The Cost-Cutting Case for Banks

The ROI of Using Ripple and XRP for Global Interbank Settlements

February 2016

ripple

Introduction

In *Building Network Effects on Ripple*, we shared our company's vision for a future state in which money moves as easily, securely and globally as information moves on the web today. We call this future state the Internet of Value, and we believe Ripple plays a critical role in the development of the Internet of Value by initiating network effects. Today, Ripple offers modern infrastructure for cost-efficient cross-border payments, connecting liquidity suppliers and liquidity takers, allowing them to pursue new revenue opportunities.

As a digital asset, XRP is a useful trading instrument to reduce spreads and expedite market thickness. In this paper, we will dive deeper into this concept. We will compare how cross-border payment processing works in legacy systems versus on Ripple and on Ripple using XRP as a bridge asset. We will detail an industry-first ROI analysis of distributed financial technology and digital assets for global interbank transactions.

Global Payment Infrastructure Today

Today's global payments infrastructure moves money from one payment system to another through a series of internal book transfers across financial institutions. Because these book transfers occur across different systems with a low level of coordination, funds settlement is slow (often 3-5 days, trapping liquidity), error prone (error rates run upwards of 12.7 percent[1]), and costly ($1.6 trillion[2] in systemwide costs for global cross-border transactions).

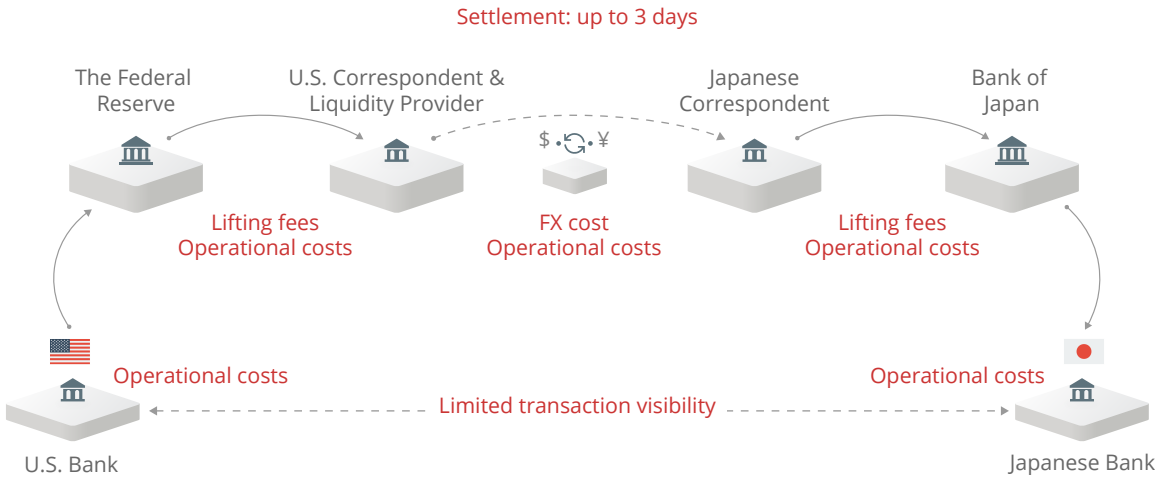
To service international payments, a small or mid-sized bank has to pre-fund an account or establish a line of credit with a correspondent bank. The correspondent, either itself or through its partnerships, provides the liquidity for these international payments in local currency accounts overseas. This arrangement eliminates the need for smaller respondent banks to maintain individual nostro accounts in many currencies, but often requires many correspondent relationships. A nostro account is a bank account held in a foreign country by a domestic bank, denominated in the foreign country's currency and used to facilitate cross-currency settlement. Correspondent banking arose as a stop-gap solution to the lack of a global, cross-border payments network in the early-mid 20th century. As demand for cross-border payments climbs, the system is proving cost-prohibitive and inefficient, especially for low-value payments. Specifically, the system has four inherent issues:

1. **Access**: In most cases, it is too expensive for financial institutions to fund positions around the world to service cross-border transactions. Instead, they rely on a handful of correspondent banks to provide access to global corridors. Limited access translates to non-competitive FX, fees and liquidity.

1 Experian, Does Valid Bank Account Data Matter?

2 Ripple analysis across: World Trade Organization, International Trade Statistics 2014; Institute of International Finance, Aggregate Capital Flows 2014; Federal Reserve Financial Services, Cross-Border Payments 2015.

