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# International remittance rails as infrastructures: embeddedness, innovation and financial access in developing economies

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**International Remittance Rails as Infrastructures:  
Embeddedness, Innovation, and Financial Access in  
Developing Economies**

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## Introduction

In this article, we analyze the evolving system of remittance transfers through the lens of infrastructure. Remittances are of crucial importance to developing countries, and particularly to households that lack access to the formal financial system. Costs and risks vary enormously across different remittance platforms, generating large disparities in economic benefits to participants. We argue that new digital technologies and platforms for remittance transfers have already had enormous impact in expanding financial access in developing economies, and have the promise to continue to do so in ways that were simply not feasible under existing systems. The development of digital payment infrastructures creates new opportunities and vulnerabilities for the populations that depend on them, calling for a careful analysis of the power relations that are produced by the new technologies. We contend that applying the infrastructure frame to the study of remittances is a highly productive method for understanding the international political economy of developing country remittances in the context of ongoing technological changes, including the classic questions of who wins and who loses, and where power lies within the system. [We also provide a relational lens into the functioning of the remittance pathways, as remittances are social phenomena and cannot be understood merely as movements of money.](#)

These issues are central to the question raised by the editors of this collection, Nicholas Bernards and Malcolm Campbell-Verduyn, about the ways recent advances in financial technology intersect with the human dimension of global finance. Is the rise of a more interconnected and faster global financial system fostering a more inclusive and consumer-friendly financial sector, or facilitating instability and marginality? What are the connections of changing infrastructures to broader socio-economic processes? Our article explores these issues through the example of a rapidly involving infrastructural system that facilitates private money transfers – remittances - between individuals in the Global North and South, but also connects to the increasingly vibrant ecosystems of domestic payments within developing countries that have proven to be powerful integrators of formal and informal economies.

Digital financial services in the developing economies provide the essential but often missing infrastructures of finance, enabling many people to access formal financial services for the first time in their lives. [Person-to-person money transfers also serve to maintain networks of obligation and mutuality that are central in the livelihoods of low-income communities.](#) Finding novel solutions for efficient remittance delivery has become a central development issue in the current era of intensifying global mobility. Over the past ten years, remittances to developing countries have increased by 51 percent. Many such countries export their labor to richer economies, with diasporas sending portions of their earnings home. Formally recorded global remittance flows reached US\$ 613 billion in 2017 (World Bank, 2018<sup>1</sup>). Remittance transfers to the poorest areas in the world remain the costliest. As of last quarter of 2017, the global cost of sending \$200 averaged around 7.45 percent of the sum sent, and in the case of Sub-Saharan

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3 Africa almost 10 percent (Table 1). The two largest global MTOs, Western Union and  
4 MoneyGram, control over 65 percent of African remittance outlets (FSD Africa, 2016). While  
5 the current institutional and regulatory conditions may make it difficult to reduce transaction  
6 costs to less than 3 percent by 2030 as outlined in the UN Sustainable Development Goals,  
7 digital technologies such as mobile money and blockchain may offer a possible solution (see also  
8 Rodima-Taylor and Grimes, 2017).  
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12 Recent rapid advances in digital financial technologies, facilitated by information  
13 technology and mobile connectivity, are reconfiguring the financial order, introducing new  
14 actors external to the traditional banking sector for greater competition and customer centrality  
15 (Dula and Chuen, 2018). The ‘fintech disruption’ started in the payments sector, which is the part  
16 of financial industry central to remittance transfers. Digital payment technologies are  
17 increasingly accessible to low-income communities through mobile phone penetration that  
18 reached 93 percent globally in 2013 (Chu, 2018). Global mobile inclusion may therefore  
19 constitute a ‘gateway to universal financial inclusion,’ reflected in a 20 percent decline in the  
20 numbers of unbanked adults in just three years, 2011-2014 (132-3). As digital payment  
21 technologies enable aggregation and analysis of consumer data with raising consumer protection  
22 and privacy concerns, they also create new opportunities for fighting money laundering and  
23 terrorist financing (Michaels and Homer, 2018). At the same time, the new challenges posed by  
24 the increasing fragmentation and privatization of payment actors combine with the ambiguous  
25 impact of growing financial inclusion on the empowerment and improved livelihoods of low-  
26 income populations.  
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33 We now understand financial inclusion as occurring within a broader, interconnected  
34 financial eco-system of diverse players that include non-bank institutions as well as the informal  
35 sector. The recent rapid rise in financial inclusion in Kenya (from 26.4 percent of people  
36 accessing formal financial services in 2006, to 75.3 percent in 2016)<sup>2</sup> largely resulted from the  
37 activities of non-banks, particularly the M-Pesa mobile money platform. Similar stories are  
38 found around the globe. Thus, remittances constitute an important element of developing  
39 countries’ engagement with international finance as well as their patterns of financial inclusion.  
40 This makes it all the more essential that scholars and practitioners understand the potential for  
41 both empowerment and vulnerability that remittances offer. To unearth that potential, we must  
42 consider the infrastructures that enable rapid growth in remittances.  
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47 The new digital payment systems in low-income communities are used predominantly  
48 for person-to-person payments, both domestic and international. In order to understand the  
49 implications of the emerging digital technologies for power imbalances and economic disparities  
50 impacting the low-income populations who rely on them, we view the peer-to-peer payment  
51 pathways as part of socially embedded infrastructures. As infrastructures tend to be concealed  
52 from the view, their social and political elements can be obscured by technical coding (Bowker  
53 et al., 2010). Suggesting that infrastructures are both relational (meaning ‘different things to  
54 different groups’) and ecological (part of the ‘balance of action, tools, and ... environment’), Star  
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3 (1999, p. 377) highlights their embeddedness in other structures and technologies as well as  
4 connectedness to conventional practice. Viewing infrastructure building as a set of distributed  
5 activities that entail both ‘community building and system building’ allows deeper insights into  
6 the ways new forms of sociality are shaped by the communicative technologies, and ethical and  
7 political values built into infrastructures (Bowker et al., 2010, p. 105). Here, we view the new  
8 digital payment technologies both as giving rise to spatially oriented ‘payment rails’<sup>3</sup> connecting  
9 individuals or institutions, but also as enabling platforms that underlie the relational character of  
10 the emerging infrastructures. We view platforms as ‘infrastructural intermediaries,’ determined  
11 by both their material and socio-cultural elements (Langley and Leyshon 2017, p. 9). We follow  
12 Guyer’s (2016) concept of ‘platform economy’ as a lens to reveal the composite architectures of  
13 the global economy with differential control and access points. Platform intermediation in  
14 developing economies that has been very sparsely studied so far; we argue that our sustained  
15 focus on infrastructures with the relational components of their connective ecologies enables a  
16 more comprehensive understanding of remittance flows and their pathways. Focus on the  
17 relational and situated dimensions of infrastructures helps to unveil socio-political agendas and  
18 power imbalances obscured by the seeming neutrality of technology, and to present a more  
19 nuanced picture of the key analytical dimensions of financial infrastructures: materiality,  
20 spatiality, and power, as outlined in the Introduction of this special issue.

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28 Our article examines how new technologies and business models of digital payment  
29 infrastructures interact with local socio-economic institutions, norms, and agency in the  
30 emerging remittance networks. These infrastructural assemblages are created and reformed  
31 through what we term ‘inventive practice’ – a creative recombining of elements from existing  
32 cultural and institutional repertoires. The importance of these concepts in analyzing the  
33 remittance infrastructure is two-fold. First, it illuminates the fundamental fact that the remittance  
34 infrastructure is neither monolithic nor (at least in whole) intentional in nature. This points to the  
35 necessity of disaggregating assessments of power, agency, and inclusion. Second, it calls for us  
36 to adopt a more explicitly interdisciplinary approach to describing and analyzing the  
37 infrastructures of remittances—in particular, we make the case for the importance of  
38 incorporating anthropological perspectives. We show that the development of digital financial  
39 inclusion has been, to a considerable extent, a ground-up process in which previously ‘unbanked’  
40 households have built on a combination of existing forms of financial access and the new  
41 possibilities afforded by digital platforms.

