	2018-02-12	<a href="https://ripple.com/insights/live-swell-real-deal-digital-buying-ripple">https://ripple.com/insights/live-swell-real-deal-digital-buying-ripple</a>
buying ripple	2	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
buy xrp	1	0	2018-02-12	<a href="https://ripple.com/xrp/buy-xrp/">https://ripple.com/xrp/buy-xrp/</a>
ripple swell project	1	0	2018-02-12	<a href="https://ripple.com/insights/news/announcing-swell-ripple-labs-news">https://ripple.com/insights/news/announcing-swell-ripple-labs-news</a>
ripple labs news	1	0	2018-02-12	<a href="https://ripple.com/category/insights/news/">https://ripple.com/category/insights/news/</a>

<sup>185</sup> Ripple. 2018 Master Editorial Calendar (2018). (RPLI SEC 1035944).

110. The way to understand Ripple’s SEO campaign in Figure 13 is to start with the search terms that Ripple prioritized for SEO, as seen in the leftmost column, e.g., “buy xrp”. Next, for a given search term, Ripple arranged to have a specific page at *ripple.com* (seen in the rightmost column) to rank highly on search engines for that term, e.g., Ripple sought to have its “Buy XRP” page (<https://ripple.com/buy-xrp>) rank highly for the search term “buy xrp” as well as for the search term “buying ripple”. Next, Ripple tracked the search engine ranking (seen in the second column from the left) of a given page for a given set of keywords, e.g., the “Buy XRP” page at <https://ripple.com/buy-xrp> ranked “1” on Google’s U.S. search engine. The goal for SEO is to have the desired page rank as highly as possible, which is why the third column from the left tracks the change in search engine ranking from the previous period. Figure 13 demonstrates that Ripple’s SEO goal was to direct search traffic for certain keywords, and by extension the individuals searching with those keywords, to specific pages on *ripple.com*, its U.S.-hosted website. Ripple also sought to direct foreign visitors to its “Buy XRP” page through “SEO/SEM”, where “SEM” refers to search engine marketing which is the process of paying for targeted ads on search engines such as Google.<sup>186</sup>

111. Figure 13 demonstrates how Ripple directed prospective U.S. purchasers to the “Buy XRP” page. First, many of the keyword groups selected by Ripple for SEO directly involve buying XRP, such as “how to buy xrp” and “how do you buy ripple.” Second, the spreadsheet demonstrates that Ripple’s SEO strategy focused on the ranking of its pages for searches originating from predominantly U.S. residents. The “SEO Tracking” tab only lists the ranking of its pages for searches made from browsers set to U.S. English “Google en-US Rank,” “Google

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<sup>186</sup> Email discussions involving [REDACTED], Ripple Product Marketing Team, November 29, 2019 - November 30, 2019. (RPLI SEC 0371815-0371816).

Mobile en-US Rank,” and “Bing en-US Rank”<sup>187</sup> and not for searches from browsers set to other regions or languages, e.g., en-UK (UK English), ko-KR (Korean) or ja-JP (Japanese).<sup>188</sup> This means that Ripple arranged to have its “Buy XRP” page rank at the top of searches by browsers set to U.S. English, which would have included U.S. residents seeking information on how to buy XRP. As such, Ripple directed prospective purchasers of XRP, including those in the U.S. to its “Buy XRP” page, which prominently listed digital asset platforms, including Foreign-Classified Platform Bitstamp, as venues where they could buy XRP with U.S. Dollars.

112. Ripple’s directing of U.S. residents to its “Buy XRP” page can also be seen by the inclusion of the search terms “how to buy ripple in *usa* [emphasis added]” and “how to buy ripple with *usd* [emphasis added]” among the keyword phrases tracked by its SEO campaign. Figure 13, shows that Ripple tried to have its “Buy XRP” page (<https://ripple.com/xrp/buy-xrp/>) to rank highly for these U.S.-related search terms.

113. Through email, Ripple also directed potential buyers to its “Buy XRP” page. When interested parties emailed [xrpcontact@ripple.com](mailto:xrpcontact@ripple.com), Ripple’s auto-reply featured a link at the top of the email that directed them to the “Buy XRP” page.<sup>189</sup> In at least one instance, Ripple sought to direct a prospective U.S. purchaser to an earlier version of the “Buy XRP” page at

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<sup>187</sup> *ibid.*

<sup>188</sup> List of region/language abbreviations can be found at: Google Analytics. List of Region/Language Abbreviations. <https://www.google.com/analytics/terms/>. A description of how websites can learn about the language of a visitor’s browser can be found at: SearchEngineWatch. (2013). <https://www.searchenginewatch.com/2013/05/21/google-analytics-language-report-what-you-can-learn-about-your-visitors/>.

<sup>189</sup> Email from [REDACTED], January 5, 2018. (RPLI SEC 0203417); this document shows the “Auto-Reply when people contact [XRPCcontact@ripple.com](mailto:XRPCcontact@ripple.com),” where, at the top of the email reply, “individual purchasers” or XRP are directed to <http://go.pardot.com/e/105572/xrp-buy-xrp/2f7ffg/152621794/> which redirected to <https://ripple.com/xrp/buy-xrp> on October 21, 2021.

*ripple.com/xrp-portal/how-to-buy-xrp*, which also provided instructions on how to buy XRP on the Foreign-Classified Platform Bitstamp, among other platforms.<sup>190,191</sup>

114. Ripple’s blog, available to U.S. visitors and hosted in the U.S. at *ripple.com*, also directed prospective purchasers to the “XRP Buying Guide” page. For example, in a blog post in December 2017 titled “How XRP Stacks Up Against Other Digital Assets,” Ripple provides a comparison between XRP and other digital assets such as Bitcoin.<sup>192</sup> At the end of the post Ripple provides a link to “buy XRP” which redirects visitors to the “XRP Buying Guide” page.<sup>193</sup> In my opinion, it is highly likely that U.S. visitors engaged with this page because visitors from the U.S. comprised the largest audience for Ripple’s website, as seen in Figure 14, which shows that in May 2019 the country with the highest number of “sessions” or visits<sup>194</sup> to *ripple.com* was the U.S., with 111,883. This is shown in the figure where the U.S. is the darkest shaded country and the bottom left corner provides a legend showing how the shading corresponds to the number of “sessions.”

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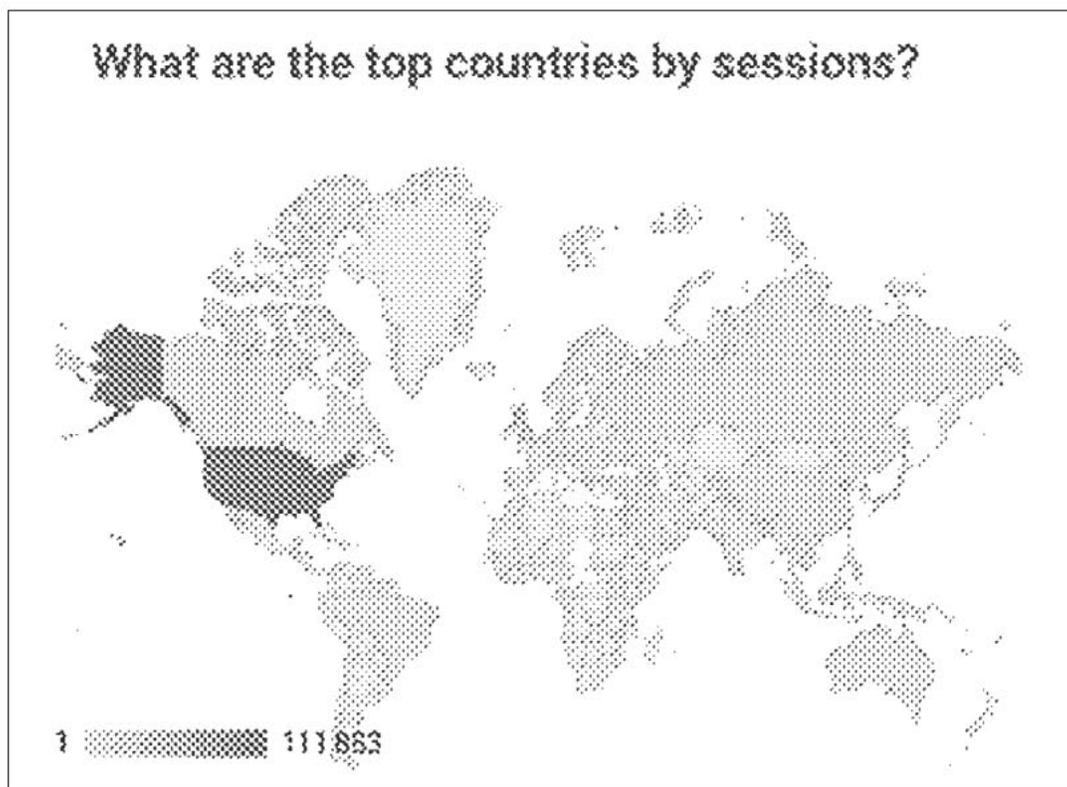
<sup>190</sup> Email from [REDACTED], October 2, 2016. (RPLI SEC 0050302). In an email conversation in October 2016, Ripple employee [REDACTED] forwards an email from Nina F asking, “I was wondering, can we buy ripple in public in USA now?” to Ripple Employee [REDACTED]. Mr. [REDACTED] asks Mr. [REDACTED] “how should we respond to these”? In reply, Mr. [REDACTED] writes, “I would direct them to the ‘How to Buy XRP’ page” and includes the link to *ripple.com/xrp-portal/how-to-buy-xrp*.

<sup>191</sup> Slack messages between Ripple employees, April 10, 2017. (RPLI SEC 0302585).

<sup>192</sup> Ripple. How XRP Stacks Up Against Other Digital Assets (2017). <https://ripple.com/xrp/xrp-stacks-digital-assets/>

<sup>193</sup> *ibid.*

<sup>194</sup> Google Support. How a web session [REDACTED] Universal Analytics. <https://support.google.com/analytics/answer/2731565?hl=en#zippy=%2Cin-this-article>.

**Figure 14. May 2019 Web Traffic Overview**<sup>195</sup>

115. Ripple also used its Twitter account to direct potential purchasers to its “XRP Buying Guide” page, as seen in Figure 15. At least some U.S. residents appear to have viewed the tweet in Figure 15 because it was retweeted by Twitter accounts that listed locations in the U.S. as their geographic location.<sup>196</sup>

116. As demonstrated above, Professor Yadav’s narrow focus regarding the offering of a digital asset for sale did not account for any of Ripple’s actions in the U.S. to target prospective purchasers, including those in the U.S.

<sup>195</sup> Ripple. Web, Social & Digital Reporting Overview (2019). (RPLI\_SEC 0733274).

<sup>196</sup> Twitter: Ripple (@Ripple, 2017). <https://twitter.com/Ripple/status/876107173784190976/retweets>.

Figure 15. Ripple Tweet Directing Potential Purchasers to "XRP Buying Guide" Page<sup>197</sup>



**4.5.1.4. Programmatic Sales of XRP on U.S.- and Foreign-Classified Platforms**

117. Ripple's offering of XRP for sale included engaging the services of three market makers, [REDACTED], [REDACTED], and [REDACTED] to programmatically sell XRP on its behalf at digital asset platforms.<sup>198</sup> From November 2014 to September 2019, [REDACTED] and [REDACTED] accounted for [REDACTED]% and [REDACTED]% of Ripple's programmatic sales of XRP

<sup>197</sup> Twitter: Ripple (@Ripple, 2017). <https://twitter.com/Ripple/status/876107173784190976>.

<sup>198</sup> XRP Programmatic Sales Reporting FY14 to Date v2 (RPLI SEC 74559).

respectively, measured in U.S. Dollars.<sup>199</sup> Excluding sales by ██████████,<sup>200</sup> between 2018 and 2019, the top three U.S.-Classified Platforms by volume of XRP sold were Kraken, Poloniex, and Bittrex, and the top three Foreign-Classified Platforms by volume of XRP sold were Bitstamp, Bithumb, and Binance.<sup>201</sup>

118. While Ripple, through its market makers, sold XRP on Foreign-Classified Platforms, the location where an order was made was not restricted to merely the locations of those Foreign-Classified Platforms as Professor Yadav contends. Indeed, U.S. residents and entities were able to and did place trade orders from the U.S. on Foreign-Classified Platforms.

119. All three of the top Foreign-Classified Platforms allowed U.S. purchasers to buy digital assets on their platforms during the Issuance Period. Bitstamp allowed U.S. investors to use its platform throughout the Issuance Period<sup>202</sup> and allowed U.S. customers to trade XRP up until January 8, 2021.<sup>203</sup> Binance initially allowed U.S. customers to use its platform without restriction, then later announced that U.S. customers would not be allowed to sign up for its platform after September 12, 2019.<sup>204</sup> However, Binance only began blocking visitors from U.S.-

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<sup>199</sup> *ibid.*

<sup>200</sup> Comprehensive programmatic XRP selling data for ██████████ was not available at the time of this Report's writing.

<sup>201</sup> ██████████ liquidity extraction reports prior to 2018 did not specifically list the digital asset platforms where XRP was sold, so the analysis was limited to 2018 and 2019 (██████████ and ██████████. Liquidity Extraction Reports. (██████████ 00000102, ██████████ 00000103, and SEC-██████████-E-0047622)).

<sup>202</sup> Bitstamp. Bitstamp About Us. <https://www.bitstamp.net/about-us/>.

<sup>203</sup> Bitstamp. XRP trading and deposits to be halted for US customers (2020). <https://blog.bitstamp.net/post/xrp-trading-and-deposits-be-halted-us-customers>.

<sup>204</sup> Binance announced the launch of Binance US on June 13, 2019 (Binance. Launch of Binance.US (2019). <https://www.binance.com/en/blog/346119082624540672/Binance-Announces-Partnership-with-BAM-to-Launch-US-Exchange>) and the following day on June 14, 2019 announced that U.S. customers would no longer be allowed to use its platform beginning September 12, 2019 (Tech Crunch. Binance Begins to Restrict US Customers (2019). <https://techcrunch.com/2019/06/14/binance-begins-to-restrict-us-customers/>).

based I.P. addresses starting in November 2020.<sup>205</sup> Bithumb allowed U.S. citizens and residents to use its platform before at least January 16, 2021.<sup>206</sup>

120. In addition, it is clear that U.S. residents and entities did indeed trade XRP on Foreign-Classified Platforms. Both Larsen and Garlinghouse had trading accounts on Bitstamp, through which they traded XRP.<sup>207</sup> [REDACTED], one of Ripple's programmatic sellers based in New York City, traded XRP on at least Bitstamp and Bitfinex.<sup>208</sup>

#### ***4.5.1.5. Flow of XRP from Foreign-Classified Platforms to U.S.-Classified Platforms***

121. Based on the documents I have reviewed and my expertise in the digital asset space, when Defendants offered XRP for sale on digital asset platforms, i) it does not appear that Ripple attempted to place restrictions regarding the offer for sale and subsequent resale of XRP to U.S. residents and ii) Ripple could not have prevented the subsequent resale of XRP to U.S. residents. According to her deposition testimony, [REDACTED], Ripple's former Head of Global Institutional Markets, is not aware of any restrictions Ripple may have imposed on two of its market makers, [REDACTED] and [REDACTED], to prevent them from selling XRP to any particular individuals.<sup>209</sup> Also, according to Ripple CEO Brad Garlinghouse, regarding [REDACTED] sales of XRP on his behalf, he never instructed [REDACTED] not to sell to U.S. persons prior to August or

<sup>205</sup> The Block. Binance has begun to block U.S. users from accessing its exchange platform (2020). <https://www.theblockcrypto.com/post/84020/binance-blocking-us-users-exchange-email-2>.

<sup>206</sup> Bithumb, Bithumb Terms of Service (Archived on December 19, 2020), <https://web.archive.org/web/20191219103055/https://support.bithumb.pro/hc/en-us/articles/360021308933-Terms-of-Service>; Bithumb, Bithumb Terms of Service (Archived on December 5, 2020), <https://web.archive.org/web/20201205122237/https://support.bithumb.pro/hc/en-us/articles/360021308933-Terms-of-Service>; Bithumb, Bithumb Terms of Service (Archived on October 11, 2021), <https://web.archive.org/web/20210116151101/https://support.bithumb.pro/hc/en-us/articles/360021308933-Terms-of-Service>.

<sup>207</sup> Bitstamp account and trading details (2020). (BITSTAMP USA 00000071, BITSTAMP USA 00000137, BITSTAMP USA 00000001, and BITSTAMP USA 00000044).

<sup>208</sup> Bitstamp. Bitstamp account and trading details (2020). (BITSTAMP USA 00002211, BITSTAMP USA 00002326). Bifinex. Bitfinex account details. (BFXNA Ripple 0000105).

<sup>209</sup> Deposition of [REDACTED], May 18, 2021 at 52.

September 2020.<sup>210</sup> Indeed, in most cases Ripple could not have prevented XRP from being resold to U.S. purchasers because after a digital asset is generally purchased on digital asset platforms, the holder of that digital asset can transfer it on the blockchain to any other person with a blockchain address, regardless of location, as well as send it on the blockchain to other digital asset platforms (including U.S.-Classified Platforms) where it can be resold and purchased by a resident of a different country. [REDACTED] principal [REDACTED] also made this point when answering the question, “If you wanted [REDACTED] could you restrict the XRP you sold from being purchased by a U.S. person?”<sup>211</sup> He replied, “[REDACTED] No...if we sell XRP to Joe Block on this exchange and Joe Block turns around and withdraws it and sells it to an American, I have no way of controlling that.”<sup>212</sup>

122. Based on analysis of XRP Ledger data, I conclude that at least \$5.7 billion worth of XRP has flowed from Foreign-Classified Platforms where Ripple sold XRP to U.S.-Based Platforms where XRP could be purchased by U.S. residents. As shown in Figure 16, from early 2017 to December 22, 2020, at least \$5.7 billion was directly transferred, i.e., in one hop or transfer, from the Foreign-Classified Platforms to U.S.-Classified Platforms. This value is a lower bound of the actual flow for XRP from Foreign-Classified Platforms to U.S.-Classified Platforms because it does not include indirect transfers, i.e., flows of XRP from Foreign-Classified Platforms to U.S.-Classified Platforms over more than one hop on the XRP blockchain.<sup>213</sup>

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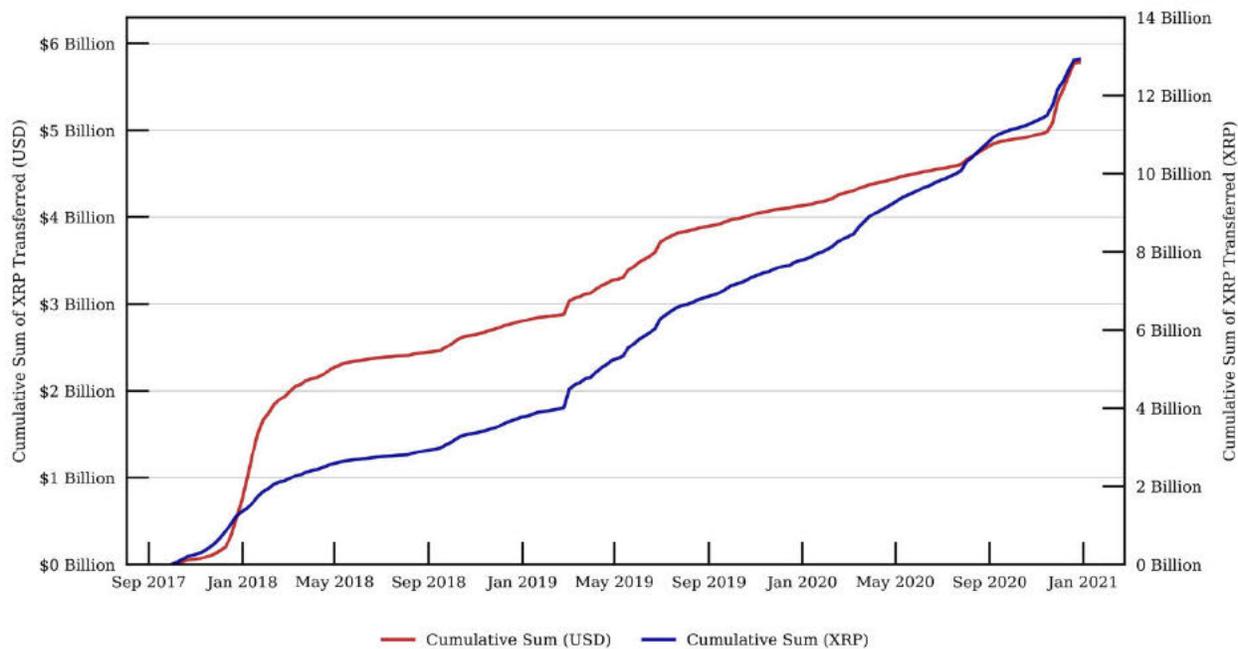
<sup>210</sup> Deposition of Brad Garlinghouse, September 20, 2021 at 487; Q: “Before [August or September 2020] had you ever instructed [REDACTED] not to sell to U.S. persons?”; A: “I don’t believe so.”

<sup>211</sup> Deposition of [REDACTED] August 11, 2021 at 156-157.

<sup>212</sup> *ibid.*

<sup>213</sup> Flows of XRP between such platforms over more than one hop would have involved the transfer of XRP over one or more intermediary addresses between the Foreign-Classified Platform and the U.S.-Classified Platform.

**Figure 16. Cumulative Flow of XRP from Foreign Platforms where Ripple Programmatically Sold XRP to U.S.-Classified Platforms<sup>214</sup>**

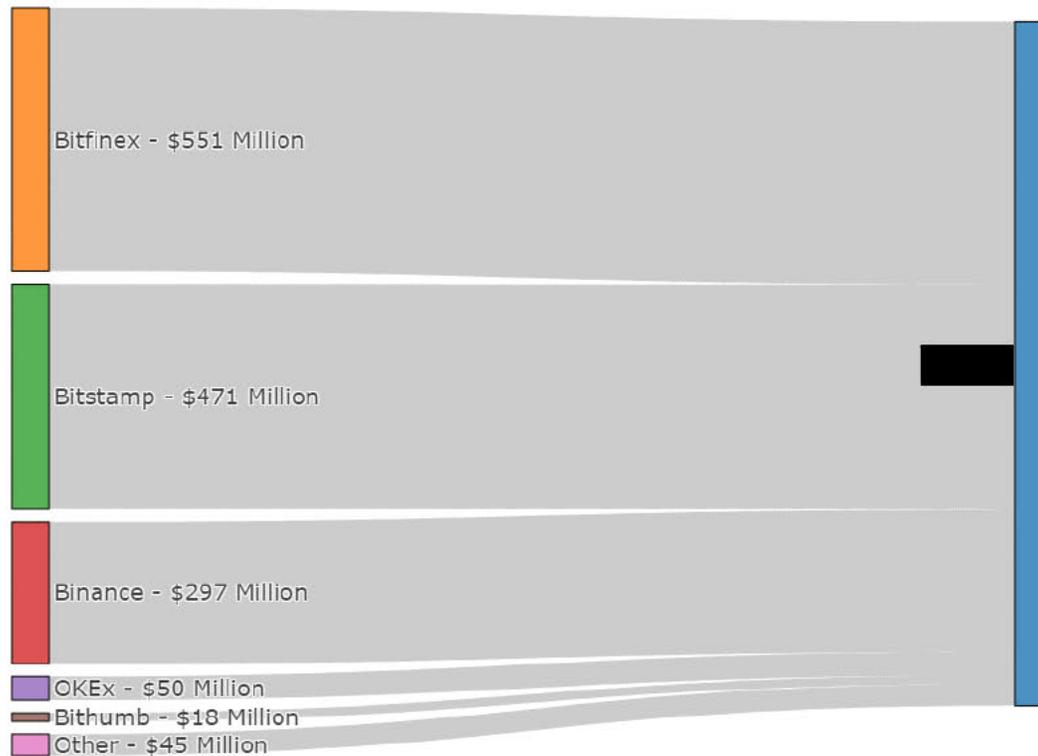


123. As seen in Figure 17, [REDACTED] one of the U.S. digital asset platforms where Ripple programmatically sold XRP, received over \$1 billion worth of XRP from the Foreign-Classified Platforms where Ripple programmatically sold XRP. [REDACTED] is a noteworthy example because Ripple made a concerted effort to enable purchasers to buy XRP on that platform. As part of an email detailing Ripple’s “Q2 XRP Plan” in 2017, Ripple’s Senior Vice President of Business Development [REDACTED] described having the goal to “drive XRP speculative trading volume,” which involved “BD [business development] racing to get [REDACTED] live for easier XRP

<sup>214</sup> Foreign platforms and US platforms where Ripple programmatically sold XRP were identified from [REDACTED] and [REDACTED], Liquidity Extraction Reports. ([REDACTED] 00000102, [REDACTED] 00000103, and SEC-[REDACTED]-E-0047622). Foreign platforms included in this analysis are: Binance, Bitstamp, Bitfinex, Bitrue, Coinone, Hitbtc, Upbit, Okex, Bitbank, Bithumb, Zb, Bitforex, Korbit, Bitmart, Coinbene, Bitlish, and Digifinex. U.S. platforms are Coinbase, Bittrex, Poloniex, and [REDACTED]. Methodology for tracing the flow of XRP can be found in Appendix A.

buying.”<sup>215</sup> This involved working with ██████ to get XRP listed<sup>216</sup> as well as providing incentive payments to ██████.<sup>217</sup>

**Figure 17. Value of Direct Transfers of XRP from Foreign Platforms where Ripple Programmatically Sold XRP to ██████**



**4.5.1.6. *Ripple Transferred Proceeds from its Offering of XRP for Sale on Digital Asset Platforms to Ripple’s U.S. Bank Account, Which Funded Ripple’s Operations, Including Those in the U.S.***

124. As described in the preceding Sections, Ripple, a U.S. company, promoted XRP to U.S. purchasers, directed them to buy XRP on U.S. and Foreign-Classified Platforms, and did not prevent XRP programmatically sold on Foreign-Classified Platforms from being resold to U.S. purchasers. In the final step of Ripple’s offering of XRP for sale, Ripple pooled the

<sup>215</sup> Deposition of ██████, June 29, 2021 at 272-275.

<sup>216</sup> *ibid.*

<sup>217</sup> Deposition of ██████, June 28, 2021 at 93-94.

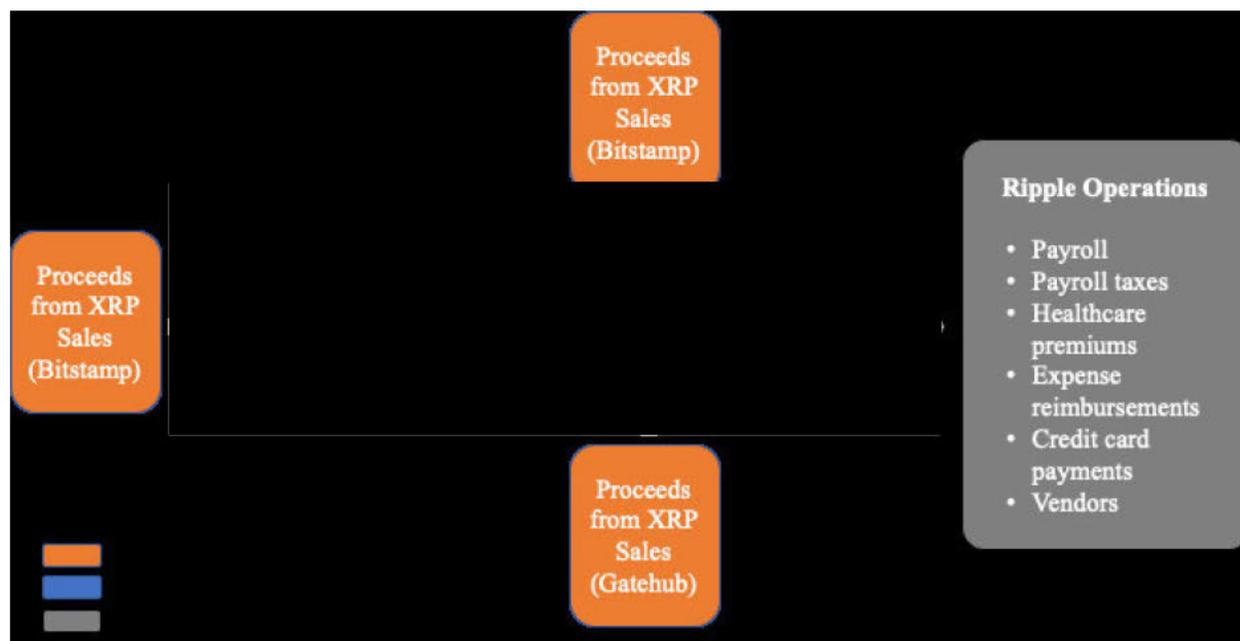
proceeds of sales of XRP from U.S. and Foreign-Classified Platforms into its U.S. bank accounts which were then used to fund its U.S. operations.

125. As illustrated in Figure 18, Ripple received funds from Bitstamp and Gatehub, two Foreign-Classified Platforms, to its U.S. bank account at [REDACTED] bank (account \*\*\*\*\*) and its U.S. bank account at [REDACTED] (account \*\*\*\*\*). It is inferred that the transfers into those two bank accounts generally encompass the vast majority of Ripple's programmatic XRP sales on U.S. and Foreign-Classified Platforms because the value of funds transferred into those two accounts between July 2017 and October 2019 is within one percent of the value of Ripple's programmatic XRP sales on U.S. and Foreign-Classified Platforms between July 2017 and September 2019.<sup>218</sup> The proceeds of Ripple's XRP sales from digital asset platforms were then pooled and sent to Ripple's [REDACTED] Account \*\*\*\*\*. This account serves to make payments to fund Ripple's operations, including those in the U.S. Examples of such payments include payroll through ADP, a U.S. payroll services company, Anthem Blue Cross, a U.S. health insurance provider, and expense reimbursements to employees based in the U.S.<sup>219</sup>

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<sup>218</sup> XRP Programmatic Sales Reporting FY14 to Date v2 (RPLI SEC 74559); [REDACTED] transaction details (SEC [REDACTED]-E-0000197); [REDACTED] transaction details (SEC [REDACTED]-E-0005094).

<sup>219</sup> [REDACTED] transaction details. (SEC [REDACTED]-E-0005025)

**Figure 18. Pooling of Proceeds from XRP Sales to fund Ripple's Operations<sup>220</sup>**

#### ***4.5.2. Professor Yadav's Assessment of U.S. Classified Platforms Is Inconsistent and Unreliable***

126. Professor Yadav provides four indicia “to determine the location of exchanges on which offers were made and trades finalized,”<sup>221</sup> described in Section 4.3 above. Using these indicia, she determines that for the Foreign-Classified Platforms, “There is no indication that offers are made on the exchanges in the U.S., or that trades on these exchanges become final in the U.S.”<sup>222</sup> In contrast, even though applying her test does indicate that trades on U.S.-Classified Platforms become final in the U.S., Professor Yadav nevertheless concludes that she cannot determine that those trades occur in the U.S.<sup>223</sup> As justification for her differential treatment of Foreign-Classified and U.S.-Classified Platforms, Professor Yadav first cites the

<sup>220</sup> ██████████ transaction details (SEC-██████████-E-0000197); ██████████ transaction details. (SEC ████████-E-0005094, SEC ████████-E-0005025, and SEC ████████-E-0005095).

<sup>221</sup> Expert Report of Yesha Yadav, October 4, 2021 at 55-56.

<sup>222</sup> Expert Report of Yesha Yadav, October 4, 2021 at 54.

<sup>223</sup> Expert Report of Yesha Yadav, October 4, 2021 at 69.

example of Bittrex, a U.S. platform which also has a foreign affiliate, Bittrex Global, where a “market- maker might have” traded. A “market- maker” in the context of this case would include the three firms that programmatically sold XRP on behalf of Ripple on digital asset platforms: [REDACTED], [REDACTED], and [REDACTED].<sup>224</sup> Second, Professor Yadav references terms of service of U.S.-Classified Exchanges which have different versions or separate stipulations for non-U.S. customers, e.g., Coinbase Singapore has a different terms of service for Singapore residents and Kraken has a separate stipulation for non-U.S. residents in its terms of service, and uses these as examples of why trades at the U.S.-Classified exchanges might not take place in the U.S.<sup>225</sup>

127. Notably, Professor Yadav only applies these exceptions to her U.S.-Classified Platforms. In other words, she is adding two new indicia – the existence of a subsidiary incorporated outside the parent company’s country of incorporation and the existence of separate terms of service or separate stipulations for residents of a different country – to U.S. Classified-Platforms only. However, if she used the same standard for her Foreign-Classified Platforms, she would also have to conclude that her indicia do not “conclusively determine” that trades on Foreign-Classified Platforms “definitively took place and became final” outside of the U.S. Using Professor Yadav’s logic, one could also just as easily question whether trades to sell XRP on Binance (a Foreign-Classified Platform) occurred not on Binance, but on Binance.US, its U.S. affiliate. Similarly, one could also question whether trades on Bitstamp (another Foreign-Classified Platform) actually took place overseas and not in the U.S. because Bitstamp has separate terms of service for U.S. residents.<sup>226</sup> However, she does not hesitate to conclude that

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<sup>224</sup> XRP Programmatic Sales Reporting FY14 to Date v2 (RPLI SEC 74559). Professor Yadav seems to acknowledge that [REDACTED] is among those who received instructions from Ripple to sell XRP on digital asset platforms (Expert Report of Yesha Yadav, October 4, 2021 at 39).

<sup>225</sup> Expert Report of Yesha Yadav, October 4, 2021 at 69.

<sup>226</sup> Bitstamp. Terms of Use - Bitstamp USA, Inc. (2021). <https://www.bitstamp.net/terms-of-use/inc/> and Bitstamp. Terms of Use - Bitstamp USA, Inc. (Archived on May 31, 2020). <https://web.archive.org/web/20200531102017/https://www.bitstamp.net/terms-of-use/inc/>.

there is no indication that trades on Foreign-Classified Platforms such as Binance and Bitstamp did not occur in the U.S., even though she has not provided any evidence demonstrating that Foreign-Classified Platforms such as Binance did not have a U.S. affiliate nor a separate terms of service for U.S. residents.

128. Laying aside the inconsistency of Professor Yadav's treatment of U.S.-Classified versus Foreign-Classified Platforms, she also ignores her own methodology and analyses through her treatment of Poloniex, one of the U.S.-Classified Platforms. Professor Yadav argues that Poloniex might not actually be based in the U.S. because, at GSR principal ██████████ deposition, he said it "might have been in one of th[o]se Caribbean Islands."<sup>227</sup> Here, Professor Yadav accepts a single individual's conjecture and permits it to displace the criteria she selected and endorsed for the determination of a digital asset trading platform's location. The following provides the context prior to ██████████ quotation that Professor Yadav cites:

*Q [Defendants' attorney Ms. Dearborn]. And she [SEC attorney Ms. Waxman] asked specifically whether any of these were U.S.-based exchanges. Do you recall that?*

*A. ██████████ Yes, I do.*

*Q. And one of the exchanges that you mentioned was Poloniex, right?*

*A. Correct.*

*Q. And you said that it was a U.S. exchange at one point. Do I have that right? I don't want to mischaracterize your testimony?*

*A. Yes. I said that.*

*Q. What do what did you mean?*

*A. Well, Poloniex was supposedly founded by a gentleman from somewhere in Upstate New York. And from dealing with the people in Poloniex over the years, I know their support staff was somewhere in the northeast too. So it seemed as though Poloniex was operating from the United States, but I don't know that I*

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<sup>227</sup> Expert Report of Yesha Yadav, October 4, 2021 at 70.

*ever saw the Article of Incorporation or I could confirm that in fact the company was based in the U.S.*

*Q. Okay.*

*A. It might have been in one of these Caribbean islands or -- yeah.*<sup>228</sup>

Professor Yadav reviewed documents related to Poloniex's organization and concluded that Poloniex's "Place of Incorporation/Domicile" was in the U.S. and that its "Principal Place of Business" was in the U.S.<sup>229</sup> Indeed, her Exhibits B25 and B26 both state that Poloniex has a principal office in Boston, Massachusetts and was "organized" and "formed in" Delaware.<sup>230</sup> Thus, in this instance Professor Yadav ignores her own methodology and instead relies on the speculation of an individual who acknowledged that he — unlike Professor Yadav — did not have the relevant information regarding the location where Poloniex was incorporated or organized.

129. Professor Yadav contends that her four indicia are insufficient to conclusively determine whether "any given offer or trade on any one of these four exchanges definitively took place and became final in the U.S." because such platforms might have foreign affiliates, including where "relevant market makers" could have traded.<sup>231</sup> But Professor Yadav does not appear to have taken any steps to determine where the "relevant market makers" in this case did trade.

130. The trading data that was available at the time of this Rebuttal report's writing definitively show that at least in one instance, one of Ripple's market makers programmatically selling XRP on its behalf did so on the U.S. platform, not the foreign platform of its affiliate.

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<sup>228</sup> Deposition of ██████████ August 11, 2021 at 302-303.

<sup>229</sup> Expert Report of Yesha Yadav, October 4, 2021 at 66.

<sup>230</sup> Exhibits B25 and B26 of Expert Report of Yesha Yadav, October 4, 2021.

<sup>231</sup> Expert Report of Yesha Yadav at 69.

Bittrex account and trading records show that GSR sold XRP on behalf of Ripple, Chris Larsen, and Brad Garlinghouse on Bittrex (U.S.) and not Bittrex Global.<sup>232</sup>

**4.5.3. Professor Yadav Acknowledges that the Location of a Digital Asset Platform's Servers is a Relevant Indicia, Yet Chooses to Ignore it in Her Analysis**

131. Professor Yadav uses four indicia to determine the geographic location of digital asset trading platforms (and, notably, then assumes the trading takes place at their purported location): place of incorporation, principal place of business, registered office address, and the locations referenced in their terms of service. These indicia omit the physical location of a platform's servers which Professor Yadav herself recognizes as an indicium for the location of a digital asset platform. For example, she provides the example of Bitstamp as an exchange with indicia pointing to different locations:

*Bitstamp, for example, has its registered office in the United Kingdom but states that its location of 'principal financial functions and operational control' is in Slovenia. It also has servers in Ireland and Germany.*<sup>233</sup>

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<sup>232</sup> GSR had an account on Bittrex to programmatically sell XRP on behalf of Ripple, Chris Larsen, and Brad Garlinghouse, and the account was registered to the email address *gsr+rl@gsr.io* (Bittrex-NY-9875 0003411). Based on the deposit log for this account (Bittrex-NY-9875 0003410), it was funded by XRP deposits from GSR wallets that were involved with programmatic sales for Ripple, Chris Larsen, and Brad Garlinghouse. This can be determined because this Bittrex deposit log contains XRP deposit transaction IDs, referred to as "hashes" on the XRP blockchain, that are also found in GSR liquidity extraction reports for Ripple (GSR00000103), Chris Larsen (GSR00000441), and Brad Garlinghouse (GSR00000446). The trading log (Bittrex-NY-9875 0003413) for this Bittrex account, used by GSR to programmatically sell XRP on behalf of Defendants, sold XRP on Bittrex between July 6, 2018 and December 5, 2019. Since Bittrex' international operations only launched after October 29, 2018 (<https://www.prnewswire.com/news-releases/bittrex-international-to-launch-trading-platform-300739320.html>), it is possible to definitively conclude that GSR's sales of XRP prior to that date occurred on Bittrex' main U.S. platform. Furthermore, since Bittrex announced that its international platform was a separate platform from its U.S. platform, it is also possible to conclude that GSR continued to sell XRP on Bittrex' main U.S. platform after the launch of Bittrex' international platform since GSR's trades continued to be recorded in the same trading log (Bittrex-NY-9875 0003413) after the international platform was launched. Also, GSR funded this account by making deposits to the same Bittrex XRP Ledger address with the same destination tag, [REDACTED] 6778 (as destination tag is akin to a checking account number and used by digital asset platforms to attribute digital asset deposits to the right account), before and after the launch of Bittrex' international platform. This further demonstrates that GSR programmatically sold XRP on Bittrex's main U.S. platform before and after the launch of Bittrex' international platform. Bates numbers correspond to documents as follows: Bittrex account and trading details (Bittrex-NY-9875 0003410, Bittrex-NY-9875 0003411, and Bittrex-NY-9875 0003413); GSR liquidity extraction reports for Ripple (GSR00000103), GSR liquidity extraction report for Chris Larsen (GSR00000441); and GSR liquidity extraction report for Brad Garlinghouse (GSR00000446).

<sup>233</sup> Expert Report of Yesha Yadav, October 4, 2021 at 55.

However, while the location of a digital asset platform's registered office and principal place of business are included among the four indicia used by Professor Yadav, the location of a platform's servers is noticeably excluded. Servers are an integral part of the execution of any trade on a digital asset platform because they provide price information to traders, accept trade orders, match trade requests, log executed trades, and convey trade records to buyers and sellers.

132. Professor Yadav's omission of the location of a digital asset platform's servers is material because some Foreign-Classified Platforms have servers located in the U.S. For example, Binance, a Foreign-Classified Platform, utilizes Amazon cloud servers in the U.S. where traders can get real-time price information and place trade orders using its API (application programming interface).<sup>234,235,236</sup> Bitstamp also has servers in the U.S., including during the Issuance Period<sup>237,238</sup> Based on my professional experience and expertise in trading digital assets, and given the significant interest in the U.S. in digital asset trading by retail traders as well as by sophisticated digital asset trading firms, in my opinion it is unsurprising that Binance, Bitstamp, or other Foreign-Classified Platforms would locate servers in the U.S. since the closer one is to an exchange's server, the faster one can obtain price information and place trade orders. By locating servers in the U.S., Binance and Bitstamp make themselves more attractive to certain traders who seek to gain a trading advantage by more quickly obtaining

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<sup>234</sup> An API enables traders to directly obtain price quotes and place trade orders using custom software. This is favored by high frequency traders who can automatically place trading orders using algorithms.

<sup>235</sup> Binance's main URL "binance.com" resolves to locations in Japan, but Binance's API "api.binance.com" resolves to Amazon servers in the U.S. according to IP Location, a server location provider (<https://www.iplocation.net/ip-lookup>).

<sup>236</sup> In March 2020, a trader based in Europe found that the latency for accessing Binance's (not Binance US) API is the shortest in Tokyo, Japan and New Jersey, which suggests that Binance could have two main servers for processing trades in those two locations: Github User Sammchardy. Binance Server Location (2018). <https://github.com/sammchardy/python-binance/issues/189>.

<sup>237</sup> "bitstamp.net" resolves to servers in the U.S. according to IP Location, a server location provider (<https://www.iplocation.net/ip-lookup>).

<sup>238</sup> ViewDNS. View DNS info for bitstamp.net. <https://viewdns.info/iphistory/?domain=bitstamp.net>.

pricing data and executing trades. Professor Yadav fails to determine or demonstrate where the servers for each of the digital asset trading platforms she reviewed are located.<sup>239</sup> Accordingly, she cannot (and does not) opine that every server belonging to a Foreign-Classified Platform is not located in the U.S., and thus cannot prove that all the trades involving Ripple’s sales of XRP on digital asset platforms were not initiated, processed, finalized, or recorded in the U.S.

133. Conversely, indicia do exist which point to the presence of U.S. servers for some of the U.S.-Classified Platforms. According to Coinbase, “Coinbase Exchange data centers [which host its servers] are in the Amazon US East N. Virginia (us-east-1) region.”<sup>240</sup> During at least part of the period when Ripple programmatically sold XRP on Poloniex, Poloniex’s servers were located in Virginia.<sup>241</sup>

#### ***4.5.4. Ripple’s Sales of XRP on the XRP Ledger were Executed by U.S.-Based Servers***

134. Ripple’s offering of XRP for sale took place not only on the digital asset platforms listed in the Yadav report, but also on the XRP Ledger. The XRP Ledger contains functionality that enables trade orders to be created, executed, and recorded on the blockchain.

135. Ripple employed the services of at least two market makers, [REDACTED] and [REDACTED], to sell XRP on the XRP Ledger.<sup>242</sup> Figure 19 illustrates the process whereby [REDACTED]

<sup>239</sup> Professor Yadav mentions that Bitstamp has servers in Ireland and Germany but does not provide any citation (Expert Report of Yesha Yadav, October 4, 2021 at 55).

<sup>240</sup> Coinbase. Coinbase Data Centers. <https://docs.cloud.coinbase.com/exchange/docs/data-centers>.

<sup>241</sup> According to the Wayback Machine, Poloniex’s API instructions at <https://docs.poloniex.com/> on June 15, 2019 and November 15, 2019, include: “If you will be performing high-frequency trading, you may wish to locate your bots as close to our servers as possible. As Poloniex uses Cloudflare for all requests, you can minimize network latency by positioning your client near the Cloudflare gateway in Ashburn, VA, United States.” (Poloniex. Introduction (Archived on June 15, 2019).

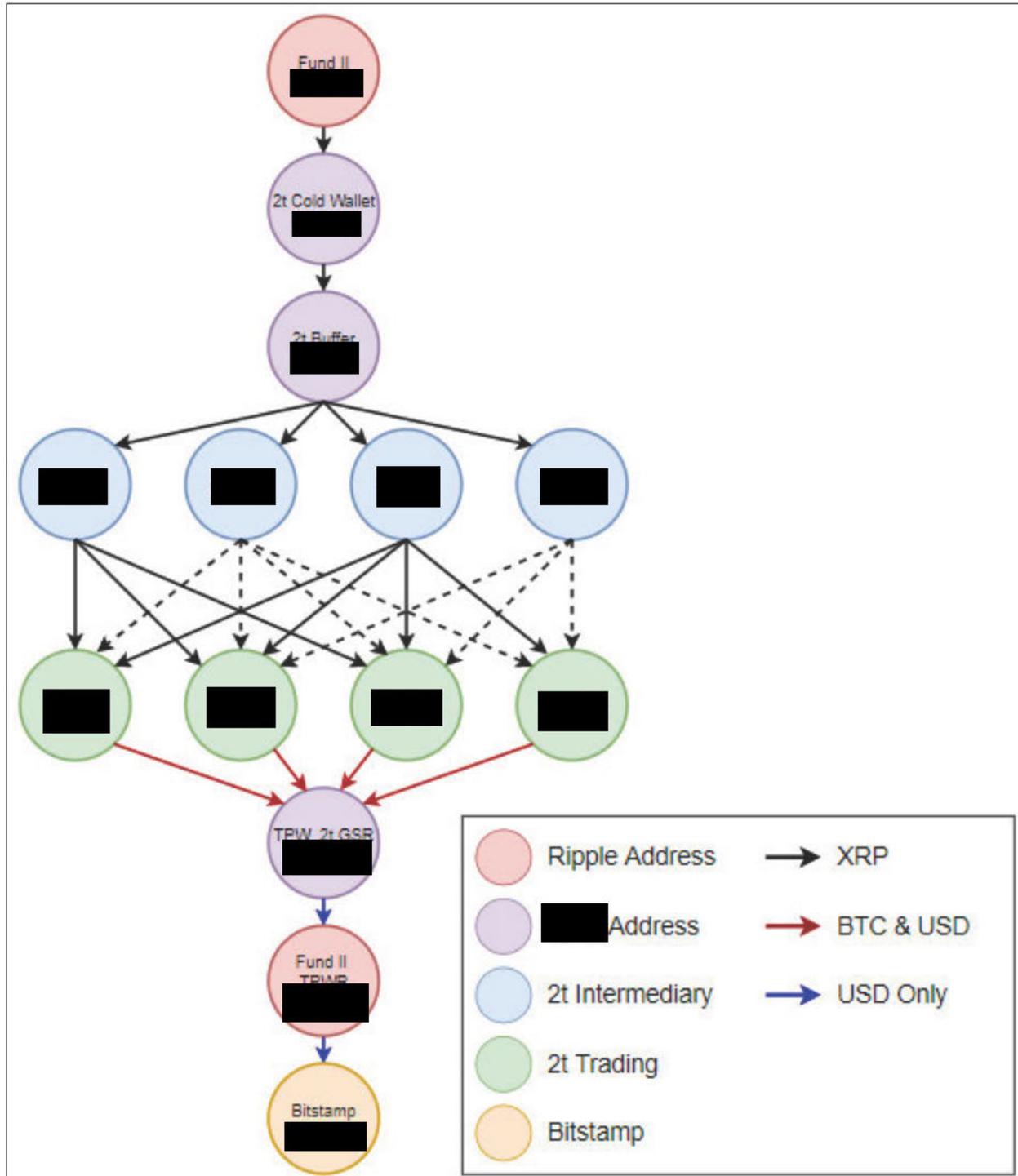
<http://web.archive.org/web/20190615031247/https://docs.poloniex.com/#introduction> and Poloniex. Introduction (Archived on November 15, 2019).

<http://web.archive.org/web/20191115040933/https://docs.poloniex.com/#deposit>).

<sup>242</sup> [REDACTED] sales of XRP on behalf of Ripple on the XRP Ledger is discussed in this paragraph. [REDACTED]’ on-ledger XRP sales on behalf of Ripple can be seen at RL\_audit2.0.xls. [REDACTED]. XRP Sales Auditing Spreadsheet. [REDACTED] 000277)

conducted these sales on behalf of Ripple for a snapshot in time from May 1 to July 1, 2016. First, Ripple disbursed XRP to [REDACTED] “Cold Wallet.” Then [REDACTED] transferred the XRP to its “Buffer Wallet” and subsequently to intermediary wallets that sold XRP on the XRP Ledger. The wallets shown in this analysis sold XRP in exchange for U.S. Dollars or Bitcoin (but they could have sold XRP for other assets as well), and transferred proceeds of sales back to [REDACTED] “TPW\_2t” wallet. Then, [REDACTED] “TPW\_2t” wallet would convert all proceeds into U.S. Dollars and profits from the proceeds would be pooled and sent to Ripple’s “Fund II TPWR” wallet. Finally, Ripple would send the received proceeds to Bitstamp, where it could withdraw its earnings in cash.

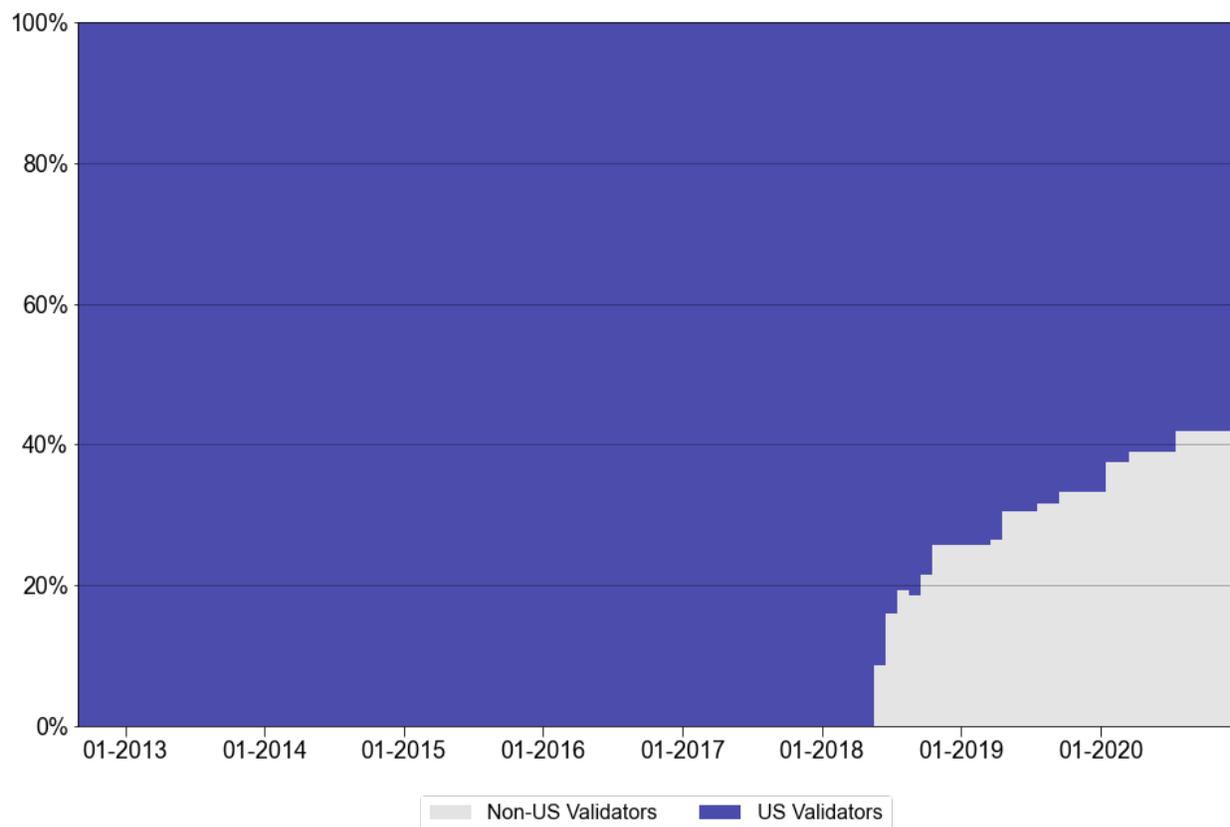
Figure 19. Process of Ripple's Programmatic Sales of XRP on the XRP Ledger<sup>243</sup>



<sup>243</sup> [REDACTED] liquidity extraction reports and publicly available blockchain data; refer to Appendix B for a detailed list of sources and the methodology for creating this figure.

136. Ripple’s sales of XRP on the XRP Ledger were initiated, executed, and recorded on the validators running the XRP Ledger software and many of the organizations running these validators were located in the U.S. Figure 20 shows the location of the official domains validating and recording all the transactions on the XRP Ledger, including the trades where Ripple sold XRP. Up until June 2018, all the validators were based in the U.S. From June 2018 to December 22, 2020, the majority of XRP Ledger validators and those validators’ servers have continued to be located in the U.S. As such, each of Ripple’s sales of XRP on the XRP Ledger were executed and finalized by organizations and on servers based in the U.S.

**Figure 20. Location of XRP Ledger Validators.<sup>244</sup>**



<sup>244</sup> A detailed list of sources and methodology for this figure can be found in Appendix C.

**4.5.5. Ripple’s Sales of XRP to U.S. Institutional and High Net Worth Individual Purchasers through Over the Counter Sales**

137. In addition to offering XRP for sale on digital asset platforms, Ripple offered XRP for sale via OTC sales to institutions and high net worth individuals. The sales were conducted by XRP II LLC, a U.S. limited liability company that was originally registered in South Carolina and later in New York where it was also registered with the New York Department of Financial Services.<sup>245</sup>

138. Ripple specifically targeted U.S.-based institutional and high net worth purchasers and its efforts were successful. Ripple’s XRP Outreach Q3 Proposal lists several segments to target for outreach, including i) “US High Net Worth Individual Investors,” ii) US Macro Hedge Funds, and iii) “US Asset Management.”<sup>246</sup> U.S. entities purchasing XRP from XRP II LLC include [REDACTED],<sup>247</sup> [REDACTED] LP<sup>248</sup> and [REDACTED] LP.<sup>249</sup> Ripple also enlisted the help of U.S.-based OTC market makers, [REDACTED] and [REDACTED], which sold XRP over the counter to individuals and entities purchasing over \$ [REDACTED] and \$ [REDACTED] worth of XRP respectively, as seen in Figure 21.

<sup>245</sup> [REDACTED] Summary of XRP Purchase (2016). [REDACTED] Ripple 0001481); [REDACTED], Master XRP Purchase Agreement (2018). (RPLI SEC 0001010).

<sup>246</sup> Ripple. XRP Outreach Q3 Proposal (2017). (RPLI SEC 0839297-0839302).

<sup>247</sup> [REDACTED] Master XRP Purchase Agreement (2017). [REDACTED] Ripple 0007120).

<sup>248</sup> [REDACTED]. Master XRP Purchase Agreement (2018). (RPLI SEC 0173808-0173826).

<sup>249</sup> [REDACTED] Master XRP Purchase Agreement (2018). (SEC- [REDACTED] E 0001260).

**Figure 21. Email Template for Institutional Buyers.**<sup>250</sup>

**\*\*\*\*\*OTC Template for Institutional Buyers:**

Hi,

Thank you for your email.

Given your interest in XRP, I would like to introduce you to an OTC market maker in your region. **We provide this information solely for your reference; Ripple does not endorse the OTC market maker below. As always, it is advisable to conduct your own due diligence.**

Please remember before signing up with an OTC market maker, you will need to have an XRP wallet ready. There are many wallets out there and although we do not support one directly, we have partnered with Bitgo.com for enterprise storage if you are expecting to store over \$300,000 of digital assets.

US-based: [https://\[REDACTED\].com/otc-trading/](https://[REDACTED].com/otc-trading/) Minimum XRP purchase: \$75k  
 US-based: [https://www.\[REDACTED\].com/en/](https://www.[REDACTED].com/en/) Minimum XRP purchase: \$250k  
 Asia-based: [https://trade.\[REDACTED\].com/register](https://trade.[REDACTED].com/register) Minimum XRP purchase: \$250k  
 UK-based: [https://www.\[REDACTED\].com/contact](https://www.[REDACTED].com/contact)

Please have your XRP wallet ready to begin onboarding with the OTC market makers to purchase XRP.

Thank you.

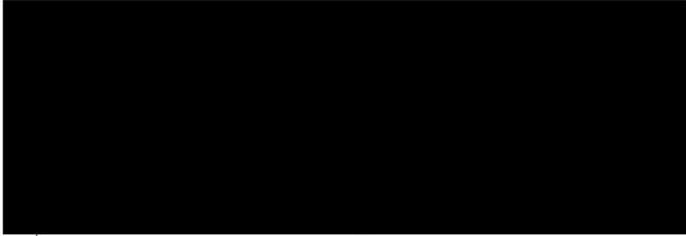
139. None of the OTC purchase agreements reviewed – including a Master XRP Purchase Agreement, XRP Purchase Agreement, Master XRP Commitment to Sell Agreement, Master XRP Loan to Purchase Agreement, Ripple Currency Wholesale Sales Invoice, and Currency Purchase Letter of Intent – contained restrictions precluding OTC buyers from reselling XRP to U.S. residents.<sup>251</sup> As such, there is no reason to believe that XRP purchased OTC by institutional or high net worth individuals was not transferred to U.S. digital asset platforms where it could be bought by U.S. purchasers.

<sup>250</sup> Email from [REDACTED] January 5, 2018 (RPLI\_SEC 0203416).

<sup>251</sup> Ripple, Master XRP Purchase Agreement (RPLI\_SEC 0668885); Ripple, XRP Purchase Agreement (RPLI\_SEC 0000517); Ripple, Master XRP Commitment to Sell Agreement (RPLI\_SEC 0301016); Ripple, Master XRP Loan to Purchase Agreement (RPLI\_SEC 0609008); Ripple, Ripple Currency Wholesale Sales Invoice (RPLI\_SEC 0609563); and Ripple, Currency Purchase Letter of Intent (RPLI\_SEC 0676713).

**RIGHT TO SUPPLEMENT**

140. The opinions expressed in this report are based on my review and analysis of the documents that I have reviewed. I reserve the right to supplement my report and analysis based on any new evidence brought to my attention.



## 5. APPENDIX A – METHODOLOGY FOR TRACING THE FLOW OF XRP FROM FOREIGN-CLASSIFIED PLATFORMS TO US-CLASSIFIED PLATFORMS

141. The Sections below describe the methodology used to create the charts seen in Figure 16 and Figure 17.

### Summary of Sources

142. Data considered in this analysis were sourced from reports on programmatic XRP sales by [REDACTED] and [REDACTED] on behalf of Ripple (3.d - Ripple XRP Sales - All Trades.csv, [REDACTED] E-0047622) and the 2018 and 2019 liquidity extraction reports for [REDACTED] bot 2h (Excel\_Export\_2018\_2h\_Ripple\_Liquidity\_Extraction\_Report.xlsx, [REDACTED] 00000102 and Excel\_Export\_2019\_2h\_Ripple\_Liquidity\_Extraction\_Report.xlsx, [REDACTED] 00000103). These documents are collectively referred to as “programmatic sales reports.” Publicly available blockchain data was also utilized.

### Identification of Digital Asset Platforms

143. The initial platforms of interest were identified based on reports from programmatic sales conducted on behalf of Ripple. [REDACTED] reported trades on 18 unique digital asset platforms while [REDACTED] reported sales on 22 unique platforms. Amounts of XRP sold across each programmatic seller at each exchange were summed to produce a total count of XRP sold on each platform. 25 unique platforms were identified between the [REDACTED] and [REDACTED] reports. This combined list of 25 platforms from the programmatic sales reports was used for further analysis. This set included the following digital asset platforms, presented alphabetically: Binance, Bitbank, Bitfinex, Bitforex, Bithumb, Bitlish, Bitmart, Bitmax, Bitrue, Bitstamp, Bittrex, BW, Coinbase, Coinbene, Coinone, Digifinex, Hitbtc, Huobi, Korbit, Kraken, Okex, Poloniex, Upbit, ZB, and ZBG.

144. This analysis used Professor Yadav’s classification to categorize the above platforms as U.S.-Classified Platforms and Foreign-Classified Platforms.

### **XRP Addresses for Digital Asset Platforms of Interest**

145. Exchange addresses were identified using a list of verified, publicly known addresses provided by XRPscan, a web-based tool that provides public access to XRP ledger data including transaction data, account balances, current validators, and proposed amendments to the XRP ledger protocol. The application programming interface (API) provided by XRPscan includes a specific command to return a list of well-known account names.<sup>252</sup> For each named address on this list, XRPscan provides the associated XRP address, the associated domain name, the account name, an associated twitter handle (if present), and a verification status. For the purpose of this analysis, only addresses with a name matching one of the addresses of interest were included. Addresses were then further filtered to only those with verification status “True.” XRPscan maintains proof of verification for these addresses and makes this proof available to users with a commercial license. For further validation, the “domain” field of the API response was verified to contain the web address matching each included exchange’s primary website.

146. Each of the 25 digital asset platforms were checked against the XRPscan well known addresses list. Among the 4 U.S.-Classified Platforms, all platforms had at least one verified address. A total of 18 unique addresses were identified as belonging to the U.S.-Classified Platforms. This process was then repeated for the 21 Foreign-Classified Platforms. This analysis identified at least one verified address for 17 of the 21 platforms. A total of 57 unique addresses were identified as belonging to these platforms. Two addresses belonging to “Binance.US” were omitted from the set of addresses for Foreign-Classified Platforms as they

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<sup>252</sup> XRPscan API. Well-Known Address List. <https://docs.xrpscan.com/api-doc.html?highlight=well%20known>.

belong to the U.S.-specific branch of Binance, resulting in a final set of 55 addresses. It should be noted that this list is not exhaustive. Platforms could have additional addresses that are not publicly verified. This conservative approach provided a lower-bound estimate of the true number of addresses used by these platforms.

### **Tracing Methodology**

147. Addresses were split into two sets based on identification as associated with Foreign-Classified vs. U.S.-Classified Platforms. The set of addresses belonging to U.S.-Classified Platforms is referred to as “Target Recipients” while the set of those addresses belonging to Foreign-Classified Platforms is referred to as “Target Senders.” These sets were verified to be disjoint: that is, an address in one set cannot be contained in the other. Tracing was performed using a publicly available dataset containing the full history of transactions on the XRP ledger.<sup>253</sup> Tracing was limited to only transactions with the “Payment” XRP ledger transaction type that were sent directly (one hop) from a target sender to a target recipient.<sup>254</sup> In the XRP ledger, a Payment refers to a specific type of transaction where a balance of some digital or fiat asset is transferred from one address to another. Payments are distinct from other transaction types such as “OfferCreate” transactions that allow users to exchange assets directly on the XRP ledger. Each included transaction was also verified to have successfully executed using the transaction result “tesSUCCESS”. Only transactions that entered the ledger prior to December 22, 2020 were included in this analysis.