2. **Certainty**: Sets of intermediaries route payments, relaying messages independent of funds settlement. With many potential points of failure and end-to-end opacity, the system results in frequent errors, unpredictable exception processing times, and uncertainty in funds delivery. Further, banks have poor visibility into individual transactions and liquidity positions.
3. **Speed**: International payments can take up to a week to process, depending on the currency corridor. Each leg of the transaction requires the receiving bank's ledger to be "online." The more parties involved, especially across different timezones, the longer transactions take to settle.
4. **Cost**: Banks absorb significant costs related to treasury operations, payment processing, liquidity, FX and compliance.



In this example of a cross-border payment, a U.S. bank is sending a payment to a Japanese bank. The U.S. bank makes an ACH or RTGS transfer to a local correspondent bank. The U.S. correspondent bank holds a nostro account with a Japanese correspondent, and provides FX for the transaction. The Japanese correspondent debits the U.S. correspondent bank's nostro account and credits the receiving bank through an ACH or RTGS transfer.

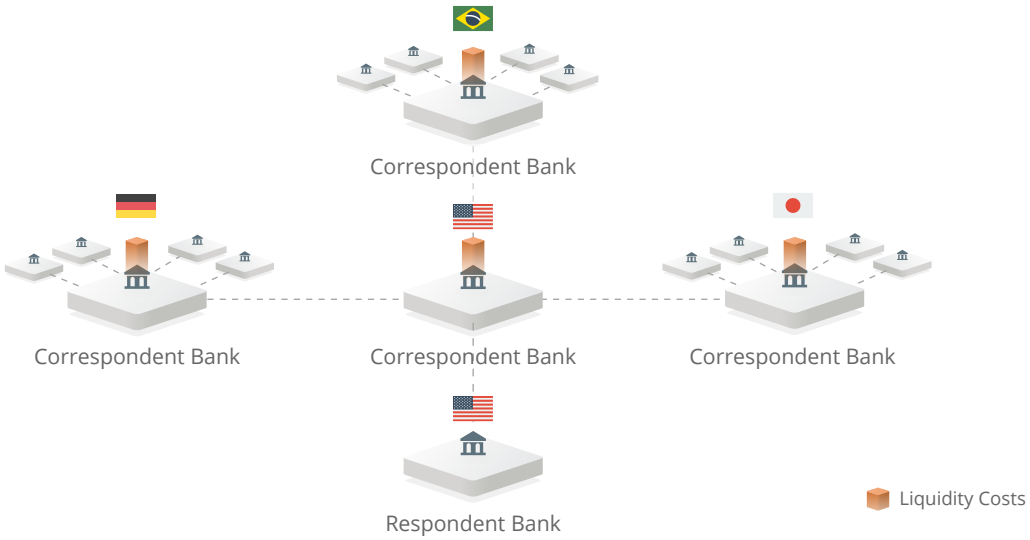
Even the largest global banks are exiting select currency corridors in response to rising liquidity and compliance costs and profitability pressures.[3] Smaller institutions that rely on these global money center banks then see increasing costs and even more limited corridor access. As a result, though there's significant demand[4] for low-value payments, like remittances, it's either uneconomical for banks to serve them, a loss-leading customer acquisition play, or results in a poor customer experience. For example, banks charged an average of 12 percent for low-value remittances according to a 2009 World Bank study.[5] As commerce becomes increasingly global and as the Internet of Things takes flight[6], we will see increasing demand and new use cases for low-value payments, such as new remittance corridors and device-to-device micropayments, that banks need to prepare to serve.

3 *CNBC*, "Deutsche Bank to shed 35,000 jobs, exit 10 countries," Oct 29, 2015.
4 BCG, *Global Payments 2015: Listening to the Customer's Voice.*
5 *The Economist*, "Remittances: Over the sea and far away," May 19, 2012.
6 Accenture, "Driving Unconventional Growth Through the Industrial Internet of Things," 2015.

