The Evolution of Global Instant Payment Infrastructure

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Global instant payment and its underlying infrastructure evolution are commonly referred to as fragmentation, with the proliferation of local instant payment systems, or consolidation, with few global instant payment systems prevailing. Even though these evolution views and related management practices are valuable, they emphasize linear and conflict-oriented evolution perspectives that undermine the possibility of progressive fragmentation and consolidation. Conversely, this paper introduces three mechanisms, transactional, modular, and institutional, as well as three related qualities, service layers, service granularity, and service integration, that characterize the evolution of global instant payment infrastructure. Drawing upon four global payment case studies, the paper illustrates evolution patterns that emerge with the mutual and reinforcing influence between these evolution mechanisms and qualities. We find that the evolution of global instant payment infrastructure is taking place with the creation, and integration, of context-specific payment services, and the reduction of layers in payment services. This perspective revisits the fragmentation vis-à-vis consolidation arguments in favor of evolution patterns, which account for progressive fragmentation and consolidation of global instant payment infrastructure.

Keywords: *Global Instant Payment, Infrastructure, Technology, Evolution, Case Study*

Introduction

At the core of today's global commercial activities are global payments and their underlying infrastructure (Scott and Zachariadis, 2012). Recently, with changes in customer demand, technological developments, and government interventions, there is a constant quest for instant payments (Bech et al., 2017). Hartmann et al. (2017) even argue that instant payment is the 'new normal.' However, evolution in infrastructure underlying global instant payment is continuously viewed in relation to fragmentation, as local instant payment systems develop, or consolidation, as few global instant payment systems prevail (BIS, 2018). Although this fragmentation vis-à-vis consolidation argument guides, it also leads to linear and conflict-oriented evolution views that undermine the progressive and dynamic fragmentation and consolidation of infrastructure (Bech et al., 2017; Hartmann et al. 2017). To this end, we ask:

What evolution patterns drive global instant payment infrastructure?

Inspired by Henderson and Clark's (1990) framework, we unravel three evolution mechanisms—transactional, modular, and institutional—as well as three related evolution qualities—service layers, service granularity, and service integration. Through four case studies, we illustrate evolution patterns driving global instant payment infrastructure by

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unfolding the relationship between these evolution mechanisms and qualities. We find that the evolution of global instant payment infrastructure is driven by higher efficiency in payment processes, which enable a reduction of processing layers in payment services. Moreover, it seems that while the creation of context-specific payment instruments enables more granular payment services, the structuring and sharing of payment data are driving the integration of granular payment services. Following these findings, we discuss the adoption of instant payment services, platform strategies for managing payment organizations, and standards to balance power relations and maintain harmony across the financial industry. Before presenting these evolution patterns and case studies, we first introduce a working definition of instant payment, discuss global payment infrastructure, and present the theoretical underpinnings of the paper.

Research Background

Instant Payment

Although instant payments are globally ubiquitous (Hartmann et al., 2017), different perspectives are taken across the financial industry with regard to the definition of instant payment. The term 'instant' is broadly related to the ongoing execution of transactions in real time and on a continuous basis (Guo et al., 2015). Thus, across the financial industry, the vast majority of views relate 'instant' to the traceability offered by continuous feedback over the payment process and to the rapid clearing of funds, which make funds available to payees without necessarily accounting for the settlement of transactions (Bott and Milkau, 2016). However, a few recent cases, such as the European Central Bank's new TARGET Instant Payment Settlement (TIPS) and Australia's New Payments Platform (NPP), also relate instant payment to the settlement of transactions and their predictable execution in central bank money (ECB, 2010).[2]

Following these ideas, and with the aim to provide an overarching definition of instant payment, we build upon a technical and an organizational view of 'real time,' which encompass the different approaches to instant payment across the financial industry. From a technical perspective, real time is a system response that is 'just in time' for its environment, allowing for the continuity of operations as explored in real-time programming languages such as Erlang (Martin, 1965; Shin and Ramanathan, 1994). The continuity of operations refers to meeting deadlines that require a level of predictability as well as control (Shin and Ramanathan, 1994). In consequence, this view of real time relates to the control of an environment in which real time accounts for a predictable response that takes place at the right time for a system to continue its operations. For example, as illustrated in Figure 1, predictability can be related to deducing central banks' system responses or to the predictable response of banks, and subsequently central banks, from an individual end-user perspective.

In contrast to the technical perspective on real time, an organizational perspective approaches real time as measuring 1/10th of the total time it takes to complete a task or an event (Hoebeke, 1990; Jaques, 1964, 1989). From this perspective, real time is the meaningful interpretation of an event with regard to its perceived completion time by the involved parties. As such, a real-time payment only needs to provide a perception of instant payment in the foreground, with no

[2] Settlement refers to "the completion of a transaction or of processing with the aim of discharging participants' obligations through the transfer of funds and/or securities." In contrast, clearing refers to "the process of transmitting, reconciling and, in some cases, confirming transfer orders prior to settlement" (ECB, 2009, p. 5, 24).

regard to the actual process in the background. The meaningful interpretation of events, however, is limited by people's cognitive skills. As exemplified in Figure 1, the sense of access to a payment process taking place through a real-time gross settlement system implies the traceability of central banks and banks' payment processing to give individuals such sense of access. Drawing on technical and organizational conceptualizations of real time, we define instant payment as *a traceable and predictable payment instrument in which funds are made available to end consumers just in time for the payment context.*

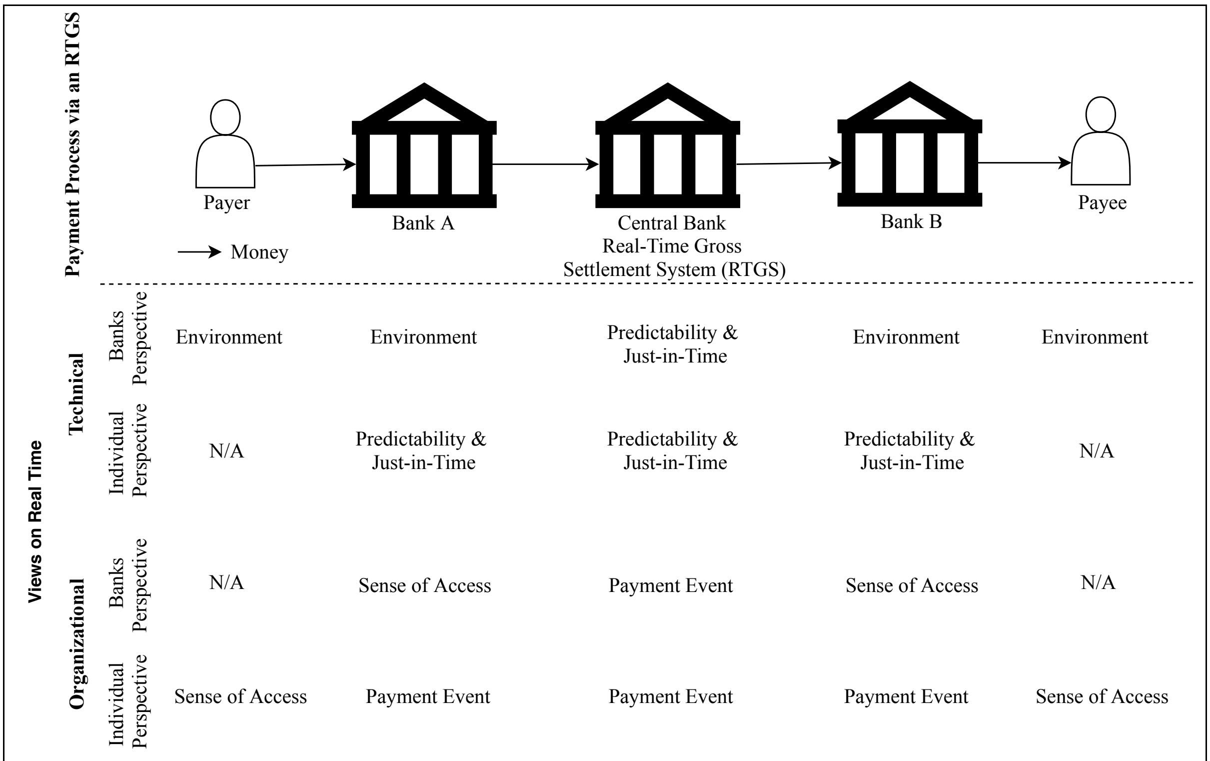


Figure 1. Illustration of Payment Process and Real Time Views[3]

For example, as presented in Table 1, a face-to-face cash payment that takes place with the use of a common currency can be viewed as instant. Conversely, while a direct debit payment taking place under the same conditions can be delivered just in time to end consumers, in cases with insufficient funds, the instrument does not provide traceability or predictability in terms of assurance of payment finality. In the case of e-money payments crossing different payment platforms, more uncertainty arises, as traceability, predictability, and the availability of funds to end consumers do not follow a common standard and are localized and dependent upon the payment platforms mediating the exchange. However, emerging credit transfer instruments following the SEPA Instant Credit Transfer scheme, as is the case with TIPS, seem to allow for properties needed to maintain connectivity across payment platforms and banks. These instruments' increased traceability and settlement speed take place in central bank money within a 10 second time window.

