

Competition and Interoperability in Mobile Money Platform Markets: What Works and What Doesn't? (*)

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Abstract: The development of mobile payment platforms in developing countries is revolutionizing access to finance for the poor. Mobile payment platforms allow their users to pay and transfer funds in mobile money, but also offer access to other financial products, such as savings or insurance. In this paper we first review the economic features of mobile payment systems in developing countries, and study the cooperation models that can emerge between the different firms potentially involved in a mobile payment transaction. We then discuss the main competition concerns that public authorities should be concerned about, and which regulatory tools they can consider as a remedy.

Key words: financial inclusion; mobile money platforms; interoperability; developing countries.

Digital financial inclusion for the poor is becoming a reality. While traditional microfinance and banks remain important, the potential of using new technology-based platforms to serve the poor is huge. In particular, mobile network coverage and the use of a variety of indirect channels (e.g., agents) reduce the costs compared to more traditional full service branches owned by banks.

Cash is the main barrier to financial inclusion. As long as poor people rely on cash or barter, they remain too costly for formal financial institutions to serve. Once poor people have access to cost-effective digital means of

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payments, they can exit this trap and could in principle be profitably supplied by a range of financial institutions. Profitability, scale and serving poor customers are not incompatible anymore. Providers can offer not only mobile money, but also savings, credit, insurance, and other financial products to the poor at low cost.

Expansion of financial inclusion, however, means venturing into a new territory and brings a new set of challenges. In this paper, we first review the economic features of mobile payment systems, and also set out a framework to understand the main questions to be asked in order to further foster digital financial inclusion among the poor. Then, we provide a normative analysis of the main competition concerns, and discuss the potential regulatory tools. Finally, we conclude.

■ Economics of mobile payment platforms

Definition and scope

Mobile payment platforms offer mobile payment services to consumers, merchants, money agents, etc. We define mobile payments as the use of a mobile device (such as a mobile phone, a smartphone, or a tablet) for a financial transaction. Financial transactions include purchases at a point of sale in exchange for goods or services, consumer-to-business payments, business-to-consumer transfers, person-to-person (P2P) money transfers, etc.

In developing countries mobile money is mainly used for P2P domestic transfers.¹ We therefore include P2P transactions in our classification of mobile payments. Note that our definition also extends to mobile banking services that do not involve any financial transaction (e.g., checking one's account on a mobile) and to mobile financial services (e.g., insurance). Indeed, the main issue in developing economies is to increase financial inclusion. Many economic issues are common both to mobile payment services and mobile banking or mobile financial services, and our analysis is informative in that respect too. If mobile payment systems are merely an

¹ On P2P payments in developed countries, see for example BRADFORD & KEETON (2012).

extension of services to existing users, then there would be little new financial inclusion.² However, the impact of mobile payment systems is far greater in that they both typically increase the number of people that use digital financial instruments, such as digital money, and they provide further opportunities to expand in various directions, including, for instance, credit and insurance.

Different technologies can be used for mobile payments, and for accessing other financial services.³ In particular:

- With SMS or USSD, a message is sent through the mobile network to make a financial transaction. The USSD technology allows displaying on the user's mobile phone a menu of options in text mode, among which she/he can choose. These technologies are used for remittances and mobile money services.
- With mobile Internet, the financial transaction is made over the mobile Internet, that is, it uses a specific application on the mobile phone and the Internet connection to make the transaction.
- With contactless or Near Field Communication (NFC), an NFC-enabled mobile device initiates a transaction with an NFC-enabled payment terminal. This technology is used for proximity payments, and can be viewed as a substitute for card payments, and in some way a complement for the SMS/USSD or mobile Internet technologies.

The SMS/USSD-based technologies are mainly used in developing countries, as they are less demanding in terms of handset technology and network quality of service. Developing a mobile payment platform based on the SMS/USSD technologies therefore maximizes the potential customer base.⁴ Note that these technologies seem as secure and safe as the other mobile payment technologies. The migration from USSD-based services to more advanced technologies (e.g., NFC) may be possible in the medium or long term, when the average user is equipped with an NFC-enabled handset and the network quality of service has improved.

² Exclusion is particularly prevalent in Africa as there is a significant gap in financial infrastructure compared to other developing regions (DEMIRGUC-KUNT & KLAPPER, 2012).

³ See BOURREAU & VALLETTI (2015) for examples of services that use these three types of technologies.

⁴ Another reason why mobile network operators have adopted USSD for their mobile money platforms is that they used already USSD platforms for providing airtime top-up. The incremental cost of adapting these platforms for mobile money platforms was therefore limited.