Digital Assets as a Solution

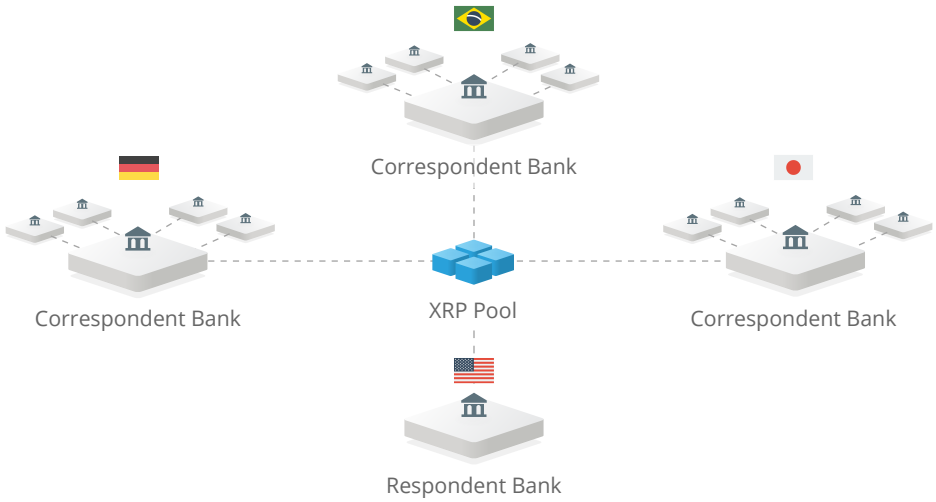
Digital assets are cryptographically-secured tokens that hold value and can be transferred between two parties without the need for a central counterparty. As a counterparty-less asset, they can facilitate easier and more scalable provision of FX liquidity without expensive operational costs, such as opening and maintaining many bank accounts.

Historically, correspondent banks have provisioned liquidity for global payments by holding various currencies in local bank accounts around the world. As the exclusive liquidity providers for global payments, they mark up spreads and charge processing fees to respondent banks. The practice of holding various currencies across many accounts is costly because banks have to maintain minimums in each account and outlay more capital than they expect to need due to imperfect forecasting. Funds fulfilling the account minimum requirements and acting as a reserve represent an opportunity cost to the banks as idle, tied up capital, known as liquidity or funding cost.



For the first time, digital assets can enable real-time value exchange anywhere in the world, providing liquidity on demand and significantly reducing costs associated with treasury and payments operations, liquidity and Basel III compliance. XRP - the native, digital asset of the Ripple consensus network - offers these capabilities and can support liquidity between any two currencies. XRP enables the transfer of value anywhere in the world in an entirely frictionless manner with fewer barriers to entry than the correspondent banking system.

Instead of holding local currency in nostro accounts around the world, trading parties (banks or third-party market makers on behalf of banks) can hold XRP on their own balance sheets and use it to make markets with any other currency. The analysis in this paper is for a respondent bank providing its own liquidity to XRP.



By consolidating liquidity to service international payments from many, disjointed, international nostro accounts into one XRP pool, respondent banks allocate less total liquidity to service the same volume of global payments. Here is how:

- The bank only has to hold its domestic currency and maintain one account with XRP.
- The bank only needs enough XRP on hand to service its largest expected payment obligation.
- By making markets directly between its domestic currency and XRP, the bank minimizes the number of intermediaries involved and their markup on spreads.

Highly liquid currencies like USD and EUR have served as intermediary currencies to bridge trades. However, only a small number of correspondent banks have the economies of scale to pool liquidity and offer markets in various currencies, limiting competition for rates. To access that liquidity, respondent banks must pay fees, maintain operational accounts, and assume the opportunity cost of capital tied up in these accounts. XRP by contrast has no counterparty costs.

Economic Implications of a Universal Bridge Asset

Banks currently incur significant infrastructure costs processing cross-border payments. Employing Ripple and XRP can help banks eliminate or lower these costs:

- **Foreign Exchange:** The cost of spread for the purchase and sale of a currency pair in the wholesale market at institutional rates. This spread can be between fiat currencies or between fiat currency and XRP held on the bank's balance sheet. When XRP is used, the model assumes that banks hold XRP on their balance sheets and provide their own liquidity for FX transactions. Third-party market makers can also be used.
- **Currency Hedging:** The cost of hedging a basket of currencies held in nostro accounts globally.
- **Treasury Operations:** The funding cost required to maintain account minimums, the overhead of managing currencies and counterparties across accounts, and the cost of occasionally rebalancing[7] cash between those accounts locally and internationally.
- **Liquidity:** Liquidity costs have two components: the cost of capital locked "in-flight" as an international wire is processed (typically two days) and the time to fund the local nostro account (typically one day depending on the local rail). Liquidity cost can be calculated as the cost of funds applied to the time-weighted average amount of capital locked up.
- **Payment Operations:** The manual intervention cost of exceptions and error handling requiring headcount and the cost of using local rails.
- **Basel III (LCR)[8]:** The opportunity cost to the sending institution of holding lower-yielding, high-quality liquid assets (as designated by pending Basel III regulations) against credit exposure during the in-flight period.