[3] The payment process example is adapted from "The Payment System" (ECB, 2010, p. 26).

Table 1. Examples of Instant Payment				
Instrument	**Context**	**Traceability**	**Predictability**	**Just-in-Time**
Cash	Face-to-face transaction between payers and payees within the same country and with the use of a common currency.	👍	👍	👍
Direct Debit	Transaction at a distance between payers and payees with the use of a common currency.	–	–	👍
e-Money	Transaction at a distance between payers and payees within the same country, with the use of a common currency, and across different e-money platforms.	–	–	–
Credit Transfer (TIPS)	Transaction at a distance between payers and payees within Europe, in Euro, and based on the SEPA instant Single Credit Transfer scheme ("SCT Inst").	👍	👍	👍

Global Payment Infrastructure

Global payment infrastructure is complex. It underlies global payments between individuals, businesses, and governments that take place across multiple jurisdictions and, in some cases, currencies (BIS, 2018). For example, global payments can cross international borders using a common currency (e.g., within the Euro area) or cross currencies and countries, as illustrated in the top right quadrant of Figure 2. In contrast, these transactions are enabled and settled through wholesale payment systems between banking institutions that are geared toward high-value/low-volume payments (ECB, 2010). This distinction between the extent of value and volume, however, seems to become blurred with the development of infrastructure underlying global payments.

With the need for speed and corresponding drive towards global instant payment, real-time gross settlement systems and automated clearinghouses within countries and across regions are bundling the clearing and settlement of transactions. The ubiquity of e-commerce, changing consumer behavior, emerging technologies, increased regulation, and entrance of new competitors continuously drive change in infrastructure underlying global payments (Gomber et al., 2018; Guo et al., 2015). New payment platforms are being created to extend or replace the services provided by established payment organizations and their prevailing practices regarding how payment data are created and shared. For instance, the P27 project – a collaboration between six Nordic banks – is developing a new payment system that replaces many of the national legacy systems and ensures real-time clearing and settlement across the Nordics.

Accordingly, global payment infrastructure, defined as *the heterogeneous and enduring payment institutions, organizations, and related processes and technologies that underly global payments*, is evolving (Hanseth and Lyytinen, 2010; Kazan et al., 2018). However, evolution views in infrastructure underlying global instant payment center on fragmentation or consolidation. While fragmentation views emphasize the proliferation of non-interoperable local payment systems, consolidation views highlight the few global payment systems prevailing (BIS, 2018). These assumptions lead to linear and conflict-oriented evolution views as well as related practices for the management of infrastructure evolution (Bech et al., 2017; Hartmann et al. 2017). Even though these perspectives and related management practices are valuable, they also undermine the possibility that fragmentation and consolidation take place progressively and dynamically rather than periodically, linearly, or through isolated systems.

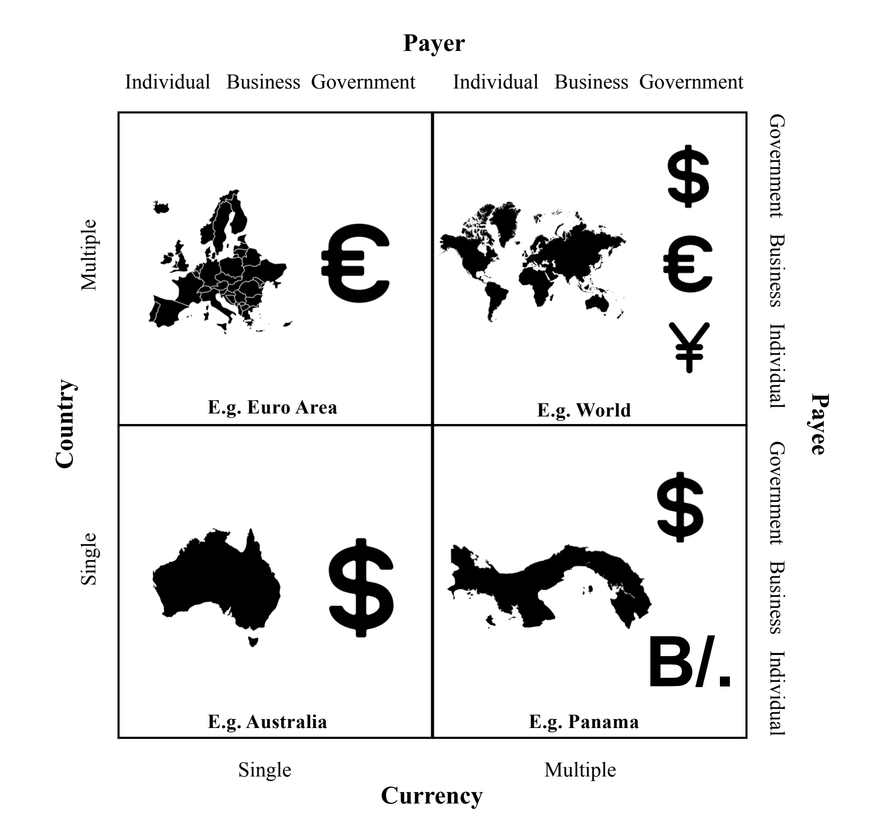


Figure 2. Payment Contexts

Theoretical Underpinnings

Evolution Mechanisms

To understand what evolution patterns drive global instant payment infrastructure, we draw upon three evolution mechanisms inspired by Henderson and Clark's (1990) framework while adapting their ideas to an infrastructure perspective. Their framework presents incremental, modular, and architectural innovation taking place as a result of changes in the components of physical products as well as linkages between them. Accordingly, as shown in Table 2, we follow three mechanisms – namely, transactional, modular, and institutional – and the interactions among them, which illustrate the evolution of global instant payment infrastructure. A transactional mechanism represents the constant increase in payment process speeds enabled by incremental improvements (Abernathy and Clark, 1985). In contrast, a modular mechanism illustrates the creation of money platforms as well as 'smart monies' that emerge with the digitalization of money (Baldwin, 2008; Simon, 1962, 2002). Lastly, an institutional mechanism represents the constant creation of rules and standards for sharing and structuring of data across different payment services (DiMaggio and Powell, 1983).

Table 2. Evolution Mechanisms of Global Instant Payment Infrastructure

Mechanism	Description	Theoretical Underpinnings
Transactional	The increase of current payments processing speed.	Incremental change taking place on current processes and technologies leads to higher versatility as well as capacity (Abernathy and Clark, 1985).
Modular	The creation of digital money platforms along with payment instruments across different payment contexts.	Modularity theory illustrates how complex systems unbundle into modules that group tasks – in this case payments – to manage complexity and facilitate change (Baldwin, 2008; Simon, 1962, 2002).
Institutional	The creation of rules for structuring and sharing data across multiple payment services.	As industries change, organizations tend to become more aligned with overarching regulatory and standardization frameworks (DiMaggio and Powell, 1983).

Transactional Mechanism. The transactional mechanism relates to the increase of current payment process speeds. Furthermore, we witness an increase in market efficiencies as well as growth in computing processing power that enable this transactional mechanism in support of the evolution of global instant payment infrastructure (Guo et al., 2015; Hartmann et al., 2017; Moore, 1965).[4] More specifically, current payment cycles are becoming faster, bundling high-value/low-volume transactions and low-value/high-volume transaction as well as clearing and settlement (e.g., TIPS credit transfers) (Bech et al., 2017; Guo et al., 2015; Hartmann et al., 2017; Salmony, 2017; Wandhöfer and Casu, 2018). In consequence, incremental change in current payment standards, practices, and knowledge drive improvements in the scale and speed of payment services (Abernathy and Clark, 1985; Henderson and Clark, 1990).

Modular Mechanism. The modular mechanisms illustrate the emergence of digital networks and platforms that offer the opportunity to add new instruments to the payment process across specific payment contexts. As money continues to be digitalized (Hedman, et al. 2017), more payment services are developed (Hedman and Henningsson, 2015; Kazan et al., 2018; Parker et al., 2016). Similarly, this mechanism highlights the unbundling of payment services (Baldwin, 2008; Simon, 1962, 2002), which facilitate instant payments within specific contexts. Initiatives on central bank digital money also illustrate this mechanism (Sveriges Riksbank, 2018a; b).