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47 We build on the growing ethnographic literature on the role of local entrepreneurs and  
48 social networks in solving the ‘last mile’ problem—i.e., how to deliver remittances to households  
49 without access to formal financial institutions—in areas where remittances have traditionally  
50 been difficult to deliver. Our analysis of the evidence from countries in Africa and Asia suggests  
51 that inventive practice that produces similar but locally-situated solutions to the common  
52 problem is a common attribute of developing economy remittance infrastructures.<sup>4</sup> By  
53 investigating the remittance infrastructures from the local level, we learn that individuals and  
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3 social networks have more agency than is usually understood by critical analyses that focus on  
4 the exploitative nature of monopolistic operators or owners of infrastructure. Indeed, it is  
5 important to remember that infrastructures enable as well as constrain.  
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7 We build our analysis using emerging theoretical approaches to infrastructures as well as  
8 empirical evidence from developing economies in Africa and Asia – some of it based on our  
9 longitudinal field research in Africa and recent interviews with some digital remittance startups,  
10 but also drawing on other recent ethnographic studies. We apply the concepts of infrastructure,  
11 assemblage, innovation, and platform economies to empirical evidence on remittances, with a  
12 particular focus on the role of local networks and initiative. We conclude with a call for more  
13 empirical research on the infrastructures and social practices of remittances in developing  
14 countries and by identifying some potential fault-lines that could shift distribution of power and  
15 benefits within them.  
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### 21 **Financial Innovation, Platforms and Inventive Practice in Digital Remittance Space**

  
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23 As material forms that facilitate exchange over space, infrastructures are physical  
24 networks over which goods, ideas, and people are moved, but they also relate to domains such as  
25 government and sociality (Larkin, 2013). Increasingly backgrounded from view, nodes of control  
26 in infrastructural networks become proxies to manipulate digital flows of money and data  
27 (DeNardis and Musiani, 2016, p. 4). Digital technologies are facilitating an entry of the social  
28 and affective into the realm of formal finance. New financial products and services increasingly  
29 build on social obligations and interpersonal patterns of mutuality, rendering the social explicit  
30 and available for ‘marketization and politization’ (Tooker and Clarke, 2018). The rapidly  
31 expanding digital payments space in the developing world has been shaped by novel  
32 technologies and business models in what Nelms, et al. (2018, p. 13) term a ‘Cambrian explosion  
33 in payments.’ However, the increasing engagement of private actors in the infrastructure of value  
34 transfer appears in tension with the perceived ‘public interest in payment’ and suggests a need to  
35 study the backgrounded political dimensions of payment infrastructures and ‘bridge tolls’ fixed  
36 by payment platforms and companies (Maurer, 2012, pp.15, 27).  
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42 At the core of the new remittance infrastructures are digital platforms that have the  
43 potential to integrate other actors and institutions in predominantly cash economies. Like other  
44 information technology platforms, such as the Internet, they provide existing financial actors  
45 with new opportunities for innovation (see also Kendall et al., 2012, p. 3). In many parts of  
46 Africa and Asia, mobile money platforms increasingly consolidate payments, lending,  
47 investment, and micro-insurance services. This ‘platformization’ of the financial environment  
48 highlights the catalytic powers of e-money and digital currencies to facilitate institutional  
49 integration in the Global South. We contend that this is not limited to formal sector institutions:  
50 facilitating financial transactions between peers, digital payments have emerged as an integral  
51 part of the informal ‘sharing economies’ of mutual security in developing societies.  
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New digital payment technologies obtain infrastructural qualities when certain characteristics are present that facilitate the connections integral for the movement of networked objects. Mobile and digital currency-based remittance technologies have given rise to new domestic, regional and transnational payment rails, but the connecting function of these pathways is performed by platforms. Through their connection-building capacities, digital platforms illuminate the relational and situated character of infrastructures. Pointing out that infrastructures are more than just physical objects, Larkin (2013, p. 329) situates the analysis of the economic and social impact of infrastructures in their ‘dual’ character both as objects and relations between objects: ‘what distinguishes infrastructures from technologies is that they are objects that create the grounds on which other objects operate, and when they do so they operate as systems’. Viewing infrastructures through their systemic characteristics rather than focusing on technology also helps to unveil political agendas and power imbalances obscured by the seeming neutrality of technological developments.

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Digital financial platforms have the potential to integrate actors in novel ways. By bringing together participants for a co-creation of value, they offer an alternative to traditional ‘vertical’ business integration. Combining input and technology from different external sources, platforms blur the boundaries between producers and consumers, while eliminating traditional gatekeepers through novel modes of re-intermediation (Parker, Van Alstyne, and Choudary, 2016). The lateral expansion of digital platforms is achieved through their editable features that are responsive to input from third-party developers, leading to an interactive and ‘loosely assembled ecosystem for innovation’ (Zachariadis and Ozcan, 2017, p. 7; Gawer and Gusumano, 2014). Through their socio-technical mediation, platforms construct infrastructural networks with the help of code and data analytics – sometimes creating an impression of disintermediated exchange between parties (Langley and Leyshon, 2016, p. 5). Langley and Leyshon view digital platforms as a ‘distinct mode of socio-technical intermediary’ within ‘wider processes of capitalization’ – one that employs ‘participatory economic culture’ combined with software code and analytics to compose infrastructures that allow for rapid scaling and revenue extraction from multi-sided value creation and data trails and thus the ability to realize monopoly rents (p. 2). The prevailing narrative of the ‘sharing economy’ as egalitarian may therefore overlook the accumulative dynamic that could arise from capitalizing on the co-creation of value.

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Platforms are not just channeling digital economic circulations, but actively programming and standardizing them while conventionalizing certain patterns of inclusion, and exclusion (ibid.); thus there is a need to study the socio-technical practices of their mediating logic. The rise of the platform infrastructure has historically been embedded in the niches and interactions of peer-based initiatives that gradually developed a ‘mediated routine practice’ (Van Dijck, 2013, in Langley and Leyshon, 2016, p. 20). For example, the origins of mobile money in East Africa lie in mobile phone users forwarding airtime to each other as cash, a local peer-based niche of information technology-mediated innovation. Their origins in community-based innovation render platforms inherently open to experimentation at diverse points of the networked chain.

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3 We argue that successful infrastructures in the remittance space depend on the  
4 incorporation of locality-specific financial innovations into the expanding networked  
5 infrastructure (Larkin 2013), conditioning interactions between the macrostructures of  
6 institutions and fields and microstructures of calculation and exchange (MacKenzie and Pardo-  
7 Guerra, 2014, p. 156). In the processes of infrastructural system-building, local histories of  
8 markets are of central importance as they make visible the cultural underpinnings of broader  
9 economic structures. While contributing to financial access among the unbanked, digital finance  
10 may pose inherent dangers by its expanded access to customer data and the possibilities for  
11 monitoring and shaping people's financial behavior through predictive digital tools (Gabor and  
12 Brooks, 2016), and facilitate the emergence of disempowered economic subjects as a tool of  
13 'financial governance' (Kear 2012). To evaluate the exploitative or empowering potential,  
14 Bernards suggests more attention to the 'organization and forms of financial practice' that  
15 emerge in local political struggles and enactments of global regulatory projects such as financial  
16 inclusion (2016, p. 2).

