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### **The gender-differential effect of financial inclusion on household financial resilience**

By Carlos Sakyi-Nyarko, Ahmad Hassan Ahmad, and  
Christopher J. Green



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Centre for Global Finance  
SOAS University of London  
10 Thornhaugh Street, Russell Square  
London  
WC1H 0XG

Email: [cgf@soas.ac.uk](mailto:cgf@soas.ac.uk)

Website: <https://www.soas.ac.uk/centreforglobalfinance/publications/>

# **The Gender-Differential Effect of Financial Inclusion on Household Financial Resilience\***

**Carlos Sakyi-Nyarko, Ahmad Hassan Ahmad, and Christopher J. Green**

**School of Business and Economics, Loughborough University  
Leicestershire, LE11 3TU, United Kingdom**

[C.Saky-Nyarko@lboro.ac.uk](mailto:C.Saky-Nyarko@lboro.ac.uk), [A.H.Ahmad@lboro.ac.uk](mailto:A.H.Ahmad@lboro.ac.uk), [C.J.Green@lboro.ac.uk](mailto:C.J.Green@lboro.ac.uk)

## **Abstract**

Using repeated cross-sectional data, this paper examines financial inclusion of women and its implications for their individual financial resilience and that of their household. Using ownership of a formal account, mobile money (m-money) usage and savings as measures of financial inclusion and the difference-in-difference (DID) approach, we find that financial inclusion of women plays an equally important role in improving household resilience to adverse effects of an external shock. Irrespective of the measure of financial inclusion used, we find that the effect of women's financial inclusion is stronger in rural households compared to urban areas. We also explored potential channels through which financial inclusion generally—and of women—affects household financial resilience.

**Keywords:** Financial inclusion; M-money; Gender; Financial resilience; Well-being

**JEL Classifications:** C31, C36, G2, I31

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## 1. Introduction

A lot of studies find that increasing financial inclusion improves welfare outcomes at the micro level (see for example, studies of consumption (Aportela, 1999), savings (Ashraf *et al.*, 2006), foreign remittances (Yang and Choi, 2007), micro-entrepreneurs (Attanasio *et al.*, 2011; Dupas and Robinson, 2013), and risk mitigation (Karlan *et al.*, 2014). For poorer individuals or households, financial inclusion offers an avenue to insure against negative economic shocks. There is also emerging evidence that welfare benefits of financial inclusion are particularly maximised in female headed households (Swamy, 2014; Holloway *et al.*, 2017). This is because women disproportionately experience poverty, emanating from unequal divisions of labour and a lack of equal access and control over economic resources (Holloway *et al.*, 2017).

Despite the clear theoretical and empirical evidence linking financial inclusion of women to the economic uplifting of their households as propagated on equity and economic empowerment grounds, another strand of literature presents contrasting findings (Kabeer, 2001; Mosley, 2011; Navajas *et al.*, 2000; Montgomery and Weiss, 2011). Indeed, financial inclusion can go—and sometimes does go—badly for financial users, particularly female users. This tendency can be analysed from at least two dimensions: usurious rates attached to credit and rapid extension of credit without proper screening.

The potential of financial inclusion to boost shared prosperity and sustainable development can be undermined by the cost/affordability of the financial product and/or service. When interest rates are extortionate, borrowers initially become better off as they are able to improve living conditions, however they become worse off when they are required to pay back the loans at high rates – the net effect of becoming financially included reduces to zero at some threshold point. The situation gets worse when the cost of credit exceeds the rate of return on the financial product. The issue of moral hazard which also arises as a result of very high interest rates has been discussed in the literature. As is widely documented in the literature, females are generally excluded from the financial system, thus as first time borrowers are considered relatively riskier applicants (attracting higher interest rates) given their lack of credit history.

Given the mixed results from both the empirical and theoretical literature, there is a strong motivation to provide a rigorous impact assessment of financial inclusion of women on their household's financial resilience. This study draws from data collected repeated cross-sectional surveys carried out in Ghana to understand how individuals access financial services,



including: the extent of usage of informal and formal financial services; level of satisfaction with financial services; barriers to access and use of financial services; sources of formal and informal finance; savings behaviour; borrowing needs and affordability of credit; modes of sending and receiving local money remittances; and financial resilience.