[4] Due to the constant increase in communication networks and platforms (e.g., WhatsApp), consumer behavior is changing, leading to higher expectations for 'instant' services. Moreover, government initiatives and regulations are also driving accessibility and efficiency in global payments and their underlying infrastructure. This is especially relevant as a more efficient local and global payment infrastructure is argued to result in economic gains within and across countries (Guo et al., 2015; Hartmann et al., 2017).

Institutional Mechanisms. The institutional mechanism illustrates changes in linkages across organizations – that is, changes in how payment data are created, validated, structured and shared across institutions, as well as the associated regulations and standards that over time make organizations look alike (DiMaggio and Powell, 1983). The PSD2 regulation is one example of this institutional mechanism, as the regulation forces banks to open up their local infrastructure to third party payment service providers.

Evolution Qualities

Related to these evolution mechanisms of global instant payment infrastructure are three qualities. As shown in Table 3, we refer to three evolution qualities – namely, service layers, service granularity, and service integration. Service layers refer to the hierarchy of layers in infrastructure (Gao and Iyer, 2006; Yoo et al., 2010), which is illustrated by the payments services that unfold after a low-value global payment takes place (e.g., a remittance). In contrast, service granularity refers to the specificity and variety of payment services in infrastructure (Kallinikos et al., 2013), exemplified by the variety of payment instruments across different contexts, such as card payments (Visa or MasterCard), direct debits (SEPA Direct Debit), or direct credits (SEPA Credit Transfer). Lastly, service integration refers to the similarity of information across organizations (Normann and Ramirez, 1993); such integration occurs as a result of the continuous distribution and standardization of payment data across payment services.

Table 3. Evolution Qualities of Global Instant Payment Infrastructure

Quality	Description	Theoretical Underpinnings
Service Layers	The hierarchy of payment service layers.	Digital services across industries are organized through hierarchical layers, similarly to software layers (Gao and Iyer, 2006; Yoo et al., 2010).
Service Granularity	The specificity and variety of digital payment services across contexts.	As services become digital, they become more granular in their composition, supporting a more varied range of functions (Kallinikos et al., 2013).
Service Integration	The distribution of payment data and its standardization across multiple payment services.	Services become integrated by bridging with other services' technologies and knowledge, ultimately enabling the creation of new value (Normann and Ramirez, 1993).

Service Layers. Industries that are highly reliant on digital technologies, like the financial industry, tend to be organized with layers of services (Gao and Iyer, 2006; Yoo et al., 2010). In turn, service layers become hierarchically loosely coupled, allowing for different types of payment services to take place at each layer. An illustration of this outcome can be seen in the division and the dependencies that exist between low-value/high-volume and high-value/low-volume payment services. When a low-value/high-volume payment is created, it unfolds other payments at other service layers, which are ultimately settled at a central bank layer. Accordingly, different payment layers fulfill different communication functions to facilitate the movement of money across countries, while dependencies might be tight or loose across payment layers. For example, as payment services at lower layers become necessary to fulfill low-value payments across countries, they can create dependencies for services at a higher layer as these are not fitted to fulfill the same functions. In the same way, lower layers might depend on higher layers to fulfill different payment functions that would otherwise not be possible. Overall, this quality can be viewed as the hierarchy of payment service layers, in which dependencies across layers might be loose or tight.

Service Granularity. In contrast to service layers, service granularity illustrates the specificity and variety of digital services (Kallinikos et al., 2013; Yoo et al., 2010). As services in higher layers become accessible and flexible, new services emerge across layers to fulfill a variety of functions. In turn, global payment services become more country-specific. Service granularity differs from service layers in that one layer across can fulfill one specific function or be more granular and fulfill multiple functions. The quality of service granularity can be illustrated by the range of payment services that are supported by banking institutions, which facilitate payments across different contexts (e.g., payments between individuals, businesses, and government agencies as well as across countries and currencies). Moreover, this quality is enabled by the constant digitalization of payment services, which offer more pathways for the initiation of global payments (Kallinikos et al., 2013; Yoo et al., 2010).

Service Integration. Lastly, service integration refers to similarities and consistencies of data across different payment services (Normann and Ramirez, 1993). As more payment data become distributed and accessible across multiple organizations, payment information becomes more integrated across different services. In turn, service integration differs from service granularity in the sense that it illustrates payment services' data as being distributed across multiple payment service providers (Guo and Liang, 2016). Moreover, in contrast to the service layers, the distribution and consistency of payment data across services might (or might not) facilitate interdependencies between those services. This quality can be illustrated with PSD2, which enforces the sharing of data across different payment services.

Case Study Research Design

To examine the evolution patterns driving global instant payment infrastructure, we report on empirical findings across four case studies. These cases are selected following the outlined theoretical underpinnings (Flyvbjerg, 2006; Wynn and Williams, 2012; Yin, 2018). Moreover, we focus on case companies working with low-value global payments as these cases provide a unique window for examining the evolution patterns that drive global instant payment infrastructure. The high market price of low-value global payments and their continuous innovation illustrate activity and change in their underlying infrastructure (Gomber et al., 2018; The World Bank, 2018). Further, low-value global payments draw our attention, not only because they provide a window for this study, but also due to their relevance in the development of societal needs (Gomber et al., 2018; United Nations, 2015). [5]

[5] Remittances, for example, are global payments "made or received by resident households to or from other non-resident households" (United Nations, 2006, p. 2), commonly made across currencies and to developing countries (see the upper-half section of Figure 2). More efficient remittances are argued to contribute to 12 of the 17 sustainability development goals outlined by the United Nations for 2030 (de Vasconcelos et al., 2017; United Nations, 2015). More than 70% of remittances are sent to developing countries, accounting for the majority of the external source of income in these countries (The World Bank, 2018). These payments have a significant impact in the reduction of poverty and inequality, and a 10% per capita increase in remittances can lead to a 3.5% decrease in the share of poor people in that particular population (Acosta et al., 2008). The volume of these payments is estimated to grow to USD 6.5 trillion by 2030, and cost targets for the United

With this background, the first case study is about Quick Remittance Services (QRS)[6] that offers a global payment platform from the United Kingdom (UK) to Latin America as well as payments across European (EU) countries. The platform partners with other platforms serving their local countries to fulfill the payment service. This approach differs from 'closed' platforms that aim to control the payment service end to end (e.g., Western Union). Thus, the platform serves as a unique case for generalizing about global payments and their underlying infrastructure. As shown in Appendix B, data were collected through field observations, interviews, and secondary documentation. We first analyzed the secondary documentation of integrations between the platform and 17 of its partners to review the data structure of transactions, which can be related to the two evolution qualities of infrastructure, namely, service integration and service granularity. Subsequently, observations and interviews were conducted to validate these findings and review the service layers quality through the money flows across QRS and its partners. Lastly, additional secondary sources, as well as observations across industry conferences, were used to validate the case findings further.

Three additional cases were selected following the evolution mechanisms presented in previous sections. These cases are SWIFT, Aryze, and MakerDAO.

SWIFT is a global member-owned cooperative and the world's leading provider of secure standardized financial messaging services between financial institutions (Scott & Zachariadis, 2012). Its messaging platform connects more than 11,000 banks (and securities organizations, payment systems, and corporate customers) in more than 200 countries and territories. In contrast, Aryze is an e-money platform start-up developing digital money services through digital assets backed by fiat currency with the aim of supporting global payments. Lastly, MakerDAO is an open source organization built on Ethereum[7] that aims to facilitate accessibility to payment services with a USD paired digital asset while relying on a non-banking institutional organization.

Data for these three cases were also collected through observations, interviews, and documents. The analysis followed the core principles behind the service visions of each organization, as they provided different perspectives on the evolution of global instant payment infrastructure. For example, we focus on SWIFT's ability to build upon existing processes and increasing payment cycle speeds, MakerDAO's emphasis is on maintaining an open system without a central point of control through the use of Ethereum, and Aryze's focus is on the creation of a digital payment platform and a new payment instrument.

The different perspectives provided by SWIFT, MakerDAO, and Aryze enable gaining an understanding of the evolution patterns driving global instant payment infrastructure. These organizations are working to facilitate global instant payments, and their different approaches facilitate unraveling the relationship between the different evolution mechanisms and qualities mentioned above. Moreover, studying these three cases in relation to prevailing global payment services and their underlying infrastructure, as exemplified with the case of Quick Remittance Services, depicts the present evolution process of global instant payment infrastructure. In the next sections, we detail this evolution process and discuss implications for financial and regulatory institutions.

Nations average 3%, with reports presenting a current cost average of 7% (de Vasconcelos et al., 2017; The World Bank, 2018).

[6] Fictitious name.

[7] Ethereum is an open source blockchain-based distributed computing platform that features smart contracts scripting functionality and public consensus mechanism (Wood, 2014).