For a representative respondent bank[9] with $12 billion in annual payment volume (across 5 corridors, 157,000 transactions/month, global average transaction size of $6,300 for international transactions) and a 6 percent cost of capital[10], the costs break down as follows:

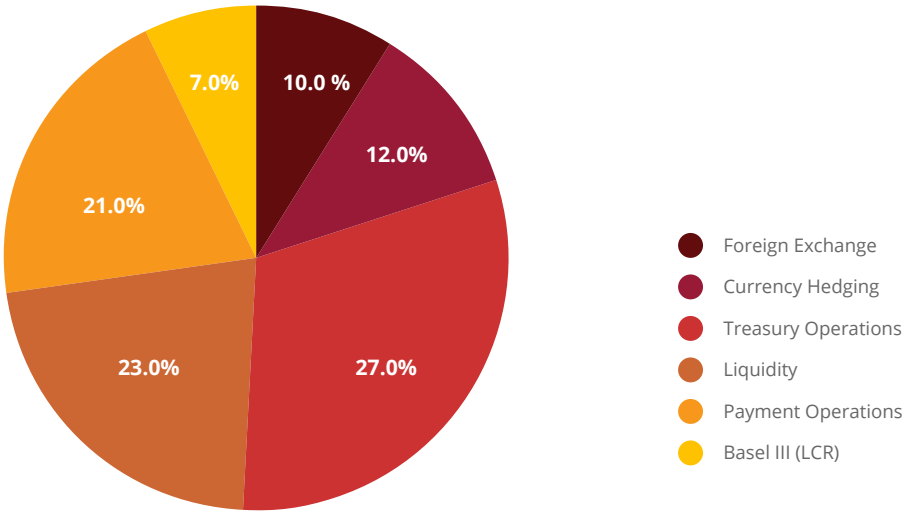
7 Cash management is distinct from the liquidity cost of capital locked in nostro accounts and pertains to transaction costs for rebalancing via SWIFT.

8 Basel III cost reductions are dependent on jurisdiction- and institution-specific methodologies for implementing LCR requirements. Costs can remain the same due to LCR calculations against a theoretical 30-day outflow. Even if the in-flight period reduces to zero with Ripple, using the next 30 days of uninstructed international payments could keep costs the same. Ongoing regulatory developments can indirectly impact other considerations in the model.

9 Here we define a respondent bank as a tier three bank that holds nostro accounts at correspondent banks domestically and overseas.

10 For a point of reference, Citi GTS processed $3 trillion in daily transactions in 2011: http://www.citigroup.com/citi/investor/data/p110202a.pdf?ieNocache=832

International Payment Servicing - Cost Breakdown



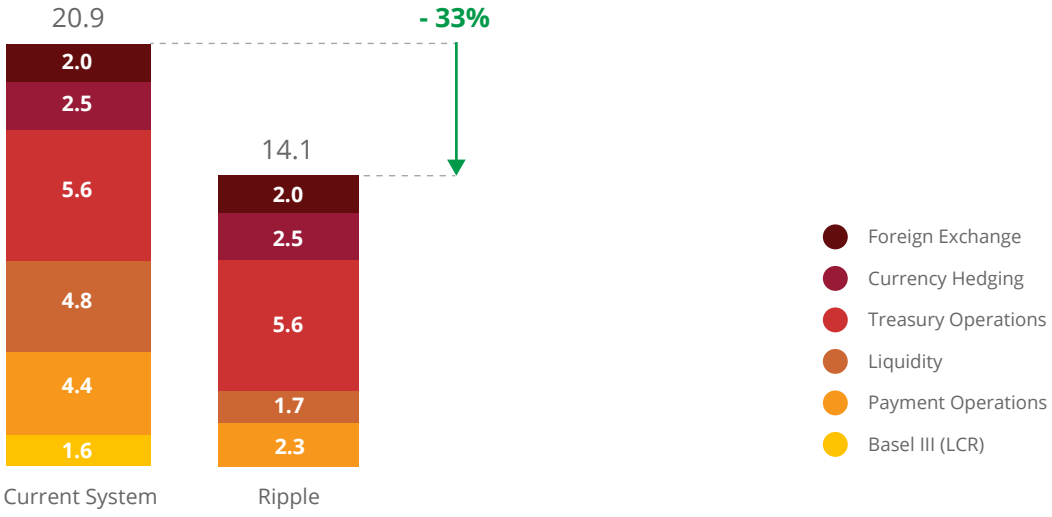
To assess the cost impact of using XRP as a universal bridge asset, let's first evaluate the potential cost-savings of using Ripple without XRP.

