

# There is no Alternative

## SWIFT as Infrastructure Intermediary in Global Financial Markets

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December 2018

Financial Geography Working Paper #22



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### Abstract

This article explores the changing infrastructural architecture of global finance through the lens of Global Production Networks (GPNs). Financial markets infrastructure (FMI) for international payments and securities trading form the backbone of global finance. However, this FMI is typically hidden from observation, debate, and analysis, partly because international payments have functioned in broadly the same way for almost 50 years, governed by large global banks and the co-operative Society for Worldwide Interbank Financial Telecommunication (SWIFT). A global monopoly sensitive to geo-political upheavals, SWIFT is increasingly influential in acting to the benefit of the world's most powerful financial and political players. Thus, more than a mere passive facilitator of global economic activity, we argue in this paper that FMI forms a carefully crafted socio-economic system of geo-political relevance, whose core components 'power' and 'embeddedness' we seek to comprehend with the GPN framework. We introduce SWIFT as a key player in global FMI and establish a conceptual dialogue between the recently introduced notion of the GPNs of finance and the newly developed idea of the GPNs of financial infrastructure. Incorporating Allen's (1997) power dimensions, we demonstrate their coexistence and complementarity in their carefully orchestrated, tightly intertwined global organizational arrangements. We show that SWIFT's proneness to technological and organizational change threatens to reconfigure long-established actors, processes and relationships in and beyond finance, and argue that this makes an in-depth understanding of FMI vital.

### Introduction

It has been a decade since the financial crisis prompted a closer examination of financial institutions, with regulatory responses designating some of them as too-big-to-fail and/or systemically important (Dymski 2011).<sup>1</sup> Yet, alongside the focus on these prominent actors, another group of systemically important financial actors has also come under increased scrutiny post-crisis: financial markets infrastructure (FMI).

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<sup>1</sup> We wish to acknowledge funding from the Research Foundation - Flanders (FWO) and the Luxembourg National Research Fund (FNR) (INTER/FWO/16/11312037/FinWebs).

Also known as financial market utilities, FMI comprises functions and services such as stock exchanges, clearinghouses and securities depositories, as well as processes and systems for payments, clearing and settlement that are core components of the global financial system. FMI links and enables global economic activity, trade, and finance between international financial centers (IFCs), which themselves are “embedded in highly competitive regulatory environments” (Dörny and Dymski 2018, 2). This grants FMI geo-political significance, which has been visible in a number of recent events, for example the Brexit-induced struggle to relocate euro clearing from London within the Eurozone (The Economist 2017), the blocking of the proposed merger of Deutsche Börse and the London Stock Exchange on the same day that the United Kingdom formally triggered Brexit (Ruddick 2017), and the striking down of the proposed acquisition of the Chicago Stock Exchange by a Chinese-owned company in the United States (Flitter 2018). Outages of the US-owned VISA and MasterCard networks in Europe have emphasized reliance on non-EU schemes for cross-border card payments (Mersch 2018). Protectionist responses to an increasingly technologically self-sufficient China and opposition to US sanctions on Iran have further intensified EU politicians’ awareness of the strategic significance of payment systems (Horobin and Jennen 2018). Based on this, we argue that FMI as an industry as well as the key actors involved in FMI deserve more analytical attention than they have hitherto received. Disentangling the socio-economic structures of governance and coordination helps to develop a more profound and holistic understanding of this ‘hidden’ backbone of global finance and to extend insights into global finance’s power relations, degrees of territorial embeddedness and connectivity, sources of financial risk, and proneness to technological and organizational change. As the latter change threatens to upset and reshuffle long-established actors, processes and relationships in and beyond finance, an in-depth understanding of FMI is of the utmost importance.

In economic geography, the literature often preconditions regional economic development upon there being ‘effective’ and ‘reliable’ infrastructure (Munnell and Cook 1990; Ottaviano 2008), even though the nature and functioning of that infrastructure often remains somewhat of a black box. Examples range from standard setting of agricultural products (Ouma 2010), to end-to-end cooling chains and global payment arrangements in tourism (Dörny 2008), and to the built environment, like transport and housing infrastructure (O’Neill 2010). This strand of literature, however, remains largely silent on the key character of infrastructures as carefully crafted socio-economic systems of geo-economic and – in the case at hand – geo-political relevance, which this article seeks to highlight. The continued production of infrastructure by public and/or private actors is necessary for the reproduction of capitalism (Appel et al. 2018), but the infrastructure of finance, despite its crucial economic role in enabling global trade and finance, its political significance and the current technological upheaval, has largely been neglected in economic geography. Often characterized as the ‘plumbing’ of the global financial system, and perceived as “boring, low margin and not strategic” (Lord et al. 2015, 6), it is poorly understood beyond its well-known intermediary ‘facilitating’ role. A fundamental function of FMI is the transfer of (exchange) value, more simply known as payment. This “seemingly

small, mundane little technicality that sets the world of finance, high and low, in motion” (Maurer 2012, 20) is in fact a huge industry, yet has attracted little academic attention outside of law and business schools (Nelms et al. 2018).

This article seeks to help with rectifying this by means of an analysis of the changing world of the Society for Worldwide Interbank Financial Telecommunication (SWIFT). We try to illustrate the key role of this monopolistic FMI actor that is a long-established, integral part of the global financial system. SWIFT is a financial messaging provider for cross-border payments in the correspondent banking (CB) system. A helpful lens to analyze SWIFT’s geo-economic and geo-political power constellations is the tried-and-tested global production networks (GPN) framework. The reason for invoking the GPN framework is that it stresses the significance of the institutional-cum-territorial logics with a strong focus on firm agency that is indeed central to SWIFT’s (changing) operation. The recently minted GPN 2.0 approach (Coe and Yeung 2015) also showcases the critical importance of intermediaries as essential lubricants and knowledge providers in today’s fragmented global economy. Thus, by invoking a GPN perspective on SWIFT this article seeks to clarify why and how FMI matters. Conducive to accomplishing this is the incorporation of Allen’s power dimensions (1997), which we introduce to refine GPN’s power aspect. To this end, we examine the CB system: the fragmented and hierarchical network of relationships that has developed over centuries and is concentrated in large, powerful banks geographically embedded in IFCs (Taylor et al. 2014; Wójcik and Burger 2010). Key to the efficient functioning and globalization of this network is SWIFT, an ostensibly ‘neutral’ and trusted third party within global finance, whose function, exposure, and ownership and governance structures nonetheless render it geo-politically strategic. We propose the GPN concept as an apt framework for the analysis of the above by extending its notion of intermediaries to include those with infrastructure characteristics. Such actors are crucial in shaping the geography of global finance and a key resource in the relational exercise of power.

Following this introduction, the next section positions the payments industry and SWIFT within the global financial system. We discuss the few academic contributions on this topic, mainly published in business studies, alongside some contributions in law and science and technology. As the activities of finance have become more complex and speculative, the system has developed powerful ordering intermediaries. In this regard, SWIFT itself makes a fascinating case as it is composed of unique actor constellations and ownership structures that add an important geo-political dimension to the debate on global finance. The following section moves on to conceptualize FMI as a key intermediary in organizing international economic and financial activity with the help of the GPN framework and its distinct focus on intermediaries. This aids in assessing SWIFT differently from merely being a facilitator and extends the literature on FMI with its predominant focuses on the technicalities of smoothing its operations to allow uninterrupted financial activities and to minimize financial risk for the trading parties and the financial system as a whole. The penultimate section scrutinizes these patterns through the lens of the GPNs of finance, and adds the FMI’s strategic geo-political role, followed by the conclusions in which we discuss the implications for a range of literatures.

