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The background of the top half of the page is a photograph of a large container ship, the "E.R. RIGA", docked at a pier. The ship is dark blue with a red hull and is heavily loaded with multi-colored shipping containers. In the background, a bridge spans across a wide river or harbor, and the sky is clear and blue.

KCG Working Paper

Urbanized and Savvy – Which African Firms are Making the Most of Mobile Money?

Charles Ackah, Aoife Hanley, Lars Hecker, and Michael Kodom

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Abstract: Our analysis of over 500 Ghanaian firms sheds light, for the first time, on how certain firms managed to extract value from mobile money. Our regressions point to the usefulness of this form of cashless payments in stabilizing sales during the COVID pandemic. Perhaps the most important message from our analysis is the recognition that the benefits from mobile money extend beyond its purpose as a tool for transacting cashless payments. We reveal that firms using these additional tools supported by MoMo (e.g. for planning or saving purposes) report higher sales resilience, all things equal. Our findings appear to echo the literature on private householders (e.g. Jack and Suri, 2014). However, while the latter report a positive effect due to remittances, our finding is more likely driven by enhanced ability of businesses to streamline their planning and sales.

Keywords: Mobile Money, Africa, Firm, Urbanization

JEL Classification: G23, G21, L25, O14, O18, O33

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1. Introduction

On the African continent, Mobile Money (MoMo) has been around for at least a decade. Its appeal is obvious – a cash-transfer technology, which is not reliant on broadband networks (formerly almost entirely absent in Africa). The benefits of MoMo are well documented, particularly in reducing the transactions costs of person-to-person payments for households and household firms (e.g. Jack and Suri, 2014). Added to this, is the role of MoMo in facilitating remittances – informal cash transfers between householders which can help to smooth consumption. This remittance aspect of the technology is especially important for householders facing production shocks such as localized crop failure.

While one strand of studies has reported the benefits of MoMo for households and household firms (e.g. Jack and Suri, 2014), there is an uptick of interest in how MoMo connects with outcomes for the ‘average’ firm (e.g. Abreha et al, 2021; Cariolle and Goeff, 2023; Dodlova et al).

However, the literature is silent on how firms from Africa’s Mittelstand interact with the now ubiquitous technology that is MoMo. Part of the reason for the scant attention so far paid to Africa’s most successful firms, is the emphasis on household or micro-firms to the exclusion of Africa’s growing class of ‘professional firms’. Another raft of research focusses on the ‘average’ firm. These studies generally identify the effect of a sectoral or spatial technology shock on firm performance. However, the focus of these studies on the ‘average firm’ is an artefact of the data used - the impossibility of connecting each individual firm with its patterns of MoMo usage, using standard census data. Accordingly, while existing work can tell us how MoMo has benefitted household firms or the ‘average’ firm, one important question remains unanswered: Does MoMo benefit Africa’s most successful firms? By ‘successful’, we imply Africa’s growing industrial Mittelstand, firms characterized as larger, more urbanized, internationalized, and more sophisticated (technologically and financially) than their peers. Moreover, conversations with policy makers underscore the importance of Africa’s nascent Mittelstand in shaping the competitive and employment landscape of the continent.

The purpose of our study is to deliver a more comprehensive picture of how a broader palette of African firms apply MoMo and benefit from this well-established technology.

To do this, we compile data for over 500 Ghanaian firms between 2019 and 2021. Our sample comprises not just household firms but is extended to include a strong representation of urbanized ‘professional firms’. Following Mahmud and Riley (2020), our investigation is backdropped by the COVID crisis. During this time of global upheaval, firms frequently experienced interruptions in their supply chains. Similarly, they faced reduced consumer demand owing to global and local lockdowns. Singling out the COVID crisis, allows us to examine how firms interfaced with MoMo, at a time of increased stress on their profits. Furthermore, we investigate how the multiple uses of MoMo (payments, remittances, bills, wages, savings) connect to firm performance. For example, are firms using MoMo for payments to suppliers more profitable, all things equal?

Our study reveals some interesting findings for this highly diverse group of Ghanaian firms. We find that at least 50 percent of sales are transacted using MoMo. For urbanized firms, this percentage is

even higher. Rural firms, more reluctant and more conservative users of the technology, allude to its perceived complexity and the higher distance to agents. Conversely, 'professional firms' are more sophisticated users, applying MoMo for a wider variety of uses, including payroll and savings. However, these more internationalized firms also experience limitations with this system of contactless payments. Transacting with foreign partners from beyond Africa's borders, is not easy with MoMo, where partners express a preference for bank transfers. But all in all, 'professional firms' seem better able to make better use of MoMo. Several functions of the MoMo package (e.g. billing and payments) are seen to correlate positively with steadier profits.

In sum, the positive correlation between MoMo and profitability is only evidenced in Ghana's urbanized firms. These firms, characterized by a wider customer base and higher sophistication in using this system of contactless payments, report steadier profits, all things equal. Finally, our regressions also reveal the complementarity between bank accounts and MoMo, suggesting that this technology works best when accompanied by increased financial muscle.

Our study is organized as follows. The next section outlines other studies focussing on MoMo and its conjectured benefits for Africa's firms. This is followed by a descriptives section, reporting MoMo usage patterns for the main and follow-up survey. Next come our regression results. Finally, we conclude with an assessment on the limitations of MoMo and how this multi-faceted technology can be optimised for firms on the African continent.

2. Background

Previous studies widely document the benefits of MoMo, from reducing transaction and travel costs (Jack and Suri, 2014; Aker and Wilson, 2013; Bångens and Söderberg, 2011), decreasing gender differences (Islam, Muzi and Mesa, 2018; Jack and Suri, 2016) and enabling the transfer of remittances (Munyegera and Matsumoto, 2016). To generate some testable hypotheses for our analysis, we single out studies most closely connected to MoMo as a tool for improving the performance of firms.