We examine the gender-differential impact of financial inclusion on household resilience in the face of a shock using the pooled data for the 2017–2019 period. We do this by comparing the differences between the household financial resilience of financially included women (treatment group) and that of financially excluded (control group) across the two time periods (compute the difference in the difference [DID]). The treatment intervention we use are these three dummy financial inclusion indicators: formal account owner, saver, and m-money account users<sup>1</sup>. Financial resilience in this context is measured by an individual's ability to come up with emergency funds in the wake of a shock.

The contribution of this paper to the literature can be appreciated from the backdrop of the seemingly large discrepancies in the welfare implications of financial inclusion of women, which we opine are due to methodological flaws in impact assessment and varying measures of financial inclusion. For example, although the paper by Hussain *et al.*, (2019) offers some interesting result on the gender-differential impact of financial inclusion on household financial resilience, their analysis relies on a cross-sectional survey, and without some time variation in the data there is a concern as to how well the results control for unobservables. The cross-sectional nature of the data used in their study also means that the results cannot be interpreted as causal effects. Our paper relies on repeated cross-sectional data and employs the DID approach to produce more precise estimates of the impact of women's financial inclusion on household financial resilience. The use of the three different measures of financial inclusion (see appendix A1) also helps to test robustness of results. By testing the hypothesis that women's financial inclusion improves household financial resilience, this paper could offer new empirical evidence to the effect that broadening financial access to women could, for example, facilitate a more inclusive recovery in the wake of the adverse economic shock caused by the COVID-19 pandemic.

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<sup>1</sup> 1 represent owner of any of the financial product and 0 otherwise. Saver represents individuals who have set aside money in the last 12 months.

The remainder of this paper is structured as follows. Section 2 provides a brief discussion on the financial inclusion landscape in Ghana. Section 3 describes the data and explains the sampling methodology. In section 4, we outline the empirical strategy employed. We provide a descriptive analysis of the data in section 5. In section 6, the methodology is discussed. Section 7 presents the main results of the study, while testing the robustness of the results to alternative specifications. Conclusions are then drawn in Section 8.

## **2. Financial Inclusion in Ghana**

Despite acknowledging the role of informal finance – as a stand-alone financial arrangement – in bridging the financial gap between the rich and the poor, this paper attaches more emphasis and importance to formal finance<sup>2</sup> – alongside m-money usage and savings – as a more effective way of improving one’s economic well-being.

From the repeated cross-sectional survey data, informal finance has mainly been about savings mobilization (e.g. Susu), and with financial arrangements which involve lending (e.g. money lenders), the loans have often been characterized by smaller amounts, shorter repayment periods and usurious interest rates – features of an inefficient financial system. In light of this, the paper rather focusses on providing more detailed descriptive analysis of formal finance, as well as a brief discussion on m-money.

The data shows that the ownership of a formal account (owned by one’s self or with others) increased from 36.3% in 2017 to 44.7% in 2019. Although the formal account penetration rate stood at 44.7% in 2019, 64.1% of the respondents reported having saved in the last 12 months, implying that propensity to save goes beyond owning a formal account. We acknowledge that other informal financial instruments and/or m-money wallets serve as media of savings. But for the purpose of this paper we define the financially included as persons with either access to a formal or m-money account, thus limiting the discussion to formal and/or m-money account ownership and usage.