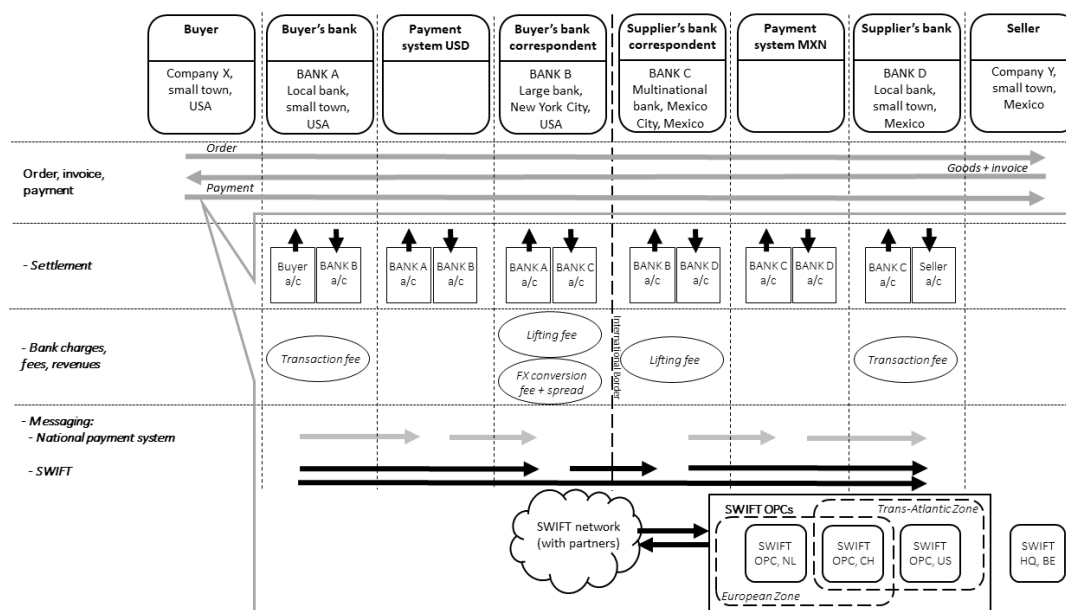
## SWIFT as a powerful intermediary in global trade and finance

Without a payments system, global production and exchange would be impossible. This is echoed in one of the financial system's core economic functions: to provide a payments system that facilitates the exchange of money necessary in the purchase of all goods and services (Dixon 2011). As access to the payments system is essential to everyday life, it has become an essential part of a country's basic infrastructure (Ingves 2018). The former governor of the US Federal Reserve (the Fed) observed that "if you wanted to cripple the U.S. economy, you'd take out the payment systems" (Greenspan 2007, 2). While in the past payments were considered a technical back office matter, hidden and obscure in nature, this is no longer the case, with the sector now acknowledged to be of strategic interest (Villeroy de Galhau 2018). Regulatory and supervisory bodies have designated some FMI actors as systemically important for their role in reducing and managing risk and maintaining stability (Bank of England 2013; European Commission n.d.; Financial Stability Oversight Council 2012). For example, the Committee on Payments and Market Infrastructures (CPMI) is the supranational body for advancing the safety and efficiency of payments, clearing and settlement. Composed of central banks, the CPMI has no formal supranational authority and relies fully on its members' own commitment to carry out its mandate, which is largely concerned with the technicalities of FMI operations to reduce risk and promote financial stability through safe and efficient arrangements for payment, clearing and settlement (CPMI and IOSCO 2012). While the CPMI provides a framework for managing various kinds of risk, and indeed favors market disciplines for achieving efficiency, FMI in some cases runs counter to this aim by being "a monopoly used by an oligopoly of participants" (Rambure and Nacamuli 2008, 73). We therefore call them 'strategic intermediaries' (on which we will expand in section 4).

Over 500 years old, the CB system evolved to support long-distance trade (Norman, Shaw, and Speight 2011) and can be considered to be the foundation of the international financial network. In this system, two banks – the respondent and the correspondent – hold reciprocal accounts with each other in a correspondent banking relationship (CBR): a formalized bi-lateral arrangement between trusted partners. Over centuries, this system has gradually built up to form today's decentralized payment network of siloed national systems. While in the past, domestic payments used CB, the advent of electronic payment systems in the early 1970s brought the centralization of settlement for domestic banking largely via central banks. Centralization has resulted in cost savings and decreased liquidity requirements for banks (Rambure and Nacamuli 2008). Usually only banks licensed and regulated in that jurisdiction have access to its payments system. As international payments take place across different currencies and borders, there is no central payment system for such transactions. Instead, banks in one country access another country's payments system via a CBR with a partner bank in that country. Such relationships quickly become hierarchical and nested when smaller banks in one country rely on larger banks in the same country to carry out international transactions. There are an estimated 1.3 million of such contractual (though not transactional) relationships across the banking industry (Zschieschang 2018). Based on their contracts, both banks negotiate the details of their revenue-

based cooperation: how they want to handle various aspects of the payments (e.g. different currencies and countries, types of payments from private individuals or businesses); when to settle their transactions; whether to pre-fund accounts or extend credit; and fees, balances and who performs foreign exchange (FX) conversion.

Approximately two-thirds of international payments are conducted via CBRs, with 13 percent conducted “on-us”, that is, within a bank’s own branches, and the remaining 20 percent using cross-border retail and high-value payment systems (International Monetary Fund 2017, 44). Thus, for local economies, CBRs provide a crucial connection to the international financial system (World Bank Group et al. 2018). However, while this system is distributed across the globe, flows end up being concentrated in systemically important banks located in IFCs who form the apex of this hierarchical banking system (Grolleman and Jutra 2017). Since the 2008 crisis, CB has been the subject of reports with concerns about increased concentration among large banks who are withdrawing from the provision of services in some geographic areas due to low profitability and risk compliance concerns. Some of the effects are reduced access to the international financial system and halted economic growth (World Bank Group et al. 2018; International Monetary Fund 2017). In one example, withdrawal of CBRs denominated in US dollar (USD) in Angola, whose economy is heavily dependent on international trade, led to a rebalancing of trade from USD to euro. The subsequent USD shortage, however, affected all sectors of the economy, including the supply of food and medicine, and subsequently caused inflation. In the case of Belize, the loss of CBRs there greatly increased transaction fees, lengthened payment times, and reduced deposits in banks. Figure 1 depicts how the CB system works. Its sound understanding is important, as SWIFT’s genesis is inseparable from the CB system.



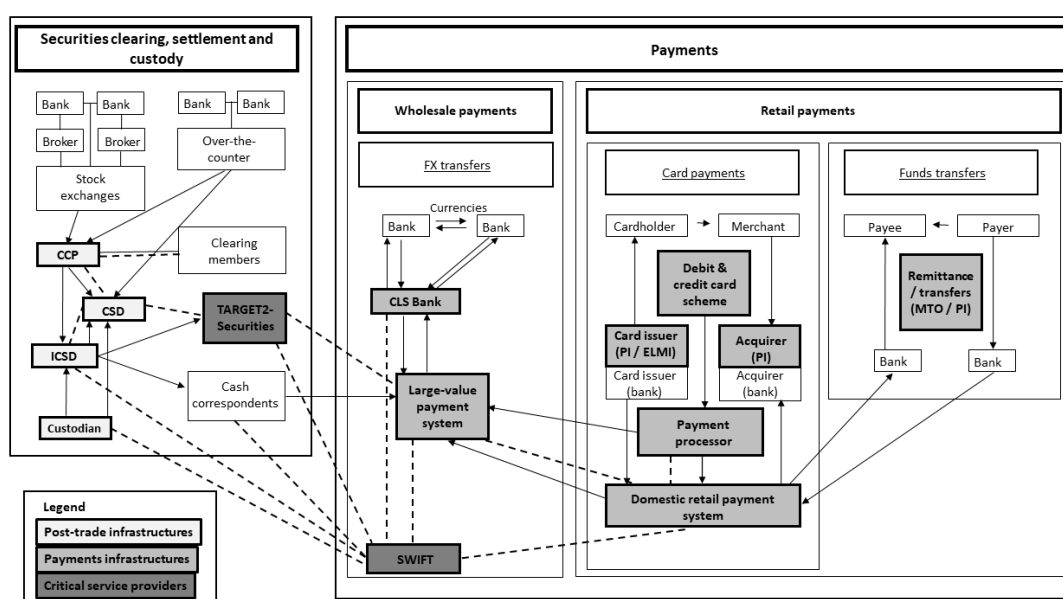
**Figure 1. The anatomy of an international payment via correspondent banking**  
 Source: own illustration, based on European Central Bank (2017); Gifford and Cheng (2016); McCune (2014); SWIFT (2016; 2018).

