Patterns of Mobile Money Adoption among Small Farmers in Kiambu and Machakos Counties, Kenya

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Abstract

Mobile money transfers have become the most widespread financial services in Sub-Saharan Africa. Over the last decade, they have been widely saluted as a 'pro-poor, developmental' technology for the financial inclusion and empowerment of millions of unbanked people. Moreover, along the years, several micro-level studies have brought evidence of the positive impacts of mobile money on the livelihoods of rural and agricultural households, especially thanks to the higher in-flow of remittances.

On the base of field research carried out in two Kenyan counties, Kiambu and Machakos, this article explores the patterns of adoption among small-scale farming households. In particular, it argues that uneven uptake patterns determine the unequal distribution of the 'developmental' impacts of such services – which in turn reinforces old inequalities while producing new ones.

Keywords: Mobile money, Kenya, small-scale agriculture, ICT, inequality

Introduction

Over the past decades, the spread of information and communication technologies (ICTs) in developing countries has been sustained by a powerful narrative claiming that the 'information revolution' would allow to leapfrog the old obstacles that historically hindered development, and reduce poverty and inequality. Consistently with the broader post-Washington Consensus doctrine fostered by international institutions and private

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actors, this promise of economic convergence towards Western economies could become real only through the privatisation and liberalisation of the telecommunication sectors and the creation of public-private partnerships to foster investments (Wade 2002; Cline-Cole, Powell 2004; Murphy, Carmody 2015).

One of the most powerful examples is the spread of mobile money transfers in Sub-Saharan African countries. These services, provided by telecommunication companies, consist in a paperless account linked to the phone number through which users can safely deposit, withdraw and send money; they have neither entry and running costs nor minimum deposit clauses and their operativity is based on telecoms' capillary networks of agents.[1] Nowadays, it is estimated that over 60% of the adult population in Sub-Saharan Africa owns a mobile money account, whereas less than a third holds a bank account; in Kenya, the cradle of mobile money, 73% adults were financially included in 2017 and 98% of them used mobile money, while only 29% had a bank account (European Investment Bank 2017; GSMA 2019; Financial Inclusion Insights 2018).

Designed to satisfy the latent demand of the unbanked poor for cheap and accessible financial services – especially for the delivery of remittances -, mobile money has been saluted by a plurality of international actors as a ground-breaking innovation for the financial inclusion of millions of people that would have led to the reduction of poverty and inequalities. For instance, a recent report by Global System for Mobile Communications Association (GSMA), the international association of mobile service providers, claims that mobile money sustains the achievement of 15 out of 17 sustainable development goals, as it "fuels economic growth by facilitating savings and investments, creates employment, drives business productivity and entrepreneurship, helps formalize the economy and provides stability during economic downturns. Mobile money is a key driver of socio-economic growth and is becoming a gateway to the digital economy" (GSMA 2019: 3).[2] This narrative has found nourishment in a vast literature of micro-level studies that, as it will be discussed later, have assessed positive impacts on users in terms of individual empowerment, agency enhancement, income improvement and reduced vulnerability to shocks (i.e. Kirui *et al.* 2010; Kikulwe *et al.* 2013; Rutten, Mwangi 2012) Nonetheless, recently several researches have stressed that mobile money, together with other information technologies, could actually deepen exclusion and inequalities as a result of uneven patterns of adoption and usage (Mothobi, Gillwald 2018; Van Hove, Dubus 2019; Wyche *et al.* 2016).

This article stresses such issue through the qualitative analysis of mobile money adoption patterns among Kenyan small farmers in two counties, Kiambu and Machakos, which present opposite characteristics in terms of agricultural sectors, pre-existent financial infrastructures and development trajectories. The study relies on a survey conducted in September-October 2015 with the administration of questionnaires to the heads of 140 randomly selected households (HHs), of which 74 in Kiambu and 66 in Machakos, through which both qualitative and quantitative data were collected.[3] In particular, it

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focuses on how these services spread according to adopters' characteristics in different contexts, in order to understand whether mobile money is promoting financial inclusion by 'filling the gaps' or actually layering on previous inequalities. The article is hence structured as follows: first, it reviews the literature on the core issues of mobile money impacts and adoption patterns; it goes on describing the national and local contexts of analysis – the broader Kenyan case as cradle of mobile money, and the surveyed areas of Kiambu and Machakos. Then, it presents and discusses the collected data, and highlights the unequal distribution of mobile money-driven 'developmental' impacts.

Mobile money impacts and the issue of adoption patterns

Since formal financial sectors have historically been characterised by limited if any outreach in rural areas and high entry barriers in most African countries, for decades cash has been the most common mean for currency transfer among the unbanked poor and remittances has mainly flowed through communal, fellowship, or parental networks (Poulton 2006; Djurfeldt *et al.* 2011; Vaughan *et al.* 2013). Conversely, mobile money allows the instantaneous dispatch of currency that can be easily withdrawn – telecom agents are much more capillary widespread than post and bank branches –, the reduction of transaction and coordination costs, as well as loss/thefts risks during the transfer process. Consequently, these services allow individuals to mobilise capital through social networks for investment purposes, the preservation and improvement of expenditure patterns, and to cope with unforeseen shocks more swiftly and efficiently – the capital coming in the form of either remittances, borrowing or solidarity relief from peers (Rea, Nelms 2017; Munyegera, Matsumoto 2016; Maree *et al.* 2013; Riley 2018). Such transfers of value, as well as their refusal, are also defining moments through which social relations are reproduced, redefined, or even undermined. While transfers *per se* may take place between single agents, their occurrence is framed by socially constructed sets of rules, obligations, and expectations. As mobile phones and mobile money respectively ease communication and value transfer thus compressing time and space as constraints to interactions (Maurer 2012; Maurer *et al.*, 2013), they trigger changes in social norms and customs. For instance, studies on migratory networks show that such tools allow urbanised migrants to take part to the social life of their community of origin, as the delivery of funds in occasion of ritual ceremonies becomes a proxy of the migrant's presence (Kusimba 2018; Guma *et al.* 2014). On the other side, the uptake of mobile money allows rural families to exercise a higher control on the 'economic debauchery' of migrants hence improving the flow of remittances and redefining gender-based power relations within families (Morawczynski 2009; Morawczynski, Miscione 2010).