148. Additional conditions were added to the tracing methodology to increase execution speed and account for idiosyncrasies of the blockchain dataset/design of XRP. Only

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<sup>253</sup> Wietse Wind. Fetch All Transactions from the XRP Ledger. <https://github.com/WietseWind/fetch-xrpl-transactions>.

<sup>254</sup> Definitions for transaction types on the XRP Ledger can be found at: XRP Ledger. Transaction Type: Payment. <https://xrpl.org/payment.html>.

direct XRP to XRP payments were considered, excluding cross-asset payments and those that transfer only a non-XRP asset. Partial payments, a special transaction type that allows sending an uncertain amount of XRP with a provided upper and lower bound, were considered in this analysis by using the “delivered amount” field.

149. This methodology again provided a conservative lower-bound estimate of the actual flow of XRP from Foreign-Classified to U.S.-Classified Platforms. The included address list uses only those addresses publicly verified to belong to each exchange, and only direct transactions are included. It is likely that XRP was moved between these parties indirectly (over more than one hop). Consideration of indirect XRP transfers could only increase the amount of XRP shown moving between these platforms.

### **Tracing Results**

150. A total of 540,876 transactions met the conditions specified for this tracing for a total of 12.9 billion XRP sent from Foreign-Classified to U.S.-Classified Platforms. 320,307 unique address/destination tag pairs were found among the identified transactions. As platforms typically assign a unique destination tag to each user account, each unique address/destination tag could be considered as a unique user account when estimating the number of transaction recipients, though sometimes it is possible for a user account have multiple destination tags. Included transactions occurred between October 1, 2017 (the first full month when both █████ and █████ conducted programmatic sales on behalf of Ripple) to just before midnight on Dec 21, 2020.

151. Prices in U.S. dollars were estimated for each transaction using publicly available historical pricing provided by CoinMarketCap.com.<sup>255</sup> Each transaction amount was multiplied

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<sup>255</sup> CoinMarketCap. XRP Historical Price Data. <https://coinmarketcap.com/currencies/xrp/historical-data/>.

by the daily close price of XRP/USD on the date it was sent to produce each USD estimate. The sum of these estimations for the top 5 platforms sending to Kraken is presented in Figure 17 and the overall total of these estimations is presented in Figure 16. In total, at least \$5.7 billion is calculated to have been transferred from Foreign-Classified Platforms to U.S.-Classified Platforms.

**6. APPENDIX B – METHODOLOGY FOR IDENTIFYING GSR PROGRAMMATIC SALES OF XRP ON BEHALF OF RIPPLE THAT WERE CONDUCTED ON THE XRP LEDGER**

152. The Sections below describe the methodology used to create the chart seen in Figure 19.

**Summary of Sources**

153. Sources used include Ripple’s wallet index (2.0 WALLET INDEX 2020.11.05 RPLI\_SEC 0628141), GSR liquidity extraction reports (Excel Export - 2014-2016 - 2t - Liquidity extraction report, RPLI\_SEC 0679467-467, and Excel\_Export\_2018\_2h\_Ripple\_Liquidity\_Extraction\_Report, Bates GSR00000102) as well as publicly available blockchain data (from <https://github.com/WietseWind/fetch-xrpl-transactions>).

**GSR Trading Bot Overview**

154. This analysis focuses on the activity of GSR trading bot 2t, which programmatically sold XRP on behalf of Ripple. Given the nature of the XRP ledger, transfers of XRP between Ripple and various GSR addresses are recorded and publicly accessible. The sales of XRP occurred over a few distinct stages where XRP or other digital assets were moved between addresses, sold, or transferred to other parties. Stages of sale activity were determined based on GSR sales reporting in details tab of the 2014-2016 - 2t - Liquidity extraction report (RPLI\_SEC 0679467-467).

**Figure 22. Example Daily Details from GSR 2t Liquidity Extraction Report.**

155. Note that until the “Market Making” wallets are reached, all reporting is denoted in XRP. The “Market Making” and “TPW” wallets receive balances in BTC or various fiat currencies. Despite being labeled as “Market Making” in the liquidity extraction reports, these wallets were engaged in the sale of XRP on behalf of Ripple and are therefore referred to as “trading wallets” in this Section. In the daily summary tab of the same document, payouts to Ripple were preceded by TPWR, indicating the name for the address where Ripple received sales revenue on the XRP ledger. “Cold” and “Buffer” refer to addresses where GSR stored XRP after receiving XRP from Ripple but before distributing to intermediary and trading wallets. Trading wallets were the only addresses aside from the TPW payout wallet to list sales/transfers in BTC or fiat currencies and were therefore inferred to be the point of sale. The purpose of intermediary wallets is not clear from this reporting, but due to their placement in reporting between buffer and trading wallets, it was inferred that these intermediaries distributed smaller sums of XRP to the trading wallets. Based on GSR reporting and these inferences, this analysis sought to examine the flow of funds as follows:

1. Transfer of XRP from Ripple to GSR cold wallet
2. Transfer of XRP from GSR cold wallet to GSR buffer wallet
3. Transfer of XRP from GSR buffer wallet to GSR intermediary wallets
4. Transfer of XRP from GSR intermediary to GSR trading wallets
5. Transfer of USD/BTC from trading wallets to GSR profits distribution (TPW) wallet
6. Transfer of USD from GSR profits distribution (TPW) wallet back to Ripple (TPWR)
7. Transfer of USD from Ripple TPWR to some outside entity for withdrawal.

156. Note that the ‘Profit’ category shown in Figure 22 is excluded from this analysis as it was presumed to refer to GSR profit from sales. To verify the flow structure described above, addresses at various stages of this process were identified and blockchain tracing was performed on a sample time window. This time window was defined as May 1 to July 1, 2016. The goals of this tracing were to: i) analyze the flow of funds associated with bot 2t, ii) identify the GSR intermediary and trading addresses used to sell XRP, and iii) determine where Ripple sent sales revenue after receiving at the TPWR address.

### **Identification of Initial Addresses**

157. The primary means of address identification for this analysis was referencing addresses found in GSR liquidity extraction reports with the Ripple wallet index (RPLI\_SEC 0628141). This document was searched for the names included above, specifically “GSR,” “Cold,” “Buffer,” “TPW,” and “TPWR.” The initial addresses of interest were labeled as "GSR Profits Distribution 2 (TPW\_2t GSR)" [REDACTED] and "Fund II TPWR 2" ([REDACTED] in the wallet index. The daily summaries in the extraction reports indicated that GSR used the TPW address to distribute programmatic sales revenue to Ripple at the TPWR address. The “Fund II” term in the TPWR address label returned an additional address [REDACTED]. Analysis of this address’ transaction history showed repeated large transfers to an address labeled “GSR 2t new Cold Wallet” ([REDACTED] in the Ripple wallet index. The naming of this address confirmed that it was used for the 2t bot previously discussed. An additional address, named only as “buffer” [REDACTED] in Excel\_Export\_2018\_2h\_Ripple\_Liquidity\_Extraction\_Report.xlsx, received many large transfers from the GSR 2t cold wallet. Based on the transfer of funds from a labeled 2t address, this wallet was inferred to have been used as a buffer for both bots 2t and 2h.

**Table 8. Identified Addresses.**

<b>Name</b>	<b>Index</b>	<b>Address</b>
Ripple Initial	Fund II	[REDACTED]
Cold	GSR 2t new Cold Wallet	
Buffer	Buffer	
TPW	TPW_2t GSR	
TPWR	Fund II TPWR 2	

**Tracing Methodology**

158. At several stages in this analysis, confirmatory blockchain tracing was performed using a publicly available dataset containing the full history of transactions on the XRP ledger. Transactions of the “Payment” and “OfferCreate” types were reviewed at each stage. In all cases, only transactions that resulted in response code “tesSUCCESS” and successfully entered the XRP ledger were considered. The flow of funds between these addresses was considered in terms of XRP, BTC, USD, and other fiat currencies.

**Transfer of XRP from Ripple to GSR Cold Wallet**

159. The candidate origin address for Ripple funds was selected based on its name (Fund II) matching the name of Ripple’s TPWR address (Fund II TPWR 2) in Ripple’s wallet index. Four XRP-to-XRP payments were identified between this Ripple controlled address and GSR’s ‘2t new Cold Wallet’ during the sample window. These transactions moved a total of 290 million XRP into GSR’s custody.

**Transfer of XRP from GSR Cold Wallet to GSR Buffer Wallet**

160. During the sample window, 5 transactions were identified between GSR’s 2t cold wallet and an address found in the 2h Liquidity Extraction Report (GSR00000102). This address was labeled as the Buffer for the 2h bot. These 5 transactions (all XRP-XRP payments) moved a total of 240 million XRP to the Buffer address. These transactions between the 2t cold wallet and 2h buffer suggest that the same buffer address was used for both bots despite the 2t files not

identifying their buffer address. This inference was validated by continued tracing forward from this buffer address presented later in this document.

### **Identification of GSR Intermediary and Trading Addresses**

161. Beyond the buffer address, the next identified address at this stage of the analysis was the 'TPW\_2t GSR' from which GSR sent revenue back to Ripple. The intermediary and trading addresses were inferred to exist between these addresses. This inference was validated by identifying transactions from the buffer address to the TPW address over 3 hops: i) buffer to intermediary, ii) intermediary to trading, and iii) trading to TPW. As expected, no direct transactions were found between the buffer and TPW addresses.

162. Addresses that received funds from the buffer wallet during the sample window were dubbed 'candidate intermediary addresses' due to their position directly following the buffer in transaction sequence. Each of these addresses received at least one payment transaction from the buffer address during the sample window. A set of candidate trading wallets was created by identifying all addresses that sent at least one payment transaction to the TPW address during the sample window. 96 candidate intermediary addresses and 68 candidate trading addresses were identified. It was further confirmed that each candidate trading address made at least one OfferCreate transaction that exchanged XRP for another digital asset or fiat currency during the sample window. Each of the 68 candidate trading wallets met this criterion.

163. The transaction histories of the candidate intermediary and trading addresses were then checked for transfers where a candidate intermediary sent XRP directly to a candidate trading address. Each address that made such a transaction was added to a list of validated intermediary or trading addresses depending on its position as sender or recipient of these transactions. All 96 of the candidate intermediary addresses were confirmed to send at least one

transaction to a candidate trading address; however, only 20 of the 68 candidate trading addresses received XRP from a candidate intermediary during the sample window. XRP flowed from buffer to intermediary, intermediary to trading wallets for sale, then from trading wallets to TPW as fiat currency or BTC. Transaction volume at each of these stages are described in the following sections.

#### **Transfer of XRP from GSR Buffer Wallet to GSR Intermediary Wallets**

164. The buffer address identified in the previous stage sent a total of 226 million XRP to the intermediary wallets during the sample window. A total of 75,348 transactions with a mean size of 3,003.24 XRP were sent to 96 unique intermediaries. Each of these intermediaries was verified to send at least some portion of those funds forward to the set of trade addresses. All transactions were again XRP-to-XRP.

#### **Transfer of XRP from GSR intermediary to GSR trading wallets**

165. Transactions between the 96 identified intermediary addresses and the 20 identified trading addresses resulted in 259 million XRP moving from intermediary to trade addresses over 80,291 XRP-to-XRP transactions. After this stage, it was expected that the trading wallets would sell the received XRP in exchange for BTC or fiat currencies. As previously described, each of the 20 trading addresses was confirmed to have made at least one OfferCreate transaction during this window. A total of 783,776 OfferCreate transactions were successfully entered into the ledger by these addresses during the sample window. The least active trading address entered 8,888 while the most active created 71,097 offers.

#### **Transfer of USD/BTC from Trading Wallets to GSR Profits Distribution (TPW) Wallet**

166. The final step of activity in GSR custody was the pooling of sales revenue into a single address for distribution back to Ripple. This address, labeled as GSR profits distribution

(TPW), received 5,974 transactions from the 20 trading addresses. These transactions sent BTC and USD via the XRP ledger. The TPW address also sent 612 ‘OfferCreate’ Transactions exchanging BTC for USD during the sample window.

**Transfer of USD from GSR profits distribution (TPW) wallet back to Ripple (TPWR)**

167. The TPW address sent 6 transactions for a total of \$1.13 million to the Ripple Fund II TPWR address during the sample window. At this point, custody was returned to Ripple and GSR reported the revenue payments in the liquidity extraction reports.

**Transfer of USD from Ripple TPWR to Outside Entity for Withdrawal**

168. The full transaction history of the Ripple TPWR address for the sample window was obtained for analysis at this stage. This address received a large amount of Bitstamp-issued USD on the XRP ledger. Ripple’s TPWR address then sent 4 transactions totaling \$830,000 to a Bitstamp address. Each transaction had the same destination tag ([REDACTED]6371). Destination tags are typically used by exchanges to reference specific customer deposit addresses. By including this tag, Ripple effectively marked these funds as intended for the same account holder at Bitstamp. Ripple is the presumed owner of the Bitstamp account associated with this destination tag.

**Table 9. Updated Summary of Identified Addresses.**

<b>Name</b>	<b>Index</b>	<b>Address</b>
Ripple Initial	Fund II	[REDACTED]
Cold	GSR 2t new Cold Wallet	[REDACTED]
Buffer	Buffer	[REDACTED]
Intermediate	Not Listed	Multiple (n = 96)
Trading	Not Listed	Multiple (n = 20)
TPW	TPW_2t GSR	[REDACTED]
TPWR	Fund II TPWR 2	[REDACTED]
Bitstamp	Ripple Bitstamp	[REDACTED] DT: [REDACTED]6371

**Full Structure of GSR Bot 2t**

169. Based on this analysis, the presented model for bot 2t was verified and extended an additional step forward to capture Ripple's deposits to a digital asset exchange (Bitstamp). The following stages illustrate the complete flow of funds from Ripple Fund II as XRP to Ripple's Bitstamp deposit address as USD:

**Table 10. Stages of 2t Bot Activity and Associated Asset/Fiat Currency.**

<b>Step</b>	<b>Description</b>	<b>Asset</b>
1	Ripple Fund II to GSR 2t cold wallet	XRP
2	GSR cold wallet to Buffer	XRP
3	Buffer to many Intermediary addresses	XRP
4	Intermediary addresses to Trading addresses	XRP
5	Trading addresses to TPW	BTC, USD
6	TPW to Ripple TPWR	USD
7	Ripple TPWR to Bitstamp	USD

170. Each address presented in Table 9 engaged in the transfer or sale of XRP originating from Ripple during the sample window. This analysis captured only intermediary addresses that directly received XRP from the buffer wallet. It remains possible that additional intermediary or trading addresses exist that were not identified in this analysis, either because they did not trade during the sample window or because they received funds over more than one hop from the GSR Buffer address.

171. Where multiple addresses existed at a stage, namely the intermediary and trading wallets, a subset of 4 addresses were drawn for inclusion in the final flow chart presented in Figure 19. These addresses were selected for illustrative purposes based on connections with other addresses in the figure.

## 7. APPENDIX C – METHODOLOGY FOR DETERMINING THE LOCATION OF XRL LEDGER VALIDATORS

173. The Sections below describe the methodology used to create the chart seen in Figure 20.

### Summary of Sources

174. This analysis draws upon Ripple’s *rippled* source code repository (*rippled* is the name of the source code for nodes that run the XRP Ledger), Ripple’s archived history of its Unique Node List (“UNL”, which is the list of the official domains validating and recording all the transactions on the XRP Ledger), the XRP Charts’ validator registry, and the I.P. and domain lookup tools provided by the ViewDNS website. All of this information is publicly available.

### Description

175. The figure shows the percentage of validators on the default Ripple UNL that have historically been based in the United States. It covers the time period of September 2012 to December 2020. Each data point represents the state of the UNL at the end of that month. The blue part of the graph is the percentage of validating nodes operating outside of the US, while red is the percentage of validating nodes operating in the US.

### Methodology

176. This analysis tracks two lists of validators. From September 2012 through October 2017, it relies on the list of public keys included in the validators-example.txt file in early versions of the *rippled* source code.<sup>256</sup> These validators were all owned and operated by Ripple, a U.S. company, and early iterations of the default configuration files include U.S. I.P. addresses to connect to these validators. Later iterations of these files, leading up to the

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<sup>256</sup> Ripple. Rippled Source Code. <https://github.com/ripple/rippled>.

publishing of the first default UNL, include “ripple.com” as the Ripple-owned validators’ domain. This domain can be traced to a U.S. server, and it has always been based in the U.S.<sup>257</sup> Subsequent validator lists have consistently listed Ripple’s validators’ domains as the subdomain “validator.ripple.com,” which again appears as in the United States.<sup>258</sup> Therefore, every validating node operated by Ripple is viewed as U.S.-based. For November 2017 through December 2020, this analysis uses records of the dynamic validator list Ripple publishes at vl.ripple.com.<sup>259</sup> The validators included in these lists are split into “Non-U.S.” and “U.S.” primarily through geolocation of each organization or individual’s domain, which is easily accessed through XRP Charts’ validator registry.<sup>260</sup> In certain cases where the IP address of a validator resolves to a U.S. location, but its organization is headquartered outside of the US, those validators are discretionarily sorted into “Non-US” to maintain a conservative estimate of validators based in the US.

## Findings

177. As demonstrated by the figure, a significant number of XRP Ledger validators operate in the U.S. In fact, the majority of default UNL validators from September 2012 to December 2020 are based in the US. Furthermore, for the majority of the XRP Ledger’s existence up until June 2018, the default validator list has only included Ripple-operated validators, and so the list has been entirely US-based for most of its existence.

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<sup>257</sup> ViewDNS. View DNS info for Ripple.com. <https://viewdns.info/iphistory/?domain=ripple.com>.

<sup>258</sup> ViewDNS. View DNS info for validator.ripple.com.

<https://viewdns.info/reverseip/?host=validator.ripple.com&t=1>; <https://viewdns.info/iplocation/?ip=52.38.41.179>.

<sup>259</sup> Ripple. Archived versions of validator lists published on vl.ripple.com. <https://github.com/ripple/vl>.

<sup>260</sup> XRP Charts. Validator Registry. <https://xrcharts.ripple.com/#/validators>.

**8. APPENDIX D – LIST OF DOCUMENTS AND DATA SOURCES CONSIDERED FOR THIS REPORT**

<b>Document Name</b>	<b>Reference</b>
2019-09-10 GSR Master lease agreement.	GSR00000039
Agoric. Agoric Under the Hood.	<a href="https://agoric.com/tech/">https://agoric.com/tech/</a>
Amendment to Articles of Incorporation of Newcoin, Opencoin, Inc. (2013).	<a href="https://businesssearch.sos.ca.gov/Document/RetrievePDF?Id_03505635-16985455">https://businesssearch.sos.ca.gov/Document/RetrievePDF?Id_03505635-16985455</a>
Azimo. Azimo Home Page.	<a href="https://azimo.com/en/countries">https://azimo.com/en/countries</a>
Barrons. The Cryptocurrency Investor Forum.	<a href="https://barronscustomevents.com/grayscale">https://barronscustomevents.com/grayscale</a>
Bifinex. Bitfinex account details.	██████████_Ripple 0000105
Binance. Launch of Binance.US (2019).	<a href="https://www.binance.com/en/blog/346119082624540672/Binance-Announces-Partnership-with-BAM-to-Launch-US-Exchange">https://www.binance.com/en/blog/346119082624540672/Binance-Announces-Partnership-with-BAM-to-Launch-US-Exchange</a>
Bithumb. Bithumb Terms of Service (Archived on December 19, 2020).	<a href="https://web.archive.org/web/20191219103055/https://support.bithumb.pro/hc/en-us/articles/360021308933-Terms-of-Service">https://web.archive.org/web/20191219103055/https://support.bithumb.pro/hc/en-us/articles/360021308933-Terms-of-Service</a>
Bithumb. Bithumb Terms of Service (Archived on December 5, 2020).	<a href="https://web.archive.org/web/20201205122237/https://support.bithumb.pro/hc/en-us/articles/360021308933-Terms-of-Service">https://web.archive.org/web/20201205122237/https://support.bithumb.pro/hc/en-us/articles/360021308933-Terms-of-Service</a>
Bithumb. Bithumb Terms of Service (Archived on October 11, 2021).	<a href="https://web.archive.org/web/20210116151101/https://support.bithumb.pro/hc/en-us/articles/360021308933-Terms-of-Service">https://web.archive.org/web/20210116151101/https://support.bithumb.pro/hc/en-us/articles/360021308933-Terms-of-Service</a>
Bitsatamp. Bitstamp Home Page.	<a href="https://www.bitstamp.net/">https://www.bitstamp.net/</a>
Bitso. Bitso Fees (Archived on November 12, 2020).	<a href="https://web.archive.org/web/20201112041112/https://bitso.com/fees">https://web.archive.org/web/20201112041112/https://bitso.com/fees</a>
Bitstamp account and trading details (2020)	BITSTAMP USA 00000071; BITSTAMP USA 00000137; BITSTAMP USA 00000001; BITSTAMP USA 00000044

Bitstamp account and trading details (2020).	BITSTAMP USA_00002211; BITSTAMP USA_00002326
Bitstamp. Bitstamp About Us.	<a href="https://www.bitstamp.net/about-us/">https://www.bitstamp.net/about-us/</a>
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ViewDNS. View DNS info for bitstamp.net.	<a href="https://viewdns.info/iphistory/?domain_bitstamp.net">https://viewdns.info/iphistory/?domain_bitstamp.net</a>
ViewDNS. View DNS Info for Ripple.com.	<a href="https://viewdns.info/iphistory/?domain_ripple.com">https://viewdns.info/iphistory/?domain_ripple.com</a>
Weiste Wind. Fetch All Transactions from the XRP Ledger.	<a href="https://github.com/WietseWind/fetch-xrpl-transactions">https://github.com/WietseWind/fetch-xrpl-transactions</a>
Worldcore. Worldcore ICO.	<a href="https://worldcore.com/">https://worldcore.com/</a>
XRP Arcade. Chainalysis adds support for XRP (2020).	<a href="https://www.xrparcade.com/news/chainalysis-adds-support-for-xrp/">https://www.xrparcade.com/news/chainalysis-adds-support-for-xrp/</a>
XRP Charts. Validator Registry.	<a href="https://xrpcharts.ripple.com/#/validators">https://xrpcharts.ripple.com/#/validators</a>
XRP Chat. Discussion of XRP listing for short term trading on Plus500.	<a href="https://www.xrpchat.com/topic/6549-ripple-xrp-added-to-plus500-trading-platform/">https://www.xrpchat.com/topic/6549-ripple-xrp-added-to-plus500-trading-platform/</a>
XRP Ledger. Transaction Type: Payment.	<a href="https://xrpl.org/payment.html">https://xrpl.org/payment.html</a>
XRP Programmatic Sales Reporting FY14 to Date v2.	RPLI_SEC 74559
XRPscan API. Well-Known Address List.	<a href="https://docs.xrpscan.com/api-doc.html?highlight_well%20known">https://docs.xrpscan.com/api-doc.html?highlight_well%20known</a>
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YouTube. Trade Desk: Advancing the Asset (2017).	<a href="https://youtu.be/jdFuiRVNUoM?">https://youtu.be/jdFuiRVNUoM?</a>

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<p><a href="https://cryptopay.me/bitcoin-wallet">https://cryptopay.me/bitcoin-wallet</a> <a href="https://cryptosa.org/portfolio/">https://cryptosa.org/portfolio/</a> <a href="https://cryptosa.org/#about">https://cryptosa.org/#about</a> Expert Report of Peter Adriaens, October 3, 2021 at 64 and Appendix D. <a href="https://fliqpay.com/blog/crypto-payments-on-fliq/">https://fliqpay.com/blog/crypto-payments-on-fliq/</a> hubrisone.com <a href="https://keyless.io/">https://keyless.io/</a> <a href="https://www.coindesk.com/markets/2019/10/30/ripple-invests-in-biometric-cybersecurity-startups-22-million-round/">https://www.coindesk.com/markets/2019/10/30/ripple-invests-in-biometric-cybersecurity-startups-22-million-round/</a> <a href="https://blog.luckbox.com/luckbox-welcomes-bitcoin-ethereum-xpr-and-litecoin-deposits-b45e78c6af12">https://blog.luckbox.com/luckbox-welcomes-bitcoin-ethereum-xpr-and-litecoin-deposits-b45e78c6af12</a> <a href="https://luckyfish.io/faq#aboutLuckyFish">https://luckyfish.io/faq#aboutLuckyFish</a> <a href="https://web.archive.org/web/20210711191910/">https://web.archive.org/web/20210711191910/</a> <a href="https://luckygames.io/">https://luckygames.io/</a> <a href="https://oveit.com/blog/2020/03/23/crypto-payments-events-venues/">https://oveit.com/blog/2020/03/23/crypto-payments-events-venues/</a> <a href="https://ppcprotect.com/">https://ppcprotect.com/</a> <a href="https://www.acceptedhere.io/catalog/company/ppcprotect-com/">https://www.acceptedhere.io/catalog/company/ppcprotect-com/</a> <a href="https://www.crunchbase.com/organization/propy/company_financials">https://www.crunchbase.com/organization/propy/company_financials</a> <a href="https://ripplecoinnews.com/ripples-ecosystem-continues-to-grow-as-xrp-partners-with-propy-and-gets-listed-on-stock-ios-app/">https://ripplecoinnews.com/ripples-ecosystem-continues-to-grow-as-xrp-partners-with-propy-and-gets-listed-on-stock-ios-app/</a> <a href="https://pumapay.io/we-now-support-ripple-stellar">https://pumapay.io/we-now-support-ripple-stellar</a> <a href="https://wiki.pumapay.io/pumapay-wallet">https://wiki.pumapay.io/pumapay-wallet</a> <a href="https://twitter.com/pumapay/status/1194888336936230914">https://twitter.com/pumapay/status/1194888336936230914</a> <a href="https://www.spoton.com/">https://www.spoton.com/</a> <a href="https://www.prnewswire.com/news-releases/spoton-enables-merchants-to-accept-cryptocurrency-with-vaultbank-partnership-300758252.html">https://www.prnewswire.com/news-releases/spoton-enables-merchants-to-accept-cryptocurrency-with-vaultbank-partnership-300758252.html</a> <a href="https://vaultbank.io/">https://vaultbank.io/</a> ODL transaction volume records: RPLI_SEC 0300926, RPLI_SEC 0301032, RPLI_SEC 0533162. <a href="https://www.qidigital.com/blockchain-payments/">https://www.qidigital.com/blockchain-payments/</a> <a href="https://www.tapjets.com/article/private-jet-pay-with-monero">https://www.tapjets.com/article/private-jet-pay-with-monero</a> <a href="https://www.travala.com/payment/xrp">https://www.travala.com/payment/xrp</a> <a href="https://twitter.com/travalacom/status/1108369768464039937?lang=en">https://twitter.com/travalacom/status/1108369768464039937?lang=en</a> <a href="https://trip.io/">https://trip.io/</a> <a href="https://medium.com/tripio/the-importance-of-cooperation-with-stable-coins-559d63d53a2">https://medium.com/tripio/the-importance-of-cooperation-with-stable-coins-559d63d53a2</a> <a href="https://medium.com/tripio/tripio-2018-annual-summary-f8081951f5d7">https://medium.com/tripio/tripio-2018-annual-summary-f8081951f5d7</a> <a href="https://twitter.com/thetripio">https://twitter.com/thetripio</a> <a href="https://www.cbinsights.com/company/tripio">https://www.cbinsights.com/company/tripio</a> <a href="https://uconekt-pay.com/#!/about">https://uconekt-pay.com/#!/about</a> <a href="https://www.viabtc.com/">https://www.viabtc.com/</a> <a href="https://wirexapp.com/blog/post/a-ripple-at-wirex-0036">https://wirexapp.com/blog/post/a-ripple-at-wirex-0036</a></p>
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	<p> <a href="https://www.crunchbase.com/organization/wirex-limited/company_financials">https://www.crunchbase.com/organization/wirex-limited/company_financials</a>  <a href="https://wirexapp.com/cryptocurrencies">https://wirexapp.com/cryptocurrencies</a>  <a href="https://worldcore.com/">https://worldcore.com/</a>  <a href="https://aave.com/">https://aave.com/</a>  <a href="https://www.kraken.com/en-us/learn/what-is-aave-lend">https://www.kraken.com/en-us/learn/what-is-aave-lend</a>  <a href="https://medium.com/anchorage/anchorage-supports-xrp-78f088c8b5e7">https://medium.com/anchorage/anchorage-supports-xrp-78f088c8b5e7</a>  <a href="https://www.anchorage.com/">https://www.anchorage.com/</a>  <a href="https://web.archive.org/web/20201221020259/https://www.anchorage.com/">https://web.archive.org/web/20201221020259/https://www.anchorage.com/</a>  <a href="https://lab577.io/wp-content/uploads/2019/08/LAB577_BCB_Article.pdf">https://lab577.io/wp-content/uploads/2019/08/LAB577_BCB_Article.pdf</a>  <a href="https://www.bcbgroup.com/tag/xrp/">https://www.bcbgroup.com/tag/xrp/</a>  <a href="https://www.bitcoinsuisse.com/fundamentals/what-is-ripple-xrp">https://www.bitcoinsuisse.com/fundamentals/what-is-ripple-xrp</a>  <a href="https://support.bitcoinsuisse.com/hc/en-us/articles/360002363819-Which-crypto-assets-can-I-buy-and-sell-through-Bitcoin-Suisse-Online-">https://support.bitcoinsuisse.com/hc/en-us/articles/360002363819-Which-crypto-assets-can-I-buy-and-sell-through-Bitcoin-Suisse-Online-</a>  <a href="https://www.bitgo.com/resources/integrations">https://www.bitgo.com/resources/integrations</a> (“Custody” and “Prime Services” sections)  <a href="https://bitso.com/">https://bitso.com/</a>  <a href="https://celsius.network/">https://celsius.network/</a>  <a href="https://celsius.network/rates/">https://celsius.network/rates/</a>  <a href="https://celsius.network/crypto-loans">https://celsius.network/crypto-loans</a>  <a href="https://coinloan.io/earn-interest-on-crypto/">https://coinloan.io/earn-interest-on-crypto/</a>  <a href="https://www.prnewswire.com/news-releases/more-than-14-million-xrp-deposits-within-the-first-week-of-listing-on-coinloan-301081431.html">https://www.prnewswire.com/news-releases/more-than-14-million-xrp-deposits-within-the-first-week-of-listing-on-coinloan-301081431.html</a>  <a href="https://coinme.com/about/">https://coinme.com/about/</a>  <a href="https://nydig.com/">https://nydig.com/</a>  <a href="https://coinmarketcap.com/exchanges/okcoin/">https://coinmarketcap.com/exchanges/okcoin/</a>  <a href="https://otcbtc.io/">https://otcbtc.io/</a>  <a href="https://www.cryptowisser.com/exchange/otcbtc/coins/?lang=es">https://www.cryptowisser.com/exchange/otcbtc/coins/?lang=es</a>  <a href="https://plasmapay.com/personal-features">https://plasmapay.com/personal-features</a>  <a href="https://docs.pokt.network/home/resources/references/supported-blockchains">https://docs.pokt.network/home/resources/references/supported-blockchains</a>  <a href="https://www.liquid.com/company/">https://www.liquid.com/company/</a>  <a href="https://www.liquid.com/company/">https://www.liquid.com/company/</a>  <a href="https://www.cbinsights.com/company/quoise">https://www.cbinsights.com/company/quoise</a>  <a href="https://blog.revolut.com/important-update-on-xrp/">https://blog.revolut.com/important-update-on-xrp/</a>  <a href="https://www.revolut.com/about-revolut">https://www.revolut.com/about-revolut</a>  <a href="https://www.bbc.com/news/business-47768661">https://www.bbc.com/news/business-47768661</a>  RPLI_SEC 0981977  <a href="https://help.ripio.com/hc/es/articles/1500003259382--Conqu%C3%A9-criptomonedas-puedo-operar-en-Ripio-">https://help.ripio.com/hc/es/articles/1500003259382--Conqu%C3%A9-criptomonedas-puedo-operar-en-Ripio-</a>  <a href="https://www.ripio.com/ar/criptomonedas/">https://www.ripio.com/ar/criptomonedas/</a> </p>
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## 9. APPENDIX E – CV

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### KEY QUALIFICATIONS AND EXPERIENCES

- Leads data-driven investigations in cryptocurrency fraud cases involving Ponzi schemes, market manipulation, money laundering, and securities violations
- Provides technical assistance to government regulators, agencies, and private companies related to digital asset technologies and forensic data analytics
- Leads team of data scientists analyzing blockchain data such as on-chain trading, smart contract activity, DeFi platforms, and tracing complex funds transfers

- Runs an investment partnership, with first-hand experience investing in digital assets, trading digital assets on cryptocurrency spot and futures markets, executing digital asset arbitrage strategies, and developing quantitative and discretionary investment strategies across a wide range of asset classes

### EDUCATION

[REDACTED]  
M.S., Electrical Engineering, May 2010

[REDACTED]  
B.S., Electrical Engineering, May 2006  
*Honors: magna cum laude*

### PROFESSIONAL EXPERIENCE

[REDACTED]  
*Director*

*Jan '19 – present*

- Leads data-driven investigations in cryptocurrency fraud cases involving money laundering, market manipulation, theft, and securities violations
- Manages a team that creates custom software and data analysis solutions to trace, cluster, and deanonymize cryptocurrency transactions
- Builds statistical tools to analyze trading data and algorithmically identify manipulative trading activity
- Analyzes activity patterns in smart contracts, ERC-20 tokens, and fund transfers on the Ethereum blockchain to identify fraudulent financial activity

[REDACTED]

Sep '16 – present

*Founder and CEO*

- Founded a quantitative investment fund originally focused on cryptocurrency arbitrage as well as derivatives strategies in equity, commodities, and currency markets
- Makes discretionary investments across a broad collection of private and public assets – equities, commodities, bonds, real estate, derivatives, private businesses, and digital assets
- Designed software to automate execution of multiple investment strategies, identify arbitrage opportunities, manage counterparty risk, and securely store cryptocurrency assets
- Created multi-asset algorithmic investment strategies to exploit pricing inefficiencies across time, exchanges, and assets in cryptocurrency markets
- Developed derivatives trading strategies utilizing machine learning and statistical signal processing techniques

[REDACTED]

Burlington, MA

Jul '15-Aug '16

*Founder and CEO*

- Founded a technology company that developed automotive radar for autonomous vehicles
- Designed radar hardware and signal processing algorithms to enable automated detection of objects in a vehicle's environment
- Managed the company's engineering, fundraising, and recruiting efforts

[REDACTED]

Bedford, MA

Jan '13-Jun '15

*Senior Engineer*

- Designed, modeled, tested, and defined requirements for multiple large radar projects
- Engineering and project management focused primarily on hardware, signal processing, and system integration

[REDACTED]

Lexington, MA

Sep '10- Dec '12

*Associate Technical Staff*

- Developed signal processing algorithms for airborne radar systems
- Researched and prototyped novel detection and classification algorithms for high performance radar signal processing projects

**10. APPENDIX F – ANALYSIS OF “91 BUSINESSES” IN PROFESSOR ADRIAENS’  
REPORT**

**10. APPENDIX F – ANALYSIS OF “91 BUSINESSES” IN PROFESSOR ADRIAENS’ REPORT<sup>1</sup>**

<b>Business Name</b>	<b>Categorization</b>	<b>Determination: Is XRP Core to business?</b>	<b>Notes on Determination</b>	<b>Source(s) Considered</b>
ActionFactory Inc. (d/b/a Stronghold)	Payments	No	Stronghold is primarily a fiat payment platform that originated with the Stellar platform/blockchain. It issues a ledger agnostic digital asset called SHx. Only two of 18 markets involving SHx listed on CoinMarketCap also involve XRP. Stronghold's digital asset trading platform first listed two XRP markets in February 2019, among at least seven other markets, the year after its venture capital round.	<a href="https://www.xrparcade.com/news/xrp-added-on-stronghold-trading-three-xlm-pairs-removed/">https://www.xrparcade.com/news/xrp-added-on-stronghold-trading-three-xlm-pairs-removed/</a> ; <a href="https://www.crunchbase.com/organization/stronghold/company_financials">https://www.crunchbase.com/organization/stronghold/company_financials</a> ; <a href="https://stronghold.co/learn/strongholds-backstory">https://stronghold.co/learn/strongholds-backstory</a> ; <a href="https://coinmarketcap.com/currencies/stronghold-token/markets/">https://coinmarketcap.com/currencies/stronghold-token/markets/</a>
BitBounce	Payments	No	This platform added XRP two years after its last funding round. Website is no longer active.	<a href="https://twitter.com/bitbounceio/status/1103717100843982848">https://twitter.com/bitbounceio/status/1103717100843982848</a> ; <a href="https://www.crunchbase.com/organization/turing-technology-inc-/company_financials">https://www.crunchbase.com/organization/turing-technology-inc-/company_financials</a>
Bitgild	Payments	No	XRP is one of at least 18 digital assets accepted by this platform, which uses a third party payment provider to handle digital asset transactions.	<a href="https://bitgild.medium.com/buy-gold-with-crypto-5cf7ecaff53a">https://bitgild.medium.com/buy-gold-with-crypto-5cf7ecaff53a</a>

<sup>1</sup> This Appendix contains information compiled while examining Professor Adriaens’ list of “91 Businesses.” It supplements and should be considered together with my opinion given in Section 3 of this Rebuttal report. To the extent this Appendix describes what a company is or does, that assessment is based on my review of the documents identified in the “Source(s) Considered” column.

BitPay	Payments	No	<p>Professor Adriaens' criteria used to identify companies that purportedly demonstrate the commercial utility of XRP or the XRP Ledger states that only companies founded after Ripple's incorporation should be considered. In Appendix D, Adriaens lists a founding date prior to 2012.</p> <p>Professor Adriaens also lists BitPay as having had a partnership with Ripple in Section IV.B of his report pertaining to "Products Enabled by Ripple," which should have excluded BitPay from this analysis according to Professor Adriaens' criteria.</p>	<p>Expert Report of Peter Adriaens, October 3, 2021 at 62, 64 and Appendix D;  <a href="https://www.globenewswire.com/news-release/2019/10/02/1924157/0/en/BitPay-Announces-Plans-to-Support-XRP-for-Payment-Processing-and-Cross-Border-Transfers.html">https://www.globenewswire.com/news-release/2019/10/02/1924157/0/en/BitPay-Announces-Plans-to-Support-XRP-for-Payment-Processing-and-Cross-Border-Transfers.html</a>;  <a href="https://xrpscan.com/tx/F1267D15E99C4D271DD1AB98D5BD169B540CE1E23E940E7AA4D95538AC295CD3">https://xrpscan.com/tx/F1267D15E99C4D271DD1AB98D5BD169B540CE1E23E940E7AA4D95538AC295CD3</a></p>
Blockdaemon	Payments	No	<p>Blockdaemon originated with the idea to provide infrastructure to operate Ethereum nodes more easily. The company offers XRP node setup as a service in addition to node setup for 40+ blockchain networks.</p>	<p><a href="https://blockdaemon.com/marketplace/xrp/">https://blockdaemon.com/marketplace/xrp/</a>;  <a href="https://blockdaemon.com/about/">https://blockdaemon.com/about/</a>;  <a href="https://blockdaemon.com/">https://blockdaemon.com/</a></p>
Bpay	Payments	No	<p>Bpay is no longer operating according to Crunchbase. There is no apparent connection to XRP or the XRP Ledger, but this cannot be verified, as Bpay's website is not functional.</p>	<p><a href="https://www.crunchbase.com/organization/bpay-io">https://www.crunchbase.com/organization/bpay-io</a></p>

Cobo	Payments	No	Cobo lists "Support for 40+ Chains and More Than 180+ Tokens" as a primary feature of its wallet service, and XRP is one of the many supported digital assets.	<a href="https://cobo.com/wallet">https://cobo.com/wallet</a>
Coil	Payments	Maybe	<p>Coil is a web monetization platform built on Ripple's Interledger Protocol (ILP), not the XRP Ledger itself. It appears that XRP was initially the only digital asset supported for payouts, but several other digital assets are now supported for payouts through Coil's partnership with Uphold.</p> <p>The ILP was developed by the Interledger Foundation, which was funded and founded by Ripple and its Board of Directors. Coil also received a 1 billion XRP grant from Ripple. Coil may therefore be considered among "Products Enabled by Ripple" according to Professor Adriaens' criteria.</p>	<a href="https://coil.com/about">https://coil.com/about</a> ; <a href="https://webmonetization.org/">https://webmonetization.org/</a> ; <a href="https://www.coindesk.com/ripple-is-giving-away-1-billion-xrp-in-massive-bid-to-fund-online-content">https://www.coindesk.com/ripple-is-giving-away-1-billion-xrp-in-massive-bid-to-fund-online-content</a> ; <a href="https://www.theverge.com/2020/8/19/21373988/mgur-emerald-subscription-service-announced-coil-micropayments">https://www.theverge.com/2020/8/19/21373988/mgur-emerald-subscription-service-announced-coil-micropayments</a> ; <a href="https://www.businesswire.com/news/home/20210414005467/en/Interledger-Foundation-Launches-to-Build-More-Equitable-and-Creative-Opportunities-on-the-Web">https://www.businesswire.com/news/home/20210414005467/en/Interledger-Foundation-Launches-to-Build-More-Equitable-and-Creative-Opportunities-on-the-Web</a> ; <a href="https://www.prnewswire.com/news-releases/uphold-announces-interledger-connectivity-with-coil-integration-301060372.html">https://www.prnewswire.com/news-releases/uphold-announces-interledger-connectivity-with-coil-integration-301060372.html</a>
CoinCorner	Payments	No	CoinCorner offers a Bitcoin-centric solution: "We're CoinCorner, a team of friendly and enthusiastic people, working together to make Bitcoin as easy for you as possible." Does not currently mention XRP on its website.	<a href="https://www.crunchbase.com/organization/coincorner">https://www.crunchbase.com/organization/coincorner</a> ; <a href="https://twitter.com/coincorner/status/1009390867575115777?lang=en">https://twitter.com/coincorner/status/1009390867575115777?lang=en</a>

Coinify	Payments	No	Coinify supports 19 digital assets for acceptance as payment by merchants. XRP is not included in this list.	<a href="https://help.coinify.com/hc/en-us/articles/360014079620-List-of-supported-cryptocurrencies-for-merchants">https://help.coinify.com/hc/en-us/articles/360014079620-List-of-supported-cryptocurrencies-for-merchants</a>
CoinPayments	Payments	No	XRP is one of hundreds of digital assets supported by this payment and custody platform.	<a href="https://www.coinpayments.net/supported-coins">https://www.coinpayments.net/supported-coins</a>
Coins.ph	Payments	No	Coins.ph offers a variety of products and services, including bill payment, cardless ATM, remittances and purchasing digital assets. XRP is one of four digital assets listed for sale on this platform.	<a href="https://coins.ph/">https://coins.ph/</a> , <a href="https://coins.ph/buy-cryptocurrency/">https://coins.ph/buy-cryptocurrency/</a> ; ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162.
CrumbsApp	Payments	No	This company's website is no longer active, but it only began supporting XRP in 2018, which was the year after its last round of venture capital funding.	<a href="https://twitter.com/crumsappio/status/1047227972162347008">https://twitter.com/crumsappio/status/1047227972162347008</a> ; <a href="https://www.crunchbase.com/organization/crumb-s-6012/company_financials">https://www.crunchbase.com/organization/crumb-s-6012/company_financials</a>
Crypto.com	Payments	No	XRP is one of 150+ digital assets traded and 30+ digital assets used for payments on this platform.	<a href="https://crypto.com/pay-merchant">https://crypto.com/pay-merchant</a> ; <a href="https://crypto.com/">https://crypto.com/</a>

Cryptopay	Payments	No	XRP is one of at least four digital assets supported by this platform.	<a href="https://cryptopay.me/bitcoin-wallet">https://cryptopay.me/bitcoin-wallet</a>
Cryptosa	Payments	No	This company is a blockchain startup advisor and accelerator with a portfolio of 10 projects, six of which are ongoing. There is no evidence that XRP or the XRP Ledger is connected to these portfolio companies.	<a href="https://cryptosa.org/portfolio/">https://cryptosa.org/portfolio/</a> ; <a href="https://cryptosa.org/#about">https://cryptosa.org/#about</a>
Ecwid	Payments	No	Professor Adriaens' criteria used to identify companies that purportedly demonstrate the commercial utility of XRP or the XRP Ledger states that only companies founded after Ripple's incorporation should be considered. In Appendix D, Adriaens lists a founding date prior to 2012.	Expert Report of Peter Adriaens, October 3, 2021 at 64 and Appendix D.
Fliqpay	Payments	No	XRP is one of at least five digital assets supported by this platform.	<a href="https://fliqpay.com/blog/crypto-payments-on-fliq/">https://fliqpay.com/blog/crypto-payments-on-fliq/</a>
HubrisOne	Payments	No	There is no apparent connection between this business and XRP or the XRP Ledger. This platform only seems to support ERC-20 tokens on the Ethereum blockchain; therefore, XRP is likely not a supported digital asset. If it is, XRP would be one of hundreds of digital assets available on this platform.	hubrisone.com
Keyless-Technologies	Payments	No	KeylessTechnologies is a biometric security company developing methods to store digital keys and passwords. Ripple provided some funding and publicity through Xpring (and this company may therefore be considered "Products	<a href="https://keyless.io/">https://keyless.io/</a> ; <a href="https://www.coindesk.com/markets/2019/10/30/ripple-invests-in-biometric-cybersecurity-startups-22-million-round/">https://www.coindesk.com/markets/2019/10/30/ripple-invests-in-biometric-cybersecurity-startups-22-million-round/</a>

			Enabled by Ripple” according to Professor Adriaens’ criteria), but the company's product appears unrelated to XRP and the XRP Ledger.	
LuckboxE-sports	Payments	No	Support for XRP, BTC, ETH, and LTC were added at the same time in Jan 2020. This company was previously a fiat-only sports betting platform.	<a href="https://blog.luckbox.com/luckbox-welcomes-bitcoin-ethereum-xpr-and-litecoin-deposits-b45e78c6af12">https://blog.luckbox.com/luckbox-welcomes-bitcoin-ethereum-xpr-and-litecoin-deposits-b45e78c6af12</a>
Luckyfish	Payments	No	XRP is one of 22 assets accepted by this platform, which promotes itself as a "Bitcoin Casino."	<a href="https://luckyfish.io/faq#aboutLuckyFish">https://luckyfish.io/faq#aboutLuckyFish</a>
Luckygames	Payments	No	Luckygames was a gambling site which advertised that it accepted payment in 103 digital assets before closing down.	<a href="https://web.archive.org/web/20210711191910/">https://web.archive.org/web/20210711191910/</a> ; <a href="https://luckygames.io/">https://luckygames.io/</a>
Oveit	Payments	No	Oveit is an event ticketing and registration software. XRP is one of five accepted digital assets used for payments, in addition to fiat currencies. Oveit began supporting digital asset payments by partnering with Crypto.com in 2020, four years after it was founded.	<a href="https://oveit.com/">https://oveit.com/</a> ; <a href="https://oveit.com/blog/2020/03/23/crypto-payments-events-venues/">https://oveit.com/blog/2020/03/23/crypto-payments-events-venues/</a>
PPCProtect	Payments	No	There is no mention of XRP on this company's site, and there is no clear connection between the company and XRP or the XRP Ledger. The only digital asset PPCProtect appears to accept as payment is Bitcoin.	<a href="https://ppcprotect.com/">https://ppcprotect.com/</a> ; <a href="https://www.acceptedhere.io/catalog/company/ppcprotect-com/">https://www.acceptedhere.io/catalog/company/ppcprotect-com/</a>

Propy	Payments	No	XRP added as a payment option in 2018, 2 years after opening. Propy raised \$15.5 million of a total of \$16.7 million in funding in 2017 prior to using XRP.	<a href="https://www.crunchbase.com/organization/propy/company_financials/">https://www.crunchbase.com/organization/propy/company_financials/</a> ; <a href="https://ripplecoinnews.com/ripples-ecosystem-continues-to-grow-as-xrp-partners-with-propy-and-gets-listed-on-stock-ios-app/">https://ripplecoinnews.com/ripples-ecosystem-continues-to-grow-as-xrp-partners-with-propy-and-gets-listed-on-stock-ios-app/</a>
PumaPay	Payments	No	Given that PumaPay supports all ERC-20 tokens, XRP is one of 850+ digital assets that are accepted. Pumapay did not support XRP until two years after its founding.	<a href="https://pumapay.io/we-now-support-ripple-stellar/">https://pumapay.io/we-now-support-ripple-stellar/</a> ; <a href="https://wiki.pumapay.io/pumapay-wallet/">https://wiki.pumapay.io/pumapay-wallet/</a> ; <a href="https://twitter.com/pumapay/status/1194888336936230914">https://twitter.com/pumapay/status/1194888336936230914</a>
Shopify	Payments	No	Professor Adriaens' criteria state that only companies founded after Ripple's incorporation should be considered. In Appendix D, Adriaens lists a founding date prior to 2012.	Expert Report of Peter Adriaens, October 3, 2021 at 64 and Appendix D.
SpotOn	Payments	No	SpotOn provides technology solutions for small business; there is no current mention of XRP on its website. It previously announced launching digital asset capabilities in a partnership with a company called VaultBank. However, that company is apparently now defunct and evidence was not found that these digital asset capabilities were ever completed. Ripple also offered incentives to SpotOn to use ODL, but evidence was not found that SpotOn ever actually did so.	<a href="https://www.spoton.com/">https://www.spoton.com/</a> ; <a href="https://www.prnewswire.com/news-releases/spoton-enables-merchants-to-accept-cryptocurrency-with-vaultbank-partnership-300758252.html">https://www.prnewswire.com/news-releases/spoton-enables-merchants-to-accept-cryptocurrency-with-vaultbank-partnership-300758252.html</a> ; <a href="https://vaultbank.io/">https://vaultbank.io/</a> ; ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162.

Stark-Payments	Payments	No	The URL provided by Professor Adriaens redirects to new site: <a href="https://www.qidigital.com/">https://www.qidigital.com/</a> . The new site states that four digital assets are accepted for payment and does not include XRP.	<a href="https://www.qidigital.com/blockchain-payments/">https://www.qidigital.com/blockchain-payments/</a>
TapJets	Payments	No	XRP is no longer among the four (formerly five) digital assets accepted as payment by this business.	<a href="https://www.tapjets.com/article/private-jet-pay-with-monero">https://www.tapjets.com/article/private-jet-pay-with-monero</a>
Travala	Payments	No	XRP is one of 67 digital assets and 13 fiat currencies accepted by this platform.	<a href="https://www.travala.com/payment/xrp">https://www.travala.com/payment/xrp</a> ; <a href="https://twitter.com/travalacom/status/1108369768464039937?lang=en">https://twitter.com/travalacom/status/1108369768464039937?lang=en</a>
Trip.io	Payments	No	The trip.io website is no longer active, and it is unclear if this company is defunct. This company is or was a Chinese marketplace for travel booking which promoted its own TRIO token for use on their platform. Its social media posts also reference accepting several other digital assets, but a reference to XRP was not identified in the sources reviewed.	<a href="https://trip.io/">https://trip.io/</a> ; <a href="https://medium.com/tripio/the-importance-of-cooperation-with-stable-coins-559d63d53a2">https://medium.com/tripio/the-importance-of-cooperation-with-stable-coins-559d63d53a2</a> ; <a href="https://medium.com/tripio/tripio-2018-annual-summary-f8081951f5d7">https://medium.com/tripio/tripio-2018-annual-summary-f8081951f5d7</a> ; <a href="https://twitter.com/thetripio">https://twitter.com/thetripio</a> ; <a href="https://www.cbinsights.com/company/tripio">https://www.cbinsights.com/company/tripio</a> ;
uConektPAY	Payments	No	XRP is one of 100+ digital assets supported by this platform.	<a href="https://uconekt-pay.com/#!/about">https://uconekt-pay.com/#!/about</a>
ViaBTC	Payments	No	This company is engaged in pooling resources to mine 18 digital assets. XRP (of which there is no mining involved) is not among these assets.	<a href="https://www.viabtc.com/">https://www.viabtc.com/</a>

WeMakePrice	Payments	No	Professor Adriaens' criteria state that only companies founded after Ripple's incorporation should be considered. In Appendix D, Adriaens lists a founding date prior to 2012.	Expert Report of Peter Adriaens, October 3, 2021 at 64 and Appendix D
Wirex	Payments	No	Two rounds of venture capital funding were completed prior to the addition of XRP to the platform in 2018, (approximately \$3.2 million of \$7.9 million raised). XRP is apparently one of 38 digital assets and 9 fiat currencies supported on the platform.	<a href="https://wirexapp.com/blog/post/a-ripple-at-wirex-0036">https://wirexapp.com/blog/post/a-ripple-at-wirex-0036</a> ; <a href="https://www.crunchbase.com/organization/wirex-limited/company_financials">https://www.crunchbase.com/organization/wirex-limited/company_financials</a> ; <a href="https://wirexapp.com/cryptocurrencies">https://wirexapp.com/cryptocurrencies</a>
Worldcore	Payments	No	This site appears to be a launch (ICO) for a token distinct from XRP. There is no apparent connection to XRP/XRP Ledger.	<a href="https://worldcore.com/">https://worldcore.com/</a>
AavePay	Trading Platforms/ Financial Services	No	Aave is a liquidity protocol implemented through a system of smart contracts that run on the Ethereum blockchain. XRP is not among the over 30 digital assets available on this platform.	<a href="https://aave.com/">https://aave.com/</a> ; <a href="https://www.kraken.com/en-us/learn/what-is-aave-lend">https://www.kraken.com/en-us/learn/what-is-aave-lend</a>
Anchorage	Trading Platforms/ Financial Services	No	Anchorage apparently began offering custody services (i.e., digital asset storage and security services) for institutional investors in April 2020. However, XRP was no longer supported as of Dec. 21, 2020 according to its homepage, which listed 37 other digital assets as being supported at that time.	<a href="https://medium.com/anchorage/anchorage-supports-xrp-78f088c8b5e7">https://medium.com/anchorage/anchorage-supports-xrp-78f088c8b5e7</a> ; <a href="https://www.anchorage.com/">https://www.anchorage.com/</a> <a href="https://web.archive.org/web/20201221020259/https://www.anchorage.com/">https://web.archive.org/web/20201221020259/https://www.anchorage.com/</a>

BCBGroup	Trading Platforms/ Financial Services	No	BCBGroup is a digital financial services platform, but there is currently no mention of XRP on its website, and there is no indication that the XRP Ledger is in any way core to this business.	<a href="https://lab577.io/wp-content/uploads/2019/08/LAB577_BCB_Article.pdf">https://lab577.io/wp-content/uploads/2019/08/LAB577_BCB_Article.pdf</a> ; <a href="https://www.bcbgroup.com/tag/xrp/">https://www.bcbgroup.com/tag/xrp/</a>
BitcoinSuisse	Trading Platforms/ Financial Services	No	XRP is not listed among the over 40 digital assets available to trade on this platform.	<a href="https://www.bitcoinsuisse.com/fundamentals/what-is-ripple-xrp">https://www.bitcoinsuisse.com/fundamentals/what-is-ripple-xrp</a> ; <a href="https://support.bitcoinsuisse.com/hc/en-us/articles/360002363819-Which-crypto-assets-can-I-buy-and-sell-through-Bitcoin-Suisse-Online-">https://support.bitcoinsuisse.com/hc/en-us/articles/360002363819-Which-crypto-assets-can-I-buy-and-sell-through-Bitcoin-Suisse-Online-</a>
BitGo	Trading Platforms/ Financial Services	No	XRP is one of over 500 digital assets supported by Bitgo's wallet. Bitgo's trading, lending, and settlement services do not support XRP.	<a href="https://www.bitgo.com/resources/integrations">https://www.bitgo.com/resources/integrations</a> (“Custody” and “Prime Services” sections)
Bitso	Trading Platforms/ Financial Services	No	XRP is one of 14 digital assets that can be traded on this platform (the homepage mentions nine digital assets but the dropdown menu lists 14).	<a href="https://bitso.com/">https://bitso.com/</a>

Bitstamp	Trading Platforms/ Financial Services	No	Professor Adriaens' criteria state that only companies founded after Ripple's incorporation should be considered. In Appendix D, Professor Adriaens lists a founding date prior to 2012.	Expert Report of Peter Adriaens, October 3, 2021 at 64 and Appendix D.
Celsius-Network	Trading Platforms/ Financial Services	No	Celsius allows users to deposit and earn interest on 46 digital assets. XRP is included in this list although the interest rate for XRP is now 0%. XRP is not in the list of 33 digital assets which can be staked as collateral for loans.	<a href="https://celsius.network/">https://celsius.network/</a> ; <a href="https://celsius.network/rates/">https://celsius.network/rates/</a> ; <a href="https://celsius.network/crypto-loans">https://celsius.network/crypto-loans</a>
CoinLoan	Trading Platforms/ Financial Services	No	XRP is one of 25 digital assets that can be traded and/or used as collateral for loans on this platform.	<a href="https://coinloan.io/earn-interest-on-crypto/">https://coinloan.io/earn-interest-on-crypto/</a> ; <a href="https://www.prnewswire.com/news-releases/more-than-14-million-xrp-deposits-within-the-first-week-of-listing-on-coinloan-301081431.html">https://www.prnewswire.com/news-releases/more-than-14-million-xrp-deposits-within-the-first-week-of-listing-on-coinloan-301081431.html</a>
CoinMe	Trading Platforms/ Financial Services	No	Coinme has a partnership with Moneygram and lists Xpring as one of its supporters (and may therefore be considered "Products Enabled by Ripple" according to Professor Adriaens' criteria). However, its kiosks only appear to support Bitcoin.	<a href="https://coinme.com/about/">https://coinme.com/about/</a>

NYDIG	Trading Platforms/ Financial Services	No	XRP is not central to this digital asset management and financial services firm, which describes itself as "a bitcoin company."	<a href="https://nydig.com/">https://nydig.com/</a>
Okcoin	Trading Platforms/ Financial Services	No	XRP is not among the 25+ digital assets currently available for trading on this platform.	<a href="https://coinmarketcap.com/exchanges/okcoin/">https://coinmarketcap.com/exchanges/okcoin/</a>
Otcbtc	Trading Platforms/ Financial Services	No	XRP is one of 36 digital assets available on this platform.	<a href="https://otcbtc.io/">https://otcbtc.io/</a> ; <a href="https://www.cryptowisser.com/exchange/otcbtc/coins/?lang=es">https://www.cryptowisser.com/exchange/otcbtc/coins/?lang=es</a>
PlasmaPay	Trading Platforms/ Financial Services	No	PlasmaPay advertises as a multi-functional platform (including "decentralized financial services and infrastructure"). XRP is one of 3,000+ digital assets available on this platform.	<a href="https://plasmapay.com/personal-features">https://plasmapay.com/personal-features</a>
Plus500	Trading Platforms/ Financial Services	No	Professor Adriaens' criteria state that only companies founded after Ripple's incorporation should be considered. In Appendix D, Adriaens lists a founding date prior to 2012.	Expert Report of Peter Adriaens, October 3, 2021 at 64 and Appendix D.
Pocket-Network	Trading Platforms/ Financial Services	No	This company provides remote procedure call (RPC) network access for various digital assets. XRP does not appear to be among the supported digital assets.	<a href="https://docs.pokt.network/home/resources/references/supported-blockchains">https://docs.pokt.network/home/resources/references/supported-blockchains</a>

Qryptos (Liquid)	Trading Platforms/ Financial Services	No	XRP is one of 80 digital assets available on the Liquid (formerly Qryptos) trading platform.	<a href="https://www.liquid.com/company/">https://www.liquid.com/company/</a>
Quoine	Trading Platforms/ Financial Services	No	Quoine is the name of the company that launched the Qryptos trading platform in the table entry directly above this one. The company and its exchange eventually rebranded as Liquid, and Professor Adriaens provides the link to Liquid's website for both entries in his list. Quoine is therefore a duplicate entry of Qryptos (Liquid), above; these are not two separate businesses.	<a href="https://www.liquid.com/company/">https://www.liquid.com/company/</a> ; <a href="https://www.cbinsights.com/company/quoine">https://www.cbinsights.com/company/quoine</a>
Revolut	Trading Platforms/ Financial Services	No	Revolut is a mobile app that offers a variety of services including money transfer, global ATM usage, budgeting assistance, and digital asset exchange and custody. Revolut's digital asset trading platform, launched two years after the company's founding, supports 30+ digital assets, including XRP, although it is not possible to withdraw XRP to be subsequently transferred on the XRP Ledger. Ripple paid incentives to Revolut to support XRP, and it may therefore be considered "Products Enabled by Ripple" according to Professor Adriaens' criteria	<a href="https://blog.revolut.com/important-update-on-xrp/">https://blog.revolut.com/important-update-on-xrp/</a> ; <a href="https://www.revolut.com/about-revolut">https://www.revolut.com/about-revolut</a> <a href="https://www.bbc.com/news/business-47768661">https://www.bbc.com/news/business-47768661</a> ; RPLI SEC 0981977
Ripio	Trading Platforms/ Financial Services	No	The Ripio website lists 12 digital assets available for trade on its platform and does not include XRP.	<a href="https://help.ripio.com/hc/es/articles/1500003259382--Con-qu%C3%A9-criptomonedas-puedo-operar-en-Ripio-">https://help.ripio.com/hc/es/articles/1500003259382--Con-qu%C3%A9-criptomonedas-puedo-operar-en-Ripio-</a> ; <a href="https://www.ripio.com/ar/criptomonedas/">https://www.ripio.com/ar/criptomonedas/</a> ; <a href="https://exchange.ripio.com/es/">https://exchange.ripio.com/es/</a>



techbureau	Trading Platforms/ Financial Services	No	XRP is not among at least 13 digital assets listed on Techbureau's digital asset trading platform, Zaif.	<a href="https://techbureau.jp/faq/">https://techbureau.jp/faq/</a> ; <a href="https://coinmarketcap.com/exchanges/zaif/">https://coinmarketcap.com/exchanges/zaif/</a>
Unocoin	Trading Platforms/ Financial Services	No	XRP is one of 30+ digital assets available on this platform.	<a href="https://coinmarketcap.com/exchanges/unocoin/">https://coinmarketcap.com/exchanges/unocoin/</a>
Uphold	Trading Platforms/ Financial Services	No	Uphold supports trading of 27 currencies, 65 digital assets (including XRP), 50 stocks, and 4 precious metals.	<a href="https://uphold.com/en-us">https://uphold.com/en-us</a> ; <a href="https://blog.uphold.com/xrp-is-now-live-on-uphold">https://blog.uphold.com/xrp-is-now-live-on-uphold</a>
VegaProtocol	Trading Platforms/ Financial Services	No	Vega is a network protocol for trading margined financial products that received funds from Xpring (and may therefore be considered “Products Enabled by Ripple” according to Professor Adriaens’ criteria). Vega has currently launched a testnet that facilitates trading Ropsten assets on an Ethereum bridge. It promises eventually to support the use of any digital asset as collateral.	<a href="https://www.businesswire.com/news/home/20191002005304/en/Vega-Raises-5-Million-to-Develop-Decentralized-Derivatives-Protocol">https://www.businesswire.com/news/home/20191002005304/en/Vega-Raises-5-Million-to-Develop-Decentralized-Derivatives-Protocol</a> ; <a href="https://vega.xyz/about/">https://vega.xyz/about/</a>
Young-Platform	Trading Platforms/ Financial Services	No	XRP is one of 23 digital assets available to trade on this platform.	<a href="https://youngplatform.com/en/exchange/">https://youngplatform.com/en/exchange/</a>
ZB	Trading Platforms/ Financial Services	No	Professor Adriaens’ criteria state that only companies founded after Ripple's incorporation should be considered. In Appendix D, Adriaens lists a founding date prior to 2012.	Expert Report of Peter Adriaens, October 4, 2021 at 64.