Findings

Global Payment Infrastructure

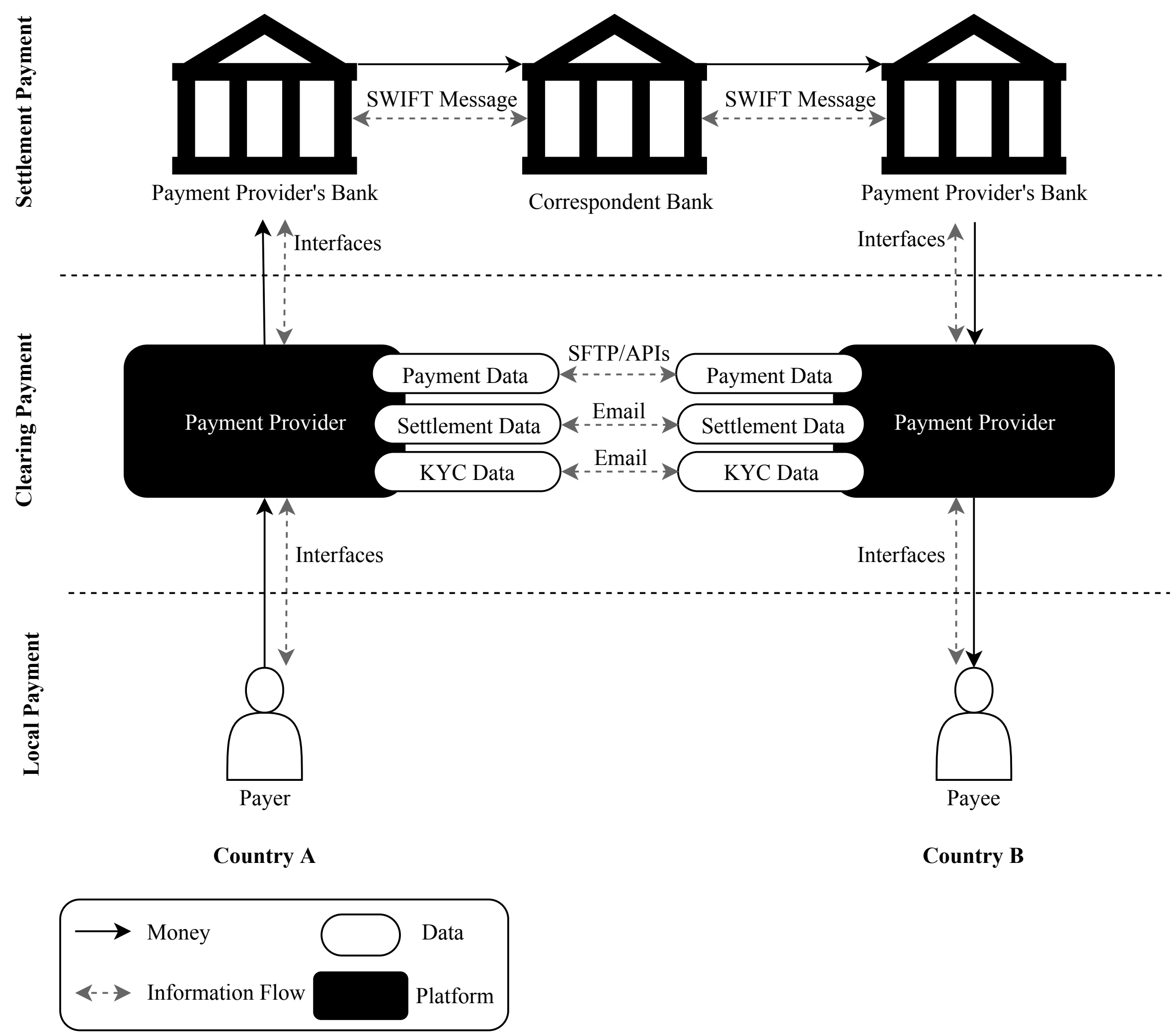
Quick Remittance Services (QRS) offers payment transfer services while operating between the interbank global payment layer and the local currency payment layer. QRS partners with platforms in different countries (which we call partner platforms) and targets low-value/high-volume transactions, which are less cost-effective for users of traditional banking institutions. In turn, QRS benefits from the accumulation of small payments while reducing its use of the inter-bank global payment systems to just the required transactions. The transactions that are managed by QRS are mainly to and from South American countries such as Peru, Ecuador, Colombia, Bolivia, Panama, Argentina, and Venezuela. However, it also offers services to the Dominican Republic, the United States, Nigeria, and Senegal and across the European Union through the use of SEPA services.

The data transmission of QRS takes place through the use of application programming interfaces (APIs) and Secure File Transfer Protocol (SFTP). There is no data standard followed across the integrations reviewed, and the lead server supporting the communication varies as well. In addition, the data transmitted also varies across the different partners, as some countries require more information for compliance procedures than others, which might lead to tension between sender and receiver countries. For example, Spain requires all transactions to be sent with an identification number. Lastly, data transmission takes place in most cases every thirty minutes, and in some cases within just a few minutes, to facilitate the availability of funds.

Regarding the settlement of payments, the global platform and its partners account for the settlement of end-user transactions once their partnering banks credit their accounts. With this basis, the platform studied specializes in exchanging from the different sending currencies to United States Dollars (USD) or Euro (EUR), which are the common currencies accepted for settlement by its partner platforms. In turn, the partner platforms specialize in exchanging from USD and EUR to the local currencies in their markets. As such, the settlement of transactions from QRS perspective takes place through the clearing of funds in banking institutions in currencies such as USD or EUR, which provide higher levels of efficiency across the inter-bank global payment market. To increase the speed of local payout payments, however, QRS prefunds its partners' accounts or uses a credit channel offered by its partners. This process can lead to high costs of capital: *"very often the cost of money transfer may include the cost of capital because you have to fund the money in advance"* (COO at UAE Exchange).

In QRS, the reconciliation part of payment transfers takes place through email. The finance departments of the platform and its partners balance their accounts, taking into consideration the transactions sent and received by each platform. For most transactions, profits and costs are agreed upon rapidly through automated reports generated by each of the platforms' systems. However, in the few cases in which transaction amounts vary, a lengthy and costly manual reconciliation process takes place until the transactions with discrepancies are found and reconciled. Among these transactions that differ across the platforms' balances are settlement payments for which additional fees are applied in the payment process and transactions that are canceled and re-sent, resulting in the application of different exchange rates.

Overall, as illustrated in Figure 3, infrastructure underlying global payments consists of connections between platform-based organizations as well as related processes, technologies, and institutions that take part in the creation of information and underlying exchange it facilitates. Payment information represents a liability across different payment organizations that also rely on other payment organizations sitting at a higher hierarchical layer (e.g., banks). These layers underly different types of global payments, which incur different levels of risks. Accordingly, we further use the case of QRS to depict the three evolution qualities, service layers, service granularity, and service integration, of global instant payment infrastructure.



Note: Money is also moved from Country B to Country A allowing the payment platforms to settle only the difference in payments' values.

Figure 3. Global Payment Infrastructure

Service Layers. Regardless of the type of global payment, three service layers enable the transfer of money:

- *Settlement payment layer*: representing the accounts reconciliation between two global payment platforms.
- *Clearing payment layer*: representing the exchange of transactions' data between two platforms involved in the process.
- *Local payment layer:* representing the transactions from payers to the platform providers as well as from the platform providers to payees.

The Quick Remittance Services case demonstrates these different service layers. The case shows the movement of money across borders, as organizations in each of the layers specialize in different payment contexts. However, in the cases in which the upper layer of the global payments does not fulfill its services rapidly enough, additional constraints emerge in the system. For example, when QRS settles transactions, payments can take up to 3 days to be cleared at the payout platform's bank. This waiting time generates additional credit risk, as more working capital is needed for platforms operating at this middle payment layer. For every 1 GBP received from a client, the QRS would need to have another 1 GBP available as prepayment or credit channel with the payout platform, as well as another 1 GBP safeguarded on a separate account (e.g., a segregated bank account) until the global payment is paid out. The latter is a regulatory requirement that can be managed if the local payment is efficiently cleared and made available in the sending platform's bank, or if the global payment is promptly paid out.[8]

Service Granularity. In QRS, service granularity is seen from the platform's reachability and flexibility in payout options through its different partners. The payout options include bank deposits, cash payments, and even home delivery in some countries (e.g., Dominican Republic). On average, each of the 17 system integrations between the platform and its partners, added 505 payout locations for cash payments, 158 banks for bank deposit payments and 47 cities where the payment is offered as home delivery (in cash). As illustrated in the appendix A, the specificity of the payment service to each country would vary depending on the local needs. For example, some countries (e.g., Dominican Republic) would rely on a higher number of home delivery transactions in which cash transactions are delivered to payees' home addresses. In addition, some payments would also vary depending on the compliance requirements of each of the countries. While some countries require an identification number to be sent with the transaction, others do not. Furthermore, for some payments, the payee would also require a code number to identify the transactions. These examples illustrate the granularity of services across global payments.