Figure 1 shows how correspondent banking relationships between the two correspondent banks transfer funds in a particular currency corridor; it also illustrates that messages but not money cross borders. There is a series of domestic transactions with the two banks ending up with more and less money in their respective correspondent accounts (McCune 2014). Accounts (a/c) are debited and credited (settled) in response to messages transmitted between banks, all this via the SWIFT system. Until the 1970s, freeform messages were transmitted via telex, which was inefficient and costly. SWIFT was established in 1973 by banks to create a standardized, secure and reliable messaging system that would overcome the inefficiencies of telex, and this is still a mainstay of its operations today. Thus, while the flow of funds in CB is concentrated among large banks who settle the payments between each other, a key component and in practice the primary way of communicating payment messages is the global messaging network centralized in SWIFT. Messaging and settlement are the two key pillars at the heart of the CB process. The main actors in the settlement pillar are banks, and settlement occurs in their accounts. As portrayed in figure 1, this is not one centralized system, but rather a fragmented, distributed network of over a million bilateral contracts. Via double entry bookkeeping, the acts of changing account and ledger entries and balances involved in settlement make it appear that money has moved across borders. These changes are communicated in the messaging pillar via SWIFT: the single main actor, or lead entity in this pillar. Mediating between all banks as the monopoly provider of the messaging network to all banks, SWIFT is both intermediary and infrastructure.

The SWIFT network encompasses both hard and soft infrastructure, such as cables, hardware, software as well as their encoded standards, thus determining how users act for the system to function efficiently. It is precisely for this reason that SWIFT was created, yet its foundation was a contested affair. During the 1960s, US and European banks' needs for reliable computer and telecommunications systems increased with the expansion of global operations, and they began to innovate by developing their own private networks (Scott and Zachariadis 2014). Although domestic payments had become standardized, international payments were not yet automated because of different languages and procedures and still relied on telex. European banks had begun to co-operate around the 1960s for a number of reasons, amongst them to prepare for the possibility of a monetary union, to react to competition from US banks, and to take advantage of opportunities presented by the Euromarkets. Europeans spearheaded the initiative to examine the feasibility, costs and specifications of a communications network for international payments and related messages. Some US banks came on board by 1971 and SWIFT was eventually founded as a non-profit co-operative in 1973. The choice of Brussels for SWIFT's headquarters – a jurisdiction of high relevance today – was a political compromise in the rivalry between London and New York. The eventual decision to adopt SWIFT was taken in reaction to attempts by First National City Bank (FNCB, now Citi) to have its proprietary messaging system imposed in 1975. Balking at the prospect of being captive to one correspondent bank and using its commercially developed standards in which they had no say, more banks signed up for the cooperative and collaborative SWIFT option instead, thereby giving it critical mass, with the first SWIFT message sent in 1977 (Scott and Zachariadis 2014). SWIFT today comprises over 11,000 members and is hailed as a model of co-opetition (i.e.

cooperative competition), yet its foundation was contested, with fear of being locked into a competitor’s system being a crucial factor in driving the adoption of a collective solution by capitalists.

SWIFT’s financial messaging system links global securities and payment systems (figure 2) making it literally an infrastructure for infrastructures classified as a “critical service provider” by its overseeing central bank (National Bank of Belgium 2017). National payments systems, and, alternatively, payments systems within a currency union like the euro, are supervised and often also run by a national (or in the case of the euro, the European) central bank. Since no centralized international payments system exists, one of the basic means by which money moves across borders is via the CB system. The bilateral, hierarchical CBRs are a crucial financial conduit. They support trade and provide domestic and cross-border payments, including remittances. As banks extend credit lines and hold balances with each other in the inter-bank market, their interdependency contains systemic risk potential (Wandhöfer and Casu 2018). SWIFT’s financial messaging service transmits the instructions between all participants in this system; SWIFT’s network is therefore essential in allowing banks to manage liquidity and risk. The payments industry in general has been growing and provided 34 percent of banking revenues in 2016 (McKinsey & Company 2017) with revenue from cross-border payments, FX transactions (figure 2) and trade services amounting to USD 145 billion (Badi et al. 2017). While it can be difficult to estimate exact revenues from CB specifically, it is also difficult for customers to obtain exact fees until after the payment transaction (Money Mover and Account 2016). Banks’ revenues come from various sources: processing fees charged to the originator and the beneficiary (figure 1), interest on ‘float’ (value difference between debiting the originator and crediting the beneficiary), and FX spreads (Rambure and Nacamuli 2008). The majority of bank profits comes from FX margin, rather than fees (Collinson 2017; Money Mover and Account 2016).



**Figure 2. Interlinkages between financial market infrastructures and the critical service providers T2S (unique within the European Union) and SWIFT**

Source: National Bank of Belgium (2017, 12), amended by the authors



Financial messaging products and services remain SWIFT's core operations, in which it has a monopoly position for payments; yet, it also handles ever-increasing numbers of messages about securities. However, SWIFT's dominant position and its model of 'co-opetition' do not lead to market power per se: SWIFT's customers (banks) are also its co-owners, and profits are used to subsidize service costs. SWIFT generates its revenues from a variety of sources, including traffic revenues for each message sent, members' initial joining fees and annual support charges, interface revenue from sales of software to connect to its network, software maintenance fees, recurring revenue from charges for connectivity, documentation, directory services, conferences, consulting and training. Profits are returned to members in the form of rebates on SWIFT services (C24 Technologies 2015; SWIFT 2018). While banks earn huge profits from their intermediary positions at various points in the settlement process, SWIFT's monopoly intermediary position is attenuated by its infrastructure function and co-operative form: it does not earn excess profits from its users as they are also its owners, acting as a "not-for-profit maximization" (Scott and Zachariadis 2014, 30 emphasis in original) organization.

This ownership model allows SWIFT to act with some autonomy relative to its owners but can also allow them to profit from an inability or unwillingness to implement costly but efficient process and technology innovations. Indeed, while SWIFT's role has expanded since its inception, its messaging system has changed comparatively little and still incorporates basic elements of the legacy technology that it replaced. The area of CB exemplifies this: its logic has not changed for hundreds of years, and the current technology is still largely the same as in the 1970s. With the aim of disentangling the interwoven complexities of SWIFT's technical role as monopoly provider of essential global financial infrastructure, its co-operative ownership by banks, and its intermediary position between these same actors, in the following section we explore extant research on SWIFT and on infrastructure. We suggest specifically that the GPN framework would be useful for appraising questions of embeddedness and power that arise from this confluence.

## The GPNs of finance and financial markets infrastructure

### *Framing FMI*

The academic literature on FMI is thin, and mainly covers SWIFT from the perspective of business studies, law, and science and technology. In the process, SWIFT is often cast as a "medium for the transmission of financial messages" (Kozolchyk 1992, 46) as it does not perform settlement of transactions itself. The reading of SWIFT as a rather passive facilitator is echoed by Kounert et al. (2012), although the main object of their analysis is to explain the socio-economic composition of SWIFT. From a business history perspective, Scott and Zachariadis (2014) aim to dispel the view of SWIFT as merely financial plumbing and provide a nuanced, empirical examination of its history and development. While contextualizing this in the historic juncture at which SWIFT was created, the focus is on SWIFT's co-operative status in assuming its ever-growing importance as a standards, technology

and community hub for global finance. The authors see it as part of a generation of private organizations performing global governance, which is susceptible to being used as a political tool through its unavoidable entanglement with external influences. However, despite asserting that SWIFT is far from a passive actor, the role of its complex governance structure, including the “national or country-level voice” principle (Scott and Zachariadis 2014, 32), is not really discussed with regard to controversies in which SWIFT has been involved. While SWIFT may self-present as a neutral global organization providing a crucial economic and financial infrastructure, powerful private financial institutions own and govern SWIFT and clearly bias its governance towards the heaviest users of the network. Of all of SWIFT’s member organizations only banks can actually own shares, which favors US banks as SWIFT’s heaviest users (Cowan 2017) (see also FX transfers, mainly denominated in USD, in figure 2). We return to this notion of unbalanced power in section 4 where the multiple controversies of SWIFT demonstrate the complexities of this intermediary organization.