Finally, the mobile payment service is funded either via an account of the consumer at a financial institution (e.g., a bank), or via a pre-paid account (e.g., at a mobile network operator). For example, with SmartMoney/Smart (Philippines), the consumer can add funds to his or her account over-the-counter at a Smart store or transfer funds from a bank account.

Expected benefits from mobile payments

We can distinguish between the short run and the long run benefits from the development of mobile payments. In the short run, given the high share of unbanked or under-banked consumers in developing economies, the diffusion of mobile payment services is a way to increase the diffusion of financial services. For example, according to DEMIRGUC-KUNT & KLAPPER (2012), 24% of adults in Sub-Saharan Africa have an account at a formal financial institution and 3% have a credit card. By comparison, according to GSMA, ⁵ in 2013 the unique subscriber penetration rate in Sub-Saharan Africa was 31%, and it is growing fast. Therefore, mobile payments allow a larger share of the population to make or receive money transfers and/or payments. In doing so, the diffusion of mobile payment services also reduces the reliance on cash from consumers. Indeed, in the absence of reliable and affordable electronic payment services, consumers tend to depend on cash for their transactions. Studies conducted in developed economies suggest that cash has a strong social cost compared to electronic payment instruments. ⁶ In developing economies, this social cost may be even higher: cash may be difficult to obtain in remote areas, and risky to hold. The development of electronic payment services, which are more secure and can to some extent eliminate distance, is therefore expected to be welfare improving. Notice that to the extent that governments need to hand out cash for social programs, the argument for government to be involved gets stronger as in developing countries it can be very costly to ship cash to remote areas.

In the longer run, the development of mobile payment platforms can also stimulate innovation in financial services around the platform, that is, the development of applications or services that fit consumers' specific needs and can be accessed via the platform. In KENYA, KENDALL *et al.* (2012)

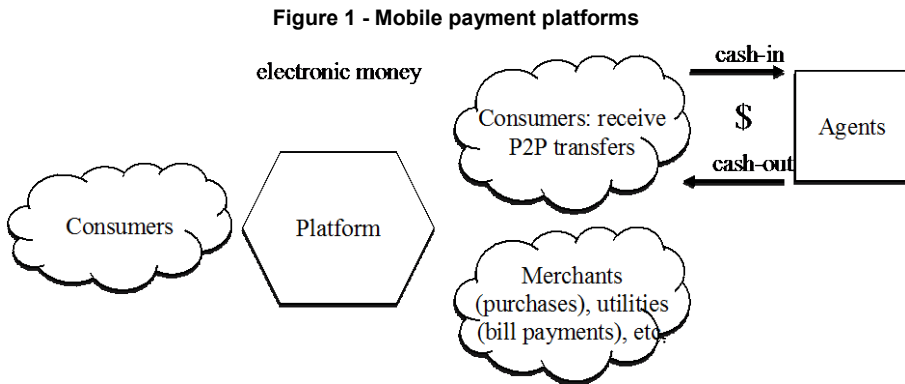
⁵ "Sub-Saharan Africa Mobile Economy 2013".
<http://www.gsmamobileeconomyafrica.com/Sub-Saharan Africa ME Report English 2013.pdf>

⁶ For example, see BERGMAN *et al.* (2007).

estimate that 90 independent financial service providers have integrated with the existing mobile money platforms (mostly, M-PESA). We expect innovation in financial services to flourish once the mobile payment platform has attracted a large enough customer base, which may explain why the M-PESA platform is the most advanced in this respect.

Mobile payment platforms

A mobile payment platform allows two groups of users to make financial transactions via mobile: on one side, consumers and on the other side, other consumers (for P2P transfers), and/or merchants (for purchases, bill payments, etc.). Another group of users can be involved: agents; see Figure 1. Agents allow consumers to convert cash into electronic money (cash-in), and back again into cash (cash-out).⁷ Mobile payment platforms with cash agents are usually called mobile money platforms. For simplicity, and in order to remain general, we will talk about mobile payment platforms, whether the platform relies on cash agents or not.



Mobile payment platforms can be viewed as two-sided platforms, due to the externalities between their two sides: the higher the number of potential recipients for money transfers (other consumers, merchants) or the higher the number of agents, the higher the benefits for a consumer to join the platform; conversely, the more consumers adopt the mobile payment

⁷ Agents are sales and service centers (small/very small bank branches) or small cash-in/cash-out points. Building a large agent network is essential for the success of a mobile money platform as it allows users to pay in and collect money sent by friends and family.

system, the higher the incentives for merchants, potential recipients and agents to join.