Service Integration. Although QRS and its partner platforms did not follow a common data standard, in practice, they followed similar approaches to structure the data communicated (e.g., see Appendix A). Consequently, data sharing between global payment platforms in the middle layer is limited to only the necessary information. Thus, constraining service integration across this layer of global payments. This illustrates a different level of service integration in comparison to the settlement layer, where a common data structure is followed.

Evolution Mechanisms of Global Instant Payment Infrastructure

In the evolution of global instant payment infrastructure, different mechanisms are involved. We draw upon the innovation projects driven by SWIFT, Aryze, and MakerDAO, which aim to facilitate instant payments and illustrate their underlying infrastructure change. As shown in Table 4, we guide the analysis of the findings with the three mechanisms previously discussed – transactional, modular, and institutional – to develop an understanding of the evolution patterns driving global instant payment infrastructure. Before presenting these findings in the

[8] The majority of global payments reviewed are paid out in cash, making it difficult for same-day payments. About 90% of low-value global payments to developing countries are estimated to be paid out in cash (de Vasconcelos et al., 2017).

next subsections, we further introduce the visions of the innovations driven by SWIFT, Aryze, and MakerDAO.

Table 4. Evolution Mechanisms found through SWIFT, Aryze and MakerDAO

Organization	Transactional	Modular	Institutional
SWIFT	👍	–	👍
Aryze	–	👍	–
MakerDAO	–	👍	👍

SWIFT illustrates the transactional as well as institutional evolution mechanisms of global instant payment infrastructure. The company's recent work with instant payments, both within countries (e.g., Australia's New Payments Platform - NPP) and across regions (e.g., Europe's TIPS), illustrates the transactional mechanism. These approaches enable instant payments by bridging the clearing and settlement of payments in central bank money. Furthermore, there is no batching or opportunity to bulk payments. Instead, individual payments are executed as soon as there is an instruction initiating them. Both approaches build upon existing systems and practices to integrate the clearing and settlement process of payments while being architected slightly differently. While clearing and settlement in TIPS are orchestrated centrally, this orchestration is distributed between financial institutions in Australia's NPP, where only the settlement information is handled centrally.

In addition, SWIFT also illustrates the institutional mechanism. Changes in the structure of data as well as sharing practices for global payments, are taking place with the development of the company's GPI service. SWIFT's GPI service is an initiative to improve global payment services. With GPI, global payments going through various corresponding banks are traced. As a result, the service is improving transparency. GPI allows payer's banks and payee's bank to know where, in the chain of banks, a payment is being processed and the charges taken by each banking institution.

In contrast to SWIFT, Aryze is a financial e-money institution start-up in its early stages. Aryze is aiming to create *"digital cash, more commonly known as stable coins,"* for instant payments. More specifically, CEO Jack Nikogosian describes the project as follows: *"we are essentially tokenizing fiat bonds (...)",* i.e., using existing infrastructure underlying global payments. Aryze's co-founder and community manager explains that they need collaboration with "*a corresponding bank that has a banking license and can process foreign exchange"* to settle the payment. So, Aryze idea is to create new payment instruments in collaboration with private institutions while also using open blockchain networks to further audit transactions. This is an illustration of a modular development that may create new flexible instant payment instruments that facilitate global payments across different contexts.

Similarly, MakerDAO illustrates the modular mechanism, and also the institutional mechanism. The organization develops a new payment instrument (digital asset) that is paired to USD. They are providing a stable blockchain-based payment instrument that mitigates the prevalent volatility that hinders the adoption of other blockchain-based payment instruments. In the process of creating stability and accessibility, however, MakerDAO also illustrates an institutional mechanism. This mechanism is generally described by the organization's head of product, as *"creating a central bank on the Blockchain,"* since stability is continuously maintained through an autonomous system of smart contracts specifically designed to respond to market dynamics. More specifically, the stability of the payment instrument is maintained through coded rules functioning as market incentives that maintain a stable value while relying on the Ethereum network for the validation of transactions. Similarly, changes in these coded rules and incentives also follow a voting governance system where MakerDAO stakeholders validate changes in the protocol. While not efficient in all contexts, these MakerDAO payment services are seen as valuable in unstable regions with low stability and high inefficiencies (e.g., some regions in South America, where the organization supports low-value payments).

Evolution Patterns driving Global Instant Payment Infrastructure

The evolution mechanisms relate to the evolution qualities of global instant payment infrastructure. The transactional, modular, and institutional mechanisms reinforced and are reinforced by the service layers, service granularity, and service integration qualities. This relationship between evolution mechanisms and qualities illustrates some evolution patterns driving global instant payment infrastructure, which are further discussed below.

Transactional Mechanism and the Reduction of Service Layers. The transactional mechanism relates to changes in the process that enables the payment service. As payment cycle speeds increase, the rapid and constant execution of transactions seems to bundle high-value/low-volume payment services and low-value/high-volume payment services. As such, the transactional mechanism relates to the consolidation of payment services across all layers and, over time, to their standardization and simplification. As inferred from the QRS case, the transactional mechanism can enable better working capital management and, in consequence, the scaling of global payment services. This scaling of services can drive consolidation across all service layers, but in particular, in the clearing payment layer. At the same time, the transactional mechanism also seems to enable organizations at a higher service layer to scale their service and fulfill services at lower service layers. For instance, a settlement service would not only be for high-value clearing but also low-value clearing. As illustrated in Figure 4, over time, the reduction of service layers also triggers and enables improvements in payment process speeds in a recurring cycle, or pattern, that drives the evolution of global instant payment infrastructure. Accordingly, we posit that:

> ***Proposition 1****. Incremental improvements of current payment processes reduce service layers.*

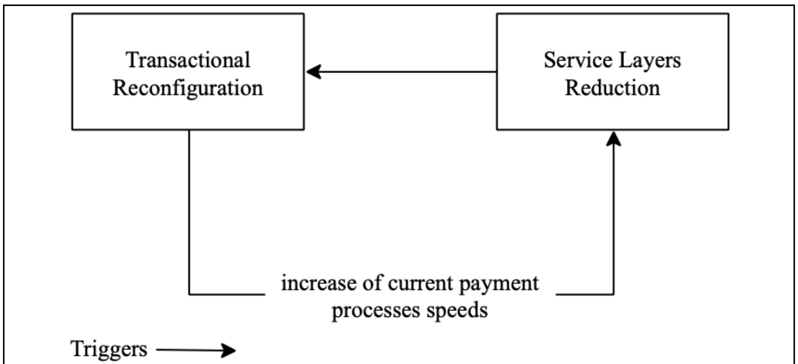


Figure 4. Transactional Mechanism and Service Layers

Modular Mechanism and the Increased Granularity of Services. In contrast to the transactional mechanisms, modular change relates to the granularity of global payment services. As money and payment services become more digital, they also become more flexible to suit narrow payment contexts, as exemplified by the growing plethora of payment services and payment instruments. In this process, however, a loss of cohesion across payment services of different payment platforms can emerge as the increasing levels of flexibility in these new payment instruments also 'close the loop' around them: *"we can make what we call programmable money. In this ecosystem, I could go and buy a liter of milk in the supermarket, and the supermarket could use these funds instantly to pay their expenses. They could even pay out salaries in the same ecosystem so that we will have this closed loop of transactions without money ever having to move. Not only [does it not] have to be moved, it doesn't have to be liquidated from the bond in which it is placed"* (Aryze, Observations). As illustrated in Figure 5, the granularity of services at the same time drives the modular mechanism as more context-specific payment services become necessary. Following this recurring cycle, or pattern, that seems to be taking place, we posit that:

Proposition 2. *The constant digitalization of money increases service granularity.*

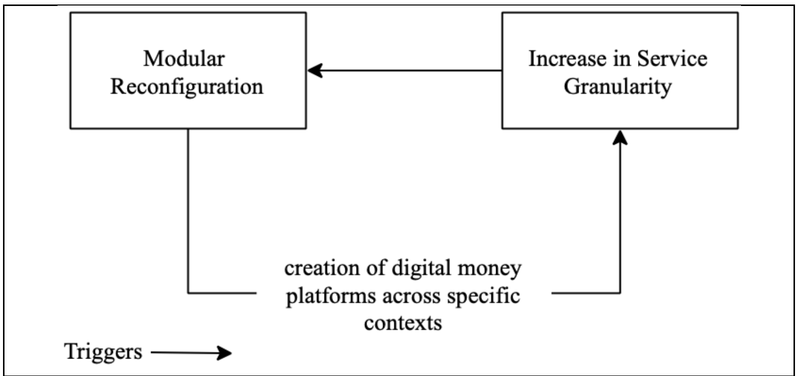


Figure 5. Modular Mechanism and Service Granularity

Institutional Mechanism and the Increase of Service Integration. The institutional mechanism relates to the integration of global payment services. As changes in rules for data creation and sharing become more relevant for instant payments, these changes facilitate the integration of different payment services. Moreover, with higher levels of transparency, payment services between financial institutions seem to be changing and becoming more alike with further linkages and standardization between global and local payment systems. These rules and sharing underlying service integration is seen in SWFIT's GPI project. SWIFT GPI service is also a framework that requires banks to confirm and make funds available to payees (e.g., posting of payments) within 24 hours. Moreover, the higher levels of transparency in global payment costs and speeds also seem to create peer pressure between banks to bring down charges and increase speeds. As a result, SWIFT is also expanding its GPI service and reviewing the possibility of linking local instant payment systems.