In rural areas, enhanced flows of remittances translate in the improvement of disposable income, consumption patterns, purchase of agricultural inputs, investments

in education, farm and non-farm activities (Kikulwe *et al.* 2013). Kirui *et al.* (2010) investigated how farmers allocate the remittances received through mobile money in three Kenyan districts. They found that they utilized money mainly for agriculturally related purposes (32%), followed by school fees payment (20%) and purchase of food (10%). Kikulwe *et al.* (2013) found that smallholding households adopting mobile money experienced an average 40% increase in disposable income and that enhanced agricultural investments translated into more commercially-oriented farming and the marketization of a higher share of the produce. Moreover, as Plyler *et al.* (2010) discuss, the enhanced flow of immediately disposable money at the local level provokes the expansion of existing businesses and the growth of small and informal ones, thereby leading to more employment opportunities and improved livelihoods of the rural inhabitants.

In spite of these micro-level positive impacts of mobile money, several studies have nonetheless highlighted the presence of uneven adoption patterns. Both adoption and proficient usage depend on age, gender and individual endowments of skills, resources, access to information, social capital, digital and financial literacy that are unequally distributed across society; mobile money thus risks to promote the reproduction of old inequalities, as well as the creation of new ones (Kiconco *et al.* 2018). For instance, a report published by Financial Inclusion Insights (FII) in 2014 – that is, seven years after the launch of M-Pesa, the first mobile money service - marked that only 30% Kenyan people with no formal education uses mobile money compared to 93% in the most educated segment; similarly, adoption rates were skewed towards urbanised people, males, those aged under 44 and people with incomes above the poverty line (FII 2014). Van Hove and Dubus (2019: 19), who carried out further analysis on the same FII dataset, conclude that "those who do not benefit from the positive effects of M-Pesa (such as the ability to receive more frequent and faster remittances and, ultimately, the ability to save on a formal account) are disproportionally non-educated, poor, and female". Moreover, among users, the uneven distribution of skills and resources determines different returns for adoption, as less endowed people cannot harness the full potential of the technology: Wyche *et al.* (2016), for instance, found that poor aged women's frequent eyesight problems and their impossibility to purchase glasses constrained the proficient use of M-Pesa and increased the marginalization of such social group. Above all, however, mobile money can amplify the inequalities generated by remittances flows - and especially domestic ones. Several studies show that, while reducing poverty, urban-rural remittances have negative impacts on income inequalities in the source regions; since the adoption of mobile money in migrants-rural kin relationships increases the amount of money dispatched over a given period, it may further exacerbate such trend (e.g. Chinmay 2011; Olowa, Shittu 2012; CGAP 2009).

Background of the study: the Kenyan context

M-Pesa was launched on the Kenyan market by Safaricom in 2007, after three years of experimentation as a microfinance development project financed by Vodafone, the UK Department for International Development (DFID), and the e-Finance Deepening Challenge Fund, with the slogan 'send money home' (Hughes, Lonie 2007).[4] At first, in fact, Safaricom focused on the simple money transfer service mainly targeting urban remitting migrants, in order to let customers to familiarise with a brand-new kind of service, refine operational procedures before adding more sophisticated functionalities and gaining the Central Bank of Kenya's (CBK) trust in its ability to run the service, while new functionalities were added in the following years (Vaughan *et al.* 2013). Between 2007 and 2015, M-Pesa scaled up from a few thousands to 22 million subscriptions and 91.000 agents across the country (Communication Authority of Kenya – CA 2015) and the boom occurred thanks to several favourable conditions. First, Kenya has been historically characterised by strong rural-urban migrations because of widespread poverty, unemployment, increasing demographic pressure, and landlessness in rural areas (IOM 2015).[5] Such flows have mainly occurred in the form of individual migrants maintaining close ties with their rural kin rather than entire nuclear families, at the point that 17% of Kenyan households depended on remittances as their primary source of income in 2007 (Mas, Radcliffe 2011). Second, the formal financial sector was structurally incapable of fulfilling the growing demand for low-cost, nationwide money transfer services: in 2007, it accounted for just 450 branches across the entire country and concentrated in the major towns. Third, the growth of the new mobile money market was allowed by the *laissez-faire* policies enacted by the Kenyan government, which refused to subject mobile money to the same restrictive regulations of the formal banking sector and, up to 2014, did not enact any proper regulatory framework (Muthiora 2015; Alliance for Financial Inclusion 2010). Finally, mobile money quickly proved its reliability even in times of crisis: in early 2008, the outbreak of post-electoral violence throughout the country dramatically constrained the movement of people, goods, and cash; most banks and microfinance institutions' branches remained closed because of insecurity while the need for cash to buy essential commodities or escape the threat of violence rose. M-Pesa hence turned into the primary tool to transfer money across the country safely and to provide financial support to relatives and friends in distant areas, since telecom agents remained the only operative source of cash in most places (Morawczynski 2009; Dupas, Robinson 2010; Jack, Suri 2010).