Institutional Cost Savings Using Ripple

Currently, settlement delays lead to high liquidity, payment processing and operational costs to banks. With Ripple, our respondent bank minimizes settlement delays and can realize 33 percent cost savings, or 6.8 bps[11] total on international volume.

International Payment Infrastructure Costs

Global Average Cost: 20.9 bps on payment volume



11 Ripple cost analysis, normalized by annual payment volume and vetted by active banking and consulting partners, 2016.

Specifically, Ripple enables the following cost efficiencies:

- **Liquidity:** With Ripple, the "in-flight" time for the cross-border leg (two days) is eliminated. The funding time (one day) for nostro accounts still holds. Overall, Ripple reduces liquidity costs by 65 percent.
- **Payment operations:** While local rail payment costs remain, Ripple can significantly reduce staff costs for settlement-related exception processing and trade failures—eliminating 48 percent of payment operations costs. Reduction in exceptions and failures is attributable to communication and reconciliation improvements enabled by Ripple's solution for cross-currency settlement.[12]
- **Basel III (LCR)[13]:** With no in-flight period for the cross-border leg, associated Basel III costs can be reduced by as much as 99 percent.

Our respondent bank that processes $12 billion in international transactions a year (over 5 corridors with an average transaction size of $6,300[14]) can assume a conservative, estimated $10 million one-time cost of deploying Ripple and a payback period of less than 15 months.[15] Deployment costs for Ripple will vary depending on the bank size and infrastructure, but a bank's associated savings accrue faster for a larger bank due to higher payment volumes, resulting in a comparable payback period to the model.

12 For more information about Ripple's enterprise solution for cross-curency settlement, see https://ripple.com/files/one_pager_cc_settlement.pdf

13 As mentioned, Basel III savings are subject to jurisdiction- and institution-specific implementations, and overall costs may be the same due to treatment of the 30-day window.

14 BCG, *Global Payments 2015: Listening to the Customer's Voice* and SWIFT, https://www.swift.com/about-us/swift-fin-traffic-figures

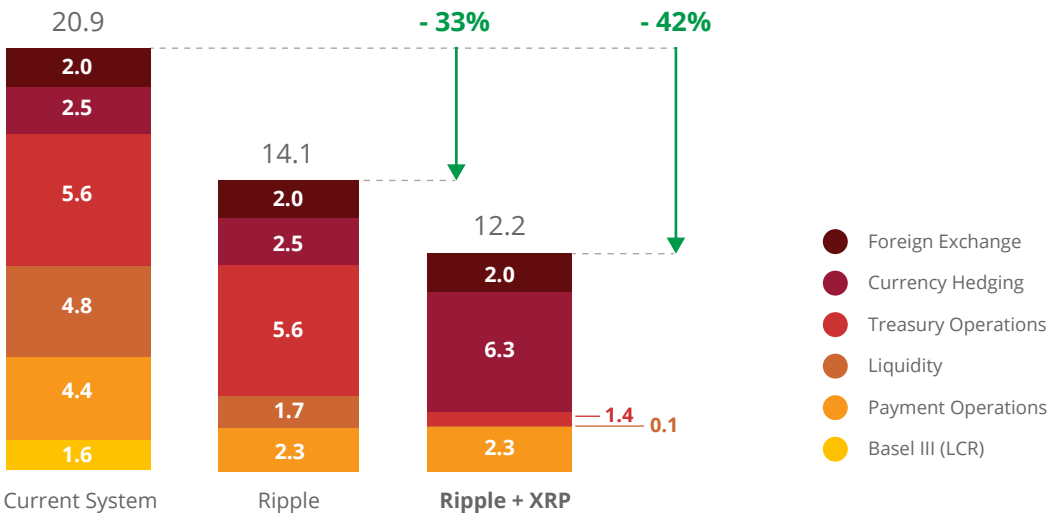
15 Cost estimate includes vendor costs from Ripple and the bank's internal deployment costs.