ZebPay	Trading Platforms/ Financial Services	No	XRP is one of 52 digital assets available on this platform.	<a href="https://zebpay.com/in/buy-cryptos/">https://zebpay.com/in/buy-cryptos/</a>
Agoric Systems LLC	Blockchain Technology	No	Though it received some funding from Xpring (and may therefore be considered “Products Enabled by Ripple” according to Professor Adriaens’ criteria), the company's technology is "blockchain agnostic," and its tech stack does not include any XRP Ledger related endpoints or protocols.	<a href="https://www.coindesk.com/markets/2019/05/13/ripples-xpring-outlier-ventures-back-4-million-raise-for-agoric/">https://www.coindesk.com/markets/2019/05/13/ripples-xpring-outlier-ventures-back-4-million-raise-for-agoric/</a> ; <a href="https://agoric.com/tech/">https://agoric.com/tech/</a>
Bluzelle	Blockchain Technology	No	Projects that involved XRP Ledger integration appear to have existed in its early stages, but the XRP Ledger is not core to its current functioning since it uses Tendermint as its consensus engine.	<a href="https://www.allcryptowhitepapers.com/bluzelle-whitepaper/">https://www.allcryptowhitepapers.com/bluzelle-whitepaper/</a> ; <a href="https://docs.bluzelle.com/developers/technology">https://docs.bluzelle.com/developers/technology</a>
BRD	Blockchain Technology	No	This wallet supports 70+ digital assets. BRD, which raised \$54.8 million between 2015 and 2019 according to Crunchbase, did receive a \$750,000 investment from Xpring in 2019, and BRD discussed joint marketing efforts with Ripple at that time. Although XRP support was added four years after BRD was founded, its XRP-related efforts may therefore be considered “Products Enabled by Ripple” according to Professor Adriaens’ criteria.	<a href="https://brd.com/blog/Ripple-Partnership;">https://brd.com/blog/Ripple-Partnership</a> ; <a href="https://www.crunchbase.com/organization/brd/company_financials">https://www.crunchbase.com/organization/brd/company_financials</a>

Chainalysis	Blockchain Technology	No	Chainalysis' core product is a blockchain tracing tool to enable investigators and compliance personnel to trace funds over various blockchains; Chainalysis claims to be able to trace or monitor "ALL cryptocurrency assets, representing over \$400 billion worth of transactions per month." Thus, neither XRP nor the XRP Ledger are core to its business model.	<a href="https://www.chainalysis.com/">https://www.chainalysis.com/</a>
Cryptonator	Blockchain Technology	No	XRP is one of at least seven digital assets supported by this "all-in-one online Bitcoin wallet."	<a href="https://www.cryptonator.com/">https://www.cryptonator.com/</a>
Edge	Blockchain Technology	No	This platform supports 31 assets and did not include XRP until June 2018. It raised \$2.1 million of its total of \$2.5 million in equity investment between 2014 and 2016, over a year before XRP was supported.	<a href="https://edge.app/?af=google-com;">https://edge.app/?af=google-com;</a> <a href="https://edge.app/blog/edge-wallet-monero-ripple-xrp/">https://edge.app/blog/edge-wallet-monero-ripple-xrp/</a>
Ellipal	Blockchain Technology	No	This wallet supports "41 Blockchains and 10,000+ Tokens."	<a href="https://www.ellipal.com/">https://www.ellipal.com/</a>
Exodus	Blockchain Technology	No	Exodus supports 152 digital assets, including XRP.	<a href="https://www.exodus.com/desktop/">https://www.exodus.com/desktop/;</a> <a href="https://www.crunchbase.com/organization/exodus-052e/company_financials">https://www.crunchbase.com/organization/exodus-052e/company_financials</a>
FlareFinance/ Flare- Networks	Blockchain Technology	Yes	Spark, the native token of the Flare Network, was created through a utility fork of the XRP Ledger.  Ripple made a payment to Flare Networks of \$95,160.30 on December 24, 2020, with the description, "Flare	<a href="https://flare.xyz/the-flare-network/">https://flare.xyz/the-flare-network/;</a> Ripple. Cash Accounts Ripple Labs all years GL report (2014-2020). (RPLI SEC 1102015)

			Networks Limited - follow-on investment in ordinary shares.” This investment may classify Flare as “Products Enabled by Ripple” according to Professor Adriaens’ criteria.	
Harbor	Blockchain Technology	No	The company that created the now-defunct Harbor wallet (SecureBlockchains) is different from Harbor (the BitGo-acquired company related to the URL provided). It was not possible to identify any venture capital funding received by SecureBlockchains on Crunchbase.	<a href="https://twitter.com/securebc?lang=en">https://twitter.com/securebc?lang=en</a> ; <a href="https://www.bitgo.com/newsroom/press-releases/harbor-acquisition">https://www.bitgo.com/newsroom/press-releases/harbor-acquisition</a>
Ledger	Blockchain Technology	No	Ledger is primarily known for its hardware wallet which supports “1,800+ coins and tokens,” but also allows purchase and trade of digital assets via partner exchanges including Changelly. XRP was first supported on the wallet product in 2017, while the capability to purchase and trade XRP via partner exchanges apparently became available in 2021.	<a href="https://www.ledger.com/ledger-live">https://www.ledger.com/ledger-live</a> ; <a href="https://www.ledger.com/ledger-announces-xrp-support-on-nano-s-and-blue">https://www.ledger.com/ledger-announces-xrp-support-on-nano-s-and-blue</a> <a href="https://m.facebook.com/Ledger/photos/a.802170596506829/3849921431731715/?type=3&amp;source=54">https://m.facebook.com/Ledger/photos/a.802170596506829/3849921431731715/?type=3&amp;source=54</a>
Polysign	Blockchain Technology	No	Polysign uses a proprietary (non-XRP Ledger) blockchain custody solution that works for different digital assets.	<a href="https://www.polysign.io/">https://www.polysign.io/</a>

R3	Blockchain Technology	No	None of the 14 case studies profiled on its website feature any use case involving XRP or the XRP Ledger.	<a href="https://www.r3.com/case-studies/">https://www.r3.com/case-studies/</a>
STYRA	Blockchain Technology	No	STYRA was shut down in 2020. The URL provided by Professor Adrians (styra.com) links to the wrong company (the proper URL should have been styra.co, which is now a defunct website).	<a href="https://www.startbase.com/organization/styra-technologies-ug/">https://www.startbase.com/organization/styra-technologies-ug/</a>
Trastra	Blockchain Technology	No	Trastra offers both a digital asset wallet and payment cards. The Trastra wallet supports seven digital assets including XRP.	<a href="https://trastra.com/faq/trastra-account/can-i-use-other-cryptocurrencies-in-my-trastra-account/">https://trastra.com/faq/trastra-account/can-i-use-other-cryptocurrencies-in-my-trastra-account/</a>
Azimo	Money Transfer	No	<p>Enables payments over hundreds of payment corridors, and serves 200+ countries, but had just one ODL corridor in 2020.</p> <p>Professor Adriaens' criteria state that only companies founded after Ripple's incorporation should be considered. In Appendix D, Adriaens lists a founding date prior to 2012.</p> <p>Due to ODL incentives received, this company may be considered “Products Enabled by Ripple” according to Professor Adriaens’ criteria.</p>	<p><a href="https://azimo.com/en;">https://azimo.com/en;</a>  ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162;  Rebuttal report Section 3, Table 7.</p>

MoneyMatch	Money Transfer	No	<p>Enables payments over hundreds of payment corridors; serves 42 countries. No ODL volume in 2020 on this platform based on ODL documents reviewed.</p> <p>Due to ODL incentives received, this company may be considered “Products Enabled by Ripple” according to Professor Adriaens’ criteria.</p>	<p><a href="https://transfer.moneymatch.co/">https://transfer.moneymatch.co/</a>;  ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162;  Rebuttal report Section 3, Table 7.</p>
MoneyTap	Money Transfer	No	<p>MoneyTap uses xCurrent, a Ripple software product which is distinct from the XRP Ledger. It does not “leverage” the XRP Ledger.</p> <p>Ripple owns 33% of the company, which was started as a joint venture between Ripple and SBI (a Japanese financial services company), so it may be considered “Products Enabled by Ripple” according to Professor Adriaens’ criteria.</p>	<p><a href="https://www.ledgerinsights.com/ripple-owns-third-sbi-money-tap-blockchain-payments/">https://www.ledgerinsights.com/ripple-owns-third-sbi-money-tap-blockchain-payments/</a>;  <a href="https://www.coindesk.com/markets/2020/10/29/ripple-to-invest-in-japans-sbi-subsidiary-moneytap/">https://www.coindesk.com/markets/2020/10/29/ripple-to-invest-in-japans-sbi-subsidiary-moneytap/</a></p>
SendFriend	Money Transfer	Maybe	<p>Website is currently not functional, but an archived version of the page advertises sending money using blockchain technology and lists Ripple as a partner. It is unclear whether this business enabled non-ODL payment corridors, so it is difficult to determine whether XRP or the XRP Ledger might be or might have been core to its business. SendFriend had one ODL corridor in 2020 according to ODL documents reviewed.</p> <p>Due to ODL incentives received, this company may be considered “Products</p>	<p><a href="https://ripple.com/insights/sendfriend-uses-on-demand-liquidity-to-save-customers-up-to-80-in-remittance-fees/">https://ripple.com/insights/sendfriend-uses-on-demand-liquidity-to-save-customers-up-to-80-in-remittance-fees/</a>;  <a href="https://web.archive.org/web/20201111230410/https://www.sendfriend.io/">https://web.archive.org/web/20201111230410/https://www.sendfriend.io/</a>;  <a href="https://www.sendfriend.io/">https://www.sendfriend.io/</a>;  ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162;  Rebuttal report Section 3, Table 7.</p>

			Enabled by Ripple” according to Professor Adriaens’ criteria.	
TransferGo	Money Transfer	No	<p>Enables payments through 40+ payment corridors, serving 66 countries. TransferGo did not have any ODL volume in 2020 based on ODL documents reviewed.</p> <p>Professor Adriaens' criteria state that only companies founded after Ripple's incorporation should be considered. In Appendix D, Adriaens lists a founding date prior to 2012.</p> <p>Due to ODL incentives received, this company may be considered “Products Enabled by Ripple” according to Professor Adriaens’ criteria.</p>	<p>www.transfergo.com/en-gb;  ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162;  Rebuttal report Section 3, Table 7.</p>
Viamericas	Money Transfer	No	<p>Serves 50+ countries, and had two ODL corridors in 2020 based on ODL documents reviewed.</p> <p>Professor Adriaens' criteria state that only companies founded after Ripple's incorporation should be considered. In Appendix D, Adriaens lists a founding date prior to 2012.</p> <p>Due to ODL incentives received, this company may be considered “Products Enabled by Ripple” according to Professor Adriaens’ criteria.</p>	<p>Expert Report of Peter Adriaens, October 3, 2021 at 64 and Appendix D;  <a href="https://corporate.viamericas.com/about/">https://corporate.viamericas.com/about/</a>;  ODL transaction volume records: RPLI SEC 0300926, RPLI SEC 0301032, RPLI SEC 0533162;  Rebuttal report Section 3, Table 7.</p>

# Exhibit 4

UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF NEW YORK

SECURITIES AND EXCHANGE  
COMMISSION,

**Plaintiff**

v

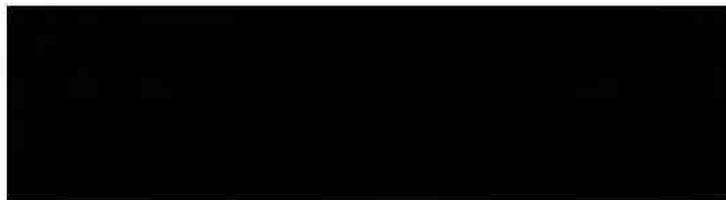
**20 Civ. 10832**

RIPPLE LABS, INC., BRADLEY  
GARLINGHOUSE, AND  
CHRISTIAN A. LARSEN,

**Defendants**

AMENDED EXPERT REPORT OF

 **Ph.D.**



OCTOBER 6, 2021

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CONTENTS

I. Qualifications.....	1
II. Assignment .....	2
III. Summary of Opinions .....	2
IV. Overview of Ripple Labs and XRP .....	4
A. Company Overview.....	4
B. XRP Trades on Digital Asset Trading Platforms.....	8
C. Ripple Sold XRP through Various Channels to Fund Operations .....	10
V. Analytical Methodology .....	13
A. Event Studies in the Context of Digital Tokens.....	15
B. Modeling XRP Returns .....	17
C. Identifying Pertinent News to Test.....	20
D. Testing for XRP Price Reactions to Ripple News.....	24
E. Summary of the Empirical Methodology.....	28
VI. XRP Prices React to News about Ripple’s Actions .....	29
A. XRP Prices Reacted to Key Milestones in Ripple’s History.....	29
B. XRP Prices Reacted to Digital Asset Trading Platform Listings .....	34
C. XRP Prices Reacted to Customer and Product Announcements .....	38
D. XRP Prices Reacted to Ripple’s Commercialization Initiatives.....	43
E. XRP Prices Did Not React to Office and Staff Announcements.....	51
F. Days with Ripple News Are Associated with Significant Abnormal XRP Returns and the Association Is Unlikely to Be Explained by Random Chance.....	54
1. There Is No Relationship between Ripple News and Negative XRP Returns .....	58
2. There Is No Relationship between Ripple News and XRP Returns Just before the News Is Released.....	59
3. Results Are Robust to Misclassifying Events .....	61
VII. Correlation of XRP Returns with Other Digital Tokens Changes over Time .....	65
A. Security Prices Are Often Related to Common Factors .....	65
B. XRP Returns Are Only Partially Explained by Bitcoin Returns, and Sometimes Can Be Better Explained by Ether Returns.....	66

# I. Qualifications

1. My name is [REDACTED] and I am a [REDACTED].
2. I have testified as an expert witness for the Securities and Exchange Commission on event studies and market efficiency. I have worked for defendants, plaintiffs, and governmental agencies in matters involving fraud, conspiracies and manipulations, and multisided platforms. I have worked both in assessing liability issues as well as in estimating damages.
3. I received my [REDACTED] where I specialized in statistics and econometrics, finance, monetary economics, and numerical methods. I was awarded a [REDACTED] by the Economics Department. I also received my [REDACTED] and my [REDACTED] where I graduated summa cum laude.
4. I began working as an economic consultant in October of 2018. Prior to that, I was employed for fifteen years at [REDACTED] where I was the [REDACTED] a team of nearly 100 professionals with responsibility for developing credit models and analytical methodologies for all asset classes across all lines of business. I frequently met with U.S., European, and Asian regulators and policy makers to discuss credit risk, credit ratings performance, risk modeling, and regulatory, antitrust and other policy matters.
5. Before leading the [REDACTED] I was the [REDACTED] at [REDACTED] with responsibilities including Default Research, Model Development and Verification, and Technology.
6. As an economist at [REDACTED] I specialized in credit research and modelling. While there I developed numerous econometric models of corporate and consumer credit as well as credit rating transitions. I routinely assessed the impact of new information on the credit worthiness of corporates, financial institutions, sovereign entities and structured vehicles.
7. I have developed patented models of default and credit rating transitions and trademarked models of regional real estate prices. I have developed models of residential mortgage default, prepayment and loss which have been used to assess the credit risk of hundreds of billions of dollars in securitizations. I have also developed several models of corporate and consumer credit, financial risk contagion, real estate market performance measures, and pharmaceutical drug development, among others. In addition, I conducted event studies to assess the impact of credit actions and announcements on corporate and sovereign costs of capital.

8. I have authored and co-authored articles in peer reviewed journals, trade publications, and Moody's Special Comments on subjects such as credit rating performance, corporate and sovereign defaults, collusion, manipulation, and screening. I have also contributed a chapter for a book on emerging markets and sovereign risk which was based, in part, on an event study analysis.
9. My curriculum vitae is included as Appendix A. [REDACTED] an hourly rate of \$600 for my time in this matter. Staff at The Brattle Group have assisted me by performing work at my direction. My opinions are my own, and neither mine nor The Brattle Group's compensation are dependent on my opinions or the outcome of this matter.

## II. Assignment

10. I have been retained by the Securities and Exchange Commission ("SEC") to provide expert opinions in the matter captioned above. Specifically, I was asked to perform an empirical analysis of XRP's price movements and assess whether actions by Ripple Labs, Inc. impact XRP prices. In conjunction with this assignment, I have been asked to assess the extent to which XRP price movements are driven by price movement in Bitcoin and other digital tokens. I have also been asked to be prepared to respond as needed on an expert issue or provide a rebuttal report on any subject on which I am qualified to opine.
11. My opinions are based on my knowledge and expertise gained during my professional career and my academic training and research. In forming my opinions in this matter, I have considered certain documents provided to me. A list of the documents I have relied upon is attached as Appendix B. In addition, I have prepared work papers that are available upon request. The opinions stated in this report are based on the evidence that has been provided to me to date. I am not opining on the accuracy of how Ripple describes its products or certain events in news or other public announcements. My work in this matter is ongoing, and I reserve the right to modify or supplement my conclusions as additional information is made available to me, or as I perform further analysis.

## III. Summary of Opinions

12. Based on my analysis and review of documents produced in this matter, I have reached the following opinions:
  - a. **XRP prices react to certain news and public statements about Ripple's actions.** Using a well-accepted event study methodology, I find statistically significant evidence that XRP prices react to news about Ripple's actions. This is particularly true for news of important milestones in the history of Ripple Labs and for announcements more directly related to XRP. The results hold for nearly all statistical models I examine at scientifically accepted levels of statistical significance. In no case do I

find a significant correlation of news and XRP returns in the days before the news, again confirming that XRP prices are reacting to news about Ripple’s actions. Taken together, this evidence indicates that XRP prices react to the news of actions by Ripple Labs.

In Figure 1, I present a summary table that illustrates my findings. Across 20 different regression model specifications, which in varying degrees account for the price movements of digital tokens like Bitcoin (“BTC”), Ether (“ETH”), and other variables, I indicate the cases in which the relationship between news and XRP prices is statistically significant.<sup>1</sup>

FIGURE 1: XRP PRICES REACT TO DIFFERENT TYPES OF RIPPLE NEWS

Model Number	Milestones	Trading Platform Listings	Customers & Product Developments	Ripple Commercialization Initiatives	Select Categories
1	✓	✓	✓	✓	✓
2	✓	✓	✓		✓
3	✓	✓	✓	✓	✓
4	✓	✓	✓		✓
5	✓	✓	✓	✓	✓
6	✓	✓	✓		✓
7	✓	✓	✓	✓	✓
8	✓	✓	✓		✓
9	✓	✓	✓	✓	✓
10	✓	✓	✓		✓
11	✓	✓	✓	✓	✓
12	✓	✓	✓	✓	✓
13	✓	✓	✓	✓	✓
14	✓	✓	✓	✓	✓
15	✓	✓	✓	✓	✓
16	✓	✓	✓		✓
17	✓	✓	✓	✓	✓
18	✓	✓	✓		✓
19	✓	✓	✓	✓	✓
20	✓	✓	✓	✓	✓

Notes:

- ✓ Indicates significance at the 5% level.
- Indicates not significant at the 5% level.

Select Categories is defined as the combination of Corporate Milestones, Trading Platform listings, Customer & Product Announcements, Ripple Commercialization Initiatives, and Acquisitions & Investments.

<sup>1</sup> Throughout this report, unless otherwise noted I shall use the phrase “statistically significant” to refer to model outcomes for which the probability of occurring under the null hypothesis is 5% or less. This “5% significance level” is a common standard for academic research.

- b. **The relationship between XRP returns and the returns of other digital tokens changes over time.** In studying the degree to which XRP returns correlate with those of BTC and ETH, I find evidence that those relationships change over time. Correlations with other digital tokens are sometimes zero or even negative. Such correlation does not preclude that XRP prices could react to news and public statements about certain Ripple actions.

## IV. Overview of Ripple Labs and XRP

### A. Company Overview

13. Ripple Labs, Inc. (“Ripple”) is a for-profit technology company based in San Francisco, CA. According to its website, Ripple has 500 employees and nine offices around the globe.<sup>2</sup> Ripple’s senior leadership and executives include Chris Larsen, who is the Executive Chairman of Ripple’s board of directors and former Chief Executive Officer (“CEO”), Brad Garlinghouse, who currently serves as CEO, and David Schwartz, who serves as Chief Technology Officer (“CTO”).<sup>3</sup>
14. Throughout its history, Ripple has highlighted certain news or initiatives of the company. Such announcements relate to Ripple raising funds from venture capital investors in 2015, 2016 and 2019, its joint venture with SBI Holdings, and its receipt of a Bitlicense from the State of New York, Department of Financial Services.<sup>4</sup> Another event in the company’s history that Ripple chose to highlight is its decision

<sup>2</sup> “Our Story,” Ripple.com, (“500 Employees, 9 Global Offices, 3X YoY Customer Growth”), accessed September 28, 2021, <https://ripple.com/company/>.

<sup>3</sup> “Leadership,” Ripple.com, accessed September 28, 2021, <https://ripple.com/company/leadership/>; see also, “Board of Directors,” Ripple.com, accessed September 28, 2021, <https://ripple.com/company/board-of-directors/>.

<sup>4</sup> See, e.g., “Ripple Labs Closes \$28 Million Series A Funding Round,” Ripple, May 19, 2015, accessed September 10, 2021, [https://ripple.com/ripple\\_press/ripple-labs-closes-28-million-series-a-funding-round/](https://ripple.com/ripple_press/ripple-labs-closes-28-million-series-a-funding-round/); “Ripple Raises \$55 Million in Series B Funding,” Ripple, September 15, 2016, accessed September 10, 2021, [https://ripple.com/ripple\\_press/ripple-raises-55-million-series-b-funding/](https://ripple.com/ripple_press/ripple-raises-55-million-series-b-funding/); and “Ripple Caps Record Year With \$200 Million Series C Funding,” Ripple, December 20, 2019, accessed September 10, 2021, <https://ripple.com/insights/ripple-caps-record-year-with-200-million-series-c-funding/>. “Ripple Strikes Multi-National Deal with SBI Holdings to Meet Growing Demand for Ripple Solutions Across Asia,” Ripple Press, January 28, 2016, accessed September 10, 2021, [https://ripple.com/ripple\\_press/ripple-strikes-multi-national-deal-with-sbi-holdings-to-meet-growing-demand-for-ripple-solutions-across-asia/](https://ripple.com/ripple_press/ripple-strikes-multi-national-deal-with-sbi-holdings-to-meet-growing-demand-for-ripple-solutions-across-asia/). See, “Ripple Receives New York’s First BitLicense for an Institutional Use Case of Digital Assets,” Ripple Insights, June 13, 2016, accessed September 10, 2021, <https://ripple.com/insights/ripple-receives-new-yorks-first-bitlicense-institutional-use-case-digital-assets/>.

to put 55 billion XRP tokens into escrow, which according to Ripple would ensure supply predictability for XRP “investors.”<sup>5</sup>

15. According to its website and other promotional materials distributed by the company, Ripple operates a network called RippleNet, which the company advertises as a real-time settlement system that aims to enable nearly instantaneous monetary transactions globally.<sup>6</sup>
16. Prior to branding RippleNet in 2019, Ripple separately marketed its commercial products under the names xRapid, xVia, and xCurrent. xRapid became commercially available in October 2018<sup>7</sup> and was eventually re-branded as On-Demand Liquidity (“ODL”).<sup>8</sup> xRapid or ODL allow users to transfer one currency to another with XRP facilitating the transfer.<sup>9</sup> According to Ripple’s public announcements, the primary selling point of this process is that it would provide faster and less expensive settlements compared to traditional cross-currency payment processing.<sup>10</sup>

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<sup>5</sup> This action was announced in May 2017 and completed in December 2017. See, “Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply,” Brad Garlinghouse, *Ripple Insights*, May 16, 2017, accessed September 10, 2021, <https://ripple.com/insights/ripple-to-place-55-billion-xrp-in-escrow-to-ensure-certainty-into-total-xrp-supply/>. (“By securing the lion’s share of our XRP, investors can now mathematically verify the maximum supply of XRP that can enter the market.”); see also, “Ripple Escrows 55 Billion XRP for Supply Predictability,” *Ripple Insights*, December 7, 2017, accessed September 10, 2021, <https://ripple.com/insights/ripple-escrows-55-billion-xrp-for-supply-predictability/>.

<sup>6</sup> RippleNet Brochure, Ripple.com, accessed September 28, 2021, [https://ripple.com/files/rippletnet\\_brochure.pdf](https://ripple.com/files/rippletnet_brochure.pdf) (“The needs of individuals and businesses sending cross-border payments have dramatically evolved. These customers are now demanding real-time, low-cost and fully trackable payments on a global scale. Yet, today’s global payments infrastructure yields an experience that is slow, costly and opaque. Ripple solves these pain points through RippleNet, a network of banks, payment providers and others. Employing Ripple’s solutions and a standardized ruleset allows for those connected on RippleNet to efficiently send and receive payments around the world.”).

<sup>7</sup> “Ripple Highlights Record Year, xRapid Now Commercially Available,” *Ripple Press*, October 1, 2018, accessed August 22, 2021, [https://ripple.com/ripple\\_press/ripple-highlights-record-year-xrapid-now-commercially-available/](https://ripple.com/ripple_press/ripple-highlights-record-year-xrapid-now-commercially-available/).

<sup>8</sup> “Ripple’s blockchain cross-border payments network grows to 300,” *Ledger Insights*, November 7, 2019, <https://www.ledgerinsights.com/ripple-blockchain-300-customers/>, accessed October 1, 2021. (“Until recently, Ripple had two main products called xCurrent and xRapid on RippleNet. The former is a messaging system for payments which competes with SWIFT. The latter uses Ripple’s digital currency XRP for fund transfers. However, the two were merged into the RippleNet brand, with xRapid rebranded as On-Demand Liquidity (ODL) which leverages XRP.”).

<sup>9</sup> “Free Working Capital with On-Demand Liquidity,” *Ripple.com*, accessed October 1, 2021, <https://ripple.com/rippletnet/on-demand-liquidity/>. (“Through the On-Demand Liquidity (ODL) service, RippleNet leverages the digital asset XRP as a bridge between two currencies, allowing you to eliminate pre-funding of destination accounts, reduce operational costs and unlock capital.”).

<sup>10</sup> See, e.g., “goLance Leverages On-Demand Liquidity to Deliver Faster, Cheaper Payments to Their Global Marketplace of Freelancers,” *Ripple Insights*, January 29, 2020, accessed October 1, 2021, <https://ripple.com/insights/golance-leverages-on-demand-liquidity-to-deliver-faster-cheaper-payments-to-their-global-marketplace-of-freelancers/>. (“RippleNet’s On-Demand Liquidity gives us the ability to make hyper-efficient, low-cost payments that make our customers happy and drive growth for our business.”).

17. xVia is described as a software tool that provides a single API to standardize connections between different payment networks.<sup>11</sup> xVia signed its first five customers in April of 2018, before later being integrated into RippleNet.<sup>12</sup> xCurrent, which became available in the first quarter of 2018,<sup>13</sup> is the software that eventually became the underlying platform of RippleNet. xCurrent “enables banks to message and settle their transactions... with RippleNet members.”<sup>14</sup> The three products were integrated into RippleNet in October of 2019.<sup>15</sup>
18. In addition to its direct commercial efforts, Ripple has engaged in and publicized various other initiatives over time. Some of these initiatives are directed to commercialize its product suite and technology and perhaps ultimately to create use-cases for XRP. As an example, the Xpring program was a venture capital initiative announced in May 2018.<sup>16</sup> The goal of Xpring was to “invest in, incubate, acquire and provide grants to companies and projects run by proven entrepreneurs” who intended to “use XRP and the XRP Ledger...to solve their customer’s problems in a transformative way.”<sup>17</sup> Company documents indicate that by 2019, Ripple had invested \$500M in over 20 companies through Xpring.<sup>18</sup> In 2020, Xpring was re-branded as RippleX.<sup>19</sup>
19. Ripple also engaged in and publicized initiatives directed to more general blockchain research or other company interests. An example of the latter type of initiative is the University Blockchain Research Initiative (“UBRI”). As described by Ripple, UBRI is a partnership program between Ripple and various

<sup>11</sup> See Birla Deposition Exhibit 32, WSJ D.Live Briefing Materials, October 30, 2018 [RPLI\_SEC 0081034 at RPLI\_SEC –81039]; see also, “xVia: A brief product overview for payment originators,” October 2017, accessed August 26, 2021, [https://ripple.com/files/xvia\\_brochure.pdf](https://ripple.com/files/xvia_brochure.pdf), at p. 8.

<sup>12</sup> See Asheesh Birla, “xVia Opens New Doors in Emerging Markets,” Ripple Insights, April 26, 2018, accessed August 26, 2021, <https://ripple.com/insights/xvia-opens-new-doors-in-emerging-markets/>.

<sup>13</sup> See David Z. Morris, “Ripple-Powered Mobile Payments to Debut at Santander,” Fortune, February 3, 2018, accessed August 26, 2021, <https://fortune.com/2018/02/03/ripple-mobile-payments-santander/> (“The xCurrent-based service, referred to simply as “Pay” in a recent Santander earnings presentation, is projected to go live in the U.K., Spain, Brazil, and Poland in the first quarter of this year.”).

<sup>14</sup> “xCurrent: A brief technical overview for financial institutions on RippleNet,” October 2017, accessed August 20, 2021, [https://ripple.com/files/xcurrent\\_brochure.pdf](https://ripple.com/files/xcurrent_brochure.pdf), p. 4.

<sup>15</sup> Sead Fadilpasic, “This is Why Ripple Removed xRapid, xVia, and xCurrent from their Site,” Cryptonews, October 9, 2019, accessed August 26, 2021, <https://cryptonews.com/news/this-is-why-ripple-removed-xrapid-xvia-and-xcurrent-from-the-4817.htm>.

<sup>16</sup> “Welcome to Xpring,” Ripple Insights, May 14, 2018, accessed August 20, 2021, <https://ripple.com/insights/welcome-to-xpring/>.

<sup>17</sup> “Welcome to Xpring,” Ripple Insights, May 14, 2018, accessed August 20, 2021, <https://ripple.com/insights/welcome-to-xpring/>.

<sup>18</sup> See Madigan Deposition pp. 198:23 – 205:5; see also, Madigan Deposition Exhibit 15, Email from Breanne Madigan to D. Samarasinghe, July 15, 2019, [RPLI\_SEC0200768] and Madigan Deposition Exhibit 56, Q2 2019 XRP Markets Report, July 24, 2019.

<sup>19</sup> Madigan Deposition, p. 60:5-13 (“Q... Is – is Xpring something that still exists or that no longer exists? A. So after Ron will and Ethan left around the same time, both the former Xpring team and the markets team were moved under Monica Long in a newly formed group called RippleX.”).

universities to “support academic research, technical development and innovation in blockchain, cryptocurrency and, [sic] digital payments.”<sup>20</sup> According to its webpage, Ripple has committed \$50 million to its UBRI initiative.<sup>21</sup>

20. To date, Ripple’s primary source of funding has been sales of XRP tokens, according to company financial statements. As shown in Figure 2, almost all of Ripple’s revenue for the years 2013 to 2020 derived from XRP sales. According to figures disseminated by Ripple, it sold approximately \$1.4 billion worth of XRP between Q1 2017 and Q4 2020 to a mix of institutional investors and retail investors via digital asset trading platforms and over-the-counter (“OTC”) sales.<sup>22</sup> In addition to funding through XRP sales, Ripple also raised approximately \$300 million in funding from angel investors and venture capital firms in Series A, Series B, and Series C rounds.<sup>23</sup>

FIGURE 2: RIPPLE LABS REVENUE BY SOURCE, 2013-2020 (\$ IN MILLIONS)

	2013	2014	2015	2016	2017	2018	2019	2020
XRP Token Revenue	\$4.4	\$13.4	\$12.2	\$15.6	\$186.1	\$552.1	\$710.8	\$457.8
Software Revenue	-	-	-	0.1	1.0	2.3	5.1	0.6
Services Revenue	-	0.1	0.5	1.7	3.9	3.1	2.9	0.6
<b>Total Revenue</b>	<b>\$4.4</b>	<b>\$13.5</b>	<b>\$12.7</b>	<b>\$17.5</b>	<b>\$190.9</b>	<b>\$557.6</b>	<b>\$718.8</b>	<b>\$459.0</b>
XRP Token Revenue (% of Total)	100.0%	99.5%	96.0%	89.6%	97.5%	99.0%	98.9%	99.7%

Note: For the years 2019 and 2020, Ripple Labs lists revenues from “XRP transactions” and “Non-monetary XRP transactions” separately. This table includes the sum of both as “XRP Token Revenue.”

Source: Ripple Labs Financial Statements, 2013-2020 (RPLI\_SEC 0090938; RPLI\_SEC 0426161; NY-9875\_T\_00017816; RPLI\_SEC 0267872; RPLI\_SEC 0920429).

<sup>20</sup> “What is University Blockchain Research Initiative (UBRI)?” accessed August 24, 2021, <https://ubri.ripple.com/faq/>.

<sup>21</sup> “What is University Blockchain Research Initiative (UBRI)?” accessed August 24, 2021, <https://ubri.ripple.com/faq/>.

<sup>22</sup> “XRP Markets Reports,” Ripple, 1Q2017 – 2Q2020, <https://ripple.com/insights>. See also, Figure 6.

<sup>23</sup> “Ripple Labs Closes \$28 Million Series A Funding Round,” Ripple, May 19, 2015, accessed September 10, 2021, [https://ripple.com/ripple\\_press/ripple-labs-closes-28-million-series-a-funding-round/](https://ripple.com/ripple_press/ripple-labs-closes-28-million-series-a-funding-round/); “Ripple Raises \$55 Million in Series B Funding,” Ripple, September 15, 2016, accessed September 10, 2021, available at [https://ripple.com/ripple\\_press/ripple-raises-55-million-series-b-funding/](https://ripple.com/ripple_press/ripple-raises-55-million-series-b-funding/); “Ripple Caps Record Year With \$200 Million Series C Funding,” Ripple, December 20, 2019, accessed September 10, 2021, available at <https://ripple.com/insights/ripple-caps-record-year-with-200-million-series-c-funding/>.

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## B. XRP Trades on Digital Asset Trading Platforms

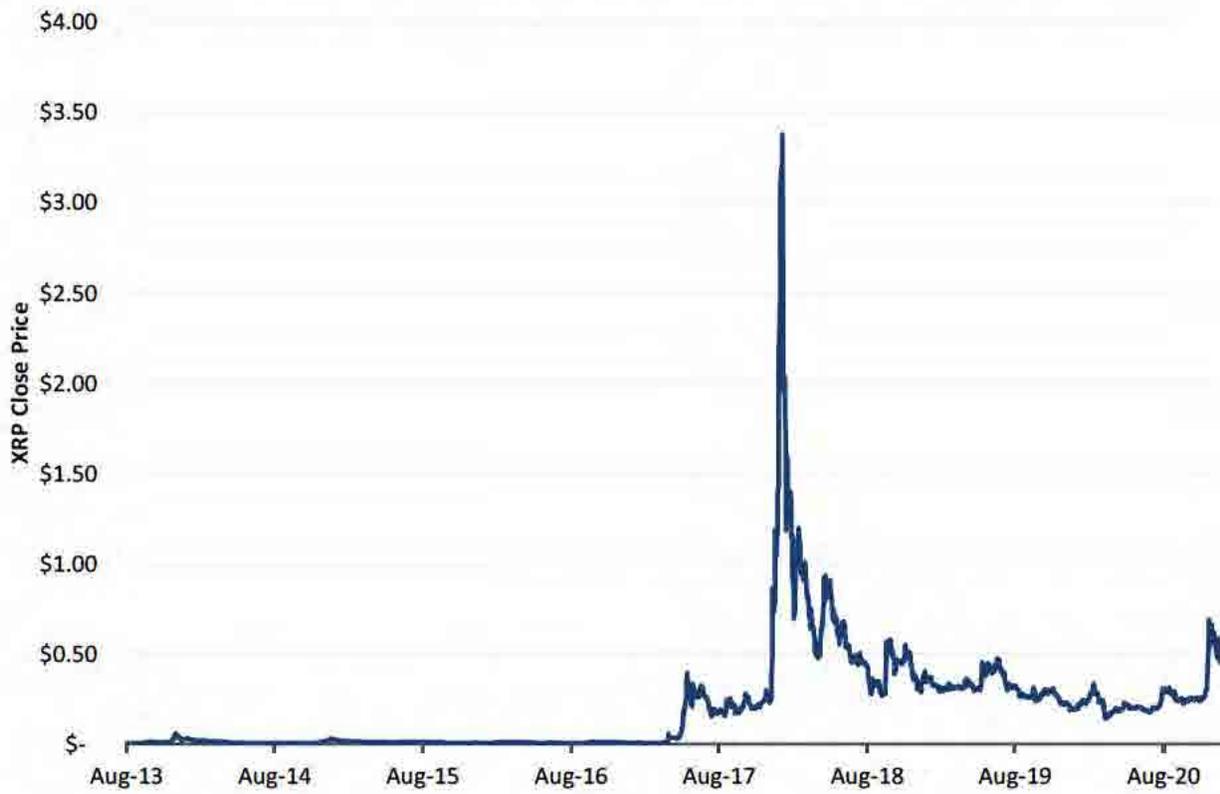
21. Digital asset trading platforms are marketplaces where those who wish to buy and sell digital tokens such as XRP can connect. Trading is conducted 24 hours a day, seven days a week on digital asset trading platforms, so there is no “opening” and “closing” of daily trading like in traditional financial exchanges.<sup>24</sup> Some of the largest and best-known U.S. trading platforms include Coinbase, ██████████ and Gemini, though there are hundreds of trading platforms globally.
22. As with other digital tokens, XRP trades are in the form of asset pairs in which one specified token is exchanged for another specified token or for a fiat currency. For example, XRP-BTC represents the XRP to Bitcoin (“BTC”) pair (i.e., XRP prices denominated in BTC) and XRP-USD represents the XRP to U.S. Dollar pair (i.e., XRP prices denominated in USD).
23. As shown in Figure 3 and Figure 4, XRP prices fluctuated substantially over time. For the first several years, it traded at or below one cent per XRP token for the most part. From mid-2017 to December 2020, XRP prices have ranged from approximately \$0.25 per token to a high of about \$3.40.<sup>25</sup>

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<sup>24</sup> Ash Bennington, “Crypto Assets Trade 24/7 – And that Changes More than Uptime,” Coindesk.com, July 24, 2017, accessed September 28, 2021, <https://www.coindesk.com/markets/2017/07/24/crpto-assets-trade-247-and-that-changes-more-than-uptime/> (“Let’s start with one of the most obvious aspects of cryptocurrency: Markets trade 24 hours a day, seven days a week – and that feature, as I’ll explain, changes a lot more than market uptime...For one, the 24-hour market structure requires investors to think about the daily price changes in their positions through a different conceptual lens than their stock portfolios. In the U.S., stocks listed on The New York Stock Exchange or the NASDAQ Stock Market trade, during regular market hours, between 9:30 a.m. and 4 p.m. EST.”).

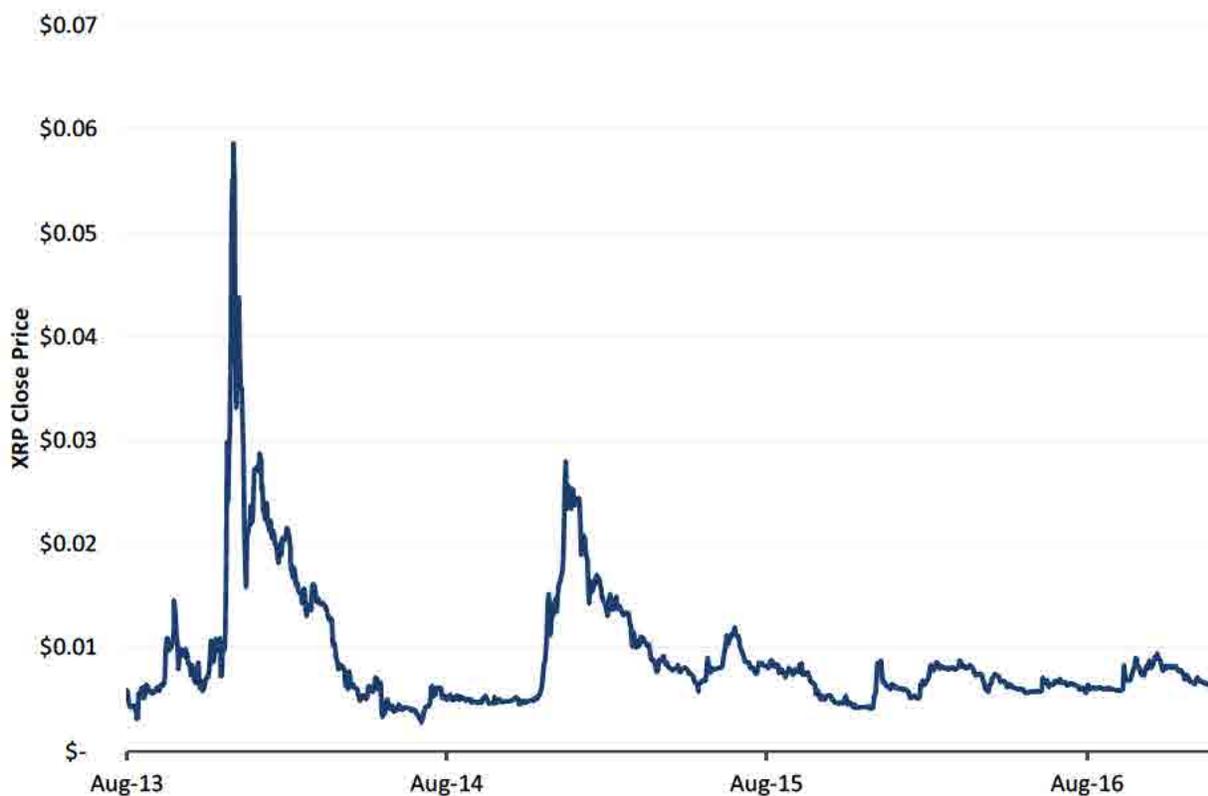
<sup>25</sup> The pricing data in Figure 3 is taken from CoinMarketCap.com, which provides a volume-weighted price across a number of digital asset trading platforms. The website hosts historical daily price data for XRP, including “open” and “close” prices based on the earliest and latest trade data in the UTC time zone, as well as a high price and a low price for the day.

FIGURE 3: XRP CLOSE PRICE, AUGUST 2013 – DECEMBER 22, 2020



Source: CoinMarketCap.

FIGURE 4: XRP CLOSE PRICE, AUGUST 2013 – DECEMBER 31, 2016



Source: CoinMarketCap.

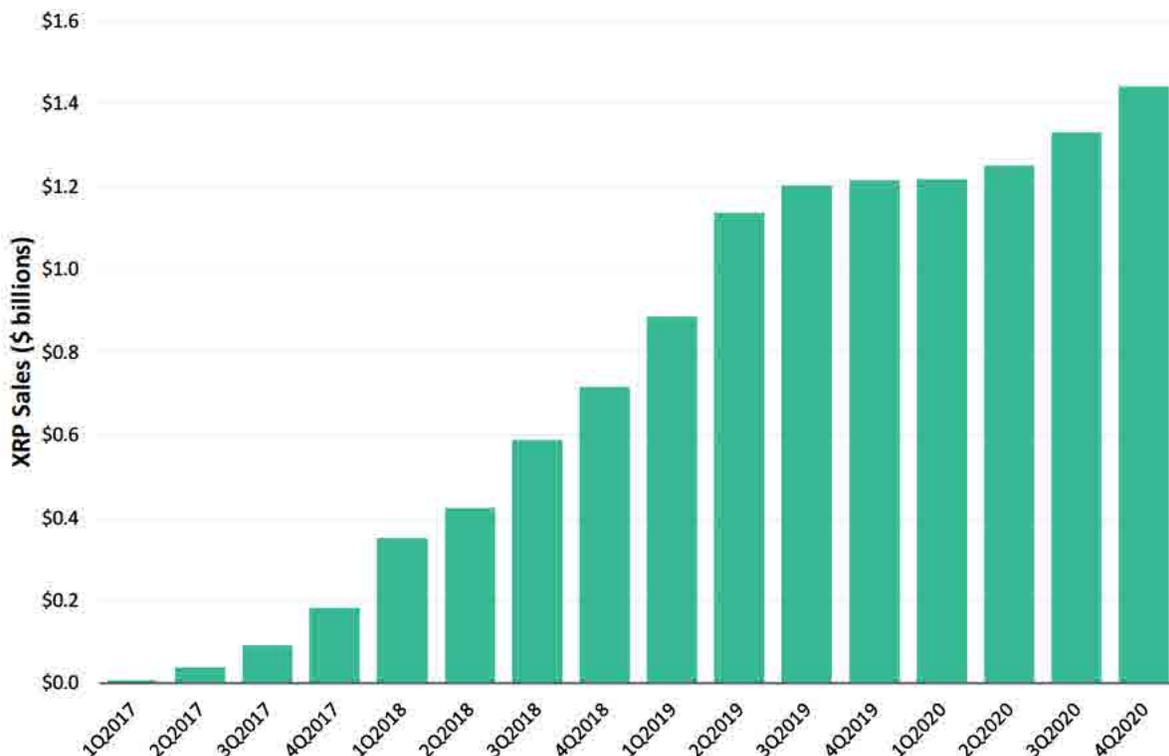
## C. Ripple Sold XRP through Various Channels to Fund Operations

24. Ripple has sold more than \$1.4 billion dollars worth of XRP tokens through various channels. As Mr. Garlinghouse explained in a February 2020 *Financial Times* article, Ripple was dependent on XRP sales for its operating cash needs, saying that “We would not be profitable or cash flow positive [without selling XRP], I think I’ve said that.”<sup>26</sup>

<sup>26</sup> Izabella Kaminska and Cat Rutter-Pooley, “The art of redefining success, MoneyGram and Ripple edition,” *Financial Times*, February 28, 2020. (“When pressed on Ripple’s own profitability, Mr. Garlinghouse noted that Ripple, the company, was cash flow positive. How much of that cash flow was coming from service provision as opposed to sales of pre-existing XRP stock was less clear. Asked if XRP was keeping everything cash flow positive at Ripple Labs, Mr. Garlinghouse answered: ‘Well XRP is one source. I don’t know how to answer that because if you took away our software revenues, that would make us less profitable. If you took away all our XRP, that makes us less profitable. So I don’t think about it as one thing.’ He clarified later: ‘We would not be profitable or cash flow positive [without selling XRP], I think I’ve said that. We have now.’”).

25. As show in Figure 5, Ripple reported that it raised approximately \$1.4 billion from sales of XRP through the fourth quarter of 2020.

FIGURE 5: CUMULATIVE QUARTERLY SALES OF XRP BY RIPPLE



Sources: Ripple sales from Quarterly XRP Markets Reports, 1Q2017 - 4Q2020.

26. Ripple classified its sales of XRP into two categories: programmatic sales and OTC sales.
- a. The programmatic sales were sales of XRP on digital asset trading platforms, managed by third-party market making firms, with two major ones being GSR and Cryptosystems.<sup>27</sup>

<sup>27</sup> Madigan Deposition, p. 51:4-23 (“Q.... When you arrived at Ripple, when you arrived at Ripple, to the extent you knew about programmatic sales, who was buying XRP from Ripple in programmatic sales? A. Sure. So the one point of clarification I wanted to make is that Ripple does not have a trading desk and so Ripple relies on third parties for its programmatic sales; namely, market makers. And, in particular, my recollection is that GSR and Cryptosystems were both managing those sales of XRP. Q. GSR and Cryptosystems were serving as intermediaries between Ripple and the market, is that correct? A. I think that’s a fair term, although I don’t know what -- yeah, what you’d call them, but they managed the sales of the XRP because Ripple couldn’t sell directly.”).

b. The OTC sales were negotiated block sales of XRP to large purchasers.<sup>28</sup> The OTC buyers included wealthy individuals, hedge funds, other investment firms, and financial institutions that had contracted with Ripple to transact in XRP using ODL.<sup>29</sup>

27. As show in Figure 6, Ripple reported \$745 million of XRP sales in the form of programmatic sales on digital asset trading platforms followed and another \$698 million in OTC sales from the first quarter of 2017 through the end of 2020.

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<sup>28</sup> Griffin Deposition, pp. 149:6 – 150:18 (“Q. Mr. Griffin, in connection with your employment at Ripple, does the term “OTC sales” mean anything to you? A. Yes. Q. What does it mean? A. An OTC sale is over-the-counter sale. Q. Sale of what? A. XRP. Q. And why -- what’s the reference to over the counter?... A. I think the -- the idea of an O -- what we -- I would have thought about an OTC as a sale to a large purchaser of XRP. Q. And were you -- what was -- what, if any, was your involvement with OTC sales of XRP while you were employed at Ripple? A. I managed the team that was charged with that responsibility. ... Q. And was one of their responsibilities to negotiate the potential purchases of XRP?... A. Yes.”).

<sup>29</sup> Griffin Deposition, pp. 163:2 – 164:3. (“Q. ...You know, what are the categories of persons that bought XRP from Ripple as OTC purchasers while you were at Ripple?... A. What -- there were individuals and investment firms. So, like, financial institutions. Brokers. I recall vaguely there was also mar -- possibly market makers. I can’t remember exactly the composition of who was buying it, but that sounds -- sounds right. Q. To the extent there were individuals, were -- you know, were these wealthy individuals or sort of -- what -- can you give me a little more about the types of individuals?... A. For the most part, that sounds right, that they were wealthy individuals if they were individuals. Q. And does investment firms include, like, hedge funds and things of that nature? A. Right.”).

FIGURE 6: RIPPLE QUARTERLY XRP SALES BY CHANNEL  
(\$ MILLIONS)

	Programmatic Sales	OTC Sales	All Sales
	[1]	[2]	[3] = [1] + [2]
1Q2017	-	\$6.70	\$6.70
2Q2017	\$10.30	\$21.00	\$31.30
3Q2017	\$32.60	\$19.60	\$52.20
4Q2017	\$71.50	\$20.10	\$91.60
1Q2018	\$151.10	\$16.60	\$167.70
2Q2018	\$56.66	\$16.87	\$73.53
3Q2018	\$65.27	\$98.06	\$163.33
4Q2018	\$88.88	\$40.15	\$129.03
1Q2019	\$107.49	\$61.93	\$169.42
2Q2019	\$144.64	\$106.87	\$251.51
3Q2019	\$16.12	\$50.12	\$66.24
4Q2019	-	\$13.08	\$13.08
1Q2020	-	\$1.75	\$1.75
2Q2020	-	\$32.55	\$32.55
3Q2020	-	\$81.39	\$81.39
4Q2020	-	\$111.12	\$111.12
<b>Total</b>	<b>\$744.56</b>	<b>\$697.89</b>	<b>\$1,442.45</b>

Sources: XRP Markets Reports, 1Q2017 - 4Q2020.

## V. Analytical Methodology

28. In this section, I describe the methodology I use to test whether XRP returns are associated with news about Ripple. My analysis builds upon a well-accepted econometric framework referred to as an event study. An event study is commonly used to measure the impact of new public information on market

prices.<sup>30</sup> Event studies have been widely used in the academic literature for over 40 years,<sup>31</sup> and have also been commonly accepted in the context of securities financial litigation.<sup>32</sup>

29. Event studies on the price of a security generally proceed with the understanding that the price is expected to be affected by important, unanticipated news about the company. For example, if an event study shows that the stock price for Company X does not change following a particular earnings announcement from Company X, this would generally be taken as evidence that the earnings announcement was not “important” (or that it was not “news”). It is generally *not* taken as evidence that the stock price of Company X is independent of the earnings of Company X.
30. In the matter at hand, I understand that the XRP token is not a claim on the assets or earnings of Ripple Labs and that Ripple Labs maintains that market participants do not view Ripple Labs’ efforts as relevant to the XRP market price. I have been asked by the SEC’s litigation counsel to test whether news about Ripple Labs and its actions is associated with statistically significant XRP price changes. This association can be tested based on the idea of independence – that is, by evaluating the likelihood that news about Ripple Labs would occur at the same time as a significant XRP price change.<sup>33</sup>
31. Even if XRP prices are independent of Ripple Labs, there will likely be, by sheer coincidence, examples of “news” happening at the same time as “significant price changes.” Similarly, even if Ripple Labs does affect XRP prices, there will likely be examples of “news” without “significant price changes,” and vice versa. To analyze the independence between XRP prices and news about Ripple Labs, I therefore examine the question: Do the instances of “news” coincide with “significant price changes” more frequently than random chance could explain?
32. As a second analysis, I consider the news jointly and test whether, as a group, XRP price increases on news days are significantly large. This analysis, known as the generalized rank test, is also used in the

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<sup>30</sup> A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 13.

<sup>31</sup> John J. Binder, “The Event Study Methodology Since 1969,” *Review of Quantitative Finance and Accounting* Vol. 11, 1998, pp. 111-137 at p. 111.

<sup>32</sup> See, Frank Torchio, “Proper Event Study Analysis in Securities Litigation,” *The Journal of Corporation Law*, Vol. 35, 2009, pp. 159-168, at p. 159 (“For over two decades, event studies have been prominently used as a valuation technique in various litigation matters including securities litigation.”).

<sup>33</sup> Two events are independent if the occurrence of one event does not affect the occurrence of the other. See, e.g., Morris H. DeGroot and Mark J. Schervish, “Probability and Statistics”, 4<sup>th</sup> Edition, p. 66 (“The conditional probability of the event A given that the event B has occurred is the revised probability of A after we learn that B has occurred. It might be the case, however, that no revision is necessary to the probability of A even after we learn that B occurs. ... In this case, we say that A and B are independent events.”).

academic literature on how digital token prices (including XRP) respond to news events.<sup>34</sup> It tests whether the price returns associated with a collection of events is statistically significant.<sup>35</sup>

33. In this section, I describe my methodology for testing the above question. I begin with a brief primer on event studies in the context of digital tokens, describe the regression models I consider, describe my approach to assembling news, and then explain how I use these elements to statistically evaluate the relationship between Ripple Labs and XRP prices.

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## A. Event Studies in the Context of Digital Tokens

34. Event studies have been used for decades in academic research to examine market price reactions to the publication of new information.<sup>36</sup> An event study is conducted by first specifying a model of *expected* price movements and then testing the extent to which *actual* price movements differ from those expectations. The econometric question an event study answers is whether the differences between actual and expected price movements are sufficiently large that, from a statistical standpoint, such differences are unlikely to be explained by random chance. “Sufficiently large” differences between the actual price movement and the expected price movement are those which are “statistically significant.” I provide a detailed discussion of the event study methodology in Appendix D.
35. Securities markets in which prices adjust to new information “quickly” are called informationally efficient.<sup>37</sup> Academic researchers have found that the digital token markets, including the XRP market, are generally less informationally efficient than the stock market, though there is evidence that efficiency is increasing over time.<sup>38</sup> My own analysis—discussed in detail in Appendix F—is consistent

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<sup>34</sup> Mohammad Hashemi Joo, Yuka Nishikawa, and Krishnan Dandapani, “Announcement effects in the cryptocurrency market,” *Applied Economics* Vol. 52, No. 44, 2020, pp. 4794-4808 at p. 4800.

<sup>35</sup> This generalized rank testing procedure is developed by James W. Kolari and Seppo Pynnonen. See, James W. Kolari and Seppo Pynnonen, “Nonparametric Rank Tests for Event Studies,” *Journal of Empirical Finance* Vol. 18, 2011, pp. 953-971.

<sup>36</sup> A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature*, Vol. 35, 1997, pp. 13-39. See also, Abigail McWilliams and Donald Siegel, “Event studies in management research: Theoretical and empirical issues,” *Academy of Management Journal*, Vol. 40, No. 3, 1997, pp. 626-657.

<sup>37</sup> Eugene F. Fama, “Efficient Capital Markets: A Review of Theory and Empirical Work,” *The Journal of Finance* Vol. 25 (2), 1970, pp. 383-417.

<sup>38</sup> See, e.g., Andrew Urquhart, “The Inefficiency of Bitcoin,” *Economics Letters* Vol. 148, 2016, p. 5 (“...we do show that Bitcoin may becoming more efficient with some of the tests for market efficiency suggesting that Bitcoin returns are random in the second subsample. ... Since it is a relatively new investment asset and still in its infancy, it is similar to an emerging market and therefore the inefficiency finding is not surprising. Consistent with this argument is that Bitcoin will become more efficient over time as more investors analyse and trade Bitcoin.”); Aurelio F. Bariviera, “The Inefficiency of Bitcoin Revisited: A Dynamic Approach,” *Economics Letters* Vol. 161, 2017, Abstract (“...daily returns exhibit persistent behavior in the first half of the period under study, whereas its behavior is more informational efficient since 2014.”); Aviral Kumar Tiwari, R.K. Jana, Debojyoti Das, and David Roubaud, “Informational Efficiency of Bitcoin—An Extension,” *Economics Letters* Vol. 163,

with the academic literature in that, by one common measure of efficiency (serial correlation), the XRP market is not fully efficient during the period of interest.<sup>39</sup>

36. Academic researchers have applied the event study methodology to digital token markets.<sup>40</sup> For example, Joo, Nishikawa, and Dandapani (2020) used an event study to evaluate the price reaction of BTC, ETH, and XRP to major news events and found all three digital tokens have statistically significant abnormal returns in connection with the identified news events.<sup>41</sup>
37. When conducting event studies on digital token prices, academic researchers typically investigate price reactions over multi-day windows.<sup>42</sup> This accounts for the possibility that digital token prices may not react to relevant information as “quickly” as would be observed in some other markets.
38. In my analysis below, I adapt several aspects of the Joo, Nishikawa, and Dandapani (2020) and Gerritsen, Lugtigheid, and Walther (2021) methodologies to the matter at hand. Where they allow up to seven days for prices to react to news, I conservatively limit my analysis to a three day window – meaning, I associate price reactions to a news event on date  $t$  only if I find evidence of statistically significant price

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2018, Abstract (“We report that the market is informational efficient as consistent to recent findings of Urquhart (2016), Nadarajah and Chu (2017) and Bariviera (2017).”); and pp. 6-7 (“We observe that the market is largely efficient with some exception to the period of April-August, 2013 and August-November, 2016.”); and Ahmet Sensoy, “The Inefficiency of Bitcoin Revisited: A High-Frequency Analysis with Alternative Currencies,” *Finance Research Letters* Vol. 28, 2019, Abstract (“We find that BTCUSD and BTCEUR markets have become more informationally efficient at the intraday level since the beginning of 2016, and BTCUSD market is slightly more efficient than BTCEUR market in the sample period.”).

- <sup>39</sup> “Serial correlation” refers to the correlation of a data series with its own history, meaning that the data at time  $t$  is correlated with the data at time  $t - s$  for some lag  $s$ . Because it is the correlation of a data series with its own history, “serial correlation” is also referred to as “autocorrelation.”
- <sup>40</sup> As an early example, see Wenjun Feng, Yiming Wang, and Zhengjun Zhang, “Informed Trading in the Bitcoin Market,” *Finance Research Letters* Vol. 26, 2018, pp. 63-70, which finds evidence of informed trading in the Bitcoin market. *See also*, Dirk F. Gerritsen, Rick A.C. Lugtigheid, and Thomas Walther, “Can Bitcoin Investors Profit from Predictions by Crypto Experts?” *Finance Research Letters*, 2021 which analyzes how Bitcoin prices react to analyst commentary.
- <sup>41</sup> Mohammad Hashemi Joo, Yuka Nishikawa, and Krishnan Dandapani, “Announcement effects in the cryptocurrency market,” *Applied Economics* Vol. 52, No. 44, 2020, Abstract (“Abnormal returns as well as cumulative abnormal returns (CARs) around major news announcements, both positive and negative, are investigated for three primary cryptocurrencies: Bitcoin, Ethereum, and Ripple. High abnormal returns are observed on the event day (Day 0), and CARs typically diverge during event windows of (-3, 6) and (0, 6), indicating that the information is not fully reflected in prices immediately after the news events. The CARs that linger for six days after an event suggest that the information flow in the cryptocurrency market is visibly slow. The magnitudes of CARs are larger for negative events than for positive events, implying that the market reaction to negative events is stronger than to positive announcements. The findings of this study may have crucial implications for investors, arbitrageurs and practitioners as we document evidence of potential trading opportunities for investors who initiate a trading position even after announcements.”).
- <sup>42</sup> For example, the Joo, Nishikawa, and Dandapani (2020) paper investigates price reactions from 3 days before to 6 days after an event. The Gerritsen, Lugtigheid, and Walther (2021) paper investigates price reactions from 4 days before to 4 days after an event. *See also*, Mark Schaub, “On the OCC Announcement Allowing US Banks to Use Stablecoins and the Immediate Impact on Cryptocurrency Valuations,” *The Economics and Finance Letters* Vol. 8, 2021, Abstract (“... Bitcoin and Ethereum increased over 20% in value within 5 days of the announcement...”.) and p. 156 (“Returns are reported beginning 10 days before the OCC announcement until 10 days after for a window of (-10, +10).”).

movements in the first three days.<sup>43</sup> Also, I limit my analysis to price reactions beginning on the day of the announcement and do not consider that prices may have begun reacting (perhaps based on leaks or rumors) in the days preceding the announcement. To the extent there was any leak of information, my approach is conservative.

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## B. Modeling XRP Returns

39. In my event study analysis, I consider several regression models of XRP price movements. The first model I consider has no control variables and is known as the Constant Mean Return Model.<sup>44</sup> This model has been used in other digital token event studies.<sup>45</sup> I then add in sequence the returns of Bitcoin (BTC), Ether (ETH), and Lumens (XLM).<sup>46</sup> Finally, I replace the individual return series with an equal-weighted index of these three returns as well as the returns on Binance Coin (BNB) and Ada (ADA).<sup>47</sup>

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<sup>43</sup> By adopting this standard, I am not taking the position that price reactions in the XRP token market are necessarily complete in three days. To the extent that prices continue to react for several days after a news event, my approach is conservative in that I will not include such reactions when determining the significance of an event. My results are robust to considering shorter and longer event windows. See Appendix E for results over a one day event window and a seven day event windows.

<sup>44</sup> See, e.g., Stephen J. Brown and Jerold B. Warner, "Using Daily Stock Returns: The Case of Event Studies," *Journal of Financial Economics* Vol. 14, 1985, pp. 3-31 (discussing estimating excess returns by subtracting mean return from actual returns at pp. 6-7).

<sup>45</sup> See, e.g., Mohammad Hashemi Joo, Yuka Nishikawa and Krishnan Dandapani, "Announcement Effects in the Cryptocurrency Market," *Applied Economics* Vol. 52, No. 44, 2020, pp. 4794-4808, at p. 4795 ("...we apply the mean-adjusted returns model. In this model, the mean return of the previous trading days is employed as the baseline-expected return, and abnormal returns are calculated as the difference between the actual daily return and the expected return."). See also, Dirk F. Gerritsen, Rick A.C. Lugtigheid, and Thomas Walther, "Can Bitcoin Investors Profit from Predictions by Crypto Experts?" *Finance Research Letters*, 2021.

<sup>46</sup> Stellar, founded in 2014 by Jed McCaleb, one of the co-founders of Ripple, shares similarities with Ripple in their blockchain technologies. The native token of the Stellar blockchain is called Lumens (XLM). See, e.g., Mary Ann Callahan, "Ripple vs. Stellar: Will There Be Only One Winner?" *FX Empire*, Yahoo News, August 29, 2018, accessed September 29, 2021, <https://www.yahoo.com/news/ripple-vs-stellar-only-one-083151892.html> ("Cryptocurrency enthusiasts frequently compare Stellar and Ripple due to the similarities in their blockchains. ... One of the co-founders of Ripple, Jed McCaleb, created Stellar in 2014. As with Ripple and XRP, Stellar refers to the technology, while XLM or Lumens refers to the cryptocurrency. Stellar is like Ripple in that it also allows for quick and affordable sending and receiving of funds. It also has similar coding to Ripple, which should be unsurprising considering their shared founder."). My pricing data for Bitcoin begins on April 28, 2013, for Lumens on August 5, 2014, and for Ether on August 7, 2015. As a result, the models which control for these tokens explicitly are not available in the very early periods of news.