As changes in linkages underlying global payment take place through data practices, these changes facilitate the integration of local and global payment services without necessarily adding new payment instruments or reducing service layers. Instead, this development shows the extent to which integration of payment data across different payment institutions takes place, as exemplified by the integration documentation of QRS in the appendix. For example, the higher transparency of payment fee data, and traceability of processing, seem to facilitate connectivity between systems and, in the process, drive the integration of services. At the same time, as illustrated in Figure 6, the integration of services also triggers an institutional change, as more integration enables higher sharing and structuring of payment data. The outcome of this pattern can be seen with the recent move of organizations, industries, and governments towards adopting the global payment standard ISO20022. With this basis, we posit that:

> ***Proposition 3****. The structuring of payment data creation and sharing increases service integration.*

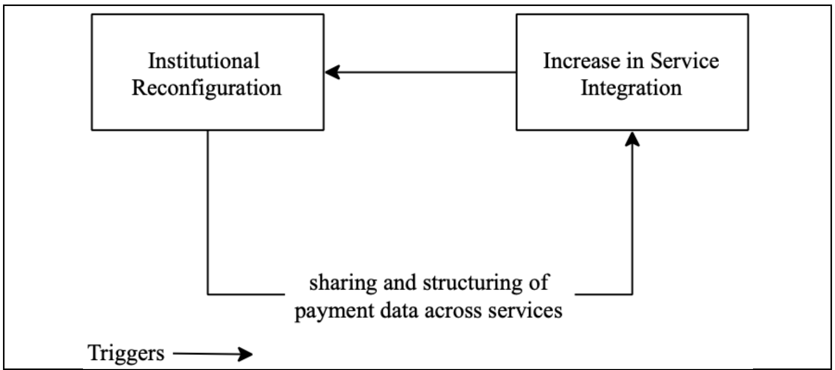


Figure 6. Institutional Mechanism and Service Integration

The Evolution of Global Instant Payment Infrastructure. The transactional, modular, and institutional mechanisms, and their related qualities, illustrate patterns driving global instant payment infrastructure. However, these patterns don't take place in isolation. There seems to also be a mutual and reinforcing influence between these different patterns over time. As illustrated in Figure 7, the transactional mechanism relates to increasing payment process speeds and, subsequently, the reduction of service layers. In this process, triggering the institutional mechanism results in increasing service integration. At the same time, the institutional mechanism can be related to triggering the modular mechanism, as the standardization of data enables the further digitalization of money and the creation of new payment instruments. Lastly, over time, the modular mechanism triggers the transactional mechanism. In consequence, the evolution of global instant payment infrastructure takes place in various dimensions that seem to lead to a granular integration of payment services. With these ideas, we posit that:

> ***Proposition 4****. The interaction between the transactional, modular, and institutional mechanisms increases the integration of granular payment services as well as the reduction of payment service layers.*

Discussion

In contrast to views of global instant payment and its underlying infrastructure evolution that emphasize a fragmentation vis-à-vis consolidation argument, this study's perspective illustrates a continuous process driving global instant payment infrastructure. Fragmentation and consolidation are taking place progressively and dynamically rather than periodically, linearly, or through isolated systems (Bech et al., 2017; Hartmann et al. 2017). There are evolution patterns that emerge with the interaction between evolution mechanisms and related evolution qualities illustrated in Figure 7, which differ from linear and conflict-oriented evolution views. From this study's perspective, the evolution of global instant payment infrastructure seems to be taking place with a granular integration of payment services and the reduction of payment service layers. Payment services are moving towards fulfilling specific needs that arise within specific contexts, while, at the same time, the method of making a payment is becoming more standardized across diverse contexts. In the process towards this outcome, middle payment service layers seem to be transforming, as higher payment processing speeds seem to facilitate the offering of a broader range of services. Accordingly, several implications arise for today's organizations, industries, and governments.

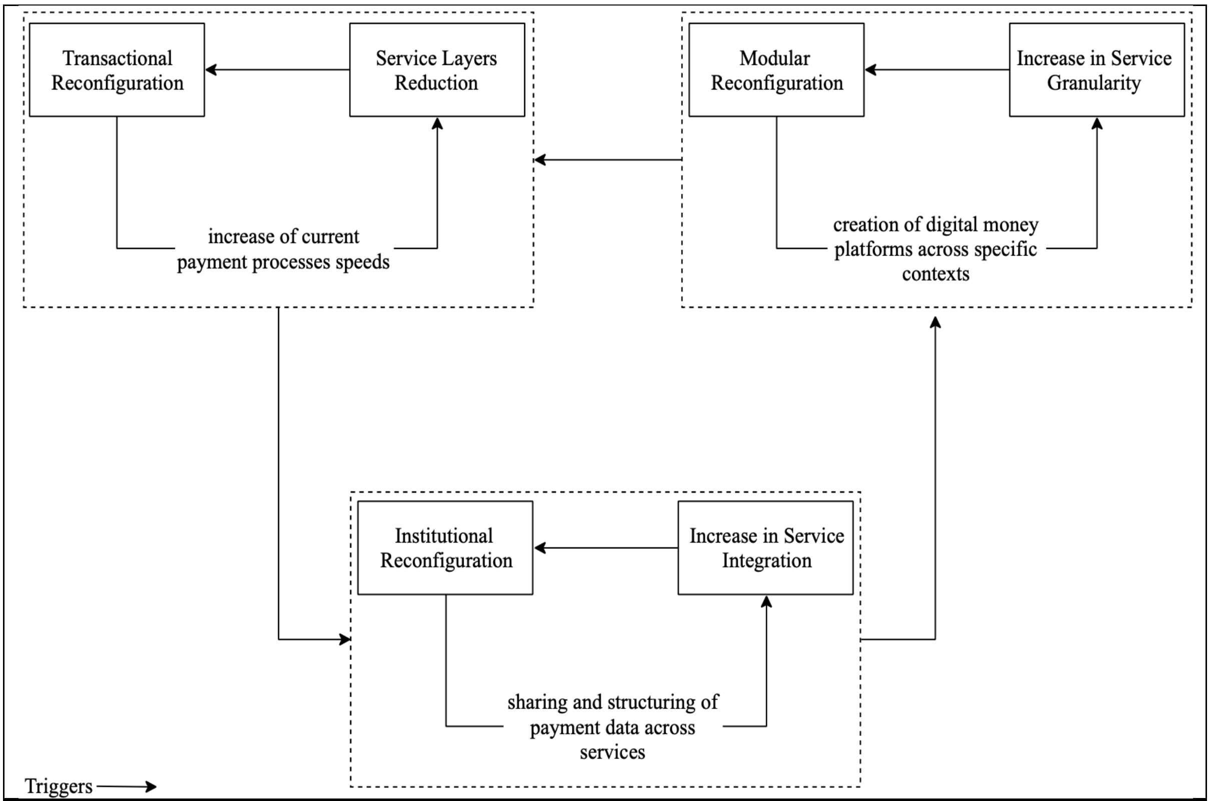


Figure 7. Evolution Patterns driving Global Instant Payment Infrastructure

Implications for Practice

Although there is no "one-size-fits-all" strategy for managing the evolution of global instant payment infrastructure, three general implications and conclusions for practice emerge from the findings:

- Strategic benefits for financial institutions lie in the early adoption and offering of instant payment services, as the early creation of new capabilities can facilitate the scaling of current payment services.
- A platform strategy is an avenue for managing global instant payment services as well as developing the agile capabilities necessary to sense and respond to opportunities and threats that stem from infrastructural change.
- Developing and adhering to flexible and inclusive standards is critical to balance power relations and maintain coopetition as well as harmony across the financial industry.