Institutional Cost Savings Using Ripple and XRP

Now let's evaluate cost savings to our representative bank using Ripple and XRP as a universal bridge asset. The cost model below assumes our same respondent bank converts 50 percent of its payments-related float into XRP after implementing Ripple, custodying the XRP itself. Banks can either source and custody XRP themselves or contract third-party liquidity providers. Currency hedging is the only cost with an initial, short-term increase due to the potential higher volatility of XRP as a new asset. As XRP gains usage, this volatility is expected to trend downward.

International Payment Infrastructure Costs

Global Average Cost: 20.9 bps on payment volume



Using XRP (even assuming initially high volatility), our respondent bank can realize 42 percent cost savings compared to the current system or 8.8 bps[16] total on international volume.

Using Ripple and XRP further compresses other aspects of the bank's cost structure for cross-border payments:

- **Liquidity:** Since using XRP does not require multiple nostro accounts, redundant liquidity costs are collapsed into a single XRP account.[17] Compared to using Ripple without XRP, using Ripple and XRP eliminates up to one additional day of funding for nostro accounts, saving up to 99 percent of related liquidity costs, as long as the bank has access to an RTGS system and XRP exchange that can support the necessary size of payment obligations. The bank would hold enough XRP on its balance sheet to handle its largest payment and could top up as needed from real-time exchanges.

16 Ripple cost analysis, normalized by annual payment volume and vetted by active banking and consulting partners, 2016.

17 Liquidity reserves for inbound payments could be effected via virtual credit where possible, but the LCR may mandate additional HQLA coverage for these open credit lines, which is not covered in this model.

- **Foreign exchange:** As liquidity for XRP grows and spreads increasingly tighten, the net FX spreads in our model are assumed to remain unchanged from today. A bank is assumed to make its own markets against XRP held on its balance sheet.
- **Treasury operations:** Since using XRP eliminates the need for nostro accounts, banks simplify and reduce cash management and account maintenance costs up to 74 percent.[18] Operational overhead for fiat currency management also decreases as the number of currencies custodied decreases, though XRP itself still requires some overhead. Banks with more nostro accounts will have more to gain in treasury savings.
- **Payment operations:** These costs remain the same as with using Ripple. Local rail costs and costs associated with trade failures from issues other than settlement remain.
- **Basel III (LCR):** Ripple already minimizes in-flight periods, therefore Basel III costs do not change with XRP usage.
- **Currency hedging:** Currency hedging can be costlier initially due to the need to hedge a new, potentially volatile asset. This model assumes hedging is five times costlier than with liquid fiat currencies at present. Hedging costs will improve over time as XRP liquidity increases. Not all banks may wish to hedge.

Our respondent bank that processes $12 billion in international transactions a year (over 5 corridors with an average transaction size of $6,300[19]) can assume a conservative, estimated $10 million one-time cost of deploying Ripple and a payback period of just over 11 months.[20] As noted above, integration costs will vary depending on the bank size and infrastructure, but a bank's associated savings would accrue faster for a larger bank due to higher payment volumes, resulting in a comparable payback period to the model.

18 While nostro accounts are eliminated, banks must still maintain their relationship management agreements to meet compliance and business requirements.

19 BCG, *Global Payments 2015: Listening to the Customer's Voice* and SWIFT, https://www.swift.com/about-us/swift-fin-traffic-figures