<sup>47</sup> I construct the "equal-weighted index" using data as they become available. In the very early period, the index only comprises Bitcoin for example. My pricing data for Binance Coin and Ada begin relatively late, on July 25, 2017 and October 1, 2017, respectively, hence I do not consider models which explicitly control for those tokens.

40. For each of the five regression models above, I further control for the growth in XRP accounts.<sup>48</sup> This factor has been suggested in recent academic literature to be related to prices of digital tokens.<sup>49</sup> This gives me a total of ten sets of control variables.
41. As I discuss in more detail in Appendix F, over much of the time period in question, the XRP return on date  $t$  is correlated with the return on date  $t - 1$ , sometimes positively, sometimes negatively. This is known as “first order autocorrelation.” For each of the ten specifications, I therefore also estimate models that control for first order autocorrelation in XRP’s residual returns.<sup>50</sup>
42. My analysis thus consists of 20 different models for XRP returns, which I summarize in Figure 7. I estimate all models using data from the prior 180 trading days (roughly six months) up to four days prior to the date of interest.<sup>51, 52</sup>
43. The Constant Mean Return Model evaluates the XRP return in the context of its own recent history; essentially, the model flags a return as “significant” because it is significantly different from the returns of the previous 180 days.<sup>53</sup> By controlling for the returns of other digital tokens, as many of the other

<sup>48</sup> XRP Scan reports counts of unique account addresses on the XRP Ledger created each day. These addresses are base58-formatted identifiers derived from the associated public key. My data on account creation begins on January 2, 2013 when 3 new accounts are reported. I do not have data on the number of accounts that may have existed before that day and assume it was 0. See “Integration Guide: Account,” XRPScan, accessed October 2, 2021, <https://docs.xrpscan.com/integration-guide.html>.

<sup>49</sup> Yukun Liu and Aleh Tsyvinski, “Risks and Returns of Cryptocurrency,” *The Review of Financial Studies* Vol. 34, 2021, pp. 2699-2700 (“We use four measures to proxy for the network effect: the number of wallet users, the number of active addresses, the number of transaction count, and the number of payment count. ... these results suggest that the network factors that measure the network effect of user adoptions are important drivers of cryptocurrency prices.”).

<sup>50</sup> To correct for this autocorrelation, I follow standard practice and regress XRP returns on date  $t$  on the control variables measured at  $t$  and one lag of XRP returns and the control variables. Gerritsen, Lugtigheid, and Walther (2021) also consider a correction for first order autocorrelation to the Constant Mean Return Model.

<sup>51</sup> A well-accepted method for performing the event study is to estimate a regression model over some period of time (an “estimation window”) to quantify the typical relationship between the price movements of the relevant instrument and explanatory factors (often market-wide movements). See, for example, A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 15 (“For example, in an event study using daily data and the market model, the market model parameters could be estimated over the 120 days prior to the event.”). A 120 business day window corresponds to roughly six months of calendar time, or 180 days.

<sup>52</sup> In my analysis, the estimation window (i.e., the 180-day window used to estimate the regression) will change with different dates of interest. This is typically referred to as a “rolling estimation window” (since the estimation window is “rolled forward” for each subsequent date of interest). By using a rolling estimation window, I allow for the relationship between the XRP prices and the explanatory factors, as well as the volatility of the random factor,  $\epsilon_t$ , to change over time. Use of a rolling model to account for changing volatility and evolving relationships among factors is often applied and is accepted in peer-reviewed literature. See Phillip A. Braun, Daniel B. Nelson, & Alain M. Sunier, “Good News, Bad News, Volatility, and Betas,” *The Journal of Finance* Vol. 50 (5), 1995, pp. 1575-1603 at pp. 1575, 1597. Rolling estimation windows have been applied in the context of digital token event studies as well. See for example, Joo, Nishikawa, and Dandapani (2020) which uses a 365 day window. Gerritsen, Lugtigheid, and Walther (2021) uses a 49 day window.

<sup>53</sup> Consider the following hypothetical. Suppose that on some date  $t$ , it is announced that XRP has been listed on a new trading platform and XRP prices fall 5%. The Constant Mean Return Model will evaluate a return of -5% against the returns

models used in this analysis do, I consider the excess return of XRP prices beyond what can be explained by factors impacting the digital token market more broadly.<sup>54, 55</sup>

FIGURE 7: MODEL SPECIFICATIONS

Model Number	Independent Variables							Lagged XRP	Lagged Independent Variables
	Constant	Account Growth	BTC	ETH	XLM	E-Index			
1	✓								
2	✓	✓							
3	✓		✓						
4	✓	✓	✓						
5	✓		✓	✓					
6	✓	✓	✓	✓					
7	✓		✓	✓	✓				
8	✓	✓	✓	✓	✓				
9	✓						✓		
10	✓	✓					✓		
11	✓							✓	
12	✓	✓						✓	✓
13	✓		✓					✓	✓
14	✓	✓	✓					✓	✓
15	✓		✓	✓				✓	✓
16	✓	✓	✓	✓				✓	✓
17	✓		✓	✓	✓			✓	✓
18	✓	✓	✓	✓	✓			✓	✓
19	✓						✓	✓	✓
20	✓	✓					✓	✓	✓

NOTES:

Check mark indicates the variable is included in the model. E-Index refers to an equal-weighted index across the returns of ADA, BNB, BTC, ETH, and XLM subject to data availability.

of the previous 180 days. Suppose it finds such a return to be “statistically significantly negative.” Evaluating the news of the platform listing using this model, I would conclude that there was a significantly negative return at the same time.

<sup>54</sup> Now suppose that on that same day it was announced that there had been a major hack to another trading platform, and this news adversely impacted digital tokens more broadly. Suppose BTC and ETH, in particular, drop 10% on date *t*. In a regression model which controls for those returns, the fact that XRP drops only 5% might indicate that its abnormal return – the difference between its actual and expected return – is actually significantly *positive*: its price dropped 5%, but it would be expected (say) to drop 10%, hence its abnormal return was actually +5%. Now evaluating the news of the platform listing using this other model, I would conclude that there was a significantly positive return at the same time.

<sup>55</sup> Ignoring stable coins, Bitcoin, Ether, Binance Coin, and Ada are currently the four largest digital tokens by market capitalization. For example, see “Today’s Cryptocurrency Prices by Market Cap,” CoinMarketCap, accessed October 4, 2021, <https://coinmarketcap.com>. Lumens is described as having a similar use case as XRP.

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## C. Identifying Pertinent News to Test

44. While there is generally a presumption that stock prices respond to new and relevant news about the company, one would not expect to see significant price changes accompanying every company announcement. For example, earnings announcements that are in line with investor expectations would not be expected to result in a significant price reaction.<sup>56</sup> An event study analysis can be used in these cases to determine if an earnings announcement (or other strategic announcements by a company about products or clients) was important news by investigating whether or not it is associated with a statistically significant price reaction.
45. A company can also disclose news other than earnings announcements. For example, many companies announce executive staff appointments, such as the appointment of a new CEO. Many companies engage in charitable activities, which they announce. In these cases, the price reaction following the event can be examined to determine if the announcement was “important.” If there is a statistically significant price reaction, and if certain conditions can be established,<sup>57</sup> then one might conclude that the market reacted significantly to the announcement. In these cases, it is often not necessary to determine *a priori* if the stock price is expected to react to the news. There is a general presumption that it would if the news were relevant and important. Significant price reactions may be taken as evidence that the news in question was important. However, a lack of significant price reaction to a specific news event is typically not generalized as evidence that the stock price does not react to all other news of the same general type or of news about the efforts, announcements, successes, or failures of the issuer of the stock.
46. In this case, the question of whether XRP prices respond to news about Ripple Labs and its business activities needs to be examined. The question therefore is not whether a particular Ripple action or event is associated with a particular XRP price response (as is the case in many event study disputes), but instead, whether Ripple actions or events are collectively associated with significant XRP price reactions. In other words, I do not presume that XRP prices might react to anything Ripple does; instead, I am investigating whether such a relationship exists.
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<sup>56</sup> In line with this, the earnings announcement literature has studied the impact of forecast error on stock prices. Forecast error is typically measured based on the difference between actual earnings and expected earnings. See, e.g., Bradford Cornell and Wayne R. Landsman, “Security Price Response to Quarterly Earnings Announcements and Analysts’ Forecast Revisions,” *The Accounting Review* Vol. 64 (4), 1989, pp. 680-692, at p. 681 (“The purpose of this paper is to investigate the extent to which revisions of more distant earnings forecasts, as well as the current forecast error, affect stock prices.”) and p. 687 (“the forecast error ... is given by  $(EPS_{it} - E(EPS_{it}|\theta_0))/P_{it}$ , where  $EPS_{it}$  is the realized quarterly earnings per share,  $E(EPS_{it}|\theta_0)$  is the mean pre-announcement IBES consensus forecast of  $EPS_{it}$ , ...”).

<sup>57</sup> Such conditions may include: (i) if there is no other confounding news that day which might explain such movement, (ii) if there is no evidence that the announcement had been leaked or anticipated by the market, and (iii) if there is a plausible explanation as to why the market might react to this announcement.

47. My statistical analysis begins with the hypothesis that there is no link – that the XRP market is independent of news about Ripple Labs.<sup>58</sup> I will then investigate the extent to which the available data are consistent with that hypothesis, or if the hypothesis of independence should be rejected.
48. I first identify the types of news that are relevant for the purpose of testing this relationship. I summarize the news identification process below:
- a. I start with the news which Ripple Labs has identified to be important by virtue of (i) having issued a press release about the event, or (ii) having written about it on its Insights/News page, or (iii) having linked to a third-party news outlet in its curated Newsroom page. By limiting myself to this set of news, I am not taking the position that other events are necessarily “unimportant.” I simply assume that based on its understanding of its business and industry, Ripple had some basis to highlight certain events and not others.
- b. I then classify these news announcements into the following categories:
- **Acquisition & Investment:** announcement of an acquisition or investment made by Ripple Labs, including through its development arm Xpring
  - **Case Study:** discussion of a customer experience or use case of XRP or other Ripple Labs products
  - **Charity:** announcement of a charitable endeavor or donation by Ripple
  - **Corporate Activity & Announcement:** miscellaneous corporate announcement or activity not related to Ripple’s products or new customers
  - **Customer & Product:** announcement related to new customer relationship (e.g., financial institutions or money centers often described as “partnering” with Ripple Labs) or products, including enhancements to the XRP ledger protocol
  - **Litigation:** news of litigation or regulatory enforcement involving Ripple Labs
  - **Market Commentary & Company Overview:** general commentary of the digital token market or Ripple Labs
  - **Markets Report:** a quarterly markets report published by Ripple
  - **Milestone:** key event in the history of Ripple Labs not related to products or customers

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<sup>58</sup> Throughout this report, the phrase “XRP market” should be understood to mean specifically XRP *prices*, as distinct from other market considerations such as volume or liquidity.

- **Miscellaneous:** other announcement not otherwise categorized
- **Other Initiative:** initiative not primarily described as being related to the commercialization or promotion of Ripple’s products or technology in the XRP ecosystem; includes cases of Ripple Labs joining existing interest groups
- **Office and Staff Announcement:** announcement of executive staff changes or the opening of a new office
- **Ripple Commercialization Initiative:** initiative launched by Ripple Labs primarily described as being related to the commercialization or promotion of Ripple’s products or technology in the XRP ecosystem
- **Trading Platform:** announcement that XRP is available for trading on a new digital asset trading platform

I acknowledge that such categorizations rely on judgment. However, I show in VI.F.3 that my results are robust to alternative categorization choices.

- c. Finally, I identify any announcements within a category that should be excluded from the analysis. There are two reasons to exclude an announcement. First, the announcement may substantially repeat a previous announcement; I term such announcements “stale.” Second, the nature of the announcement may not have a particular directional implication for XRP prices, even assuming the hypothesis of independence is false. I describe such announcements as “direction uncertain.”

I acknowledge again that these considerations require judgment. I show in Appendix E that my results are robust to these exclusions.

49. My initial set of sources consists of 72 Press Releases, 298 Insight Articles, and 323 Newsroom Articles for a total of 693 sources published prior to December 22, 2020.<sup>59</sup> I exclude ten of these sources from my analysis: eight are excluded because the articles are no longer available, one is excluded because it is not available in English, and one is excluded because I could not determine its exact publication date (a review of its content indicates that it would not prove relevant anyway). These exclusions are listed in Figure 8.<sup>60</sup> My final set of sources thus consists of 683 documents which I group into 514 events.<sup>61</sup> These are listed in Appendix C.

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<sup>59</sup> On December 22, 2020 the SEC announced its action against Ripple Labs, which may have had direct effects on XRP prices, over and above any effect it may have on those tokens through an effect on Ripple. I therefore limit my analysis to events reported before December 22, 2020.

<sup>60</sup> In a handful of additional cases the link from the Ripple Newsroom no longer works, however an internet search revealed articles of the same title from the same source. I have included those in my analysis.

<sup>61</sup> Some events are covered by multiple documents, hence there are fewer events than documents.

FIGURE 8: ARTICLES CLASSIFIED AS NOT AVAILABLE

Date	Headline	Source	Reason for Exclusion
8/23/2020	Ripple, A Blockchain-Powered Cross-Border Payments, Addresses an Increasing Need for Immigrant Remittances in the Japanese Market	Ripple Newsroom	Document not in English
n.a.	Ripple and XRP Are More Stable Than You Think	Ripple Newsroom	Document Unavailable
10/14/2016	Bloomberg Markets: Next President Must Have Fintech Plan	Ripple Newsroom	Document Unavailable
6/23/2016	Bloomberg Advantage: Larsen on the Internet of Value	Ripple Newsroom	Document Unavailable
4/28/2015	Building the Value Web with Open Standards	Ripple Newsroom	Document Unavailable
n.a.	Top Five Trends for Payments in 2015	Ripple Newsroom	Document Unavailable
n.a.	Why Do Banks Prefer Ripple Over Bitcoin?	Ripple Newsroom	Document Unavailable
n.a.	Cross-Border Payments Due For Disruption	Ripple Newsroom	Date Indeterminable**
n.a.	Bitcoin Makes Gains With Merchants	Ripple Newsroom	Document Unavailable
9/27/2018	Ripple for Good Supports Education and Financial Inclusion with \$100 Million Commitment	Ripple Insights	Document Unavailable

Notes:

\*\* This article is available as part of a report dated spring 2015. I am not able to determine an exact publishing date, so I exclude the article from my analysis, despite its still being available.

50. Below I test the correlation between XRP returns and news announcements in those categories related more directly to XRP, such as Customer & Product. If the null hypothesis of independence is false, then I should find a statistically significant correlation; if it is true, then I should not. For certain other categories, such as general market commentary (often written by third parties and which does not break new information), it seems self-evident that there should be no meaningful connection with the XRP market in any case, hence testing such categories is not informative.
51. It is important to consider the qualitative direction of the news I am evaluating. As a self-selected (by Ripple) set of news, it is strongly biased in favor of “good” news or at worst “neutral” news. Ripple may announce when customers are added to its network, but it may choose not to announce if a customer leaves its network. If the XRP market reacts to this “good” news, then it presumably means that XRP prices increase, they do not decrease. I will thus be testing whether “good news” is correlated with significant *positive* XRP returns, not negative returns.<sup>62</sup>

<sup>62</sup> There is always the subtle possibility that news which appears superficially “good” is nevertheless disappointing to the market. If a company announces an increase in earnings of \$0.02 per share when the market had expected \$0.05, it is possible that such an announcement might lead to a decrease in the stock price. Likewise, it might be that when Ripple announces a partnership with 7 banks, the market had expected 20. My analysis conservatively assumes that what is superficially “good news” should be met with positive XRP returns. I do not consider a negative return (even if it is significant) to be evidence in support of the proposition that the XRP market reacts to Ripple. I will test for correlation with negative returns as a robustness check.

## D. Testing for XRP Price Reactions to Ripple News

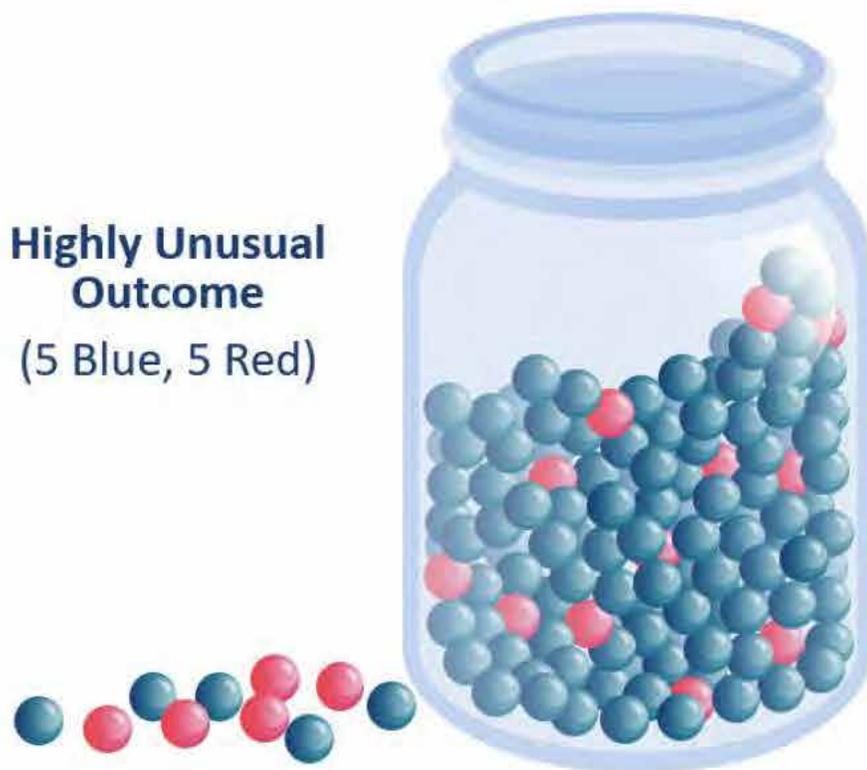
52. As I explained above, my analysis examines whether instances of Ripple news coincide with significant XRP price changes more frequently than random chance could explain. Consider the following “jar of marbles” example as an illustration of the framework for my statistical analysis:
- Imagine a jar with one thousand marbles. Nine hundred are blue, and they are mixed with one hundred red marbles. From this jar of marbles, if one were to draw a marble at random, the likelihood of drawing a red marble is 10% since 10% of all the marbles are red.
  - Now imagine 10 marbles are drawn *at random*. Since 10% of all the marbles are red, we would expect to find 1 red marble in this group of 10 (as 10% of 10), as shown in Figure 9. However, as with most experiments that involve randomness, it is possible that we may have two or three. We could likely find no red marbles. It’s even theoretically possible to draw 10 red marbles, though that is less likely than winning the lottery.

FIGURE 9: IN A RANDOM DRAW OF 10 MARBLES, ONE IS EXPECTED TO BE RED



- c. The likelihood of all outcomes, from having 0 red marbles to having 10, is well understood by statisticians, if the draws are *random*.<sup>63</sup> Across the range of possible outcomes, some are more likely than others. For example, suppose we find 5 of the 10 marbles are red, not 1 as expected, as shown in Figure 10. While having 5 instead of 1 may not seem like a significant outcome, in fact it is. The probability of drawing 5 or more red marbles at random is about 0.15%. That is less likely than two people sharing the same birthday. Against the common academic standard of 5% significance, we would say that this outcome is statistical evidence that the draws were not, in fact, random.

FIGURE 10: DRAWING 5 RED MARBLES IS STATISTICALLY SIGNIFICANT EVIDENCE THAT THE DRAW WAS NOT RANDOM

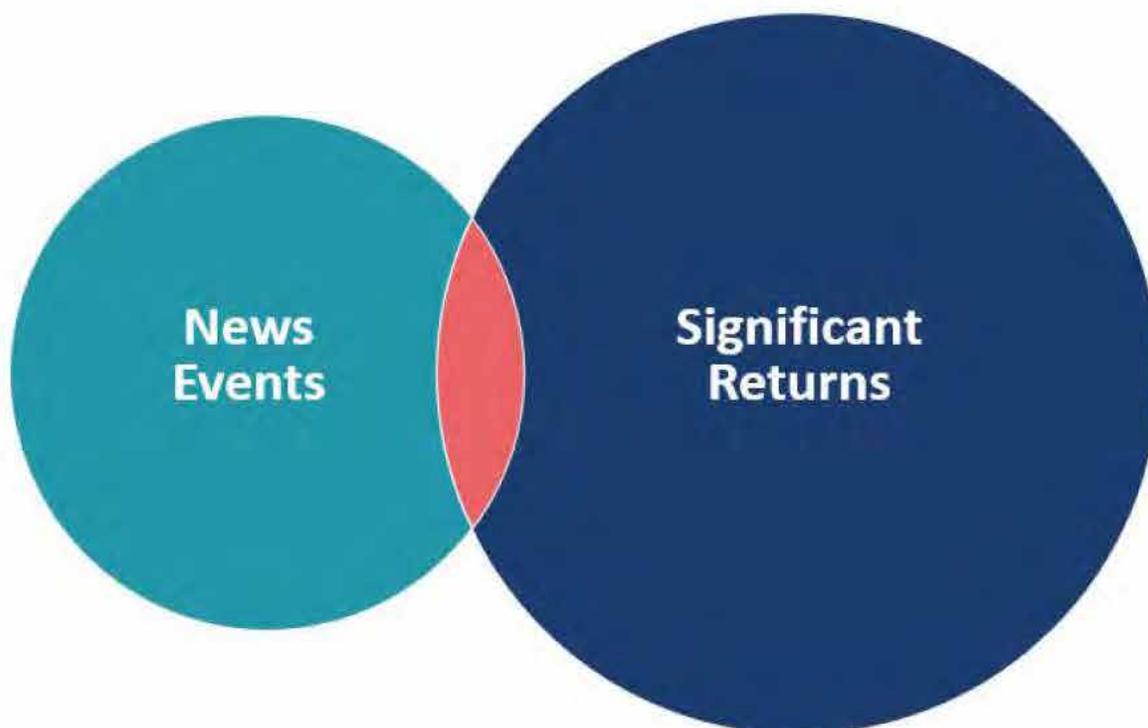


53. In the matter at hand, we do not have marbles which might be red, we have days which might have a significant (positive) XRP return. And rather than draw those days at random, I draw them based on whether there is Ripple Labs news as identified from my news identification process discussed above.

<sup>63</sup> Without replacement, each draw of marbles from the jar changes, however slightly, the probability that the next draw will be red. This complexity separates the binomial distribution (which assumes draws with replacement) from the hypergeometric distribution (which assumes draws without replacement).

54. Between May 5, 2014 (the first instance of news in my set) and December 20, 2020 (the last instance of news in my set before the SEC announced its action against Ripple Labs) there are 2,422 trading days (for illustrative purposes, imagine it is an even 2,500 days). For each of those days, I estimate the regression models that I described above based on the previous 180 trading days.<sup>64</sup> Each model generates an estimated abnormal return on each day, and a measure of the statistical likelihood of that abnormal return. I thus obtain from each model a set of days which have statistically significant positive XRP returns. We can think of this as the “set of red marbles” created by each model.
55. Suppose that a given model classifies 225, or 9%, of those 2,500 returns as significantly positive. Suppose that during the same period, 100 days have pertinent Ripple Labs news. If XRP returns are independent of Ripple Labs news, then we would expect 9 of those 100 “news days” to also have “significant returns” since 9% of all days have significant returns. In other words, if there is no relationship between “news” and “returns,” random chance still suggests that there will be some small overlap between those sets, and statistics tells us what that overlap should be. This random overlap is shown in Figure 11.

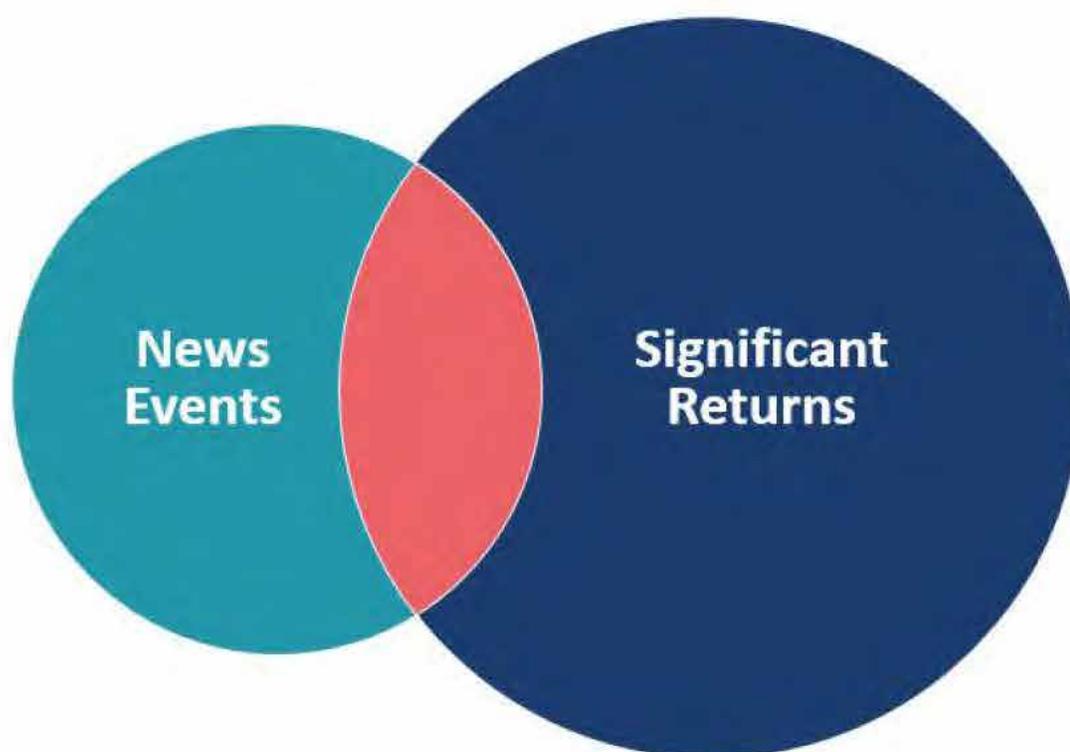
FIGURE 11: THE DEGREE OF OVERLAP IS SMALL IF NEWS EVENTS AND MARKET RETURNS ARE UNRELATED



<sup>64</sup> Note that not every statistical model I consider can be estimated over this entire period. Models which use the returns on certain other digital tokens as controls, for example, cannot be estimate before price data for those tokens become available.

56. But suppose that rather than 9, I find 25 significant returns among the 100 news days. How likely is such an outcome if the XRP market is independent of Ripple Labs? This is exactly analogous to the jar of marbles example: from a jar with 2,500 marbles, with just 225 of them being red, if 100 marbles are drawn at random, how likely is it that 25 or more would be red? If it is unlikely – if, say, the probability of that outcome is less than 5% - then this would be evidence that the draw was *not* random. In the case of XRP returns and Ripple Labs news, this would be evidence that there is a statistically significant relationship or correlation between Ripple Labs news and XRP returns. Figure 12 illustrates such a statistically significant overlap.

FIGURE 12: A LARGE OVERLAP IS STATISTICALLY SIGNIFICANT EVIDENCE THAT NEWS AND RETURNS ARE RELATED



57. To have 25 or more red marbles *from a random draw* is highly unlikely: the probability is just 0.0001%, or about one in 1,000,000, far beyond the common academic standard of 5% significance. To put that in perspective, the probability that two people selected at random share the same birthday is about 2,500 times greater. Such a result is statistical evidence that the draw was not random and is evidence of a statistically significant correlation between Ripple news and XRP returns. This result is effectively what I find below.

58. In summary, my analysis first selects different categories of news event, determines how many of those correspond to significantly positive XRP returns according to different regression models I consider, and then calculates how likely that outcome is. If the likelihood is less than 5%, I will conclude that there is a statistically significant (positive) correlation between the news events in question and XRP returns.

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## E. Summary of the Empirical Methodology

59. I implement the statistical framework described above with the following steps.
60. First, I specify the regression model of XRP returns. As explained in Section V.B above, I consider 20 different models estimated using 180 day “estimation windows.” As shown in Appendix E, my conclusions are robust to longer and shorter estimation windows.
61. Second, I specify the “event window,” i.e., the window over which to measure the changes in XRP prices following a news event. As discussed above, I consider event windows over multiple days: date  $t$  (i.e., a one-day event window coinciding with the day of the news event), dates  $t$  and  $t + 1$  (i.e., a two-day event window), and dates  $t$ ,  $t + 1$ , and  $t + 2$  (i.e., a three-day event window). As shown in Appendix E, my conclusions are robust to longer and shorter event windows.
62. Third, I estimate the (cumulative) abnormal returns for each trading day over the corresponding event window and determine which are significant. I determine the significance of abnormal returns using two approaches:
- a. **Parametric Approach:** assesses the abnormal return against the significant thresholds from the  $t$ -distribution (approximately 1.64 for a one-sided test and 1.96 for a two-sided test).<sup>65</sup> This approach is common practice in academic studies.<sup>66</sup>
  - b. **Nonparametric Approach:** assesses the abnormal return against the distribution of standardized abnormal returns observed over the 180 days used to estimate the regression model.
63. For both the parametric and nonparametric approaches, I evaluate abnormal returns at the 5% significance level. For a given significance level, I classify date  $t$  as “significantly positive” if any of its

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<sup>65</sup> The “one-sided” test classifies a return as significant if there is only a 5% probability of drawing a greater (more positive) return. The “two-sided” test classifies a return as significant if there is only a 5% probability of drawing a more extreme (whether positive or negative) return. When using the “two-sided” standard, I continue to restrict myself only to positive returns, unless otherwise noted.

<sup>66</sup> Under general conditions this approach is appropriate. However, those general conditions may not apply in this case. In particular, XRP returns may not be normally distributed. To account for this possibility, the nonparametric method compares the standardized abnormal return from the event window with the distribution of standardized abnormal returns from the estimation data.

cumulative returns over a one-, two-, or three-day event window is significantly positive and none of its returns over those windows is significantly negative.

64. Finally, I examine the interaction between the set of news days I have identified and the set of days with significant positive XRP returns. If there is a relationship between Ripple's actions and XRP returns, then I would expect that (presumptively positive) news would be significantly associated with positive returns. I would not expect that such news would be significantly associated with negative returns, and I consider this robustness check below.

## VI. XRP Prices React to News about Ripple's Actions

65. In this section, I describe the results of my analysis. I find that across major milestones in the history of Ripple Labs and across those categories of news more directly related to XRP's proposed use cases, there is statistically significant evidence that the price of XRP reacts to news of Ripple's actions. This holds for nearly all statistical models at any reasonable significance level.
66. In no case do I find a significant correlation between news about Ripple Labs and XRP's negative returns. In no case do I find a significant correlation between news about Ripple Labs and XRP's returns in the days before the news. Furthermore, I find that my results are robust to possible errors in the classification of news events.
67. Taken together, my results indicate that the price of XRP reacts to the news about actions of Ripple Labs. I therefore reject the hypothesis that XRP prices are independent of Ripple Labs.

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### A. XRP Prices Reacted to Key Milestones in Ripple's History

68. Figure 13 lists eight key corporate milestones in the history of Ripple Labs.<sup>67</sup> These milestones include Ripple's funding rounds, its joint venture with SBI Holdings, the licensing by New York State, and its

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<sup>67</sup> I identify nine milestone events in my data, listed in Appendix C. On 5/16/2017, Ripple announces its plan to escrow 55 billion XRP tokens. A Newsroom article from 5/26/2017 again reports Ripple's plan to escrow 55 billion XRP tokens. I exclude the 5/26/2017 event from my analysis as stale. See Brad Garlinghouse, "Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply," ripple.com insights, May 16, 2017, accessed 10/4/2021, <https://ripple.com/insights/ripple-to-place-55-billion-xrp-in-escrow-to-ensure-certainty-into-total-xrp-supply/> and Ari Levy, "Bitcoin rival Ripple is suddenly sitting on billions of dollars worth of cryptocurrency," CNBC, May 26, 2017, accessed 10/4/2021, <https://www.cnbc.com/2017/05/26/bitcoin-rival-ripple-is-sitting-on-many-billions-of-dollars-of-xrp.html>.

decision to escrow 55 billion XRP tokens. If the XRP market is independent of Ripple Labs, then there is no reason that XRP prices should react to any of these events.

FIGURE 13: KEY MILESTONE EVENTS

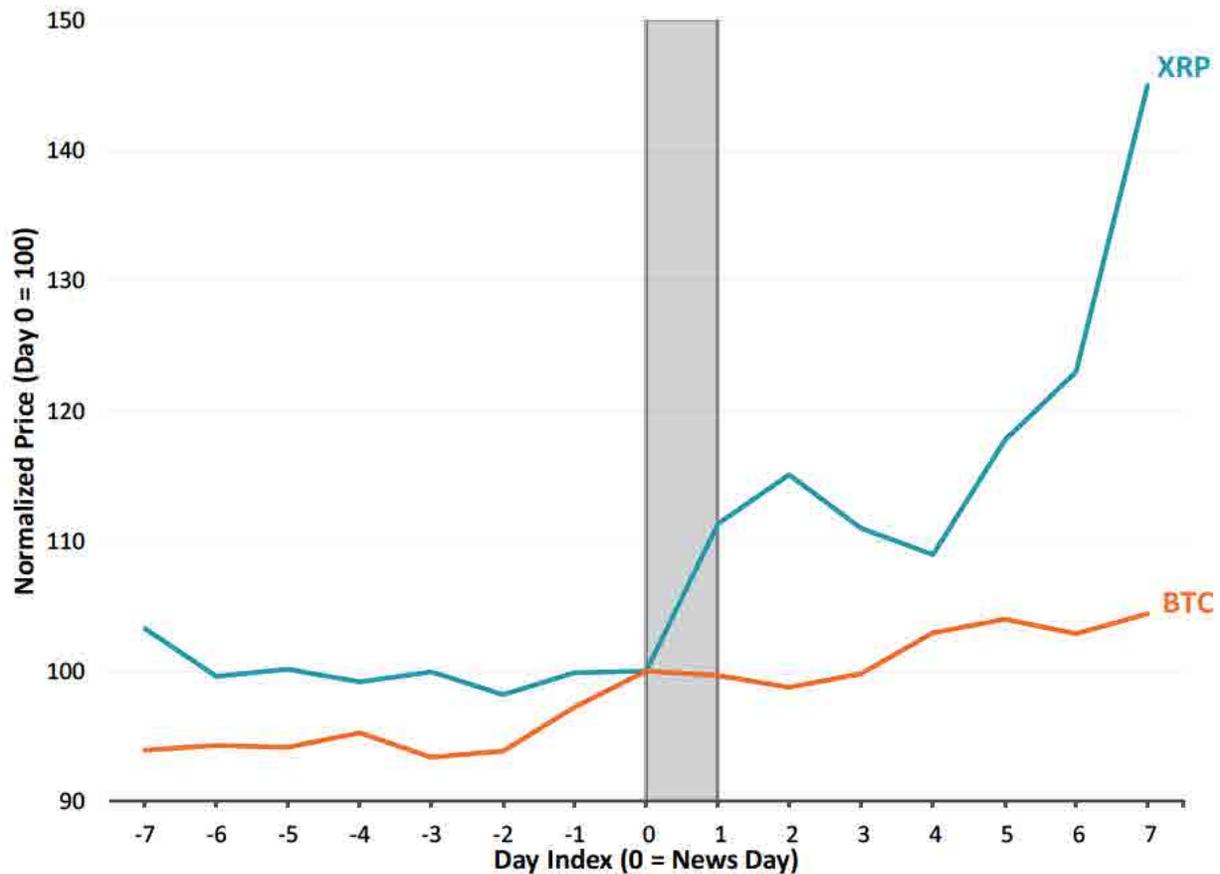
Event Date	Event	Stale?	Representative Document	
			ID	Headline
5/18/2015	Series A Funding		7585	Ripple Labs Closes \$28 Million Series A Funding Round
10/6/2015	Santander Investment		7580	Ripple Adds Santander InnoVentures Fund as Series A Investor
1/29/2016	SBI Holdings Deal		7578	Ripple Strikes Multi-National Deal with SBI Holdings to Meet Growing Demand for Ripple Solutions Across Asia
6/13/2016	New York BitLicense		8527	Ripple Receives New York's First BitLicense for an Institutional Use Case of Digital Assets
9/15/2016	Series B Funding		7573	Ripple Raises \$55 Million in Series B Funding
5/16/2017	Escrow Announcement		8463	Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply
5/26/2017	Escrow Announcement	✓	7793	Bitcoin rival Ripple is suddenly sitting on billions of dollars worth of cryptocurrency
12/8/2017	Escrow Action		8432	Ripple Escrows 55 Billion XRP for Supply Predictability
12/20/2019	Series C Funding		8329	Ripple Caps Record Year With \$200 Million Series C Funding

69. Figure 14 plots the average XRP price path for the week leading up to and the week following these milestones and compares it with the average BTC price path.<sup>68</sup> The average XRP price path was essentially flat for the week leading up to a milestone event, then jumps 11% on the milestone date, holds fairly steady for a couple of days, and then appears to increase even further. By contrast, the prices of Bitcoin (commonly known to be the largest digital token by market cap)<sup>69</sup> are comparatively flat around these milestone events, which indicates that the movements in XRP prices are not attributable to movements in the broader digital token market.

<sup>68</sup> For each milestone, I collect prices for the seven days leading up to and following the milestone date. I then normalize the price to 100 at the beginning of the news day (equivalently, the end of the day before the news day). The chart plots the simple average across these normalized price series.

<sup>69</sup> See "Today's Cryptocurrency Prices by Market Cap," CoinMarketCap, accessed October 1, 2021, <https://coinmarketcap.com/>.

FIGURE 14: AVERAGE NORMALIZED PRICE BEFORE AND AFTER RIPPLE MILESTONES EVENTS



Note: Day labels indicate the beginning of the specified day. News Day is shaded in gray. News is released at some point between Day 0 and 1.

70. The first event, Series A funding, is dated May 18, 2015 and the last event, Series C funding, is dated December 20, 2019. This spans 1,678 trading days. I consider 20 different statistical models of XRP returns, each of which generate somewhat different estimates of the abnormal XRP return on each of those days. I then evaluate those abnormal returns at the one-sided 5% significance level determined both parametrically and nonparametrically. The result is 40 potentially different sets of “significant positive XRP return days.”<sup>70</sup> As an example, applying the Constant Mean Return Model (Model 1) and the one-sided 5% significance level determined parametrically yields 146 days as “significantly positive.”

<sup>70</sup> This follows as 40 = 20 models x 2 methods of determining critical values.

71. Each model measured under each method thus generates a probability of finding a significantly positive XRP day at random. For the Constant Mean Return Model we have been considering, this is 8.7% (146/1,678).
72. If I draw eight days at random from the 1,678 days which span May 18, 2015 through December 20, 2019 where the chance that any one is significant is just 8.7%, the most likely outcome is that I would not draw a single significantly positive day; for the Constant Mean Return Model, the probability of drawing 0 significantly positive days is 48.2%, or 1 in 2.1.
73. However, I do not draw the eight days at random. Rather, I draw the eight days corresponding to the eight milestone events described above. And in that set of eight days, I find six days with significantly positive returns. Where my “success rate” if I were picking these days at random should be 8.7%, my actual success rate is 75% (6/8). The odds of drawing six or more by random chance are about 1 in 100,000, or 0.0010%. The usual scientific standard would consider any outcome with a likelihood of less than 5%, or 1 in 20, as “statistically significant.” While it is not impossible to draw 6 by random luck, the more likely explanation is that there is a relationship between this news about Ripple and XRP prices.
74. Figure 15 presents the results of my event study and statistical analysis. A check mark indicates that I find statistically significant evidence of a correlation between XRP price increases and Ripple milestone events. In other words, I can reject the hypothesis that XRP prices are independent of these eight Milestone events.
75. Put another way, the results in Figure 15 mean that statistically I can reject the hypothesis that it is simply coincidence that XRP prices significantly increase at the same time that these events are publicized; there is almost certainly a common factor between them. From an economic perspective, one explanation of course is that news of the event causes the XRP price response.<sup>71</sup>
76. Observing a relationship between XRP prices and Ripple milestone events has important economic implications for the matter at hand. If the XRP market looks to Ripple Labs to create value, then it becomes understandable why certain corporate developments would impact XRP prices. However, if the XRP market does not look to Ripple Labs to create value, then it is difficult to understand why XRP prices would react to these events.

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<sup>71</sup> Another explanation would be the reverse – that somehow the news of these events is released in response to XRP price increases but otherwise would not have been released on these days, or that the “price causes the news.” A third explanation would be that there is some other factor – an “X factor” – which is driving both these events and the XRP market. These events, of course, are disparate in their nature, including venture funding rounds involving multiple investors, joint ventures in Asia, and licensing decisions made by the state of New York. Many of them also represent the culmination of long processes.

FIGURE 15: XRP PRICES REACT TO RIPPLE MILESTONE EVENTS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:



Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

## B. XRP Prices Reacted to Digital Asset Trading Platform Listings

77. I have identified eleven announcements related to new listings of XRP on trading platforms.<sup>72</sup> I examine if there is a significant correlation between these announcements and XRP prices.

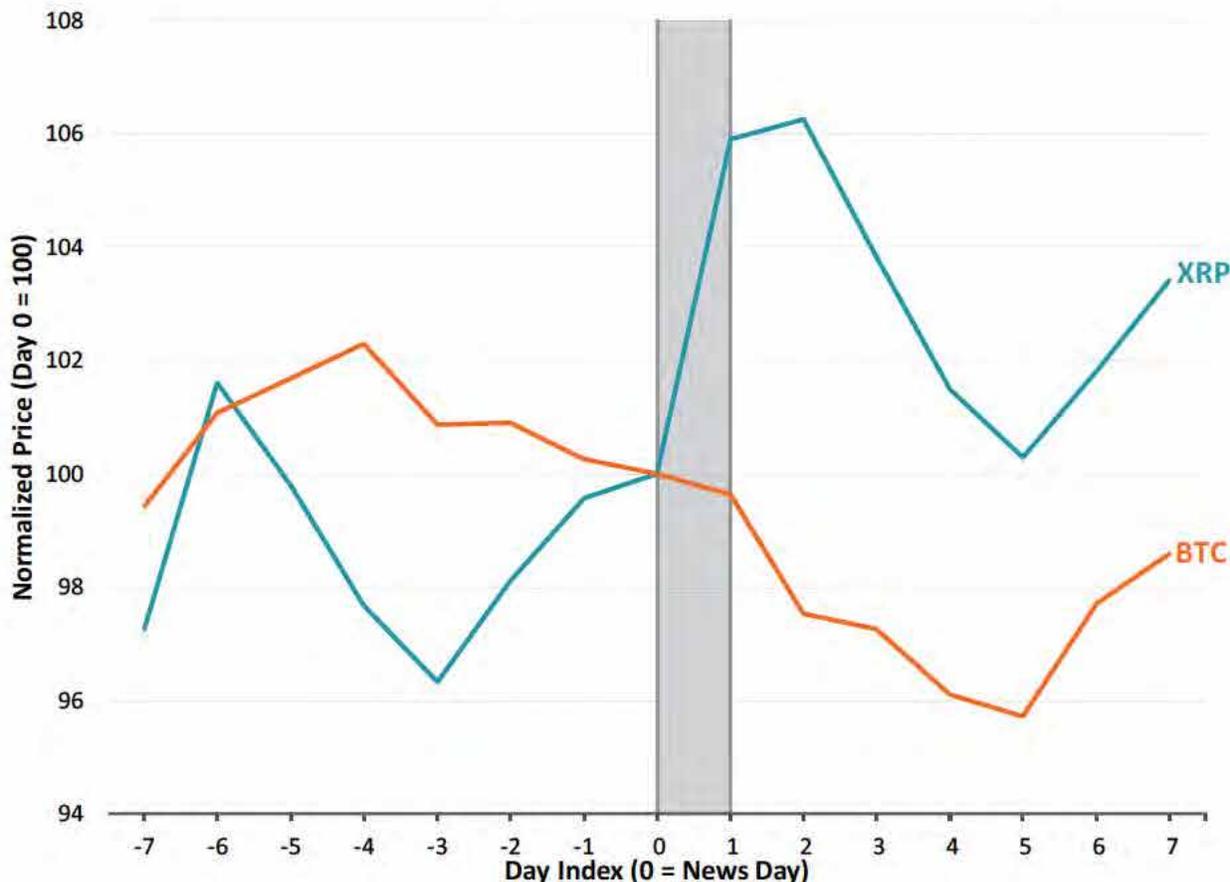
FIGURE 16: KEY TRADING PLATFORM LISTING EVENTS

Event Date	Event	Ripple Action?	Representative Document	
			ID	Headline
2/29/2016	Partnership with Crypto Facilities	✓	8539	Ripple Partners with Crypto Facilities for XRP Derivatives
10/9/2016	Derivatives Listing on Crypto Facilities	✓	8501	Ripple Announces XRP Futures Trading on Crypto Facilities
10/27/2016	Listing on Coincheck		8496	Coincheck Lists XRP on Its Digital Asset Exchange
1/10/2017	Listing on Bitstamp with 0% Fees	✓	8483	Bitstamp Now Trading XRP with 0% Fees
5/18/2017	Listing on Six New Exchanges	✓	7567	XRP Liquidity to Increase With Listings on Six New Exchanges
8/31/2017	Partnership with Bitcoin IRA, Kingdom Trust		8452	It's Never Been Easier to Access and Store XRP
12/21/2017	Listing on CEX.IO, GMOCoin, Huobi.pro		8426	XRP Now Available on 50 Exchanges Worldwide
1/30/2018	Listing on SBI Virtual Currencies		8419	SBI Virtual Currencies to Exclusively List XRP at Launch
3/28/2018	Listing on Uphold		8410	XRP Ecosystem Grows with New Listing on Uphold
8/16/2018	Listing on Bittrex, Bitso, and Coins.ph	✓	7550	xRapid Brings on Three New Exchange Partners
2/12/2020	Partnership with BRD Wallet	✓	8323	BRD Supports XRP and Launches Enterprise Expansion

78. Figure 17 plots the average XRP price path for the week leading up to and the week following these eleven announcements and compares it with the average BTC price path. The XRP price on average jumps 6% on these dates, though the bump appears to be temporary. By contrast, Bitcoin prices are trending down on average and show no particular reaction to these XRP listings.

<sup>72</sup> On January 10, 2017, an Insight article announces that XRP is newly listed on Bitstamp. An announcement dated February 16, 2017 extends that by announcing that a particular trading pair (XRP/BTC) is newly available on that trading platform. I regard this second announcement as qualitatively different from announcing a listing on a new trading platform, hence I do not include it in my analysis.

FIGURE 17: AVERAGE NORMALIZED PRICE BEFORE AND AFTER TRADING PLATFORM LISTINGS



Note: Day labels indicate the beginning of the specified day. News Day is shaded in gray. News is released at some point between Day 0 and 1.

79. The first trading platform announcement is dated February 29, 2016, and the last February 12, 2020, spanning 1,445 days. Using again the example of the Constant Mean Return Model, this model identifies 123 days as being significantly positive (when assessed parametrically) over this period of time. Drawing eleven days at random, the most likely single outcome is to find just one significantly positive day—the probability of this outcome is 39%. But among the eleven trading platform listing days, I find five significantly positive market days.<sup>73</sup> The probability of drawing five or more is just 0.13%, or about 1 in 800.

<sup>73</sup> By “market day,” I mean a day with a statistically significant positive abnormal return.

80. Figure 18 presents the result of my event study and statistical analysis. A check mark indicates that I find a statistical evidence of a correlation between XRP prices and announcements of listings on new trading platforms. In other words, I can reject the hypothesis that XRP prices are independent of news of trading platform listings.

FIGURE 18: XRP PRICES REACT TO LISTINGS ON NEW TRADING PLATFORMS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

-  Indicates significance at the 5% level.
-  Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

81. Ripple Labs may not have been an active participant in every trading platform listing. But according to Ripple’s announcements, it appears to have been involved in at least some, and this is a type of action

which is significantly correlated with XRP prices. For example, in an Insight Article from October 10, 2016, Ripple writes:

“In February, Ripple formalized its partnership with Crypto Facilities, a London-based financial services firm that provides FCA-regulated risk management and trading solutions for digital assets. Today, Ripple is excited to announce that Crypto Facilities will be the first derivatives exchange to list regulated XRP futures contracts. To further establish digital assets as a new asset class, Crypto Facilities is also partnering with CME Group, which has invested in Ripple through its venture arm.”<sup>74</sup>

82. In my review of these eleven announcements, I believe that six indicate involvement by Ripple.<sup>75</sup> Figure 19 reports the likelihood of the outcomes from this subset of trading platform listings. The subset of trading platform listings which indicate action by Ripple is significantly correlated with XRP prices. Once again, I can reject the hypothesis that XRP prices are independent of trading platform listings.

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<sup>74</sup> “Ripple Announces XRP Futures Trading on Crypto Facilities,” Ripple.com Insights, October 10, 2016, accessed September 29, 2021, <https://ripple.com/insights/ripple-announces-xrp-futures-trading-crypto-facilities/>.

<sup>75</sup> I am not taking the position that Ripple was not involved in the other trading platform listings. I am simply identifying those six events for which my reading of the announcements suggests that Ripple likely was involved.

FIGURE 19: XRP PRICES REACT TO NEW TRADING PLATFORM LISTINGS INVOLVING RIPPLE LABS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

✓	Indicates significance at the 5% level.
	Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

## C. XRP Prices Reacted to Customer and Product Announcements

83. I have identified 85 announcements related to customer and product developments. It is not always clear if Ripple is an active participant or not. For example, Ripple’s first press release, dated May 5,

2014, is headlined “Ripple Labs Announces Fidor Bank AG as First Bank to Use the Ripple Protocol.”<sup>76</sup> The body of the announcement says that “Fidor Bank AG [is] the first bank to integrate Ripple,” and it goes on to define Ripple as “an open, decentralized payments protocol that enables anything of value to be traded through a global value web.” Reading this press release, one could interpret this as an example of a bank choosing to adopt an open source technology such that, in principle, Ripple Labs is in no way involved. In fact, the first several announcements by Ripple – AstroPay, GBI, CBW Bank, and Cross River Bank – read largely the same way.

84. However, following the announcements that CBW Bank and Cross River Bank were integrating the “Ripple protocol” – again defined as the decentralized ledger technology – Chris Larsen, then CEO of Ripple Labs, is quoted in a Newsroom Article saying, “It’s a big milestone...We’ve been working on our enterprise banking strategy for well over a year. It takes awhile for banks to get going.”<sup>77</sup> This would suggest that it was, at least in part, due to the efforts of Ripple Labs that some of these first institutions adopted the decentralized protocol.
85. One economic consideration is that not all product developments might be expected to lead directly to increased utilization of XRP. For example, some announce new validators on the XRP ledger; this is different from a new bank joining RippleNet. Also, two events appear to repeat old information and hence are effectively stale.<sup>78</sup> In all, from these 85 events, I exclude 8 as not relevant. These are listed in Figure 20. I note that my conclusions are qualitatively unchanged if these events are included; please see Appendix E.

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<sup>76</sup> “Ripple Labs Announces Fidor Bank AG as First Bank to Use the Ripple Protocol,” ripple.com press center, May 5, 2014, accessed September 29, 2021, [https://ripple.com/ripple\\_press/ripple-labs-announces-fidor-bank-ag-as-first-bank-to-use-the-ripple-protocol/](https://ripple.com/ripple_press/ripple-labs-announces-fidor-bank-ag-as-first-bank-to-use-the-ripple-protocol/).

<sup>77</sup> Biz Carson, “Two US banks are ready to embrace the Ripple protocol, allowing instant global money transfers,” Gigaom, September 24, 2014, accessed September 29, 2021, <https://gigaom.com/2014/09/24/two-us-banks-are-ready-to-embrace-the-ripple-protocol-allowing-instant-global-money-transfers/>.

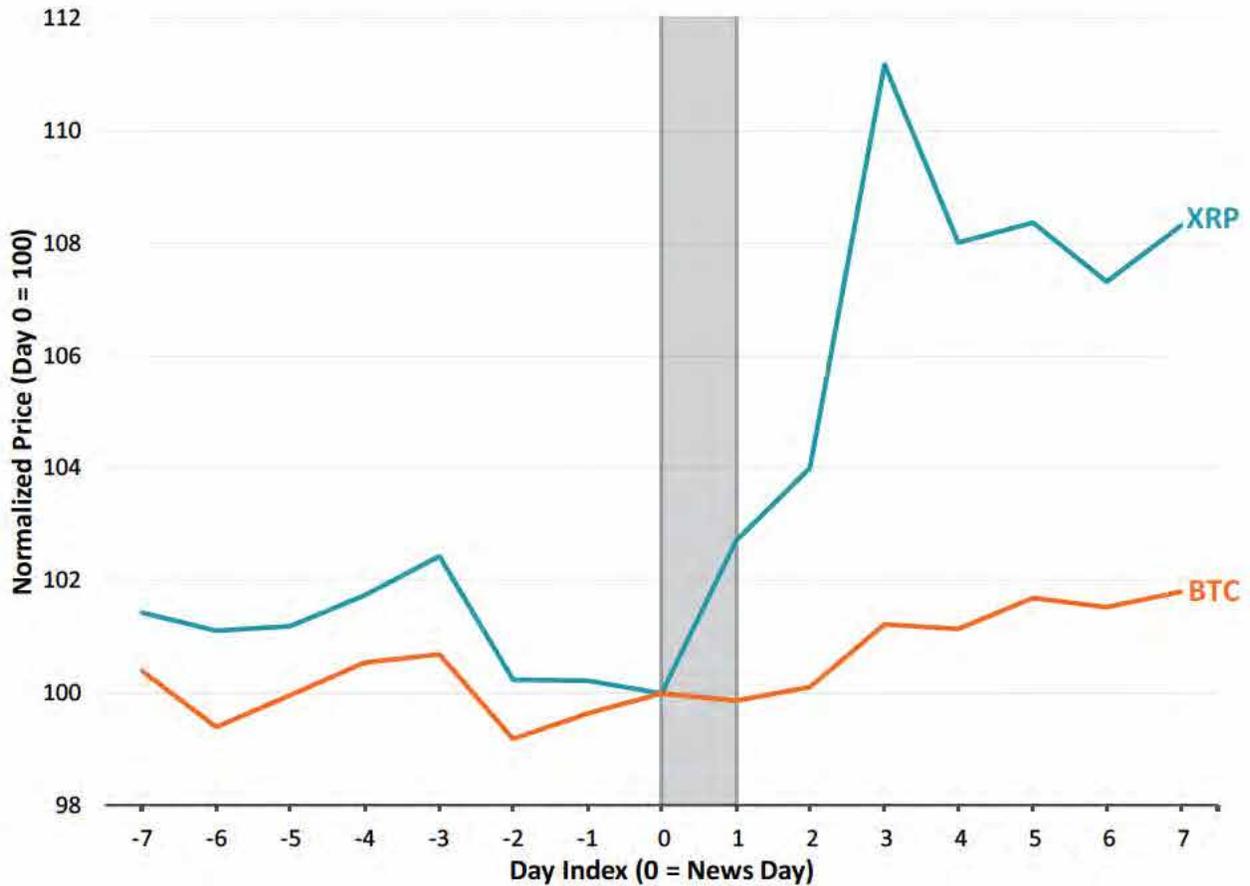
<sup>78</sup> An Insight Article from August 16, 2016 entitled “Multi-Signing in Ripple: A Q&A with David Schwartz” discusses an amendment to the XRP Ledger which had been recently adopted. It is not clear that Ripple Labs sponsored the amendment, but regardless, the amendment itself is not being newly proposed in this article. The second case is a Newsroom Article dated January 29, 2018 entitled “MoneyGram CEO Plans Waves with Ripple” which essentially repeats the news of January 11 from a Press Release headline titled, “Ripple and MoneyGram Partner to Modernize Payments.”<sup>78</sup> See, “Multi-Signing in Ripple: A Q&A with David Schwartz,” ripple.com insights, August 16, 2016, accessed September 29, 2021, <https://ripple.com/insights/multi-signing-ripple-ga-david-schwartz/>; PYMNTS, “MoneyGram CEO Plans Waves with Ripple,” pymnts.com, January 29, 2018, accessed September 29, 2021, <https://www.pymnts.com/news/2018/moneygram-ripple-cryptocurrency-blockchain-alex-holmes/>; “Ripple and MoneyGram Partner to Modernize Payments,” ripple.com press center, January 11, 2018, accessed September 29, 2021, [https://ripple.com/ripple\\_press/ripple-and-moneygram-partner-to-modernize-payments/](https://ripple.com/ripple_press/ripple-and-moneygram-partner-to-modernize-payments/).

FIGURE 20: EXCLUDED CUSTOMER AND PRODUCT ANNOUNCEMENT EVENTS

Event Date	Event	Reason for Exclusion		ID	Representative Document	
		Stale	Direction Unclear		Headline	
1/12/2016	Earthport Launch of Ripple API		✓	8554	Earthport Launches Distributed Ledger Hub	
4/12/2016	MIT Runs Ripple Validator		✓	7575	MIT Adopts Ripple Validator to Advance Consensus and Blockchain Research	
8/16/2016	Recently Adopted XRP Ledger Amendment	✓		8514	Multi-Signing in Ripple: A Q&A with David Schwartz	
11/16/2016	Improvement of RippleCharts		✓	8492	Ripple Announces An Upgrade to RippleCharts	
5/11/2017	XRP Ledger Validator Updates		✓	8464	How We Are Further Decentralizing the XRP Ledger to Bolster Robustness for Enterprise Use	
7/17/2017	Expansion of XRP Ledger Validator Nodes		✓	8458	XRP Ledger Decentralizes Further With Expansion to 55 Validator Nodes	
1/29/2018	Pilot with MoneyGram	✓		7760	MoneyGram CEO Plans Waves With Ripple	
2/21/2018	Ripple Releases White Papers		✓	7747	Ripple Papers Pledge New Start for \$40 Billion XRP	

86. Figure 21 plots the average XRP price path for the week leading up to and week following these 77 announcements and compares it with the average BTC price path. The average XRP price path increases 3% on the announcement date but continues to increase thereafter, ending about 8% higher a week later. By contrast, Bitcoin prices are trending up slowly on average but show no particular reaction to these Ripple announcements.

FIGURE 21: AVERAGE NORMALIZED PRICE BEFORE AND AFTER CUSTOMER AND PRODUCT ANNOUNCEMENTS



Note: Day labels indicate the beginning of the specified day. News Day is shaded in gray. News is released at some point between Day 0 and 1.

87. Figure 22 presents the results of my event study and statistical analysis on customer and product announcements, leading me to reject the hypothesis that XRP prices are independent of these developments.

FIGURE 22: XRP PRICES REACT TO NEW CUSTOMER AND PRODUCT ANNOUNCEMENTS

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:



Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

## D. XRP Prices Reacted to Ripple's Commercialization Initiatives

88. Ripple Labs has launched a number of initiatives described as commercializing or promoting its technology and payment solutions, including some described as creating use-cases for XRP.<sup>79</sup> These include:

- The Global Payments Steering Group (GPSG), described in a Ripple press release as overseeing “the creation and maintenance of Ripple payment transaction rules, formalized standards for activity using Ripple, and other actions to support the implementation of Ripple payment capabilities.”<sup>80</sup>
- The Infrastructure Innovation Initiative, described in a Newsroom article as “a team within [Ripple Labs] that will focus on providing Ripple’s DLT [Distributed Ledger Technology] and payments technology to central banks and market infrastructures. The initiative will enable regulators and financial institutions (FIs) to use Ripple’s technology to explore blockchain themselves and develop solutions.”<sup>81</sup>
- The Line of Credit, described in a Ripple Insight Article as “a new beta service on RippleNet that allows customers using On-Demand Liquidity (ODL) to source capital on-demand to initiate cross-border payments at scale using the digital asset XRP.”<sup>82</sup>
- The RippleNet Accelerator Program, described in a Ripple Insight Article as “a unique reward for financial institutions that are the first in their markets to process and promote commercial payments on RippleNet...the RippleNet Accelerator Program is funded by \$300 million of XRP from Ripple’s XRP holdings.”<sup>83</sup>

<sup>79</sup> By classifying these initiatives as “Ripple Commercialization Initiatives,” I am not taking the position that the initiatives were ultimately successful in commercializing Ripple’s technology or in creating use cases for the XRP token, merely that Ripple’s descriptions of these initiatives suggest that that would be a goal or objective of the program.

<sup>80</sup> “Major Banks Launch Global Payments Steering Group,” ripple.com press center, September 23, 2016, accessed September 29, 2021, [https://ripple.com/ripple\\_press/major-banks-launch-global-payments-steering-group/](https://ripple.com/ripple_press/major-banks-launch-global-payments-steering-group/).

<sup>81</sup> PYMNTS, “Ripple Ramps Up Focus on Blockchain Infrastructure,” pymnts.com, December 21, 2017, accessed September 29, 2021, <https://www.pymnts.com/news/b2b-payments/2017/ripple-infrastructure-initiative/>.

<sup>82</sup> “Fund Instant Cross-Border Payments With a Line of Credit From RippleNet,” ripple.com insights, October 8, 2020, accessed September 29, 2021, <https://ripple.com/insights/fund-instant-cross-border-payments-with-a-line-of-credit-from-rippletnet/>.

<sup>83</sup> “Ripple Rolls Out \$300M RippleNet Accelerator Program to Grow Volume and XRP Utility,” ripple.com insights, October 13, 2017, accessed September 29, 2021, <https://ripple.com/insights/ripple-rolls-300m-rippletnet-accelerator-program-grow-volume-xrp-utility/>.