There was a significant increase in the number of m-money account – 34.9% penetration in 2017 to 92.6% penetration in 2019. With the rapid mobile phone penetration rate in Ghana over the last decade, banks in collaboration with mobile network operators (MNOs) have been able to leverage this deep penetration of mobile technology to introduce digital financial

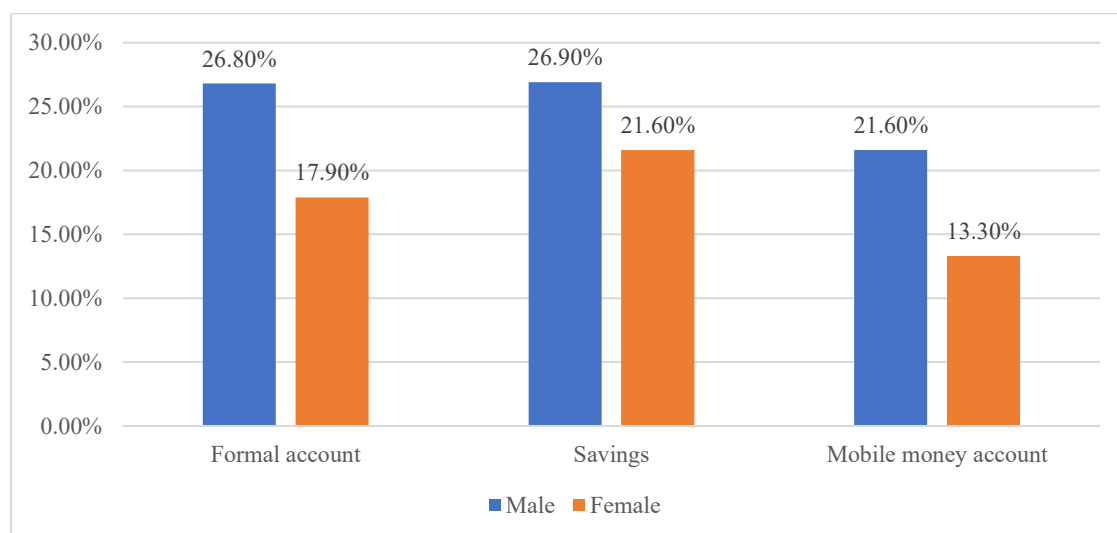
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<sup>2</sup> Formal sources provide a wider range of financial services needed to maximize welfare benefits.

inclusion particularly in the rural areas. This financial inclusion ecosystem that was created as a result of the intersection between telecommunication and banking has gained so much popularity primarily because of the rural-urban divide in Ghana. Many Ghanaians move from rural areas to urban areas in search of greener pastures to send money to their families back home. Mobile banking has given these individuals a more cost-effective and efficient alternative of remitting money to their loved ones back in the rural areas. With a fee of 1% (free for amounts less than GHC100 during the COVID-19 pandemic) of the amount being transferred, this mode of transferring money is significantly less than the cost associated with the other conventional ways (such as delivering cash via public transport) of transferring money to rural Ghana.

## 2.1 Account Penetration by Gender

The paper focusses on ownership of accounts at commercial banks and microfinance/rural/community banks as they form the major sources of formal finance to the Ghanaian according to the survey data. The data collected in 2017 shows that only 17.9% of formal account owners are female, compared to 26.8% male. Similarly, with respect to savings, there is a gender gap of 5.3%, where 26.9% of respondents who have saved in the past 12 months are male, compared to 21.6% female. The gender gap is even higher in terms of m-money penetration (8.3%), with 21.6% of respondents reporting owning a registered m-money account being male, as oppose to 13.3% female.



*Figure 1 Financial Inclusion by Gender – 2017 survey data*

In contrast, the 2019 data shows that the gender gap has been bridged on all the three measures of financial inclusion. In fact, the data suggests that females are more financially included. The gender gap is now in favour of females, although modest (see figure 2).

As noted by Morawczynski (2009), m-money has made significant strides in breaking barriers to women’s financial exclusion. Prior to the introduction of M-PESA for example, women in rural Kenya had to get consent from their husbands to acquire a personal savings account (ibid). Because cash is less evident in the operation of M-PESA, women are now able to freely and privately-run personal savings without the permission of their husbands.