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18 Understanding the effects of spreading digital finance to power and inequality thus  
19 requires consideration of a broad set of practices and actors involved in their actualization.  
20 Engelen et al. (2010) suggest viewing financial innovation within three temporal and agency-  
21 related frameworks: the macro-frame of global finance, the meso-level of geographically-defined  
22 conjuncture, and the micro-level of bricolage as agency-based opportunism and creativity. We  
23 view digital remittance infrastructures as assemblages of heterogenous elements through which  
24 the novel pathways and their knowledge and power dimensions are constructed. We contend that  
25 remittances are seeing enormous changes at the macro- and meso- levels due to technological  
26 change and national regulatory practices; in response, the micro-level responses of financial  
27 agents are often guided by a situational re-use and adaptation of existing ideational and material  
28 resources that increasingly defines financial innovation.

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30 Such institutional design by 'recombination and grafting' of cognate elements by means-  
31 focused actors (Kalyanpur and Newman, 2017; Carstensen 2011) draws attention to the socio-  
32 cultural context of the elements used and highlights its experimental dimensions.  
33 Anthropologists have studied such processes extensively. Guyer suggests the framework of  
34 'platform economy' as characterizing the present economic condition in a broader sense – as  
35 representing a 'combination of architecture, standard applications, and spaces for novel  
36 performances' (2016, p. 112). We see in Guyer an 'infrastructural' view of the global economy.  
37 It calls attention to the empirical processes of managing 'intelligibility' in the construction and  
38 functioning of platforms: 'The concept of the platform economy arises from taking the  
39 ethnographic route into both the architectures of economies and public understanding,  
40 acceptance, and participation in them' (p. 18). Focus on the enactment of economies as a set of  
41 innovative practices reveals the political processes involved – frameworks of power and  
42 ideology, but also their everyday negotiation. The compositional elements that are re-used and  
43 re-arranged in economic platforms are subject to political processes of establishing intelligibility



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3 among participants, but also depend on entailed histories and stabilized compositional patterns  
4 such as legal and financial devices (ibid.). We argue that the inventive practices in the digital  
5 remittance space introduce not only multiple sources of uncertainty, but also the potential for  
6 locally initiated repair and renewal. Whereas traditional financial institutions (banks and money  
7 transfer operators) facilitate transfers along routinized pathways, novel digital infrastructures  
8 may be more receptive to channeling local agency and enabling translations along areas of  
9 common interest.  
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### 15 **Infrastructures for Remittances: The Multiplicity of Payment Rails**

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18 International remittances travel across ‘payment rails’ that are multidimensional,  
19 incorporating plural digital, institutional, regulatory, and legal facets. Remittances can traverse  
20 multiple rails, both formal (banking system, side services of credit unions and post-offices, or  
21 licensed money transfer businesses such as Western Union) and informal (*hawala* or cash  
22 transport). Until recently, remittance transfers via formal channels were broadly similar to one  
23 another from an infrastructural point of view. They were dominated by a small number of highly-  
24 regulated institutions that transferred value either internally or in routinized transactions with  
25 other highly-regulated institutions. The short chain of transfers was constituted by internal  
26 transactions within the money transfer firm or bank or between a home bank and a correspondent  
27 bank in the destination country via SWIFT. Informal, trust-based money transfer systems ranged  
28 from physical cash transport to *hawala* - a netting process between two *hawaladars* (generally  
29 merchants) who communicate directly with each other, transacting only as necessary to make up  
30 the difference in value. *Hawaladars* often operate in a legal gray zone, as their activities can skirt  
31 capital controls and encourage money laundering. Although embedded in cultural and religious  
32 traditions, modern-day *hawala* constitutes a complex transnational system with integral  
33 connections to the banking sector and mobile money providers. Its highly personalized quasi-  
34 kinship reciprocities among diaspora senders combine with anonymous digital global capital  
35 flows, bound together in assemblages that operate—seamlessly from the users’ point of view—  
36 as payment rails (see also Rodima-Taylor, 2013).  
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43 Existing remittance payment rails, whether formal or informal, have traditionally been  
44 costly. For small-scale remittances to developing countries, particularly in Africa, these costs  
45 may exceed 20 percent of the value of the remittances.<sup>5</sup> Remittance fees in the formal payment  
46 systems reflect both the actual costs of the transactions and, especially for developing countries,  
47 the limited number of transnational banks and money transfer operators in a given country. The  
48 costs of transactions to providers, which include maintaining facilities and IT systems, hiring  
49 personnel, complying with regulation in both the origin and recipient jurisdiction, and other such  
50 as currency hedging, can be substantial. Bringing the costs down by increasing the volume and  
51 size of transaction is a challenge in developing countries with low levels of financial inclusion  
52 and global diasporas of low-paid workers remitting small amounts.  
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3 Mobile money and digital currencies bring down transfer costs. International digital  
4 payment systems, however, remain long chains of payment rails managed by multiple actors -  
5 many of them acting opportunistically rather than in a clearly coordinated manner. At the center  
6 of the payment rails lies a platform such as a telecom company, electronic exchange, or - in the  
7 case of cryptocurrencies - an algorithm. As Langley and Leyshon (2017) argue, the platform is  
8 one important place to look for the exercise of power. But surrounding the platform on both the  
9 sender and recipient sides are complex and changing ecosystems of users, entrepreneurs, and  
10 preexisting social configurations that have developed to solve the first and last mile problem.  
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14 Mobile and digital payment infrastructures are classic increasing-return-to-scale  
15 processes, able to scale up rapidly. However, the actual collection and delivery of value to end-  
16 users does not offer increasing returns to scale in all cases. Kenya's M-Pesa has been very  
17 successful at expanding financial access, particularly in terms of access to electronic payment  
18 and storage of value. End-users, however, still face challenges in using the money in their mobile  
19 wallets. Thus, a system of agents and cash delivery services has arisen to help recipients to  
20 convert their mobile money to cash. These ecosystems are local and varied in nature, constituted  
21 by new entrepreneurial actors as well as building on existing social relations. In the Philippines,  
22 for example, new crypto-remittance companies have chosen to link with existing networks of  
23 pawnbrokers to provide cash and goods to recipients.  
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28 While we have so far presented mobile and digital platforms as parallel or competitive  
29 with traditional (either formal or informal) infrastructures, in practice there is significant overlap  
30 and layering. Western Union offers remitters the choice of paying in cash or via electronic bank  
31 transfer or mobile services, and of designating the payment to the recipient either in cash through  
32 a given Western Union office or agent, transfer to a bank account, or as mobile money. In  
33 Kenya, one of the main sources of delivery of value is via M-Pesa itself; thus, Western Union is  
34 both competitor and client, offering an alternative infrastructure while also taking advantage of  
35 the efficiencies of its competitor. Meanwhile, leading global banks are experimenting with the  
36 use of blockchain to reduce costs of record-keeping and AML compliance, while  
37 cryptocurrency-based remittance companies are starting to compete with their services.  
38 Increasingly, all remittances operate within a multilayered and constantly-changing set of  
39 infrastructures as actors experiment with existing and new technologies to take advantage of  
40 'conjunctural opportunities' (Engelen, et al., 2010), seeking cost savings and filling in gaps in  
41 remittance rails.  
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### 48 Emerging Mobile Remittance Infrastructures

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50 Mobile phones have become central in people's lives in Africa. Multimedia platforms  
51 and social network apps facilitate cross-border communication across the continent, connecting  
52 diaspora and home communities in a web of 'social kinship' (Mavhunga, 2017, p. 21). While  
53 peer-to-peer money transfers – mostly domestic remittances – are usually the first and primary  
54 use of mobile money on the continent, mobile money integrates users with the payments  
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ecosystem and serves as a gateway to savings, loans, insurance, health, and farming services. Innovative mobile platforms that help African mobile users manage their livelihoods include eSoko, offering agricultural market monitoring and sales information; iCow that helps farmers to manage their cattle; FarmDrive, a digital record-keeping application for small farmers; and eKilimo, a platform for farmers to sell produce while avoiding exploitation by established middlemen. Digital platforms are credited with creating jobs and stimulating rural trade, while addressing constraints such as limited financial and technological access – and as a recent CGAP blog indicates, potentially increasing ‘farmer’s incomes by 50 percent or more’ (Shrader, Morawczynski and Karlyn, 2018)<sup>6</sup>. Many of these can be accessed through simple feature phones that are available to low-income consumers.