Strategic benefits lie in the early adoption of Instant Payment Services. With infrastructural change, there is a reconfiguration of payment institutions, organizations, and related technologies underlying global payment. The competitive landscape is re-shaped, presenting opportunities for banking institutions to maintain a competitive position within the highly competitive payment ecosystem (Hedman and Henningsson, 2015). In turn, early development of the capabilities needed to support global instant payment services can provide long-term strategic benefits as well as enable the scaling of current payment services to support payments at lower or higher service layers. As such, the value of global instant payment services goes beyond simply moving money around the world's financial system; moreover, it goes beyond efficiency and short-term profits. Instead, the value of global instant payment services lies in their strategic and societal implications brought about by their underlying infrastructure evolution, which brings opportunities for the scaling of payment services in terms of volumes and reachability. However, the adoption of instant payment services is also a complex task that requires new investments as well as changes in work processes and practices.

Platform strategy for managing global instant payment services. Platform strategies enable the creation of interdependent service modules through the participation of diverse actors (Parker et al., 2016). Additionally, a platform approach facilitates the internalization of external functions over time, as well as the management of tension between standardizing payment services to have larger volumes and developing context-specific payment services that fit narrower needs (Kazan et al., 2018; Parker et al., 2016).

Flexible and inclusive Standards for balancing power relations and maintaining coopetition. Lastly, with a granular integration of payment services, developing and adhering to flexible and inclusive standards become critical to balance power relations and maintain coopetition and harmony across the financial industry (Hedman and Henningsson, 2015). This is especially the case because the reduction of payment service layers might lead to powerful payment actors that, in the short term, constrain the development of other actors (e.g., small global payment platforms supporting payment services to small towns in developing countries). In consequence, flexible and inclusive standards that support interoperability with incumbent services, as well as new digital forms of money and their different use contexts, are necessary to sustain *global* instant payment services. However, this transition path, as highlighted by Guo et al. (2015, p. 13), requires "the participation, coordination, and harmonious collaboration of banks" as well as smaller and emerging payment organizations and government institutions.

Limitations and Future Research

The arguments in this study do not come without limitations. There extensive discussions on the value of case study research for generalization as well as for unfolding emerging and complex phenomena (Flyvbjerg, 2006; Wynn and Williams, 2012; Yin, 2018). Nonetheless, further evidence of the presented findings and framework is necessary to have a more extensive view of the evolution of global instant payment infrastructure. Longitudinal in-depth case studies, as well as quantitative approaches that validate the presented propositions, can aid in unraveling further this infrastructure evolution. Moreover, we draw, in part, upon low-value global instant payments and their underlying infrastructure evolution due to the attention these receive as well as their societal value to the sustainable development goals set by the United Nations (Gomber et al., 2018; The World Bank, 2018; United Nations, 2015). However, studies that explore the mechanisms outlined from a central bank and an inter-bank global wholesale payments perspective can provide a complementary as well as supporting view of the evolution of global instant payment infrastructure.

Conclusion

This paper illustrates evolution patterns driving global instant payment infrastructure. Building on a study of four mature and emerging global payment organizations, we find that higher efficiency in payment processes enables a reduction of processing layers in payment services. Simultaneously, the creation of context-specific payment instruments allows for more granular payment services. It also seems that the structuring and sharing of payment data are driving the integration of these granular payment services. Put differently, payment services are moving towards fulfilling specific needs that arise within specific contexts, while, at the same time, the method of making a payment is becoming more standardized across diverse contexts. These evolution patterns emerge with the mutual and reinforcing influence of three mechanisms, transactional, modular, and institutional, as well as three related qualities, service layers, service granularity, and service integration, that characterize the evolution of global instant payment infrastructure.

Evolution patterns and their related mechanisms and qualities revisit arguments that relate the evolution of global instant payment infrastructure as fragmentation vis-à-vis consolidation (Bech et al., 2017; BIS, 2018; Hartmann et al., 2017). These views emphasize linear and conflict-oriented perspectives that approach evolution as periodically, linearly, or through isolated systems. Conversely, this study acknowledges that fragmentation and consolidation take place progressively through evolution patterns. Last but not least, there is much evidence to suggest that the evolution of global instant payment infrastructure is contributing not only to economic development within and across countries. It is also driving society closer to the sustainable development goals set by the United Nations. Thus, there is a continuous need to study infrastructure across various contexts for understanding further the relationship between technology and organization, as well as their sustainable management and development.

References

Abernathy, W. J., and Clark, K. B. (1985). Innovation: Mapping the winds of creative destruction. *Research Policy*, *14*(1), 3–22.

Acosta, P., Calderón, C., Fajnzylber, P., and Lopez, H. (2008). What is the Impact of International Remittances on Poverty and Inequality in Latin America? *World Development*, *36*(1), 89–114.

Baldwin, C. Y. (2008). Where do transactions come from? Modularity, transactions, and the boundaries of firms. *Industrial and Corporate Change*, *17*(1), 155–195.

Bech, M., Shimizu, Y., and Wong, P. (2017). The quest for speed in payments. *BIS Quarterly Review*, 57–68.

BIS. (2017). Distributed ledger technology in payment, clearing and settlement. *Committee on Payments and Market Infrastructures, Bank for International Settlements*, 1–29.

BIS. (2018). Cross-border retail payments. *Committee on Payments and Market Infrastructures, Bank for International Settlements*, 1–45.

Bott, J., and Milkau, U. (2016). A Market for Payments – Payment Choice in the 21st Century Digital Economy. In J. Górka (Ed.), *Transforming Payment Systems in Europe* (pp. 1–27). New York: Palgrave Macmillan.

de Vasconcelos, P., Ponsot, F., Terry, D. F., and Vasquez, B. (2017). *Sending Money Home: Contributing to the SDGs, one family at a time. International Fund for Agricultural Development IFAD*.

DiMaggio, P. J., and Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, *48*(2), 147.

ECB. (2009). *Glossary of terms related to Payment, Clearing and Settlement Systems*.

ECB. (2010). *The Payment System*.

Flyvbjerg, B. (2006). Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, *12*(2), 219–245.

Gao, L. S., and Iyer, B. (2006). Analyzing Complementarities Using Software Stacks for Software Industry Acquisitions. *Journal of Management Information Systems*, *23*(2), 119–147.

Gomber, P., Kauffman, R. J., Parker, C., and Weber, B. W. (2018). On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services. *Journal of Management Information Systems*, *35*(1), 220–265.

Guo, Y., and Liang, C. (2016). Blockchain application and outlook in the banking industry. *Financial Innovation*, *2*(1), 24.

Guo, Z., Kauffman, R., Lin, M., and Ma, D. (2015). Near Real-Time Payment and Settlement Systems Mechanism Design (Working Paper No. 2014-004). *SWIFT Institute*.

Hanseth, O., and Lyytinen, K. (2010). Design Theory for Dynamic Complexity in Information Infrastructures: The Case of Building Internet. *Journal of Information Technology*, *25*(1), 1–19.

Hartmann, M., Hernandez, L., Plooij, M., and Vandeweyer, Q. (2017). Are instant payments becoming the new normal? *European Central Bank*.

Hedman, J., and Henningsson, S. (2015). The new normal: Market cooperation in the mobile payments ecosystem. *Electronic Commerce Research and Applications*, *14*(5), 305–318.

Hedman, J., Tan, F. B., Holst, J., and Kjeldsen, M. (2017). Taxonomy of payments: a repertory grid analysis. *International Journal of Bank Marketing*, *35*(1), 75-96.

Henderson, R. M., and Clark, K. B. (1990). Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. *Administrative Science Quarterly*, *35*(1), 9.

Hoebeke, L. (1990). Measuring in Organisations. *Journal of Applied Systems Analysis*, *17*, 115–122.

Jaques, E. (1964). *Time-Span Handbook*. Heinemann Educational Books Ltd.

Jaques, E. (1989). *Requisite organization: The CEO guide to creative structure and leadership*. Cason Hall.

Kallinikos, J., Aaltonen, A., and Marton, A. (2013). The Ambivalent Ontology of Digital Artifacts. *MIS Quarterly*, *37*(2), 357–370.

Kazan, E., Tan, C.-W., Lim, E. T. K., Sørensen, C., and Damsgaard, J. (2018). Disentangling Digital Platform Competition: The Case of UK Mobile Payment Platforms. *Journal of Management Information Systems*, *35*(1), 180–219.

Martin, J. (1965). *Programming Real-Time Computer System*. London: Prentice-Hall International.

Moore, G. E. (1965). Cramming more components onto integrated circuits. *Electronics*, *38*(8).

Normann, R., and Ramirez, R. (1993). Designing interactive strategy. *Harvard Business Review*, *71*(July), 65–77.

Parker, G., Alstyne, M. W. Van, and Choudary, S. P. (2016). *Platform Revolution: How networked markets are transforming the economy and how to make them work for you*. New York; London: W. W. Norton and Company.

Salmony, M. (2017). The future of instant payments: Are we investing billions just for mobile peer-to-peer payment? *Journal of Payments Strategy and Systems*, *11*(1), 58–77.

Scott, S. V, Van Reenen, J., and Zachariadis, M. (2017). The long-term effect of digital innovation on bank performance: An empirical study of SWIFT adoption in financial services. *Research Policy*, *46*(5), 984–1004.