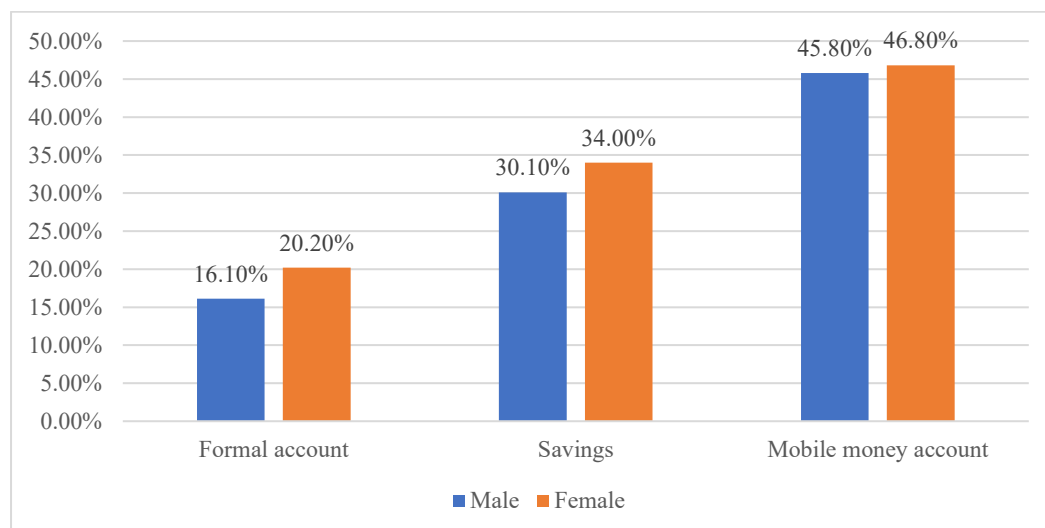


Figure 2 Financial Inclusion by gender – 2019 survey data

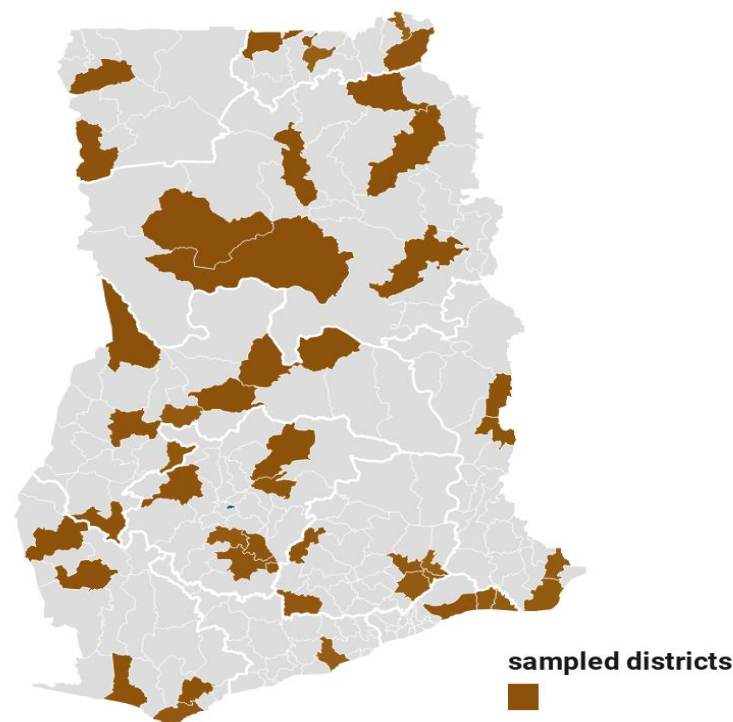
Over the 2017–2019 period, data has told quite a comprehensive story of the progress made with regards to women’s financial inclusion. What the data does not tell us right away – and what this paper seeks to examine – as more women become financially included – is *whether* and *how* their financial inclusion contributes to their household’s economic well-being in the face of a negative shock.