The social sciences have seen a turn towards new and more nuanced understandings of infrastructure, recognizing that not just its material but also its immaterial forms set the rules and standards shaping the rhythms and flows of social life (Appel, Anand, and Gupta 2018; Easterling 2016). Work such as that on the foundational economy (Bentham et al. 2013) recognizes the importance and politics of national infrastructure, broadly defined as providing territorially distributed goods and services that are often taken for granted and which are either directly or indirectly authorized by the state. However, the crucial coordinating intermediary role of international infrastructure as a bridge between disparate jurisdictions in the global economy has been much less explored from this vantage point. Featuring characteristics of public goods but largely provided and controlled by private actors, the governance of financial infrastructure has been analyzed in terms of market power (Ruben Lee 2011). Depending primarily on whether there is competition in the provision of services in a particular area, market power’s economic effects enable firms enjoying a (near) monopolistic position to engage in abusive or anticompetitive behavior, yet this insufficiently captures the more nuanced ways in which infrastructure is related to power. Neither a thing that moves across space nor a blanket force emitted from a center and experienced uniformly within its range, power is relational; the effect of social interaction and resources mobilized over space. The various modes of power, ranging from the more overt domination and authority to subtler techniques such as seduction and inducement, are modulated and experienced differently due to geography and actors’ varying abilities to deploy resources effectively. Thus, a relational understanding of power as exercised across space via “a succession of mediated relations or through the establishment of a simultaneous presence” (Allen 2003, 2) allows us to consider how the characteristics of infrastructure, particularly its embeddedness in and intermediary role between territories, make it a potent resource and medium. The location of a resource influences and is influenced by its mobilization in the exercise of power. However, merely controlling a resource does not automatically infer power upon an actor: as power is enacted relationally, resource governance is key. Building on this notion of

relational power, we apply this to SWIFT as a distinctive infrastructure and intermediary whose singularity of function, governance and ownership grant it a powerful role, not just within networks of global financial activity, but also without.

### *Linking FMI with the GPNs of finance*

Starting from the observation that today's global economy does not only rely on trade between national economies but on "the tightly coordinated global ... networks of firms that ... are the key organizational form" (Coe and Yeung 2015, 9), leading GPN scholars have forged a new focus on intermediaries. The GPN 2.0 framework (Coe and Yeung 2015) stresses the importance of the 'connecting' economic and non-economic actors that help to produce goods and services across various geographic locations for the world's markets. GPN 2.0 is a useful heuristic for capturing the logic and workings of SWIFT's network for the following reasons, thereby also addressing some of its blind spots.

First, the GPN framework is well suited to grasp the underlying logics of financial infrastructure that weaves firms and places into the global networks that make up the financial bloodstream. It therefore helps to shed light on the (distinct) workings of infrastructure as a neglected yet indispensable backbone of global economic activity. International finance is broadly concerned with national economies and their monetary and macroeconomic interrelations. Recent applications of the GPN framework have focused on finance with two distinct directions. First, the global financial network (GFN) agenda (Coe, Lai, and Wójcik 2014) seeks to shed light on the triadic entanglement between the financial and advanced business services (FABS) intermediaries who link the territories of world cities and offshore jurisdictions and, in so doing, mediate relations between global economic activity and its anchorage in specific regions (Coe, Lai, and Wójcik 2014). In spite of its analytical power, the GFN fails to fully recognize intermediaries in the globalized processes of connecting and embedding, that is, entities responsible for designing and running the mediating infrastructure in addition to providing the mediating services. Infrastructure is, however, not just a given technical device. Rather, infrastructure itself forms a carefully crafted socio-economic system. Hence, second, the literature on the GPNs of finance (Dörry 2015; Dörry 2016) is particularly useful to comprehend "the GPNs of financial products, instruments and practices, themselves ..., i.e. the global organization of financial intermediaries of all kinds, and their interplay with specialized production sites, i.e. financial centres" (Dörry 2016, 4). In this spirit, we make a plea to broaden and deepen the notion of intermediaries in the GPN framework. This includes firms but also forms of inter-firm collaboration responsible for building, organizing and running the infrastructure and services, as presented with SWIFT and CB.

Second, the GPN 2.0 approach seeks to strengthen our understanding of agency. Acknowledging that "the under-theorization of ... intermediaries in global production networks ... represents a missing link in our existing knowledge base" (Coe and Yeung 2015, 51), it introduces intermediaries as a largely ignored group of powerful actors in the organization of GPNs. Coe and Yeung distinguish three

discrete groups of strategic – and often powerful – intermediaries that help to facilitate international trade and financial flows across sectors: financial intermediaries, logistics intermediaries, and standards intermediaries. However, building on the introduction of SWIFT as a key player in the global FMI, we seek to broaden Coe and Yeung’s “endeavour to offer greater analytical purchase on the processes of network formation, coordination, and configuration” (2015, 24) and introduce infrastructure intermediaries as a missing, yet essential group of intermediaries to the debate. We thereby specifically focus on the financial links that build the GPNs’ vital connections and underpin their flows. SWIFT and the places in which it is anchored can therefore be defined, following Callon’s terminology (1986, 204), as “obligatory passage points” in the global financial system (e.g. Bassens and van Meeteren 2015). More than a mere passive facilitator of economic activity and a neutral provider of a level playing field, today SWIFT is a global monopoly highly sensitive to geo-political upheavals in the world. At the same time, it is increasingly influential and seemingly prone to act to the benefit of the world’s most powerful financial and political players. Not just a market actor, SWIFT has also become a market maker: its actions can significantly influence the payment industry and thereby make it bigger or smaller. SWIFT’s geo-political and geo-economic significance stems from its intermediary position within global financial networks: it mediates between the world’s banks and FMIs, but it incorporates features of both a public good and a private co-operative organization run on a profit-making basis, with profits recycled into SWIFT’s system. In its role and function of a key infrastructure provider of global geo-political and geo-economic importance, we argue that SWIFT forms a carefully crafted socio-economic system in itself.

Third, the GPN framework helps draw attention to FMI’s particular power structures both within and outside FMI (Coe, Dicken, and Hess 2008). Considering the cooperatively run SWIFT as a private monopoly with a distinct public good character in the CB system (see figure 1), the observation of relational and structural power constellations between SWIFT’s member banks, the materialization of power structures and dependencies ‘imported’ from the outside geo-political environment, as well as the mutual interest combining the network actors are noteworthy. FMI, however, shares further characteristics with GPN arrangements, dubbed ‘embeddedness’ (Hess 2004). SWIFT’s historic emergence is closely linked with the geo-political situation in the 1970s. Although the geo-economic and geo-political environments have significantly changed since, its historic origins still shape SWIFT’s internal organization, its power structures and the degree of functional connectivity, whilst its institutional-cum-territorial logic is echoed in the specific national anchoring of SWIFT’s operating centers (OPCs; see section 4). The GPN framework has mainly dealt with forms of firm competition and oligopolies; monopoly constellations, however, challenge the concept and its notion of lead firm-based governance in particular. Yet, we show that both the GPNs of financial products and services and the GPNs of financial infrastructure coexist and complement each other in their carefully orchestrated, tightly intertwined global organizational arrangements, in which financial risk (management) features prominently (Clark, Dixon, and Monk 2009).

Large banks' locations are significant, often with symbolically ostentatious offices in IFCs; the nodes which international payment flows are concentrated in and channeled through. SWIFT's presence is spatially significant in a different way. As an intermediary, SWIFT is interposed as a connecting medium between the nodes in a payment and a bridge between national currencies, while as an infrastructure, SWIFT is always and everywhere present throughout the flow. Both roles are fulfilled not only via SWIFT's software and hardware, but by setting and enforcing the standards and rules that govern international payment flows, for example via the Business Identifier Code (BIC) essential for making a payment. The geographies of both the intermediary and the infrastructure concepts are powerful, though largely veiled, as discussed in the following sections.

### Powerful infrastructure intermediary: SWIFT's geo-economics and geo-politics

Drawing on John Allen's (1997) conception of power – power as a capacity, as a medium, and as a technology – this section engages with the interplay within and between the different authorities of SWIFT's governance and oversight, and its embeddedness in particular regulatory jurisdictions, from which SWIFT's geo-economic and geo-political significance originates. A slight difference with Allen's original power typology, however, is that we deal with a monopoly with command and control over key aspects of a social system that defines the core of the world's global economy and “mediate[s] relationships which involve different modes of power in overlapping and coexisting spatial arrangements” (Allen 1997, 65). Nonetheless, Allen's basic concepts of power provide a useful sorting mechanism of SWIFT's geo-economic and geo-political power dimensions: power as a capacity essentially inscribes agents' power over others through inherent social (and material) relationships of domination and subordination, thus ultimately controlling economic space. Meanwhile, power as a (fluid) medium stresses the ‘power to’, the way in which agents generate and deploy power by strategically mobilizing (own and collective) resources. Finally, power as a technology highlights “that power works on subjects, not over them or simply as a resource” (Allen 1997, 63). Anchored in institutional spaces, the exercise of power includes arrays of strategies, techniques and practices, for example strategic location choices that (indirectly) enable/control other agents' flexibility.