- Xpring, described in a Ripple Insight Article as “a new initiative by Ripple that will invest in, incubate, acquire and provide grants to companies and projects run by proven entrepreneurs. Every entrepreneur will use the digital asset XRP and the XRP Ledger.”<sup>84</sup>

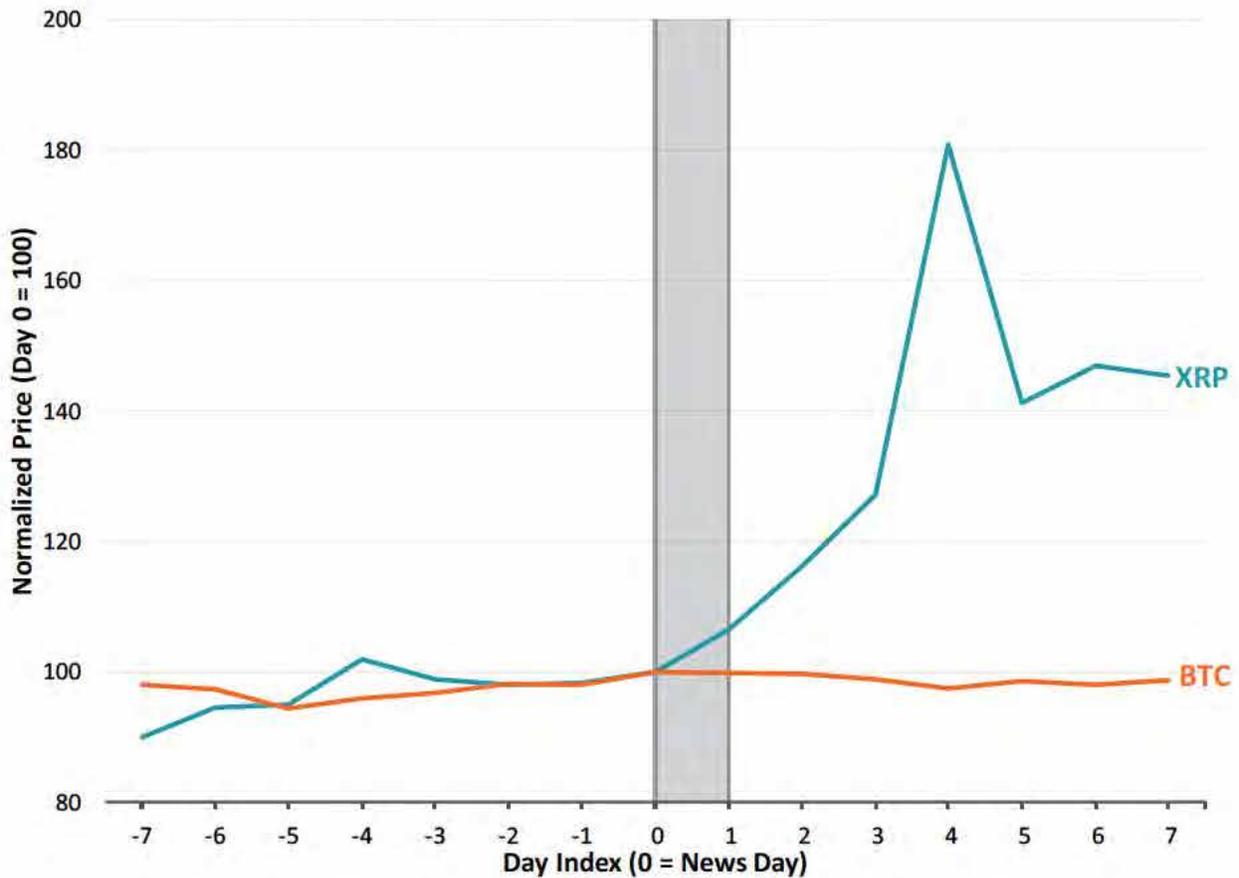
FIGURE 23: KEY RIPPLE COMMERCIALIZATION INITIATIVE EVENTS

Event Date	Event	Representative Document	
		ID	Headline
9/23/2016	Launch GPSG	7571	Major Banks Launch Global Payments Steering Group
3/30/2017	MUFG Joins GPSG	8469	MUFG Joins Ripple's Global Payments Steering Group
10/13/2017	Creation of RippleNet Accelerator Program	8446	Ripple Rolls Out \$300M RippleNet Accelerator Program to Grow Volume and XRP Utility
12/19/2017	Establish Infrastructure Innovation Initiative	8428	Exploring Innovation in Payment System Infrastructures
5/14/2018	Announce Xpring	8401	Welcome to Xpring
10/2/2019	Update to Xpring	8340	Announcing the Next Chapter of Xpring, Ripple's Developer Platform
10/8/2020	Launch RippleNet Line of Credit	8298	Fund Instant Cross-Border Payments With a Line of Credit From RippleNet

89. I have identified seven announcements related to these initiatives, either announcing their launch or some expansion to their program; these are listed in Figure 23. Figure 24 plots the average XRP price path for the week leading up to and the week following these announcements and compares it with the average Bitcoin price path. The difference is striking. Average XRP prices increase 7% on the day of the announcement, and one week later are about 50% higher. Bitcoin prices, on the other hand, do not appear to react at all.

<sup>84</sup> “Welcome to Xpring,” ripple.com insights, May 14, 2018, accessed September 29, 2021, <https://ripple.com/insights/welcome-to-xpring/>.

FIGURE 24: AVERAGE NORMALIZED PRICE PATH AROUND RIPPLE’S COMMERCIALIZATION INITIATIVES



Note: Day labels indicate the beginning of the specified day. News Day shaded in gray. News is released at some point between Day 0 and 1.

90. Figure 25 presents the results of my event study and statistical analysis on Ripple Commercialization Initiatives. The statistical evidence here is more mixed than the other news categories I have considered thus far, however, more than half of all models indicate a significantly positive correlation between Ripple Commercialization Initiatives and XRP prices.

FIGURE 25: XRP PRICES REACT TO RIPPLE’S COMMERCIALIZATION INITIATIVES

Model Number	Parametric	Nonparametric
1	✓	✓
2		
3	✓	✓
4		
5	✓	✓
6		
7	✓	✓
8		
9	✓	✓
10		
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16		
17	✓	✓
18		
19	✓	✓
20	✓	✓

Notes:

✓	Indicates significance at the 5% level.
	Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

91. By contrast, Ripple Labs has also launched initiatives which do not appear directly related to the commercialization or promotion of its technology, specifically, or to the creation of XRP use cases.

These include:

- University Blockchain Research Initiative (UBRI), described in a Ripple press release as “a program comprised of collaborative partnerships with leading universities to support academic research, technical development and innovation in blockchain, cryptocurrency and digital

payments. Through the program, Ripple will donate \$50M to universities around the world to help shape the workforce of the future.”<sup>85</sup>

- Research Consortium, described in a Newsroom Article which states “SBI Ripple Asia is forming a consortium that will research the use of distributed ledger technology in securities products...the new consortium will see joint efforts from 18 securities firms to research and commercialize applications of emerging technologies, particularly DLT [Distributed Ledger Technology], to improve efficiency for customers, while reducing operational cost.”<sup>86</sup>
- Carbon Neutrality, described in a Ripple press release as “several initiatives to lead global finance toward a carbon-neutral future, including the launch of an open-source tool that helps enable any blockchain to decarbonize.”<sup>87</sup>
- Ripple Labs periodically announces its participation with existing research initiatives or interest groups. I include such announcements in this analysis.

---

<sup>85</sup> “Ripple Announces \$50M University Blockchain Research Initiative,” ripple.com press center, June 4, 2018, accessed September 29, 2021, [https://ripple.com/ripple\\_press/ripple-announces-50m-university-blockchain-research-initiative/](https://ripple.com/ripple_press/ripple-announces-50m-university-blockchain-research-initiative/).

<sup>86</sup> Wolfie Zhao, “SBI Ripple Asia Forms Consortium to Bring DLT to Securities,” CoinDesk, January 30, 2018, accessed September 29, 2021, <https://www.coindesk.com/markets/2018/01/30/sbi-ripple-asia-forms-consortium-to-bring-dlt-to-securities/>.

<sup>87</sup> “Ripple Leads Sustainability Agenda to Achieve Carbon Neutrality By 2030,” ripple.com press center, September 30, 2020, accessed September 29, 2021, <https://ripple.com/ripple-press/ripple-leads-sustainability-agenda-to-achieve-carbon-neutrality-by-2030/>.

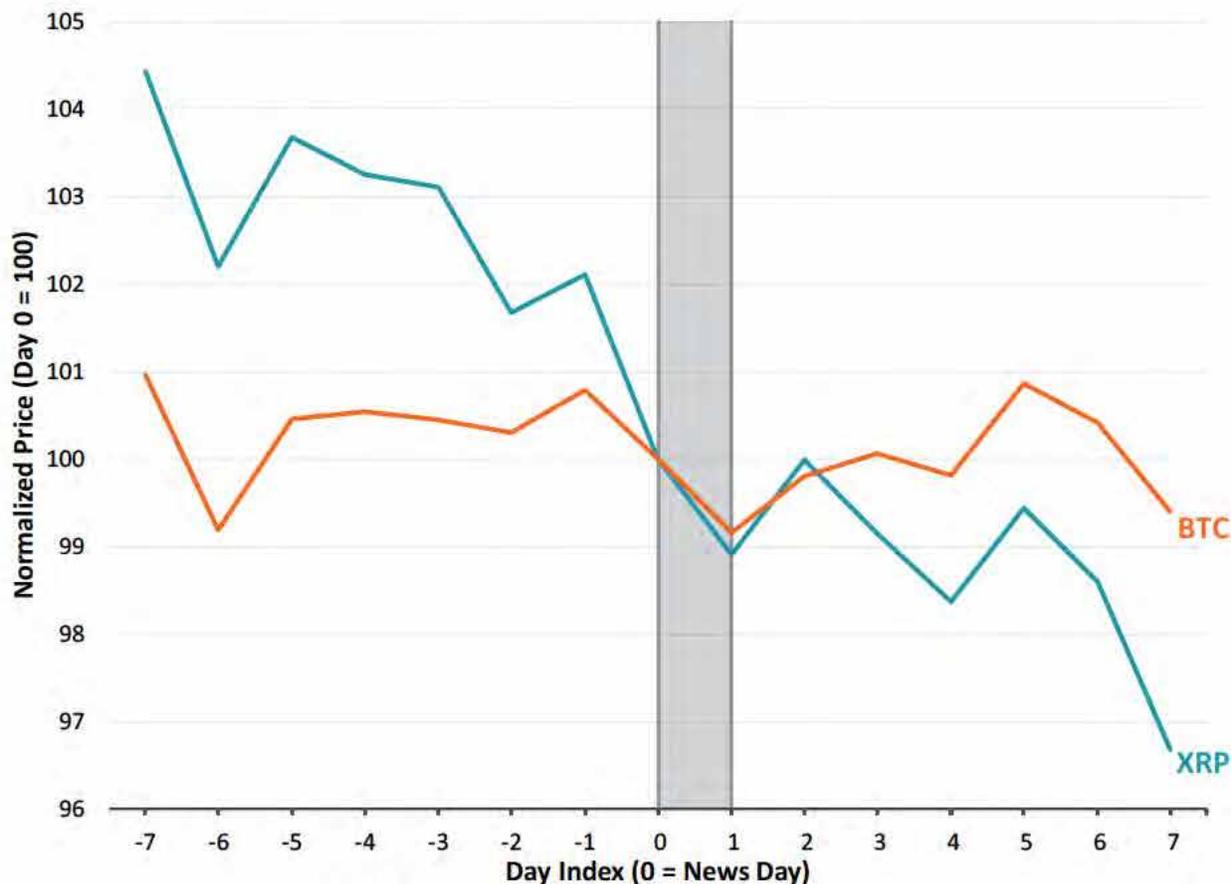
FIGURE 26: KEY OTHER INITIATIVE EVENTS

Event Date	Event	Stale?	Representative Document	
			ID	Headline
2/10/2015	Joins Center for Financial Services Innovation		8588	Ripple Labs joins the Center for Financial Services Innovation
2/12/2015	Joins W3C Web Payment Interest Group		7589	Ripple Labs Joins W3C Web Payment Interest Group to Help Set Standards for the Value Web
3/4/2015	Joins International Payments Framework Association		8587	Ripple Labs Joins International Payments Framework Association
6/15/2015	Ryan Zagone Elected to Faster Payments Task Force Steering		8575	Ripple Labs Elected to Fed Steering Committee for Faster Payments
1/30/2018	Creation of SBI Ripple Asia Consortium		7759	SBI Ripple Asia Forms Consortium to Bring DLT to Securities
3/28/2018	Joins Hyperledger Blockchain Consortium		7733	Ripple Joins Hyperledger Blockchain Consortium
6/4/2018	Launch University Blockchain Research Initiative		7552	Ripple Announces \$50M University Blockchain Research Initiative
1/23/2019	UBRI Partnership with THUIFR		7679	Ripple Partners With Chinese University for Blockchain Research Program
2/7/2019	Additional UBRI Partnerships		7542	Ripple Announces New University Blockchain Research Initiative Partners, Expands to China and Singapore
7/30/2019	UBRI Expansion to Japan		7538	Ripple Expands University Blockchain Research Initiative Program to Japan, Supports 33 University Partners Across 14 Countries
6/10/2020	Joins ISO 20022 Registration Management Group		8309	ISO 20022: Shaping the Future of Cross-Border Payments
6/18/2020	Joins Open Payments Coalition to launch PayString		8306	Why Ripple Supports PayString
8/26/2020	Additional UBRI Partnerships		8303	UBRI Expands To New Global Markets With More Than 35 University Partners
9/30/2020	Commitment to Carbon-Net Zero by 2030		7529	Ripple Leads Sustainability Agenda to Achieve Carbon Neutrality By 2030
11/2/2020	Commitment to Carbon-Net Zero by 2030	✓	7615	Cryptocurrency's carbon footprint is massive and not sustainable

92. I have identified fourteen relevant announcements related to these initiatives, either announcing their launch or some expansion to their program (see Figure 26).<sup>88</sup> Figure 27 plots the average XRP price path for the week leading up to and following these announcements and compares it with the average BTC

price path. Unlike the direct XRP-related initiatives discussed above, in these cases there appears to be little or no reaction in the XRP markets to these initiatives (if anything, prices are down slightly following these events), and little or no difference between XRP prices and Bitcoin prices in the days immediately surrounding these announcements.

FIGURE 27: AVERAGE NORMALIZED PRICE PATH BEFORE AND AFTER RIPPLE’S OTHER INITIATIVES



Note: Day labels indicate the beginning of the specified day. News Day shaded in gray. News is released at some point between Day 0 and 1.

93. Figure 28 presents the results of my event study and statistical analysis on Ripple’s Other Initiatives. Not surprisingly, there is no evidence of any correlation between these initiatives and XRP prices.

<sup>88</sup> I exclude a November 2, 2020 Newsroom Article which repeats the announcement of the sustainability initiative, Ken Weber, “Cryptocurrency’s carbon footprint is massive and not sustainable,” Forkast, November 2, 2020, accessed September 29, 2021, <https://forkast.news/cryptocurrency-big-carbon-footprint-not-sustainable-ripple-ken-weber/>.

FIGURE 28: XRP PRICES DO NOT REACT TO RIPPLE’S OTHER INITIATIVES

Model Number	Parametric	Nonparametric
1		
2		
3		
4		
5		
6		
7		
8		
9	<b>NO SIGNIFICANT RESULTS</b>	
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Notes:

- Indicates significance at the 5% level.
- Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

94. The evidence suggests that the XRP market is more responsive to Ripple’s Commercialization Initiatives than it is to its other initiatives.

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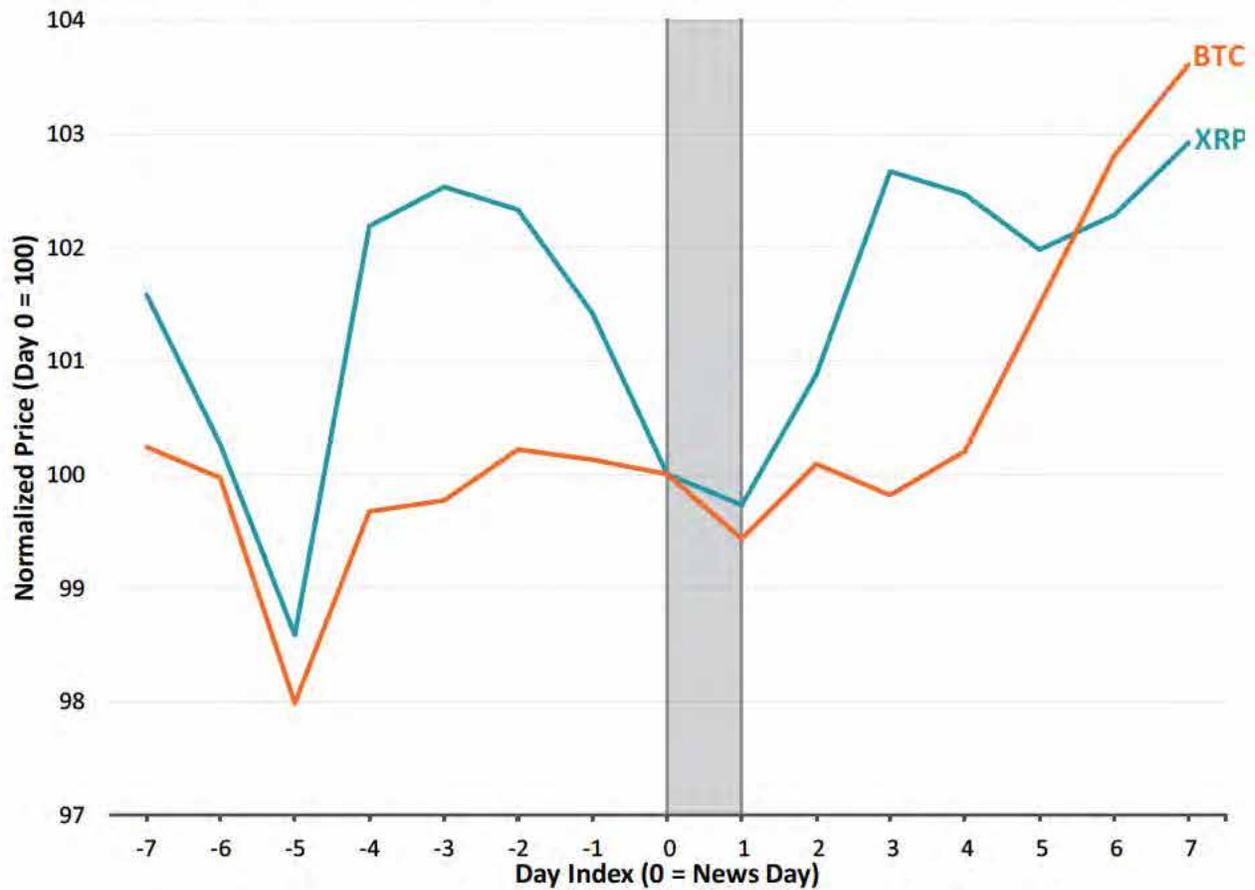
## E. XRP Prices Did Not React to Office and Staff Announcements

95. I have identified 28 relevant announcements related to staff or office expansions.<sup>89</sup> Figure 29 plots the average XRP price path for the week leading up to and following these announcements and compares it with the average BTC price path. The series appear very similar, and XRP prices do not appear to react to such announcements.

---

<sup>89</sup> I exclude a March 17, 2018 Newsroom Article which repeats the March 8 announcement that Cory Johnson was joining Ripple as its chief market strategist. See Ari Levy, "Ripple hires Bloomberg TV's Cory Johnson as chief marketing strategist," CNBC, March 8, 2018, accessed September 29, 2021, [https://www.cnbc.com/2018/03/08/ripple-hires-bloomberg-tvs-cory-johnson-as-chief-market-strategist.html?\\_source=twitter%7Cmain](https://www.cnbc.com/2018/03/08/ripple-hires-bloomberg-tvs-cory-johnson-as-chief-market-strategist.html?_source=twitter%7Cmain); see also, Daniel Roberts, "Ripple's new chief market strategist: Crypto regulation will 'separate the wheat from the chaff'," Yahoo! Finance, March 17, 2018, accessed September 29, 2021, <https://finance.yahoo.com/news/ripples-new-chief-market-strategist-crypto-regulation-will-separate-wheat-chaff-114110796.html>.

FIGURE 29: AVERAGE NORMALIZED PRICE BEFORE AND AFTER OFFICE AND STAFF ANNOUNCEMENTS



Note: Day labels indicate the beginning of the specified day. News Day shaded in gray. News is released at some point between Day 0 and 1.

96. This observation is confirmed statistically. Figure 30 presents the results of my event study and statistical analysis on Office and Staff Announcements. Not a single test indicates a statistically significant correlation between these announcements and XRP prices.<sup>90</sup>

<sup>90</sup> I note that this result does not preclude the possibility that “management quality” is of general interest to investors in Ripple Labs or, possibly, to holders of XRP tokens.

FIGURE 30: XRP PRICES DO NOT REACT TO OFFICE AND STAFF ANNOUNCEMENTS

Model Number	Parametric	Nonparametric
1		
2		
3		
4		
5		
6		
7		
8	<b>NO SIGNIFICANT RESULTS</b>	
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Notes:

- ✓ Indicates significance at the 5% level.
- Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

97. In summary, XRP price increases are significantly correlated with key milestones for Ripple Labs, with news of new trading platform listings, with customer and product announcements, and with major initiatives from Ripple Labs including those designed to generate proposed XRP use cases. They do not appear to react to more mundane office and staff announcements or to Ripple’s other initiatives not directly tied to Ripple’s Commercialization Initiatives.

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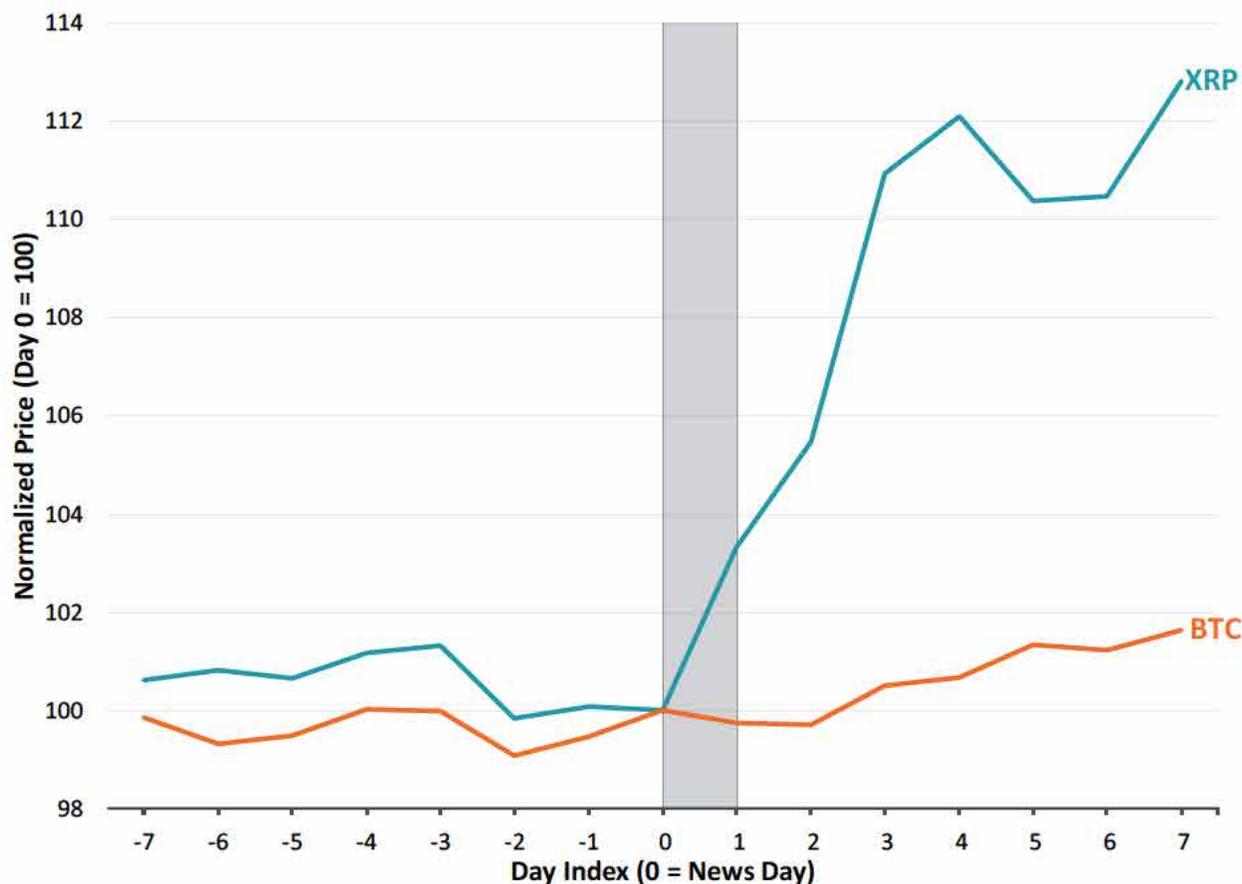
## F. Days with Ripple News Are Associated with Significant Abnormal XRP Returns and the Association Is Unlikely to Be Explained by Random Chance

98. As a final analysis I combine all the following categories: Milestones, Trading Platform Listings, Customer & Product, Acquisitions & Investments, and the Ripple Commercialization Initiatives described above in Section VI.D.<sup>91</sup> By combining these events, how I categorize among them becomes irrelevant. It will not matter if a particular event is thought of as a “Milestone” or as a “Customer & Product” announcement. Together these comprise 113 unique, relevant events on 105 unique days.
99. Figure 31 plots the average XRP price path for the week leading up to and the week following these announcements and compares it with the average BTC price path. XRP prices (and Bitcoin prices) appear essentially flat for the week leading up to these events. But while Bitcoin prices remain nearly flat, XRP prices increase sharply, jumping 3% on the day of the announcement and ending about 13% higher one week later.

---

<sup>91</sup> I had not previously presented the Acquisitions & Investments category. I find 11 Acquisitions & Investments events in my data, listed in Appendix C. I mark one event, the completion of Ripple’s investment in MoneyGram on November 25, 2019, as stale, since this investment had been previously announced on June 17, 2019 (see Daniel Phillips, “Ripple Completes \$50 million investment in MoneyGram,” Decrypt, November 25, 2019, accessed 10/3/2021, <https://decrypt.co/12038/ripple-completes-50-million-investment-in-moneygram> and Paul Vigna, “Ripple to Invest up to \$50 Million in MoneyGram,” Wall Street Journal, June 17, 2019, accessed 10/3/2021, <https://www.wsj.com/articles/ripple-to-invest-up-to-50-million-in-moneygram-11560803556>). I do not find a statistically significant relationship with this category in isolation. See Appendix E.

FIGURE 31: AVERAGE NORMALIZED PRICE BEFORE AND AFTER MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES



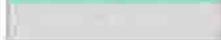
Note: Day labels indicate the beginning of the specified day. News Day shaded in gray. News is released at some point between Day 0 and 1.

100. These 105 event days span 2,369 trading days. Again using the Constant Mean Return Model as an example, it flags 199 days as significantly positive, or 8.4%. Drawing 105 days at random, the single most likely outcome is to draw eight significant market days. Instead, in my sample of 105 event days there are 24 market days. The odds of there being 24 or more market days by random chance are about 1 in 360,000. Recall that the typical standard for scientific research is 1 in 20.
101. Figure 32 presents the results of my event study and statistical analysis on all milestones, trading platform listings, customer & product announcements, acquisitions & investments, and Ripple commercialization initiatives. Every case of every model indicates a statistically significant correlation between these Ripple actions and XRP prices.

FIGURE 32: XRP PRICES REACT TO MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

-  Indicates significance at the 5% level.
-  Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

102. The hypothesis that XRP prices are independent of Ripple’s news about its business and activities can be rejected at any reasonable significance level. As a further demonstration of this, I apply the generalized rank test also found in Joo, Nishikawa, and Dandapani (2020). This is a test of the joint significance of these 105 event days: is the XRP return of this group events, taken together, statistically significant? Figure 33 indicates the statistical significance of these results. Every model indicates a significant reaction in the XRP market at the 5% level.

FIGURE 33: SIGNIFICANCE OF GENERALIZED RANK TEST APPLIED TO MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES

Model Number	Minimum T-Statistic	Maximum T-Statistic
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

- ✓ Indicates significance at the 5% level.
- Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. See Appendix E.

## 1. There Is No Relationship between Ripple News and Negative XRP Returns

103. As my first robustness check, I investigate whether the Ripple events described above are significantly associated with negative XRP returns. Such an association could be construed as evidence against the proposition in question.
104. Figure 34 reports instances of statistically significant correlations between these news events and XRP price *decreases*. Not a single instance indicates a significant correlation with negative returns.

FIGURE 34: THERE IS NO SIGNIFICANT RELATIONSHIP BETWEEN NEGATIVE XRP RETURNS AND MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES

Model Number	Parametric	Nonparametric
1		
2		
3		
4		
5		
6		
7		
8	<b>NO SIGNIFICANT RESULTS</b>	
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Notes:

- Indicates significance at the 5% level.
- Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly negative returns are identified at the 5% one-sided level. See Appendix E.

## 2. There Is No Relationship between Ripple News and XRP Returns Just before the News Is Released

105. I next investigate whether Ripple news events are announced or released during periods of time when XRP prices are simply increasing for “other reasons.” I apply my analytical framework not to the news

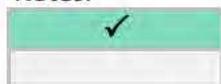
day itself, but to three days before the news day. If I continue to find evidence of significant correlation between XRP prices days before the news, this would suggest that something else, something other than the news itself, is driving the price growth. To associate the price increases with the news, and setting aside the possibility of rumors and leakage, I should not find any correlation if I look “too early.”

106. Figure 35 reports incidents of statistically significant correlations between these news announcements and XRP prices three days before the news is released. Not a single instance indicates a significant correlation at the 5% significance level.

FIGURE 35: THERE IS NO SIGNIFICANT RELATIONSHIP BETWEEN XRP RETURNS AND MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES 3 DAYS BEFORE EVENT

Model Number	Parametric	Nonparametric
1		
2		
3		
4		
5		
6		
7		
8	<b>NO SIGNIFICANT RESULTS</b>	
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Notes:



Indicates significance at the 5% level.

Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

### 3. Results Are Robust to Misclassifying Events

107. Classifying news is necessarily a subjective exercise. As a final robustness check, I consider the possibility that I may have misclassified events. There are two types of misclassification errors. First, I may have incorrectly included events in my set of “important” events which do not belong – meaning,

some of these 113 events should not have been considered. This first type of error is called “over-classification error.” Second, I may have incorrectly excluded events – meaning, some of the 400 or so excluded events should have been included. This second type of error is called “under-classification error.” I investigate both types of error below.

108. First I consider whether some of the events I have included in the set of Milestones, Trading Platform Listings, Customer & Product Announcements, Acquisitions & Investments and Ripple Commercialization Initiatives should be excluded. I randomly select 10% of the events and remove them from the analysis. I do this ten times. Figure 36 reports the average results. All cases of all models continue to indicate a significant correlation with XRP prices at any reasonable level of confidence. This indicates that my results are robust up to at least a 10% over-classification error rate.

**FIGURE 36: CORRELATION BETWEEN XRP RETURNS AND MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES IS ROBUST TO A RANDOM EXCLUSION OF EVENTS**

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

Notes:

-  Indicates significance at the 5% level.
-  Indicates not significant at the 5% level.

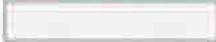
Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

109. Next, I consider whether some of the events I have excluded from this set of events should be included. I randomly select 10% of all excluded events and add them to the analysis. I do this ten times. Figure 37 reports the average results. All cases continue to indicate a significant correlation with XRP prices at the 5% level. My results are robust up to at least a 10% under-classification error rate.

**FIGURE 37: CORRELATION BETWEEN XRP RETURNS AND MILESTONES, TRADING PLATFORM LISTINGS, CUSTOMER & PRODUCT ANNOUNCEMENTS, ACQUISITIONS & INVESTMENTS, AND RIPPLE COMMERCIALIZATION INITIATIVES IS ROBUST TO A RANDOM INCLUSION OF EVENTS**

Model Number	Parametric	Nonparametric
1	✓	✓
2	✓	✓
3	✓	✓
4	✓	✓
5	✓	✓
6	✓	✓
7	✓	✓
8	✓	✓
9	✓	✓
10	✓	✓
11	✓	✓
12	✓	✓
13	✓	✓
14	✓	✓
15	✓	✓
16	✓	✓
17	✓	✓
18	✓	✓
19	✓	✓
20	✓	✓

**Notes:**

-  Indicates significance at the 5% level.
-  Indicates not significant at the 5% level.

Reports cases which are significant at the 5% level. Significantly positive returns are identified at the 5% one-sided level. See Appendix E.

## VII. Correlation of XRP Returns with Other Digital Tokens Changes over Time

110. Event studies applied to traditional equity securities usually include controls for the “broad market” as well as the “industry sector” appropriate to the case at hand.<sup>92</sup> These specifications are supported by a great deal of theoretical research which suggests that there are likely common factors which would be expected to impact equity securities in a broadly similar way, and industry factors which would be expected to impact a subset of equity securities in a broadly similar way. As an example, during the pandemic equities were generally negatively impacted, but “airline” or “hotel” securities as a group might be impacted differently from “pharmaceuticals” as a group.
111. The idea that a particular market price might be affected both by idiosyncratic events as well as broader market drivers is therefore standard in the event study literature. In this section I investigate the relationship between XRP returns and those of other leading digital tokens to determine to what extent there may be common “digital token” factors driving correlated returns.

---

### A. Security Prices Are Often Related to Common Factors

112. Financial economists have proposed a number of methods for modelling prices of securities. One general method is called the factor model,<sup>93</sup> where security prices are modelled to be related to the returns of some factors. Typically, these factors are returns of portfolios of other traded securities.<sup>94</sup> The market model is an example of a one-factor model,<sup>95</sup> which relates securities returns to the return of the broad market portfolio.
113. Because Bitcoin is by far the largest and most well-known digital token—especially in the earlier periods—financial economists have sometimes used Bitcoin as a proxy for the broader digital token

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<sup>92</sup> A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 18.

<sup>93</sup> A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 18.

<sup>94</sup> A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 18.

<sup>95</sup> A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 18.

market. For example, Liu and Tsyvinski (2021) use Google searches for the word “Bitcoin” to proxy for investor attention of the broader digital token market.<sup>96</sup>

114. Consistent with that, financial economists have found that returns of other digital tokens are correlated with BTC returns.<sup>97</sup> As discussed below, I also find that during the period from 2014 to the end of 2020, XRP returns are correlated with Bitcoin returns, although the magnitude of that correlation fluctuates over time. More importantly, XRP returns can only be partially explained by BTC returns, and sometimes are explained more by ETH returns.

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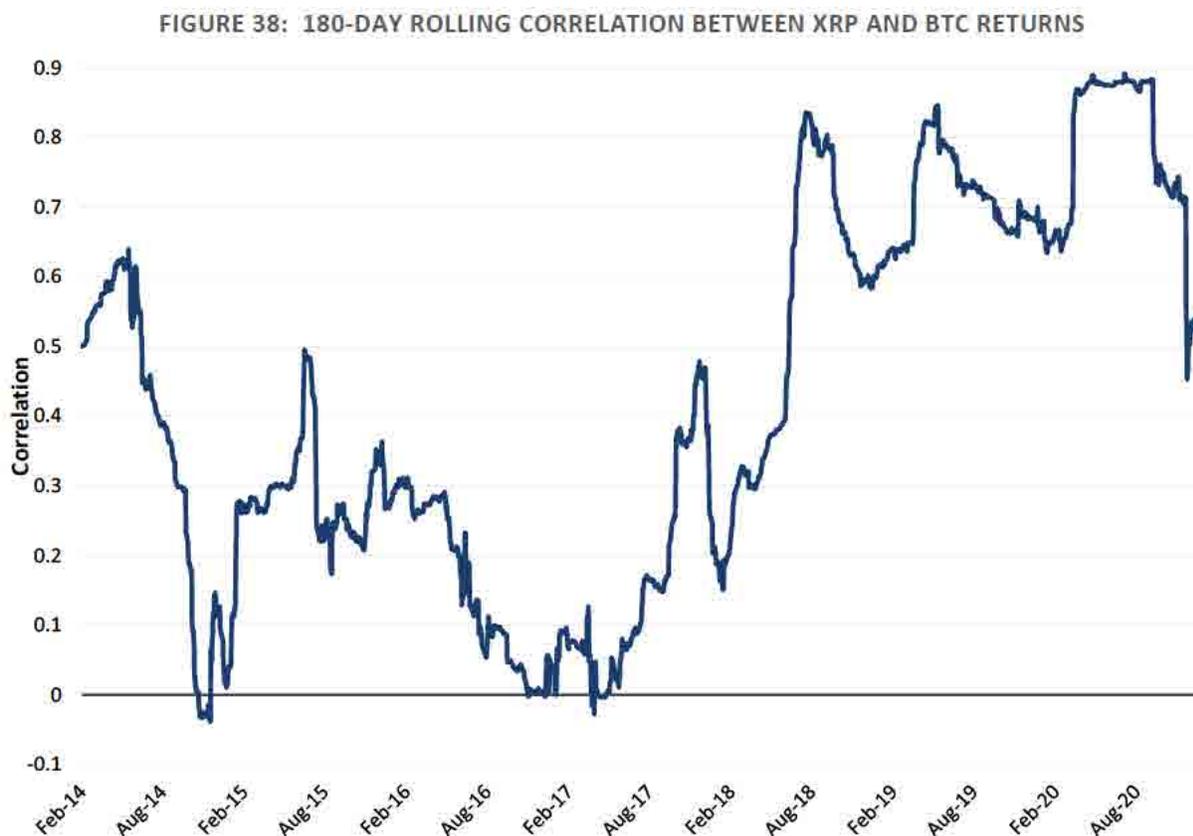
## B. XRP Returns Are Only Partially Explained by Bitcoin Returns, and Sometimes Can Be Better Explained by Ether Returns

115. Figure 38 plots the 180-day rolling correlation between XRP returns and BTC returns. Correlation ranges from -1 to 1; a value of “1” means that two series are perfectly correlated while a value of “0” means they are uncorrelated. In this case, a correlation of “1” would mean that XRP returns and BTC returns move in the same direction in a one-to-one manner: when one increased, the other increased, and vice versa. Knowing the return of one token would immediately tell you the return of the other. A correlation of “-1” would mean that when one increased, the other decreased, and vice versa; again, knowing the return of one would tell you the return of the other (it would just be the opposite). If knowing what happened to one token would not tell you anything about what happened to the other, then the correlation would be “0.” Intermediate correlations are informative but not decisive: a correlation of, say, 50% means that knowing the return of one token gives you some information about the return of the other, but only limited information.
116. Figure 38 illustrates that, except for some short periods of near-zero or even negative correlation, XRP returns and BTC returns are positively correlated, but only partially, with an average value of 0.42. Importantly, Figure 38 illustrates the historical correlation between XRP and BTC returns fluctuates over time and does not have a clear trend or pattern.

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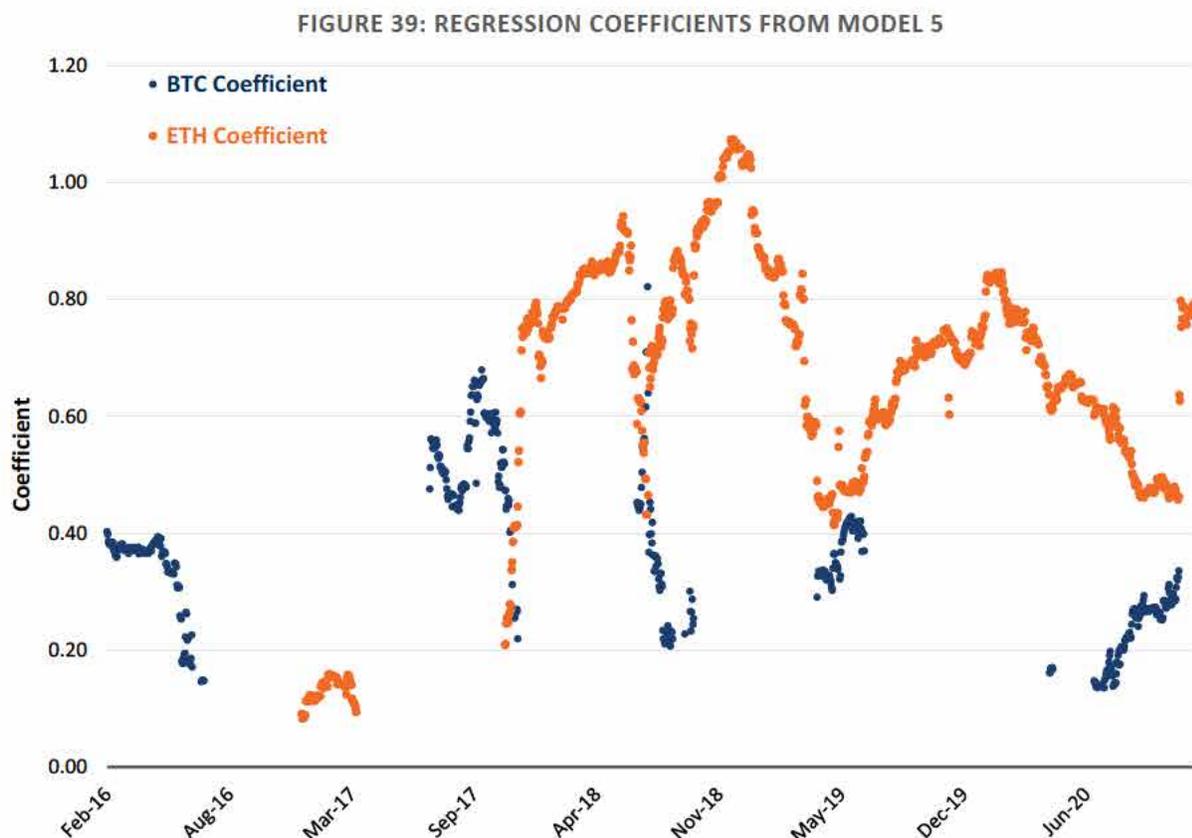
<sup>96</sup> Yukun Liu and Aleh Tsyvinski, “Risks and Returns of Cryptocurrency,” *The Review of Financial Studies* Vol. 34, 2021, pp. 2689-2727 at pp. 2707-2708.

<sup>97</sup> See, e.g., Albert S. Hu, Christine A. Parlour, and Uday Rajan, “Cryptocurrencies: Stylized Facts on a New Investible Instrument,” *Financial Management* Vol. 48, 2019, pp. 1049-1068 at Abstract.



Source: CoinMarketCap.

117. As discussed in Section V.B, I implement 20 regression models for XRP returns, each controlling for different sets of explanatory variables that could explain returns of XRP. Most of the models control for BTC; Model 5, in particular, controls for both BTC returns and ETH returns. Results from this model indicate that XRP returns are often explained more by ETH returns than by BTC returns. In addition, the relationship among returns of XRP, BTC, and ETH fluctuates over time.
118. Figure 39 plots the coefficients on BTC returns (dark blue) and the coefficients on ETH returns (orange) from 180-day rolling regressions. Only coefficients that are significant at least at the 10% level are plotted; gaps in Figure 39 therefore correspond to days when those coefficients do not achieve at least that level of significance. When ETH returns are not statistically related to XRP returns, there is a gap in the orange dots; when BTC returns are not statistically related to XRP returns, there is a gap in the dark blue dots.

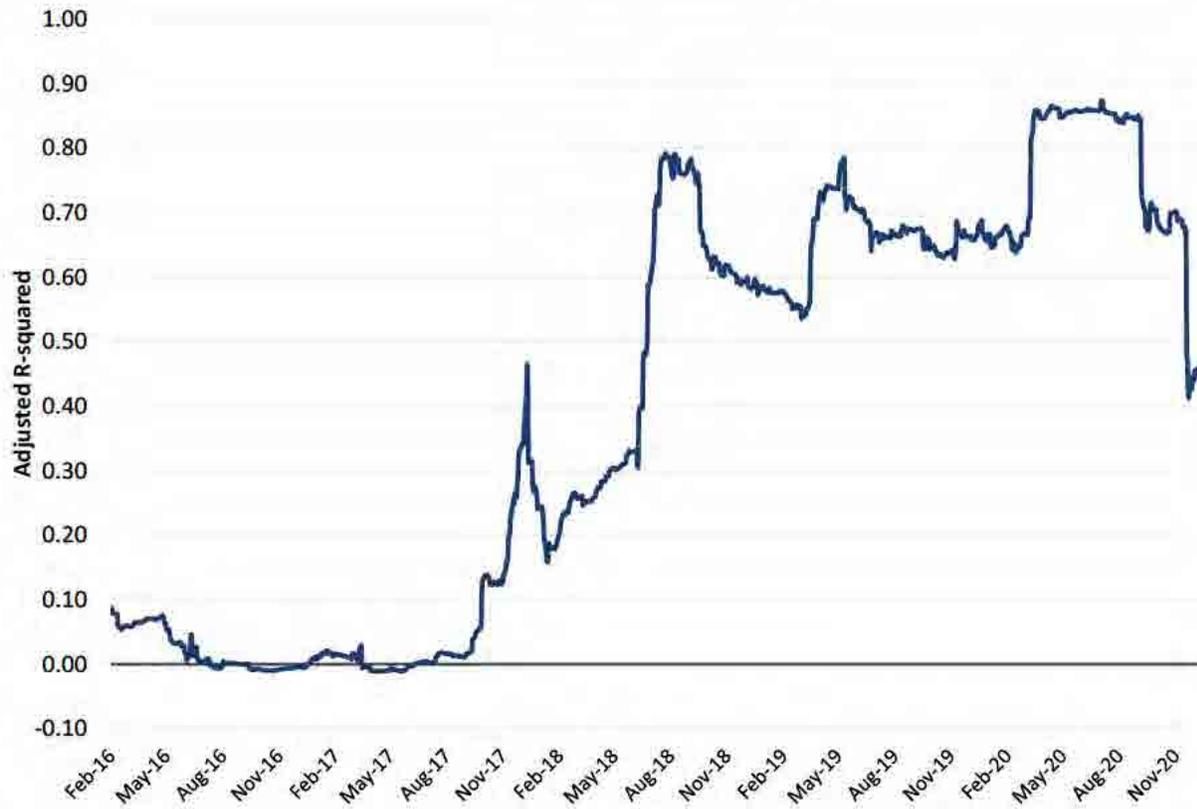


Source: CoinMarketCap.

119. As illustrated in Figure 39, for both ETH and BTC there are times when they have no statistically significant relationship with XRP returns (i.e., there are gaps in the chart). More recently, ETH returns have “crowded out” BTC returns: there are more gaps in the dark blue dots than in the orange dots. This means, in more recent periods, ETH returns can explain XRP returns more than BTC returns can.
120. Figure 39 also illustrates that the magnitude of the relationships—measured by the coefficients—between XRP returns and ETH returns and the relationship between XRP returns and BTC returns fluctuate over time. A coefficient of 1 on ETH returns means that a 1% change in ETH’s price is expected to be associated with a 1% change in XRP’s price. Figure 39 illustrates that the coefficient on ETH returns ranges from about 0.10 to above 1.00, whereas the coefficient on BTC returns ranges from about 0.10 to about 0.70.
121. Consistent with the fluctuating pattern illustrated in Figure 39, when taken together, ETH returns and BTC returns can explain XRP returns in varying degrees over time. The adjusted R-squared of Model 5, plotted in Figure 40, illustrates this point. The R-squared measures how well a given set of control variables can explain the independent variable. An R-squared of 1 means that the control variables, taken together, can explain 100% of the variation in XRP returns. As illustrated in Figure 40, while BTC and ETH returns can explain as much as almost 90% of XRP returns during Q2 and Q3 of 2020, they

provide little explanatory power for XRP returns before late 2017. On average, these two factors explain only about 40% of the variation in XRP returns.<sup>98</sup>

FIGURE 40: ADJUSTED R-SQUARED IN MODEL 5



Source: CoinMarketCap.

<sup>98</sup> 40% calculated as the average of the adjusted R-squared series plotted in Figure 40.

New York, NY

Dr. [REDACTED] worked for 15 years at [REDACTED] specializing in corporate, financial institution, sovereign and structured finance credit research and analysis. Most recently he was [REDACTED] a group of nearly 100 professionals with responsibility for developing credit models and methodologies for all asset classes across all lines of business. Dr. [REDACTED] also worked to create the [REDACTED], a team dedicated to leveraging machine learning and data mining techniques. Prior to that Dr. [REDACTED] was the [REDACTED], including Default Research, Model Development and Verification, and Technology. Dr. [REDACTED] frequently met with regulators and policy makers to discuss credit risk, credit ratings performance, risk modeling, and anti-trust and other policy questions.

Dr. [REDACTED] main areas of specialization are econometrics and statistics, finance, institutional and consumer credit, real estate, risk modeling and assessment, and numerical methods. He is the author of copyrighted and patented models. In addition to credit risk, his experience also includes work in asset pricing, real estate, and government. His work has been featured in the media such as the *Wall Street Journal*, *The Financial Times*, *The Economist*, *CNNMoney*, *CNBC*, *Forbes*, *Bloomberg*, *Fox Business*, *BusinessWeek*, *Washington Post*, *Huffington Post*, and *Reuters*, among others.

Since becoming a consultant in 2018, Dr. [REDACTED] has testified as an expert witness on behalf of the U.S. Securities and Exchange Commission on event studies and market efficiency. He has worked as the case manager for the U.S. Department of Justice on behalf of [REDACTED] to assist in establishing liability and estimating damages in a case involving fraudulent mortgage servicing practices. Much of his work has been on collusion and manipulation of various markets, including commodities and fixed income securities such as corporate bonds, agency securities, sovereign and supranational bonds, variable rate demand obligations and other debt derivatives.

Dr. [REDACTED] has also worked on behalf of defendants on issues of class certification in the health insurance market. He has also worked on mergers and acquisitions in the telecommunications industry. Dr. [REDACTED] has worked extensively on cases involving multi-sided platforms for private plaintiffs, defendants and the U.S. government.

Dr. [REDACTED] has developed several models of corporate and consumer credit, financial risk contagion, real estate market performance measures, and pharmaceutical drug development, to name a few. He has developed patented models of default and credit rating transitions and trademarked models of regional real estate prices. Dr. [REDACTED] has developed models of residential mortgage default, prepayment and loss which have been used to assess the credit risk of hundreds of billions of dollars in securitizations. He has contributed to books on emerging markets and sovereign risk.

In pharmaceuticals, he co-developed a model to estimate the likelihood of drugs failing and succeeding each of the clinical stages of the Food and Drug Administration, and their expected durations in each of these phases. This model has become one of the two most used by industry analysts to assist in valuing pharmaceutical and biotechnology pipelines. His research on pharmaceuticals has been discussed in books on how to value pharmaceutical and biotechnology companies, and on publications pertaining to health care, intellectual property and cartels.

Dr. [REDACTED] has been at the forefront of the empirical detection of some conspiracies and manipulations. In 2008 he flagged the possibility of collusion in LIBOR prior to the launch of large scale investigations. He has also flagged the possibility of manipulation and collusion in gold markets in 2013.

Dr. [REDACTED] has co-authored several articles and papers on econometric methods and screens for conspiracies, manipulations and fraud. He has published in peer-reviewed journals such as the Journal of Pharmaceutical Finance, Economics and Policy, and the Journal of Banking and Finance. His work has also appeared in trade publications including The Antitrust Source, and The Competition Policy International Antitrust Chronicle.

Dr. [REDACTED] holds a PhD and a Masters in Economics from [REDACTED] where he was awarded Distinction in the field of Econometrics. He also holds a Bachelor of Arts in Economics from [REDACTED] where he graduated summa cum laude.

## PROFESSIONAL EXPERIENCE

[REDACTED] (New York) 2020–Present  
 Senior Consultant

- Credit Risk
- Securities fraud and manipulation
- Multi-sided platforms
- Mergers and acquisitions
- Event studies
- Valuation
- Collusion

[REDACTED] (New York) 2018–2020  
 Managing Director. Consulting experience includes:

- Class certification
- Multi-sided platforms
- Mergers and acquisitions
- Event studies
- Securities fraud

- Valuation
- Collusion
- Market Manipulation

[REDACTED] (New York) 2003–2018  
Managing Director of the [REDACTED] managing a team of about 100 analysts. Research and technical responsibilities included:

- Development of credit rating methodologies and models for all produce lines, including corporate, financial institutions, sovereign, sub-sovereign, municipal and structured finance
- Default and ratings performance research for all product lines, including corporate, financial institutions, sovereign, sub-sovereign, municipal and structured finance
- Model verification and version control
- Regulatory reporting

Managing Director of [REDACTED] a group of 40 analysts. Research and technical responsibilities included:

- Default and ratings performance research for all product lines, including corporate, financial institutions, sovereign, sub-sovereign, municipal and structured finance
- Rating methodology and credit model development
- Rating methodology and credit model validation
- Model verification and version control
- Regulatory reporting

Research Economist, [REDACTED] as Vice President and Senior Vice President

- Published research primarily on corporate default and ratings performance
- Represented [REDACTED] at industry conferences
- Built a patented default and rating transition model
- Built a credit rating predictor model
- Select modeling and methodology development projects include:
  - US Residential Mortgages: lead developer of mortgage default and loss severity models using data for nearly 1.4 million private label mortgages. These models represent the core of [REDACTED] new US residential methodology. The models provide the monthly term structure of default and prepayment risks as well as the first and second moments of the borrower's loss-given-default distribution. Easily permits stressing a portfolio of mortgage exposures based on macroeconomic scenarios.
  - Global Bank Stress Testing: lead the effort to develop a new, consistent framework for stress-testing the asset portfolio of banks globally. A reduced form approach, it applies stress multiples to expected losses of different asset classes.
  - Global Bank Credit Scorecard: developed an innovative credit scorecard for the Baseline Credit Assessments of global banks. The scorecard is based on a regression analysis of

bank failures during the recent financial crisis and incorporates bank balance sheet information, macroeconomic variables and assessments of sovereign credit risk.

- Corporate Defaults: lead developer of the patented Credit Transition Model, [REDACTED] proprietary model of corporate (financial and non-financial) credit rating transitions and default. The model forecasts all rating transitions, including upgrades, downgrades, default and withdrawal at the individual issuer level by conditioning on issuer-specific information and macroeconomic drivers. Easily permits a coherent stress-test of corporate exposures based on macroeconomic scenarios. These scenarios could consider not just default, but transitions across rating boundaries (such as falling from investment-grade into speculative-grade) which may be critical to a portfolio manager.
- Credit Rating Prediction: lead developer of [REDACTED] proprietary Rating Predictor Model which maps credit ratios to implied credit ratings. The model significantly outperforms standard approaches such as linear regression and ordered Probit models. The model allows counter-factual analysis to determine how credit ratings might change given changes in underlying balance sheet metrics.

[REDACTED] (Washington, DC) 2002–2003

Principal Analyst in the Microeconomics and Finance Division. Research and policy projected included:

- Econometric Modeling:
  - Developed a model to forecast bank deposits, assessable and insured, for use by the Budget Analysis Division
  - Estimated a discrete time, multiple-destination mixed proportional hazards model of pharmaceutical development
  - Estimated Logistic regressions of first stages of the FHA loss mitigation program
  - Specified a two-stage Probit model of additional stages of FHA loss mitigation program to correct for endogenous selection
- Financial Analysis:
  - Used derivative pricing theory to estimate the market value of risk born by the government through various contingent programs

[REDACTED] (Chicago) 1998–2002

Chief Economist of the real estate investment company. Research projects included:

- Commercial Property Rent and Occupancy: developed proprietary forecasting models of rent and occupancy levels for multifamily, office, retail and warehouse properties at the MSA level.

- Optimal Property Location: developed location models for the Assisted Living and Self-Storage sectors in the U.S. and Europe. The models informed asset acquisition/disposition decisions.

## EDUCATION

[REDACTED]  
PhD, Department of Economics (2002)

*Primary Fields:* Econometrics, Macroeconomics and Monetary Economics, Numerical Methods

*Secondary Fields:* Asset Pricing, Public Finance

*Awards:* Award of Distinction in Econometrics, 2000

First Ever Student Awarded this Distinction in the Economics Department

MA, Economics (1997)

[REDACTED]  
BA, Economics (1994)

*Awards:* Summa cum laude / Phi Beta Kappa junior year / College Honors Senior Comprehensive Distinction / *Wall Street Journal* Award for excellence in economics

## EXPERT TESTIMONY

[REDACTED]  
[REDACTED]  
United States District Court, Southern District of New York

- Report Filed [REDACTED]
- Rebuttal Report Filed [REDACTED]
- Deposition Testimony [REDACTED]
- Declaration Filed [REDACTED]

## SELECTED PUBLICATIONS, WORKING PAPERS, AND PRESENTATIONS

- [REDACTED] with [REDACTED] book chapter included in [REDACTED] published by [REDACTED] 2021 (forthcoming)
- [REDACTED] with [REDACTED] (forthcoming)

- [REDACTED] with [REDACTED] Working Paper, June 2021
- [REDACTED] with [REDACTED] Working Paper, June 2021
- [REDACTED] with [REDACTED] Working Paper, June 2021
- [REDACTED] with [REDACTED] November 2020
- [REDACTED] with [REDACTED] August 2020
- [REDACTED] November 2019
- [REDACTED] with [REDACTED] January 2019
- [REDACTED] with [REDACTED] July 2018
- [REDACTED] with [REDACTED] December 18, 2014
- Contributed book chapter to [REDACTED] edited by [REDACTED] December 2014
- [REDACTED] Special Comment, July 2014
- [REDACTED] Special Comment, July 2014
- [REDACTED] with [REDACTED] Working Paper, October 2014
- [REDACTED] with [REDACTED] Working Paper, February 2014
  - Assisted in triggering litigation and investigations worldwide
  - Extensively discussed in the media including Bloomberg, Reuters, Wall Street Journal, The Economist, The Financial Times, Kitco
- [REDACTED] NBER 2014
- [REDACTED] NBER 2013
- [REDACTED] presentation to the [REDACTED] NYSSA, 2012
- [REDACTED] with [REDACTED] March (1) 2012
  - Discussed in U.S. Senate Hearings on [REDACTED] November 2013
  - Discussed in Litigation on USD LIBOR by both Plaintiffs and Defendants

- [REDACTED] with [REDACTED] Working Paper 2011
- [REDACTED] Working Paper 2011
- [REDACTED] with [REDACTED] 36, 136-150, 2012
  - [REDACTED] 2012
  - [REDACTED]
  - Featured in the WSJ, [REDACTED] published March 18, 2011
  - Featured in the FT, [REDACTED] published March 25, 2011
  - Featured in The Economist, [REDACTED] The Economist, July 7, 2012, [REDACTED]
  - Featured in BBC Radio on [REDACTED] aired January 17, 2013
  - Featured in Sky News TV, UK, on [REDACTED] The Boulton and Co Today TV Show, February 6, 2013
  - Featured in Testimony in the UK Parliament on LIBOR
- [REDACTED] with [REDACTED] Working Paper, 2010
- [REDACTED] with [REDACTED] Working Paper, April 2008
- [REDACTED] available at SSRN, June 2007
- [REDACTED] available at SSRN, August 2007
- [REDACTED] with [REDACTED] (2006), 19-42
  - Presented at the [REDACTED] in Boston in March 2003
  - Presented at the [REDACTED] in Chicago in June 2003
  - Discussed in books on health care and on how to value pharmaceutical and biotech R&D pipelines
- [REDACTED] (4), March 2005
- [REDACTED]

- Presented at [REDACTED] in Copenhagen, Denmark, *May 2007*
- Presented at [REDACTED] in Venice, Italy, *September 2007*
- Presented at [REDACTED] in Chicago, *October 2008*
- [REDACTED] with [REDACTED] 2004
- [REDACTED] with [REDACTED]
- Presented at the [REDACTED] in Washington in March 2003
- [REDACTED] 2003-6
- [REDACTED]
- PhD Dissertation in Economics, [REDACTED]
- Presented at the [REDACTED] in [REDACTED]

#### PATENTED AND TRADEMARKED WORK

- [REDACTED]
- [REDACTED]

#### SELECTED INTERVIEWS AND OTHER MEDIA COVERAGE

- [REDACTED]







**Documents Relied Upon**

	<b>Legal Pleadings</b>	<b>Date</b>
[1]	Complaint, Securities and Exchange Commission v. Ripple Labs, Inc., Bradley Garlinghouse, and Christian A. Larsen, 20 Civ. 10832	December 22, 2020
	<b>Depositions and Exhibits</b>	<b>Date</b>
[2]	Breanne Madigan	May 18, 2021
[3]	David Schwartz	May 26, 2021
[4]	Dinuka Samarasinghe	June 9, 2021
[5]	Monica Long	June 17, 2021
[6]	Asheesh Birla	June 23, 2021
[7]	Miguel Vias	June 28, 2021
[8]	Patrick Griffin	June 29, 2021
[9]	Ryan Zagone	July 20, 2021
[10]	Phillip Rapoport	July 22, 2021
[11]	William Hinman	July 27, 2021
[12]	Ron Will	July 30, 2021
[13]	Lawrence Angelilli	August 3, 2021
[14]	Antoinette O'Gorman	August 4, 2021
[15]	[REDACTED]	August 11, 2021
[16]	Ethan Beard	August 24, 2021
[17]	Christian Larsen	September 14, 2021
[18]	Bradley Garlinghouse	September 20, 2021
	<b>Produced Documents</b>	
[19]	NY-9875_T_00017816	
[20]	RPLI_SEC 0081034	
[21]	RPLI_SEC 0090938	
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[33]	Andrew Urquhart, "The Inefficiency of Bitcoin," <i>Economics Letters</i> Vol. 148, 2016	
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[35]	Aviral Kumar Tiwari, R.K. Jana, Debojyoti Das, and David Roubaud, "Informational Efficiency of Bitcoin—An Extension," <i>Economics Letters</i> Vol. 163, 2018	
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Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Acquisition & Investment	1/16/2018	287	1/16/2018	7766	Ripple turns investor as execs lead \$25M round for storage and rental startup Omni
	4/11/2018	318	4/11/2018	7555	Ripple Invests \$25M in Blockchain Capital's Latest Fund
	4/11/2018	318	4/11/2018	8409	Ripple Invests \$25 Million to Drive Innovation in Blockchain and Digital Assets
	2/5/2019	402	2/5/2019	7675	Investing in Dharma
	2/5/2019	401	2/5/2019	7676	Former BMG Head Zach Katz Launches Music and Tech Investment Group With Scooter Braun's Ithaca Holdings
	3/12/2019	407	3/12/2019	7674	A Big Bet on Blockchain and Gaming: Ripple and Forte Announce \$100 Million Fund
	6/17/2019	418	6/17/2019	7539	Ripple Announces Strategic Partnership with Money Transfer Giant, MoneyGram
	6/17/2019	418	6/17/2019	7668	Ripple to Invest Up to \$50 Million in MoneyGram
	9/27/2019	426	9/27/2019	7664	Ripple's Xpring Looks to Build XRP DeFi Products With New Acquisition
	9/30/2019	427	9/30/2019	8341	Ripple Continues Acquisition Streak, Expands European Operations to Iceland
	10/14/2019	433	10/14/2019	8337	Our Investment in Bitso
	10/14/2019	433	10/14/2019	7659	Ripple invests in Mexican broker Bitso, targets Brazil and Argentina
	11/25/2019	444	11/25/2019	7653	Ripple completes \$50 million investment in MoneyGram
	10/28/2020	507	10/28/2020	7616	Ripple to Invest in Japan's SBI Subsidiary MoneyTap
Case Study	12/13/2014	28	12/13/2014	7901	Small Bank in Kansas Is a Financial Testing Ground
	6/27/2016	155	6/27/2016	7820	Canada to Germany Ripple bank transfer breakthrough for banking industry
	6/27/2016	155	7/12/2016	7819	Sent in Seconds, Not Days: Canadian Bank Tries Distributed Ledger
	7/15/2016	158	7/15/2016	8521	Watch Real Money Cross Borders in Real Time
	2/1/2017	206	2/1/2017	8479	National Bank of Abu Dhabi: First Middle East Bank to Use Ripple for Cross-Border Payments
	7/10/2017	231	7/10/2017	8460	Results of the Bank of England/Ripple Proof of Concept Published Today
	12/18/2017	262	12/18/2017	8430	Krungsri Collaborates with Petrochemical Company to Expedite Cross-border Payments and Retain Customers
	1/29/2018	293	1/29/2018	7761	In Their Own Words: Real Companies Talk Ripple XRP Pilots
	5/10/2018	328	5/10/2018	7553	Ripple Reports Positive Results From xRapid Pilots
	5/10/2018	328	5/10/2018	8402	First Pilot Results for xRapid
	5/10/2018	328	5/10/2018	7715	Ripple: XRP Pilot Cuts Payment Fees Up to 70%
	5/10/2018	328	5/10/2018	7716	Ripple Reveals Results Of First Pilot Tests Using XRP Cryptocurrency
	6/29/2018	345	6/29/2018	7700	Santander, Ripple Use Blockchain To Settle Global Payments
	10/1/2018	368	10/1/2018	8376	Swell 2018: How Banco Santander Launched a Payment App for Millions
	10/2/2018	370	10/2/2018	8373	TransferGo On Solving for Real-Time Cross-Border Settlement at Swell 2018
	10/18/2018	375	10/18/2018	8370	How Payments Improved InstaReM and BeeTech's Customer Experience
	11/15/2018	385	11/15/2018	8361	Swell 2018: Siam Commercial Bank Seeks a Payments Vendor, Finds a Business Partner in Ripple
	11/21/2018	386	11/21/2018	8360	Swell 2018: How Blockchain Can Learn from eBay, the Original Digital Cross Border Payments Company
	12/10/2018	388	12/10/2018	8358	Coinone Transfer Offers South Korea's First Blockchain-Powered Remittance Service
	11/8/2019	443	11/8/2019	8331	Swell 2019: MoneyGram CEO Says 10% of Transactions Between Mexico and U.S. Use On-Demand Liquidity
	12/12/2019	447	12/12/2019	8330	SendFriend Uses On-Demand Liquidity to Save Customers Up to 80% In Remittance Fees
	1/29/2020	452	1/29/2020	8326	goLance Leverages On-Demand Liquidity to Deliver Faster, Cheaper Payments to Their Global Marketplace of Freelancers
	2/12/2020	454	2/11/2020	8324	Amendments: Ensuring Sensible Evolution of the XRP Ledger
	3/5/2020	459	3/5/2020	8320	Bitso and Ripple Are Delivering Friction-Free Exchange Across Latin America
	3/26/2020	462	3/26/2020	8319	Siam Commercial Bank Drives Innovation and Customer Growth With Help From Ripple
	4/2/2020	464	4/2/2020	7642	Money transfer service Azimo partners with Siam Commercial Bank for faster payments to Thailand
	4/2/2020	464	4/9/2020	8318	Azimo and SCB Runs on Ripple for Instant Payments Into Thailand
4/29/2020	469	4/29/2020	8315	TPBank Uses RippleNet to Drive Transparent Global Payments Between Vietnam and The World	
5/7/2020	473	5/7/2020	8312	BTC Markets Drives Sustainable Growth of Its Exchange with XRP	
5/27/2020	476	5/27/2020	8311	Tapping the Power of RippleNet Cloud	
6/8/2020	478	6/8/2020	8310	Staying the Course in Remittances and SME Payments	
Charity	4/23/2015	61	4/23/2015	8585	RippleWorks Launches to Support Global Entrepreneurs Building Paths out of Poverty
	10/16/2017	246	10/16/2017	8444	Ripple & the Gates Foundation Team Up to Level the Economic Playing Field for the Poor
	12/26/2017	268	12/26/2017	8425	The Season for Giving: Auctioning Off Ripple-Branded Patagonia Jackets for Charity
	3/27/2018	315	3/27/2018	8411	Ripple and Its Executives Proud to Support America's Public Schools with \$29 Million XRP Donation to DonorsChoose.org
	3/27/2018	315	3/28/2018	7727	Bay Area startup donates \$29 million to classrooms all over U.S.