### 3. Data and Sampling Methodology

The datasets used in this analysis were obtained through two rounds of household surveys administered in 2017 and 2019 in all the regions of Ghana. As national representation is key to demand-side surveys, census information was used to build a sample that shares characteristics

proportionate to the actual national population. During the 2010 Population and Housing Census, there were 10 regions in Ghana. Accordingly, the baseline survey was stratified into these 10 administrative regions, which contain 216 districts in total. After the one-stage stratified sampling design was initiated, a multi-stage cluster sampling was conducted to narrow down the survey areas. The first stage involved the division of the survey areas (regional strata) into smaller distinct geographic areas (districts). Consequently, each regional stratum contains a number of districts. Next, to find the approximate population size for each district. ENA software – based on the probability proportional to size software (PPS) – to randomly allocate clusters to each geographic unit (district).

*Figure 3 Map of Ghana showing the sampled districts used for the survey*



*Source: Survey data and 2010 Ghana Population and Housing Census (PHC)*

To select households within these identified clusters, systematic random sampling was employed. Various random route procedures were then used to select households – interval sampling from randomly generated starting points (school, church/chapel/mosque, health facility or market) and random start (any number from 1–100). As a result, 1000 households

were selected using the systematic randomly sampling technique. After identifying households, sample of 1000 individuals – defined as persons aged 18 and above – were randomly selected within the selected households by means of the last birthday method.

Despite the prominence of the Kish Grid as a within-household selection method in most studies, the last-birthday method was used in this study. The main reason for choosing the latter method was purely a matter of how sensitive individuals in Ghana are about disclosing their age. Bearing in mind that the modified Kish Grid method of selecting individuals requires individuals to disclose their age, the use of the last birthday was more appropriate in the Ghanaian context. Moreover, the last-birthday method is much easier in terms of training required and implementation (Salmon and Nickols, 1983). The concomitant effect is that it saves cost. Again, because it is less time-consuming, both interviewers and interviewees would be less weary during the interviewing, thus yielding better survey results.

The second round of survey was conducted in a similar fashion to the first. The main demographic characteristics of the sampled respondents from the baseline and second round surveys are shown in Table 1, along with Ghana population data for comparison.

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Insert Table 1 about here

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Table 2 provides definitions of the variables used in the analysis. Binary variables are constructed to represent the 5-likert scaled information collated. In addition to the measure of financial resilience, these include dummies to control for socio-demographic characteristics.

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Insert Table 2 about here

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#### **4. Empirical Strategy**

Household data were obtained from repeated cross-sectional surveys that were carried out in Ghana to understand how individuals access formal and m-money financial services, as well as the specifics regarding the different aspects that encompass the extent of usage of formal accounts and m-money, level of satisfaction with formal account and m-money services amongst end-users, and barriers to access and use of formal account and m-money. The surveys

captured all these dimensions of financial inclusion, which remain missing in most demand-side surveys. The datasets also contain data on how adults save, borrow, make payments, manage risk, as well as socio-economic characteristics (age, income level, level of education, employment status, rural/urban locality, etc.) of respondents. To reiterate, these surveys are repeated cross-sections undertaken in 2017 and 2019, with an average sample size of 1000 nationally representative observations. The occurrence of two major financial developments in 2018/2019 set up a natural experiment upon which we apply DID regression to precisely identify the causal effect of women's financial inclusion on household financial resilience. These two financial developments are discussed in the subsequent paragraph.

The launch of m-money interoperability in 2018, taking full flight in 2019, allows direct and seamless transfer of funds between m-money wallets provided by different networks, as well as bank accounts. As a result of the implementation of m-money interoperability, total m-money transactions increased to GHC32.8 billion [signifying a significant percentage increase of 45% in just a year] (Bank of Ghana, 2019). Towards the end of 2018, banks were required to meet the new minimum capital requirement of GHS400m (\$86.4m), replacing the previous level of GHS120m (\$25.9m). The recapitalisation was to ensure that banks are well equipped and more capable of carrying out their core business of advancing loans, while safeguarding bank stability. These financial developments have positive implications for financial inclusion.