Jack and Suri (2014), in a much-cited study, highlight the enormous scope of mobile money for African households, arguing that the application makes it easier and less costly for individuals to transfer cash. Their reasoning is as follows. Wealthier African householders have traditionally transferred money to their less well-off family members and friends (See Gertler et al, 2012). The concept, known as remittances, operates rather like a collective insurance scheme. Under this scheme, householders can smoothen their income (and hence their consumption)¹. The advent of MoMo, has dispensed with the need for these remittances to take the form of physical cash, couriered over long distances by a bus-driver or equivalent. In this way, MoMo revolutionizes the possibilities for families to sponsor family-members in a crisis. In turn, households supporting poorer family members can expect to receive financial support when they themselves run into financial difficulty. To cite from the Jack and Suri (2014) study –

¹ This benefit of transferring money between family members should not be understated, as farmers in developing countries frequently experience volatile crop yields from agriculture.

"...reductions in transactions costs expand the number of active network participants and hence the extent to which shocks can be smoothed". (P190)

A further feature of the Jack and Suri (2014) analysis is its focus on the multiple ways in which MoMo can be used, beyond its obvious purpose in funding calls for the mobile phone device. Specifically, MoMo allows users to pay household bills, save their wealth, and even organize payroll. The latter feature is, of course, only useful for users of MoMo who are also managing a business. Overall, Jack and Suri report that the introduction of MoMo, allows householder consumption to increase from 43 to 70 percent.

Mahmud and Riley (2020), like the preceding study, deal with an economic shock experienced by users and non-users of MoMo – noting the differences in outcomes. Again, the spotlight is on the role of MoMo in smoothing financial volatility. The Mahmud and Riley study deals explicitly with the COVID pandemic. Using data for 1,277 rural householders in Uganda, they examine income and consumption changes for users and non-users of MoMo, following the COVID shock. In this largely descriptive study, respondents not using MoMo were associated with lower income, all things equal. However, non-users are relatively rare – penetration rates for MoMo corresponding to 70 percent of the respondents sampled. An interesting feature of the Mahmud and Riley study, is that only income generated from sources other than agriculture, seem to be adversely affected by the economic shock –

"We find a large decline of 60 percent in household non-farm income due to household enterprise profits and labour income being almost wiped-out post the lockdown". (P1)

Both the above papers deal with the capacity for mobile money users to use the application for smoothing income and consumption, when confronting an economic shock. A common characteristic of the above studies is their focus on predominantly rural householders. As such, we can say little about more urbanized users or business users. Several studies document a pronounced rural/urban divide in penetration rates and the accessibility of agents selling and supporting the package. For this reason, a study by Lashitew et al. (2019) is highly interesting. Their study involved interviewing 31 agents and developers supporting the mobile money package M-PESA. They specifically control for the level of urbanization, conjecturing how urbanization is expected to impact positively on the diffusion of mobile money. Their results reveal that, contrary to expectation, urbanization does not influence the adoption or use of mobile money accounts. However, it must be remembered that MoMo is now a ubiquitous technology, originally and primarily adopted to help users pay for calls from their mobile phone device. For this reason, users of the technology are likely to be highly diverse. Accordingly, without knowledge of how Adopters are using the technology, it is difficult to draw conclusions about its benefits. Are MoMo merely using the technology to pay for their phone calls? Or as a higher-order tool enabling them to save surplus income? Are they using the technology for the even more advanced functions of payroll or billing?

Summing up, none of the studies reviewed so far, shed light on how businesses are using the application. And despite studies shedding light on its ability to smooth income and consumption for users (Suri and Jack, 2014; Mahmud and Riley, 2020), no study explicitly examines the performance of businesses, using the myriad forms of contactless payments (e.g. paying customers).

Do we have evidence that users apply MoMo for purposes beyond the most fundamental purpose of paying for calls on their device? Evidence presented by Jack and Suri (2014) suggest that few households use additional features such as billing or savings (Jack and Suri, 2014). But this study is older and confined to householders. Additionally, these additional features of MoMo are more complex, requiring increased financial sophistication or 'savvy'. Alternatively, they are superfluous for more primary users such as householders which frequently do not have to pay wages.

This brings us to businesses and how they interact with MoMo. We collect data over 500 businesses in Ghana, ranging from primary household businesses to more 'professional' urban businesses. This highly granular and comprehensive dataset surveying commercial usage patterns of MoMo, allows us to explore key ideas such as the potential for a rural/ urban divide in usage. A further intuition is that larger, more internationalized, more sophisticated business users are more competent at extracting value from the various functions of MoMo. In this way, profits are more stabilized when the business gets exposed to the shock of an external crisis. Our regressions are designed to capture the extent to which a business owner-manager applies the more commercial applications of contactless payments (e.g. payroll function) to reduce transaction costs.

This brings us to formulate our first hypothesis –

Hypothesis 1:

More 'professional' firms (larger, more internationalised, and urbanized) use MoMo more intensively, across the entire range of services (Bills, Payments, Savings, Remittances).

Our next testable hypothesis deals with the connection between the urbanization of firms and how their interaction with mobile money payments connects to their resilience during the COVID crisis. We have already alluded to the focus of previous studies on rural household firms. Why should we expect urbanized firms to display different usage patterns of MoMo, which in turn connects with differences in their resilience during the COVID crisis? Our reasoning is as follows. As pointed out before, Jack and Suri (2014) have highlighted the risk-sharing feature of MoMo. But in rural areas, in the absence of alternative forms of risk-sharing, we might expect remittances to play a more critical role. Additionally, these areas have traditionally been recipients of remittances (informal cash transfers) from wealthier friends and family.