Below, we discuss how identified power dimensions link and materialize with SWIFT's socio-economic compositions. We start with SWIFT's ‘power as capacity’ before touching each of the identified power dimensions in no particular order. Infrastructure – both hard- and software – is territorially grounded and thus subject to the regulations of a respective jurisdiction. Headquartered in Belgium, SWIFT has offices all over the world. Its operating centers, in which every message is processed and stored for up to 124 days, are, however, located in the Netherlands, Switzerland, and the United States, thus, being embedded in carefully chosen institutional environments (Hess 2004; Yeung 2009). Messages are always stored in two OPCs

**Table 1: Suggested SWIFT power dimensions**

<b>Power as a...</b>	<b>SWIFT's geo-economic power structures</b>	<b>SWIFT's geo-political sensitivities</b>
<i>...capacity</i> (‘power over’)	HQ location as part of SWIFT's (legal) infrastructure; OPCs locations to regulate data protection	Oversight by a range of differently powerful regulators (Belgium, EU, US); global reach of USD as key reserve currency
<i>...medium</i> (‘power to’)	Defending position as the gatekeeping intermediary in global finance (access control to the entire system)	Defending position as monopolistic infrastructure in global finance (concerted action by co-opetition of SWIFT's member banks)
<i>...technology</i> (power anchored in institutional space)	Monopoly; established network externalities; unequal ownership structure	Influence of national powers on SWIFT's individual board members over sanctions imposed on, e.g. Russia, Iran

*Source: authors, based on Allen's (1997) power dimensions*

for resilience in case of disaster-recovery (SWIFT 2016). The location of OPCs is not merely a technical consideration: data has a footprint and always resides in particular jurisdictions. The Dutch and Swiss OPCs comprise the European Zone, and the Swiss and US OPCs the Trans-Atlantic Zone. Intra-EU messages remain within the European Zone.

SWIFT's involvement in a number of international political events echoes some fundamental controversies, in which the intricate interplay of SWIFT's governance, oversight and territorial embeddedness are apparent. The highest-profile example was what became known as the ‘SWIFT affair’ when, following the 9/11 terrorist attacks in the United States, SWIFT supplied financial data to US authorities to allow them to analyze financial flows and thereby identify and thwart terrorist activity (de Goede 2012). Due to having a branch in the United States, SWIFT was legally compelled to comply with US subpoenas to provide access to the data. However, despite wanting to preserve its neutral and trusted position, the nationally focused and unequal nature of SWIFT's internal governance and oversight also played a part. The CEO at the time, Leonard Schrank, was “there to cooperate [with US authorities] seeing himself first and foremost as an American” (Zarate 2013, 52). He persuaded the board to co-operate with the US authorities, despite potential criticism from member banks, European politicians and a privacy-conscious European Union. When the SWIFT board grew uneasy about the continuation of the data access program, Alan Greenspan, the then-chairman of the Fed and one of the members of the SWIFT Oversight Group, exerted influence on the other central bankers involved in SWIFT oversight to persuade them to maintain co-operation. High-ranking figures from US national security and politics also persuaded SWIFT board members during visits to Washington (Zarate 2013). Having made confidentiality agreements with the United States regarding the data transfer and not informed EU data protection

authorities, SWIFT subsequently found itself under investigation by the Belgian Privacy Commission when knowledge of the program became public in 2006. Incorporated in Belgium, SWIFT is subject to Belgian data protection law, which implements the EU Data Protection Directive (Fuster, Hert, and Gutwirth 2008). This prompted SWIFT to re-design its OPC architecture to that depicted in figure 1.

SWIFT has since been unable to avoid further politicization as it has made actors both aware and wary of its potential as a geopolitical tool. In 2012, SWIFT disconnected Iranian banks from its network in response to sanctions imposed by the European Council (SWIFT 2012). The apparent success of this in persuading Iran to negotiate over its nuclear program, also led to calls from some in the United States and the European Union to disconnect Russia in response to its invasion of Ukraine (The Economist 2014). China and Russia's view of SWIFT use as a political weapon of the West, has seen both voice the need to develop an alternative (Tett and Farchy 2015; Wildau 2015). Since the election of President Trump, US and EU views are increasingly divergent. As the United States has reactivated sanctions, SWIFT may once again have to disconnect Iran or face US punishment of its board members and their employers, such as US travel bans and restricted ability for banks to conduct business in the United States (Peel and Brunnsden 2018). This has ironically led to some calls in the European Union for SWIFT to be made more independent from the United States (Horobin and Jennen 2018). The USD is the overwhelmingly dominant currency in FX trading (Wójcik, MacDonald-Korth, and Zhao 2017) and in world trade, with the currency channeled through the US payment system and banks, overseen by the Fed. USD CBRs are thus critical for trading countries to access the global financial system (International Monetary Fund 2017). This notion of external power configurations imported to FMI's internal operations goes far beyond the GPN's explanation and power terminology of inter-firm control and lead firms (e.g. Gibbon 2008; Hamilton and Gereffi 2008; Ponte, Gibbon, and Vestergaard 2011).

The organization of the global payment network has benefitted from increasing external network effects as – with the increasing importance of finance and financial institutions in society – cross-currency payments along with the new demand for these fundamental payment services has risen sharply. Both the setting and enforcement of standards upon network users mean that SWIFT shares some of the characteristics of a “lead firm” (Coe et al. 2004; Gereffi and Korzeniewicz 1993), although we might perhaps call it more accurately “lead entity”, given its co-operative corporate form and ownership structure. This also ties in with SWIFT's unique governance structure. While SWIFT is governed by a board composed of individuals from some of its member banks, it is not ownership by equals. Since banks control access to the payments system via CB, access to the provision of these payment services is via a fragmented, hierarchical network of ‘equal’ banks, who act as gatekeepers. The infrastructure and standards underpinning this system is provided by the SWIFT co-operative owned by these same banks and overseen by national financial authorities. This governance structure at times refracts or concentrates control in unequal ways, and sometimes allows SWIFT to operate with relative autonomy. Diverging from Gereffi et al.'s (2005) governance concept of lead firms, the defining factors for SWIFT's governance model are not product and process

complexity, transaction codification, and supplier capability, but rather streamlining inefficient processes and thereby enhancing global expansion while managing financial risk that has evolved over time.

Although SWIFT's membership has expanded in recent times to include other members of the finance sector and even some non-finance firms, its original members – banks – were at first opposed to such an expansion. Only supervised financial institutions are eligible to own shares in SWIFT while other members have access to fewer SWIFT services and are not eligible to be shareholders. There is also an uneven distribution of voting rights among members, with national usage of SWIFT messaging determining shareholding allocation, which in turn determines composition of the board of directors (SWIFT n.d.). Ownership and control are disproportionately allocated according to national usage of SWIFT's basic services; and this determines influence over matters such as the election of the board of directors, power to change bylaws, and votes at general meetings to influence strategy. The composition of the board is weighted proportionally by national shareholding (using a formula), and the board then chooses a chairperson and the deputy from among its members. Thus, the national or country-level voice is a key feature of SWIFT's governance.

Neither a payment nor a settlement system, SWIFT is not regulated by financial supervisors. Since 1998 it has been subject to oversight (focusing mainly on maintaining stability) by the G-10 central banks and the ECB, with the National Bank of Belgium (NBB) acting as lead overseer, as SWIFT is incorporated in Belgium (SWIFT n.d.). The NBB and SWIFT maintain “a continuous relationship, with regular ad hoc meetings” (National Bank of Belgium 2017, 70). Cooperative oversight is conducted through the Oversight Group, which includes the chairperson of the CPMI as well as the central banks. Within this, the Executive Group is composed of representatives of the Bank of Japan, the Federal Reserve Board, the Bank of England, the ECB and the NBB; this group meets with SWIFT's board and management. With only one non-Western country involved in oversight, this reflects global financial power at the time of SWIFT's creation. The post-crisis loss of moral authority and slow shift of power away from the West is reflected in the 2012 creation of the SWIFT Oversight Forum, in which the G-10 shares information on SWIFT oversight with a further 10 central banks (SWIFT n.d.). The latter, however, are not members of the core Oversight Group. SWIFT is thus a child of its time, born of the Euromarkets-enabled globalization of US and European financial firms.