Kiambu and Machakos

While agriculture represents the backbone of both Kiambu and Machakos economy, their different pedo-climatic conditions have determined divergent development trajectories. Kiambu Highlands are characterised by highly fertile volcanic soils as well as abundant and predictable rainfalls and groundwater, which are conducive to

the growth of both cash and food crops, high-value horticultural products and zero-grazing livestock keeping (County Government of Kiambu – CGK 2012b). The appeal of the area brought to vast alienations of land to white settlers during the colonial period. Since independence, the policies of land reallocation on individual basis to squatters, landless and the evicted has led to the formation of a conspicuous class of small farmers, 85% of whom now own a private title deed on land; however, the combination of high yields per unit of land – determining the viability of smaller plots - and the increasing population have nourished a process of over-fragmentation of the holdings (CGK 2012a). Nonetheless, the vigour of the small-scale subsector has been the main driver of wealth in the county and nowadays Kiambu experiences lower poverty, smaller inequalities and higher education rates compared to the national averages (Kenya National Bureau of Statistics – KNBS, Society for International Development – SID 2013a). Consequently, out-migration from the county has mainly occurred towards the capital and abroad, with the outflow not only of poor migrants looking for any employment, but also of highly educated and skilled people seeking qualified jobs as well as for educational purposes (CBS, MOPND 2004; IOM 2015).[6] The primary sector in Kiambu can rely on a set of relatively well developed infrastructures, in terms of both storage, transport and financial infrastructures. The latter, in particular, ramifies in a capillary network of commercial and village banks, insurance companies and especially Saving and Credit Cooperative Organizations (SACCOs), whose importance comes from the strength of the cooperative movement in the area (CGK 2014).[7] On the other side, despite the proximity to the Nairobi's urban markets, marketing chains are often long and inefficient, thus reducing the producers' profits. Moreover, most agricultural and livestock products are sold raw and not processed in the county, and the horticultural subsector struggles to achieve traceability, safety, sanitary and phytosanitary standards (CGK 2012a).

Agriculture in Machakos provides livelihoods to 85% households, but it lags behind the lack of water because of unpredictable and erratic rainfalls, poor soils, and the lack of skilled labour, which determine low production levels and food insecurity phenomena (Government of Machakos – GOM 2012, 2015; KNBS 2006). Nonetheless, the sector is constrained by a broad set of other issues. First, transport infrastructures are weak and become inaccessible during the rainy seasons. Second, the formal financial institutions concentrate in the urban centres and have a low penetration in rural areas.[8] Third, agricultural markets are not well developed in the area: since seasonality characterises the production of vegetables and fruits, the local markets experience alternating periods of surplus and scarcity during the year, thus implying low incomes for farmers and produce wastage (GOM 2012, 2015). Fourth, land titling has proven a slow process and the proportion of titled land stands at a mere 28.5%, while the absence of national and county land use policies has led to the proliferation of informal and unplanned settlements, inadequate infrastructure and service provision, demographic pressure over cultivated land and conflicts. As a result, agricultural stagnation and the

consequent uneven development of the overall local rural economy, poverty and the lack of job opportunities have historically led to significant out-migration phenomena toward Nairobi and other major cities, mainly in the form of individual migrants (Tiffen 1991; KNBS, SID 2013b).

Adoption patterns in Kiambu and Machakos

The adoption of M-Pesa in the surveyed counties was assessed through two indicators: which tools the household members used to save their money and what payment means they used to complete transactions as both sellers and purchasers. In general, most households in both counties had access to mobile phones (89% in Kiambu and 97% in Machakos) and aggregate data show that 32% households used M-Pesa in Kiambu against 76% in Machakos. In the former, usage is stronger among the youngest households (43% in the 18-25 years group) and tend to decline along with age, plummeting from 35% to 15% between those aged 46-55 and 56-65, then rising again to 30% among the oldest (66+); further, it is positively correlated with education, as it soars from 24% at primary level to 33% at secondary and 56% at college/technical school. In the latter, distribution per age presents a fluctuation throughout the age scale, piking to 100% at 26-35 and 84% at 56-65, but never getting any lower than 63% (at 46-55), and the same trend connotes education, with adoption rates at 77% at primary, 82% at secondary, and 67% at college/technical school level.

Kiambu and Machakos farmers present a broad difference in the overall access to the different saving methods. In the former, 82% households made use of formal financial services provided by banks and saving cooperatives[9] and only 27% used M-Pesa-based services, with 8% interviewees using both of them; in the latter, such percentages respectively stood at 55%, 60% and 27%. The financial exclusion rates stood at 8% in Kiambu and 4% in Machakos. Figure 2 shows the overall diffusion of the various saving methods and takes into account that similar services could be used within the same household.[10]

Figure 1: methods and services used by the agricultural households to save their money
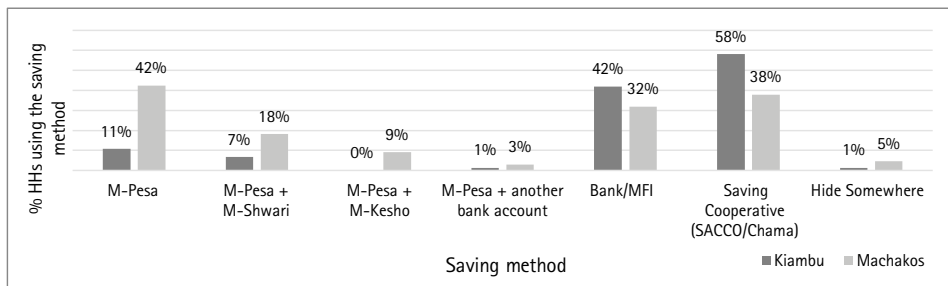
Source: the author.