There is a second reason why we expect urban and rural firms to use MoMo differently, these different usage patterns in turn impacting on their costs (and hence their profits). The lower diffusion of agent infrastructure in rural areas, makes MoMo less convenient to use. Accordingly, MoMo enabled payments are associated with higher opportunity costs, for rural firms (compared to their urban counterparts).

This reasoning allows us to formulate our second testable hypothesis –

Hypothesis 2:

The correlation between MoMo with a firm's costs (and hence profitability), relate to the firm's degree of urbanization.

Finally, we shift the lens to explore a completely different concept – namely, the role of traditional banks and how banking interacts with MoMo. Intuitively, we expect MoMo users to benefit from the addition of banking to the financial mix.

Several studies deal with a further angle on mobile money – namely, its role in filling a void which, in more developed countries is normally filled by conventional banks (Lashitew et al., 2019; Demirgüç-Kunt and Klapper, 2012). These studies on financial inclusion appear to agree that mobile money, with its broad functionality to allow payments and billing, operates very much like a bank. This inclusiveness of mobile money allows millions of unbanked users, to access financial services. As such, mobile money can sometimes be seen as a substitute for a bank account.

The above studies deal with householders, not businesses. The latter are more complex. Businesses not only buy from suppliers, but also sell to customers. The volume and size of business transactions are expected to be higher, than for individual households. And the necessity for savings, liquidity and creditworthiness is arguably higher for businesses, which transact with partners at arms-length (e.g. in export markets) and within supply chains. For this reason, it is reasonable to assume that possession of a bank account might send a positive signal to suppliers and customers. On an operational level, banks can now interface with mobile money through the ‘wallets’ function. Overall, we are unsure whether the effect of possessing a bank account is necessary for urbanized firms, when seeking to extract value from their MoMo transactions. Urban firms have arguably, more possibilities to pay using different features of MoMo, supported by a strong agent network. For rural firms, these possibilities may be fewer, and possession of a bank account may perform a stronger signalling mechanism or lend additional financial muscle.

This brings us to formulate our third hypothesis –

Hypothesis 3:

Bank accounts may (or may not) help firms to optimise the usefulness of MoMo. These effects may differ, across the rural-urban divide.

3. Empirical Strategy

In our empirical approach we use the COVID-19 pandemic as an exogenous shock to identify the shock resistance of Ghanaian firms. Equation 1 illustrates the main OLS estimation, with the change in sales during the early phase of the pandemic as a measure for instantaneous resilience as the outcome variables.

$$\Delta Y_i = \beta_0 + \beta_1 MoMo_i + \beta_2 Rural_i + \beta_3 MoMo_i XRural_i + X_i + \varepsilon, \quad (1)$$

where Y_i is the difference between the natural logarithm of sales in the year 2019 before COVID-19 and natural logarithm of sales at the end of 2020 after the first wave ($\log(Sales_{2020}) - \log(Sales_{2019})$).²

² The use of log differences to describe growth rates is justified by $g_Y = \frac{\Delta Y_t}{Y_{t-1}} \approx \ln\left(\frac{Y_t}{Y_{t-1}}\right) = Y_t - Y_{t-1}$.

$MoMo_i$ is the first main term of the interaction effect and our main variable of interest. It captures different applications of MoMo as for example paying, planning and saving. In this way, we can estimate separate regressions for each aspect of the MoMo package. The second main term $Rural_i$ denotes whether the firm is located in a rural area.

To better understand the relative strength/ weakness of MoMo in rural or urban areas, the interaction term $MoMo_iXRural_i$ describes how rural firms interface with each aspect or function of the MoMo package.

Lastly, X_i is a vector of controls covering the size, sector, region, export region, environment of the firm and the manager characteristics.

3.1. Data

The data used for this paper is provided by the Kiel Institute for the World Economy (IfW) and was collected as part of the "Achiever Companies and Enterprises - Ghana" (ACE-G) survey. The main survey was conducted in late autumn of 2021 and provides detailed information on 656 firms in Ghana over the first two years of the COVID-19 pandemic. A second survey followed in September 2023 reaching 576 of the 656 firms of the main survey and providing a detailed overview on firms use of MoMo during the COVID-19 pandemic. An attrition bias can partially be ruled out since the difference in participants can be explained by the SIM identification program in 2022/2023 of Ghanaian government after which many of our subjects changed their phone number making them harder to identify. Firm mortality might also be one reason for data attrition, but the Ghanaian Statistical Service states that only 2.5 percent did not reopen their businesses after the COVID pandemic (GSS, 2022).

For the main regression we focus on the instantaneous resilience of firms which measures the ability to quickly adapt and withstand unexpected shocks or disruptions. This can be achieved by looking at the first year or first two waves of COVID pandemic. In the subsequent robustness checks, we aim to shed light on dynamic resilience – namely, the ability of firms to reconstruct and recover. However, this approach has limitations for our data set since we are only working with the second year of the pandemic and smaller shocks are still frequent. Thus, it is questionable how many firms have already overcome the first stage of resilience.

To measure robust effects, the model must be adjusted to the peculiarities of the COVID-19 shock. First, mobility data from Google and Vodafone is used as a proxy for economic activity and therefore accounts for a potential lockdown bias during the first wave. The variable is based on the median daily percentage change in the number of trips between two districts in each region, each day during the Lockdown from 30th March to 19th April (GSS, 2020). Second, regional vulnerability controls are employed to account for regional specific differences in impact of the virus. Measured for each region for the 10 main regions, vulnerability is composed of a myriad of factors: population age, epidemiology, fragility, health system, density, socioeconomic, transport availability and housing. Moreover, this variable is based on the overall African Covid Community Vulnerability Index (CCVI, 2022). Lastly, we use clustered standard errors at the community level to allow for correlation of unobserved shocks with very localised COVID-19 outbreaks.