20 Cost estimate includes vendor costs from Ripple and the bank's internal deployment costs.

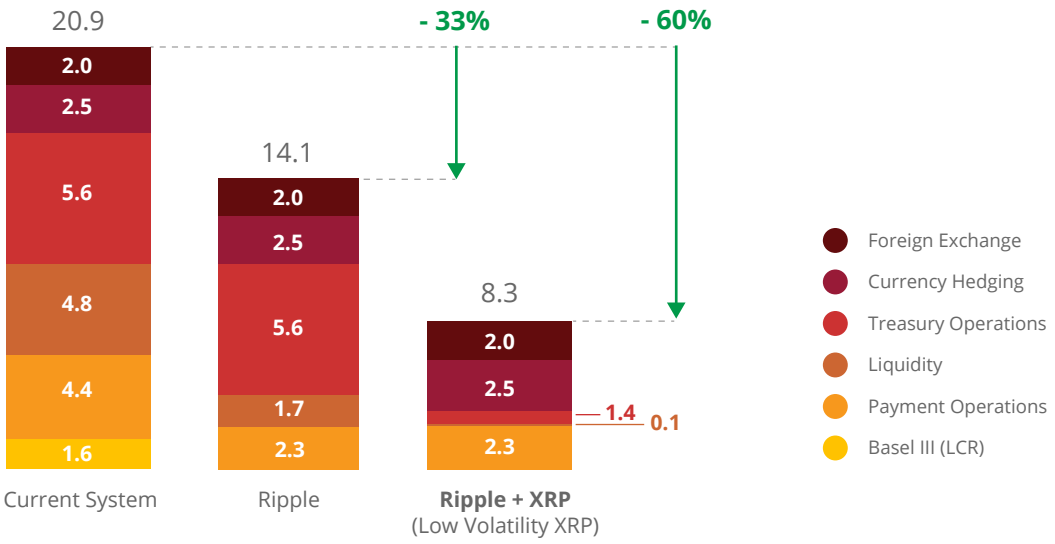
Model Assumptions

Margins have not been considered in this model since pricing will be decided by each participant in the value chain. Ripple plans to introduce programmatic distribution of XRP to market makers who use it to tighten spreads for cross-currency transactions. It is assumed that this XRP incentive program will compress the spreads of trades using XRP. Moreover, compliance (AML/KYC) costs do not change with a new settlement mechanism so they are unchanged in the model. One-time setup costs for XRP custody, including procurement and compliance, have not been considered in this model. When considering compliance requirements, digital assets are entirely traceable for regulatory oversight and law enforcement.

This model includes a conservative assumption of hedging costs with initially high volatility of XRP. However, institutional holdings and active trading of XRP can greatly reduce the volatility of XRP, significantly lowering the hedging costs. In a low volatility state, assuming the volatility of XRP is the same as that of a basket of liquid global currencies, costs can decrease an additional 3.8 bps ($10 billion system-wide)[21] or 60 percent compared to the current system, translating to total system-wide cost savings of over $33 billion annually with lower volatility of XRP.

International Payment Infrastructure Costs

Global Average Cost: 20.9 bps on payment volume, assuming low volatility of XRP



21 Ripple cost analysis, normalized by annual payment volume and vetted by active banking and consulting partners, 2016.

The Incentive Accelerator

Banks can capitalize on the reach and real-time speed XRP affords with hedging, regardless of XRP price. In *Building Network Effects on Ripple*, we alluded to programmatically distributing XRP to incentivize its use to offer better spreads on currency trades and payments. This forthcoming incentive program accelerates use of XRP as a universal bridge asset by rewarding offer size, time outstanding, and spread.

An incentive program stimulates XRP adoption in market making by rebating liquidity providers for quoting against XRP in the immediate term, thereby supporting spread reduction over time against a new asset. The incentive serves to offset volatility risk for market makers and provides an algorithmic distribution schedule for XRP. As adoption and use of XRP increases, so does its liquidity and price stability.

Most other digital assets are built on an anonymous transactor and validator model. As a result, those systems require very large amounts of funding for network security, which can only be paid with seigniorage. The overwhelming majority of mining revenues on the Bitcoin and Ethereum networks are used to pay for energy and equipment costs. Moreover, in such mining networks, an algorithm selects the validators, producing poor results for financial soundness and control, as in the case with Bitcoin's current validator distribution.[22]

By contrast, the Ripple consensus network powering XRP is a more viable institutional alternative. In the Ripple consensus network, the stakeholders select their validators, resulting in verified institutions as trusted validators with a more balanced geopolitical distribution.[23] The cost of securing Ripple's consensus network is thus much lower and seigniorage can be redirected to driving liquidity via the liquidity incentive program. Since seigniorage on the Ripple consensus network can be directed to liquidity providers to cover the cost of volatility risk, XRP is best positioned to drive institutional network effects and serve as the universal bridge asset in the Internet of Value.