The adoption of different saving means is mainly correlated with the agricultural income level: in Machakos, M-Pesa in its basic version is mostly adopted among the lowest agricultural income level groups (up to 75% at $48.07–96.15 per year), whereas M-Shwari and M-Kesho start to be adopted at a higher point of the income scale (beyond $96.15); on the other side, the access to banks and cooperatives soars over the threshold of $168.26. In Kiambu, the diffusion patterns of the M-Pesa services follow the same scheme, but deposits with cooperatives are particularly significant throughout the income scale (oscillating between 38% and 89%), whereas the access to banks concentrates among the 'wealthiest' groups having an income over $480.76. Divergent patterns also emerge in the usage of the mobile services across households' education levels:[11] while adoption is positively correlated with schooling in Kiambu, passing from 12% at primary to 28% at college or technical school, in Machakos such rates follow the opposite trend and decline from 69% to 56%. In both cases, nonetheless, adoption rates are driven by the basic M-Pesa at the lowest schooling level, while its combination with the mobile banking services gains in consistence along with education.

Data on the payment methods present similar differences. Whereas cash is the most common mean in both counties, cheques are significantly more widespread in Kiambu than in Machakos (57% vs 14%), while M-Pesa reveals an opposite figure (23% vs 53%). Their utilisation is closely related to the kind of farmers' customers: within both groups, cheques are dominant among those selling to cooperatives and industries, while higher rates of M-Pesa utilisation are observed in the case of sale to traders and middlemen.[12] Moreover, only 21% households in Kiambu directly selling to customers used M-Pesa against 57% in Machakos. Further, in both counties, rates above the average were found among those farmers selling to middlemen and traders (respectively 33% and 43% in Kiambu, and 78% and 59% in Machakos).

Explaining differences in adoption patterns
Out-migration and rural-urban relations
The causes of such discrepancies can be traced out in various concurring circumstances. The first issue relates the differences in terms of spatial dimensions and purposes of out-migration. Since the main feature of M-Pesa is the possibility to instantly and cheaply exchange money between accounts, it will be more appealing to those migrants that would otherwise face greater challenges in arranging the delivery – whether by travelling themselves or coordinating with other fellows. The surveyed areas in Kiambu are particularly close to Nairobi and the connecting transport infrastructure is decent, allowing workers to even commute rather than moving out, while Machakos areas are farther and present poor road infrastructures that increase the travel time: specifically, a migrant would need about one hour to return home in the former and 2-4 hours in the latter; it is thus clear that M-Pesa results more time and travel cost saving for Machakos than Kiambu migrants. Beyond this economic aspect, it has to be

considered that the act of remitting is embedded in the wider migrants' necessity or will to maintain the social bonds with their rural communities and the way in which it is carried out has an impact on such relations. Frequently paying visit home has much more strengthening outcomes than the mere periodical transfer of money, but the differences in terms of distance make it more feasible for Kiambu migrants, who can avoid falling back on M-Pesa.[13]

The purposes of out-migration produce outcomes that challenge various theoretical assumptions on the diffusion of the ICTs, considering adoption to be positively correlated with the education level because of the need of skills to use these technologies (Erumban, De Jong 2006) and inversely with age (Neves *et al.* 2013). In this sense, the Kiambu case adheres more strictly to the theory, contrarily to Machakos; in the latter, in fact, high adoption rates were found even among the theoretically weaker groups, which sometimes show higher rates than the younger and more educated farmers. It has to be considered that, when a households decides to opt for a livelihood strategy based on the migration of one or more of its members, the first to depart will be those with the best opportunities to find a job elsewhere, that is the males, the youngest and the most educated. Now, FSD Kenya reports (2009, 2013) highlight that the diffusion of M-Pesa started – and still is more intense - in urban areas, among the youths, early adults, and well-educated people; the overlap of such categories allows to conclude that Machakos urbanised migrants were the first household members to experiment M-Pesa and then introduced it to the others for the delivery of remittances. Adoption patterns in Kiambu follow the same mechanism, but with an inversion of the money flow. Several interviewees explained that, in the county, parents use to send their adolescent children to study in the major towns, especially in Nairobi, for the countryside hosts only village institutes whose quality cannot compete with the nearby colleges and technical schools in the main urban areas. Clearly, pupils need to be partially or entirely maintained during their studies, implying that parents have to send them money periodically. As in the case of Machakos, youths living in urban areas were the first to adopt M-Pesa and then introduced it to their parents and relatives, but with the purpose to receive money rather than sending remittances. Taken that the median mothers' age at first birth is 20-21 (Bongaarts, Blanc 2015), migration for educational purposes explains why the adoption rate falls among the 56-65 group, then to ascend again among the oldest farmers: this group is the least liable of having – or having had – either children or grandchildren in college age to support since M-Pesa was launched.

Formal financial infrastructures
The second issue relates the differences in the development of the financial infrastructure. Besides favouring the remittances flow, in fact, M-Pesa acts as a money storage service, while M-Shwari and M-Kesho provide interest-paying accounts and access to loans. Kiambu farmers can rely on a well-structured financial system with

branches in most trading centres that allow most respondents to access formal financial services; since cooperatives have lower entry barriers than banks, they allow poorer farmers to be served. At the same time, the low overlapping rate between traditional and M-Pesa services entails that it is mainly spreading through gaps left by these institutions, providing new instruments to those previously excluded from the financial circuit, while the higher exclusion rate than in Machakos also derives from farmers' perception of the different services in addition to conditions of deprivation. Various aged farmers in Kiambu, in fact, argued that they have had negative experiences with the formal institutions and hence they decided to close their accounts; on the other side, they perceived mobile money has a perilous tool because someone could steal the money from the account.