Additionally, we control for size (based on the number of full and part time workers), sector, maximum delivery range, firm characteristics (electricity problems, registration and access to loans) and manager characteristics (age, education, religion and gender).

We also tested for variance inflation for the main regressors. The risk of multicollinearity does not seem to be a problem for most variables. "Lockdown" is one exception since it has some overlap with the vulnerability regions. This overlap naturally exists since most lockdown actions took place in high density regions which, in turn, contribute towards explaining a region's vulnerability. The lockdown variable is therefore only used as a robustness check.

3.2. Mobile Money Measure

While working with original dataset of 2021, we were faced with the problem that our results were ambiguous to different settings. One reason for this was that we defined mobile money (MoMo) usage as usage which is restricted to dealings with business suppliers or customers. This is why we decided to conduct the follow up survey in 2023 to deepen our understanding of how firms used MoMo during the pandemic. We voted against using too restrictive a measure for MoMo usage. Business transactions sit at the core of our analysis. However, some micro-firms might experience a blurring of boundaries between their private and commercial usage. The literature cites a variety of different purposes for which MoMo can be used. Importantly, our outcome variable allows us to identify these different purposes, since our survey captures a wide palette of applications.

The different applications can be summarized into four categories: payment, planning, personal payments and finance. The payment category includes the main application of paying suppliers or clients. Additionally, we can pick up variation from regular or governmental payments by using MoMo to pay for electricity, water or taxes. The planning category covers organizational features of MoMo such as keeping track of expenses or payments and plan sales or production. Our surveys also captured information for remittances received and sent, a highly important funding channel during the COVID-19 pandemic. Unfortunately, we cannot distinguish whether the transfer originates from outside of Ghana. Lastly, we include a variable to describe conventional banking applications for which MoMo can also be used. These applications include storing money in a MoMo wallet or accessing loans or credit.

The variables with which we measure MoMo usage are not exclusive in the sense that: 1) firms can use MoMo for different applications and 2) firms can support or replace certain applications by using traditional bank accounts.

The first point broadly describes usage habits since MoMo is most commonly used to expedite payments. More niche user groups might use the application more narrowly e.g. users also using MoMo to save cash generated by their business. Therefore, the dummy variable stating whether a firm uses MoMo for savings, might also conceivably use MoMo for payments or planning. This definition of our usage variable would create a small bias, in the absence of controlling for the effect from other applications.

We try to control for the second point by including a dummy which states if the firm has a bank account for its operations. However, we cannot say what the firm is doing with the bank account and if it is using it for its conventional purpose but at least we can differentiate it from firms that cannot use a bank account at all.

4. Results and Discussion

4.1. Descriptive Results

In this section we investigate how firms use mobile money and whether certain usage patterns can be discerned.

Around 64 percent of all 566 firms in our dataset are MoMo users (Table 2).³ This is in line with the overall user rates during the COVID pandemic, as collected in other studies (among others, GSS, 2022). The growth rates, however, differ quite substantially. For example, the business tracker study from the Ghana Statistical Service (2022) reveals that during the first and second wave of the COVID pandemic in 2020, an average of 35 percent of all firms used MoMo. In 2021, one year later, many firms started using MoMo, increasing user rates to 70 percent. A study by GSMA (2021) achieves a broader focus and is not restricted to firms but rather captures data for registered and active MoMo users. These show a lower, but still relatively high, increase of around 20 percent from 2020 to 2021. However, in our sample between 2020 and 2021, only 3.5 percent of firms decided to start using MoMo. This difference in growth rates during the COVID pandemic shows that, although we have similar user rates, the MoMo growth period our firms happened much earlier in 2015–2018, with an average growth in user rates of 8 percent per year. Thus, our dataset seems to include firms that are using MoMo for a long time and might be technologically more advanced than the average firm in Ghana.

Focusing on the 64 percent of firms in our dataset that use MoMo, the patterns describing MoMo usage differ significantly (Table 2).

Basic applications, such as paying suppliers or customers, are reported by around 60 percent of all users. Although payments seem to be one of the main reasons why firms use MoMo, for more than half of all firms, the actual share of sales or purchases transferred by MoMo corresponds to less than 20 percent of the total amount (Table 4). Firms that nearly exclusively use MoMo for payments are also rare, since only 8 percent to 10 percent of firms perform more than 60 percent of their transactions using MoMo.

Another basic application of MoMo is to send or receive remittances, a facility used by around 80 percent of MoMo users in our dataset. Since remittances, especially those transferred electronically, thrived during the pandemic, it is difficult to quantify how much of this activity is due to a COVID effect.

³ In the original survey we asked the participants if they used MoMo for dealings with their suppliers or customers. In the follow up survey the applications are much more widespread e.g. savings or planning production for their own business. The difference in user rates from original to the follow up survey is therefore not a selection but a broader concept of MoMo.

Apart from these basic applications of MoMo, new innovations enable users to professionalize their businesses. These organizational tools help to keep track of expenses and payments, a facility which is used by 30 percent to pay electrical bills or taxes. Moreover, the usage of MoMo to plan production is availed of by 21 percent of all MoMo firms in our dataset. Furthermore, this professionalization increases the access to finance for more firms, allowing them the possibility to save money (39 percent) or to obtain loans (23 percent) using MoMo applications (Table 2).