Here we consider two African mobile money markets that are regarded as among the most advanced – Kenya and Tanzania. Both of these are mobile network operator (MNO)-led markets, but with important differences in infrastructural connectivity models and resulting solutions for first and last miles. Kenya’s M-Pesa is one of the first mobile money initiatives in East Africa. It is a system for small-scale electronic payment and value storage via text messages (SMS). In 2015, M-Pesa had over 19 million subscribers in Kenya, with daily transactions of \$150 million (Ochieng, 2016). M-Pesa’s network provider Safaricom has a virtual monopoly on Kenyan mobile services since its establishment in 2008. M-Pesa is mostly used for peer-to-peer payments – domestic but increasingly also cross-border remittances. The costs of sending money in Kenya before M-Pesa were considerably higher by both formal and informal channels: for sending USD \$100 one had to pay \$20 (bank wire transfer), 12 (MoneyGram), or 3-6 dollars (sending by bus or postal money orders) (Altamirano and van Beers, 2017, p. 12). M-Pesa has reduced money transfer costs by 50 percent or more as compared to alternative systems, vastly expanding total remittances (Donovan, 2012, p. 63). Its impact extends to all corners of the country, including even Maasai cattle traders in marginal rural areas. Reducing the need to carry large amounts of cash, mobile money lowered high levels of violence while enabling traders to by-pass middlemen and manage stocking more efficiently (Rutten and Mwangi, 2012).

M-Pesa has not fully replaced the banking sector. In fact, increasing synergies can be observed – such as the Commercial Bank of Kenya partnering with Safaricom to create M-Shwari digital savings-credit platform operating via M-Pesa, and Equity Bank launching its mobile banking service Equitel that runs on Airtel’s network. There has been a rise in banks engaging with M-Pesa to move funds between customers’ bank and mobile money accounts – with the MNO contributing scale and network, and banks providing financial and regulatory expertise (Cook and McKay, 2017, p. 5). By supplying banks with appropriate technologies to manage small value accounts with irregular flows, M-Pesa has acted as a platform to help banks reach more Kenyans particularly in rural areas (Ndung’u, 2018, p. 43).

Neighboring Tanzania presents an alternative model of a multiple provider market and advanced interoperability. Since 2008, mobile money has enabled its dispersed population of 57 million unprecedented access to financial services. Since m-money services were added to

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3 Tanzania's traditional bank-centric mode of financial service delivery, the population using  
4 formal financial services grew from 11 percent in 2006 to 62 percent in 2016, with more than  
5 260,000 mobile money access points (World Bank, 2017, pp. 31-32). Interoperability agreements  
6 established in 2015 allow cross-network money transfers as the four main service providers share  
7 the agent network, offering customers better access and lower costs. Thus, although both are  
8 mobile money success stories, neighboring Kenya and Tanzania are following divergent  
9 approaches to the last mile issue. Largely due to the market monopoly of Safaricom, only 4  
10 percent of the agents in Kenya's mobile money market serve multiple providers, compared to 52  
11 percent of the agents in Tanzania.<sup>7</sup> That has contributed to significantly lower mobile money  
12 transfer costs in Tanzania. Because of easy access to a larger variety of providers and products,  
13 Tanzanian digital money ecosystem is on the way to becoming the most advanced and equitable  
14 in Africa. This comparison demonstrates the practical impact of distinctive remittance  
15 infrastructures on low-income communities.  
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21 While interoperability is still often viewed as a competitive disadvantage for mobile  
22 money operators in their home markets, international remittance corridors are increasingly  
23 opening up to multilateral agreements between providers. Aspiring to break the monopoly of  
24 cross-border payments by banks and money transfer operators, mobile money networks have  
25 seen the growth in cross-border mobile money corridors from 29 in 2015 to 46 in 2016.<sup>8</sup> Hubs  
26 such as MSF Africa and HomeSend are emerging in the region to facilitate interoperability  
27 across a range of money transfer operators, merchants, and banks (ibid.). These developments  
28 reflect the growing efforts of local platforms, such as M-Pesa, to develop their own cross-border  
29 remittance rails, rather than serving just as a last mile delivery solution for traditional money  
30 transfer operators like the Western Union.  
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35 At present, large digital platforms in Africa have yet to realize their full potential, due to  
36 limited data connectivity, and inadequate power for smartphones (Porteous and Morawczynski  
37 2017, p. 19). A variety of non-smartphone platforms have been developed as features to access  
38 global social media platforms. Mobile money platforms such as M-Pesa may be on their way of  
39 becoming an African version of 'superplatforms' by integrating diverse products and services  
40 while mediating between different sectors, and connecting customers to various financial  
41 institutions such as commercial banks (ibid.). Customers are increasingly responding to the 'pull'  
42 factor of the diverse services around the digital payment option that frequently forms a center of  
43 such platforms – like the case of M-Pesa in East Africa demonstrates<sup>9</sup>. While access to  
44 diversified financial services may also be empowering, the rapid growth of such large platforms  
45 may reinforce industry monopolies as well as excessive borrowing among customers with  
46 inadequate financial literacy and experience.  
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### 53 Digital Remittances: A Gateway to Informal 'Sharing Economies'