On the contrary, the spread of M-Pesa in Machakos is linked to the poorness of the formal financial sector. On the one side, branches condense in major towns and have a small outreach in the countryside - implying that it would take significant time and costs for a farmer from a remote village to get there; on the other side, low incomes prevent farmers to overcome the entry barriers and the costs of keeping a bank account. M-Pesa has thus found a clear field in Machakos and spread rapidly among the poor, since M-Pesa agents can be commonly found even in small and remote villages.[14] Hence, those who receive remittances constitute the early adopters in Machakos, but the service rapidly spread among other members of the community who were completely excluded from the financial system. Nonetheless, albeit it is true that M-Pesa has allowed part of the poor to climb the first step of the 'banking ladder' (Morawczinski 2009: 510) and entering the formal financial circuit, it seems to mark a new social differentiation. M-Shwari and M-Kesho provide proper banking services such as the possibility to take micro-loans and pay interests on deposits, the former being crucial in contexts where farmers chronically suffer constraints in the access to credit, but their adoption patterns are characterised by the exclusion of the poorest among the poor from this circuit – at least in terms of agricultural income -. The causes of such trend should be better investigated, starting from the fact that these services present no entry barriers.

Moreover, in Machakos, the significant overlapping rate of 27% entails that M-Pesa services are not only filling the gaps left by the formal institutions, but they are also challenging that sector from a competitive position. On the one side, M-Pesa has attracted those banked people receiving remittances as a faster way than the bank transfer. On the other side, it is competitive in the provision of credit services to farmers, which explains why M-Shwari and M-Kesho are more widespread than in Kiambu. The persistence of M-Kesho, the technically dead ancestor of M-Shwari, appears to be due to a progressive transition toward news services. Initially, when the first service was launched, they received advertising SMSs from Safaricom and decided to create an account with the aim to take a loan, mainly under the encouragement of other users.

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The emerging picture is consistent with the discussion carried out by Cook and McKay (2015): the users did not know exactly how the credit score system worked, and many of them never achieved to receive credit. Moreover, the distribution of M-Kesho users in the higher income groups can be attributed to the fact that, in 2010, mobile phones were much more expensive than today, so the households with the lowest incomes could not afford to buy one, as remittances were mainly utilized for more urgent expenses. Therefore, those who accessed cellular phones earlier were the most likely to adopt M-Kesho. As the phone prices decreased, farmers had the chance to purchase one or they received an older device from their urban fellows who bought a new model. Nevertheless, by that time, Safaricom had already abandoned M-Kesho to its fate and launched M-Shwari in 2012, while poorer households had become able to afford the technology and thus access the new, massively advertised, mobile banking service. Contemporarily, the author found that the M-Kesho's customer base is progressively disintegrating as farmers become aware of the new services. Its users are progressively moving towards M-Shwari or other paperless mobile services because they are both appealed by the more favourable saving terms (i.e., the higher interest rate on deposit) and because they hope they will be finally able to take a loan. However, M-Shwari users are not much informed yet about the lending criteria and they rely on a rather empirical science: when they receive money on their M-Pesa accounts, such as a remittance or payment, they immediately transfer it on M-Shwari. Moreover, interviewee users argued that they know that movements on the M-Pesa account are related to the loan limit in some way, so they were testing the system by paying and getting paid with M-Pesa. This behaviour is common also among the M-Kesho users, and it could be one of the explanations of the high usage of mobile money for the transactions in agriculture as it will be discussed later.

Differences in the credit system determine diverse phenomena. First, it must be noted that the number of farmers who perceived the need to take a loan in the past years is much higher in Kiambu than in Machakos. The explanation for this could be threefold: on the one hand, farmers pursuing subsistence strategies do not generate income, so they would not have the financial means to repay a loan. Second, those farmers who have been refused by financial institutions in the past might be discouraged and have decided to rely only on their means. Third, the remittances flow to the agricultural households may alleviate the need to take a loan, as money are already available to be spent for various purposes. On the other hand, in Kiambu, the higher income levels allow farmers to make investments or bear expenses with their savings while those needing a loan have had the chance to rely on a well-developed financial infrastructure and SACCOs in particular. In turn, the higher revenues from the agricultural activity and the ownership of private title deeds on land in the county make farmers more eligible for a loan. Both in the case of banks and SACCOs, registered cases of repayment troubles were related to delays in paying the instalments because of discrepancies

between the restitution dates and the harvest, but, eventually, farmers failing to repay were not found.

Even if data on M-Shwari loans are few, and no specific assertions can be done, the performance of the sampled ones seems to be rather positive. In general, M-Shwari users in Machakos knew that delays in repaying the loans affect the probability to take another one and that repaying before the due date would have increased it. Singularly, it has been found that the majority of the users were frequently borrowing minimal sums, usually Kshs 100-150, that they would repay within few days or weeks to check how the system would react, with the aim to increase their loan limit with a view of a possible need to take one in the future. It entails that these farmers were making an investment in their capacity to borrow because they had to pay a 7.5% fee on each taken loan. Among those who 'literally' borrowed from M-Shwari, only one farmer had troubles, as the first time he borrowed he did not know the difference between the 30- and 60-days limits. These farmers borrowed for two primary purposes, which are the access to medical care for a member of the family and the purchase of inputs such as fertilizers and farming tools. Whereas, the first mainly represented emergencies to cope with, the second were planned loans taken about a month before a harvest, which would be then sold to repay the debt.