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Charity	3/27/2018	315	3/28/2018	7728	Ripple donates \$29 million after nonprofit's founder 'dared' himself to ask
	3/27/2018	315	3/28/2018	7729	Ripple gives away \$29 million of its cryptocurrency to public schools
	3/27/2018	315	3/28/2018	7730	Cryptocurrency Company's \$29 Million Donation Funds Thousands Of Classroom Projects
	3/27/2018	315	3/29/2018	7724	A \$29 Million Cryptocurrency Donation Just Funded Every Project On DonorsChoose.Org
	3/27/2018	315	3/29/2018	7725	San Francisco based Ripple donates \$29M to schools across country
	3/27/2018	315	3/29/2018	7732	Bonanza for schools as SF crypto king Ripple gives \$29M to DonorsChoose.org
	3/27/2018	315	4/2/2018	7726	Every single teacher on a crowd-funding site just got their wishes fulfilled
	5/23/2018	332	5/23/2018	7713	Ellen DeGeneres Gets Emotional After Ashton Kutcher Surprises Her With \$4 Million Donation to Wildlife Fund
	7/30/2018	350	7/30/2018	8389	Ripple and Raising Malawi Launch Campaign to Sponsor Children in Need
	7/30/2018	350	7/31/2018	7697	Ripple Partners With Madonna to Fundraise for Orphans in Malawi
	9/27/2018	364	9/27/2018	7547	Ripple Announces Ripple for Good, Social Giving Will Top \$100 Million
	9/27/2018	364	9/27/2018	7689	'Ripple for Good': Ripple Commits \$100 Million to Social Giving Program
	3/7/2019	406	3/7/2019	8348	Ripple Partners with Tipping Point to Improve Economics Mobility for Bay Area Workers and Families
	4/16/2020	465	4/16/2020	8317	Giving in Place: Ripple Is Proud to Be Part of the Tech Community's Response to COVID-19
	4/16/2020	465	4/25/2020	7639	Blockchain firm Ripple donates \$5 million to Bay Area food banks
	5/22/2020	475	5/22/2020	7637	Ripple And Chris Larsen Make Waves With Covid-19 Donations In Bay Area
	10/15/2020	503	10/15/2020	8297	Mercy Corps: Leveraging the Potential of Fintech To Accelerate Financial Inclusion in Emerging Markets
12/20/2020	514	12/20/2020	8292	Our Commitment To Combating Food Scarcity With Eat. Learn. Play.	
Corporate Activity & Announcement	6/19/2014	4	6/19/2014	7933	Creating Faster Foundations
	10/20/2014	15	10/20/2014	7593	21 Top Bitcoin and Digital Currency Companies Endorse New Digital Framework for Digital Identity, Trust and Open Data
	10/20/2014	15	10/20/2014	7920	Manifesto Vows to Give Consumers Control of Digital Identities
	10/20/2014	15	10/21/2014	7918	Why 20 Bitcoin Companies Are Backing a New Deal for Digital Identity
	12/24/2014	30	12/24/2014	7899	The 10 Most Influential People in Bitcoin 2014
	2/9/2015	42	2/9/2015	7590	Ripple Labs Named Fourth Most Innovative Company in Money for 2015 by Fast Company
	2/9/2015	42	2/9/2015	8589	Ripple Labs Makes Fast Company's 2015 Most Innovative Companies List
	2/9/2015	42	2/9/2015	7881	The World's Top 10 Most Innovative Companies Of 2015 In Money
	3/30/2015	55	3/30/2015	7871	EBAday attracts titans of transaction banking
	4/30/2015	63	4/30/2015	8583	European Payments Council: Ripple for Inter-bank Payments
	5/1/2015	65	5/1/2015	7861	An infrastructure approach to improving Financial Inclusion
	8/5/2015	90	8/5/2015	7582	Ripple Labs Awarded as Technology Pioneer by World Economic Forum
	8/5/2015	90	8/5/2015	8571	Ripple Labs Named a Technology Pioneer by World Economic Forum
	12/9/2015	110	12/9/2015	7830	The Fintech 50: The Complete List 2015
	12/21/2015	114	12/21/2015	8557	Looking Forward to Davos 2016
	1/16/2016	121	1/16/2016	7648	The 35 Best Small and Medium Workplaces in the Bay Area
	2/2/2016	130	2/2/2016	8545	Join the Interledger Community Meeting
	2/22/2016	133	2/22/2016	8541	Looking Forward to the W3C Interledger Payments Community Group Meeting
	3/16/2016	137	3/16/2016	8537	Chris Larsen to Guest Lecture for MIT Future Commerce
	4/15/2016	142	4/15/2016	8534	Looking Forward to NACHA #PAYMENTS2016
	4/26/2016	144	4/26/2016	8532	Nilesh Dusane Recognized as BAFT Future Leader
	7/29/2016	161	7/29/2016	8518	Looking Forward to Sibos 2016
	9/26/2016	175	9/25/2016	8508	Sibos 2016: Ripple Has Arrived
	9/27/2016	176	9/27/2016	8507	Ripple Executive Marcus Treacher Appointed to CHAPS Board
	10/17/2016	183	10/17/2016	8499	Interledger.js Joins the JavaScript Foundation
	1/18/2017	204	1/18/2017	8480	Ryan Zagone Recognized as BAFT Future Leader
	7/21/2017	234	7/21/2017	8456	Federal Reserve Task Force: Ripple Improves Speed and Transparency of Global Payments
	8/24/2017	236	8/24/2017	8454	Announcing Swell by Ripple
	10/15/2017	237	10/15/2017	8445	A Rising Tide of Anticipation Builds for Swell
	2/21/2018	304	2/21/2018	8415	Continued Decentralization & the XRP Ledger Consensus Protocol
3/2/2018	306	3/2/2018	7556	Ripple Applauds Mexico's Lower House of Congress for Passing FinTech Rules	
3/23/2018	313	3/23/2018	8412	Tour de Schwartz	
4/17/2018	320	4/17/2018	7720	Ripple's Brad Garlinghouse and Michael Arrington to talk cryptocurrency at Disrupt SF	

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Corporate Activity & Announcement	4/24/2018	321	4/24/2018	8407	XRP Community Comes Together for Blockchain Week
	5/15/2018	331	5/15/2018	8399	Growing Support for an XRP Symbol
	5/23/2018	333	5/23/2018	8398	Schwartz Rides Again: Tour de Schwartz EU
	7/31/2018	351	7/31/2018	7551	President Bill Clinton Keynotes Ripple's Swell Conference 2018
	7/31/2018	351	7/31/2018	8388	President Bill Clinton Keynotes Swell 2018
	9/7/2018	359	9/7/2018	8385	President Bill and Counting Crows Headline Swell 2018
	9/30/2018	366	9/30/2018	8379	Swell 2018 Kicks Off Tomorrow
	10/3/2018	373	10/3/2018	8372	Swell 2018: Wrapping Up a Historic Year for Ripple
	10/19/2018	376	10/19/2018	8369	Ripple Leadership Front and Center at Money20/20
	12/18/2018	390	12/18/2018	8357	Ask Me Anything with Brad Garlinghouse and Monica Long
	4/8/2019	410	4/8/2019	7672	World Changing Ideas 2019: All the winners, finalists, and honorable mentions
	4/16/2019	412	4/16/2019	7671	Blockchain 50: Billion Dollar Babies
	8/19/2019	422	8/19/2019	8344	A New Reality Unfolds: Announcing Swell 2019 Keynote Speakers
	9/4/2019	423	9/4/2019	7665	Top Startups To Work For In 2019 According To LinkedIn
	9/12/2019	424	9/12/2019	8343	Ambassador Chan Heng Chee to Highlight U.S.-China Politics and Geoeconomics at Swell 2019
	9/25/2019	425	9/25/2019	8342	DBS Group CEO Piyush Gupta to Discuss the Future of Digital Banking at Swell 2019
	10/4/2019	429	10/4/2019	8339	Academia, Take the Wheel: UBRI Enters Its Sophomore Year in High Gear
	10/16/2019	435	10/16/2019	8336	MoneyGram CEO to Highlight the Impact of Digital Assets and Blockchain Technology at Swell 2019
	2/19/2020	456	2/19/2020	7646	Forbes Blockchain 50
	4/28/2020	468	4/28/2020	7631	World Changing Ideas Awards 2020: Experimental Finalists and Honorable Mentions
	5/5/2020	471	5/5/2020	8313	Block Stars: How Digital Assets Will Help Create a Sustainable Global Economy
	5/29/2020	477	5/29/2020	7636	Meet the Most Influential Women in Bay Area Business 2020
	6/16/2020	481	6/16/2020	7635	DISRUPTOR 50 2020. Ripple
	7/29/2020	486	7/29/2020	7629	100 Best Workplaces for Innovators
	7/31/2020	488	7/31/2020	7628	Top Bay Area Corporate Philanthropists
	8/3/2020	490	8/3/2020	7627	Annual Inc5000 2020
	9/15/2020	494	9/15/2020	8302	The World Economic Forum's Sheila Warren Keynotes Ripple Swell Global 2020
10/22/2020	505	10/22/2020	8295	Creating a More Inclusive Financial System With Crypto	
Customer & Product	5/5/2014	1	5/5/2014	7598	Ripple Labs Announces Fidor Bank AG as First Bank to Use the Ripple Protocol
	6/12/2014	2	6/12/2014	7597	AstroPay Launches First Latin American Money Service Business on Ripple Protocol
	6/12/2014	2	6/13/2014	7935	Ripple LatAm Looks To Streamline Remittances and Cross-Border Payments
	7/21/2014	7	7/21/2014	7930	Ripple Labs Unveils Proposal for New Smart Contract System
	7/29/2014	9	7/29/2014	7596	Anyone Can Now Trade, Send and Spend Physical Gold Online via GBI's Ripple Gateway
	7/29/2014	9	7/30/2014	7926	You Can Now Use Ripple to Buy, Spend and Trade Gold
	7/29/2014	9	7/30/2014	7927	The Bitcoin Crowd Reaches Out to the Gold Bugs
	9/24/2014	11	9/24/2014	7594	Hundred-Year-Old CBW Bank One of the First U.S. Banks to Integrate Ripple as Transformational Money Transfer Protocol
	9/24/2014	12	9/24/2014	7595	Cross River Bank to Integrate Ripple for Real-Time International Payments
	9/24/2014	13	9/24/2014	7923	Two US banks are ready to embrace the Ripple protocol, allowing instant global money transfers
	9/24/2014	13	9/24/2014	7924	Ripple Signs First Two U.S. Banks to Bitcoin-Inspired Payments Network
	9/24/2014	13	9/25/2014	7919	US Banks: Why We Embraced Ripple
	9/24/2014	13	9/25/2014	7925	Ripple Brings Real Time Payments To The U.S.
	10/27/2014	17	10/27/2014	7916	Ripple Ecosystem Expands with British Startup Ripula
	11/4/2014	21	11/4/2014	7912	Ripple protocol integrated into risk management system from Yantra
	12/3/2014	26	12/3/2014	7592	Earthport and Ripple Labs Announce Global Partnership to Improve the Efficiency and Speed of Cross-Border Payments
	12/3/2014	26	12/4/2014	7903	BitBeat: Ripple Partners With Global Payments Service Earthport
	12/3/2014	26	12/4/2014	7904	Ripple Labs, Earthport Cut Open Source Deal
	12/3/2014	26	12/4/2014	7905	Earthport and Ripple Bring Crypto Tech to Cross-Border Payments
	12/3/2014	26	12/4/2014	7906	Ripple to plug into Earthport payment network
	12/3/2014	26	12/4/2014	7907	Ripple Labs Partnership Brings Real-Time Transactions to Global Payments Hub
	4/29/2015	62	4/29/2015	8584	Milken Institute: Bringing Financial Inclusion to the Underserved
4/29/2015	62	4/29/2015	7864	New Moves by Coinbase, Ripple Advance Digital Money Tech	

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[1]	[2]	[3]	[4]	[5]	[6]
Customer & Product	4/29/2015	62	4/29/2015	7865	Western Union Will Give Ripple a Chance
	6/9/2015	77	6/9/2015	7853	Westpac, ANZ trial Ripple payments, but big four reluctant on bitcoin
	10/6/2015	97	10/6/2015	7579	New Ripple Settlement and FX Solutions Lower the Total Cost of Settlement for Banks and Their Customers
	10/13/2015	98	10/13/2015	7837	D+H adopts Ripple distributed ledger to reduce costs
	12/16/2015	112	12/16/2015	8558	Distributed Ledger Technology Offers Solutions for Trade Finance in Asia
	1/12/2016	119	1/12/2016	8554	Earthport Launches Distributed Ledger Hub
	4/12/2016	141	4/12/2016	7575	MIT Adopts Ripple Validator to Advance Consensus and Blockchain Research
	4/12/2016	141	4/12/2016	8535	MIT Running a Ripple Validator
	4/19/2016	143	4/19/2016	8533	Introducing CGI's Ripple-Enabled Intelligent Gateway
	5/26/2016	148	5/26/2016	8528	Santander Becomes the First U.K. Bank to Use Ripple for Cross-Border Payments
	5/26/2016	148	5/26/2016	7833	Santander first UK bank to do blockchain-based international payments using Ripple
	6/22/2016	154	6/22/2016	7574	More Financial Institutions Join Ripple's Global Network
	6/22/2016	154	6/22/2016	8523	Seven Leading Banks Join Ripple's Global Network
	6/22/2016	154	6/22/2016	7823	Banks trial Ripple blockchain to make money transfers 'like sending an iMessage'
	6/22/2016	154	6/22/2016	7825	Banks to use cutting-edge blockchain technology to speed up transactions
	6/22/2016	154	6/23/2016	7827	More Banks Are Trying Out Blockchains For Fund Transfers
	6/22/2016	154	7/2/2016	7828	Seven banks kick-off Ripple's blockchain network including Santander, UBS and UniCredit - '90 more in the pipeline'
	6/22/2016	154	6/22/2016	7822	Banks claim blockchain breakthrough in money transfer
	7/18/2016	159	7/18/2016	8520	Mizuho to Pilot Ripple for Cross-Border Payments
	8/16/2016	165	8/16/2016	8514	Multi-Signing in Ripple: A Q&A with David Schwartz
	8/19/2016	169	8/19/2016	8513	SBI Ripple Asia Announces Japanese Bank Consortium
	9/15/2016	171	9/15/2016	7572	Ripple Adds Several New Banks to Global Network
	9/15/2016	171	9/15/2016	8511	Several Globl Banks Join Ripple's Growing Network
	9/28/2016	177	9/28/2016	8506	Sibos Day 2: Standard Chartered and CGI Share News
	9/28/2016	177	9/28/2016	8505	Live from Sibos: Bankers Talk Ripple
	10/20/2016	185	10/20/2016	7570	R3 Trials Interbank Cross-Border Payments With Ripple's Digital Asset XRP
	10/20/2016	185	10/20/2016	8497	Ripple and R3 Team Up with 12 Banks to trial XRP for Cross-Border Payments
	10/20/2016	185	10/20/2016	7806	U.S. start-up R3, banks test Ripple's cross-border payments technology
	10/20/2016	185	10/20/2016	7807	Ripple and R3 Achieve Breakthrough in Cross-Border Bank Payments
	11/16/2016	191	11/16/2016	8492	Ripple Announces An Upgrade to RippleCharts
	12/12/2016	197	12/12/2016	8486	FlashFX Uses Ripple and XRP
	1/9/2017	199	1/9/2017	7801	Axis Bank becomes third lender to offer block chain service
	2/15/2017	209	2/15/2017	8477	BitGo Builds Enterprise Wallet for XRP
	2/28/2017	212	2/28/2017	8474	Ripple Consensus Ledger Can Sustain 1000 Transactions per Second
	3/2/2017	213	3/1/2017	8473	Forty Seven Japanese Banks Move Towards Commercial Phase Using Ripple
	3/2/2017	213	3/1/2017	7797	Ripple takes money transfers to the cloud
	3/7/2017	214	3/7/2017	8472	Ripple Can Help Banks Evaluate Their Cross-Border Payment Costs
	3/17/2017	216	3/17/2017	8470	Ripple Selected to Participate in the Bank of England FinTech Accelerator
	3/31/2017	219	3/31/2017	8468	New Features Increase XRP Ledger Transaction Throughput to Same Level as Visa
	4/26/2017	222	4/26/2017	7568	Ten More Financial Institutions Join Ripple's Global Payments Network
	4/26/2017	222	4/26/2017	8465	Ten New Customers Join Ripple's Global Payment Network
	5/11/2017	224	5/11/2017	8464	How We Are Further Decentralizing the XRP Ledger to Bolster Robustness for Enterprise Use
	6/29/2017	229	6/29/2017	7566	SCB, Ripple Launch First Blockchain-Powered Payment Service Between Japan and Thailand
	6/29/2017	229	6/29/2017	8461	It's Now Faster and Easier to Send Money Between Japan and Thailand
	7/10/2017	230	7/10/2017	8459	Sumitomo Mitsui Banking Corporation and Japan Post Bank Join SBI Ripple Asia's Bank Consortium
	7/17/2017	232	7/17/2017	8458	XRP Ledger Decentralizes Further With Expansion to 55 Validator Nodes
	9/11/2017	241	9/11/2017	8450	SBI Ripple Asia partners with DAYLI Financial Group to bring Ripple to South Korea
	10/10/2017	244	10/10/2017	7565	Ripple's Blockchain Network Is Now More Than 100 Strong
	10/10/2017	244	10/10/2017	8447	RippleNet Grows to More Than 100 Financial Institutions
	11/16/2017	252	11/16/2017	7564	American Express Introduces Blockchain-enabled, Cross-border Payments
	11/16/2017	252	11/16/2017	8438	American Express Joins RippleNet - Giving Visibility and Speed to Global Commercial Payments
	11/22/2017	255	11/22/2017	8436	Ripple-powered Instant Payment Services Now Live with Axis Bank, RAKBANK, and Standard Chartered

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[1]	[2]	[3]	[4]	[5]	[6]
Customer & Product	11/22/2017	255	11/22/2017	7790	Standard Chartered, Axis Launch Payments Service With Ripple Tech
	12/5/2017	258	12/5/2017	8434	Japan Bank Consortium Moves to Become Production-ready
	12/12/2017	261	12/14/2017	8431	Top Korean Banks Work with Japan Banks Consortium to Modernize Cross-border Payments
	1/11/2018	284	1/11/2018	7562	Ripple and MoneyGram Partner to Modernize Payments
	1/11/2018	284	1/11/2018	8422	MoneyGram to Use XRP for Faster International Payments
	1/11/2018	284	1/11/2018	7768	MoneyGram shares jump on partnership with bitcoin rival Ripple
	1/11/2018	284	1/11/2018	7769	MoneyGram Signs Deal to Work With Currency Startup Ripple
	1/11/2018	284	1/11/2018	7770	Ripple surges after news of deal with MoneyGram
	1/11/2018	284	1/14/2018	7767	MoneyGram teams up with cryptocurrency Ripple on 'payment flow' project
	1/24/2018	290	1/24/2018	8420	More Global Payment Providers, IDT and MercuryFX, Sign Up to Use XRP
	1/24/2018	290	1/24/2018	7763	Ripple Adds New Partners in Push to Make Case for XRP
	1/29/2018	292	1/29/2018	7760	MoneyGram CEO Plans Waves With Ripple
	2/7/2018	296	2/7/2018	7561	Ripple Partners with LianLian International to Power Instant Payments to China
	2/7/2018	296	2/7/2018	8418	LianLian International Joins RippleNet to Provide Faster Payments into China
	2/7/2018	296	2/7/2018	7758	Ripple Blockchain Network Adds China Payments Provider
	2/8/2018	297	2/10/2018	7560	UAE Exchange Partners with Ripple for Instant Cross-Border Payments
	2/8/2018	297	2/11/2018	7757	Ripple Signs International Payment Deal with Foreign Exchange Giant UAE Exchange
	2/8/2018	297	2/12/2018	7755	UAE Remittance Firm Partners With DLT Startup Ripple
	2/8/2018	297	2/12/2018	7756	UAE Exchange Partners With Ripple
	2/13/2018	299	2/13/2018	7752	Western Union Says It's Testing Transactions With Ripple
	2/13/2018	299	2/14/2018	7751	Western Union says it's testing transactions using Ripple technology
	2/13/2018	299	2/14/2018	7753	Western Union Is Testing Ripple and XRP for Money Transfers
	2/14/2018	300	2/14/2018	7559	Ripple and Saudi Arabian Monetary Authority (SAMA) Offer Pilot Program for Saudi Banks
	2/14/2018	300	2/14/2018	8417	Ripple and Saudi Arabian Monetary Authority (SAMA) Offer Pilot Program for Saudi Banks
	2/14/2018	300	2/14/2018	7754	Saudi Central Bank to Test Ripple Payments Tech
	2/14/2018	300	2/15/2018	7749	Saudi Arabia's central bank signs blockchain deal with Ripple
	2/21/2018	302	2/21/2018	7558	Ripple Extends its Reach into Emerging Markets With Five New Customers
	2/21/2018	302	2/21/2018	8416	RippleNet Strengthens Emerging Markets Access into India, Brazil and China
	2/21/2018	302	2/21/2018	7745	Ripple Adds 5 New Clients Across 4 Countries
	2/21/2018	302	2/21/2018	7746	Ripple Adds Top Latin America Bank to Its Cash-Transfer Network
	2/21/2018	303	2/21/2018	7747	Ripple Papers Pledge New Start for \$40 Billion XRP
	3/1/2018	305	3/1/2018	7557	FLEETCOR & Ripple Team Up to Modernize Payments Using Blockchain
	3/1/2018	305	3/1/2018	8414	Cambridge to Use XRP for Faster Global Payments
	3/1/2018	305	3/1/2018	7744	Payment Provider Fleetcor to Pilot Ripple's XRP Cryptocurrency
	3/6/2018	308	3/6/2018	8413	Ripple Powered Mobile App to Provide On-Demand Domestic Payments in Japan
	3/6/2018	308	3/7/2018	7739	Japanese Banks to Harness Ripple DLT for Consumer Payments App
	3/6/2018	308	3/7/2018	7741	Ripple Develops Blockchain Payments App With 61 Japanese Banks
	3/6/2018	308	3/7/2018	7742	Ripple develops blockchain-powered payment app with 61 banks to speed up transactions in Japan
	3/24/2018	314	3/24/2018	7734	Santander is set to launch an international money transfer app with Ripple
	4/12/2018	319	4/12/2018	8408	Santander Launches First Mobile App for Global Payments Using Ripple's xCurrent
	4/12/2018	319	4/12/2018	7721	Blockchain dreams do come true: A big Spanish bank's customers can now use it to transfer money
	4/12/2018	319	4/12/2018	7723	Santander launches a blockchain-based foreign exchange service that uses Ripple's technology
	4/12/2018	319	4/12/2018	7722	Santander launches blockchain-based foreign exchange service
	4/26/2018	324	4/26/2018	7554	Ripple Grows Its Global Payments Network With Five New xVia Customers
	4/26/2018	324	4/26/2018	8404	xVia Opens New Doors in Emerging Markets
	5/7/2018	327	5/8/2018	8403	Korea's Coinone Transfer Joins RippleNet
	5/7/2018	327	5/9/2018	7717	Crypto Exchange Coinone Taps Ripple for New Remittance Service
	5/14/2018	329	5/14/2018	8400	Mitsubishi Corporation, Krungsri and Standard Chartered Pilot Payments from Thailand to Singapore on RippleNet
	5/26/2018	335	5/31/2018	7709	Money Transfer Firms Join Ripple's Payment Network
	6/27/2018	344	6/27/2018	8394	Ripple Improves Access to India with Kotah Mahindra Bank
	9/5/2018	358	9/5/2018	7692	TransferGo Opens Payments Corridor to India Using Ripple Tech
	9/13/2018	361	9/13/2018	8384	National Commercial Bank of Saudi Arabia Joins RippleNet

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Customer & Product	9/19/2018	362	9/19/2018	7548	PNC Treasury Management Joins RippleNet
	9/19/2018	362	9/19/2018	8382	PNC Bank Embraces Blockchain and Join RippleNet
	9/19/2018	363	9/19/2018	8383	RippleNet Now Reaches 40 Countries Improving Remittances and SME Payments
	9/19/2018	362	9/19/2018	7690	Blockchain startup Ripple signs up PNC as a customer for its payment tech
	9/28/2018	365	9/28/2018	8380	Siam Commercial Bank Drives Pioneers RippleNet's "Multi-hop" Feature
	10/1/2018	367	10/1/2018	7546	Ripple Highlights Record Year, xRapid Now Commercially Available
	10/1/2018	367	10/1/2018	8378	Ripple Highlights Record Year, xRapid Now Commercially Available
	10/1/2018	367	10/1/2018	7684	Ripple says 3 clients are putting xRapid into full commercial use
	10/1/2018	367	10/1/2018	7685	Ripple is Real, as Global Money Transfers Fueled by XRP Go Live Today
	10/1/2018	367	10/1/2018	7686	Startup Ripple signs up payments firms for crypto-based platform
	10/1/2018	367	10/1/2018	7687	Ripple Debuts XRP-Based Cryptocurrency Product for International Payments
	10/1/2018	367	10/1/2018	7688	Ripple's cryptocurrency product goes live for the first time with three financial firms
	11/14/2018	384	11/14/2018	7545	CIMB Group Joins RippleNet to Power Instant Payments Across ASEAN
	11/14/2018	384	11/14/2018	8362	CIMB Group Joins RippleNet to Power Instant Payments Across ASEAN
	12/13/2018	389	12/13/2018	7682	Finabl's UAE Exchange, Ripple to begin blockchain payments by first quarter
	1/8/2019	392	1/8/2019	8355	RippleNet Surpasses 200 Customers Worldwide
	1/8/2019	394	1/8/2019	7680	Could Ripple's XRP replace correspondent banks? This bank says yes
	1/8/2019	392	1/9/2019	7544	RippleNet Reaches Milestone, Surpasses 200 Customers
	10/9/2019	431	10/9/2019	7537	Ripple to Bring Blockchain Technology to Finastra's Banking Customers
	10/9/2019	431	10/9/2019	8338	Ripple to Bring Blockchain Technology to Finastra's Banking Customers
	10/9/2019	431	10/16/2019	7658	Finastra taps Ripple for real-time payments across borders
	11/6/2019	441	11/6/2019	7535	Ripple Announces More Than 300 Customers, RippleNet Growth
	11/6/2019	441	11/6/2019	8332	RippleNet Growth: Announcing More Than 300 Customers
	11/6/2019	441	11/6/2019	7654	Ripple Surpasses 300 Customers As Swell 2019 Kicks Off In Singapore
	12/10/2019	445	12/10/2019	7651	Xpring Releases New XRP Tools, XRPL 1.4.0 Released
	1/21/2020	450	1/21/2020	8328	How Blockchain and Crypto Meet Growing SME Demand
	2/4/2020	453	2/4/2020	8325	Enabling Faster Cross-Border Payments Between the U.S. and Mexico
	2/25/2020	457	2/25/2020	7534	Ripple on Full-Scale to Tap into South Korean Market
	2/25/2020	457	2/25/2020	8322	Sentbe, Hanpass, WireBarley and More Leverage RippleNet to Improve Remittances in Korea
	2/26/2020	458	2/26/2020	7533	Azimo and Ripple Partner to Deliver Faster, Cheaper Payments to the Philippines
	2/26/2020	458	2/26/2020	8321	Azimo Uses On-Demand Liquidity for Faster International Payments Into the Philippines
	2/26/2020	458	2/26/2020	7645	Ripple claims a big win in the elusive quest to use cryptocurrency in banking
	3/19/2020	460	3/18/2020	7532	DeeMoney Partners with Ripple to Power Faster and Cheaper Cross-Border Money Transfers
4/27/2020	467	4/27/2020	7531	SCB Partners with Ripple Extending SCB Global Payment Strategy	
6/15/2020	480	6/15/2020	7530	RippleNet Cloud Reaches New Milestone, Signs First Bank Customer	
6/15/2020	480	6/15/2020	8308	Banco Rendimento Runs on RippleNet Cloud	
10/6/2020	498	10/6/2020	7528	Lemonway Joins RippleNet to Power Instant, Cost-Effective Euro-to-Euro Payments	
10/6/2020	498	10/6/2020	8299	Lemonway Leverages RippleNet To Unlock Faster Euro-To-Euro Payments	
Litigation	5/5/2015	66	5/6/2015	7862	What Ripple's Fincen Fine Means for the Digital Currency Industry
	9/10/2018	360	9/10/2018	7549	Ripple and R3 Reach Settlement
	4/21/2020	466	4/21/2020	8316	Enough Is Enough: It's Time to Protect the Community
	4/21/2020	466	4/21/2020	7640	Ripple sues YouTube over cryptocurrency scams
	4/21/2020	466	4/21/2020	7641	Covid Scammers Are Taking Advantage of Big Tech Platforms, Says Ripple CEO
Market Commentary & Company Overview	6/13/2014	3	6/13/2014	7934	Cryptocurrency News Round-Up: Bitcoin Auction, Dogecoin Hacked & Ripple Swells
	7/9/2014	6	7/9/2014	7932	30 Innovators to Watch: Key Executives Shaping the Industry in 2014
	7/14/2014	5	7/14/2014	7931	Cross Border Remittance Ripe for Startups as Bank Abandon Business
	7/22/2014	8	7/22/2014	7929	Bitcoin for the Underbanked
	7/29/2014	10	7/29/2014	7928	BankThink Bank Payment Systems Still Operate Like CompuServe and AOL
	9/27/2014	14	9/27/2014	7922	The Internet's Missing Link
	10/22/2014	16	10/22/2014	7917	Apple's Mobile Buzz Impacts Bitcoin, but Regs Still Unclear

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Market Commentary & Company Overview	10/28/2014	18	10/28/2014	7915	When We Don't Own Who We Are
	11/3/2014	19	11/3/2014	7913	Money20/20 Day 1: Regulators, Finance Giants Forecast Bitcoin's Future
	11/3/2014	20	11/3/2014	7914	Ripple Labs CEO looks to revolutionise online payments
	11/20/2014	23	11/20/2014	7910	Why banks fear Bitcoin
	11/24/2014	24	11/24/2014	7909	Susan Athey On How Digital Currency Could Transform Our Lives
	12/2/2014	25	12/2/2014	7908	MasterCard Seeks 'Level Playing Field' for Bitcoin Regulation
	12/10/2014	27	12/10/2014	7902	Bitcoin for Rockstars
	12/21/2014	29	12/21/2014	7900	Why Bitcoin's Erratic Price Doesn't Matter
	12/29/2014	31	12/29/2014	7898	Rethink Identity So Personal Data Can Stay Personal
	1/6/2015	32	1/6/2015	7896	Block Chain 2.0: The Renaissance of Money
	1/8/2015	33	1/8/2015	7895	The magic of mining
	1/13/2015	34	1/13/2015	7894	There's a blockchain for that!
	1/14/2015	35	1/14/2015	7893	Did we solve a payments problem that no longer exists?
	1/18/2015	36	1/18/2015	7892	Federal Reserve Bank VP: We're a Protocol Just Like Bitcoin
	1/21/2015	38	1/21/2015	7887	Bill Gates on Mobile Banking, Connecting the World and AI
	1/21/2015	38	1/22/2015	7884	Bill Gates: Bitcoin Alone Won't Solve Global Payments Challenges
	1/22/2015	39	1/22/2015	7885	5 ways digital currencies will change the world
	1/26/2015	40	1/26/2015	7883	The Fed Has a Vision for Faster Payments; Does It Have the Will?
	1/29/2015	41	1/29/2015	7882	Fed's Payments Leaders Show Interest in Cryptocurrency, Privacy Tech
	2/11/2015	44	2/11/2015	7880	The Fed's Unexpectedly Bold Payments Idea
	2/16/2015	46	2/16/2015	7879	Policy Experts Talk Transparency in Bitcoin at Foreign Affairs Event
	2/23/2015	47	2/23/2015	7876	Digital-Only German Bank to Enter U.S. Market, Court Millennials
	2/25/2015	48	2/25/2015	7878	Heads and Tails: How Can Cryptocurrencies Enable Legal Cross-Border Money Transfers?
	3/3/2015	49	3/3/2015	7874	Welcome to the Internet of Value
	3/3/2015	50	3/3/2015	7875	Cryptocurrency Technology Set to Shake Up Correspondent Banking
	3/11/2015	52	3/11/2015	7873	Goldman Sachs Report Says Bitcoin Could Shape 'Future of Finance'
	3/15/2015	53	3/15/2015	7872	Coollest Brands 2015: Ripple Labs
	4/7/2015	57	4/7/2015	7870	Banks Can Cherry-Pick the Best Bits from Bitcoin: Report
	4/8/2015	58	4/8/2015	7868	What's missing from Facebook's digital payments plan
	4/15/2015	59	4/15/2015	8586	Ripple Labs and Aite Group Host Webinar on Global Payments
	5/1/2015	64	5/1/2015	8582	CGAP: Why an Open Payments Infrastructure Matters for Financial Inclusion
	5/1/2015	64	5/1/2015	7859	The 'Ripple' Effect: Why an Open Payments Infrastructure Matters
	5/7/2015	67	5/7/2015	7860	The next big thing
	5/13/2015	68	5/13/2015	7858	EBAday: banks still best placed for payments
	5/14/2015	70	5/14/2015	8581	European Banking Association Emphasizes Promise of Distributed Ledgers
	5/14/2015	69	5/14/2015	7857	Blockchain manoeuvres: applying Bitcoin's technology to banking
	5/19/2015	72	5/20/2015	8579	NACHA Banks Approve Same-Day Settlement in U.S.
	5/29/2015	73	5/28/2015	8578	McKinsey: Why Banks Should Invest in Payments Infrastructure
	6/2/2015	75	6/2/2015	8577	Gates Foundation: Lessons Learned About Payments Systems
	6/4/2015	76	6/4/2015	8576	Daily Fintech: Real-time Payments is a Game-changer
	6/16/2015	79	6/16/2015	8574	Santander: Distributed Ledger Tech Could Save Banks \$20 Billion a Year
	6/19/2015	80	6/19/2015	7849	The Sea Change Ripple Labs Sees For FinTech
	6/19/2015	81	6/19/2015	7851	RBS pledges to boost resilience spend after latest IT failure
	7/2/2015	82	7/2/2015	8573	World Economic Forum Report: The Rise of Non-Traditional Payment Systems
	7/6/2015	83	7/6/2015	7850	Ravi Menon: A smart financial centre
	7/13/2015	84	7/13/2015	7848	FinTech: Will Blockchain Enable Better Banking?
	7/20/2015	85	7/20/2015	8572	McKinsey: New Partnership Models in Transaction Banking
	7/23/2015	86	7/23/2015	7847	BankThink Ripple's Overlooked Path to Decentralization
	8/1/2015	88	8/1/2015	7844	Ripple Labs: Opening Access to Finance
	8/3/2015	89	8/3/2015	7845	Ripple's Chris Larsen adds up savings for banks using distributed ledgers
	8/5/2015	90	8/5/2015	7842	49 Technology Pioneers to watch in 2015
	8/7/2015	91	8/7/2015	7843	Ripple Labs: smoothing the path to better payments

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Market Commentary & Company Overview	8/13/2015	92	8/13/2015	7841	Ripple well-placed for global adoption
	8/27/2015	93	8/27/2015	7840	Internet of Value: New Protocol Could Usher in Real-time Payments
	9/3/2015	95	9/3/2015	7839	Why we need a common standard for moving e-money
	9/22/2015	96	9/22/2015	8570	WEF Report: Distributed Financial Technology Goes Mainstream by 2027
	10/26/2015	100	10/26/2015	8569	BIS Describes Peak Correspondent Banking
	10/29/2015	101	10/29/2015	8568	Needham Report: Welcome to the Internet of Value
	10/30/2015	102	10/30/2015	8567	McKinsey: The Powerful Forces Reshaping the Payments Landscape
	11/2/2015	103	11/2/2015	8566	Money 20/20: How Banks Can Leverage Distributed Financial Technology
	11/5/2015	104	11/5/2015	8565	Blockchain Investment By Financial Institutions in One Chart
	11/10/2015	105	11/10/2015	8564	Correspondent Banking's Steady Decline
	11/12/2015	106	11/12/2015	8562	What the Blockchain Means for Banks
	11/12/2015	107	11/12/2015	8563	Financial Inclusion Can Generate \$380 Billion in Revenues for Banks
	11/19/2015	108	11/19/2015	8561	Why Banks Are Abandoning Traditional Cross-Border Payments in One Chart
	12/3/2015	109	12/3/2015	8560	Accenture Report: APAC Fintech Investments Signal Major Opportunity in Payments
	12/11/2015	111	12/11/2015	8559	Capgemini: Blockchain Tech Can Transform Global Financial Network
	12/17/2015	113	12/17/2015	7829	Ripple chief Chris Larsen: Sorting out payments will aid innovation in securities settlements
	1/4/2016	115	1/4/2016	8556	Every Business is a Payments Business
	1/6/2016	116	1/6/2016	8555	Wired: A Global Standard for Payments
	1/6/2016	117	1/6/2016	7836	The Plan to Unite Bitcoin With All Other Online Currencies
	1/12/2016	118	1/12/2016	7835	Blockchains Poised To Be The Hot Tech For Moving Money In 2016
	1/14/2016	120	1/14/2016	8553	Mike Hearn: Bitcoin Has Failed
	1/20/2016	122	1/20/2016	8551	IMF at Davos: Distributed Ledger Technology is Extremely Beneficial
	1/20/2016	123	1/20/2016	8552	Vermont Realizes They Don't Need the Blockchain
	1/22/2016	124	1/22/2016	8550	Chris Larsen at Davos: The Merging of the Web, the Physical Web and the Value Web
	1/25/2016	125	1/25/2016	8549	New DTCC White Paper Gets Real About Blockchain Hype
	1/27/2016	126	1/26/2016	8548	Highlights from the World Economic Forum 2016
	1/28/2016	128	1/28/2016	8547	Bank of England: How Our Modern Payment System Began at a Bar
	2/2/2016	129	2/2/2016	8544	Fed Releases Faster Payments Progress Report
	2/12/2016	131	2/12/2016	8543	The Block Chain Conference 2016: Highlights
	2/16/2016	132	2/16/2016	8542	Accenture on Ethics: Banks Could Boost Earnings by \$500 Million a Year
	2/23/2016	134	2/23/2016	8540	Ripple and XRP Can Cut Banks' Global Settlement Costs Up to 60 Percent
	3/11/2016	136	3/11/2016	8538	White & Case: the Blockchain Revolution in Financial Services
	4/7/2016	139	4/7/2016	7834	Ripple Aims to Put Every Transaction on One Ledger
	5/6/2016	145	5/6/2016	8531	Highlights from Consensus 2016
	5/10/2016	146	5/10/2016	8530	ECB Weighs in on Distributed Ledger Tech
	5/23/2016	147	5/23/2016	8529	Interledger: Beyond Blockchain
	6/2/2016	149	6/2/2016	7832	Meet the Real Bank of Mom and Dad
	6/14/2016	151	6/14/2016	8526	Japan Explores the Future of Blockchain
	6/16/2016	152	6/16/2016	8525	Goldman Sachs: Blockchain Billions
	6/27/2016	156	6/27/2016	7821	These are the 5 Hottest Companies in Fintech
	7/11/2016	157	7/11/2016	8522	Citi Research: Blockchain Tech Could Remake Payments Infrastructure
	7/20/2016	160	7/20/2016	8519	Bain: Distributed Ledger Tech Will Make Winners and Losers in Banking
	8/8/2016	162	8/8/2016	8517	Credit Suisse: Solving the Problems of Cross-Border Payments
	8/9/2016	163	8/9/2016	8516	SEPA in the Age of Real-Time Payments
	8/15/2016	164	8/15/2016	8515	WEF: Distributed Ledgers Are the Foundation of New Financial Infrastructure
	8/18/2016	166	8/18/2016	7818	Man Who Introduced Millions to Bitcoin Says Blockchain Is a Bust
	8/19/2016	167	8/19/2016	7816	Google and Apple like Ripple's Interledger Protocol for interoperability - and because it's not Visa
	8/19/2016	168	8/19/2016	7817	Overseas remittances' costs to reduce with new system
	9/15/2016	172	9/15/2016	7814	It Might Take Longer Than You Think For The Future Of Banking To Arrive
	9/21/2016	173	9/21/2016	8510	Chris Larsen on the Internet of Value
	10/5/2016	178	10/5/2016	8504	Three Key Takeaways from the Capgemini World Payments Report
	10/6/2016	179	10/6/2016	8503	Clearing Away the Debris With Distributed Ledger Technology

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Market Commentary & Company Overview	10/7/2016	180	10/7/2016	8502	Ovum Report: Corporate Treasurers Need More From Banks
	10/14/2016	182	10/14/2016	8500	McKinsey Report: By 2020, Payments Will Generate \$400 Billion More Per Year
	10/18/2016	184	10/18/2016	8498	Bank of England: Scaling Real-Time Gross Settlement
	11/10/2016	188	11/10/2016	8494	Keep Calm and Blockchain On
	11/14/2016	190	11/14/2016	8493	BNY Mellon: Reinventing Payments
	11/14/2016	189	11/14/2016	7802	Where Finance and Technology Come Together
	11/22/2016	192	11/22/2016	8491	KPMG: Future Bright for Next-Generation Payment Solutions
	11/28/2016	193	11/28/2016	8490	Santander and Reisebank Both Recognized for Innovation
	12/6/2016	195	12/6/2016	8488	Fed Distributed Ledger Tech Report Singles Out Interledger
	12/7/2016	196	12/7/2016	8487	McKinsey: Corporates Need Faster Payments, Too
	12/14/2016	198	12/14/2016	8485	Key Strengths of Distributed Ledger Tech from the Hong Kong Monetary Authority
	1/9/2017	200	1/9/2017	8484	Three Forces Shaping Payments: BCG Global Report
	1/12/2017	202	1/12/2017	8482	SWIFT GPI Part 3: the Empire Strikes Back
	1/13/2017	203	1/13/2017	8481	XRPに関する6つの迷信 (English translation follows)
	1/27/2017	205	1/27/2017	7799	Will Tech Titans Enter Payment Industry?
	2/6/2017	207	2/6/2017	8478	BAFT Europe Bank to Bank Highlights
	2/15/2017	208	2/15/2017	7798	Why Blockchain and Asia are A Perfect Match
	3/9/2017	215	3/9/2017	8471	Discussing Trends in Global Payments at the GCC Financial Forum
	3/20/2017	217	3/20/2017	7796	Sending Money Overseas to Get Faster Once Banks Pick a Winner
	5/4/2017	223	5/4/2017	7795	Financial technology is proving less of a battleground than feared
	6/14/2017	228	6/14/2017	7792	Inside Ripple's plan to make money move as fast as information
	7/31/2017	235	7/31/2017	8455	Ripple's Product Suite is Growing
	10/6/2017	243	10/6/2017	8448	10 Things You Need to Know About XRP
	10/17/2017	247	10/17/2017	8443	Swell Day 1: A former Fed Chair Speaks, The Practical Applications of Digital Assets, Blockchain and More
	10/18/2017	248	10/18/2017	8442	Swell Day 2: Words of Wisdom from the Inventor of the Web and Industry Leaders Discuss Which Blockchain Should Rule Them All
	10/26/2017	250	10/26/2017	8440	Top 3 Takeaways From Swell
	11/13/2017	251	11/13/2017	8439	Ripple Hosts World's Central Banks to Explore Next Generation of Payments
	11/17/2017	253	11/17/2017	7787	Ripple boss predicts central bank adoption of blockchain
	11/17/2017	253	11/17/2017	7791	Why the CEO behind one of the largest cryptocurrencies left AOL and Yahoo for blockchain
	12/5/2017	257	12/5/2017	7788	What will next year bring for cryptocurrencies? Ask our banking editor and Daniel Aranda, managing director for Europe at Ripple.
	12/7/2017	260	12/7/2017	8433	Internet of Value Depends on Interoperability, Not Blockchain Alone
	12/21/2017	267	12/21/2017	8427	Happy 5th Anniversary, XRP Ledger!
	12/22/2017	265	12/21/2017	7785	Bitcoin Is So 2017 as Ripple Soars at Year End: Chart
	12/26/2017	269	12/26/2017	7784	The Death of the ICO (And 4 Other 2018 Predictions)
	12/28/2017	270	12/28/2017	8424	The Most Popular Ripple Insights Posts of 2017
	12/28/2017	271	12/28/2017	7783	What is ripple, and what is XRP?
	12/29/2017	273	12/29/2017	7781	What the heck is Ripple? A brief look at the hottest cryptocurrency of the moment.
	12/29/2017	272	12/29/2017	7780	Ripple cryptocurrency surges as Japanese groups agree to use it
	12/30/2017	274	12/30/2017	7782	Digital currency ripple soars nearly 56 percent, becomes second-largest cryptocurrency by market cap
	12/31/2017	275	12/31/2017	7779	Ripple: cryptocurrency enjoys end-of-year surge – but will it endure?
	1/1/2018	276	1/1/2018	7777	Here are the top 10 cryptoassets of 2017 (and bitcoin's 1,000% rise doesn't even make the list)
	1/2/2018	277	1/2/2018	7776	These 3 Cryptos Have A Bigger Market Cap Than Exxon
	1/3/2018	278	1/3/2018	7775	Bitcoin May be King, but Ripple Dark Horse in Crypto Race
	1/4/2018	279	1/4/2018	7774	Cryptocurrency boom: Why everyone is talking about ripple
	1/5/2018	280	1/5/2018	7773	Ripple Steals Bitcoin's Thunder, Surges 1,135% in a Month
	1/9/2018	281	1/9/2018	8423	Who Really Cares About Real-time Payments?
	1/10/2018	283	1/10/2018	7772	Ripple, the Company behind Cryptocurrency XRP, is betting big on Asia
	1/10/2018	282	1/10/2018	7771	Ripple's XRP is the Hot New Cryptocurrency - Here's How You Buy It
	1/11/2018	285	1/11/2018	7778	Looking To Start A Blockchain Business? Ripple Founder Chris Larsen Has One Piece Of Advice
	1/16/2018	286	1/16/2018	7765	Ripple is sitting on close to \$80 billion and could cash out hundreds of millions per month — but it isn't
	1/18/2018	288	1/18/2018	8421	Top 9 Frequently Asked Questions About Ripple and XRP
	1/20/2018	289	1/20/2018	7764	Ripple Founder Chris Larsen Talks About The Many Use Cases For Blockchain

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Market Commentary & Company Overview	1/26/2018	291	1/26/2018	7762	Ripple Drops More Than 30% In A Week As Hype Fades
	2/13/2018	298	2/13/2018	7750	Ripple CEO Favors More Regulation of the Crypto Market
	2/16/2018	301	2/16/2018	7748	Is it Ripple or Bitcoin Bringing Life To Cryptos?
	3/4/2018	307	3/4/2018	7743	How XRP Fits Into Ripple's Payments Products Explained
	3/7/2018	309	3/7/2018	7737	Ripple CEO Brad Garlinghouse on Fast Money
	3/7/2018	309	3/7/2018	7738	Ripple CEO tells cryptocurrency industry to 'work with the regulators'
	3/7/2018	310	3/7/2018	7740	Data Sheet—How Ripple Wants to Enhance, Not Kill, the Global Payments System
	4/25/2018	322	4/25/2018	8405	Ask Me Anything with Brad and Cory
	4/27/2018	325	4/27/2018	7719	7 Facts You Might Not Know About Ripple
	5/4/2018	326	5/4/2018	7718	The battle for the remittances market
	5/30/2018	334	5/30/2018	7710	Bitcoin's influence over cryptocurrency prices could end soon, says Ripple CEO
	5/30/2018	334	5/30/2018	7711	Momentum for Ripple continues to build: Ripple CEO
	6/4/2018	337	6/4/2018	7703	Brad Garlinghouse explains the difference between Ripple and XRP
	6/5/2018	340	6/5/2018	8396	Ripple CEO at Money20/20 Europe: Blockchain Hype Outpaces Reality
	6/5/2018	338	6/5/2018	7704	Bitcoin is not the 'panacea' people thought it would be, Ripple CEO says
	6/5/2018	339	6/5/2018	7705	Ripple and Swift slug it out over cross-border payments
	6/7/2018	341	6/7/2018	8395	American Express and Ripple at Money20/20 Europe: Changing the Cross-Border Payments Experience for SMEs
	6/18/2018	342	6/18/2018	7702	Everything you need to know about the blockchain
	7/13/2018	347	7/13/2018	8391	Ask Me Anything with David Schwartz and Asheesh Birla
	7/26/2018	349	7/26/2018	7698	Bitcoin is slow when you talk about moving money: Cory Johnson
	8/15/2018	352	8/15/2018	7696	Ripple 'definitely' wants to target China with its blockchain-based payments tech, exec says
	8/16/2018	354	8/16/2018	7695	Ripple's CTO invented a distributed computer system 20 years before blockchain – ask him about it
	8/22/2018	355	8/22/2018	8386	Ask Me Anything with Brad and Cory
	8/29/2018	356	8/29/2018	7693	Ripple's Chris Larsen: The Richest Person In Cryptocurrency
	9/5/2018	357	9/5/2018	7691	Ripple's Trillion-Dollar Man
	10/1/2018	369	10/1/2018	8377	CEO Brad Garlinghouse Talks Internet of Value and Customer Traction at Swell 2018
	10/2/2018	371	10/2/2018	8374	Swell 2018: Report Finds Tipping Point for Mass Adoption of Blockchain Is Near
	10/2/2018	372	10/2/2018	8375	Global Regulatory Policies Took Center Stage On Day One of Swell 2018
	10/11/2018	374	10/11/2018	8371	Crypto Regulation Around the World
	10/23/2018	377	10/23/2018	8368	David Schwartz Makes the Case for Blockchain in Payments at Money20/20 USA
	10/24/2018	378	10/24/2018	8367	Chris Larsen Reflects on Disruption, Regulation and the Internet of Value at Money20/20
	10/29/2018	380	10/29/2018	8365	The Ripple Drop - Episode 6
	11/7/2018	381	11/7/2018	8364	The 800 Pound Gorilla: Digital Asset Adoption
	11/12/2018	382	11/12/2018	8363	Blockchain and Digital Asset Use in ASEAN: CEO Brad Garlinghouse in Convo with IMF's Ross Leckow at Singapore Fintech Festival
	11/13/2018	383	11/13/2018	7683	Ripple Is Aiming to Overtake Swift Banking Network, CEO Says
	11/30/2018	387	11/30/2018	8359	The Ripple Drop - Episode 7
	12/26/2018	391	12/26/2018	8356	The Ripple Drop - Episode 8
	1/8/2019	393	1/8/2019	7681	Ripple wants a piece of the global payment system while it fights a cryptocurrency 'holy war'
	1/17/2019	395	1/17/2019	8354	A Global Look at the Future of Blockchain and Fintech Innovation
	1/30/2019	399	1/30/2019	7678	Ripple CEO: Decentralized payment systems are likely to win
	1/31/2019	400	1/31/2019	8352	The Ripple Drop - Episode 9
	2/8/2019	404	2/8/2019	8350	What's on the Regulatory Horizon for Digital Assets in the E.U.?
	2/28/2019	405	2/28/2019	8349	The Ripple Drop - Episode 10
	3/26/2019	408	3/26/2019	8347	Southeast Asia's Perfect Payments Storm
	3/28/2019	409	3/28/2019	8346	The Ripple Drop: Episode 11
	5/20/2019	415	5/20/2019	7670	Ripple CEO Brad Garlinghouse explains why big banks should get into cryptocurrencies
	5/30/2019	416	5/30/2019	7669	Ripple courting banks, paytech and big fintech to beat Swift to emerging markets
	7/29/2019	419	7/29/2019	7667	Ripple's Senior VP on the U S. Senate Cryptocurrency Hearing
	8/7/2019	421	8/7/2019	7666	The current state of crypto regulation is hurting US companies
	10/7/2019	430	10/7/2019	7662	Ripple CEO Not Bullish on Facebook's Ability to Launch Libra Cryptocurrency
	10/8/2019	434	10/14/2019	7661	Brad Garlinghouse, CEO of Ripple: One on One with the Man Running Ripple and XRP
	10/10/2019	432	10/10/2019	7660	Altcoins: Ahead of Libra, XRP cryptocurrency gains toehold in commerce

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Market Commentary & Company Overview	10/20/2019	437	10/20/2019	7657	XRP Is Up 30% On September As Bitcoin Flatlines—Ripple Sees It Going Even Higher
	10/23/2019	439	10/23/2019	7656	Ripple CEO: Facebook has a 'trust deficit'
	11/5/2019	440	11/5/2019	8333	Blockchain in Payments Report 2019: Flywheel Set in Motion
	11/6/2019	442	11/6/2019	7655	Ripple CEO Expects Volatility in Cryptocurrencies to Continue
	12/10/2019	446	12/10/2019	7652	Selling Blockchain To Enterprises: How Ripple And Others Make Money
	1/5/2020	449	1/5/2020	7649	Cross-border transactions key to connecting a fragmented region   Opinion
	3/27/2020	463	3/27/2020	7643	"XRP is Not Centralized": Ripple SVP Addresses Crypto Community Criticism
	5/7/2020	472	5/7/2020	7638	The financial world's nervous system is being rewired
	5/16/2020	474	5/16/2020	7632	Navigating payments: emerging markets, COVID-19 and M&As
	6/18/2020	483	6/18/2020	8307	Policy Framework for Digital Assets in India
	6/20/2020	484	6/20/2020	7633	Ripple suggests a regulatory framework to keep India from banning cryptocurrencies — yet again
	7/28/2020	485	7/28/2020	7630	The Ripple Story: CTO David Schwartz on the Founding, Ledger & XRP
	7/30/2020	487	7/30/2020	8305	How the U.S. Can Pave the Way for Global Digital Asset Regulation - And Why It Should
	8/21/2020	491	8/21/2020	7626	The tech cold war is here — and the US isn't winning
	9/11/2020	493	9/11/2020	7624	Your Next Bank Will Be a Tech Giant
	10/1/2020	496	10/1/2020	7622	Blockchain Management Styles At 3 Systemically Important Financial Institutions Show A Diversity Of Strategies
	10/5/2020	497	10/5/2020	8300	Ripple's Mission in Action
	10/14/2020	501	10/14/2020	7619	'China is well ahead' of every country on global financial infrastructure: Ripple CEO
	10/15/2020	502	10/15/2020	8296	Blockchain in Payments Report 2020: From Adoption To Growth
	10/21/2020	504	10/21/2020	7618	Pandemic Put Tailwind Behind Crypto Markets: Ripple Labs
11/13/2020	510	11/13/2020	7614	Brad Garlinghouse explains how regulatory uncertainty around XRP has affected Ripple	
11/19/2020	511	11/19/2020	7613	Bitcoin bulls and bears: Tech execs discuss what's in store for cryptocurrency	
12/2/2020	512	12/2/2020	7612	Ripple CEO on what's driving cryptocurrency	
Markets Report	4/18/2017	221	4/18/2017	8466	Q1 2017 XRP Markets Report
	7/20/2017	233	7/20/2017	8457	Q2 2017 XRP Markets Report
	10/19/2017	249	10/19/2017	8441	Q3 2017 XRP Markets Report
	4/25/2018	323	4/25/2018	8406	Q1 2018 XRP Markets Report
	7/24/2018	348	7/24/2018	8390	Q2 2018 XRP Markets Report
	10/25/2018	379	10/25/2018	8366	Q3 2018 XRP Markets Report
	1/24/2019	397	1/24/2019	8353	Q4 2018 XRP Markets Report
	4/24/2019	413	4/24/2019	8345	Q1 2019 XRP Markets Report
	10/18/2019	436	10/18/2019	8335	Q3 2019 XRP Markets Report
	1/22/2020	451	1/22/2020	8327	Q4 2019 XRP Markets Report
	4/30/2020	470	4/30/2020	8314	Q1 2020 XRP Markets Report
	8/3/2020	489	8/3/2020	8304	Q2 2020 XRP Markets Report
	11/5/2020	509	11/5/2020	8294	Q3 2020 XRP Markets Report
	Milestone	5/18/2015	71	5/18/2015	7585
5/18/2015		71	5/18/2015	8580	Ripple Labs Raises \$28 Million From IDG Capital Partners, CME Group, Seagate, and Others
5/18/2015		71	5/19/2015	7855	Ripple Labs Closes \$28 Million in Funding
5/18/2015		71	5/19/2015	7856	BitBeat: NYSE Launches Bitcoin Index, Ripples Gets \$28 Million
10/6/2015		99	10/6/2015	7580	Ripple Adds Santander InnoVentures Fund as Series A Investor
10/6/2015		99	10/6/2015	7838	Ripple Gets \$4M From Santander Arm, Inks Partnership With Accenture
10/6/2015		99	10/22/2015	7831	Santander plans to become 'Ripple evangelist'
1/29/2016		127	1/28/2016	7578	Ripple Strikes Multi-National Deal with SBI Holdings to Meet Growing Demand for Ripple Solutions Across Asia
1/29/2016		127	1/28/2016	8546	Ripple's Deal With Japanese Multinational Opens Door for Rapid Asian Expansion
6/13/2016		150	6/13/2016	8527	Ripple Receives New York's First BitLicense for an Institutional Use Case of Digital Assets
6/13/2016		150	6/13/2016	7824	Ripple Wins BitLicense from New York Regulator
9/15/2016		170	9/15/2016	7573	Ripple Raises \$55 Million in Series B Funding
9/15/2016		170	9/15/2016	8512	Ripple Raises \$55 Million in Series B Funding
9/15/2016		170	9/15/2016	7809	Fintech Firm Ripple Gets \$55 Million In Funding

Category	Event Date	Event ID	Document Date	Document ID	Headline	
[1]	[2]	[3]	[4]	[5]	[6]	
Milestone	9/15/2016	170	9/15/2016	7810	Blockchain payments startup Ripple raises \$55 million	
	9/15/2016	170	9/15/2016	7811	Ripple Just Raised \$55 Million and Signed on These Major Bank Partners	
	9/15/2016	170	9/15/2016	7812	StanChart invests in blockchain startup Ripple	
	9/15/2016	170	9/15/2016	7813	Google-backed blockchain start-up Ripple raises \$55 million from big banks	
	9/15/2016	170	9/15/2016	7815	Ripple Raises \$55 Million, Adds Seven More Banks to Its Network	
	5/16/2017	225	5/16/2017	8463	Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply	
	5/26/2017	227	5/26/2017	7793	Bitcoin rival Ripple is suddenly sitting on billions of dollars worth of cryptocurrency	
	12/8/2017	259	12/7/2017	8432	Ripple Escrows 55 Billion XRP for Supply Predictability	
	12/20/2019	448	12/20/2019	8329	Ripple Caps Record Year With \$200 Million Series C Funding	
	12/20/2019	448	12/20/2019	7650	Ripple Raises \$200 Million as Part of Bid for XRP Adoption	
	Miscellaneous	11/17/2014	22	11/17/2014	7911	RBS embraces crypto-currencies in hackathon challenge
		11/28/2017	256	11/28/2017	8435	TechCrunch Founder Michael Arrington Launches \$100M Crypto Fund with XRP
11/28/2017		256	11/28/2017	7789	Michael Arrington Has a New \$100 Million Hedge Fund That Will Be Valued in Ripple's XRP	
6/27/2018		343	6/27/2018	7701	Coinbase CEO Launches Crypto Charity Fund, Aims to Raise \$1 Billion	
10/6/2020		499	10/6/2020	7621	Ripple threatens to leave U.S. over crypto regulation	
10/23/2020		506	10/23/2020	7617	\$10 billion crypto firm Ripple considers relocating to London over U.S. regulation	
Office & Staff	1/20/2015	37	1/20/2015	7591	Former Chief White House Advisor Gene Sperling Joins Ripple Labs Board of Directors	
	1/20/2015	37	1/20/2015	7890	Ripple Labs Names Former Obama Advisor to Board of Directors	
	1/20/2015	37	1/20/2015	7891	Ripple Labs appoints ex-White House advisor Gene Sperling to board of directors	
	1/20/2015	37	1/21/2015	7888	Transition: Sperling Joins Ripple Labs Board	
	1/20/2015	37	1/20/2015	7889	Bitcoin company Coinbase lands \$75m investment from NYSE and BBVA	
	3/18/2015	54	3/18/2015	7588	Ripple Labs Names Former State Department Official Anja Manuel as Advisor	
	4/6/2015	56	4/6/2015	7587	Ripple Labs Expands to Asia Pacific to Serve Regional Demand for Ripple's Real-Time Settlement Protocol	
	4/6/2015	56	4/8/2015	7869	Asia-Pacific's Heating Up for U.S. Payment Expansion Plays	
	4/16/2015	60	4/16/2015	7586	Brad Garlinghouse Joins Ripple Labs as Company's First Chief Operating Officer	
	4/16/2015	60	4/16/2015	7866	Ripple Labs Hires Brad Garlinghouse As Its COO	
	4/16/2015	60	4/16/2015	7867	Garlinghouse, Former Yahoo Executive, Joins Startup Ripple Labs	
	6/1/2015	74	6/1/2015	7584	Ripple Labs Names Donald Donahue as Advisor	
	6/1/2015	74	6/1/2015	7854	Ripple Labs names former DTCC boss Donahue as an advisor	
	7/29/2015	87	7/29/2015	7583	Ripple Labs Names Michael S. Barr as Advisor	
	7/29/2015	87	7/29/2015	7846	Ripple Labs names Michael Barr as advisor	
	8/31/2015	94	8/31/2015	7581	Bret Allenbach Joins Ripple Labs as Chief Financial Officer	
	3/21/2016	138	3/21/2016	7577	Ripple Continues Global Growth With New London Office to Serve European Bank Demand	
	4/11/2016	140	4/11/2016	7576	HSBC Executive and SWIFT Board Member Joins Ripple to Support Continued Global Growth	
	4/11/2016	140	4/11/2016	8536	HSBC Executive and SWIFT Board Member Joins Ripple	
	6/20/2016	153	6/20/2016	8524	Ripple Continues Global Growth with New Luxembourg Office to Support Protocol Neutrality	
	11/1/2016	187	11/1/2016	7569	Amid High Growth, Ripple's Chris Larsen Appoints Brad Garlinghouse Chief Executive Officer	
	11/1/2016	187	11/1/2016	8495	A New Chapter for Ripple	
	11/1/2016	187	11/1/2016	7804	Bitcoin-Technology Pioneer Chris Larsen to Step Down as Ripple CEO	
	11/1/2016	187	11/1/2016	7805	Brad Garlinghouse takes over as CEO of payments startup Ripple	
	11/30/2016	194	11/30/2016	8489	CME Group Executives Miguel Vias Joins Ripple	
	2/23/2017	211	2/23/2017	8475	Ripple Welcomes Ken Kurson to its Board of Directors	
	4/12/2017	220	4/12/2017	8467	Ripple Hires Former Business Director at SWIFT gpi Marjan Delatinne	
	8/25/2017	238	8/25/2017	8453	Former State Department Official Anja Manuel Joins Ripple's Board of Directors	
	9/5/2017	240	9/5/2017	8451	Ripple Launches New Mumbai Office to Serve India's Digital Economy	
	9/25/2017	242	9/25/2017	8449	Ripple Supports Singapore's Fintech Hub Aspirations With New Office	
	11/21/2017	254	11/21/2017	7563	Ripple Appoints Former New York State Superintendent of Financial Services Benjamin Lawsky to Its Board and Ron Will as CFO	
	11/21/2017	254	11/21/2017	8437	Ripple Welcomes New Board Member Benjamin Lawsky	
	12/19/2017	264	12/19/2017	8429	Zoe Cruz Joins Ripple's Board of Directors	
3/8/2018	311	3/8/2018	7736	Ripple hires Bloomberg TV's Cory Johnson as chief market strategist		