Although stressing its apolitical nature and creating “a ‘grand narrative’ about itself as the world's foremost secure trusted third party” (Scott and Zachariadis 2014, 138), SWIFT's governance structure and internal politics still reflect these roots. SWIFT's historic origins have set a path difficult to alter as its institutional embeddedness ties in with its intricate internal power relationships that cannot be separated from the external geo-political environments. These complexities are typical for international infrastructures, which are beyond the control of individual states and economic actors, thus, influencing SWIFT's own geo-economic actions and strategic decisions with effects on the entire world economy.



## Conclusion

This analysis has sought to shed light on FMI as much more than a mere technical matter of facilitation. It has done so by focusing on the mundane yet fundamental and profitable area of payments. Within this, we examined the CB system, a core function of the global financial system underpinning the network of IFCs going back centuries, and the role of SWIFT as a crucial messaging infrastructure enabling this. CB therefore reinforces the power of a rather exclusive network of IFCs, which defines a vital, but generally neglected dimension of centralized financial power. SWIFT is variously perceived as an intermediary and a crucial infrastructure but also characterized as an entity of global governance which somewhat glosses over its creation, ownership and governance by powerful private institutions. Far from being the self-proclaimed neutral actor, we illustrated how the economic intermediary SWIFT is also highly political through its function and exposure, and consists of a politically sensitive ownership structure, which itself adds yet another layer of complexity. This notion points to another aspect that makes the investigation and empirical scrutiny of financial markets infrastructure so timely and apt for economic and financial geographers. Literature on infrastructure largely focuses on domestic infrastructure. International infrastructure by its nature, however, does not fall under the remit of any one state. In the case of SWIFT, it is thus likely to be provided by private actors to meet their own needs. Yet it is still located between and within distinct territorialities and is as such a crucial resource in the relational exercise of control and power over firms and space.

For these reasons, this article engages with and further develops the emerging literatures on both international infrastructure and intermediaries. The GPN 2.0 concept has more strongly placed the spotlight on intermediaries in its analysis of important shapers of the global economy, and we have sought to extend and complement the suggested three groups of intermediaries in GPN 2.0 by introducing the CB-cum-SWIFT organization as an infrastructure intermediary. This new group helps to understand a kind of intermediary not yet covered in the typology but vital at many different levels and dimensions for the global political economy, as we illustrated in several examples in the article. We reflected the manifold, overlapping power intricacies with the help of John Allen's apt conceptualizations of power, which enabled us to develop a more nuanced though holistic understanding of this 'hidden' backbone of global finance and to elucidate the geo-economic dimension of SWIFT. We highlighted the ways in which complex governance structures and territorial embeddedness feed back on each other in a politicized process, which influences the geography of global finance.

Our analysis shows that privately governed international infrastructure intermediaries are significant actors, both in maintaining banks' profitable position within the global financial system and in shaping access to this system. In order to deepen our comprehension of FMI's geo-political dimension in global finance, both as controlling and controlled social entities, further analytical and empirical attention should be paid to the complexities and interaction of corporate form, ownership,

governance and politics in the exercise of power. To this end we incorporate the GPN framework, although we are wary not to overstretch the concept.

Thus, the crucial function of FMI processes and actors in reproducing the international financial system mean that they should be of interest to economic geographers. This is particularly salient at a time when financial technological (FinTech) innovations may instill rare political and topological reconfigurations of the established order. A brief review of the current SWIFT-CB system shows that although the system is secure and global, it suffers from drawbacks. Increasingly concentrated among fewer large banks, it is also slow, expensive, opaque, and carries risks for banks. On top of FX spreads, for example, a payment can cost up to 60 EUR and can take between three and five working days, with transparency in pricing, timing and tracking significantly lacking. A lack of standardization means payments are error-prone, often requiring costly and time-consuming manual intervention, while anti-money laundering (AML) and know your customer (KYC) regulatory compliance is also costly (McKinsey & Company 2015). Maintaining correspondent accounts impacts the treasury, liquidity and risk positions of both banks' positions (Rambure and Nacamuli 2008) and makes it increasingly expensive for even large banks to preserve. Some early FinTech challenger firms are about to launch their new businesses and threaten the established order. Yet, change seems to come about only slowly. Empirical scrutiny of the technological capabilities of these FinTech challengers and their potential barriers to disruption by the well-integrated SWIFT-CB intermediary infrastructure is well under way.

## Acknowledgments

The authors thank Paolo Balmas, Hossein Nabilou, and the participants at the seminar on 'The Future of Fintech: The Politics of Technological Innovation in Finance', University of Luxembourg, 22 October 2018, for thoughtful comments that helped much to improve this manuscript.

## References

- Allen, John. 1997. 'Economies of Power and Space'. In *Geographies of Economies*, edited by Roger Lee and Jane Wills, 59–70. London; New York: Routledge.
- Allen, John. 2003. *Lost Geographies of Power*. Malden, MA: Wiley-Blackwell.
- Appel, Hannah, Nikhil Anand, and Akhil Gupta. 2018. 'Introduction: Temporality, Politics and the Promise of Infrastructure'. In *The Promise of Infrastructure*, edited by Nikhil Anand, Akhil Gupta, and Hannah Appel, 1–38. Durham: Duke University Press Books.
- Badi, Mohammed, Stefan Dab, Pierre Paoli, Maarten Peeters, Prateek Roongta, Olivier Sampieri, and Yann Sénant. 2017. *Global Payments 2017: Deepening the Customer Relationship*. Boston Consulting Group & SWIFT.  
<https://www.bcg.com/publications/2017/transaction-banking-financial-institutions-global-payments-2017-deepening-customer-relationship.aspx>.
- Bank of England. 2013. 'The Bank of England's Approach to the Supervision of Financial Market Infrastructures'. Bank of England.  
<https://www.bankofengland.co.uk/-/media/boe/files/financial-stability/financial-market-infrastructure-supervision/the-boe-approach-to-the-supervision-of-fmi.pdf>.
- Bassens, David, and Michiel van Meeteren. 2015. 'World Cities under Conditions of Financialized Globalization: Towards an Augmented World City Hypothesis'. *Progress in Human Geography* 39 (6): 752–775.  
doi:10.1177/0309132514558441.
- Bentham, Justin, Andrew Bowman, Marta de la Cuesta, Ewald Engelen, Ismail Ertürk, Peter Folkman, Julie Froud, et al. 2013. *Manifesto for the Foundational Economy*. Working Paper 131. CRESC Working Paper.  
<https://www.scribd.com/document/122563517/The-foundational-economy-rethinking-industrial-policy-Andrew-Bowman-Julie-Froud-Sukhdev-Johal-and-Karel-Williams>.
- C24 Technologies. 2015. 'What Is Swift?' C24 Technologies.  
<https://web.archive.org/web/20150829213123/https://www.c24tech.com/what-is-swift>.
- Callon, Michel. 1986. 'Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Briec Bay'. In *Power, Action and Belief: A New Sociology of Knowledge*, edited by Law, John, 196–233. London: Routledge Kegan & Paul.
- Clark, Gordon L., Adam D. Dixon, and Ashby H. B. Monk, eds. 2009. *Managing Financial Risks: From Global to Local*. Oxford: Oxford University Press.
- Coe, Neil M., Peter Dicken, and Martin Hess. 2008. 'Global Production Networks: Realizing the Potential'. *Journal of Economic Geography* 8 (3): 271–295.  
doi:10.1093/jeg/lbn002.
- Coe, Neil M., Martin Hess, Henry Wai-chung Yeung, Peter Dicken, and Jeffrey Henderson. 2004. "'Globalizing" Regional Development: A Global Production Networks Perspective'. *Transactions of the Institute of British Geographers* 29 (4): 468–484. doi:10.1111/j.0020-2754.2004.00142.x.