The first part of the paper tests the hypothesis that females who own a formal account are more likely to improve the financial resilience of their household than females who do not own a formal account. For ease of exposition the former is referred to as "formal account owners" (represented by a dummy variable, 1), and the latter as the "formal account non-owners" (represented by a dummy variable, 0). To measure financial resilience, individuals were asked to state how possible they can access emergency funds (could come up with GHC1100<sup>3</sup> within the next month) in the next month on scale of 1-5, where 1 indicates "very possible", 2 indicates "somewhat possible", 3 indicates "neutral", 4 indicates "not very possible", and 5 indicates "impossible". For ease of interpretation and exposition, a binary variable is created where 1 represents individuals who find it very possible or somewhat possible to access emergency funds in the next month, and 0 otherwise.

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<sup>3</sup> 1/20 GNI per capita

Similarly, the second part of the paper will test the hypothesis that females who own a savings account are more likely to improve their household's resilience to external shocks than females who do not have a savings account. We will then test the robustness of earlier results when usage of m-money account is used as the measure of financial inclusion.

## **5. Descriptive Analysis**

In this section, we provide a descriptive analysis of the data with respect to the measures of financial inclusion and the socioeconomic characteristics of respondents. Account penetration by gender has already been discussed in earlier sections so we focus on the remaining socioeconomic characteristics in this section.

The data from the years 2017 and 2019 shows that on all measures of financial inclusion, rural dwellers are less financially included compared to their urban counterparts, consistent with the findings from Allen *et al.*, (2016). We do not find this result surprising considering that most commercial banks have shied away from providing financial services to the rural poor. Narain (2009) and Beck and Cull (2013) attribute this to the huge costs associated with providing banking services to the rural poor. Given the lack of proper infrastructure in rural communities in Ghana, traditional banks have found it increasingly costly to set up and maintain physical bank branches in these communities and this has led to the exclusion of rural dwellers from formal finance over the past years. But with the rapid mobile phone penetration rate in Ghana in recent years (86% in 2017; 97.5% in 2019 as revealed by the Ghana survey data), banks in collaboration with mobile network operators (MNOs) have leveraged this deep penetration of mobile technology to introduce digital financial inclusion particularly in the rural areas. Although there is still a locality gap in digital financial inclusion, there gap is no longer significant.

As evident from table 3, high income earners (relatively richer individuals) are more financially included in line with the findings by Zins and Weil (2016) and Allen *et al.*, (2016) although they all controlled for other socioeconomic characteristics. High-income earners are more likely to be financially included compared to low income earners, given some of the financial requirements associated with some financial products and services. Again, relatively high-income earners are more likely to have saved in the last 12 months, consistent with the marginal propensity to save (MPS) theory. Similarly, high earners are more likely to use m-money accounts (more certainly to send remittances rather than receive). In the spirit of social network



and familial support, richer family members are expected to send remittances to relatives in financial distress. M-money provides these individuals a more cost-effective and efficient alternative of remitting money to their relatives back in the rural areas. With a fee of 1% of the amount being transferred, this mode of transferring money is significantly less than the cost associated with the other conventional ways (such as delivering cash via public transport) of transferring money to rural poor.

Concerning mobile phone ownership, the data shows that individuals who own a mobile phone are more financially included, as seen on all the measures of financial inclusion. In fact, there is a wide gap between the mobile phone owners who are financially included and mobile phone non-owners who are financially included. The finding is not surprising considering the burgeoning use of mobile phones to conduct financial transactions (both formal financial and m-money transactions).

Married individuals and persons living with their partners appear to be more financially included. While there isn't really *a priori* expectation for this finding, we suspect that the 'responsible tag' associated with being married contributes to being formally financially included. With the extra responsibilities that come with marriage or partnership is the need for a better savings habit. As discussed earlier, m-money also provides a cost-effective way of remitting money to family members, so it's somewhat unsurprising that m-money penetration seems to be higher amongst married individuals and those in partnership.

Regarding education, the data shows that individuals who have attained higher education (at least secondary education) are more financially included than those with only primary education or no formal education. The theoretical literature on demand-side barriers to financial inclusion suggests that individuals are more likely to get involved in formal finance when financial products and services are specifically tailored to their financial needs. It is this group of "highly educated" individuals who are in a position to affect the design of these unique financial products, thus are more likely to financially include. Allied to this, those who have attained higher education will most likely have the level of financial literacy to understand risks and benefits of the financial products and services on offer, thus increasing the likelihood of their engagement in formal finance. This is consistent with the findings of the Alliance for Financial Inclusion (2016) who note that education and awareness are strong determinants in the uptake of any financial service or product. Given the low levels of educational attainment in the rural areas where providers of formal financial services usually shy away from, it is

expected that financial exclusion of the uneducated and/or those educated just at the basic level will be more prevalent.