Due to their two-sided nature, mobile payment platforms exhibit barriers to adoption on the demand side. If the users on one side of the platform (say, merchants) do not expect the users on the other side (say, consumers) to join, the platform will be unable to attract any users. To be successful and to overcome this "chicken-and-egg" problem, it is critical that the platform convince at least one side of the market to join. This observation has repercussions for pricing policies and regulatory options. Governments can try to stimulate adoption on the consumers' side by moving government to person (G2P) payments (e.g., welfare payments) and person to government (P2G) payments (e.g., tax payments) towards mobile platforms. In Philippines, for example, tax payments can be made through the Bayadload mobile money platform while in India, welfare and social aid payments are done via mobile money services.

There are barriers to adoption on the supply side of mobile payment platforms too. Due to the sunk costs of infrastructure, mobile payment and mobile money systems are characterized by the presence of economies of scale. The platform has therefore to reach a large enough scale to be able to offer affordable services to users. This is of particular importance if consumers' willingness-to-pay is very low.

Users' incentives to join a mobile payment platform depend on the number of users on the other side as we have already explained, on the price of the service, and on its quality, as well as on the value of the outside option (i.e., keeping using cash). Here, we can make a distinction between two scenarios: the service provider can be the platform itself (closed platform), and/or it can be an independent service provider that accesses the platform to provide financial services (open platform). In the former case, users typically pay a price to the platform in exchange of a service managed by the platform. In the latter case, users can pay a price both to the platform and to the service provider, for different services. From a policy perspective, there are benefits to vertical integration, as the platform can internalize the complementarity between mobile financial services and mobile money services. However, the platform may not have the capability of delivering a large enough variety of services, which may warrant some degree of openness, at least when the platform has matured.

In the case of an open platform, there are potential barriers to entry or innovation that may in turn affect users' adoption decisions. First, service

providers have to incur integration costs to connect their service infrastructure to the platform. Well-designed and standardized application programming interfaces (APIs) reduce integration costs for services providers, but APIs may be functioning poorly. For example, KENDALL *et al.* (2011) highlight that independent service providers find it hard to connect to M-PESA's mobile money platform due to the low quality of the platform's APIs. Second, on an open platform, security has a public good nature. If a service provider makes insufficient efforts in securing the transactions of its clients, strong security problems can occur, which would of course damage the reputation of the service provider, but would also risk spilling over to the platform itself. We will come back on this issue in the section on competition concerns, when we discuss entry controls.

Cooperation for mobile payment services

In the previous section, we assumed that the mobile payment platform was operational and briefly discussed the users' incentives to join it. An important question is however, whether a mobile payment platform or service can actually emerge.

To answer this question, it helps to see a mobile payment (platform) service as a combination of different inputs:

- a mobile network service, provided by a mobile network operator;
- a mobile handset, provided by a handset manufacturer;
- a bank account, provided by a bank;
- an acceptance network, provided by payment network;
- an agent network, either provided by an existing mobile money platform or rolled out by the service provider;
- an NFC chip, provided by a hardware manufacturer;
- software, provided by a software application provider.

Obviously, a mobile payment service requires at least a mobile network service, a mobile handset and some software. However, a mobile payment platform's service depends heavily on the nature of its relationships with the different input suppliers. Some of them have moderate market power (e.g., hardware manufacturers); we therefore expect a payment platform to access these inputs at competitive conditions. Others (e.g., MNOs or banks) have more market power and access to the inputs they provide may involve a partnership with the input supplier. Alternatively, the mobile payment

platform may decide to bypass these key input suppliers, if it does not succeed to find an agreement.

The mobile payment platform can bypass the MNOs by installing the payment application in a separate memory card instead of using the consumer's SIM card (controlled by the MNO) or by providing the payment application as a mobile application. Note that in developing countries, the USSD technology that is mainly used does not allow to bypass the MNOs, because it requires access to the MNO's core networks. The consumer's bank (if she/he has any) can be bypassed by setting up a prepaid account or an e-wallet. Finally, the mobile payment platform can develop its service without the cooperation of an acceptance network. In the case of mobile money, it can roll out its own agent network, instead of requiring access to an existing network (see below for a discussion on agent-level interoperability).