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3 Digital payment infrastructures occupy an increasingly ambiguous space between public  
4 and private sectors. Increasingly distributed among different groups of stakeholders with  
5 divergent and competing interests and agendas, modern infrastructural projects are likely to  
6 produce unpredictable outcomes, while less amenable to guidance by governments or  
7 corporations (Harvey 2016, p. 10). In the present era, state-managed infrastructures that  
8 foreground technical experts are disappearing, while ‘privately funded projects of state-led  
9 development’ make claims to public interest (Collier et al., 2016). Kenya’s Safaricom (40  
10 percent owned by U.K.-based Vodafone and 35 percent by the Kenyan government) is becoming  
11 a central actor in the Kenyan socio-political scene by performing culturally legible functions of  
12 public good and engaging with the body politic – while also raising concerns about state capture  
13 (Park and Donovan, 2016).  
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18 The multiplicity of actors in the creation of infrastructures highlights the role of  
19 experimentation, contingency, and non-linear movement in infrastructural development that is  
20 frequently observed in the developing world (Bowker, 2015). ‘Leapfrogging’ from cash transfers  
21 to mobile money, for example, skips over the conventional ‘stages’ of card instruments or even  
22 traditional bank accounts – motivated by the need for financial access by the unbanked. This  
23 calls attention to the ‘long now’ of domestic remitting in Africa, in which organizational and  
24 social changes around infrastructures are integrally connected to technological ones (Bowker et  
25 al., 2010). The ‘long now’ of East African remittances can be seen as related to several factors  
26 that produced particular livelihood and monetary patterns that interact with today’s mobile  
27 money initiatives. These include the evolution of mutual support groups and networks - from  
28 traditional labor pooling groups, to cash savings groups with the spread of money economy  
29 (Rodima-Taylor, 2014). Economic and demographic factors involve the rise of cash cropping  
30 that fostered group labor and brought cash to rural communities, as well as urban labor migration  
31 of male household heads that shaped domestic remittance flows.  
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38 The integral connectedness of emerging digital infrastructures to grassroots economies is  
39 thus evident at intimate levels of livelihood strategies. Mobile money infrastructures in Kenya  
40 build on the ways low-income people manage their money – defined by frequent demands for  
41 small sums, managed and circulated through social networks. M-Pesa has linked into reciprocal  
42 transfers between relatives and business associates (Mas and Radcliffe, 2010; Dzokoto and  
43 Appiah, 2014), spreading through the network effect once its impact to increasing income  
44 inflows was understood (Morawczynski and Pickens, 2009). Mobile money has also transformed  
45 these networks by expanding the circles of mutual security and further integrating users with  
46 formal and informal financial systems (Jack, Ray and Suri, 2013). Concentrating around women-  
47 centered household units, mobile money networks in Western Kenya facilitated resource pooling  
48 among extended kin – incorporating domestic as well as international remittances, and fostered  
49 new economic opportunities (Kusimba, Yang and Chawla, 2016). Kiiti and Mutinda (2011) point  
50 out that M-Pesa fosters more efficient contributions to women’s savings groups, while also  
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3 limiting social interaction of group members. Mobile money thus facilitates new social  
4 connections as well as separations.  
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7 Digital finance infrastructures also build on local practices of debt and reciprocity. Our  
8 field research in rural East Africa focused on the evolution of local patterns of relationality and  
9 informal financial mechanisms that have become the basis for money circulation networks  
10 (Rodima-Taylor, 2014). In that work, we identified a recent rise in informal work groups and  
11 savings-credit associations (ROSCAs) in African communities. For example, groups among the  
12 Kuria of northeast Tanzania had become effective mediators within the expanding money  
13 economy by relying on cultural patterns of mutuality. Kuria work groups allowed their  
14 participants to advance their socioeconomic standing and extend themselves as persons in  
15 culturally accepted ways, presenting an interesting paradox of a growing formalization of the  
16 groups (including written by-laws and records) in the context of a pronounced relationality of  
17 reciprocal obligations. Such ‘hybrid organizational forms,’ in which formal elements co-mingle  
18 with customary and kin-based norms and idioms, have become important platforms in regulating  
19 a complex web of obligations while facilitating novel peer-to-peer payment systems.  
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24 Thus, money transfer systems effectively build on local inventive practice and integrate  
25 with formal and informal financial networks, in the process expanding and transforming them.  
26 The ambiguous alliance of new technologies and customary social money uses creates a new  
27 type of financial infrastructure built on a combination of custom and modernity. Thus, the new  
28 remittance infrastructures combine expanding global networks and kinship norms and values,  
29 allowing customary payment networks to replicate themselves along new payment rails.  
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33 As anthropologists have emphasized, more attention is needed to the everyday practices  
34 and social contexts of money use in cash-based economies (Maurer, 2012; see also Guyer, 2012,  
35 2004). As Guyer has indicated, the ‘modern’ monies in Africa are dynamic and evolving,  
36 continuing to interface with older, special purpose currencies and repertoires. We contend that by  
37 cutting into interpersonal exchange networks, digital platforms act as novel interfaces between  
38 formal and informal economies, allowing hard and soft currency systems to intersect within  
39 global remittance flows.  
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#### 44 **Innovation, Embeddedness, and Path Dependence**