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Office & Staff	3/17/2018	312	3/17/2018	7735	Ripple's new chief market strategist: Crypto regulation will 'separate the wheat from the chaff'
	7/11/2018	346	7/11/2018	8392	Ripple Welcomes Kahina Van Dyke as Senior Vice President in Business and Corporate Development
	7/11/2018	346	7/11/2018	8393	Two Big Changes to Our Leadership Team
	7/11/2018	346	7/11/2018	7699	Ripple Hires Facebook Payments Exec and Names New CTO
	1/30/2019	398	1/30/2019	7543	Stuart Alderoty Joins Ripple as General Counsel
	1/30/2019	398	1/30/2019	7677	Ripple Hires General Counsel from Lending Giant CIT Group
	4/8/2019	411	4/8/2019	7673	Ripple aims to make a splash in Asia with expansion of Singapore office
	4/25/2019	414	4/25/2019	7541	Yoshitaka Kitao Joins Ripple Board of Directors
	6/11/2019	417	6/11/2019	7540	Provider of Solutions for Global Payments from Silicon Valley Officially Launches Operations in Brazil
	10/22/2019	438	10/22/2019	7536	Craig Phillips Joins Ripple Board of Directors
	10/22/2019	438	10/22/2019	8334	Ripple Expands Global Regulatory Team in D.C. and Joins the Blockchain Association
	3/18/2020	461	3/18/2020	7644	Ripple Taps Senior Exec for Regional Expansion
	12/15/2020	513	12/14/2020	8293	Ripple Adds Sandie O'Connor To Board of Directors
	12/15/2020	513	12/15/2020	7527	Ripple Adds Sandie O'Connor to Board of Directors
	12/15/2020	513	12/15/2020	7611	Ripple Board Lands JPMorgan Veteran and Regulatory Expert Sandie O'Connor
Other Initiatives	2/10/2015	43	2/10/2015	8588	Ripple Labs joins the Center for Financial Services Innovation
	2/12/2015	45	2/12/2015	7589	Ripple Labs Joins W3C Web Payment Interest Group to Help Set Standards for the Value Web
	3/4/2015	51	3/4/2015	8587	Ripple Labs Joins International Payments Framework Association
	6/15/2015	78	6/15/2015	8575	Ripple Labs Elected to Fed Steering Committee for Faster Payments
	6/15/2015	78	6/19/2015	7852	Ripple Labs' Ryan Zagone Joins Fed's Faster Payment Task Force
	1/30/2018	294	1/30/2018	7759	SBI Ripple Asia Forms Consortium to Bring DLT to Securities
	3/28/2018	316	3/28/2018	7733	Ripple Joins Hyperledger Blockchain Consortium
	6/4/2018	336	6/4/2018	7552	Ripple Announces \$50M University Blockchain Research Initiative
	6/4/2018	336	6/4/2018	8397	Ripple Introduces the University Blockchain Research Initiative
	6/4/2018	336	6/4/2018	7706	Ripple Pumps \$50 Million Into Academic Research on Blockchain
	6/4/2018	336	6/4/2018	7707	Why Classes on Cryptocurrency, Blockchain, and Bitcoin Are About to Boom at Colleges
	6/4/2018	336	6/4/2018	7708	Crypto start-up Ripple donates \$50 million to top universities to boost blockchain adoption
	1/23/2019	396	1/23/2019	7679	Ripple Partners With Chinese University for Blockchain Research Program
	2/7/2019	403	2/7/2019	8351	University Blockchain Research Initiative Expands Global Footprint with 11 New Partners
	2/7/2019	403	2/8/2019	7542	Ripple Announces New University Blockchain Research Initiative Partners, Expands to China and Singapore
	7/30/2019	420	7/30/2019	7538	Ripple Expands University Blockchain Research Initiative Program to Japan, Supports 33 University Partners Across 14 Countries
	6/10/2020	479	6/10/2020	8309	ISO 20022: Shaping the Future of Cross-Border Payments
	6/18/2020	482	6/18/2020	8306	Why Ripple Supports PayString
	6/18/2020	482	6/18/2020	7634	Ripple launches PayID allowing users to send digital payments across different platforms
	8/26/2020	492	8/26/2020	8303	UBRI Expands To New Global Markets With More Than 35 University Partners
9/30/2020	495	9/30/2020	7529	Ripple Leads Sustainability Agenda to Achieve Carbon Neutrality By 2030	
9/30/2020	495	9/30/2020	8301	Leading the Way on Global Crypto and FinTech Sustainability	
9/30/2020	495	9/30/2020	7623	Energy Web Is Starting With Ripple in Its Bid to Make Crypto Provably Green	
11/2/2020	508	11/2/2020	7615	Cryptocurrency's carbon footprint is massive and not sustainable	
Ripple Commercialization Initiatives	9/23/2016	174	9/23/2016	7571	Major Banks Launch Global Payments Steering Group
	9/23/2016	174	9/23/2016	8509	Announcing Ripple's Global Payments Steering Group
	3/30/2017	218	3/30/2017	8469	MUFG Joins Ripple's Global Payments Steering Group
	10/13/2017	245	10/13/2017	8446	Ripple Rolls Out \$300M RippleNet Accelerator Program to Grow Volume and XRP Utility
	12/19/2017	263	12/19/2017	8428	Exploring Innovation in Payment System Infrastructures
	12/19/2017	263	12/21/2017	7786	Ripple Ramps Up Focus On Blockchain Infrastructure
	5/14/2018	330	5/14/2018	8401	Welcome to Xpring
	5/14/2018	330	5/14/2018	7714	Ripple is going after startups to build an ecosystem around the XRP cryptocurrency
	5/14/2018	330	5/24/2018	7712	Ripple's Xpring Isn't Quite a Venture Fund—It's More
	10/2/2019	428	10/2/2019	8340	Announcing the Next Chapter of Xpring, Ripple's Developer Platform
10/2/2019	428	10/2/2019	7663	Ripple's Xpring Releases Technology To Bring XRP To The Internet	

Category	Event Date	Event ID	Document Date	Document ID	Headline
[1]	[2]	[3]	[4]	[5]	[6]
Ripple Commercialization Initiatives	10/8/2020	500	10/8/2020	8298	Fund Instant Cross-Border Payments With a Line of Credit From RippleNet
	10/8/2020	500	10/8/2020	7620	Ripple Enters Lending With XRP Credit Lines to Fund Global Payments
Trading Platforms	2/29/2016	135	2/29/2016	8539	Ripple Partners with Crypto Facilities for XRP Derivatives
	10/9/2016	181	10/10/2016	8501	Ripple Announces XRP Futures Trading on Crypto Facilities
	10/27/2016	186	10/27/2016	8496	Coincheck Lists XRP on Its Digital Asset Exchange
	1/10/2017	201	1/10/2017	8483	Bitstamp Now Trading XRP with 0% Fees
	1/10/2017	201	1/10/2017	7800	Bitstamp adds Ripple currency XRP to trading platform
	2/16/2017	210	2/16/2017	8476	XRP/BTC Now Available on Bitstamp
	5/18/2017	226	5/18/2017	7567	XRP Liquidity to Increase With Listings on Six New Exchanges
	5/18/2017	226	5/18/2017	8462	XRP Liquidity to Deepen with Listings on Six New Exchanges
	8/31/2017	239	8/31/2017	8452	It's Never Been Easier to Access and Store XRP
	12/21/2017	266	12/21/2017	8426	XRP Now Available on 50 Exchanges Worldwide
	1/30/2018	295	1/30/2018	8419	SBI Virtual Currencies to Exclusively List XRP at Launch
	3/28/2018	317	3/28/2018	7731	Ripple's XRP now available from US-based crypto bank Uphold
	3/28/2018	317	3/29/2018	8410	XRP Ecosystem Grows with New Listing on Uphold
	8/16/2018	353	8/16/2018	7550	xRapid Brings on Three New Exchange Partners
	8/16/2018	353	8/16/2018	8387	xRapid Brings on Three New Exchange Partners
8/16/2018	353	8/16/2018	7694	Ripple Endorses 'Preferred' Crypto Exchanges for XRP Payments	
2/12/2020	455	2/12/2020	8323	BRD Supports XRP and Launches Enterprise Expansion	

## Notes:

- [1]: Assigned news classification.  
[2]: Identification number assigned to event.  
[3]: Date assigned to event in UTC time.  
[4]: Identification number assigned to document.  
[5]: Document date of publication expressed in local time.  
[6]: Headline of document.

## APPENDIX D

## ADDITIONAL DETAILS OF THE ANALYTICAL METHODOLOGY

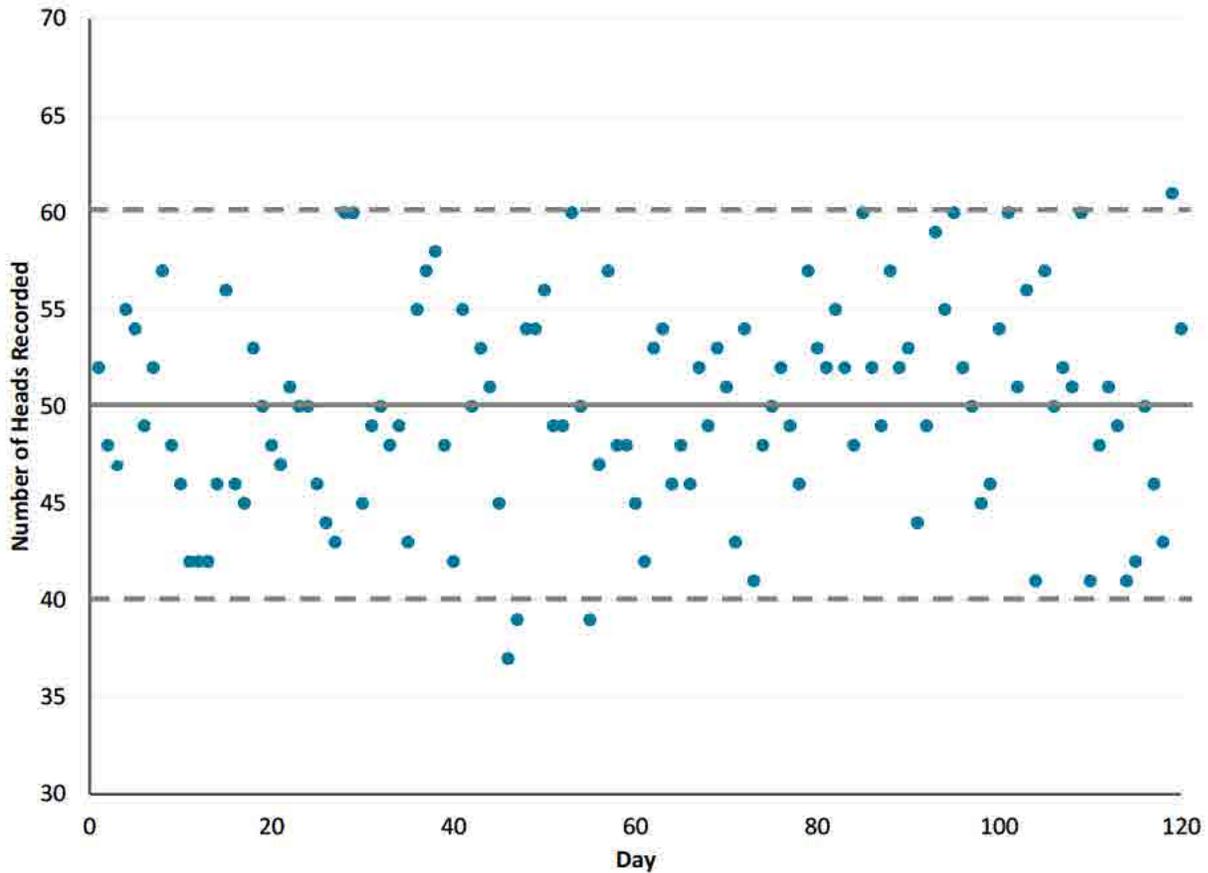
1. In this Appendix I provide additional details on certain aspects of the analytical methodology. I begin with a detailed primer on event studies in general, and then proceed to discuss my method for dating the events identified in my news sources.

## A. THE EVENT STUDY METHODOLOGY

2. An event study is conducted by first specifying a model of *expected* price movements and then testing the extent to which *actual* price movements differ from those expectations. The key question an event study answers is whether the differences between actual and expected price movements are sufficiently large that, from a statistical standpoint, such differences are unlikely to be explained by randomness. In this context, “randomness” refers to the tendency for *actual* outcomes (in this case, the actual price movement) to deviate from the *expected* outcomes in ways which appear random in nature. Below is a simple example to illustrate these ideas.
3. Suppose that Company X flips a coin 100 times each day, and the stock return of Company X is equal to the percentage of times the coin comes up Heads. Suppose that we know that the coin is fair, meaning there is a 50/50 chance of getting Heads. This means we expect to record 50 Heads out of 100 flips. However, in practice, we will not always record 50. Some days we will record a few more, and some days a few less. The *actual* outcomes will often differ from the *expected* outcome in any particular case (though, by definition, not “on average”).
4. Figure 1 below presents some simulated data of this process: 100 random flips each day for 120 days, each flip having a 50% chance of generating a “Head.” In this set of simulated data, the average number of Heads per day is 49.95. However, only 10 out of the 120 days resulted in an outcome of exactly 50 Heads. Statisticians have a well-developed understanding of this problem and use what are called “confidence intervals” to describe the likelihoods of different outcomes. Figure 1 plots the expected number of Heads (50) and the statistical 95% confidence interval (indicated by the dotted lines). The “95% confidence interval” means that there is only a 5% chance (based on pure randomness) of observing an outcome which is outside the interval. Figure 1 shows that 95% of the time the number of Heads will range between 40 and 60, and only 5% of the time will it be less than 40 or more than 60, *if the coin is fair*. In other words, “random variation” can account for approximately 95 percent of outcomes ranging from 40 to 60 Heads from Company X flipping a fair coin 100 times.

## APPENDIX D

**FIGURE 1: DISTRIBUTION OF REPORTED HEADS WITH 95% CONFIDENCE INTERVAL**  
(Expected Value = 50, 100 Tosses)



5. Now suppose that tomorrow, Company X will purchase a new coin which might (or might not) be a fair coin. If tomorrow we record 42, or 58, or 47, or indeed any number of Heads between 40 and 60, we would not regard such an outcome as unusual for flipping a fair coin. In other words, we could not reject the hypothesis that Company X was still using a fair coin in order to generate returns.
6. But what if instead we record 65 Heads? That represents a deviation of 15 away from our expectation of 50 and is well outside the “95% confidence interval.” Statistically we can say that the likelihood of observing an *actual* outcome which is 15 or more away from our expected outcome is less than 0.5% (i.e., this would occur approximately once in 300 days).<sup>1</sup> While such an outcome is not impossible from a fair coin, we can say that it is highly unlikely. Instead, it is more likely that the weight of the coin has changed. Suppose further that we find news reports indicating that Company X was hoping to purchase a heavier coin designed to produce more Heads. This qualitative information, combined with our statistical observation, suggests that the outcome of 65 Heads was most likely caused by a new coin that is not a fair coin. This is the basic logic applied in an event study methodology.

<sup>1</sup> The cumulative probability of observing 65 or more Heads or 35 or fewer Heads across 100 tosses of a fair coin is 0.35%, which is approximately equal to  $1/300 = 0.33\%$ .

## APPENDIX D

7. Returning to the matter at hand, I specify several models of expected XRP price movements and then test the extent to which actual price movements differ from those expectations. A well-accepted method for performing such a statistical analysis is to estimate a regression model over some period of time (an “estimation window”) to quantify the typical relationship between the market price of the relevant instrument on the one hand and explanatory factors (often other market prices) on the other.
8. I consider several regression models using data from the prior 180 trading days (roughly six months) up to four days prior to the date of interest.<sup>2</sup> In each model, I regress the XRP return on a set of explanatory factors. As an example, one of the models (Model 7) I consider may be written as (“**Equation 1**”):

$$XRP_t = \alpha + \beta_1 BTC_t + \beta_2 ETH_t + \beta_3 XLM_t + \varepsilon_t$$

9. Here,  $XRP_t$  is the XRP return on date  $t$ ,  $BTC_t$ ,  $ETH_t$ ,  $XLM_t$  are the return on Bitcoin, Ether, and Lumens on date  $t$ , respectively,  $\alpha$  is the average difference, and  $\varepsilon_t$  is the random factor on date  $t$ .<sup>3</sup>
10. In the framework above, the estimation window (i.e., the 180-day window used to estimate the regression) will change with different dates of interest. This is typically referred to as a “rolling estimation window” (since the estimation window is “rolled forward” for each subsequent date of interest and the length of the estimation window remains the same). By using a rolling estimation window, I allow for the relationship between the XRP prices and the explanatory factors, as well as the volatility of the random factor,  $\varepsilon_t$ , to change over time. Use of a rolling model to account for changing volatility and evolving relationships among factors is well accepted in practice and peer-reviewed literature.<sup>4</sup>
11. I then use the model to estimate the expected XRP return on each date, and measure the corresponding unexpected or abnormal return, i.e., the difference between the actual XRP return and the expected XRP return predicted by the model. The estimates from the regression model are also used to form a measure of the “statistical significance” of that abnormal return.
12. For example, the return on XRP on May 17, 2018 (a day selected at random) is -6.8%. My analysis examines whether this return is statistically significantly different from expectations where “expectations” are based on the model I described above. Applying the model yields an expected (or “predicted”) return of -5.7% for XRP for May 17, 2018.<sup>5</sup> The excess or abnormal return is then calculated as the difference between the actual return and the predicted return, which equates to -1.1%.

<sup>2</sup> A. Craig MacKinlay, “Event Studies in Economics and Finance,” *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 15: “For example, in an event study using daily data and the market model, the market model parameters could be estimated over the 120 days prior to the event.” For traditional securities, 120 trading days corresponds to about six calendar months, or about 180 trading days for a digital token such as XRP which trades every day.

<sup>3</sup> Following standard practice, I calculate the return to any instrument on date  $t$  as the difference in log prices of dates  $t$  and  $t-1$ .

<sup>4</sup> Phillip A. Braun, Daniel B. Nelson, & Alain M. Sunier, “Good News, Bad News, Volatility, and Betas,” *The Journal of Finance* Vol. 50 (5), 1995, pp. 1575-1603 at pp. 1575, 1597.

<sup>5</sup> The returns on BTC, ETH, and XLM on the same day are -3.3%, -5.0%, and -6.5% respectively. The predicted return is found as follows:  $-5.7\% = -0.14 * -3.34\%$  (Coefficient on BTC *times* BTC return)  $+ 0.56 * -4.99\%$  (Coefficient on ETH *times* ETH return)  $+ 0.49 * -6.54\%$  (Coefficient on XLM *times* XLM return)  $- 0.15\%$  (constant term from regression).

## APPENDIX D

13. To test whether an abnormal return value of -1.1% falls within a statistically defined confidence interval, or whether it is statistically unusual, I need a measure of the statistical variation of the abnormal return. The test for whether randomness alone can account for an abnormal return of -1.1%, or whether some other factor not currently controlled for in the regression likely contributed to such a return, is often based on what is known as the “t-statistic.” The t-statistic is the value of the abnormal return divided by its standard deviation and represents the number of standard deviations between the actual return and the predicted return. Under fairly general conditions, one would expect that 95% of the time, a value drawn at random would fall within +/-1.96 standard deviations of its expected value, or that 95% of the time, the value would be less than +1.6649 standard deviations of its expected value.<sup>6</sup> Values further away become statistically unlikely if the underlying model of the data remains valid. Returning to the coin-flipping example, it’s similar to saying that an outcome of 65 Heads is unlikely *if Company X is continuing to flip a fair coin*. Instead, it becomes more likely that some other factor, outside the model is, is driving the abnormal return that day (e.g., Company X has purchased a new coin that is not a fair coin).
14. In this example of the XRP return on May 17, 2018, an abnormal return of -1.1% is within the range of “typical” values; its t-statistic is just -0.13. In other words, there is no statistical evidence to suggest that anything beyond the usual random variation is affecting XRP returns on May 17, 2018.
15. The regression methodology I apply in this matter thus provides a scientific basis to test whether the actual XRP returns will fall within a reasonable distance of the predicted return unless there is some non-random explanation. Such a non-random explanation could be the influence of company-specific news revealed to the market on the event day.

## B. IDENTIFYING THE DATE OF THE NEWS

16. The universe of documents comprised of Ripple Press Releases, Insight Articles, and Newsroom Articles identifies a set of events. To incorporate an event into my event study, it is necessary to assign a Coordinated Universal Time (“UTC”) date to that event since my data on digital token prices are measured in UTC-defined days.
17. For example, for a Ripple press release dated January 1 PT, it is possible that its UTC date is January 2. To account for time zone differences, I may review the published time indicated in the html code of the web page presenting the document if my statistical conclusions would be sensitive to such a difference.
18. It is also possible that a party other than Ripple, or a party other than the source Ripple linked to in its Newsroom, reported the news of the event earlier than my source would indicate. In some cases I conduct a broader search including Factiva, LexisNexis, and internet searches to determine if the event was reported earlier through some other news channel. I also consider the time stamps on related Tweets issued by the official Ripple account. I date an event by the earliest day I am aware of that the information was released to the market.

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<sup>6</sup> This is the case when data are distributed according the Gaussian or “Normal” distribution. The cutoff point of 1.96 is known as the “critical value” for a “two-sided” test. The critical value of the t-test may be adjusted from 1.96 if there is reason to believe the abnormal returns are not Normally distributed, or if a different level of significance is sought, or if a one-sided test is appropriate. The critical value of 1.6449 corresponds to the 5% one-sided test.

**Significance of Correlation Between XRP Price Increases and Announcements:  
Milestone Events**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.01***	5.70*
2	0.01***	0.04***	0.82***	4.52**
3	0.02***	0.06***	0.01***	0.05***
4	0.19***	0.42***	0.07***	0.04***
5	0.02***	0.06***	0.01***	0.16***
6	0.26***	0.74***	0.12***	0.08***
7	0.01***	0.05***	0.00***	0.00***
8	0.21***	0.77***	0.10***	0.06***
9	0.02***	0.00***	0.01***	0.69***
10	0.23***	0.06***	0.05***	0.51***
11	0.00***	0.00***	0.00***	0.60***
12	0.22***	0.55***	0.82***	0.64***
13	0.02***	0.05***	0.01***	0.07***
14	0.24***	0.60***	0.08***	0.06***
15	0.02***	0.06***	0.01***	0.19***
16	0.38***	0.91***	2.57**	2.57**
17	0.02***	0.05***	0.00***	0.00***
18	0.32***	1.00**	0.12***	2.57**
19	0.02***	0.00***	0.00***	0.00***
20	0.02***	0.07***	0.08***	0.07***

## Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
Milestone Events Excluding Escrow Events**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.07***	0.14***	0.46***	3.26**
2	0.05***	0.11***	0.32***	2.57**
3	1.12**	1.96**	0.55***	0.27***
4	0.78***	1.40**	0.36***	0.23***
5	1.99**	3.13**	1.21**	0.89***
6	1.26**	2.55**	0.74***	0.57***
7	1.48**	3.09**	0.83***	0.66***
8	1.10**	2.62**	0.64***	0.47***
9	1.14**	0.20***	0.46***	3.71**
10	0.89***	0.16***	0.30***	3.04**
11	0.08***	0.16***	0.40***	0.23***
12	0.05***	0.14***	0.32***	0.25***
13	1.06**	1.84**	0.49***	0.35***
14	0.92***	1.81**	0.40***	0.31***
15	1.90**	3.13**	1.11**	1.01**
16	1.62**	2.93**	0.83***	0.83***
17	1.68**	2.89**	0.74***	0.85***
18	1.45**	3.13**	0.76***	0.83***
19	1.06**	0.18***	0.41***	0.33***
20	0.07***	0.20***	0.39***	0.36***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
New Trading Platform Listings**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.13***	0.26***	0.32***	0.17***
2	0.60***	1.32**	0.16***	0.09***
3	0.14***	0.40***	0.47***	0.19***
4	0.58***	1.39**	0.21***	0.14***
5	0.14***	0.38***	3.35**	2.30**
6	0.51***	1.70**	1.82**	1.31**
7	0.67***	0.37***	2.02**	1.58**
8	0.40***	1.79**	1.47**	0.97***
9	1.00**	0.40***	0.30***	0.18***
10	0.65***	1.83**	0.14***	0.11***
11	0.15***	0.34***	0.28***	0.18***
12	0.09***	0.26***	0.01***	0.01***
13	0.13***	0.35***	0.39***	0.32***
14	0.09***	0.31***	0.02***	0.02***
15	1.00**	0.38***	3.00**	2.68**
16	0.09***	0.33***	0.23***	0.23***
17	0.84***	2.10**	0.20***	0.26***
18	0.07***	0.38***	0.02***	0.02***
19	0.12***	0.33***	0.30***	0.22***
20	0.12***	0.37***	0.02***	0.02***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
New Trading Platform Listings Indicating Ripple Action**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.07***	0.12***	0.39***	0.24***
2	0.65***	1.21**	0.23***	0.15***
3	0.07***	0.18***	0.54***	0.27***
4	0.63***	1.27**	0.29***	0.20***
5	0.07***	0.17***	5.71*	4.39**
6	0.57***	1.49**	3.75**	2.98**
7	0.71***	0.17***	4.02**	3.39**
8	0.48***	1.55**	3.22**	2.43**
9	0.97***	0.18***	0.38***	0.26***
10	0.69***	1.58**	0.21***	0.17***
11	0.07***	0.15***	0.36***	0.25***
12	0.05***	0.12***	0.01***	0.01***
13	0.07***	0.16***	0.46***	0.39***
14	0.05***	0.14***	0.02***	0.01***
15	0.97***	0.17***	5.29*	4.88**
16	0.05***	0.15***	0.31***	0.31***
17	0.84***	1.77**	0.28***	0.33***
18	0.04***	0.17***	0.01***	0.01***
19	0.06***	0.15***	0.38***	0.30***
20	0.06***	0.17***	0.02***	0.01***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
Customers & Product Developments (Select)**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	1.77**	1.19**	8.26*	3.04**
2	0.31***	0.35***	5.14*	0.61***
3	2.52**	0.17***	3.14**	9.64*
4	3.13**	1.28**	0.57***	3.61**
5	0.50***	0.85***	0.24***	0.05***
6	0.07***	0.11***	0.01***	0.01***
7	0.15***	0.28***	0.25***	0.34***
8	0.06***	0.48***	0.02***	0.10***
9	1.28**	0.09***	2.05**	2.02**
10	1.59**	0.17***	0.41***	1.45**
11	0.83***	0.71***	7.27*	1.45**
12	0.15***	0.07***	2.20**	1.38**
13	2.20**	1.98**	2.60**	2.61**
14	3.94**	0.96***	0.76***	5.14*
15	0.40***	0.35***	0.17***	0.07***
16	0.20***	0.09***	0.01***	0.03***
17	1.96**	0.23***	0.21***	0.06***
18	0.48***	0.37***	0.05***	0.04***
19	2.12**	0.99***	1.89**	6.81*
20	0.83***	0.61***	0.63***	3.20**

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
Customer & Product Developments (All)**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	3.43**	2.56**	12.39	4.88**
2	0.70***	0.34***	7.97*	1.11**
3	4.75**	0.49***	5.41*	13.84
4	5.60*	2.74**	1.13**	5.73*
5	1.09**	1.90**	0.51***	0.12***
6	0.17***	0.30***	0.02***	0.02***
7	0.34***	0.71***	0.51***	0.65***
8	0.14***	0.42***	0.06***	0.20***
9	2.64**	0.29***	3.64**	3.44**
10	3.09**	0.49***	0.84***	2.53**
11	1.77**	1.66**	11.02	2.53**
12	0.37***	0.21***	3.74**	2.41**
13	4.19**	4.09**	4.55**	4.39**
14	6.92*	2.17**	1.50**	7.97*
15	0.89***	0.86***	0.37***	0.16***
16	0.47***	0.25***	0.03***	0.08***
17	3.61**	0.58***	0.44***	0.13***
18	1.00**	0.35***	0.12***	0.10***
19	4.05**	2.25**	3.37**	10.36
20	1.77**	1.50**	1.25**	5.31*

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	1.68**	2.74**	0.60***	0.43***
2	8.45*	12.84	4.20**	3.37**
3	1.91**	3.41**	1.02**	0.43***
4	9.46*	13.82	6.06*	4.09**
5	2.07**	3.47**	1.10**	0.66***
6	8.59*	14.99	5.81*	4.20**
7	1.34**	3.36**	6.44*	5.21*
8	8.17*	15.83	32.34	27.79
9	1.83**	3.52**	0.70***	5.57*
10	10.05	15.83	31.65	29.92
11	1.87**	3.41**	0.56***	0.43***
12	1.31**	2.69**	4.42**	4.64**
13	1.87**	3.09**	0.91***	0.60***
14	1.57**	3.04**	0.75***	0.53***
15	1.91**	3.41**	0.96***	0.72***
16	10.80	17.39	6.06*	5.69*
17	1.57**	3.09**	6.06*	6.44*
18	10.05	18.27	35.01	34.68
19	1.72**	3.14**	0.70***	0.54***
20	1.75**	3.41**	0.66***	0.56***

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
Other Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	70.83	77.24	58.49	100.00
2	67.16	75.26	54.40	100.00
3	71.90	78.58	100.00	100.00
4	68.58	75.08	59.39	100.00
5	100.00	100.00	100.00	100.00
6	100.00	100.00	100.00	100.00
7	100.00	100.00	100.00	100.00
8	100.00	100.00	100.00	100.00
9	72.93	79.69	100.00	100.00
10	70.17	78.58	100.00	100.00
11	71.90	79.22	57.27	100.00
12	30.53	77.75	54.40	100.00
13	71.69	43.32	100.00	100.00
14	32.88	43.56	100.00	100.00
15	100.00	100.00	100.00	100.00
16	100.00	100.00	100.00	100.00
17	100.00	100.00	100.00	100.00
18	100.00	67.94	100.00	100.00
19	100.00	79.22	100.00	100.00
20	100.00	19.23	100.00	100.00

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
New Office & Staff**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	22.32	55.90	53.58	42.25
2	64.76	76.14	79.80	72.28
3	71.89	80.49	87.07	78.35
4	90.25	93.74	83.82	100.00
5	58.86	68.44	80.22	73.47
6	79.96	88.40	100.00	100.00
7	51.48	67.86	39.09	69.51
8	79.44	89.43	70.64	100.00
9	73.55	82.68	56.77	80.88
10	91.54	95.52	82.89	100.00
11	24.03	59.98	51.93	45.43
12	39.25	55.90	79.52	77.44
13	71.61	80.49	86.32	81.15
14	69.55	80.28	85.33	79.80
15	57.12	69.05	79.20	38.68
16	83.51	90.76	100.00	71.39
17	54.18	66.70	38.25	37.37
18	82.86	91.70	73.82	72.81
19	71.89	82.11	55.59	81.41
20	72.17	83.79	54.79	82.41

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
Acquisitions & Investments, Customer & Product Developments,  
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.00***
2	0.00***	0.00***	0.00***	0.00***
3	0.00***	0.00***	0.00***	0.00***
4	0.01***	0.00***	0.00***	0.00***
5	0.00***	0.00***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.00***
8	0.00***	0.00***	0.00***	0.00***
9	0.00***	0.00***	0.00***	0.00***
10	0.00***	0.00***	0.00***	0.00***
11	0.00***	0.00***	0.00***	0.00***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.00***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

## Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Decreases and Announcements:  
Acquisitions & Investments, Customer & Product Developments,  
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	56.73	58.84	42.28	15.37
2	25.74	44.21	33.66	19.76
3	67.77	52.71	66.48	28.49
4	50.55	74.10	54.46	36.66
5	44.85	36.62	51.64	9.99*
6	30.48	47.50	24.83	23.91
7	71.18	73.54	56.77	61.68
8	70.09	90.93	39.48	78.41
9	32.37	90.39	58.83	79.61
10	67.14	93.67	73.01	88.64
11	39.81	65.32	38.68	17.50
12	21.18	32.73	11.97	23.36
13	42.06	49.34	59.03	29.15
14	33.86	73.23	49.36	40.84
15	34.23	20.88	42.01	56.11
16	43.36	47.58	13.93	25.46
17	75.90	74.16	94.10	67.75
18	95.63	85.96	76.31	73.56
19	24.54	78.79	79.33	50.61
20	67.77	92.82	89.17	66.49

## Notes:

Tables report p-values of the hypothesis that significant XRP price decreases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements  
Measured 3 Days Early:  
Acquisitions & Investments, Customer & Product Developments,  
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	70.51	77.44	54.48	38.30
2	39.21	61.43	45.26	34.43
3	86.47	94.30	72.75	58.53
4	58.52	70.66	61.80	68.60
5	58.31	58.31	40.38	26.78
6	58.31	58.31	40.38	19.92
7	58.31	63.38	46.77	26.78
8	58.31	38.09	46.77	26.78
9	78.98	90.13	76.59	58.53
10	60.66	82.41	70.57	53.77
11	68.52	82.19	63.92	55.79
12	58.03	63.06	45.26	42.78
13	82.61	93.72	82.21	77.60
14	74.25	92.02	59.42	58.53
15	58.59	43.49	40.62	33.89
16	58.59	63.66	40.62	33.89
17	58.59	68.25	53.04	33.89
18	58.59	72.38	47.03	40.62
19	86.47	85.26	83.72	75.09
20	83.98	84.97	72.75	66.26

## Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements  
(90 Day Estimation Window):  
Acquisitions & Investments, Customer & Product Developments,  
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.00***
2	0.00***	0.00***	0.00***	0.00***
3	0.00***	0.00***	0.00***	0.00***
4	0.00***	0.00***	0.00***	0.00***
5	0.00***	0.01***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.03***
8	0.00***	0.00***	0.00***	0.00***
9	0.00***	0.00***	0.00***	0.01***
10	0.00***	0.00***	0.00***	0.01***
11	0.00***	0.00***	0.00***	0.00***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.01***	0.01***	0.01***	0.01***
16	0.01***	0.02***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.00***	0.01***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

## Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements  
(360 Day Estimation Window):  
Acquisitions & Investments, Customer & Product Developments,  
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.00***
2	0.00***	0.00***	0.01***	0.01***
3	0.00***	0.00***	0.00***	0.00***
4	0.00***	0.00***	0.00***	0.01***
5	0.00***	0.00***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.02***
7	0.00***	0.00***	0.00***	0.01***
8	0.01***	0.00***	0.00***	0.02***
9	0.00***	0.00***	0.00***	0.00***
10	0.00***	0.00***	0.00***	0.00***
11	0.00***	0.00***	0.00***	0.00***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.01***	0.00***
18	0.00***	0.00***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

## Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements  
(1 Day Event Window):  
Acquisitions & Investments, Customer & Product Developments,  
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.02***
2	0.00***	0.00***	0.01***	0.01***
3	0.00***	0.00***	0.00***	0.00***
4	0.00***	0.01***	0.00***	0.00***
5	0.00***	0.01***	0.00***	0.00***
6	0.00***	0.01***	0.00***	0.00***
7	0.00***	0.01***	0.01***	0.01***
8	0.00***	0.01***	0.00***	0.00***
9	0.01***	0.00***	0.00***	0.01***
10	0.01***	0.02***	0.01***	0.03***
11	0.00***	0.00***	0.00***	0.01***
12	0.00***	0.00***	0.01***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.01***	0.01***	0.00***
18	0.00***	0.00***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.01***

## Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements  
(7 Day Event Window):  
Acquisitions & Investments, Customer & Product Developments,  
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.04***	0.01***	0.10***	0.18***
2	0.01***	0.00***	0.13***	0.01***
3	0.00***	0.00***	0.00***	0.03***
4	0.04***	0.00***	0.01***	0.01***
5	0.00***	0.01***	0.00***	0.00***
6	0.00***	0.01***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.00***
8	0.00***	0.02***	0.00***	0.01***
9	0.02***	0.00***	0.01***	0.05***
10	0.09***	0.01***	0.04***	0.05***
11	0.01***	0.01***	0.08***	0.04***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.01***
14	0.00***	0.00***	0.00***	0.00***
15	0.01***	0.02***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.01***	0.00***	0.00***
19	0.02***	0.03***	0.02***	0.00***
20	0.01***	0.00***	0.00***	0.00***

## Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and  
Random Exclusion of Events From:  
Acquisitions & Investments, Customer & Product Developments,  
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.00***	0.01***
2	0.00***	0.00***	0.01***	0.00***
3	0.00***	0.00***	0.00***	0.00***
4	0.01***	0.00***	0.00***	0.00***
5	0.00***	0.00***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.00***
8	0.00***	0.01***	0.00***	0.00***
9	0.00***	0.00***	0.00***	0.00***
10	0.00***	0.00***	0.00***	0.01***
11	0.00***	0.00***	0.00***	0.00***
12	0.00***	0.00***	0.00***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.00***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

## Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and  
Random Inclusion of Events To:  
Acquisitions & Investments, Customer & Product Developments,  
Milestone Events, Trading Platform Listings, and Ripple Commercialization Initiatives**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	0.00***	0.00***	0.02***	0.04***
2	0.00***	0.00***	0.04***	0.01***
3	0.00***	0.00***	0.00***	0.01***
4	0.03***	0.01***	0.00***	0.01***
5	0.00***	0.00***	0.00***	0.00***
6	0.00***	0.00***	0.00***	0.00***
7	0.00***	0.00***	0.00***	0.00***
8	0.00***	0.02***	0.00***	0.00***
9	0.01***	0.00***	0.00***	0.01***
10	0.03***	0.01***	0.01***	0.02***
11	0.00***	0.00***	0.01***	0.01***
12	0.00***	0.00***	0.01***	0.00***
13	0.00***	0.00***	0.00***	0.00***
14	0.00***	0.00***	0.00***	0.00***
15	0.00***	0.00***	0.00***	0.00***
16	0.00***	0.00***	0.00***	0.00***
17	0.00***	0.00***	0.00***	0.00***
18	0.00***	0.02***	0.00***	0.00***
19	0.00***	0.00***	0.00***	0.00***
20	0.00***	0.00***	0.00***	0.00***

## Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Correlation Between XRP Price Increases and Announcements:  
Acquisitions & Investments**

Model Number	One-Sided 5%		Two-Sided 5%	
	Parametric	Nonparametric	Parametric	Nonparametric
1	100.00	15.66	100.00	100.00
2	11.70	3.17**	32.32	27.80
3	50.44	20.22	41.18	26.45
4	50.44	3.91**	40.62	31.05
5	52.31	58.78	100.00	34.79
6	48.00	59.58	100.00	33.57
7	100.00	59.18	100.00	100.00
8	100.00	60.76	100.00	100.00
9	54.12	61.90	100.00	35.40
10	52.77	61.14	100.00	36.00
11	100.00	19.56	100.00	100.00
12	12.28	4.14**	32.32	32.32
13	48.99	18.57	100.00	32.95
14	13.79	5.00**	41.73	34.79
15	47.50	59.18	100.00	36.00
16	49.48	61.90	38.92	36.59
17	52.31	59.98	100.00	100.00
18	52.31	63.02	100.00	100.00
19	51.38	57.55	100.00	33.57
20	51.85	5.52*	40.62	36.59

Notes:

Tables report p-values of the hypothesis that significant XRP price increases are independent of the indicated announcements

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

**Significance of Generalized Rank Test  
Applied to Milestones, Trading Platform  
Listings, Customer & Product  
Announcements, Acquisitions & Investments,  
and Ripple Commercialization Initiatives**

Model Number	Minimum T-Statistic	Maximum T-Statistic
1	3.06***	3.25***
2	2.48**	2.82***
3	4.04***	4.24***
4	3.47***	3.89***
5	3.74***	3.99***
6	3.17***	3.28***
7	3.28***	3.81***
8	2.75***	3.48***
9	3.83***	4.35***
10	3.33***	4.12***
11	3.08***	3.30***
12	2.41**	2.76***
13	4.15***	4.43***
14	3.45***	3.85***
15	3.80***	3.90***
16	3.01***	3.43***
17	3.33***	3.97***
18	2.87***	4.03***
19	3.74***	4.44***
20	3.01***	4.02***

Notes:

\* Indicates significance at the 10% level

\*\* Indicates significance at the 5% level

\*\*\* Indicates significance at the 1% level

## INFORMATIONAL EFFICIENCY OF XRP PRICES

1. In this Appendix I provide additional discussion on the informational efficiency of XRP prices during the period from February 1, 2014 to December 31, 2020. In the literature of economics and finance, in an informationally efficient market, prices “fully incorporate the expectations and information of all market participants.”<sup>1</sup> There are three forms of efficiency:<sup>2</sup>
  - a. Weak Form Efficiency: Prices reflect past prices;
  - b. Semi-Strong Form Efficiency: Prices reflect all public information; and
  - c. Strong Form Efficiency: Prices reflect all private information.
2. This taxonomy represents an order. Since “all private information” includes “all public information” which includes “past prices,” if a market is not weak-form efficient, then it cannot be semi-strong and hence cannot be strong.
3. A key implication of weak form efficiency is that returns must be unpredictable based on past returns alone, meaning that intertemporal correlation of an asset’s returns—called “autocorrelation”—must be zero.<sup>3</sup> Finding a counter example, that is, establishing that an asset’s return at  $t$  is correlated with its returns at  $t - s$ , effectively establishes that the market for that asset is not weak form efficient, which establishes that it is not semi-strong or strong.
4. As discussed in my report, academic researchers have found that the digital token markets, including the XRP market, are generally less informationally efficient than the stock market, though there is evidence that efficiency is increasing over time.<sup>4</sup>

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<sup>1</sup> See, e.g., John Y. Campbell, Andrew W. Lo, and A. Craig MacKinlay, “*The Econometrics of Financial Markets*,” 2<sup>nd</sup> Edition, p. 20 (“In an informationally efficient market...price changes must be unforecastable if they are properly anticipated, i.e., if they fully incorporate the expectations and information of all market participants.”).

<sup>2</sup> See, e.g., John Y. Campbell, Andrew W. Lo, and A. Craig MacKinlay, “*The Econometrics of Financial Markets*,” 2<sup>nd</sup> Edition, p. 22 (“The classic taxonomy of information sets, due to Roberts (1967), distinguishes among Weak-form Efficiency: The information set includes only the history of prices or returns themselves. Semistrong-Form Efficiency: The information set includes all information known to all market participants (*publicly available* information). Strong-Form Efficiency: The information set includes all information known to any market participant (*private* information).”).

<sup>3</sup> See, e.g., Zvi Bodie, Alex Kane, and Alan J. Marcus, “*Investments*,” 9<sup>th</sup> Edition, 2010, p. 358 (“Weak-Form Tests: Patterns in Stock Returns ... Early tests of efficient markets were tests of the weak form. Could speculators find trends in past prices that would enable them to earn abnormal profits? ... One way of discerning trends in stock prices is by measuring the *serial correlation* of stock market returns. Serial correlation refers to the tendency for stock returns to be related to past returns. Positive serial correlation means that positive returns tend to follow positive returns (a momentum type of property). Negative serial correlation means that positive returns tend to be followed by negative returns (a reversal or ‘correction’ property).”).

<sup>4</sup> See, e.g. Andrew Urquhart, “The Inefficiency of Bitcoin,” *Economics Letters* Vol. 148, 2016, p. 5 (“...we do show that Bitcoin may becoming more efficient with some of the tests for market efficiency suggesting that Bitcoin returns are random in the second subsample. ... Since it is a relatively new investment asset and still in its infancy, it is similar to an emerging market and therefore the inefficiency finding is not surprising.”).

**APPENDIX F**

5. I examined the autocorrelation of XRP returns and my findings are consistent with this literature. Figure 1 below plots the autocorrelation of XRP returns from February 1, 2014 to December 31, 2020. Specifically, I examine the correlation between XRP's daily returns and its previous day's returns over a 180-day rolling window, a measure of "first-order autocorrelation."
6. Figure 1 shows that XRP returns exhibit both positive and negative autocorrelation between February 1, 2014 and December 31, 2020 (the blue line). Days where the autocorrelation is statistically significantly different from 0 are identified by orange dots. For both positive and negative autocorrelation, there are periods where such autocorrelation is statistically significant. During these periods, I can reject the hypothesis that XRP prices are even weak form efficient.

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Consistent with this argument is that Bitcoin will become more efficient over time as more investors analyse and trade Bitcoin."); Aurelio F. Bariviera, "The Inefficiency of Bitcoin Revisited: A Dynamic Approach," *Economics Letters* Vol. 161, 2017, Abstract ("...daily returns exhibit persistent behavior in the first half of the period under study, whereas its behavior is more informational efficient since 2014."); Aviral Kumar Tiwari, R.K. Jana, Debojyoti Das, and David Roubaud, "Informational Efficiency of Bitcoin—An Extension," *Economics Letters* Vol. 163, 2018, Abstract ("We report that the market is informational efficient as consistent to recent findings of Urquhart (2016), Nadarajah and Chu (2017) and Bariviera (2017).") and pp. 6-7 ("We observe that the market is largely efficient with some exception to the period of April-August, 2013 and August-November, 2016."); and Ahmet Sensoy, "The Inefficiency of Bitcoin Revisited: A High-Frequency Analysis with Alternative Currencies," *Finance Research Letters* Vol. 28, 2019, Abstract ("We find that BTCUSD and BTCEUR markets have become more informationally efficient at the intraday level since the beginning of 2016, and BTCUSD market is slightly more efficient than BTCEUR market in the sample period.").

## APPENDIX F

**FIGURE 1: AUTOCORRELATION OF XRP RETURNS BETWEEN FEBURARY 1, 2014 AND DECEMBER 31, 2020**



7. Not finding significant first-order autocorrelation, as holds during some periods, is not sufficient to establish that this market is semi-strong or strong form efficient. However, I note that my statistical conclusions hold even at a one-day test window, as shown in Appendix E. Even if one were to believe that this market is informationally efficient in the semi-strong sense and hence believe that prices should fully reflect all public information “quickly,” the hypothesis that the XRP market is independent of news of actions of Ripple Labs can be rejected at any reasonable significance level.

# **Exhibit 5**

UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF NEW YORK

SECURITIES AND EXCHANGE  
COMMISSION,

**Plaintiff**

v

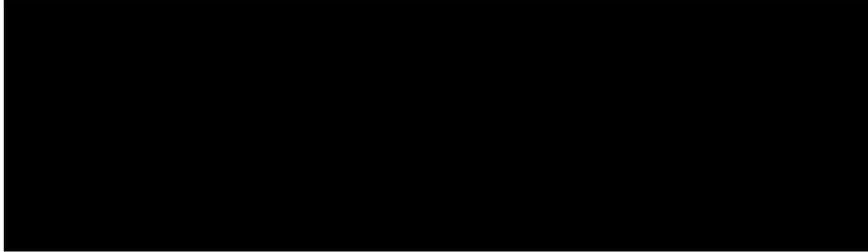
**20 Civ. 10832**

RIPPLE LABS, INC., BRADLEY  
GARLINGHOUSE, AND  
CHRISTIAN A. LARSEN,

**Defendants**

EXPERT REBUTTAL REPORT OF

 **Ph.D.**

  
**NOVEMBER 12, 2021**

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CONTENTS

I. Assignment .....	1
II. Summary of Opinions .....	1
III. Review of Dr. Ferrell’s Analysis .....	4
IV. Dr. Ferrell’s Analysis Cannot and Does Not Answer the Question of Whether XRP Prices React to News about Ripple’s Actions .....	6
V. Dr. Ferrell’s Analysis Is Poorly Specified and Irrelevant from an Economic Perspective .....	7
A. Dr. Ferrell’s Analysis Implausibly Suggests That the Actions of Major Corporations Have No Effect on the Prices of Their Stocks.....	8
B. Dr. Ferrell’s Model Effectively Explains Just Three Monthly Returns in Six Years.....	10
C. Dr. Ferrell Does Not Discuss the Economically Significant Returns Not Explained by His Models	13
VI. Dr. Ferrell’s Analysis Is Not Robust.....	17
A. Dr. Ferrell Appears Not To Have Conducted Basic Due Diligence on His Data Sources .....	18
B. Dr. Ferrell’s Analysis Is Highly Dependent on the Day on Which He Begins His Analysis.....	24
C. Dr. Ferrell’s Analysis Ignores That Model Parameters Might Change over Time .....	27

## I. Assignment

1. I have been retained by the Securities and Exchange Commission (“SEC”) to provide expert opinions in the matter captioned above. I previously submitted an expert report on October 4, 2021 (“**Report**”), in which I performed an empirical analysis of XRP’s price movements and assessed whether news of actions by Ripple Labs, Inc. impacted XRP prices. I additionally assessed the extent to which XRP price movements were driven by price movement in Bitcoin and other digital tokens. My qualifications, publications, and prior testimonies are described in that report.
2. Allen Ferrell, Ph.D. submitted an expert report on behalf of Ripple Labs, Inc. on October 4, 2021 (the “Ferrell Report”). I have been asked to review and respond to certain opinions expressed in the Ferrell Report regarding variation in long-run XRP price returns and factors that could and could not explain that variation as identified by Dr. Ferrell.
3. My opinions are based on my knowledge and expertise gained during my professional career and my academic training and research. In forming my opinions in this matter, I have considered certain additional documents provided to me. Those documents and materials I relied upon for the **Report** were identified in Appendix B to that report. Any additional documents or materials relied upon for this report are listed in Appendix A attached to this report, which include documents cited by the Ferrell Report. In addition, I have prepared work papers that are available upon request.
4. The opinions stated in this report are based on the evidence that has been provided to me to date. My work in this matter is ongoing, and I reserve the right to modify or supplement my conclusions as additional information is made available to me, or as I perform further analysis. **Report** an hourly rate of \$600 for my time in this matter. Staff at The Brattle Group have assisted me by performing work at my direction. My opinions are my own, and neither The Brattle Group’s nor my compensation are dependent on my opinions or the outcome of this matter.

## II. Summary of Opinions

5. The Ferrell Report employs various statistical tests in an attempt to show that XRP returns can be explained by broader movements in the digital token market, and from the results of these statistical tests Dr. Ferrell concludes that XRP price returns (at least “long run returns”) “are associated with factors outside Ripple’s control.”<sup>1</sup> He further concludes that those returns “are unrelated to factors

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<sup>1</sup> Ferrell Report, ¶ 13.

over which Ripple may have control, including the various distributions of XRP.”<sup>2</sup> I have reviewed this portion of the Ferrell Report and have reached the following opinions:

- **The Ferrell Report’s tests are not well defined conceptually in that they do not test any meaningful hypotheses relevant to the matter at hand.**
  - Dr. Ferrell’s ultimate statistical finding that XRP price returns are “associated with factors outside of Ripple’s control” is not disputed; *all* security price returns are associated with factors outside the control of the issuing party.<sup>3</sup> My first report in this matter presents a discussion of such relationships.
  - If Dr. Ferrell means to suggest that because XRP price returns are associated with factors outside of Ripple’s control, they therefore cannot be associated with any factors inside Ripple’s control, that is false as a matter of logic.
- **The Ferrell Report’s analysis of whether Ripple’s XRP distributions impacted XRP price returns does not address whether any other actions by Ripple might have impacted XRP price returns. Dr. Ferrell makes no attempt to evaluate any other news or actions by Ripple.**
  - Dr. Ferrell’s statistical finding that XRP price returns are “unrelated” to XRP distributions, even if true, does not speak to whether XRP price returns are “related” to any other factors inside Ripple’s control.
  - Although Dr. Ferrell frames his conclusion as applying to Ripple-controlled factors “*including* the various distributions of XRP” (emphasis added), his analysis is *limited* to XRP distributions—and Dr. Ferrell makes no attempt to evaluate the impact of any other Ripple-controlled factors.
  - The Ferrell report does not include an “event study analysis,” which is the commonly accepted method to determine if news significantly impacts price returns.
- **The Ferrell Report’s finding that average (excess) XRP price returns are not statistically significant is unsurprising and is in fact consistent with modern asset pricing theory.**
  - Applying the Ferrell Report methodology to the well-known stocks comprising the Dow Jones Industrial Average indicates, in almost all cases, that the average (excess) returns of those stocks are also not statistically significant. It would be absurd to suggest that *therefore* the prices of the stocks in the Dow Jones Industrial Average are totally unaffected by the actions of their issuers (they plainly are), or that investors in those stocks do not rely on the actions of those issuers to make a profit (they plainly do).

<sup>2</sup> Ferrell Report, ¶ 13.

<sup>3</sup> I am not opining in this report on whether or not Ripple’s offers and sales of XRP were offers and sales of securities. Rather, I apply Dr. Ferrell’s test to securities in Section V to illustrate that the test cannot appropriately be used to draw the conclusion that Dr. Ferrell does here, i.e., that Ripple’s actions did not affect the price of XRP.

- In fact, almost all stocks comprising the Dow Jones Industrial Average would fail Dr. Ferrell’s statistical analyses, which indicates that Dr. Ferrell’s analytical framework is not suited for the matter at hand.
- **The Ferrell Report’s finding of a high adjusted  $R^2$  should not be interpreted as indicating that there is no scope for other factors not accounted for by Dr. Ferrell—including factors under the control of Ripple—to also significantly impact XRP price returns.**
  - The adjusted  $R^2$  in excess of 90% found in some of Dr. Ferrell’s models is attributable to three unusual monthly returns. This same model explains only a little over 30% of the variation of the other 67 monthly returns of XRP.
  - The magnitude of the monthly returns that remain unexplained by Dr. Ferrell’s models is economically large, often in excess of 100%.
- **The statistical analyses employed by Dr. Ferrell are not robust in many respects.**
  - Dr. Ferrell does not appear to have examined his pricing data for “outliers,” and his procedure of appending one pricing data source onto another leads to spurious and nonsensical estimates of price returns.
  - Dr. Ferrell does not appear to have considered that certain parameters of his models can and do change over time.
  - Dr. Ferrell’s methodology appears numerically unstable. His principal components are sensitive to outliers in his underlying data, outliers which in some cases appear to be spurious. This becomes apparent when I replicate his analysis starting on different days. As a result of these sensitivities, measures of model fit can range from 14% to 58%, and the explanatory power of the principal components can range from 40% to 100%, depending on the day on which the analysis begins.
- **Accepting all of Dr. Ferrell’s results as correct would not answer the question of whether news and actions of Ripple impacts XRP price returns or not.**
  - As I showed in my first report, XRP prices are affected by broad “cryptocurrency” factors, but they are also affected by certain news and actions of Ripple. There is no contradiction between those positions. Since Dr. Ferrell does not test whether XRP prices react to news and actions of Ripple beyond the XRP distributions he studies, his report cannot speak to these issues.
  - Dr. Ferrell does not cite to any scientific authority that endorses his approach that finding (i) statistically insignificant regression intercepts with (ii) some statistically significant market factors establishes that the asset’s price is therefore “unrelated to factors” over which the issuer “may have control.”

### III. Review of Dr. Ferrell’s Analysis

6. In the section of the Ferrell Report titled “Variation in Long-Run XRP Price Return is Explained by Factors Outside of Ripple’s Control,”<sup>4</sup> Dr. Ferrell uses a framework known as the “factor model” to argue that factors outside of Ripple’s control affect XRP long-run price returns. In this section I briefly summarize aspects of his methodology.
7. Dr. Ferrell explains that “factor models are used to determine the factors that explain the common component of the variation in asset price returns.”<sup>5</sup> In practice, different models utilize different types and numbers of factors. Commonly used factors in finance include market indices, such as indices for stocks, commodities, and currencies. Dr. Ferrell states that many factor models include market indices as factors, which Dr. Ferrell claims are unavailable for the digital token market.<sup>6</sup> Dr. Ferrell therefore chooses to employ a statistical technique known as “principal components analysis” (“PCA”) to construct factors from the returns of other, non-XRP digital tokens.
8. Dr. Ferrell examines 28-day XRP returns over two different periods: August 6, 2013 – December 15, 2020 (“Period 1”) and August 11, 2015 – December 20, 2020 (“Period 2”).<sup>7</sup> The principal components (“PCs”) in Period 1 are constructed from nine digital tokens that were traded during that period (though not all were traded continuously throughout that period), while the PCs in Period 2 are constructed from 91 digital tokens (again, not all of which were traded continuously through the period in question).<sup>8</sup>
9. Across different regression specifications, Dr. Ferrell is primarily interested in the following statistical results. First, he tests whether the constant in his regressions (also known as “alpha”) is significantly different from zero or not.<sup>9</sup> Second, he notes whether the coefficient on any of the PCs in his regressions (also known as “beta”) is significantly different from zero or not.<sup>10</sup>
10. In all of his models, Dr. Ferrell finds that alpha is statistically insignificant (meaning, Dr. Ferrell cannot reject the hypothesis that it is zero at the 5% significance level) and at least one “beta” is statistically

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<sup>4</sup> Ferrell Report, Section III.C.

<sup>5</sup> Ferrell Report, ¶ 91.

<sup>6</sup> Ferrell Report, ¶ 93.

<sup>7</sup> Ferrell Report, ¶¶ 95 and 97.

<sup>8</sup> Ferrell Report, ¶ 93.

<sup>9</sup> Ferrell Report, ¶ 96.

<sup>10</sup> Ferrell Report, ¶ 98.

significant (meaning, for at least one factor in his model Dr. Ferrell can reject the hypothesis that its coefficient is zero at the 5% significance level).<sup>11</sup>

11. By failing to find a statistically significant alpha, Dr. Ferrell concludes that there are “no remaining average ‘excess’ XRP price returns that are unexplained by the model.”<sup>12</sup> Dr. Ferrell interprets finding at least one statistically significant beta in his models as a demonstration of “the importance of the underlying cryptocurrencies in explaining variation in XRP price returns.”<sup>13</sup>
12. In those models which add certain XRP distributions, Dr. Ferrell finds that the regression coefficients on those distributions are not significant at the 5% level.<sup>14</sup> From this, Dr. Ferrell concludes that Ripple’s XRP distributions have no effect on XRP’s long-run price returns.<sup>15</sup>
13. From the basic results that (i) “alpha” is not significant, (ii) at least one “beta” is significant, and (iii) other conventional pricing factors are insignificant, Dr. Ferrell concludes that (i) “Variation in long-run XRP price return can be explained by exogenous cryptocurrency market factors that are outside Ripple’s control,” that (ii) “Non-cryptocurrency assets (e.g., equities) are not correlated with XRP price return, controlling for cryptocurrency market factors,” and that (iii) “On average, XRP price returns are not statistically different than zero, controlling for cryptocurrency market factors, over which Ripple has no control.”<sup>16</sup> This apparently leads him to conclude that “none of those [XRP] returns is owing to the efforts of Ripple.”<sup>17</sup>
14. As I describe in the following sections, Dr. Ferrell’s analysis simply cannot and does not address the question of whether XRP prices react to news about Ripple’s actions. His conclusion that XRP returns “owe nothing” to the actions of Ripple is therefore unsupported and unreliable. In addition, his analysis is poorly specified in many ways and his results are not robust.

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<sup>11</sup> In what follows I shall adopt the conventional shorthand that some parameter may be “statistically significant” or “statistically insignificant” to describe cases where the hypothesis can or cannot be rejected at the 5% significance level, respectively.

<sup>12</sup> Ferrell Report, ¶ 102.

<sup>13</sup> Ferrell Report, ¶ 99.

<sup>14</sup> Ferrell Report, ¶¶ 115-117 and Exhibits 11A, 11B, 12A, and 12B.

<sup>15</sup> Ferrell Report, ¶ 118.

<sup>16</sup> Ferrell Report, ¶ 90.

<sup>17</sup> Ferrell Report, ¶ 118.

## IV. Dr. Ferrell's Analysis Cannot and Does Not Answer the Question of Whether XRP Prices React to News about Ripple's Actions

15. In Dr. Ferrell's summary of conclusions, he writes that "XRP price returns are unrelated to factors over which Ripple may have control, including the various distributions of XRP extensively invoked in the SEC's complaint."<sup>18</sup> This assertion is unsupported by Dr. Ferrell's analysis. Even accepting all of his results as correct, Dr. Ferrell's analysis would only serve to establish that (i) there is a relationship between XRP returns and those of other digital tokens (which is not disputed and which I established in the █████ Report), (ii) there is no additional relationship between XRP returns and a select set of other pricing factors (which is not relevant),<sup>19</sup> and (iii) there is no additional relationship between monthly XRP returns and the value of monthly distributions (which does not speak to Ripple's other efforts to build its network of customers and the broader XRP ecosystem). Since the analysis does not test whether XRP returns are related to any other news or action of Ripple, it does not support any conclusions related thereto.
16. The █████ Report demonstrated that, contrary to Dr. Ferrell's claims, XRP's prices have reacted to efforts taken by Ripple to develop the XRP ecosystem. My analysis was based upon the well-accepted econometric framework referred to as an event study, which is a technique that has been widely used in the academic literature and in the context of securities financial litigation.<sup>20</sup>
17. Dr. Ferrell does not include an event study in his report. Instead, Dr. Ferrell simply finds that XRP's *monthly* price returns move with those of non-XRP cryptocurrencies, and not with Ripple Labs' distributions of XRP. From this monthly correlation he concludes that XRP's price returns are explained by factors outside of Ripple Labs' control, and "purchasers of XRP can have no reasonable expectation of profits from the efforts of Ripple."<sup>21</sup> This is a logical leap that simply cannot be supported by the analysis he performs, if for no other reason than he tests only one form of action or effort by Ripple, the distribution of XRP tokens.