When investigating whether MoMo was useful during the COVID pandemic, it is imperative to consider the differences in usage behaviour in urban and rural areas. These differences in usage are primarily due to lower user numbers, in turn, lowering the average effectiveness of MoMo applications. This is especially true when it comes to conducting transactions with other people. In our dataset, 75 percent of users are located in urban areas, compared with 47 percent of users in rural areas. Secondly, coverage by MoMo agents is less patchy in urban regions. Accordingly, 56 percent of all firms in urban regions report walking times of less than five minutes to the next agent. In rural areas, only 39 percent of firms surveyed have this efficiency bonus. Similarly, 22 percent of all non-users in rural areas state that one reason why they decided against using MoMo is that the next agent is too remote. In comparison, only 2 percent of all urban firms report this a deciding factor, when electing not to adopt MoMo. However, proximity to an agent is essential for firms desiring guaranteed and fast access to the MoMo wallet (for deposits or withdrawals). With a patchy agent coverage, transactions costs rise and the attractiveness of using MoMo falls.

But it is not only infrastructure and environment that results in this urban-rural gap. Rural firms state more often that the applications are too complex, that they have no trust in the provider or government, or that the costs are too high. Interestingly, 40 percent of non-users both in rural and urban areas state that low demand is one of the reasons why they have decided against using MoMo. Using MoMo for insurance or pensions might represent an obvious next step, especially when focussing on shock resistance, but currently only 7 percent and 1 percent of all firms use these tools.

Table 5 extends this analysis, focussing on the characteristics of firms using MoMo. In addition to urbanization, size, region or sectoral effects, the effect of export or trading destinations and manager characteristics, can be analysed to establish how these variables shape usage patterns of MoMo.

Overall, we can see that MoMo is a tool not commonly used by large firms with more than 20 workers. As we will see in Section 4.2, these firms have a different scope and different requirements which may not be fulfilled by MoMo alone. When it comes to the use of specific applications, the data shows that the higher-order functions of MoMo (e.g. savings or insurance, described earlier) are heavily used by the middle class of firms (1–20 full time workers). These firms seem to have an increased demand for organizational tools and therefore use MoMo for this purpose. Household firms on the other hand, only seem to use MoMo for transacting remittances. Otherwise, transactions do not seem to be connected to a certain firm size. When it comes to trade destinations, compared to firms that only have customers in their own district, firms that trade inside Ghana and firms that trade to ECOWAS are the main users of MoMo. This distance effect drops when firms start to export to the rest of the world. This decrease can be traced back to the fact that MoMo is not used by customers around the world. Thus, 60 percent of exporting firms state that their international business contacts avoid MoMo, preferring bank payments. This negation of MoMo by international customers hints a serious obstacle

to trade - payment preferences reported to obstruct business deals for 16 percent of firms. Most likely, this is because MoMo and international banking do not work well together. Conversely, 30 percent of firms operating on the African continent, state that their African business contacts even *prefer* to pay using MoMo. Interestingly, when it comes to financial or organizational services, firms with a wider reach have an increased incentive to use MoMo as this is unrelated to the clients payment preferences.

Manager characteristics also offer some interesting insights. For example, companies run by males and well-educated entrepreneurs are more likely to use MoMo applications. The age of the owner is only important in connection with remittances and savings, as the data shows that younger owners are more likely to use these applications. Lastly, for nearly all applications the data show that most firms also obtain a bank account beside the MoMo application (Table 5).

Figure 1 shows a density graph of our main outcome variable, the change in sales from 2019 to 2020.⁴ The majority of Ghanaian firms suffered a significant sales decrease with only 18 percent of all firms being able keep sales equal or even raise them above the pre-COVID level. Five firms had to temporarily close their business in 2020 and could not realize any sales nor profits, while 10 firms were able to increase their sales by more than 100 percent.⁵ We can exclude any selection effects since firms at the end of both extremes differ significantly regarding size or sector.

4.2. Main Estimation Results

In the following, the main estimation results of the model introduced in Equation 1 are presented.

Table 1 is structured as follows: Each column displays the direct and interaction effect of a different application and an urbanization dummy on sales growth. The beta coefficients of this table can be interpreted as percentages ($100 * \beta$) since the outcome variable is approximately the growth rate of sales measured in percentages.

We begin by estimating the direct effect of MoMo use on sales growth. However, even after adding an interaction term with a rural dummy, the effect remains insignificant. This supports our hypothesis that while the urban/ rural dimension is crucial for the success of MoMo, the variety of applications accessible with MoMo is more extensive than the payments function alone, offering some important benefits for firms in both regions.

Starting with the basic applications of paying customers or suppliers the direct effect in both regressions is negative and significant - columns 1 and 2, respectively. Thus, the payment aspect of MoMo appears less beneficial for urban firms, undermining their sales growth. The interaction effect is insignificant in both regressions indicating the lack of a significant difference between rural and urban areas.

⁴ For better readability we present the graph of relative resilience measured as $(sales_{2019} - sales_{2020})/sales_{2020}$. As explained in the methodology the results are approximately the same.

⁵ We had to drop two observations due to unrealistic growth rates, which occurred due to new founded firms in 2019 and therefore lower sales.

However, what appears to have helped firms during the COVID pandemic, was what we refer to as the ‘professionalization’ of MoMo. Specifically, we imply the use of MoMo enabled organizational or financial services which are more advanced than basic and conventional applications. In Columns 3 and 5 we can observe that the direct effect of organizational tools is always positive and significant, indicating that urban firms profited considerably from these tools. Rural firms on the other hand, are characterized by a substantial efficiency gap compared to urban firms, as suggested by the interaction effect.

These patterns are revealing since they suggest that professionalization is a crucial factor when it comes to resistance towards shocks. Notably during the COVID pandemic, in which supply chains collapsed or lockdowns affected customers, firms profited from higher flexibility, and from being able to coordinate their expenses and production. Here, an application like MoMo appears to have helped.