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46 While ‘knowledge work’ in modern communicative technologies increasingly involves  
47 specialized experts (Bowker et al., 2010, p. 101), the embedded relationality of infrastructures  
48 depends not only on the visible production work, but also on backgrounded ‘articulation work’  
49 performed by the users (Star, 1999, p. 387). Thus, the user-centric perspective is essential for  
50 understanding the role of indigenous knowledge in the evolution of digital finance  
51 infrastructures. The development of technologies such as mobile money systems and entry of  
52 multinational corporations in the low-income communities of the Global South may contribute to  
53 inequalities and deepen the digital divide. The global flows of communicative technologies may  
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3 especially impact local labor relations and entrepreneurship structures (Pesa, 2018, Meagher et  
4 al., 2016).  
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7 The notion of ‘frugal innovation’ helps us to understand both the inclusive and  
8 exploitative aspects of this interaction (Leliveld and Knorrinda, 2018). Frugal innovation  
9 involves ‘(re)designing products, services, systems’ to provide context-specific and affordable  
10 products for low-income communities (1), characterized by a cumulative and piecemeal dynamic  
11 of user-based adaptations. The concept fits into a broader set of historical paradigms of  
12 technology transfer between higher and lower income countries. Schumacher’s ‘appropriate  
13 technology’ model (1973) highlighted small-scale and labor-intensive technologies provided by  
14 non-governmental organizations (Altamirano and van Beers 2018). In contrast, frugal innovation  
15 foregrounds the private sector as a ‘key innovation partner,’ with a focus on ‘for-profit  
16 appropriate technologies’ (Rosca, Reedy and Bendul, 2018, p. 140). It therefore brings together  
17 diverse actors from different fields, including multinational corporations and informal street-  
18 level initiatives, and foregrounds the role of informal practitioners in knowledge generation. This  
19 grassroots connection may empower innovation but also marginalize certain actors. Meagher  
20 argues that frugal innovation may result in adverse incorporation of informal actors in the  
21 business models, reconfiguring informal economies around corporate goals (2018, p. 17).  
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27 The processes of frugal innovation are not inherently inclusive or politically neutral. The  
28 infrastructural approach to emerging digital finance networks in the developing world enables a  
29 more discerning view of the emerging power differentials, allowing the analyst to overcome the  
30 reified binarisms between formal and informal, local and global. Insofar as mobile money in  
31 Africa largely builds on informal networks of reciprocity, the promise of universal access may  
32 not be forthcoming and those excluded from these networks may remain marginalized, thus  
33 reproducing patterns of informality and exclusion. The effects of digital technologies on  
34 inclusiveness are perhaps most clearly visible in the example of important mediators of local  
35 innovation – mobile money agents. Most of the mobile money networks in the Global South are  
36 driven by commission-based agents contracted by the network operator. Mobile money is thus  
37 more than just a payment technology – it depends on a ‘cash-in, cash-out infrastructure’ provided  
38 by a network of ‘cash merchants’ (Donovan, 2012, p. 61). These are non-bank retail outlets that  
39 exchange physical cash for e-money for commission (Mas and Radcliffe, 2011, p. 300). In  
40 developing countries, mobile money agents vastly surpass all other financial access points (Riley  
41 and Kulathunga, 2017, p. 118) and are instrumental in solving the last mile problem.  
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47 These agents act as aggregators – ‘bridges between financial service providers and their  
48 clients’ – increasingly important actors for extending formal finance in marginal areas by  
49 reducing high costs of financial services and managing risk (Porteous and Dong, 2018, p. 4). The  
50 continued importance of cash in most low-income communities ensures the persistence of  
51 physical interfaces in digital finance initiatives. Agents are frequently embedded in additional  
52 layers of aggregators, such as agent network managers who coordinate agent networks and help  
53 them manage their liquidity (e.g. Pep Intermedius, a network of cash merchants, is one the  
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3 largest agent aggregators in Kenya, helping agents manage their cash floats for a fee; p 18).  
4 Other aggregators facilitate risk transformation for digital providers – such as member-based  
5 groups, including informal ROSCAs as well as larger, regulated credit unions.  
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8 The reliance on local aggregators may constitute a source of inclusivity as well as  
9 exploitation. For its expansive agent network, M-Pesa tapped into a pool of local shopkeepers,  
10 part-time retailers, and hawala remittance distributors, with their embedded systems of relational  
11 contracting (Meagher, 2018, p. 28). Drawing on these informal patterns of labor recruitment  
12 contributes to last mile outreach but may facilitate unfair hiring practices. In Kenya, Safaricom  
13 initially oversaw its agent management directly, while eventually outsourcing it to external agent  
14 network managers. Allowing subagents was another recent development, with M-Pesa agents  
15 forging informal agreements with outlets that they do not own or operate. Similarly, a recent  
16 empirical study of frugal innovation from Zambia shows that while there exist economic  
17 empowerment opportunities for mobile money retail agents, these may not transfer to the tellers  
18 they employ, who face further informalization (Pesa, 2018).  
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23 Agents constitute an important part of the social infrastructures of the mobile money  
24 network. As their interactions with the customers are grounded within community norms and  
25 resource limitations, they can scale up services in ‘low-income outlying’ areas (Pesa 2018, p. 11)  
26 and redefine local livelihoods. Mobile money agents are instrumental in facilitating the social  
27 imaginaries of mobile innovation among their customers (see also Batiz-Lazo, 2016 on the  
28 historical role of financial professionals in creating a shared social acceptance of novel payment  
29 technologies). Through constitutive appropriation, consumers of the information technology  
30 emerge as active producers of knowledge, technological networks, and sociality (Odumosu,  
31 2017, p. 138). The categories of producer and consumer in these communicative infrastructures  
32 are increasingly blurred, while users actively modify and re-make mobile money through ‘user-  
33 driven innovations’ (Maurer, 2012, p. 592).  
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38 New financial infrastructures thus build on and make visible people’s practices of  
39 sociality. Elyachar (2010) suggests that such ‘social infrastructures of communicative channels’  
40 route economic as well as affective resources, and shape the political economy in the conditions  
41 of informality. These include the affective dimensions of remittance sending and other relational  
42 work of migrants. This suggests that rather than viewing such formal-sector initiatives as either  
43 exploitative or empowering, there is a need to study entailed channels of sociality and emerging  
44 transformational nodes in them. Social networks and communicative practices therefore  
45 constitute an important part of infrastructures, maintaining and redefining them and making  
46 visible the dynamics of power.  
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51 Money, payments and agency acquire new meanings in the new digital infrastructures.  
52 Infrastructures are not just physical objects but have a capacity to represent certain ideas and  
53 values, creating ‘affectual commitments’ and operating on the level of ‘fantasy and desire’  
54 (Larkin, 2013, p. 333). This ‘poetics of infrastructure’ (p. 329) entails a constitution of the moral  
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3 and political through the materiality of technology. Remittance systems are often advertised as a  
4 ‘market of devotion’ – reflected in the Western Union slogan ‘Sending So Much More Than  
5 Money’ in the Philippines (Todoroki et al., 2014, p. 193). Idioms of kin-based mutuality and  
6 sharing also permeate mobile money systems, as in the successful ‘Sending Money Back Home’  
7 campaign of Safaricom that crystallized the role of the new digital infrastructure in the economic  
8 lives of low-income Kenyans. Remittance infrastructures reflect community and kinship values  
9 while also symbolizing mobility and new global connections. Drawing upon modern payment  
10 technologies, they integrate and expand the local ‘sharing economies’ – ubiquitous informal  
11 networks of delayed debt and reciprocity.  
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16 Path dependence is particularly evident in blockchain-based money transfer networks, as  
17 we have argued elsewhere (Rodima-Taylor and Grimes, 2017, 2018). These constitute a separate,  
18 but in many ways, parallel, set of remittance infrastructures. The development of crypto-  
19 remittances is still at an early stage and its impact varies greatly by geography. However, they  
20 provide important insights into the nature of remittance infrastructures, including the crucial role  
21 of local actors and their networks. Replacing traditional corresponding banks with their interbank  
22 fees, blockchain-based cross-currency settlement network helps lower costs and duration of  
23 remittance transactions (World Bank, 2017). These emerging technologies also pose a range of  
24 policy and logistical challenges, including safeguarding customer protection and financial  
25 oversight while not curbing innovation, and the massive volumes of electricity spent to mine  
26 cryptocurrencies such as bitcoin (World Bank, 2018).  
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31 Theoretically, it may be the ability of blockchain to keep track of past transactions  
32 without a trusted intermediary through distributed consensus mechanisms that makes it appealing  
33 in the contexts of low institutional trust and underdeveloped governance infrastructures. At the  
34 same time, an increasing tendency can be observed of blockchain-based initiatives to operate in  
35 tandem with more traditional money transfer infrastructures, resulting in novel types of re-  
36 intermediation (Rodima-Taylor and Grimes, 2018). Their adoption is therefore affected by  
37 existing institutional environments and agendas that shape the opportunities for empowerment or  
38 exploitation of particular groups.  
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43 The remittance market in the Philippines, the third largest globally due to its large labor  
44 diaspora, has been conducive to experiments with crypto-remittances, including such successful  
45 ventures as Coins.ph and Bitspark.<sup>10</sup> Interfacing with existing money transfer businesses and last  
46 mile outlets has been important to the success of these cross-border crypto-remittance corridors.  
47 In particular, the Philippines’ many pawnshops have long been key local actors in the last mile of  
48 remittances and, more recently, mobile banking. With nearly 70 percent of the people in the  
49 Philippines unbanked, pawnshops have emerged as important grassroots financial institutions  
50 that offer a range of services from credit to burial insurance. Crypto-remittance platforms  
51 creatively draw upon this vast network of uniquely Southeast Asian institutions of local  
52 finance.<sup>11</sup> Similarly, in Vietnam, 30,000 pawnshops were estimated to serve the country’s 90  
53 million people.<sup>12</sup> Similar synergies that ‘add value to traditional players’ characterize also the  
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3 digital foreign exchange and payment platform BitPesa in Africa that leverages bitcoin  
4 blockchain for cross-border payments, aiming to create a ‘hybrid financial infrastructure.’<sup>13</sup>  
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7 The Chinese digital payments giant Ant Financial Services (affiliate of Alibaba Group)  
8 announced in June 2018 a launch of a blockchain based money transfer service between Hong  
9 Kong and the Philippines, in partnership with Philippines’ mobile money service GCash. The  
10 new venture claims that money transfers will be completed in real time and involve lower  
11 transaction fees and exchange rates.<sup>14</sup> Unlike pawnshop networks, which are well-established  
12 throughout the Philippines, the advance of Ant crypto-remittance services is built upon new set  
13 of networked actors, driven by the penetration of Chinese companies, entrepreneurs, and tourists  
14 across Southeast Asia. Crypto-remittance startups largely focus on leveraging a network of  
15 already existing money transfer businesses by providing them blockchain-based transfer and  
16 compliance tools – thus seeking to create assemblage-style payment rails rather than new  
17 alternative institutions.<sup>15</sup>  
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22 As these mobile money and crypto-remittance cases show, incorporation of last mile  
23 actors can be crucial in determining the viability of a remittance network. Resilient last mile  
24 infrastructures are based on socially embedded networks of mutual support and other informal  
25 financial actors such as village retail shops and merchants in East Africa and pawnbrokers in  
26 South-East Asia. New payment technologies such as mobile money and digital currencies are  
27 therefore less likely to become fully disruptive alternatives than to form novel synergies with  
28 grassroots sharing economies and the prevailing pipelines of the formal sector.  
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32 The rise of digital payment infrastructures in the Global South, however, has not  
33 eliminated the role of cash and the importance of physical interfaces of money transfer. Cash  
34 payments remain pivotal in most of the developing world, as seen in the key role of mobile  
35 money agents in Kenya, Tanzania, and Zambia. The existence of large informal economies may  
36 expand the use of cash even in case of well-developed formal finance and telecommunications  
37 sectors (Del Angel, 2016) as people often prefer to combine interpersonal transactions with  
38 digital ones. This dynamic again highlights the enduring importance of intermediaries and  
39 aggregators in the new digital remittance infrastructures.  
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### 45 **Power, Profits, and Access Within the Remittance Infrastructures**