Looking at age, the descriptive statistics summarised in table 3 shows that out of the 44% of respondents who had a formal account in 2017, only 7.9% fell in the youngest age bracket, and even falling to only 5% in 2019. Some of the plausible reasons for the low financial inclusion amongst the youngest group include high transaction costs associated with formal financial services and the negative stereotypes about youth. Again, those in the youngest age bracket constitute only a minority of respondents who have set aside money in the last 12 months, implying a weak savings culture amongst the youngest group of respondents. The majority of savers fall within the 26-35-year bracket, where a more aggressive savings habit is required to meet the growing needs of a young professional. Older folks appear to be less financially included and less keen on savings, confirming the non-linear relationship between age and financial inclusion as found by Fungáčová and Weill (2015).

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Insert table 3 about here

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As revealed by the descriptive statistics and backed by the simple statistical tests of differences in means, there are significant differences between the financially included and financially excluded (on all measures) in terms of employment and financial resilience. Given the high transaction costs associated with some formal financial services it is expected that those in employment (with a regular income flow) are more likely to be banked. As theoretically predicted, with easier access to financial services comes an increased chance of raising money to meet emergency needs. In the wake of the negative economic shocks caused by COVID-19, we empirically test this theoretical prediction, especially from the gender dimension to see if financial inclusion could play a significant part in the economic recovery process.

## **6. Methodology**

While the primary objective of this paper is to investigate the gender-differential impact of financial inclusion on household financial resilience, we first estimate its impact without the gender dimension. Thus, we use the pooled data for the 2017–2019 time period and compare the differences in financial resilience between individuals who are financially included (treatment group) and those who are financially excluded (control group) across these two time periods (compute the difference in the difference [DID]). The basic assumption in pooling the

surveys is that different individuals were interviewed in each survey so that on average changes reflect either change in individuals' behaviour (model effect) or changes in the make-up of the population over time (distribution effect).

The DID technique reduces two potential biases: (1) the ensuing bias from the cross-sectional comparison between the treatment and control groups during the post policy change period, which can be the result of the constant differences between the two groups, but unrelated to the intervention (formal account ownership, m-money usage and savings); (2) the bias emanating from the comparisons over the two-year period for the financially included, which may be caused by temporal trends, with no relation to the intervention (Cameron, 2009; Athey & Imbens, 2006). The dummy variable formulation of our DID estimation with repeated cross sections in line with Angrist & Kreuger (1999) is given as:

$$Y_{ij} = \alpha + \gamma d2019_{ij} + \mu FI_{ij} + \delta(FI_{ij} * d2019_{ij}) + \phi X_{ij} + \epsilon_{ij} \quad (1)$$

where  $Y_{ij}$  is a dummy variable indicating whether the individual  $i$  is able to come up with emergency funds in location  $j$ ;  $d2019_{ij}$  is the year dummy variable for the second time period (1 for year 2019 and 0 for year 2017), which captures aggregate factors that would cause changes in  $Y_{ij}$  even in the absence of the two policy changes highlighted in section 4;  $FI_{ij}$  represents three categories of financial inclusion dummy variables (owners of formal account, m-money users and savers), capturing the possible differences between the treatment and control groups prior to the two policy changes discussed in section 4;  $\delta$  is the effect of being financially included;  $FI_{ij} * d2019_{ij}$  is a dummy variable equal to 1 for observations in the treatment group in 2019 (the second period);  $X_{ij}$  are additional controls (income, education, age, locality, marital status, negative external shock) to adjust for observed differences between the treatment and control groups. Including  $X_{ij}$  as additional control variables in the DID framework as argued by Abadie (1995) and Meyer (1995) helps to control the mixing of trends and improve the efficiency of estimating the main parameter of interest,  $\delta$ , through its reduction effect on the residual variance.  $\epsilon_{ij}$  denotes an error term that captures unobserved household factors that vary over time and affect  $Y_{ij}$ . Standard errors are clustered at the location level.