Scott, S. V, and Zachariadis, M. (2012). Origins and development of SWIFT, 1973–2009. *Business History*, *54*(3), 462–482.

Shin, K. G., and Ramanathan, P. (1994). Real-Time Computing: A New Discipline of Computer Science and Engineering. *IEEE*, *82*(1), 6–24.

Simon, H. A. (1962). The architecture of complexity. *Proceeding of the American Philosophical Society*, *106*(6), 467–482.

Simon, H. A. (2002). Near decomposability and the speed of evolution. *Industrial and Corporate Change*, *11*(3), 587–599.

Sveriges Riksbank. (2018a). *Sveriges Riksbank Economic Review: Special issue on the e-krona*.

Sveriges Riksbank. (2018b). *The Riksbank's e-krona project: Report 2*.

The World Bank. (2018). *Migration and Remittances: Recent Developments and Outlook*.

United Nations. (2006). *Definitions of Remittances*.

United Nations. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development.*

Wood, G. (2014). Ethereum: A secure decentralised generalised transaction ledger. *Ethereum project yellow paper*, 151, 1-32.

Wynn, and Williams. (2012). Principles for Conducting Critical Realist Case Study Research in Information Systems. *MIS Quarterly*, *36*(3), 787–810.

Yin, R. K. (2018). *Case Study Research and Application: Design and Methods* (Sixth Edit). London: SAGE Publication Ltd.

Yoo, Y., Henfridsson, O., and Lyytinen, K. (2010). Research Commentary —The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research. *Information Systems Research*, *21*(4), 724–735.

Appendix

Appendix A

Examples of integration documents between global payment platforms. The integration fields are just part of the integration documents of QRS' platform partners. The field examples are made up to illustrate data of real transactions.

	Field	Type	Description	Example
1	Sequence	Num 8	Consecutive number (it will keep increasing with the number of transfers sent regardless of when they were sent) 1,2,3,4….	1
2	Transfer code	Char 15	Transfer code assigned by partner	001-9482
3	Date	Char 8	yyyymmdd	20041110
4	Sender's surname from father	Char 30		GUERRA
5	Sender's surname from mother	Char 30		MARTINEZ
6	Sender's name	Char 30		RAMON
7	ID number	Char 15	e.g. passport number or any other identification number	73929485
8	Sender's Address	Char 50		395 MAPLE AV LONDON
9	Payee's surname from father	Char 30		PAZ
10	Payee's surname from mother	Char 30		RAMIREZ
11	Payee's name	Char 30		JOSE
12	Payee's address	Char 50		AV. COSTANERA 432
13	Pay-out city	Char 20	If the transfer is sent to a bank (for a bank deposit or to be paid as cash in a bank) this field should have the name of the bank	LIMA
14	Payee's Country	Char 15		PERU
15	Payee's contact number 1	Char 15		943-5934
16	Payee's contact number 2	Char 15		950-29384
17	Payment method	Char 1	O=Cash B=Bank deposit D=Delivery	O = To pay in cash in a local agency or partner bank B = To pay into a bank account D = To be delivered
18	Amount sent in USD	Num 10,2	Amount sent to the payee in US dollars	250.00
19	Pay-out currency	Char 1	D=Dollars , M=Local currency	D
20	FX rate	Num 10,3		1.00
21	Pay-out amount	Num 12,2	Pay-out amount according to	250.00

Partner A.

Field	Size	Format	Description	Example
Partner Code	8	Numeric	Partner Code	1304
Date	8	YYYY-MM-DD	Transmission date	2013-10-07
Transfer Number	6	Numeric	Number of transfer sent	4032
Reference	7	Numeric	Consecutive number with partner	1
Transfer code	16	Alphanumeric	transfer code or payment key	ESP873427
Pay-out amount in dollars	8	Numeric(6.2)		300.00
FX rate	8	Numeric(6.2)	FX rate, 1 if it is dollars	1.00
Commission	6	Numeric(4.2)	transfer fees	0.5
Pay-out amount	10	Numeric(8.2)	Pay-out amount (with decimals, always .00)	1000.00
Pay-out currency	10	Alphanumeric	Iso 4217	EUR
Message	100	Alphanumeric		Hello
Sender name	20	Alphanumeric		Carlos
Sender surnames	20	Alphanumeric		Medrano Pérez
Sender ID number	20	Alphanumeric		EG3029349
Payee name	20	Alphanumeric		Sandra
Payee Surname	20	Alphanumeric		Pérez Moreno
Payee Address	50	Alphanumeric		Calle Escalante Nº. 90, Puerta 2 55
Payee Neighbourhood	50	Alphanumeric		Malasaña
Payee city	30	Alphanumeric		Madrid
Payee state/province	30	Alphanumeric		Madrid
Payee contact number 1	15	Alphanumeric		192930492
payee contact number 2	15	Alphanumeric		948573849
Payee country	20	Alphanumeric	Code ISO 3166. URY (Uruguay) ESP (Spain) ITA (Italy), etc.	ESP
Payee bank name	25	Alphanumeric	bank name if transfer goes to bank account	SANTANDER
Branch number	25	Alphanumeric	Branch number	Suc 3303
Account type	10	Alphanumeric	bank account type	savings
Account number	25	Alphanumeric		983729340

Partner B.

		Field	Description	Example
1	R	Date	Transfer date	dd/mm/yyyy
2	R	Consecutive Number	Consecutive number starting in 1	125
3	R	Reference	User reference (alphanumeric)	TT125
4	R	Amount sent	Amount sent in dollars	153
5	R	FX rate	FX rate given by partner	1
6	R	Pay-out Currency	Pay-out Currency ISO 4217 - 3 Characters	USD = Dollars UYU = Uruguayan Pesos ARS = Argentinian Pesos
7	R	Pay-out amount	Amount to be paid. It is expressed in the pay-out currency and it should have applied the FX rate	153 (if decimals, use '.')
8	-	Partner Commission	Commission to be paid to the partner	1
9	R	Sender's Name	Alphanumeric	JUAN
10	R	Sender's surname	Alphanumeric	SOSA
11	-	Sender's ID number	Alphanumeric	AZA153545
12	R	Beneficiary's Name	Alphanumeric	LAURA
13	R	Beneficiary's Surname	Alphanumeric	MORA
14	R	Beneficiary's Address	Alphanumeric	Av. Infanta 1932
15	R	Beneficiary's City	Alphanumeric	Montevideo
16	R	Beneficiary's Country	Alphanumeric	URUGUAY
17	R	Beneficiary's Contact number	Alphanumeric	7080520
18	-	Message	Alphanumeric 100 characters max.	SALUDOS A TODOS.....
19	R	Bank Name	Alphanumeric	BRADESCO
20	R	Bank Branch	Alphanumeric	195-0
21	R	Account Number	Alphanumeric	94382
22	R	Account type	Alphanumeric	CTE = Current Account AHO = Savings Account
23	-	Beneficiary's CPF	Alphanumeric	93848329-94
24	R	Pay-out office code	Pay-out offices code that the partners provides to the agent -Alphanumeric	1094
25	R	Country of origin (ISO code, 3 Characters)	Alphanumeric	e.g. Spain ISO **ESP** Italy ISO **ITA**
26	R	Sender's number	Alphanumeric	12346657
27	R	Sender's Address	Alphanumeric	
28	R	Sender's city	Alphanumeric	Madrid

Partner C.

Appendix B

Breakdown of Data Sources			
Data Source	**Observations**	**Interviews**	**Documents**
Quick Remittance Platform (QRS)	Participant observations (~16 hours).	CEO Interviews, 5 meetings (300 min).	493 Integrations documents (~1000 pages).
SWIFT	SIBOS Conference (~20 hours).	Instant Payments Executive (80 min), and Senior Market Manager (100 min).	56 reports and 23 videos on instant payment services and the company's GP project (450 pages, 220 Minutes).
Aryze	Keynote Presentations (~3 hours).	Co-Founder and Community Manager (32 min).	45 Company blogs and reports (261 pages).
MakerDAO	Keynote Presentations (2 hours). Online Company Meeting Recordings (~8 hours).	Chief Executive Officer (CEO), and Head of Product (Joint interview, 52 min).	85 Company blogs and reports (348 pages).
Other Sources	International Association of Money Transfer Networks, London Conference (16 hours). Blockchain in Banking, Copenhagen FinTech Lab Conference (2 hours). 3rd Nordic Blockchain Conference (3 hours).	Chief Operating Officer at Arabic remittance provider (33 min).	11 related reports, documents and articles from the European Central Bank (722 pages). 14 related reports, documents and articles from the World Bank (524 pages).
Total	8 Observation Sources (70 hours)	10 Interviews (597 Minutes)	727 Documents (3.305 pages, 220 Minutes)