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47 The spread of mobile and cryptocurrency payments and remittance services has vastly  
48 increased financial inclusion in developing countries. Still, it is important to bear in mind that the  
49 effects on low-income communities depend crucially on the payment infrastructures that make it  
50 possible.  
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53 International remittances operate across multiple and competing infrastructures, the  
54 intrinsic elements of which are rails and platforms. Key elements of both function in a way that  
55 is mostly invisible to those who use them; this backgrounding of essential operations creates  
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3 asymmetric power and potential for exploitation. Identifiable financial institutions are thus  
4 replaced by invisible infrastructures that enable the apparently horizontal, networked relations  
5 among individuals or households – but the disintermediation is illusory.  
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7       Infrastructural analysis of remittance rails must encompass both the spatiality of payment  
8 rails as well as relationality of platforms. The payment rails that we discuss in this paper are  
9 vertical in nature, connecting the ultimate senders to the ultimate recipients. An example is the  
10 classic Western Union rail, in which a remitter brings cash to a local agent, then Western Union  
11 manages the cross-border value transfer through a combination of netting and conversion, and  
12 the recipient picks up cash at a local office (or in some cases, the chain is elongated by the use of  
13 various local agents). Even so, as we have shown, remittance rails are in most cases assemblages,  
14 composed of heterogeneous elements. This is particularly true of rails that must surmount the first  
15 and last mile challenges between lower-income, unbanked populations; however, even the  
16 payment rails of global banks can be characterized as ‘kludges’ that include multiple actors and  
17 intersections across technologies and systems. Nonetheless, it is helpful to think of these  
18 pathways as rails: path-dependent routes that are so well-worn and efficient in their own terms  
19 that they constantly replicate themselves over time. The entire rail is effectively backgrounded,  
20 as all of the elements along the way internalize their own operations and standardize the  
21 connections between them. This backgrounding has allowed incumbent remittance services to  
22 exploit their privileged position with minimal external scrutiny.  
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24       In contrast, payment platforms are horizontal and relational, bringing together users on  
25 both sides of a transaction. By providing a common venue and means of mutual discovery for  
26 users, they facilitate transactions. Their usefulness is defined by network effects—the more  
27 potential partners that use the platform, the better the opportunities. As with physical railways,  
28 digital platforms can also be junction points for payment rails. For example, customers using  
29 Western Union to send remittances to countries such as Kenya and Tanzania now have the  
30 option of delivering the money to the recipient’s mobile money account, at a cheaper rate than  
31 providing it in the cash form. A service like M-Pesa can thus be understood as a domestic  
32 remittance rail, while also operating as a platform that is used in the last mile by money transfer  
33 companies, banks, or hawaladars. Translating collective inputs by user-innovators and providing  
34 creative connections to local livelihood niches through ever-expanding products and services,  
35 platforms gain power through articulating their users’ interests, which also gives them the  
36 potential to exploit.  
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38       Looking forward, we anticipate that regulation and competitive conditions will determine  
39 the extent to which remittance infrastructures become exploitative instead of empowering for  
40 users in developing economies. Leaving aside the very real costs generated by legitimate public  
41 goals such as prudential regulation, consumer protection, and anti-money laundering, the key  
42 drivers for costs will be competition, technology, and scale. As we have shown, the intersection  
43 of grassroots social and innovation dynamic with digital payment technologies and pathways  
44 emerges as a central element in facilitating empowerment or exploitation. These possibilities  
45 depend on existing social structures and systems of livelihood, as well as on organizational and  
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3 business templates of payment companies. Digital infrastructures are not products of deliberate  
4 design. Thus, we follow the call of Edwards et al. to approach the infrastructural ‘growth’ as an  
5 ‘organic unfolding’ within an existing environment, starting with a ‘gateway phase’ where  
6 technical or social innovations connect separate heterogenous systems to larger networks, and  
7 followed by processes of environmental adjustment (2009, p. 369). The success of such growth  
8 processes for digital infrastructures depends thus on the establishment of interoperability  
9 between various platform actors, including informal dimensions of the expanding network, but  
10 also on ‘scaling down’ as the infrastructures adapt to locally specific niches. ‘Scaling down’  
11 makes global infrastructures ‘locally useful.’ Constructing locally accessible gateways for the  
12 global systems relies crucially on local institutional and technological resources, such as the use  
13 of local merchants and retail shops as agents to solve the last mile issue in cross-border  
14 remittances. Each of these processes can advantage some actors and disadvantage others.  
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20 One of the most striking aspects of mobile and crypto-remittances in developing  
21 countries is that monopolistic or oligopolistic platforms have so far not crowded out small and  
22 medium-sized enterprises (SMEs) from the payments space. We see this in the first and last mile  
23 mobile ecosystems, where small players have been able to generate financial and ancillary  
24 services innovation in underserved spaces. However, its very success potentially creates an  
25 attractive opportunity for better-capitalized competitors. As long as scale remains small, larger  
26 firms cannot profitably leverage their technological advantages or broader networks to out-  
27 compete local firms. As these markets grow, however, it is possible that the existing vibrant  
28 culture of smaller ecosystems will be replaced by fintech monoculture dominated by a small  
29 number of platforms. While we see no convincing evidence as yet that this is occurring, it is a  
30 worthy question for future empirical study that builds on this infrastructural perspective.  
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### 36 **Concluding Remarks**