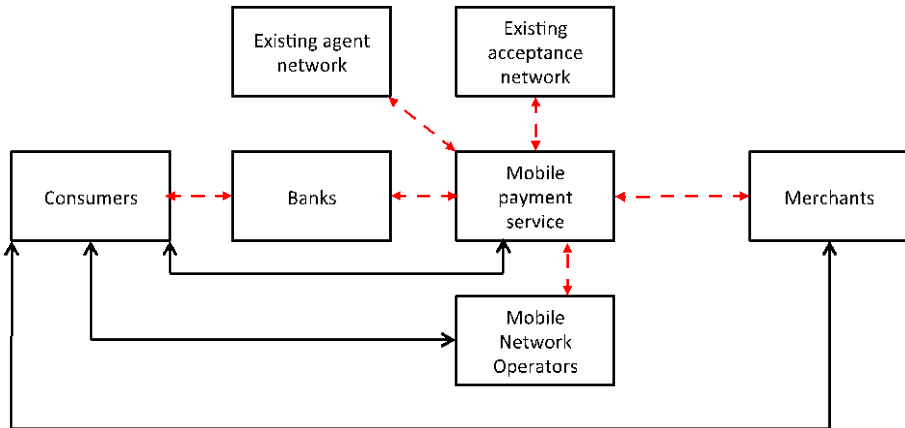
Figure 2 represents the economic relationships between the different players that might be involved in a mobile payment solution. The solid lines represent economic relationships that necessarily exist, while the dashed lines represent economic relationships that may or may not exist, depending on the service offered by the platform. Indeed, the platform may decide to cooperate with some of the key input suppliers, or to bypass them.

Since, as we have seen, each one of the three potential inputs suppliers (MNO, bank, payment/agent network) can be bypassed or not by the mobile payment service provider, we have several cooperation models that can emerge. We consider that cooperation between the mobile payment service provider and each input supplier can be either weak or strong. Strong cooperation can take place either through a joint venture, vertical integration, or M&A.

There are clearly complementarities between MNOs, banks and payment/agent networks: they also have balancing capabilities for the design of a mobile payment solution. However, the potential for cooperation between these players is limited, especially when they actually compete to control the distribution of mobile payments. MNOs view mobile payments as a new revenue channel, in a context where their existing revenue streams saturate, and as a way of increasing their customers' loyalty. For banks and financial institutions, mobile payments represent a source of differentiation, of new revenue streams, and it may also help them to reduce their costs. OZCAN & SANTOS (2015) argue that cooperation between MNOs and banks is all the more difficult as the potential partners hold dominant

positions in different markets. Ultimately, cooperation depends on whether banks see opportunities beyond the traditional banking sector or whether they see strategic threats to their core business.

Figure 2 - Economic relationships between the players involved in a mobile payment service



Different cooperation models

BOURREAU & VERDIER (2010) identify five different cooperation (business) models for mobile payments, out of the theoretically six possible models:

- With the "light" model, the cooperation with the other players and input suppliers (banks, acceptance/agent networks) is minimal.
- The "mobile-centric" model relies on a strong cooperation with a mobile network operator, while the cooperation with banks and acceptance/agent networks is minimal.
- With the "bank-centric" model, banks develop a mass-market mobile payment solution without the cooperation of MNOs.
- The "partial integration" model takes place when there is a strong link between a bank and a MNO, but no cooperation with the acceptance/agent networks.
- Finally, the "full integration" model corresponds to a situation of vertical integration over the value chain, where a single company provides

mobile services, payment services, and has access to a large acceptance/agent network.

These different models involve different degrees and different forms of cooperation. The "light model" involves the lowest degree of cooperation with the key input suppliers. Therefore, entry barriers are lower with this model, but the possibility to target more than a niche market seems limited. However, the "light model" may be an efficient form of cooperation for the development of financial services on an existing payment platform that targets specific ("niche") consumer needs. The "bank-centric" and "mobile-centric" models involve a strong degree of cooperation with either a bank or a mobile network operator. Banks have experience in offering a variety of financial services to consumers, and in risk and fraud management. Furthermore, regulations may require banks to be involved in any mobile payment solution. In developing countries, MNOs usually operate a USSD platform for airtime top-up, which can be upgraded to provide mobile money services. Mobile money services seem also to be a strong complement to mobile telephony services, and to enhance consumer loyalty. Finally, the "partial-integration" and "full-integration" models involve strong cooperation between the main players. A high degree of cooperation has benefits, due to the complementarities or synergies between the different players, but it also has costs, in particular in terms of negotiation or coordination.

There is no preferable model per se, or in the words of GSMA (2013), "there is more than one workable business model". Mobile payments are a major innovation, both in developed and developing economies, and the industry players should experiment to find the "right" business model(s). TEECE (2010) argues that technological innovations often require new business models to succeed in the market place, and consequently "new business models can themselves represent a form of innovation". Firms that are uncertain about which business model is the right one have to go through an experimentation phase, which may involve incremental adjustments of the traditional business model. The various examples that can be observed worldwide highlight that mobile payment platforms experiment constantly, in terms of services, pricing, etc. This experimentation path should be left to the market.

■ Competition concerns

Competition, when feasible, is normally a healthy solution for the delivery of goods and services. This rule of thumb is also applicable to mobile payments. Yet, there are some peculiar characteristics of mobile payments that can give rise to concerns. These have to be understood first, and obviously prior to suggesting possible regulatory interventions.