Local cash flow

The last reason for the higher diffusion of M-Pesa among Machakos farmers pertains to the way in which money flow into the local economy. First, there is an external pressure for its adoption due to the power asymmetry within the produce marketisation process: since farmers usually are the weaker part in the bargain and that the definition of the terms of payment is part of it, they will be moved to acquiesce the customer's preferences.[15] One of the principal virtues of M-Pesa is the security of the money stored on the account, even when the mobile phone gets stolen; before its introduction, middlemen and traders used to pay with cash and thus were exposed to thefts and robberies, as they always had a certain amount of money in their pockets – whether revenues or payments for suppliers –. M-Pesa has thus allowed these actors to reduce and diversify the risks associated with cash, and middlemen have started asking farmers to pay in e-money. Second, various Machakos farmers transacting with M-Pesa stated that they preferred it rather than cash because their customers do not have much money to spend and, when they have to, they are very careful in dosing their resources for their daily needs. Considering that transactions between farmers and consumers consist of little amounts, it means that if the consumer has only banknotes and the farmer does not have loose change, the only exit strategy is that one of them must change the money, or the transaction could fail because the consumer cannot buy more products. On the contrary, M-Pesa allows to send the exact amount of money, and transferring e-money is much cheaper than withdraw cash at an agent.

Conclusion

As this article has discussed, the question of whether ICTs – and mobile money, in particular - will sustain a general reduction of poverty and inequalities or, contrarily, will foster old as well as unprecedented processes of social differentiation in the rural communities remains open. Indeed, digitalisation of financial services has started bridging the traditional lack if not complete absence of formal financial institutions in rural areas and has reduced entry barriers, thus transforming scattered masses of unappealing, troublesome to serve, mostly poor countrymen in a brand-new virgin market.

The presented research results on the M-Pesa diffusion in Kiambu and Machakos reflect such transformations and raise questions on the socio-economic mutations these technologies are triggering. On the one side, previous researches have assessed positive impacts generated by this service on the livelihoods and agricultural performances of the Kenyan small-scale farmers; on the other side, this study has shown that adoption is closely related to a broad range of factors such as age, income, education, migratory patterns, banking infrastructure and marketing process, whose role depends on the long-term trajectories of the two contexts taken in consideration. Following this, data from the surveyed areas suggest that the uptake and 'developmental' impacts of mobile money are unevenly distributed along different dimensions, thus both reinforcing old cleavages of inequality and creating new ones.

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NOTES:

1 - Deposits and withdrawals in cash into/from the account can be done at telecom company agents' kiosks; the former are free of charge and do not pay interests, while the latter have decreasing fees as the amount rises. All operations are managed via app or USSD menu and every order is secured by various steps of confirmation -including the insertion of a PIN.

2 - See also *Mobile Money offers Africans a Financial Future*, "International Finance Corporation", May 2018: https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/impact-stories/mobile-money-africa.

3 - The mentioned wards are Githiga, Komothai, Githunguri, Ngewa and Ikinu in Kiambu, and Ikombe, Tala and Kiima Kimwe in Machakos. Despite the survey has not been carried out on the whole counties' territories, here the sampled area will be addressed as 'Kiambu' and 'Machakos' for a matter of simplicity. Most questions included in the questionnaires were structured as close-ended with single or multiple-choice answers, in order to facilitate the elaboration of descriptive statistics. Questionnaires included a broad set of questions, among which HHs' demographic profile (age, members, etc.), education, agricultural and non-agricultural activities, income, information collection, technology awareness, mobile money usage and the access to financial services among the others. The fieldwork did not include actual in-depth interviews, but the researcher wrote down interviewees' comments and observations at the end of each questionnaire. This study is 'qualitative' in the meaning that, although it mainly relies on quantitative data, it doesn't aim to be statistically representative of the entire populations through statistical inference. Rather, it limits itself to grasp some of the main ongoing trends, which will have to be more thoroughly studied in future.

4 - The main Safaricom shareholders are Vodafone (40%) and the Government of Kenya (35%). *Safaricom Sustainability Report 2015*, "Safaricom", n.a.: https://www.safaricom.co.ke/sustainabilityreport_2015/public/uploads/Shareholders.pdf.

5 - Historically, three Kenyan regions mainly contributed to the internal migration toward urban areas, namely Nyanza, Western and Eastern, all afflicted by impressive poverty rates (Central Bureau of Statistics – CBS, Ministry of Planning and National Development - MOPND 2004), the latter of which comprehended the current Machakos County.

6 - In 2009, 21.75% of the population was classified as poor against a national average standing at 45.2%, while the Gini coefficients stood at 0.335 and 0.445 respectively (KNBS, SID 2013a, 2013b). The IOM (2015) report ranks Kiambu as the second Kenyan county for international migrants, preceded only by Nairobi, with an outflow for times stronger than in Machakos.

7 - The county accounts for 254 active societies, in agriculture as well as in other sectors, for the provision of both financial services and productive activities, and the largest farmers' cooperatives usually have a parent SACCO. For instance, the Githunguri Dairy and Community SACCO mainly draws its membership from the Githunguri Dairy Farmers Co-operative Society, one of the biggest operators of the dairy milk sector in Kenya, and they account respectively for 16,000 and 23,000 members. See S. Njenga. *Kenya: Kiambu Dairy Farmers Sacco in Plans to Expand*, "AllAfrica", 22 April 2015: http://allafrica.com/stories/201504221662.html; *Githunguri Dairy Farmers Cooperative*, "Fresha Dairy Products", n.a.: http://fresha.co.ke/content.php?com=2&com2=16&com3=#.WPz9GljyiUk.