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38 Remittance transfer systems constitute rapidly transforming global infrastructures that  
39 integrate formal and informal financial networks to create distinctive payment pathways. The  
40 ambiguous alliance of new technologies and customary social money uses facilitates a new type  
41 of ‘hybrid’ infrastructure in which the sophisticated global financial technologies and networks,  
42 generally considered to form the backbone of remittance mechanisms, only fulfill their promise  
43 when gaining legibility for their users through existing networks and values.  
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47 The new technologies have been instrumental in bringing down costs, particularly for  
48 remittances that are small-scale or directed towards the least developed countries or rural areas.  
49 However, the key to expanding access to remittances has been the ways in which these novel  
50 digital networks intersect with informal sharing economies. We followed the suggestion of  
51 Langley and Leyshon (2017) to study platforms as ‘infrastructural intermediaries,’ determined by  
52 both material and socio-cultural elements, and broadened its application to include the  
53 economies of the Global South with their low-income remittance senders and recipients. We  
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3 found that various social and human intermediaries in the local connective ecologies are  
4 important elements in the platform infrastructures. The innovation ecosystems that have emerged  
5 around mobile and digital currencies build on indigenous knowledge and patterns of resource  
6 management, cultural monetary practices, and kinship values. Actors such as M-Pesa introduce  
7 novel practices of individual savings and credit in people's financial repertoires. Mobile money  
8 platforms are in turn impacted by the sociality of debt in local communities, becoming part of  
9 expanding networks of mutuality. Participants in remittance networks turn to the informal sector  
10 to manage the risk and uncertainty of the first and last mile of digitally-based payment rails; their  
11 evolving practices serve to mediate, transform, and co-create the infrastructures. To understand  
12 these phenomena, we argue, scholars must pay attention to the interplay of the local monetary  
13 pragmatics and new globally-situated technologies and networks.  
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18 As cases from Africa and Asia reveal, the emergence of alternative remittance  
19 infrastructures has driven down the cost of remittances and helped to reinforce social and kinship  
20 networks that tie diasporas to their countries of origin. Remittance rails have been formed both  
21 by the opportunities offered by new digital technologies and by the creativity of local innovators  
22 in adapting those opportunities to existing networks and practices. Digital platforms, meanwhile,  
23 provide the junctures that in some cases have allowed local innovators to co-create  
24 infrastructures, rather than simply being subject to the choices made by a handful of oligopolistic  
25 financial institutions able to make large-scale investments in technology and branches. The  
26 platforms have emerged as new interfaces for negotiating value and pursuing 'marginal gains'  
27 (Guyer 2004), central to people's daily activities and money management practices, while also  
28 connecting the low-income populations to national and global financial circulations.  
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34 Our analysis suggests that rather than viewing the impact of digital financial technologies  
35 in developing countries as inherently exploitative (related to the involvement of multinational  
36 corporations or digital technology threats to consumer privacy) or empowering (through  
37 increased financial inclusion or peer-to-peer disintermediation), a more nuanced approach is  
38 called for. We contend that such approach is enabled by viewing the emerging digital  
39 technology-mediated networks as broad and multilevel, yet also fragmented and overlapping,  
40 infrastructural assemblages. Digital disruption in developing societies often depends on the  
41 social embeddedness of payment platforms and rails, highlighting the importance of trust in the  
42 outreach and operation of payment systems. Informal mutual support networks and groups as  
43 well as other financial intermediaries – alternative moneylenders, hawaladars, retail shops, and  
44 pawnbrokers – have thus emerged as essential partners in digital remittance systems. A broader  
45 perspective that considers the spatial, relational, and temporal aspects of these formations  
46 therefore facilitates a better understanding of their grassroots, cross-border, and global dynamics,  
47 and their implications for power and inequality.  
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53 Importantly, viewing remittance infrastructures in this way has several implications for  
54 further research, both in terms of methodology and research questions. Methodologically, our  
55 work demonstrates the importance of on-the-ground research about how remittance rails are used  
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3 and extended through an inventive recombination of existing tools and repertoires. Theoretically,  
4 it calls on researchers to focus on the agency of participants in remittance chains. These choices  
5 determine not only the impact of externally-created infrastructures, but also the overall shape of  
6 the remittance infrastructures themselves; research methods must adapt to that reality rather than  
7 seek to describe it in ways that are dictated by existing theory. Our analysis also demonstrates  
8 the importance of tracking the evolution of platforms and practices, with a focus on efficiency,  
9 inclusion and exclusion. We contend that it is essential to understand how and why  
10 infrastructures change, including how collective choices of agents end up affecting those agents  
11 reflexively.  
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16 These developments pose broader questions about the evolution of the global payments  
17 space towards more participatory and peer-based models. Will the expansion of new technology-  
18 based platforms in the remittance space replace local actors over time? Or could digital  
19 remittance infrastructures that channel trust-based affective payments facilitate a rise of more  
20 participatory financial systems? By bringing together recent advances in financial technologies  
21 with the human dimension through a novel infrastructural lens, we hope that this article will be  
22 an early but significant step towards a systematic analysis of these topics, which are increasingly  
23 central to the global political economy.  
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51 <sup>1</sup> <http://www.knomad.org/sites/default/files/2018-04/Migration%20and%20Development%20Brief%202029.pdf>

52 <sup>2</sup> Ndung'u, 2018

53 <sup>3</sup> Several terms used in the payments industry (e.g. rails, interchange fees, etc.) originate from transit engineering  
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55 symbolizing new opportunities as well as 'unsettling' of old solidarities and conventions, as indicated by Maurer and  
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Swartz, 2015, accessed in [https://github.com/DigitalPublishingToolkit/Money-Lab-Reader/blob/master/md/5\\_1-Maurer-Swartz.md](https://github.com/DigitalPublishingToolkit/Money-Lab-Reader/blob/master/md/5_1-Maurer-Swartz.md).

<sup>4</sup> In this article, we use Kenya and Tanzania as our primary examples because of the extensive degree of information and detailed ethnography available on local adaptation in the remittance space, but also note parallels elsewhere.

<sup>5</sup> Because pricing depends on country, town, size of remittance, and whether the transaction is in person or to an account, it is difficult to offer a meaningful quantitative summary. It is further complicated by the fact that banks and money transfer companies also make money on the exchange rate they use, in addition to the stated fee.

<sup>6</sup> <https://www.cgap.org/blog/super-platforms-connecting-farmers-markets-africa>

<sup>7</sup> Zetterli, P. Tanzania: Africa's Other Mobile Money Juggernaut. GCAP blog, 17 March 2015.

<sup>8</sup> <https://blog.mondato.com/international-remittance-hubs-interoperability-evolving/>

<sup>9</sup> While mobile money is relatively widespread in East Africa, its uptake has been slower in the Western part of the continent. The growing engagement in Africa with foreign digital payment and e-commerce platforms – such as Chinese Alipay or WeChat Pay – poses novel concerns for customer privacy with lacking data protection laws in many African states, and regulatory hurdles with accommodating these offshore payment providers (ibid.).

<sup>10</sup> Chu 2018; <https://support.coins.ph/hc/en-us/articles/201322620-Which-cash-in-methods-are-available-https://bitspark.io/>

<sup>11</sup> The first-mile remittance outlets in the sending country frequently encompass startups with a strong focus on particular diaspora groups. Luis Buenaventura, CEO of Bloom Solutions, June 2018, interview with the author.

<sup>12</sup> <https://qz.com/830058/pawnbroking-is-huge-in-the-philippines-and-its-going-online/>

<sup>13</sup> <https://techmoran.com/2018/03/24/we-are-creating-a-hybrid-financial-infrastructure-that-is-equally-accessible-and-efficient-elizabeth-rossiello-ceo-bitpesa/>

<sup>14</sup> That said, as licensing requirements for crypto-remittance markets in South-East Asia are still evolving, recent remittance volumes of several blockchain startups have been somewhat limited by regulatory uncertainties and liquidity issues on regional bitcoin exchanges. Luis Buenaventura, CEO of Bloom Solutions, June 2018, interview with the author.

<sup>15</sup> One could also say that the existing applications of crypto-remittances therefore fall short of the utopian expectations of the new distributed payment infrastructures that provide as a decentralized alternative to private intermediaries - see Swartz 2018 for an analysis of the socio-technical imaginaries of 'digital metallism' and 'infrastructural mutualism,' often associated with cryptocurrencies.

Table 1: Average Cost of Remittance by Recipient Region (percent)

	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>
East Asia & Pacific	8.97	8.52	8.13	8.33	8.24	7.55
Europe & Central Asia	6.77	6.49	6.11	6.48	6.48	6.65
Latin America & Caribbean	7.77	6.21	6.14	5.92	6.01	5.86
Middle East & North Africa	7.81	8.32	8.41	7.46	7.35	7.32
South Asia	7.16	6.56	5.96	5.54	5.4	5.21
Sub-Saharan Africa	12.21	11.71	10.21	9.72	9.81	9.44
Global	9.05	8.36	7.72	7.53	7.45	7.13

Source: World Bank, *Remittance Prices Worldwide*, Issue 25, March 2018, Table 5.

Note: Data are from Q1 of the listed year.