Table 1: Mobile Money and Urbanization

Outcome variable: Log change in sales (2019-2020)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
MoMo: Customer payments	-0.164** (0.081)						
Customer payments X Rural	0.171 (0.137)						
MoMo: Payments suppliers		-0.125* (0.078)					
Payments suppliers X Rural		0.148 (0.139)					
MoMo: Billing			0.225** (0.091)				
Billing X Rural			-0.324** (0.165)				
MoMo: Plan expenses				0.172** (0.082)			
Plan expenses X Rural				-0.414* (0.231)			
MoMo: Plan production					0.171* (0.102)		
Plan production X Rural					-0.604** (0.306)		
MoMo: Remittances						-0.092** (0.045)	
Remittances X Rural						0.222* (0.112)	
MoMo: Savings							0.203** (0.079)
Savings X Rural							-0.230* (0.127)
Rural	-0.097 (0.086)	-0.087 (0.077)	0.001 (0.078)	0.034 (0.078)	0.016 (0.074)	-0.113 (0.072)	0.021 (0.085)
Controls	yes	yes	yes	yes	yes	yes	yes
Adjusted R-squared	0.081	0.079	0.083	0.085	0.086	0.083	0.083
Observations	563	563	563	563	563	563	563

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; Controls: size, sektor, region, firm characteristics and manager characteristics

Although we do not expect pronounced differences in the effectiveness of MoMo for urban versus rural regions, rural firms experience negative effects in the application of these tools. MoMo

infrastructure is patchier in rural areas, possibly lowering the benefits from using such a tool. Another dimension of professionalization is being able to save money or apply for loans. In Column 7 of Table 1, we can see that MoMo enabled savings appears to have helped buffer against the shock. The structure of the effect resembles the previous regressions, with a significantly direct effect for urban firms and a significantly negative interaction effect. In this case, the overall effect of savings for rural firms is cancelled out, suggesting no net negative effect for this category of firms.

The only application of MoMo that seems to be beneficial for users in rural areas is receiving remittances. In Table 1, Column 6, the interaction effect is positive indicating that rural firms profit more from receiving remittances than urban firms. In addition, the total effect for rural firms receiving remittances is positive and significant as well.

The financial flow from urban to rural regions is traditionally well established, a main reason for the advent of MoMo, in the first place. In addition, foreign transfers are expected to have been especially important during the COVID pandemic. Interestingly, when it comes to transmitted shocks, the data suggest that this risk sharing ability of MoMo as described in the literature, represents the only way for rural firms to cope with the crisis. Our results contribute to the literature that remittances sent to rural firms not only stabilize the household's consumption but simultaneously help to stabilize the sales of the household firm.

The negative overall effect of receiving remittances for urban firms might arise from a selection bias, where the worst performing firms are precisely those firms most urgently requiring remittances. For rural areas, we can expect this potential bias to be minimized. This is because in more remote areas, remittances represent the rule rather than the exception. Moreover, the structure of financial flows from urban to rural regions is a stylized fact. Another reason for the negative effect reported by firms in urban regions, is that money transfers are possibly earmarked for consumption, rather than investment in the firm.

Our analysis now moves to examine the relationship between MoMo and banking – building on theories of financial inclusion and the complementarity between MoMo and banks. These traditional institutions are more conventional intermediaries for financial transactions. In Table 6 we again interact the various MoMo applications with an urbanization dummy. However, we additionally split the regression by firms possessing a bank account, and firms without this facility. This differentiation is subsequently discovered to be only relevant for financial applications such as savings or remittances.

Our examination of firms possessing a bank account, is revealing. The overall effect of savings remains significant and positive. However, the interaction effect becomes insignificant. Thus, there is no significant difference in the effect of savings between rural and urban firms, when the owners possess a bank account. Similarly, when we focus on remittances, the overall effect for rural firms is only significant if the firm is additionally using a bank account. These findings suggest that while in urban areas MoMo can be used as a substitute for traditional banks - since MoMo requires no further input from a bank - in rural areas banks may remain necessary for guaranteeing the conditions under which positive outcomes can materialise.

As we pointed out in the descriptive statistics, MoMo can be expected to have more limited usefulness when exporting beyond the African continent. These regions have low thresholds of MoMo usage, or reduced connectivity with other payment systems. However, Table 7 reveals the indispensability of banks for exporting firms, especially those firms with a high export share. Here the role of traditional banks is underscored, for lack of a compelling alternative. Thus, if a firm wishes to continue growing and aspires to become an exporter, the benefits of MoMo have exhausted their limits.

Lastly, the full potential of MoMo becomes manifest when the effects are put in context with the average losses of firms during the Corona virus period. These losses decreased by an average of 34 percent from 2019 to 2020. The effects of the MoMo feature, enabling firms to improve the organizational and financial tasks of firms, is associated with a sales increase of 17–22 percent. From this we can conclude that this organizational feature of MoMo can help to attenuate the average loss by at least a half. The use of MoMo applications, especially those higher-order applications which go beyond its conventional usage for transacting payments, seems connected with the most resilient outcomes. Especially, if this usage is paired with low acquisition costs. Mobile phones offer a relatively cheap way to access these applications. Accordingly, what is needed is for firms to exploit these higher-order features, going beyond the basic functionality of enabling cashless payments.

4.3. Robustness Checks

In our first robustness check, we cluster standard errors by district to allow firms that are affected by unobserved COVID-19 outbreaks to be affected similarly. The results do not change significantly, compared to the baseline regression. Together with the positive effects for region vulnerability - not strongly correlated with the actual vulnerability - we can conclude that the health effects were relatively low for firms. In addition, when we include a lockdown dummy, our results are relatively unaffected, underpinning the point that the lockdown was too short to have exerted a significant difference on sales growth.

5. Conclusion and Limitations

Our analysis of over 500 Ghanaian firms sheds light, for the first time, on how certain firms managed to extract value from mobile money. Our regressions point to the usefulness of this form of cashless payments in helping to stabilize sales during the COVID pandemic. More interestingly, our survey suggests that the technology is particularly embraced by Africa's growing class of urbanized, middle-sized firms.