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<sup>18</sup> Ferrell Report, ¶ 13.

<sup>19</sup> Whether or not XRP returns are correlated with the financial indices selected by Dr. Ferrell has no bearing on the separate issue of whether XRP prices react to news or actions by Ripple.

<sup>20</sup> See, e.g., A. Craig MacKinlay, "Event Studies in Economics and Finance," *Journal of Economic Literature* Vol. 35, 1997, pp. 13-39 at p. 13; John J. Binder, "The Event Study Methodology Since 1969," *Review of Quantitative Finance and Accounting* Vol. 11, 1998, pp. 111-137 at p. 111; and Frank Torchio, "Proper Event Study Analysis in Securities Litigation," *The Journal of Corporation Law*, Vol. 35, 2009, pp. 159-168, at p. 159.

<sup>21</sup> Ferrell Report, ¶ 15.

18. Moreover, as shown in Figure 1, Dr. Ferrell makes this unsupported statement in increasingly strong language as his report progresses. At the beginning of the report, in paragraph 13, he writes simply (and without dispute) that XRP returns are “associated” with price returns of non-XRP cryptocurrencies, but by paragraph 118 he states that “long-run price returns are owing to non-XRP cryptocurrency market factors; none of those returns is owing to the efforts of Ripple.”

FIGURE 1: SELECTED FERRELL REPORT QUOTES (EMPHASIS ADDED)

Quotes from the Ferrell Report	Paragraph
"My economic analysis demonstrates that XRP's long-run price returns are associated with factors outside Ripple's control, namely, price returns of non-XRP cryptocurrencies."	¶ 13
"Ripple's XRP distributions do not have a statistically significant relation with long-run XRP price return after controlling for returns of other non-XRP cryptocurrencies outside of Ripple's control."	¶ 82
"[M]y empirical analyses show that the variation in long-run price return of XRP can be explained by exogenous, non-XRP, cryptocurrency price returns or, put differently, by factors outside Ripple's control."	¶ 100
"These findings demonstrate that factors outside of Ripple's control... explain movements in long-run XRP price return. In other words, XRP's long-run price returns are owing to non-XRP cryptocurrency market factors; <b>none of those returns is owing to the efforts of Ripple.</b> "	¶ 118

## V. Dr. Ferrell's Analysis Is Poorly Specified and Irrelevant from an Economic Perspective

19. In this section, I will show that Dr. Ferrell's statistical argument is unfit to support his conclusions, as his analysis sheds no light on whether XRP prices are affected by Ripple's actions. First, he asserts that XRP price returns can be *explained* by cryptocurrency market factors outside Ripple's control, yet fails to examine or even mention the economically significant returns every month that are unexplained by his models. Second, he seems to rest his conclusion on finding significant “betas” and insignificant “alphas” in his various factor models, but that is generally what is expected with any financial asset, hence it is not clear whether any relevant conclusions can be drawn from such results. Finally, much of the variation in XRP's returns that he purports to explain is due to unusually large returns.

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## A. Dr. Ferrell’s Analysis Implausibly Suggests That the Actions of Major Corporations Have No Effect on the Prices of Their Stocks

20. Upon finding a statistically insignificant alpha and some significant betas in his factor models for XRP returns, Dr. Ferrell concludes that “variation in long-run price return of XRP can be explained by exogenous, non-XRP, cryptocurrency price returns or, put differently, by factors outside Ripple’s control” and ultimately asserts that those returns are unrelated to *any* actions of Ripple.<sup>22</sup> Yet these statistical results on alpha and beta seem perfectly consistent with asset pricing theory, not contrary to it.
21. The fallacy of Dr. Ferrell’s analysis can be demonstrated by applying that analysis to well-known stocks in the U.S. stock market. Dr. Ferrell’s logic implies that the prices of those stocks must be unrelated to the actions of their issuers, yet we know that is not true.
22. To illustrate, I apply Dr. Ferrell’s methodology to the current constituents of the Dow Jones Industrial Average (“DJIA”), an index of large blue chip stocks. That is, I construct 28-day returns for each stock in the DJIA and subtract the same risk-free rate that Dr. Ferrell uses. Then, for each constituent stock in sequence, I conduct a PCA across all other constituent stocks and regress the reference stock returns on some of the principal components.<sup>23</sup>
23. For each DJIA component stock, I note whether alpha is significant and whether any of the principal components enters the regression significantly (whether any of the betas is significant). If we find similar results here to what Dr. Ferrell found for XRP, should we then conclude that the actions of the company did not matter to the stock price?
24. As presented in Figure 2, I find that for 26 of 27 stocks in the DJIA, alpha is not statistically different from zero, while in all cases, at least some principal component enters the regression significantly. In other words, almost every member of the DJIA behaves exactly like XRP under Dr. Ferrell’s statistical framework. Such results seem perfectly consistent with asset pricing theory, yet Dr. Ferrell interprets them as evidence that XRP prices are not affected by Ripple Labs. I find this conclusion implausible.

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<sup>22</sup> Ferrell Report, ¶ 100.

<sup>23</sup> To determine the number of PCs to use, I consider the same BIC calculation Dr. Ferrell suggests but further add a requirement that the number of PCs considered must span at least 95% of the variance of the reference data set.

FIGURE 2: DR. FERRELL'S METHOD APPLIED TO DOW JONES INDUSTRIAL AVERAGE

Company Name	Betas Significant?	Alpha Insignificant?	Adjusted R <sup>2</sup>
	[A]	[B]	
JPMorgan Chase & Co	✓	✓	0.752
Goldman Sachs Group Inc	✓	✓	0.741
Travelers Companies Inc	✓	✓	0.593
Visa Inc	✓	✓	0.575
Johnson & Johnson	✓	✓	0.521
Boeing Co	✓	✓	0.518
American Express Co	✓	✓	0.494
Walt Disney Co	✓	✓	0.488
Coca-Cola Co	✓	✓	0.469
Home Depot Inc	✓	✓	0.465
Chevron Corp	✓	✓	0.462
3M Co	✓	✓	0.459
Microsoft Corp	✓	✓	0.455
IBM Corp	✓	✓	0.446
Cisco Systems Inc	✓	✓	0.417
Intel Corporation	✓	✓	0.380
Caterpillar Inc	✓	✓	0.365
Amgen Inc	✓	✓	0.357
Salesforce.com Inc	✓	✓	0.356
NIKE Inc	✓	✓	0.309
Verizon Communications Inc	✓	✓	0.302
Procter & Gamble Co	✓	✓	0.293
McDonald's Corp	✓	✓	0.266
Apple Inc	✓	✓	0.266
Merck & Co Inc	✓	✓	0.251
UnitedHealth Group Inc	✓		0.237
Walmart Inc	✓	✓	0.130

## Notes:

The significance of Beta is determined by an F-test. The insignificance of Alpha is determined by a T-test.

[A]: Checkmark indicates significant at the 5% level.

[B]: Checkmark indicates not significant at the 5% level.

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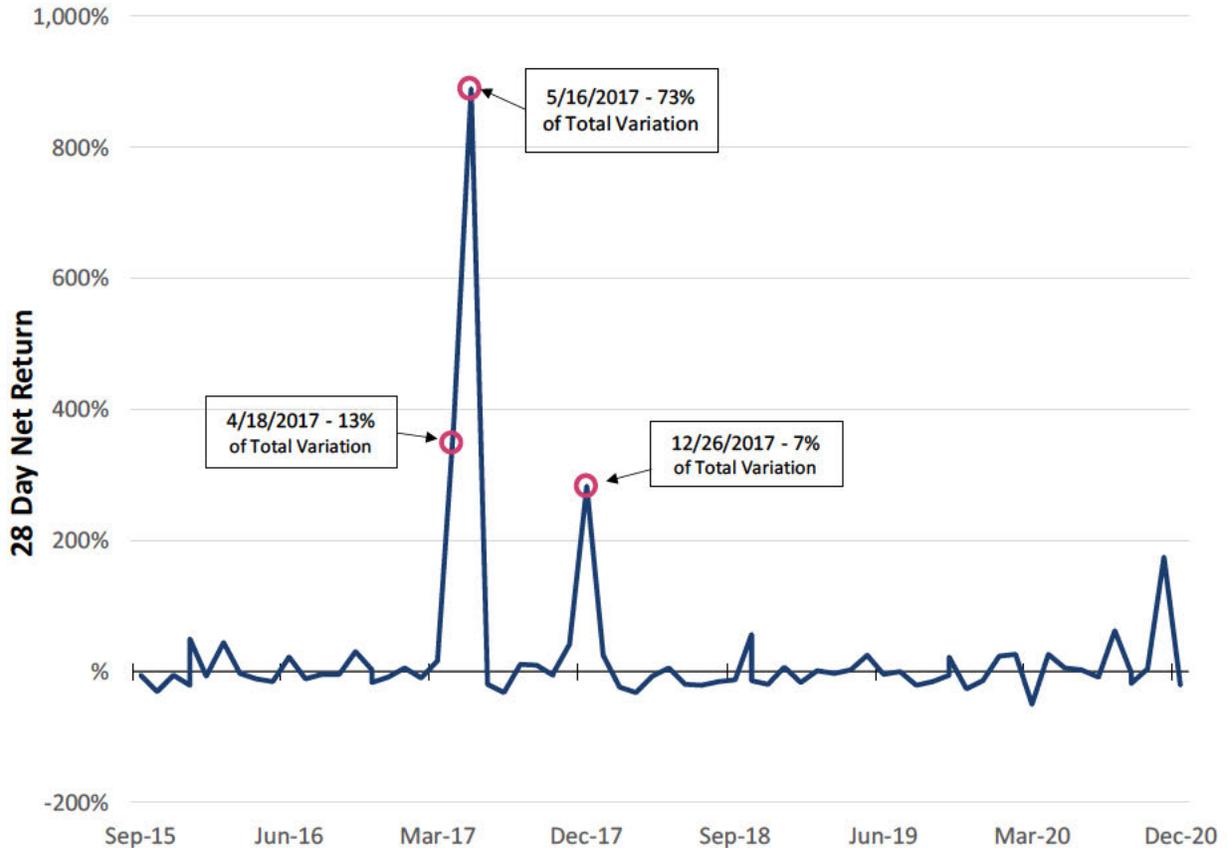
## B. Dr. Ferrell's Model Effectively Explains Just Three Monthly Returns in Six Years

25. In this subsection, I show that the variation explained by Dr. Ferrell's PCA model is concentrated on three months with extreme returns, while the model explains relatively little of the variation on XRP's prices outside of those three months.
26. From Exhibit 3 of Dr. Ferrell's report we see that the adjusted  $R^2$  of his regression (a common measure of model fit) for Estimation Period 2 is 0.923; the unadjusted  $R^2$ , not reported in that Exhibit, is 0.935.<sup>24</sup> This means that these eleven principal components can explain over 93% of the variation in monthly XRP returns from August 11, 2015, through December 20, 2020. Under a superficial review, that might seem to leave very little room for other drivers, such as news or actions by Ripple (though that ignores the extent of the unexplained returns themselves). However, upon closer inspection, this impressive fit is achieved only because of three exceptionally high returns out of 70 observations. Figure 3 plots these 70 observations of monthly XRP returns that are the basis of that analysis and highlights the three dominant returns.

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<sup>24</sup> Ferrell Report Backup Files.

FIGURE 3: MONTHLY XRP RETURNS IN ESTIMATION PERIOD 2



Source: Brattle Workpapers.

27. As depicted in Figure 3, XRP's net return for the 28-day period ending May 16, 2017 (the day Ripple Labs announced its intention to escrow 55 billion of its XRP tokens by the end of that year)<sup>25</sup> was 890.6%.<sup>26</sup> This single observation represents about 73% of the variation of the six years of data.<sup>27</sup> The previous return of the 28-day period ending April 18, 2017, is 381.0% and represents an additional 13% of the

<sup>25</sup> "Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply," Brad Garlinghouse, *Ripple Insights*, May 16, 2017, accessed November 11, 2021, <https://ripple.com/insights/ripple-to-place-55-billion-xrp-in-escrow-to-ensure-certainty-into-total-xrp-supply/>.

<sup>26</sup> XRP's closing price on May 16, 2017 was \$0.3250, while 28 days earlier on April 18, 2017, it was just \$0.03281, leading to a 28-day return (gross of the risk-free rate) of 890.6%:  $8.91 = 0.3250 / 0.03281 - 1$ . The closing price just one day earlier on May 15, 2017, was \$0.263. In other words, XRP's price increased \$0.062 (23.5%) in just one day from May 15 to 16, 2017. See Ferrell Report Backup Files.

<sup>27</sup> Regressing on the single observation on May 16, 2017 results in an unadjusted  $R^2$  of 0.73. See Brattle Workpapers.

total variation.<sup>28</sup> The return of December 26, 2017, is 282.7%, representing an additional 7.5% of the total variation.<sup>29</sup> Together, these three observations alone represent about 94% of the variation in XRP returns in Dr. Ferrell's data, as shown in Figure 4.

**FIGURE 4: JUST THREE MONTHS EXPLAIN 94% OF THE VARIATION IN XRP RETURNS IN DR. FERRELL'S ESTIMATION PERIOD 2**

		Coefficient [A]
Constant	[1]	0.02
05/16/2017	[2]	8.89***
04/18/2017	[3]	3.79***
12/26/2017	[4]	2.81***
Observations	[5]	70
Unadjusted R <sup>2</sup>	[6]	0.941
Adjusted R <sup>2</sup>	[7]	0.938

Notes:

\* Indicates significance at the 10% level.

\*\* Indicates significance at the 5% level.

\*\*\* Indicates significance at the 1% level.

28. How much of the variation of the other 67 (of 70) observations does Dr. Ferrell's model explain? To answer this question, I apply the following procedure:
- I replicate Dr. Ferrell's analysis for Estimation Period 2 (August 11, 2015 through December 20, 2020) as shown in Exhibit 3 of the Ferrell Report;
  - I apply his model to obtain the predicted XRP returns over this period of time; this is the "in-sample" fit of Dr. Ferrell's model;
  - I omit the three large returns mentioned above and regress the remaining 67 months of XRP returns on their fitted values to determine how much of the variation of those remaining observations is explained by Dr. Ferrell's model.

<sup>28</sup> Regressing on both the observations on May 16, 2017 and April 18, 2017 results in an unadjusted  $R^2$  of 0.866. The contribution of April 18, 2017 is found as  $0.134 = 0.866 - 0.732$ . See Brattle Workpapers.

<sup>29</sup> Regressing on the observations on May 16, 2017, April 18, 2017, and December 26, 2017 results in an unadjusted  $R^2$  of 0.941. The contribution of December 26, 2017 is found as  $0.075 = 0.941 - 0.866$ . See Brattle Workpapers.

29. The results are presented in Figure 5. The (unadjusted)  $R^2$  is 0.328, meaning that while Dr. Ferrell's model explains 93.5% of the variation of all 70 months, at best it only explains 32.8% of the variation of 67 of those 70 months.<sup>30</sup>

FIGURE 5: DR. FERRELL'S MODEL EXPLAINS NO MORE THAN 32.8% OF THE VARIATION FOR 67 OF 70 MONTHS IN ESTIMATION PERIOD 2

		Coefficient [A]
Constant	[1]	0.00
Fitted XRP Returns	[2]	0.48***
Observations	[3]	67
Unadjusted $R^2$	[4]	0.328
Adjusted $R^2$	[5]	0.318

Notes:

\* Indicates significance at the 10% level.

\*\* Indicates significance at the 5% level.

\*\*\* Indicates significance at the 1% level.

30. From Figure 5 we see that Dr. Ferrell's model is statistically unbiased—alpha is numerically close to zero and one cannot reject the hypothesis that it is zero at any reasonable significance level. However, his model over-predicts (both positively and negatively) actual returns by a factor of about two (the coefficient on the fitted values, its "beta," is 0.48 in Figure 5). In other words, if Dr. Ferrell's model predicts an XRP return of +10%, the best guess of what the *actual* XRP return is to cut that in half to about 4.8%.

## C. Dr. Ferrell Does Not Discuss the Economically Significant Returns Not Explained by His Models

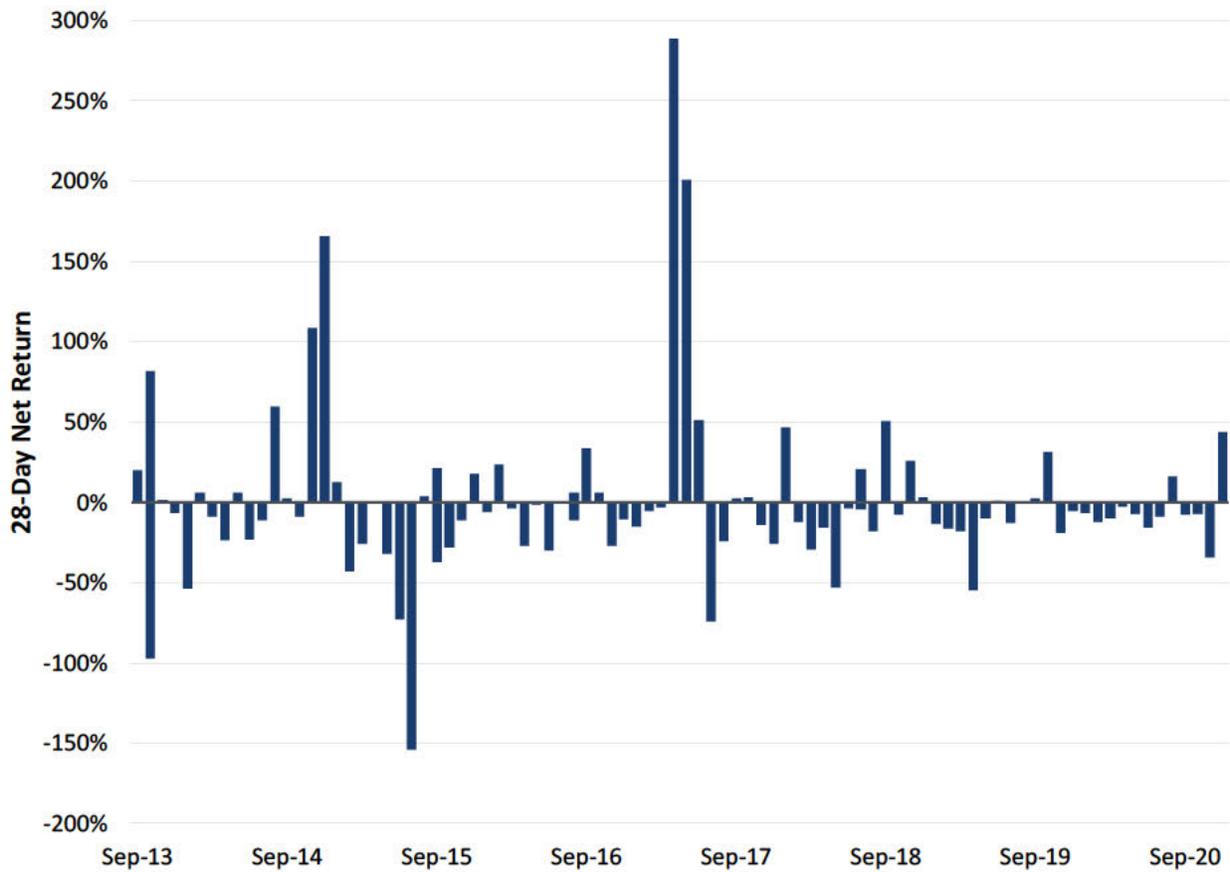
31. As noted above, Dr. Ferrell purports to find that "XRP price returns are unrelated to factors over which Ripple may have control." This sweeping conclusion is based exclusively on the overall *average* co-

<sup>30</sup> I say "at best" because this calculation of 32.8% is predicated on our being allowed to optimally adjust the predictions of his model to best match the data. In fact, if we take those model predictions as given without adjustment, the conventional  $R^2$  calculation is not well defined (it is actually negative) since the variance of the errors of Dr. Ferrell's model is actually greater than the variance of the data itself in these 67 months. Taking Dr. Ferrell's model predictions as given, the implied unadjusted  $R^2$  from his model over those 67 months is -0.0523. This negative  $R^2$  results because the variance of the *errors* from Dr. Ferrell's model is actually greater than the variance of the XRP return data itself.

movements between XRP and the cryptocurrency market that he finds by way of regression analysis. Setting aside the fact that just three extreme XRP returns give Dr. Ferrell’s model the appearance of a good fit, Dr. Ferrell does not perform any assessment of news or other company specific information that could be driving XRP prices on an intraday, daily, weekly, or even monthly basis.

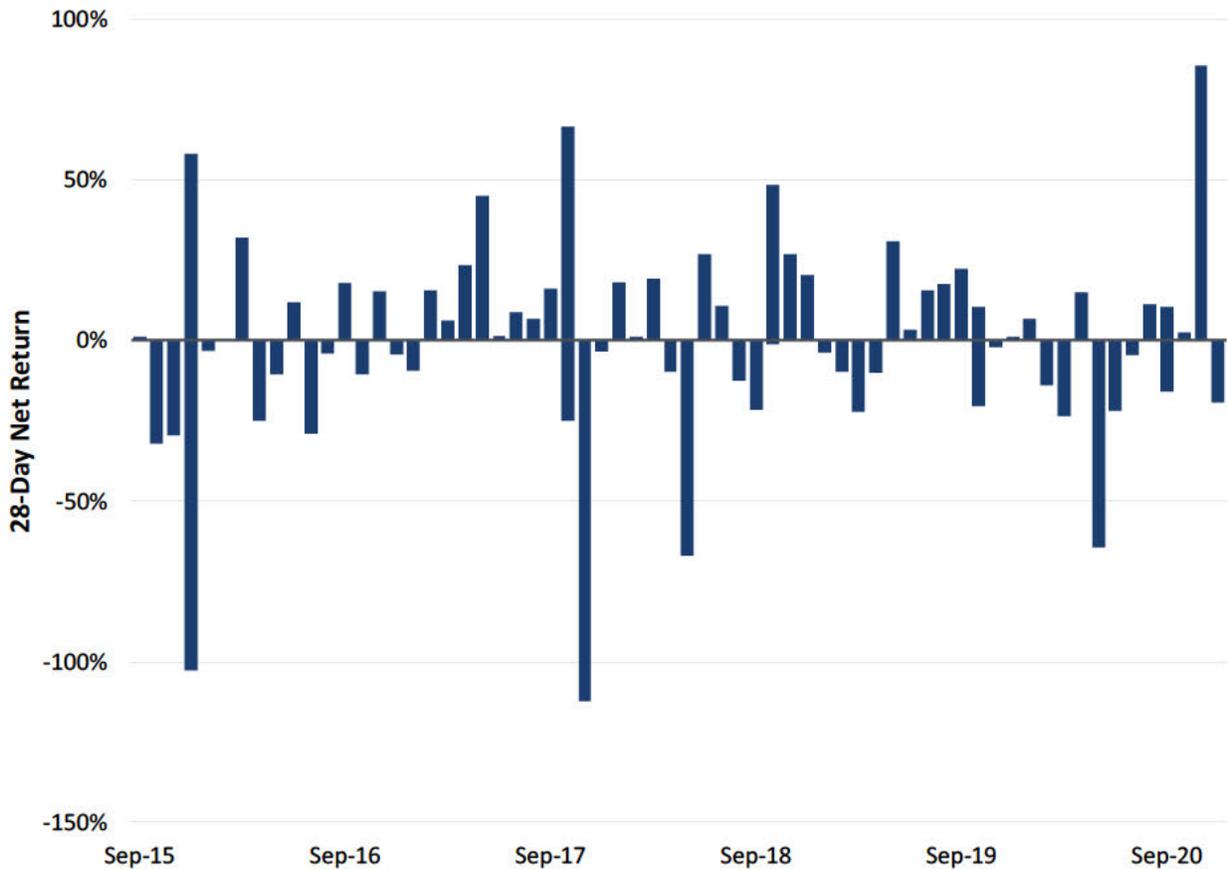
32. In Figure 6 and Figure 7, I present the 28-day excess net returns for XRP in Dr. Ferrell’s model for Estimation Periods 1 and 2, respectively. Each bar on the chart represents the difference between the predicted XRP return from Dr. Ferrell’s model and the actual XRP price return (net of the risk-free rate). The differences are often substantial, with XRP deviating from Dr. Ferrell’s model by more than 50% in many months and sometimes by well over 100%.

FIGURE 6: XRP 28-DAY NET RETURN UNEXPLAINED BY DR. FERRELL’S MODEL (ESTIMATION PERIOD 1)



Source: Brattle Workpapers.

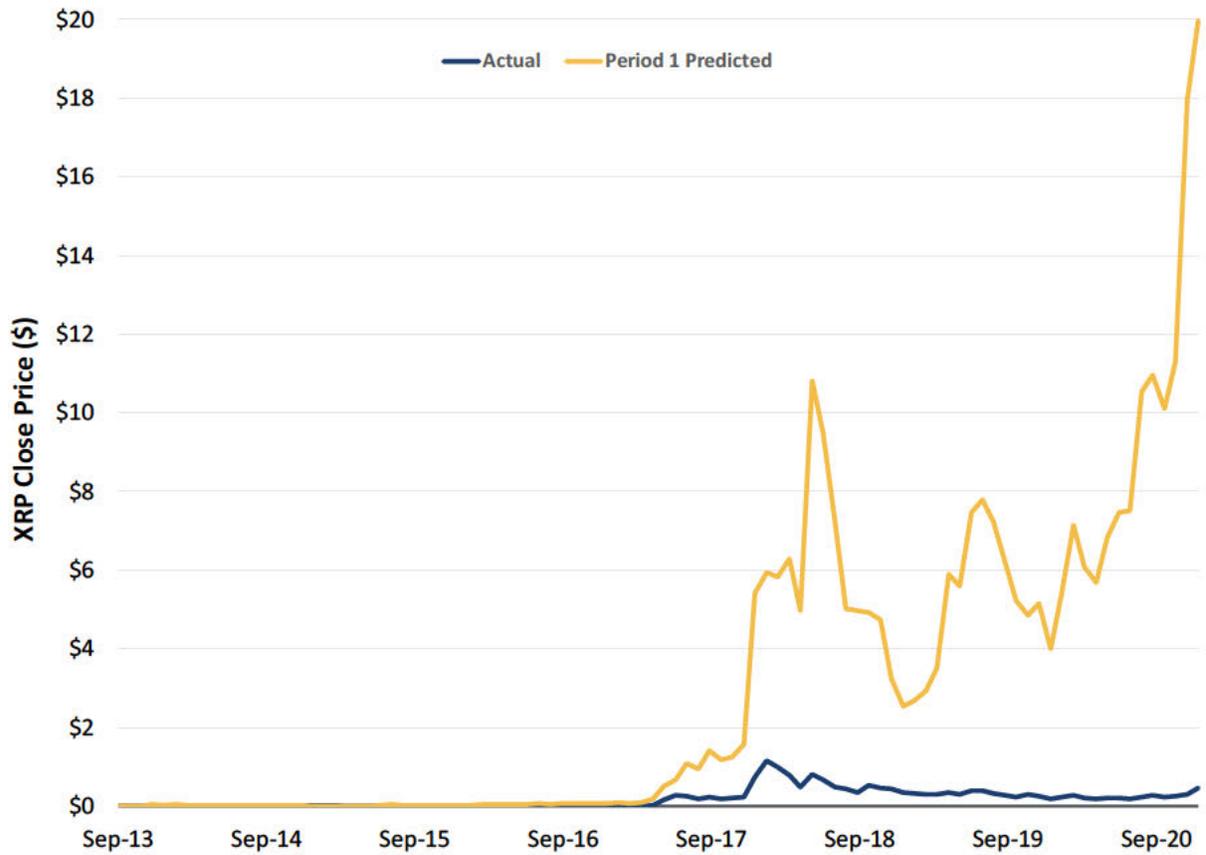
FIGURE 7: XRP 28-DAY NET RETURN UNEXPLAINED BY DR. FERRELL'S MODEL (ESTIMATION PERIOD 2)



Source: Brattle Workpapers.

33. It should be apparent from both of these figures that economically significant deviations from Dr. Ferrell's model occur in almost every 28-day return period. Therefore Dr. Ferrell's claim that "XRP price returns are unrelated to factors over which Ripple may have control" is unsupported. He did not perform any testing to see whether Ripple news or actions coincided with any of these unexplained returns.
34. To further illustrate the difference between Dr. Ferrell's models and the data, in Figure 8 and Figure 9, I plot XRP prices predicted by Dr. Ferrell's Exhibit 3 factor models versus XRP's actual prices. As shown, both his Period 1 factor model and his Period 2 factor model predict biased XRP prices.

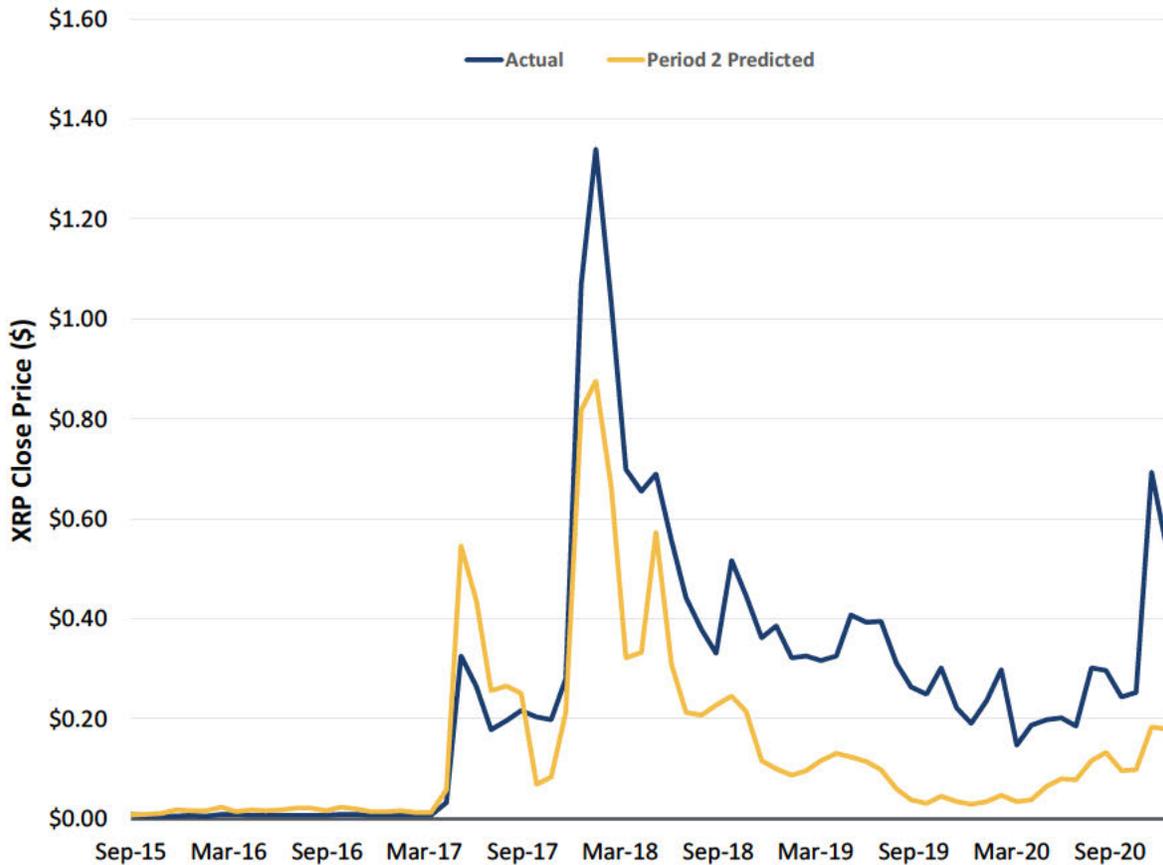
FIGURE 8: FERRELL EXHIBIT 3 PREDICTED VS. ACTUAL XRP PRICES FOR ESTIMATION PERIOD 1



Source: Ferrell Report Backup Files.

Note: Predicted prices are based on XRP's price on August 6, 2013, as the starting point, compounded with monthly returns predicted from Dr. Ferrell's model (with the risk-free rate added back).

FIGURE 9: FERRELL EXHIBIT 3 PREDICTED VS. ACTUAL XRP PRICES FOR ESTIMATION PERIOD 2



Source: Ferrell Report Backup Files.

Note: Predicted prices are based on XRP’s price on August 11, 2015, as the starting point, compounded with monthly returns predicted from Dr. Ferrell’s model (with the risk-free rate added back).

## VI. Dr. Ferrell’s Analysis Is Not Robust

35. In Section V I explained that Dr. Ferrell’s statistical framework does not “test” anything meaningful to the matter at hand. In this section I will show that it is also not robust and is prone to numerical instability.
36. In what follows I focus on the various analyses of Dr. Ferrell which make use of principal components. The Ferrell Report does include analysis based on digital token returns directly and not on principal components constructed therefrom. Dr. Ferrell claims, for example, that his regressions summarized in Exhibit 5 “demonstrates that the importance of the underlying cryptocurrencies in explaining variation

in XRP price return hold even if I make no use of the PCA.”<sup>31</sup> While it is true that these regressions do not make use of the PCA, it must be pointed out that they still do not address whether actions by Ripple impact XRP prices. The [REDACTED] Report already included regression models with control for the returns of other digital tokens yet nevertheless found statistically significant evidence that XRP prices were associated with certain news and actions of Ripple.<sup>32</sup>

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## A. Dr. Ferrell Appears Not To Have Conducted Basic Due Diligence on His Data Sources

37. Dr. Ferrell appears not to have reviewed his data for outlier (and invalid) observations. Outliers (observations that are unusually large or unusually small) can be legitimate—*e.g.*, a digital token can have very large price swings in certain periods—or they can indicate errors in the underlying data. In either case outliers can have important effects on the results.
38. As just one example, the price data used by Dr. Ferrell includes what are surely incorrect values for the digital token, THC. Dr. Ferrell combines two sources of price data to form his final data on digital token prices—CryptoCompare and CoinMarketCap. From January 14, 2016 to December 20, 2020, Dr. Ferrell uses THC prices from CryptoCompare, whereas he uses prices from CoinMarketCap for dates prior to January 14, 2016.<sup>33</sup> As shown in Figure 10, most prices for THC are fractions of a cent, but there are three dates (August 21, 22, and 23, 2017) when THC prices are reported to reach values of over ten million U.S. dollars per token in the CryptoCompare data.

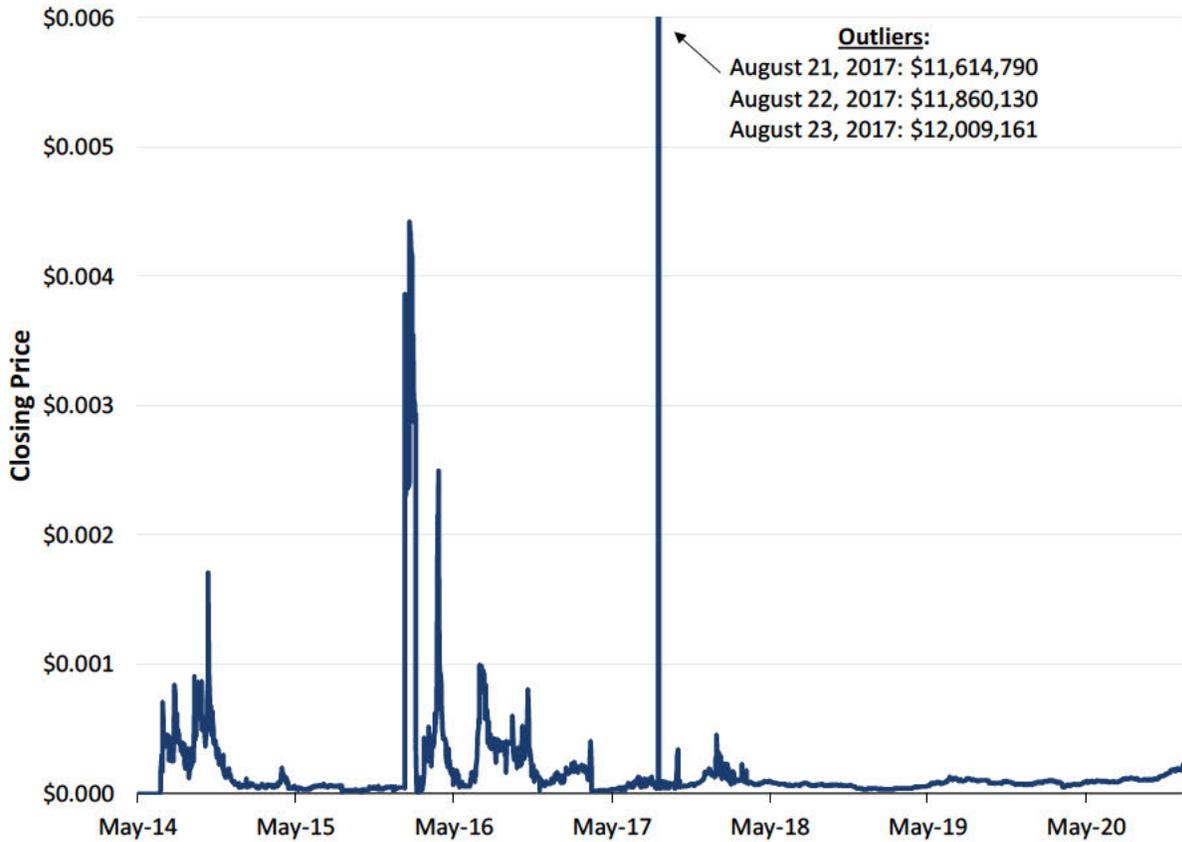
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<sup>31</sup> Ferrell Report, ¶ 99

<sup>32</sup> Furthermore, the [REDACTED] Report presented evidence that the relationship between XRP returns and the returns of other digital tokens, at least at the daily frequency, was not stable over time. Dr. Ferrell’s regression models do not allow for any variation in parameters over periods of between five and seven years.

<sup>33</sup> Ferrell Report Backup Files.

FIGURE 10: DAILY THC MARKET PRICES (DR. FERRELL'S MERGED DATA)



Source: Ferrell Report Backup Files.

Note: Closing prices as constructed by Dr. Ferrell.

39. The prices for these three dates seem clearly inaccurate, as the all-time high price of THC outside of these three dates is never reported to have exceeded a dollar in either of Dr. Ferrell's pricing data sources. I can further confirm the inaccuracy of these prices when comparing the Cryptocurrency prices on these dates to the CoinMarketCap prices. As shown in Figure 11, THC prices from CoinMarketCap from August 21 to 23, 2017, do not even reach two cents and do not appear unusual compared to the prices immediately before and after. The outlier prices (which appear to be whole numbers) found on the three days cannot be reconciled.

FIGURE 11: DAILY THC CLOSING PRICES (IN USD)

Dates	CryptoCompare Price	CoinMarketCap Price	Ferrell Report Price
8/17/2017	\$ 0.000043	\$ 0.006826	\$ 0.000043
8/18/2017	\$ 0.000041	\$ 0.006744	\$ 0.000041
8/19/2017	\$ 0.000083	\$ 0.007288	\$ 0.000083
8/20/2017	\$ 0.000041	\$ 0.007412	\$ 0.000041
8/21/2017	\$ 11,614,790.000000	\$ 0.009061	\$ 11,614,790.000000
8/22/2017	\$ 11,860,130.000000	\$ 0.010072	\$ 11,860,130.000000
8/23/2017	\$ 12,009,161.000000	\$ 0.014453	\$ 12,009,161.000000
8/24/2017	\$ 0.000043	\$ 0.012877	\$ 0.000043
8/25/2017	\$ 0.000087	\$ 0.012270	\$ 0.000087
8/26/2017	\$ 0.000087	\$ 0.011080	\$ 0.000087
8/27/2017	\$ 0.000043	\$ 0.010391	\$ 0.000043

Source: Ferrell Report Backup Files.

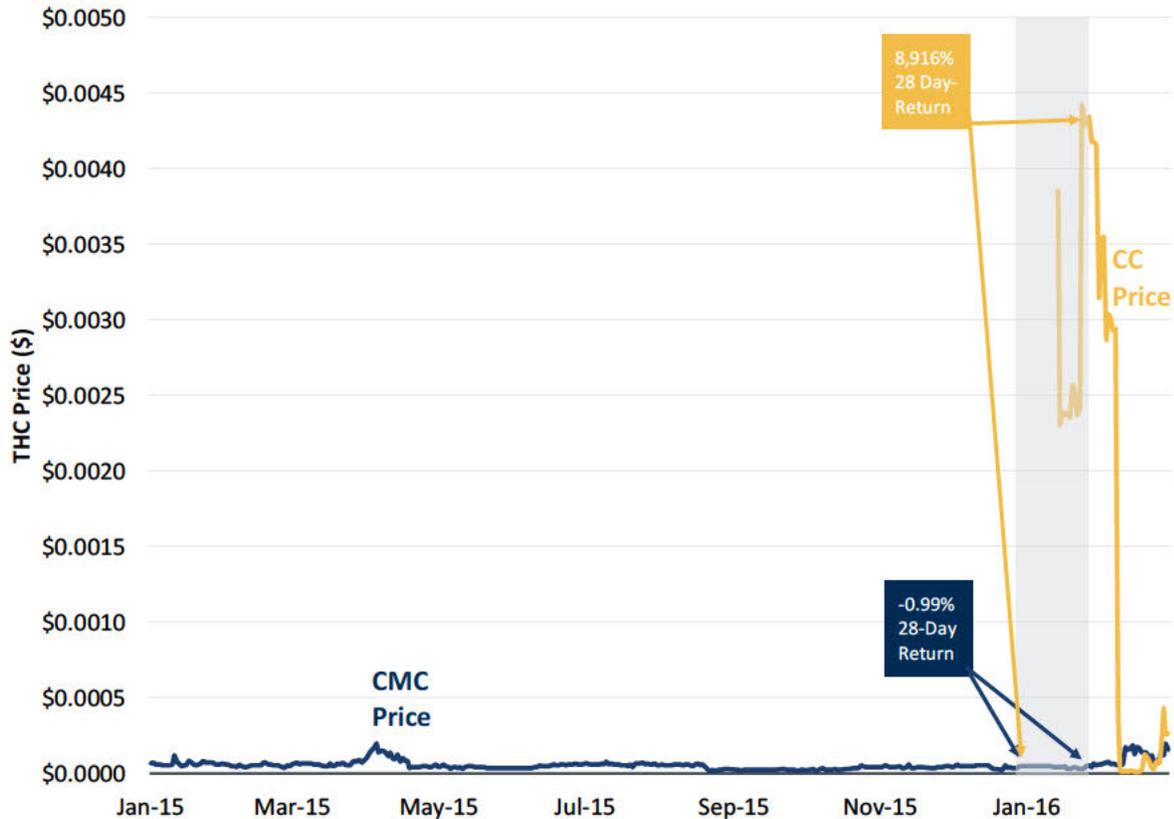
Note: Ferrell Report Price reflects closing price as constructed by Dr. Ferrell in his model.

40. Dr. Ferrell's apparent failure to conduct basic due diligence has further consequences for his Period 2 analysis because THC is one of the coins used to construct the principal components for Period 2 (the principal components for Period 1 do not incorporate THC). To be specific, for THC prices, Dr. Ferrell switches from CoinMarketCap data to CryptoCompare data on January 14, 2016. As a result, there is an apparent jump in THC prices on January 14, 2016 due to the price differences *across* the two sources, not because of real changes in the market. The 28 day return calculated by Dr. Ferrell thus conflates whether prices changed over those 28 days with the fact that the price data sources change.
41. This is shown in Figure 12. Dr. Ferrell's Estimation Period 2 includes the 28 day return from December 29, 2015 to January 26, 2016. There is only one data source available (CoinMarketCap) which reports that 28 day price return for THC, and that data source indicates a gross return of -1%.<sup>34</sup> However, by splicing the two data sources together as Dr. Ferrell does, he calculates an absurd gross return of 8,916%.<sup>35</sup>

<sup>34</sup> This follows from:  $-0.01 = 0.000047089 / 0.000047558 - 1$ .

<sup>35</sup> This follows from:  $89.16 = 0.004288 / 0.000047558 - 1$ .

FIGURE 12: COINMARKETCAP VS. CRYPTOCOMPARE PRICES FOR THC



Source: Ferrell Report Backup Files.

42. Because of such a high (artificial) variance of THC returns, THC is given a weight of 0.998 in the second PC used in Period 2, as depicted in Figure 13.<sup>36</sup> This means that the second PC in Dr. Ferrell's analysis is, essentially, just equal to the THC token's returns. It might have struck some researchers as surprising that essentially the entire second PC across 91 digital tokens was comprised of a single token, the THC token, one of the so-called "cannabis coins."<sup>37</sup> Further investigation might have led a researcher to question the merit of splicing the two pricing data sources together in the manner Dr. Ferrell adopts, since that methodology is responsible for the artificial variance in question.

<sup>36</sup> Recall that principal components are ordered by the amount of variation they explain in the reference data. The first principal component is the most effective at explaining the variance, the second principal component is the next most effective, and so on. For Period 2 Dr. Ferrell constructs 69 principal components.

<sup>37</sup> See, e.g., "Cannabis Coins" at <https://cryptoslate.com/cryptos/cannabis/>, accessed November 11, 2021.

**FIGURE 13: TOP 10 COINS BY WEIGHT (ABSOLUTE VALUE) FOR THE SECOND PRINCIPAL COMPONENT  
(ESTIMATION PERIOD 2)**

Coin	Weight
THC	0.9983
EMC	0.0217
XEM	0.0191
ETH	0.0160
MAX	0.0159
XBC	0.0127
42	0.0120
BLOCK	0.0113
ANC	0.0113
BTB	0.0109

Source: Ferrell Report Backup Files.

43. The first two PCs as constructed by Dr. Ferrell in his Estimation Period 2 collectively account for 96.6% of the variation in his data set.<sup>38</sup> However, if I regress XRP returns on those first two PCs, I find that they have no explanatory power for XRP at all—the adjusted  $R^2$  is actually negative (see Figure 14). On the other hand, if the THC token is dropped from the analysis of Estimation Period 2, a very different second PC results, one which is more correlated with XRP returns. Now if I regress XRP returns on the first two PCs, I find that they explain almost 30% of XRP returns (see Figure 14 ).

<sup>38</sup> Ferrell Report, Exhibit 2.

**FIGURE 14: REGRESSION RESULTS OF XRP RETURNS ON PC1 AND PC2 (WITH AND WITHOUT DROPPING THC COIN)**

		Coefficient (Original) [A]	Coefficient (THC dropped) [B]
Constant	[1]	0.251	0.071
Principal Component 1	[2]	-0.001**	-0.001***
Principal Component 2	[3]	-0.003*	0.129***
Observations	[5]	70	70
Unadjusted R <sup>2</sup>	[6]	0.002	0.293
Adjusted R <sup>2</sup>	[7]	-0.028	0.272

Notes:

\* Indicates significance at the 10% level.

\*\* Indicates significance at the 5% level.

\*\*\* Indicates significance at the 1% level.

44. Besides failing to check for outliers in his data, Dr. Ferrell also fails to assess whether his dataset is sufficiently large to perform this analysis. As described in the preceding section, Dr. Ferrell constructs several factor models to explain the returns on XRP's prices. In all of these models he uses monthly return data (strictly, 28-day return data) to estimate his factor models. Doing so leads to a small sample size, 96 observations for Estimation Period 1 and 70 for Estimation Period 2. This is problematic given that his principal component analysis requires the estimation of a very large number of parameters—for Estimation Period 1 he has to calculate 45 distinct components of a variance-covariance matrix<sup>39</sup> and for Estimation Period 2, he has to calculate 4,186 components.<sup>40</sup> This combination of a small sample and a large number of parameters leads to the robustness issues that are detailed below.
45. This problem could have been avoided by using weekly or daily data, since this would have increased his sample size without increasing the number of parameters that needed to be estimated. However, Dr. Ferrell justifies his use of monthly data by citing to papers that either (i) use a much longer sample (Fama and French (2015) use a sample of over 600 months of data, compared to Dr. Ferrell's 96 and 70

<sup>39</sup> With 9 non-XRP digital tokens, the variance-covariance matrix is a 9 by 9 matrix, which has 45 unique elements.  $9 \times (9 + 1)/2 = 45$ .

<sup>40</sup> With 91 non-XRP digital tokens, the variance-covariance matrix is a 91 by 91 matrix, which has 4,186 unique elements.  $91 \times (91 + 1)/2 = 4,186$ .

months),<sup>41</sup> or (ii) also consider more frequent sampling in addition to monthly (Liu and Tsyvinski (2021) use data at daily, weekly, and monthly levels, not just the monthly level).<sup>42</sup>

## B. Dr. Ferrell’s Analysis Is Highly Dependent on the Day on Which He Begins His Analysis

46. As a consequence of the issues discussed in Section 36, Dr. Ferrell’s analysis is numerically unstable. In particular, the explanatory power of his models is highly dependent on the day on which he begins his analysis. As Dr. Ferrell states in his report, he begins all of his 28-day periods on a Tuesday, arguing in footnote 163 of his report that, “I circumvent any concerns that trading on weekends is of lower volume and of a somewhat different nature ... I use Tuesday rather than Monday to reduce the number of U.S. holidays.” I note that Dr. Ferrell offers no suggestion that using Wednesday, Thursday, or Friday would be any less valid than Tuesday.
47. For Estimation Period 1, the first 28-day return is September 3, 2013, and the last is December 15, 2020, while for Estimation Period 2 the first is September 8, 2015, and the last would naturally be December 22, 2020, though Dr. Ferrell instead stops the analysis on Sunday, December 20, 2020, apparently in violation of his own concerns. These two estimation periods, in other words, are offset by one week. In the case of Estimation Period 2, Dr. Ferrell arguably cannot begin a week earlier on September 1 because he lacks trading data on Ethereum, a major digital token. However, he certainly could begin Estimation Period 1 one week later on September 10, 2013, if he so chose.
48. What would happen if we replicated Dr. Ferrell’s methodology but began on September 10, 2013 instead? Instead of reporting an adjusted  $R^2$  of 54.1% as shown in Exhibit 3 of the Ferrell Report we would have an adjusted  $R^2$  of just 25% (See Figure 15). Thus when Dr. Ferrell writes that “[t]he adjusted R-squared in Estimation Period 1...exceeds 50%,” that finding depends on his decision to begin the analysis on September 3 rather than September 10 which would have been consistent with his Estimation Period 2.<sup>43</sup>
49. To determine which is more representative of the power of his first factor model—an  $R^2$  of 54.1% or 25%—Figure 15 plots the adjusted  $R^2$  which results from applying Dr. Ferrell’s methodology beginning

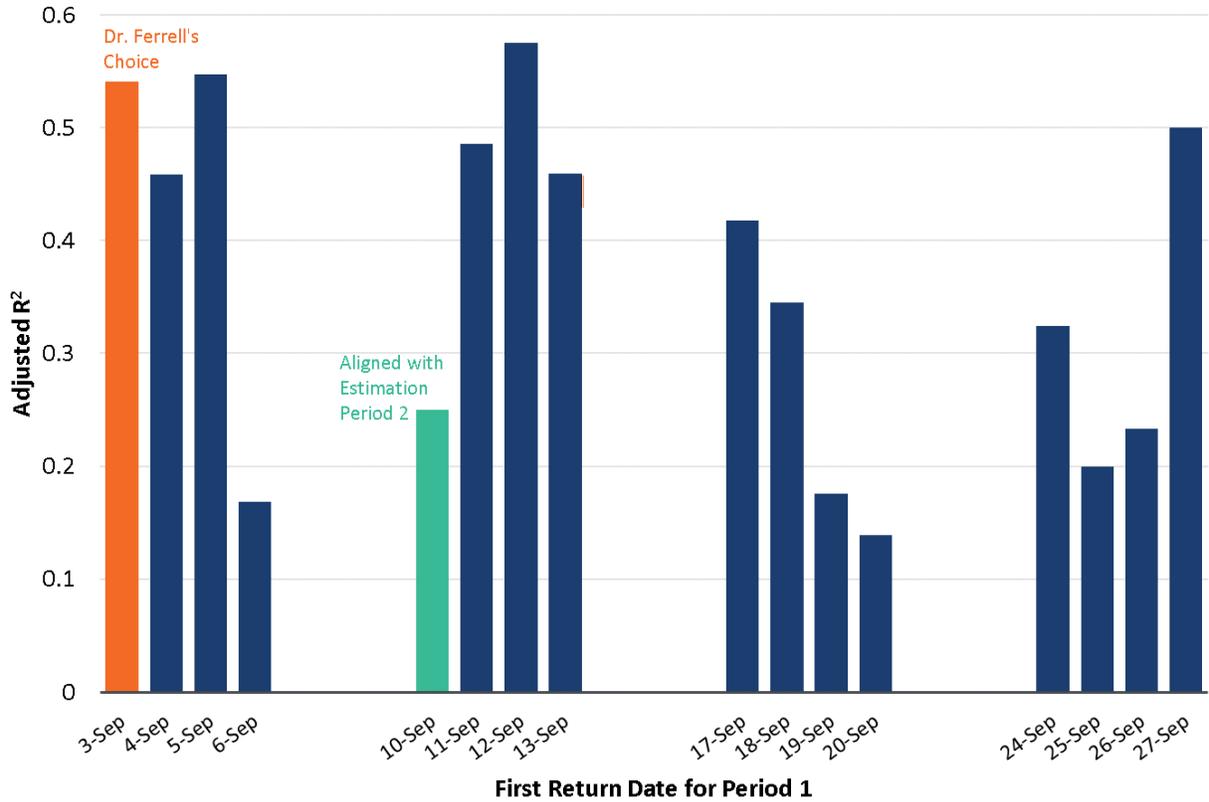
<sup>41</sup> Eugene F. Fama and Kenneth R. French, “Dissecting anomalies with a Five-Factor Model,” *The Review of Financial Studies*, Vol. 29 (1), 2015, pp. 69-103.

<sup>42</sup> Yukun Liu and Aleh Tsyvinski, “Risks and Returns of Cryptocurrency,” *The Review of Financial Studies*, Vol. 34 (6), 2021, pp. 2689-2727.

<sup>43</sup> Ferrell Report, ¶ 98.

on every Tuesday, Wednesday, Thursday, or Friday in the month of September, 2013. The adjusted  $R^2$  ranges from a low of 13.9% to a high of 57.5% depending on the starting day.

FIGURE 15: ADJUSTED  $R^2$  FOR ALTERNATIVE START DATES FOR ESTIMATION PERIOD 1

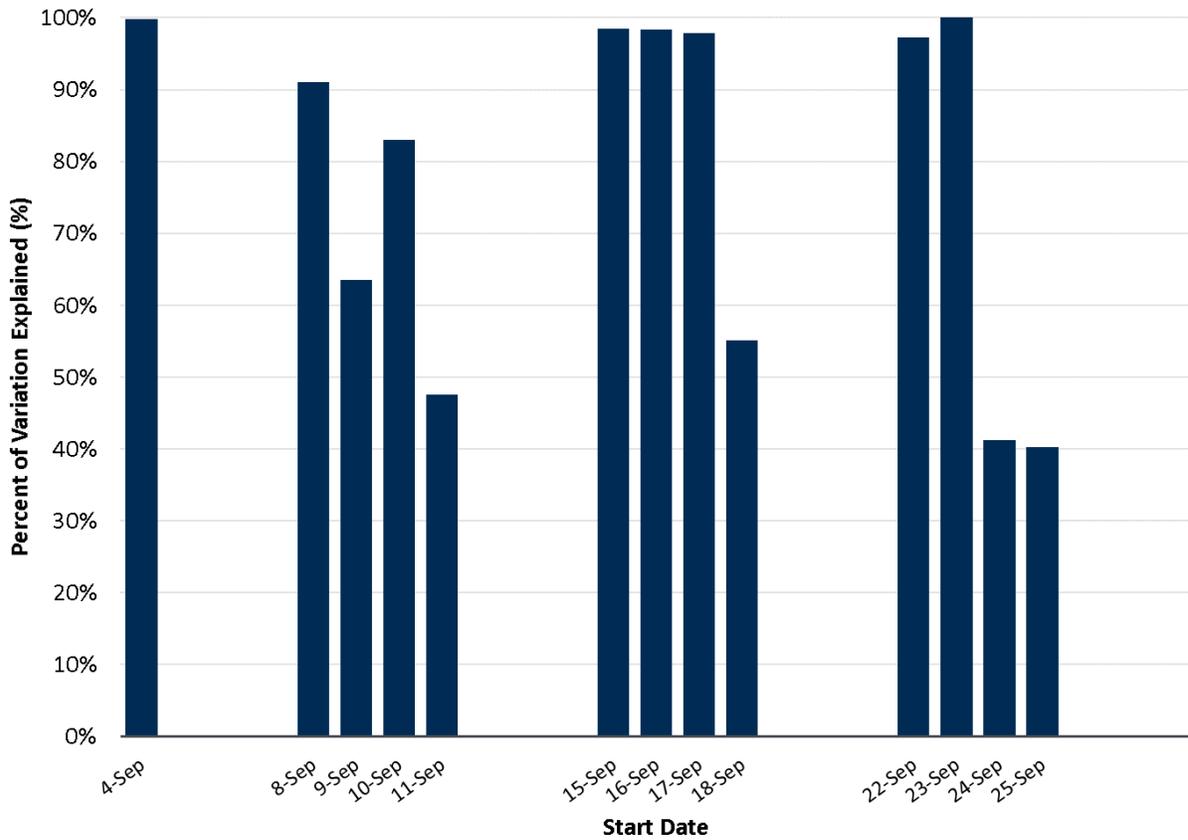


50. The analysis of Estimation Period 2 is even more unstable. In this case, Dr. Ferrell is constructing principal components across 91 digital tokens with only 70 observations of each.<sup>44</sup> Even this obscures the fact that many of his tokens do not report pricing data every day over this period of time; if Dr. Ferrell happened to pick a different start date, he would be forced to either drop certain dates (because he does not have data on all 91 tokens on that date) or to drop certain tokens (because they do not have observations on all dates).
51. In Exhibit 2 of Dr. Ferrell’s report he notes that the first principal component of Estimation Period 2 accounts for 91.1% of the variation across all 91 tokens in this period. This means that there is a way to combine the returns of these 91 tokens so that 91.1% of the total variation of those returns can be explained by a single time series.

<sup>44</sup> In technical terms, the covariance matrix is of less than full rank.

52. In what follows, I apply Dr. Ferrell’s methodology starting from different dates in September 2015. I drop any digital token that has missing data in that sequence of 28 days. For example, if I begin on Wednesday September 9, 2015, instead of Tuesday September 8, the tokens MANNA, RBT, and THC are missing some returns in the subsequent sequence of 28 days and hence I drop them from the analysis.
53. For each start date I perform a principal components analysis on the digital tokens with complete data and record the percentage of variation explained by the first principal component. The results are presented in Figure 16. The contribution of the first principal component ranges from a low of 40.3% to a high of 100%. As an example, if Dr. Ferrell had started his analysis just one day later on Wednesday September 9, the first principal component would only have explained 63.5%, not 91.1%, of total variation. In fact, starting on that date, it would take 6 principal components to explain 91% of total variation.<sup>45</sup>

**FIGURE 16: VARIATION EXPLAINED BY PRINCIPAL COMPONENT 1 (ESTIMATION PERIOD 2)**



54. Looking at September 23, what can it mean that 100% of the variation of about 90 digital tokens can be explained by a single time series? If “true” it would mean that the returns for all 90 tokens are perfectly

<sup>45</sup> Brattle Workpapers.

correlated with each other. In reality, it means that the data for these 90 tokens is dominated by a single outlier. In this case, the culprit is the same THC coin discussed in Section VI. When starting on this date, the prices of over \$10,000,000 per coin create 28 day returns of almost 16,000,000,000,000%.

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## C. Dr. Ferrell's Analysis Ignores That Model Parameters Might Change over Time

55. As I demonstrated in my opening report, and consistent with other literature on digital token returns, conditions in this market can change over time. Dr. Ferrell's analysis, however, implausibly assumes stable parameters over time for periods of between five and seven years. He assumes, for example, that the construction of principal components is stable, and he assumes that the relationship between XRP returns and those principal components is stable. I demonstrate in this section one simple example that shows how key model parameters can vary over time.
56. I begin with Dr. Ferrell's analysis of Estimation Period 2. Recall that for this model, Dr. Ferrell estimates that alpha is  $-0.022$  with a standard error of about twice that magnitude,  $0.041$ .<sup>46</sup> As I did above in Section VI.B, I apply this methodology beginning in different days in September of 2015, disregarding any digital token with missing data. The only change I make to his analysis is that, instead of requiring the regression intercept alpha to be constant over the subsequent 5 years, I allow it to change once Ripple receives its BitLicense from New York State. This was announced on June 13, 2016.<sup>47</sup> The first 28-day return measured entirely post-BitLicense would therefore be the return of July 11, 2016.
57. Figure 17 presents the estimated intercept, alpha, and the change to alpha in the post-BitLicense period. Out of 15 possible "start dates" for Estimation Period 2, (i) four would deliver statistically significant evidence that the average XRP return, net of the risk-free rate and principal component factors, was statistically significantly negative and (ii) five would indicate that the change to that average return was statistically significantly positive.<sup>48</sup> One possible interpretation of these results would be that XRP returns were lagging the market until Ripple Labs obtained its BitLicense.

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<sup>46</sup> Ferrell Report, Exhibit 3.

<sup>47</sup> "Ripple Receives New York's First BitLicense for an Institutional Use Case of Digital Assets," Ripple Insights, June 13, 2016, accessed November 11, 2021, <https://ripple.com/insights/ripple-receives-new-yorks-first-bitlicense-institutional-use-case-digital-assets/>.

<sup>48</sup> Statistical significance at the 5% level.

FIGURE 17: DR. FERRELL'S EXHIBIT 3 PERIOD 2 INTERCEPT CAN BE SIGNIFICANT AND CHANGES OVER TIME

Period 2 Start Date	Alpha	Post-BitLicense Period Change in Alpha	Adjusted R <sup>2</sup>
04-Sep-2015	-0.04	0.05	0.943
08-Sep-2015	-0.14	0.13	0.923
09-Sep-2015	-0.12	0.17	0.963
10-Sep-2015	-0.17	0.23*	0.960
11-Sep-2015	-0.21	0.22	0.881
15-Sep-2015	-0.17**	0.19*	0.963
16-Sep-2015	-0.65*	0.77**	0.813
17-Sep-2015	-0.28*	0.34**	0.965
18-Sep-2015	-0.18*	0.21**	0.966
22-Sep-2015	-0.22**	0.22**	0.944
23-Sep-2015	-0.19**	0.17*	0.891
24-Sep-2015	-0.18	0.15	0.865
25-Sep-2015	-0.16*	0.15	0.917
29-Sep-2015	-0.03	0.02	0.901
30-Sep-2015	-0.36**	0.31**	0.741

Notes:

\* Indicates significance at the 10% level.

\*\* Indicates significance at the 5% level.

\*\*\* Indicates significance at the 1% level.

For the September 23, 2015 start date, I exclude THC returns for the reasons discussed in Section VI.A. If THC returns are included, Alpha is not significant at the 5% level and the Post-BitLicense Period Change in Alpha is not significant at the 5% level. The adjusted  $R^2$  is negative.

**Additional Documents Relied Upon**

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**Expert Reports**

- [1] Expert Report of Allen Ferrell, Ph.D.

**Date**

October 4, 2021

**Websites**

- [2] <https://cryptoslate.com/cryptos/cannabis/>

**Academic Literature**

- [3] Eugene F. Fama and Kenneth R. French, "Dissecting anomalies with a Five-Factor Model," *The Review of Financial Studies* Vol. 29 (1), 2015, pp. 69-103.
- [4] Jim Kyung-Soo Liew, Richard Ziyuan Li, Tamás Budavári, and Avinash Sharma, "Cryptocurrency Investing Examined," *The Journal of the British Blockchain Association*, Vol. 2(2), 2019, pp. 1-12.
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