- Coe, Neil M., Karen P. Y. Lai, and Dariusz Wójcik. 2014. 'Integrating Finance into Global Production Networks'. *Regional Studies* 48 (5): 761–777. doi:10.1080/00343404.2014.886772.
- Coe, Neil M., and Henry Wai-chung Yeung. 2015. *Global Production Networks: Theorizing Economic Development in an Interconnected World*. Oxford: Oxford University Press.
- Collinson, Patrick. 2017. 'Revealed: The Huge Profits Earned by Big Banks on Overseas Money Transfers'. *The Guardian*, April 8, sec. Money. <https://www.theguardian.com/money/2017/apr/08/leaked-santander-international-money-transfers-transferwise>.
- Cowan, Thomas C. 2017. 'Network Control in a Globalized World: How Visa and Swift's Founding Structures Serve Their Stakeholders on the International Stage'. Thesis, Massachusetts Institute of Technology. <http://dspace.mit.edu/handle/1721.1/112017>.
- CPMI, and IOSCO. 2012. 'Principles for Financial Market Infrastructures'. <https://www.bis.org/cpmi/publ/d101.htm>.
- de Goede, Marieke. 2012. 'The SWIFT Affair and the Global Politics of European Security'. *JCMS: Journal of Common Market Studies* 50 (2): 214–230. doi:10.1111/j.1468-5965.2011.02219.x.
- Dixon, Adam D. 2011. 'The Geography of Finance: Form and Functions'. *Geography Compass* 5 (11): 851–862. doi:10.1111/j.1749-8198.2011.00458.x.
- Dörry, Sabine. 2008. *Globale Wertschöpfungsketten Im Tourismus: Ohnmächtige Unternehmen in Mächtiger Position? Relationale Governance Bei Der Organisation Deutscher Pauschalreisen Nach Jordanien*. Berlin: LIT.
- Dörry, Sabine. 2015. 'Strategic Nodes in Investment Fund Global Production Networks: The Example of the Financial Centre Luxembourg'. *Journal of Economic Geography* 15 (4): 797–814. doi:10.1093/jeg/lbu031.
- Dörry, Sabine. 2016. 'The Geographies of Industrialised Finance: Probing the Global Production Networks of Asset Management'. *Geography Compass* 10 (1): 3–14. doi:10.1111/gec3.12256.
- Dörry, Sabine, and Gary Dymksi. 2018. 'Will Brexit Reverse the Centralizing Momentum of Global Finance?' *Geoforum*. doi:10.1016/j.geoforum.2018.02.003.
- Dymksi, Gary A. 2011. 'Genie out of the Bottle: The Evolution of Too-Big-to-Fail Policy and Banking Strategy in the US'. <https://www.postkeynesian.net/downloads/soas12/Dymksi-Banking-and-TBTF.pdf>.
- Easterling, Keller. 2016. *Extrastatecraft: The Power of Infrastructure Space*. Reprint edition. London New York: Verso.
- European Central Bank. 2017. 'Tenth Survey on Correspondent Banking in Euro 2016 : February 2017.' <https://publications.europa.eu/en/publication-detail/-/publication/8828d161-28b4-11e7-ab65-01aa75ed71a1/language-en>.
- European Commission. n.d. 'Financial Markets Infrastructure Policy'. Text. European Commission. [https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-markets/post-trade-services/financial-markets-infrastructure-policy\\_en](https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-markets/post-trade-services/financial-markets-infrastructure-policy_en).

- Financial Stability Oversight Council. 2012. 2012 Annual Report. Washington, D.C. <https://www.treasury.gov/initiatives/fsoc/studies-reports/Pages/2012-Annual-Report.aspx>.
- Flitter, Emily. 2018. 'S.E.C. Blocks Chinese Takeover of Chicago Stock Exchange'. *The New York Times*, February 15, sec. Business Day. <https://www.nytimes.com/2018/02/15/business/china-deal-chicago-exchange-blocked.html>.
- Fuster, Gloria González, Paul De Hert, and Serge Gutwirth. 2008. 'SWIFT and the Vulnerability of Transatlantic Data Transfers'. *International Review of Law, Computers & Technology* 22 (1–2): 191–202. doi:10.1080/13600860801925185.
- Gereffi, Gary, John Humphrey, and Timothy Sturgeon. 2005. 'The Governance of Global Value Chains'. *Review of International Political Economy* 12 (1): 78–104. doi:10.1080/09692290500049805.
- Gereffi, Gary, and Miguel Korzeniewicz, eds. 1993. *Commodity Chains and Global Capitalism*. Westport, Conn: Praeger.
- Gibbon, Peter. 2008. 'Governance, Entry Barriers, Upgrading: A Re-Interpretation of Some GVC Concepts from the Experience of African Clothing Exports'. *Competition & Change* 12 (1): 29–48. doi:10.1179/102452907X264511.
- Gifford, Karen, and Jessie Cheng. 2016. 'Implementation of Real-Time Settlement for Banks Using Decentralised Ledger Technology: Policy and Legal Implications'. *Financial Stability Review*, no. 20: 143–151.
- Greenspan, Alan. 2007. *The Age of Turbulence: Adventures in a New World*. London: Penguin.
- Grolleman, Dirk Jan, and David Jutra. 2017. Understanding Correspondent Banking Trends: A Monitoring Framework. Working Paper 17/216. IMF Working Paper. International Monetary Fund. <https://www.imf.org/en/Publications/WP/Issues/2017/10/04/Understanding-Correspondent-Banking-Trends-A-Monitoring-Framework-45318>.
- Hamilton, Gary G., and Gary Gereffi. 2008. 'Global Commodity Chains, Market-Makers, and the Rise of Demand-Responsive Economies'. In *Frontiers of Commodity Chain Research*, edited by Jennifer Bair, 136–161. Palo Alto, CA: Stanford University Press.
- Hess, Martin. 2004. "'Spatial" Relationships? Towards a Reconceptualization of Embeddedness'. *Progress in Human Geography* 28 (2): 165–186. doi:10.1191/0309132504ph479oa.
- Horobin, William, and Birgit Jennen. 2018. 'EU Looking to Sidestep U.S. Sanctions With Payments System Plan'. *Bloomberg.com*, August 27. <https://www.bloomberg.com/news/articles/2018-08-27/eu-looking-to-sidestep-u-s-sanctions-with-payments-system-plan>.
- Ingves, Stefan. 2018. 'Money and Payments - Where Are We Heading?' Speech presented at the Stockholm School of Economics, Stockholm, June 4. <https://www.bis.org/review/r180725e.htm>.
- International Monetary Fund. 2017. Recent Trends in Correspondent Banking Relationships: Further Considerations. Policy Papers. International Monetary

- Fund. <https://www.imf.org/en/Publications/Policy-Papers/Issues/2017/04/21/recent-trends-in-correspondent-banking-relationships-further-considerations>.
- Kaunert, Christian, Sarah Léonard, and Alex MacKenzie. 2012. 'The Social Construction of an EU Interest in Counter-Terrorism: US Influence and Internal Struggles in the Cases of PNR and SWIFT'. *European Security* 21 (4): 474–496. doi:10.1080/09662839.2012.688812.
- Kozolchyk, Boris. 1992. 'The Paperless Letter of Credit and Related Documents of Title'. *Law and Contemporary Problems* 55 (3): 39–101.
- Lee, Ruben. 2011. *Running the World's Markets: The Governance of Financial Infrastructure*. Princeton, N.J: Princeton University Press.
- Lord, Crispian, Gagan Bhatnagar, Joerg Ruetschi, and Tim Power. 2015. 'Post-Trade Services in Financial Markets: Moving from Backstage to Center Stage'. Strategy&. <https://www.strategyand.pwc.com/reports/post-trade-services-financial-markets>.
- Maurer, Bill. 2012. 'Payment: Forms and Functions of Value Transfer in Contemporary Society'. *The Cambridge Journal of Anthropology* 30 (2). doi:10.3167/ca.2012.300202.
- McCune, Erin. 2014. 'There Is No Such Thing As An International Wire'. Glenbrook. <https://pv.glenbrook.com/there-is-no-such-thing-as-an-international-wire/>.
- McKinsey & Company. 2015. Global Payments 2015: A Healthy Industry Confronts Disruption. Financial Services Practice. <https://www.mckinsey.com/industries/financial-services/our-insights/global-payments-2015-a-healthy-industry-confronts-disruption>.
- McKinsey & Company. 2017. Global Payments 2017: Amid Rapid Change, an Upward Trajectory. Global Banking Practice. <https://www.mckinsey.com/industries/financial-services/our-insights/global-payments-2017-amid-rapid-change-an-upward-trajectory>.
- Mersch, Yves. 2018. 'Strengthening the European Financial Industry amid Disruptive Global Challenges'. Speech presented at the European Institute of Financial Regulation (EIFR), Paris, September 3. <https://www.ecb.europa.eu/press/key/date/2018/html/ecb.sp180903.en.html>.
- Money Mover, and Account. 2016. 'The Hidden Cost of Moving Money Internationally'. <https://www.moneymover.com/bank-charges/>.
- Munnell, Alicia H., and Leah M. Cook. 1990. 'How Does Public Infrastructure Affect Regional Economic Performance?' *New England Economic Review*, no. September/October (September): 69–112.
- National Bank of Belgium. 2017. 'Financial Market Infrastructures and Payment Services Report 2017'. National Bank of Belgium. <https://www.nbb.be/en/articles/financial-market-infrastructures-and-payment-services-report-2017-0>.
- Nelms, Taylor C., Bill Maurer, Lana Swartz, and Scott Mainwaring. 2018. 'Social Payments: Innovation, Trust, Bitcoin, and the Sharing Economy'. *Theory, Culture & Society* 35 (3): 13–33. doi:10.1177/0263276417746466.