8 - Such constraint is partially overcome by the presence of several local SACCOs and mainly by self-help, women and youth groups.

9 - By 'banks' it is intended both the commercial banks and the microfinance banking institutions, while the term 'saving cooperatives' comprehends both the SACCOs and the *chamas* (pooled micro-saving and investment cooperative groups that can either be formal, semi-formal or informal). No informal *chamas* members were found during the survey.

10 - Both M-Shwari and M-Kesho are mobile banking services associated to M-Pesa (but working as different accounts) with no entry barriers or running costs, that allow customers to take micro-loans and pay interests on deposits. The loan cap is defined through a sophisticated credit-scoring algorithm; customer's creditworthiness is based on data related to airtime credit, M-Pesa and M-Kesho/M-Shwari usage, credit performance, the length of time as a client.

11 - Intended as the highest education level achieved (or going to be) by one or more members. As the amounts of households with no formal schooling and university students/graduates are scant, the present analysis will be limited to the primary, secondary, and college/technical school segments.

12 - It has to be noted that, in Kiambu, only 43% farmers selling to traders and 33% selling to middlemen used M-Pesa as a mean of payment, while such percentages spike at 59% and 78% in Machakos.

13 - An extensive analysis on the transformational role of M-Pesa on the relations between migrants and their rural fellows in distant places can be found in Morawczinsky (2009).

14 - This is due to the fact that becoming an M-PESA agent is one of the few non-farm job opportunities in these locations and thus it is a yearned employment.

15 - This holds particularly true when their counterparts are industries, cooperatives, middlemen and traders. For instance, it was found that the Githunguri Dairy Farmers Co-operative Society has imposed to its small-scale milk suppliers to own an account at its parent SACCO, into which payments are credited.

References

Alliance for Financial Inclusion (2010), *Enabling Mobile Money Transfer: The Central Bank of Kenya's Treatment of M-PESA*, AFI, Bangkok

Bongaarts J., A. K. Blanc (2015), *Estimating the Current Mean Age of Mothers at the Birth of Their First Child from Household Surveys*, in «Population Health Metrics», vol. 13, n. 25

CBS, MOPND (2004), *Kenya 1999 Population and Housing Census Volume VI Analytical Report on Migration and Urbanisation*, CBS, Nairobi

CGAP (2009). *Poor People Using Mobile Financial Services: Observations on Customer Usage and Impact from M-PESA,* CGAP, Washington D.C.

CGK (2012a), *Agriculture, Livestock and Fisheries Strategic Plan 2013-2017*, CGK, Kiambu

CGK (2012b), *County Integrated Development Plan 2013-2017*, CGK, Kiambu

CGK (2014), *Annual Development Plan 2015/2016,* CGK, Kiambu

Chinmay T. (2011), *Remittances in India: Facts and Issues,* Indian Institute of Management, Bangalore

Cline-Cole R., M. Powell (2004), *ICTs, 'Virtual Colonisation' & Political Economy*, in «Review of African Political Economy», vol. 31, n. 99

Cook T., C. McKay (2015), *How M-Shwari Works: The Story So Far*, report n. 10, CGAP, Washington D.C.

Djurfeldt G., E. Aryeetey, A.C. Isinika (2011), *African smallholders: Food crops, markets and policy*, CABI, Oxfordshire

Dupas P., J. Robinson (2010), *Coping with Political Instability: Micro Evidence from Kenya's 2007 Election Crisis*, in «American Economic Review», vol. 100, n. 2

Erumban A. A., S. B. Jong (2006), *Cross-Country Differences in ICT Adoption: A Consequence of Culture?*, in «Journal of World Business», vol. 41, n. 4

European Investment Bank (2017), *Banking in Sub-Saharan Africa. Interim Report on Digital Financial Inclusion*, EIB, Luxembourg

Financial Inclusion Insights (2018), *2017 Annual Report: Financial Inclusion in Kenya*, FII, Washington D.C.

FSD Kenya (2009), *National Survey 2009: Dynamics of Kenya's Changing Financial Landscape*, FSD Kenya, Nairobi

FSD Kenya (2013), *National Survey 2013: Profiling Developments in Financial Access and Usage in Kenya*, FSD Kenya, Nairobi

GOM (2012), *Machakos County Strategic Framework 2013-2017: From Third World to First World in One Generation,* Kenya Mpya Initiative and Machakos County Development Forum, Nairobi and Machakos

GOM (2015), *Machakos County Integrated Development Plan 2015: The Place to Be*, GoM, Machakos

GSMA (2019), *State of the Industry Report on Mobile Money 2018*, GSM Association, London

Guma P. K. (2014), *Reimagining Rurality in Mobile Money Times: Life, Identity, and Community,* The Institute for Money, Technology, and Financial Inclusion, Irvine

Hughes N., S. Lonie (2007), *M-PESA: Mobile Money for the "Unbanked" Turning Cellphones into 24-Hour Tellers in Kenya*, in «Innovations: Technology, Governance, Globalization», vol. 2, n. 1-2

IOM (2015), *Migration in Kenya: A Country Profile 2015*, IOM, Nairobi

Jack W., T. Suri (2010), *Mobile Money: The Economics of M-PESA*, MIT Sloan, Cambridge