Perhaps the most important message from our analysis is the recognition that the benefits from mobile money for business customers extend beyond its mere usefulness as a tool for transacting cashless payments. Some aspects of MoMo can help firms to professionalize their sales and purchasing operations. We reveal that firms which use these additional services of MoMo (e.g. for planning or saving purposes) exhibit higher sales resilience, all things equal. Although a sizeable percentage of firms in our survey opted out of using mobile money, claiming a lack of customer demand, this reasoning neglects its role in helping to smooth the volatility of shocks, through enhanced control over income and expenses.

A further aspect of our findings relates to traditional banking. Are banks a substitute for mobile money? Or does access to a bank account complement a firm's mobile money transactions? The answer to this question is not clearcut. Our findings suggest that urbanized firms appear to use mobile money as a substitute for traditional banks since it allows for full autonomy. However, in rural areas, banks still appear necessary for underpinning the mobile money environment, perhaps to signal creditworthiness or add additional financial muscle. In rural areas, without access to a bank account, the benefits of mobile money appear to dissipate.

But mobile money also appears to have its limitations. Our analysis suggests that foreign partners, from the rest of the world, are disproportionately cautious about using mobile money, preferring bank transfers. We conclude from this that if a firm wants to internationalize to achieve higher sales growth, the possibilities for using mobile money to transact exchanges are more limited.

Our analysis is intended as a first stab at the under-researched topic of how businesses on the African continent apply, and benefit from, the ubiquitous technology of mobile money. Our findings are unlikely to be affected by reverse causality since the costs are relatively trivial, users needing only a mobile phone and a sim card provider. And although we focus on correlations rather than causations, we can observe a substantial connection between sales growth and the use of MoMo tools. This positive finding appears to confirm parallel studies from the literature on private householders. Using mobile money, these individuals can maintain their income, and hence consumption, during localized economic shocks. However, while the latter result is driven by remittances, our finding for businesses is more likely driven by enhanced ability to streamline the firm's planning and sales.

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Appendix

Figure 1: Covid-19 shocks on firm sales

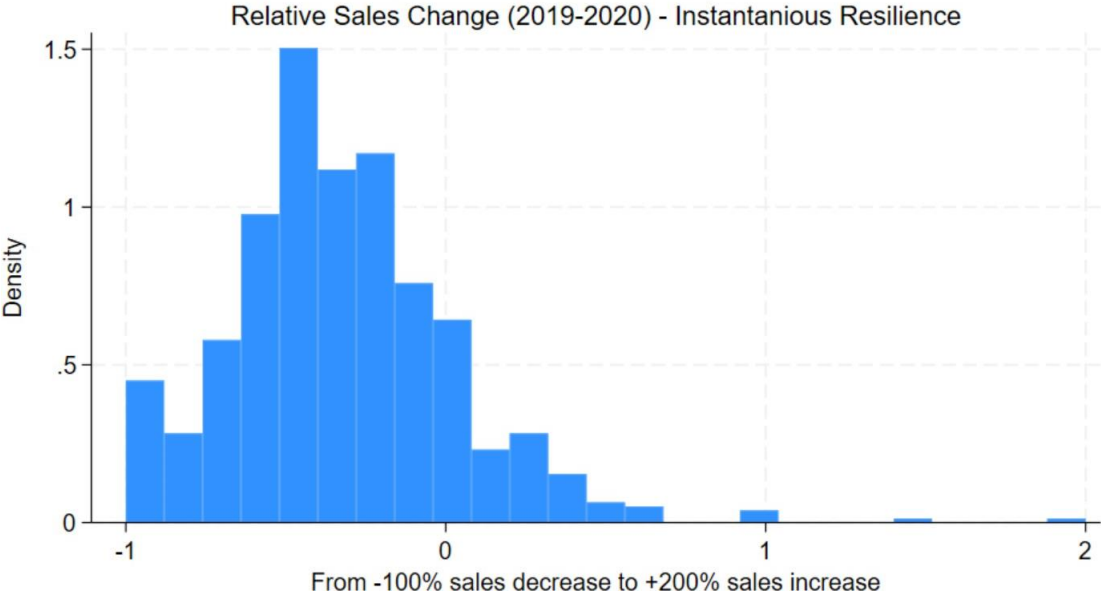


Table 2: Different applications of mobile money

	YES (Frequency)	Yes (Percentage)
Does the Respondent use MoMo?	364	63.75
MoMo is used to pay Workers	74	20.33
MoMo is used to pay Bills	77	21.15
MoMo is used to pay Suppliers	215	59.07
MoMo is used to pay Customers	223	61.26
MoMo is used to plan Expenses	111	30.49
MoMo is used to plan Production	48	13.19
MoMo is used for Remittances	290	79.67
MoMo is used for Savings	143	39.29
MoMo is used for Loans	83	22.80
MoMo is used for Insurance	24	6.59