Network effects

Network effects refer to the ability and utility that consumers have to interact with many counterparts. In the absence of interconnection between competing networks, positive network externalities mean that consumers will typically want to join the largest network. This effect, if not counterbalanced by product differentiation or consumer switching costs, implies that the largest network will grow larger and larger, until it may capture the whole market as a limiting case. While in itself this may be a daunting case, as the remaining operator will have uncontested monopoly power over customers and can therefore exploit them, the dynamic process related to network externalities is actually more interesting and less scary. Especially in an initial phase of the market, network effects imply that rival platforms will compete very fiercely to establish a leading position in the market. In other words, there will be an initial phase of competition "for the market" with cheap prices, which may be followed by not very intense competition "in the market" in the longer term. Since network effects in payment systems are mostly related to national geographic markets (as people tend to conduct transactions within a geographic area that is, at most, national), what matters is the national market size, while the presence of operators in multiple markets (e.g., pan-African MNOs) does not help in itself to increase or decrease network effects (though multiple market presence may of course be a signal of experience and expertise).

Network effects can also be a barrier to entry in the absence of interconnection between platforms. This is because a new entrant is unlikely to be able to attract customers. In this sense, interconnection and interoperability between networks can be an appropriate solution in order for everybody to enjoy positive network externalities. Whether this should be mandated or not depends on the relative positions of competing platforms. In a market with symmetrically placed competitors, it is expected that they will realize the mutual benefits they can get, as extra value to the customers is

created due to the increase in positive network effects. This is expected to expand the market by stimulating additional demand and attracting new subscribers. The picture however changes quite radically with asymmetric firms. In such cases, the largest firm will typically refuse interconnection, unless sufficiently compensated.

If markets are truly start-ups, interconnection should probably not be mandated *de jure*, as one would first want to see if the principle of competition "for the market" could prevail. Eventually, if network benefits are really strong, competing firms will have mutual incentives to interconnect in any case (*de facto*, rather than *de jure*). The incentive to interconnect is also likely to arise in more mature markets as long as firms are symmetrically placed. Instead, one would want to concentrate on interconnection when markets may tip in favor of one player who may want to refuse interconnection.

The examples of Kenya and Tanzania are revealing in this respect. In Kenya, M-PESA, offered by Safaricom, is the leading mobile money service. M-PESA lacks interoperability with any of the rival services run by the country's three other operators. Yet, it has been and still is very successful. Given its success, Safaricom is now under pressure to change its ways. In July 2014, Safaricom opened up its network of agents to its rival Airtel. The operator's unilateral move came just before the Competition Authority of Kenya ordered it to open up its network of agents to rivals. In Tanzania, three of the leading operators announced an agreement in June 2014 to let subscribers send and receive mobile money with the users of rival services for the first time. However, the country's largest operator, Vodacom, which offers M-PESA in Tanzania did not sign up. The lesson here is that there has been strong competition for the market in both countries. Regulatory intervention (or anticipation of such intervention) has been playing a role in Kenya recently, when the market was tipping. Instead, in Tanzania, voluntary interconnection among the smaller players emerged to become credible contestants against a larger incumbent.

The examples from Kenya and Tanzania also show that there are various levels of interconnection, so that "opening" the network is often just a step but not sufficient to ensure that network effects are enjoyed in full. More precisely, interoperability can be achieved at three different levels: ⁸

⁸ <http://www.cgap.org/blog/interoperability-branchless-banking-and-mobile-money-0>

- At the mobile network level: customers can access their mobile money service through any SIM card.
- At the agent level: the agents for one service can serve consumers of another service (no exclusivity). This is the level of interoperability proposed by M-PESA in Kenya.
- At the platform level: money transfers can be both on-net and off-net; that is, a user of one service can send electronic money to a user of another service. This is the level of interoperability negotiated among operators in Tanzania.

When mobile money platforms are not interoperable, electronic money sent to a consumer on a rival mobile network generates a voucher, which can only be cashed out at an agent from the sender's network. In other words, electronic money cannot circulate off-net.

Leverage of market power and foreclosure

Bundling is a strategy that joins products or services together in order to sell them as a single combined unit to customers. This may cause competition concerns if market power can be leveraged from one product to a bundled one. As an example, a mobile operator with market power in mobile services or a manufacturer with market power in the handset market (such as Apple) might try to leverage market power over complementary goods such as mobile payments. While this is a possibility that cannot be excluded, it does not seem so endemic to require a regulatory intervention *ex ante*. It is preferable to tackle this occurrence *ex post*, via competition law, and on a case by case basis.

Related to this, and possibly a greater source of concern, is the potential of existing market power in traditional payment systems being used to limit or delay the development of mobile payments. The degree of this will depend on the extent to which mobile payments systems rely on access to bank clearing systems and the pre-existing market power of banks. The banks' incentive to foreclose the market in turn depends on whether mobile payment systems are seen to be a substitute for or complement to traditional banking services.