- Norman, Ben, Rachel Shaw, and George Speight. 2011. The History of Interbank Settlement Arrangements: Exploring Central Banks' Role in the Payment System. Working Paper 412. Bank of England Working Paper. Bank of England.  
[https://www.ecb.europa.eu/home/pdf/research/Working\\_Paper\\_412.pdf](https://www.ecb.europa.eu/home/pdf/research/Working_Paper_412.pdf).
- O'Neill, Phillip M. 2010. 'Infrastructure Financing and Operation in the Contemporary City'. *Geographical Research* 48 (1): 3–12. doi:10.1111/j.1745-5871.2009.00606.x.
- Ottaviano, Gianmarco I. P. 2008. 'Infrastructure and Economic Geography: An Overview of Theory and Evidence'. *EIB Papers* 13 (2): 8–35.
- Ouma, Stefan. 2010. 'Global Standards, Local Realities: Private Agrifood Governance and the Restructuring of the Kenyan Horticulture Industry'. *Economic Geography* 86 (2): 197–222. doi:10.1111/j.1944-8287.2009.01065.x.
- Peel, Michael, and Jim Brunnsden. 2018. 'Swift Shows Impact of Iran Dispute on International Business'. *Financial Times*. <https://www.ft.com/content/9f082a96-63f4-11e8-90c2-9563a0613e56>.
- Ponte, S., P. Gibbon, and J. Vestergaard, eds. 2011. *Governing through Standards: Origins, Drivers and Limitations*. Houndmills, Basingstoke, Hampshire ; New York: Palgrave Macmillan.
- Rambure, Dominique, and Alec Nacamuli. 2008. *Payment Systems: From the Salt Mines to the Board Room*. 2008 edition. Basingstoke, England; New York: Palgrave Macmillan.
- Ruddick, Graham. 2017. 'London Stock Exchange and Deutsche Börse Merger Blocked by EU'. *The Guardian*, March 29, sec. Business.  
<https://www.theguardian.com/business/2017/mar/29/london-stock-exchange-deutsche-borse-merger-blocked-ec>.
- Scott, Susan V., and Markos Zachariadis. 2014. *The Society for Worldwide Interbank Financial Telecommunication: Cooperative Governance for Network Innovation, Standards, and Community*. 1 edition. London; New York, NY: Routledge.
- SWIFT. n.d. 'Organisation & Governance'. SWIFT. <https://www.swift.com/about-us/organisation-governance/oversight>.
- SWIFT. 2012. 'SWIFT Instructed to Disconnect Sanctioned Iranian Banks Following EU Council Decision'. SWIFT. <https://www.swift.com/insights/press-releases/swift-instructed-to-disconnect-sanctioned-iranian-banks-following-eu-council-decision>.
- SWIFT. 2016. 'SWIFT: The Global Financial Messaging Provider'. SWIFT.  
[https://www.swift.com/sites/default/files/resources/swift\\_corporate\\_brochure.pdf](https://www.swift.com/sites/default/files/resources/swift_corporate_brochure.pdf).
- SWIFT. 2018. 'Annex to the Annual Review 2017: Consolidated Financial Statements'. SWIFT. <https://www.swift.com/about-us/financials>.
- SWIFT. 2018. 'SWIFT and Data'. SWIFT. Accessed August 15.  
<https://www.swift.com/about-us/swift-and-data>.
- Taylor, Peter J., Ben Derudder, James Faulconbridge, Michael Hoyler, and Pengfei Ni. 2014. 'Advanced Producer Service Firms as Strategic Networks, Global

- Cities as Strategic Places'. *Economic Geography* 90 (3): 267–291. doi:10.1111/ecge.12040.
- Tett, Gillian, and Jack Farchy. 2015. 'Russian Banker Warns West over Swift'. *Financial Times*. <https://www.ft.com/content/7020c50c-a30a-11e4-9c06-00144feab7de>.
- The Economist. 2014. 'The Pros and Cons of a SWIFT Response'. *The Economist*, November 20. <https://www.economist.com/international/2014/11/20/the-pros-and-cons-of-a-swift-response>.
- The Economist. 2017. 'In a Pre-Brexit Skirmish with the City, Eurex Takes on LCH'. *The Economist*, November 23. <https://www.economist.com/news/finance-and-economics/21731634-german-bid-loosen-londons-grip-clearing-euro-interest-rate-swaps>.
- Villeroy de Galhau, François. 2018. 'Europe in a Disruptive World'. Speech presented at the Paris Europlace International Financial Forum, Paris, July 11. <https://www.bis.org/review/r180724h.htm>.
- Wandhöfer, Ruth, and Barbara Casu. 2018. The Future of Correspondent Banking Cross-Border Payments. 2017–001. SWIFT Institute Working Paper. SWIFT Institute. [https://swiftinstitute.org/research/the-future-of-correspondent-banking/?dm\\_i=47RJ,DW4K,2UJEB5,1K9DS,1](https://swiftinstitute.org/research/the-future-of-correspondent-banking/?dm_i=47RJ,DW4K,2UJEB5,1K9DS,1).
- Wildau, Gabriel. 2015. 'China Launch of Renminbi Payments System Reflects Swift Spying Concerns'. *Financial Times*. <https://www.ft.com/content/84241292-66a1-11e5-a155-02b6f8af6a62>.
- Wójcik, Dariusz, and Csaba Burger. 2010. 'Listing BRICs: Stock Issuers from Brazil, Russia, India, and China in New York, London, and Luxembourg'. *Economic Geography* 86 (3): 275–296. doi:10.1111/j.1944-8287.2010.01079.x.
- Wójcik, Dariusz, Duncan MacDonald-Korth, and Simon X. Zhao. 2017. 'The Political–Economic Geography of Foreign Exchange Trading'. *Journal of Economic Geography* 17 (2): 267–286. doi:10.1093/jeg/lbw014.
- World Bank Group, Van Der Does De Willebois, Emile J. M, Ricardo David Valencia, Ana Maria Aviles, Karol Karpinski, Sameer Goyal, et al. 2018. The Decline in Access to Correspondent Banking Services in Emerging Markets: Trends, Impacts, and Solutions - Lessons Learned from Eight Country Case Studies. Working Paper 125422. Washington, DC: The World Bank. <https://openknowledge.worldbank.org/handle/10986/29778>.
- Yeung, Henry Wai-Chung. 2009. 'Transnational Corporations, Global Production Networks, and Urban and Regional Development: A Geographer's Perspective on Multinational Enterprises and the Global Economy'. *Growth and Change* 40 (2): 197–226. doi:10.1111/j.1468-2257.2009.00473.x.
- Zarate, Juan C. 2013. *Treasury's War: The Unleashing of a New Era of Financial Warfare*. New York: PublicAffairs.
- Zscheschang, Katja. 2018. 'KYC – Why Not Come Together? Know Your Customer'. *The Banker*, July, 115–116.