Conclusion

Ripple presents a compelling long-term value proposition for all financial institutions seeking global reach. As infrastructure technology, Ripple enables banks to transact instantly and directly with any other bank partner around the world, optionally sourcing liquidity from a competitive market of third-party liquidity providers, with end-to-end visibility and confirmation of funds delivery. Taken together, Ripple and XRP minimize settlement risk and eliminate the need for banks to collateralize nostro accounts around the world, resulting in a lower total cost of settlement than ever before.

22 At time of print, China's four largest mining pools (i.e., F2Pool, Antpool, BW, and BTCChina) account for at least 70 percent of the bitcoin hashrate distribution: https://blockchain.info/pools

23 *The Ripple Protocol Consensus Algorithm*, 2014.

Specifically, Ripple can eliminate 6.8 bps or $18 billion[24] annually in liquidity and payment operations costs. Implementing Ripple with XRP, which further improves liquidity and treasury operations costs, can lead to a total savings of 8.8 bps or $23 billion[25] annually. As the volatility of XRP approaches that of a global currency basket, cost savings can amount to 12.6 bps or $33 billion[26] annually. Furthermore, as banks globally adopt Ripple and as liquidity costs are eliminated, there is a real possibility that the marginal cost of international transactions approaches zero. To accelerate market thickness and reduce volatility for XRP, Ripple will soon introduce an XRP incentive program to algorithmically rebate market makers who provide liquidity through XRP.

While this paper focuses on cross-border payments, Ripple and XRP offer the same benefits of cost savings and collateral elimination to all corners of the global financial system. Collateral usage has been on the rise in areas of particular relevance for financial stability. Trillions of dollars are trapped in collateral accounts to support repo and reverse repo transactions, offset counterparty risk in the derivatives market, and minimize credit risk in payment and settlement systems. To give just one example, in the $100 trillion-plus market for non-cleared interest rate swaps, $5 trillion in collateral was required to offset OTC counterparty risk in 2014, while the margin for cleared derivatives rose to $455 billion.[27]

Just as the redundancy of nostro accounts needed to service international payments for correspondent banks can be consolidated into one XRP pool, financial institutions can begin to consolidate collateral accounts needed to participate in different markets into single XRP positions that can provide one point of interchange to every other financial instrument. Ripple technology can then eliminate settlement risk and reconciliation costs as transactions move between systems, releasing billions of dollars annually back into the economy while strengthening financial stability.

In the end, the exciting potential of the new technology lies not just in the cost savings banks can extract from the old system but the possibility to enable new models and businesses entirely. In the world of payments, a technology solution like Ripple and XRP that creates unprecedented cost-efficiency and global reach makes use cases like global disbursements, international cash pooling, low-value remittances and even micropayments not just possible but profitable. It's these new business models that will catalyze development of the Internet of Value.

24 Applying 6.8 bps in savings on volume to $26.5 trillion in annual cross-border payments volume (BCG, *Global Payments 2015: Listening to the Customer's Voice*) for Ripple without XRP.

25 Applying 8.8 bps in savings on volume to $26.5 trillion in annual cross-border payments volume (BCG, *Global Payments 2015: Listening to the Customer's Voice)* for Ripple and XRP.

26 Applying 12.6 bps in savings on volume to $26.5 trillion in annual cross-border payments volume (BCG, *Global Payments 2015: Listening to the Customer's Voice*) for Ripple with low volatility of XRP.

27 DTCC, *The Impact of Margin Requirements for Non-cleared OTC Derivatives in the Fund Management Industry*, January 2016.

About Ripple

Ripple provides global financial settlement solutions to ultimately enable the world to exchange value like it already exchanges information – giving rise to an Internet of Value (IoV). Ripple solutions lower the total cost of settlement by enabling banks to transact directly, without correspondent banks, and with real-time certainty of settlement. Banks around the world are partnering with Ripple to improve their cross-border payment offerings, and to join the growing, global network of financial institutions and market makers laying the foundation for the Internet of Value.

Ripple is a venture-backed startup with offices in San Francisco, New York and Sydney. As an industry advocate for the Internet of Value, Ripple sits on the Federal Reserve's Faster Payments Task Force Steering Committee and co-chairs the W3C's Web Payments Working Group.

Contact Us

For institutional XRP purchases or for market making questions, please contact us at mm@ripple.com.

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