If a mobile payment system is initially developed as a "closed" system, it may later require access to an existing conventional payment system, such as the national bank clearing system or credit card networks, in order to

facilitate transfers or for transactions to take place between customers of the mobile payment system and customers of the existing banking system. As national bank clearing systems are typically run by banks, it is possible that banks could seek to restrict access to an operator of such a mobile payment system, operated by a non-bank.

The key question is whether and under what conditions a bank, or group of banks, would have an incentive to do so. This depends on the expected benefits and costs from providing such access. If the deposits of the mobile payment system are re-invested in the domestic financial system, then the overall availability of domestic capital might be expected to increase. Thus, the mobile payment system could raise the level of deposits made by people with no existing bank account. However, if the deposits are not re-invested in the domestic financial system, or if mobile payments capture market shares away from traditional financial systems, then this could potentially reduce the capital/liquidity available to banks.

Additionally, if the mobile payment system providers intend to engage in the provision of other revenue-generating banking services (such as lending or the provision of additional financial services) on the basis of the initial deposit-taking and transactions services, then this could be seen as a threat to either actual or future potential banking revenues. The greater the opportunity for generating additional revenues, and the larger the mobile operators relative to the banks, the greater the perceived threat to banking revenues.

To the extent that access to the clearing system would facilitate the expansion and take-up of mobile payments, banks could seek to restrict access to clearing strategically to minimize the potentially negative effect of the growth of mobile payment systems on their own profits. In the event that the mobile payment systems are more efficient than traditional payment mechanisms, this could result in productive inefficiencies, especially for certain types of transactions such as micro transactions. Such an outcome, could therefore lead to some consumers continuing to have to use higher cost services, or having a more restricted ability to execute transactions.

■ Regulation and challenges

Before intervening in a market, a regulatory authority should first assure itself that, left on its own, the market would not generate an efficient

outcome, and that the benefits of intervention will outweigh any costs associated with it. Regulatory intervention to deal with competition concerns in the telecommunications sector can be broadly classified as either *ex ante* regulation, or *ex post* regulation.

Ex ante regulation refers to a situation where, a regulatory (or other relevant) authority establishes that, absent such *ex ante* intervention, the abuse of a dominant position (or other market failure) will occur. As a general principle therefore, *ex ante* regulation should be imposed only if there is an expected market failure that can be avoided or mitigated more effectively by pre-emptive regulatory intervention than by *ex post* intervention, if and when a market failure has occurred. In the case of *ex post* intervention, regulatory remedies are imposed only following an investigation and establishment of a market failure as a result of anticompetitive behavior by market participants. This type of intervention typically relies on the principles of general competition legislation, applicable to any sector of the economy, rather than sector-specific regulation.

In the case of the introduction of a new system or service, *ex ante* regulation may be appropriate to ensure that rival systems are interoperable. There are a number of approaches that an authority could take to further this aim, ranging from relatively interventionist strategies, such as requiring operators, through *ex ante* regulation, to ensure the technical interoperability/interconnection of their respective systems, to a light-touch approach, such as requiring the creation of a standards body (coordinating and approving standards for mobile payment systems).

Financial sector regulation is also *ex ante*, but, somehow in contrast with telecommunications regulation, *ex post* supervision is less aimed at market conduct (one exception is the oversight of risk management in payment systems which is in place in many countries), but more at financial stability. This different approach, which is rooted in banking regulation and concentrates especially on the *ex ante* part for very good reasons, may however be too heavy handed in the initial phases of the development of mobile payment systems, as we argue next.

Objectives

In order to establish whether or not regulatory intervention is needed, one should first ask what objectives should be achieved, followed by an analysis of the appropriateness of the instruments available for an identified

intervention. As for the objectives, they are typically standard, such as the development of a competitive environment, or the quality of payment infrastructures. Yet, it is important that these are clearly defined, and not too many: too many goals water down the main purpose of an intervention, and certainly do not help for the accountability of regulatory bodies.

Another objective, which is specific to payment systems, is the security of transactions. Transactions that are unsecure reduce users' trust in payment instruments, which in turn reduces their usage. There are therefore strict rules for becoming a payment service provider.

Instruments

Entry controls

One standard instrument for the regulator is the control of entry, via authorizations or licenses. Control of entry enables the regulator to refuse entry of inefficient service providers, for example, if they do not have the technical and financial capabilities to provide a good quality of service. In the payments industry, there are also specific risks associated with the entry of new players: operational risks, and reputational risks (if failure of a new player in terms of security hurts the reputation of all players). However, imposing too stringent entry conditions could slow down the development of mobile payment services, in particular given the two-sidedness of the market. For example, in Indonesia, when mobile money was launched in 2007, the central bank requested cash agents to ask for a remittance license. As a consequence, the mobile operators were unable to build large agent networks. New regulations were introduced in 2013 to stimulate the development of mobile money services, and since then thousands of agents have entered the market.