Table 3: Summary statistics of control variables

Variable	Obs	Mean	Std. dev.	Min	Max
Logged Sales Growth 2019-2020 Size (Worker)	643	-.5723202	.7410303	-5.886104	1.098612
0	656	.3597561	.480295	0	1
1-5	656	.5045732	.5003606	0	1
5-20	656	.0838415	.2773614	0	1
>20	656	.0518293	.2218514	0	1
Mining and Quarrying	656	.0091463	.0952708	0	1
Retail trade	656	.152439	.3597202	0	1
Light manufacturing	656	.1844512	.3881477	0	1
Fuel and Chemicals	656	.0335366	.1801704	0	1
Heavy industry	656	.0335366	.1801704	0	1
Other industry	656	.0228659	.1495898	0	1
Wholesale trade	656	.277439	.4480766	0	1
Other_services	656	.0807927	.2727244	0	1
Regional Vulnerability					
1 (low)	656	.2881098	.453228	0	1
2	656	.1493902	.3567447	0	1
3	656	.2179878	.4131941	0	1
4	656	.1661585	.3725069	0	1
5 (high)	656	.1783537	.3831023	0	1
Rural	656	.4207317	.4940533	0	1
Delivery Range Ghana	656	.3323171	.4714034	0	1
Export to ECOWAS	656	.0655488	.2476805	0	1
Export to ROW	656	.1615854	.3683509	0	1
Intense competition	656	3.966463	.9533086	1	5
Problem electricity	656	2.943598	1.236168	1	5
Registered	656	1.33689	.4730077	1	2
Lack access credit	656	3.753049	1.229407	1	5
Age	656	48.3811	12.20166	16	87
Education	656	.9801829	.6975884	0	2
Religion	656	.2926829	.4553413	0	1
Female Manager	656	.5929878	.4916521	0	1
Sole manager	656	.8689024	.3377646	0	1
Bank account	656	.5960366	.4910647	0	1
Online banking	656	.0960366	.2948662	0	1

Table 4: Percentage weekly sales paid through MoMo in 2021

Sales percentage	Freq.	Percent
<20%	171	47.90
20-39%	102	28.57
40-59%	51	14.29
60-79%	23	6.44
>80%	10	2.80
Total	357	100.00

Table 5: Which Firms are using Mobile Money?

Firm characteristics for different applications of mobile money								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Size small	0.044 (0.139)	0.429** (0.207)	-0.037 (0.131)	0.100 (0.133)	0.300* (0.163)	0.731*** (0.216)	-0.381*** (0.137)	0.142 (0.143)
Size medium	0.269 (0.299)	0.598* (0.310)	-0.171 (0.238)	0.040 (0.239)	0.686** (0.273)	0.570* (0.323)	0.127 (0.261)	0.271 (0.246)
Size large	-0.753** (0.355)	0.235 (0.383)	-0.101 (0.310)	-0.127 (0.313)	0.433 (0.353)	0.750* (0.430)	-0.821** (0.323)	-0.609* (0.361)
Delivers inside Ghana	0.722*** (0.150)	0.708*** (0.236)	0.427*** (0.145)	0.651*** (0.146)	1.016*** (0.203)	0.698*** (0.249)	0.321** (0.148)	0.574*** (0.157)
Delivers to ECOWAS	1.045*** (0.334)	0.348 (0.344)	0.244 (0.283)	0.885*** (0.297)	0.803** (0.361)	0.846** (0.419)	0.242 (0.289)	0.035 (0.315)
Delivers to ROW	0.273 (0.279)	0.556* (0.310)	0.073 (0.230)	0.276 (0.233)	0.814*** (0.292)	0.583 (0.372)	-0.082 (0.236)	0.479* (0.258)
Age Manager	-0.004 (0.005)	0.005 (0.006)	-0.006 (0.005)	-0.013** (0.005)	-0.000 (0.006)	-0.006 (0.008)	-0.013** (0.005)	-0.010* (0.005)
Education Manager	0.249** (0.119)	0.615*** (0.139)	0.075 (0.107)	-0.078 (0.111)	0.372*** (0.132)	0.230 (0.166)	0.028 (0.107)	-0.006 (0.112)
Religion Manager	0.101 (0.157)	-0.010 (0.201)	0.015 (0.139)	0.152 (0.143)	0.155 (0.167)	0.125 (0.209)	-0.017 (0.148)	0.212 (0.143)
Female Manager	-0.222 (0.164)	-0.119 (0.187)	-0.094 (0.146)	-0.063 (0.146)	0.052 (0.168)	0.030 (0.206)	-0.374** (0.151)	0.153 (0.154)
Sole Manager	0.260 (0.189)	-0.028 (0.250)	0.120 (0.175)	0.291 (0.179)	0.484** (0.220)	-0.126 (0.259)	0.145 (0.171)	-0.028 (0.181)
Bank Account	0.643*** (0.137)	-0.342* (0.201)	0.589*** (0.138)	0.512*** (0.136)	0.115 (0.174)	-0.435* (0.234)	0.716*** (0.138)	0.164 (0.146)
Observations	571	571	571	571	571	571	571	571

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; We dropped Sector and Region for better presentation Settings: (1) MoMo, (2) Billing, (3) Customer payments, (4) Payments to suppliers, (5) Plan expenses, (6) Plan production, (7) Remittances, (8) Savings.

Table 6: Effect of Bank Accounts on MoMo Applications

Outcome variable: Log change in sales (2019-2020)		
	(1)	(2)
MoMo: Remittances	-0.232** (0.101)	
Remittances X Rural	0.360* (0.184)	
MoMo: Savings		0.246** (0.099)
Savings X Rural		-0.156 (0.162)
rural	-0.100 (0.121)	0.165 (0.144)
Controls	yes	yes
Adjusted R-squared	0.044	0.042
Observations	349	349

Table 7: Limits of Mobile Money Effectiveness

Outcome variable: Log change in sales (2019-2020)			
	(1)	(2)	(3)
Mobile Money	-0.003 (0.065)		
Exporter	-0.025 (0.209)	-0.315** (0.147)	
Mobile Money X Exporter	-0.104 (0.212)		
Bank account		-0.189 (0.125)	-0.206* (0.126)
Bank account X Exporter		0.394* (0.238)	
Export share			-0.146* (0.09)
Bank account X Export share			0.202** (0.1)
Controls	yes	yes	yes
Adjusted R-squared	0.057	0.062	0.053
Observations	571	571	571

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1; Controls: size, sector, region, firm characteristics and manager characteristics