Kiconco R.I., G. Rooks, G. Solano, U. Matzat (2018), *A Skills Perspective on the Adoption and Use of Mobile Money Services in Uganda*, in «Information Development», vol. 20, n. 10

Kikulwe E. M., E. Fischer, M. Qaim (2013), *Mobile Money, Market Transactions, and Household Income in Rural Kenya.* GlobalFood Discussion Papers Series 22, GlobalFood, Göttingen

Kirui O. K., J. J. Okello, R.A. Nyikal (2010), *Awareness and Use of M-Banking Services in Agriculture: The Case of Smallholder Farmers in Kenya*, Contributed Paper presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa, 19-23 September 2010

KNBS (2006), *Kenya Integrated Household Budget Survey 2005*, KNBS, Nairobi

KNBS, SID (2013a), *Exploring Kenya's Inequality: Pulling Apart or Pooling Together?: Kiambu County Report*, KNBS and SID, Nairobi

KNBS, SID (2013b), *Exploring Kenya's Inequality: Pulling Apart or Pooling Together?: Machakos County Report*, KNBS and SID, Nairobi

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Kusimba S. (2018), *Money, Mobile Money and Rituals in Western Kenya: The Contingency Fund and the Thirteenth Cow*, in «African Studies Review», vol. 61, n. 2

Maree J., R. Piontak, T. Omwansa, I. Shinyekwa, K. Njenga (2013), *Developmental Uses of Mobile Phones in Kenya and Uganda*, Working Paper 35, University of Manchester, Manchester

Mas I., D. Radcliffe (2011), *Mobile Payments Go Viral: M-PESA in Kenya*, in «Capco Institute's Journal of Financial Transformation», vol. 32, pp. 169-182

Maurer B. (2012a), *Mobile Money: Communication, Consumption and Change in the Payment Space*, in «Journal of Development Studies», vol. 48, n. 5

Maurer B. (2012b), *Payment: Forms and Functions of Value Transfer in Contemporary Society*, in «The Cambridge Journal of Anthropology», vol. 30, n. 2

Morawczynski O. (2009), *Exploring the Usage and Impact of "Transformational" Mobile Financial Services: The Case of M-PESA in Kenya*, in «Journal of Eastern African Studies», vol. 3, n. 3

Morawczyinski O., G. Miscione (2010), *Trust and Mobile Transactions through M-Pesa: A Longitudinal Study on Money Transfer in Kenya,* in D. Latusek, A. Gerbasi (eds.), *Trust and Technology in a Ubiquitous Modern Environment: Theoretical and Methodological Perspectives,* IGI Global, Hershey

Munyegera G.K., T. Matsumoto (2016), *Mobile Money, Remittances, and Household Welfare: Panel Evidence from Rural Uganda*

Murphy J. T., P. R. Carmody (2015), *Africa's Information Revolution: Technical Regimes and Production Networks in South Africa and Tanzania*, Wiley Blackwell, Chichester

Muthiora B. (2015), *Enabling Mobile Money Policies in Kenya: Fostering a Digital Financial Revolution*, GSMA, London

Nelms T., S. Rea (2017), *Mobile Money: The First Decade*, Working Paper 2017-1, Institute For Money, Technology and Financial Inclusion, Irvine

Neves B. B., F. Amaro, J. Fonseca (2013), *Coming of (Old) Age in the Digital Age: ICT Usage and Non-Usage Among Older Adults*, in «Sociological Research Online», vol. 18, n. 2

Olowa O.W., A.M. Shittu (2012), *Remittances and Income Inequality in Rural Nigeria*, in «E3 Journal of Business Management and Economics», vol. 3, n. 5

Plyler M. G., S. Haas, G. Nagarajan (2010), *Community-Level Economic Effects of M-Pesa in Kenya: Initial Findings*, Financial Services Assessment, Maryland

Poulton C., J. Kydd, A. Dorward (2006). *Overcoming Market Constraints on Pro-Poor Agricultural Growth in Sub-Saharan Africa*, in «Development Policy Review», vol. 24, n. 3

Riley E. (2018), *Mobile Money and Risk Sharing Against Village Shocks*, in «Journal of Development Economics», vol. 135

Rutten M., M. Mwangi (2012), "*M-Pesa Field Household Surveys among the Maasai Pastoralists of Kajiado County*", in J. Gewald, A. Leviveld, I. Pesa (eds.), *Transforming Innovations in Africa: Explorative Studies on Appropriation in African Societies*, Brill, Leiden

Tiffen M. (1991), *Environmental Change and Dryland Management in Machakos District, Kenya: Population Profile*, Working Paper n. 54, Overseas Development Institute, London

Van Hove L., A. Dubus (2019), *M-PESA and Financial Inclusion in Kenya: Of Paying Comes Saving?*, in «Sustainability», vol. 11

Vaughan, P., W. Fengler, M. Joseph (2013), "*Scaling Up through Disruptive Business Model: The Inside Story of Mobile Money in Kenya*", in L. Chandy, A. Hosono, H. Kharas, J. Linn (eds.). *Getting to Scale: How to Bring Development Solutions to Millions of Poor* People, Brookings Institution Press, Washington D.C.

Wade R. (2002), *Bridging the Digital Divide: New Route to Development or New Form of Dependency?*, in «Global Governance», vol. 8, n. 2

Wyche S., S. Simiyu, M.E. Othieno (2016), *Mobile Phones as Amplifiers of Social Inequality among Rural Kenyan Women*, in «ACM Transactions on Computer-Human Interaction», vol. 23, n. 3