One could view the appropriate regulation of mobile money platform as a form of "ladder to banking" for non-banks. This ladder should avoid too stringent regulations from the outset, otherwise there will be no take-off. The different rungs on this "ladder to banking" should be designed so that mobile money platforms evolve from simple P2P transfer services to complete financial service providers. This evolution may require access to different levels of bank infrastructures at different stages of development of non-banks. Of course, regulations will follow this progression too – as MNOs

enter lending, for instance, they should be subject to the same capital and other prudential requirements as applied to banks.

MNOs' off-net (termination) fees

In view of the network characteristics of telecommunications markets, regulators have also considered measures that could facilitate the emergence of stronger competition – typically measures related to the ease of switching between alternative service providers. The framework used in the assessment of the need to introduce such measures varies from country to country, but they have been typically considered and introduced as a way of facilitating competition. Mobile money platforms also share a very typical feature of telecoms, which often involve cross-network transactions among customers belonging to different MNOs, that may require regulatory oversight of the so-called "off-net" (or "termination") fees.

For instance, in Indonesia, the on-net and off-net fees for money transfers are different. While transferring electronic money on-net is free, it costs IDR 2,000 (around USD 0.20) to send money off-net. This fee is then shared between the originating and receiving networks. A question for the industry is whether the discrimination between on-net and off-net money transfers should be removed, in particular if the cost of off-net money transfers encourages cash-ins/cash-outs, which are costly for the industry players. To the extent that one can borrow from the experience in mobile voice communications, off-net transfers may need to be capped by regulatory interventions. A less intrusive intervention would be to require reciprocity of such transfers in each direction, without specifying the level. The situation to be avoided is one where each party sets unilaterally the off-net fees for the other party, as this leads to multiple mark-ups that result in too high prices for end users. This may also have the consequence of inducing extensive multi-SIM use, and it is unclear whether using this model would be optimal for mobile money.

We now consider the role of regulation in relation to the different potential competition concerns that could be raised in the development of mobile payment systems (see also HOUPIS & BELLIS, 2007).

Regulation and interoperability

The challenge is to determine how and when to intervene to secure interoperability, recognizing that intervention can have both costs and

benefits. Given the uncertainty about the development of the mobile transactions market, there should be no general presumption that the regulatory imposition of interoperability will improve economic efficiency. It is possible that mandated interoperability could hamper market development, for example if the regulator inadvertently dampens competition and innovation in the development of potentially market leading propositions. Given this, *ex ante* regulation should focus on ensuring that interoperability remains feasible at low cost but should not be used to mandate interoperability at the outset. The key advantage of this approach is that, correctly specified, it can allow maximum scope for market development to be guided by competition between networks, whilst reserving a credible option for *ex post* regulatory intervention to secure interoperability, should this become necessary in the light of market developments.

Under this approach, *ex ante* regulation should focus on ensuring that firms do not take actions that increase the barriers to achieving interoperability. The details of this will be country- and system- specific. As shown earlier, the notions of interoperability are various, and have been applied at different levels, for instance, in Kenya and Tanzania.

Interoperability becomes a regulatory option only in later stages of the market development, but not in initial stages when commercial agreements are also feasible, and possibly only if and when dominant positions are present in the market. In Tanzania, where agent exclusivity is not permitted, the regulator stated preference for the market to arrive at an interoperable solution on its own, which is indeed what has happened. Regulations do not mandate but offer a framework for interoperability driven by market value propositions. This outcome is facilitated by having a competitive MNO environment, with three operators that have teamed up to fight the largest (but not dominant) MNO provider.

Another scenario involves "full cooperation" between industry players for a single platform, which corresponds to the so-called "Peru Model".⁹ The benefit of having a shared mobile money platform is that interoperability is already "built-in". The downside is that a single platform is created from the outset, bypassing the early phase of competition for the market. The question is also whether participants to a shared platform have enough

⁹ See CÁMARA & TUESTA (2014) and <http://www.mobile-money-global.com/Content/Jeffery-Bower-Better-Than-Cash-Alliance>.

incentives to develop the platform's services, given that their possibilities of differentiation may be limited.

Regulation and clearing

The previous analysis of the potential for foreclosure from access to a national bank clearing (or similar) system, suggests that the traditional banking system may, in some circumstances benefit from the introduction and expansion of mobile payment systems, if these result for example in the expansion of banking services to the unbanked. This is of particular relevance in countries with a relatively large share of unbanked populations and where mobile platforms create access and distribution networks that have significantly greater coverage than conventional banking services. There are also other potential costs, and benefits, that banks will be expected to evaluate.

Policy makers should be concerned with ensuring that access to a national bank clearing system does not increase unduly the risk for the system as a whole, or other individual participants. To the extent that the access seeker is not going to engage in revenue generating banking activities, then the requirements for access to the system should be no more stringent than necessary to meet the objective of ensuring no increase in risk from such access. Requesting a mobile payment provider to obtain a full banking license in order to have access, could be too onerous a requirement, in the absence of such provider offering banking services. At the other extreme, too weak criteria could generate operational, financial, or legal risks. What would be the proper criteria is currently reviewed in the European Union, which considers the possibility of allowing non-banks to offer payment and settlement systems.

Were such provider to seek to offer banking services in the future, and compete with existing/traditional bank services providers, the requirement to obtain a banking license would apply then. This should reduce concerns of the provision of access to a national bank clearing system without a full banking license, leading to 'unfair competition' from operators of mobile payment systems.

Regulatory setup

It is important to clarify the regulatory setup, as the players may view the lack of regulatory oversight as an obstacle to the development of mobile payments. Since mobile payments represent financial instruments, it is natural that the banking regulators (central banks in particular) should conduct most of the oversight activity. Indeed, this is what has happened in most countries. However, the presence of a central bank is neither a necessary nor a sufficient condition for the developing of mobile payment platforms.

In Somaliland, for instance, there is no formal banking infrastructure and no internationally recognized banks operate there. However, the presence of a strong mobile operator, Telesom, with 1 million mobile connections and about 85% market share, allowed developing the mobile money ecosystem around Telesom ZAAD. Key commercial decisions of Telesom were to make the service free, and to utilize its own distribution network and not to recruit external agents. The lack of a developed financial regulation also induced Telesom to implement forms of self-regulation in order to get financial credibility, such as identifying and implementing customer due diligence procedures. Given the dominant position in the mobile market, there is now the reasonable possibility that Telesom will start charging customers to use the service – this is where an *ex post* approach to regulation, as typically done by competition authorities or by telecoms regulators, will be needed to monitor the developments of the market.

This case, however, is more the exception rather than the rule. It is more common to find central banks engaged in discussions with the market players and with the telecoms regulator in order to find appropriate solutions. The situation to be avoided is one which is too bank-centric, which may overregulate the requirements for licenses to be awarded, and may retard the adoption of mobile payment systems. We already pointed out that Indonesia had initially adopted stringent regulations that were simply too costly for MNOs to build agent networks. As new, more flexible, regulations were implemented by the central bank, mobile payments eventually took up. Other examples include streamlined branch regulations that permit banks to manage differentiated service models. In general, it is good advice to avoid burdening with unnecessary provisions, and to allow a class of non-bank e-money issuers authorized to raise deposits and process payments.

■ Conclusion: creating the right ecosystem

Can mobile money really be the catalyst for innovation in financial services, leading to further financial inclusion? The answer is yes, in principle: given the dense network of transaction points, costs are much reduced compared to the traditional financial sector. Even more importantly, once clients are brought into the financial system, they can get platform access to a whole new set of services and delivery models. Mobile money can drive financial inclusion, that is, the possibility of providers offering savings, credit, insurance and other products to the poor at low cost: the first key obstacle here is scale, as networks and platforms require scale to have impact. Innovations can come from the development of new products that operate through the mobile money channel. However, this also comes with the problem that building trust and maintaining a relationship with customers is difficult, especially when there are less face-to-face contacts.

Even Kenya, perhaps "the" success story of mobile payments so far, comes with caveats. Some authors argue there is an innovation gap: M-PESA does not innovate any more. In economics terms, there may be a risk of a "replacement effect": if M-PESA further innovates, it basically replaces itself as the main player in the market. Hence, its incentives to innovate are reduced compared to a smaller player that would strive to become dominant. Respondents to surveys conducted by KENDALL *et al.* (2011), argue that M-PESA fees may still be too high to build an interesting ecosystem in Kenya, perhaps an indication that indeed M-PESA is exercising market power. More tellingly, the quality of M-PESA's APIs is poor, which is problematic especially for smaller innovators with limited in-house software development capability.

The M-PESA example highlights that large initial investments and/or progress within one technological path can later on limit the prospects for further innovation. When an existing mobile payment platform operates at a relatively large scale, its incentives to upgrade or expand its service are reduced compared to a new player, due to the "replacement effect" mentioned above. This can be problematic, in particular if the payment platform cannot meet all consumers' needs in its present design and would have to be upgraded.

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