To investigate women's financial inclusion and its effect on their individual financial resilience and that of their household, we employ the standard DID approach to estimate the simple probit model of the form:

$$Y_{ij} = \alpha + \gamma d2019_{ij} + \mu FIFemale_{ij} + \delta(FIFemale_{ij} * d2019_{ij}) + \phi X_{ij} + \psi_j + \epsilon_{ij} \quad (2)$$

where  $Y_{ij}$  is a dummy variable indicating whether the individual  $i$  is able to come up with emergency funds in location  $j$ ;  $d2019_{ij}$  is the year dummy variable (1 for year 2019 and 0 for year 2017), which captures aggregate factors that would cause changes in  $Y_{ij}$  even in the absence of the two policy changes highlighted in section 4;  $FIFemale_{ij}$  represents three categories of women's financial inclusion dummy variables (female with a formal account, female user of m-money, and female saver), capturing the possible differences between the treatment and control groups prior to the two policy changes;  $\delta$  is the effect of women's financial inclusion;  $FIFemale_{ij} * d2019_{ij}$  is a dummy variable equal to 1 for observations in the treatment group in 2019 (the second period);  $X_{ij}$  are additional controls (income, education, age, locality, marital status, negative external shock). Standard errors are clustered at the location level.

## 7. Results

In table 4, we present results from the estimated simple probit model (using the difference in difference approach) on the treatment (marginal) effect of financial inclusion on financial resilience. We use the three binary measures of financial inclusion: formal account owner (and individual who owns a formal account), m-money user (an individual who has used m-money in the last 12 months, and saver (an individual who has saved in the past 12 months).

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Insert table 4 about here

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On all the three measures, we find that financial inclusion significantly improves financial resilience. Financially included individuals are more likely to come up with funds in the face of an emergency. More specifically, owning a formal account, using m-money, and saving increase household's financial resilience by 68%, 63% and 47% respectively. The results suggest that formal finance penetration yields the strongest effect on financial resilience. The finding is largely consistent with our argument that formal finance opens up a broader range of financial services and in greater magnitude to its users compared to say m-money. In Jiang *et al.*, (2020b), we find that m-money is mainly used for remittances, but the amounts involved are relatively small, with the largest remittance payment of any kind not exceeding GHC541. That notwithstanding, using m-money is more cost-effective than formal finance, offering its

users considerable cost savings which is used to improve household consumption outcomes (Aker *et al.*, 2016).

Regarding the other significant covariates, we find that negative external shock to a household decreases the household's ability to come up with funds during an emergency by 2%–5%, depending on the measure of financial inclusion. Married individuals and those in partnerships are 3.5%–4.7% more likely to be financially included. Rural dwellers are 8.8%–10% less likely to be financially resilient. While those on a higher income earning are 2.3%–7.5% more likely to be financially resilient, highly educated individuals are also 2%–9.3% more likely to be financially resilient. On education and income, we find similar results from other empirical studies. Lusardi and Mitchell (2006), Ramji (2009), Kelegama and Tilakaratna (2014) all found better educational attainment to improve financial resilience because it increases financial awareness and encourages better use of resources. On economic status, our results dovetail that of Eriksen and Kelly (2007) where richer individuals are found to be more financially resilient in the face of an emergency. In emergency situations involving a dying or sick family member, CGAP (2010) argue that poorer individuals are less financially equipped to save the situation, thus plunging the family into deeper crisis. In cases where they are able to borrow to meet these emergencies, the loans come with higher interest rates (given their perceived level of risk), which in the long run deepens their financial woes.

We now turn to the gender-differential impact of financial inclusion on household financial resilience. On all measures, women's financial inclusion significantly improves financial resilience of their household. Expanding formal financial access to women improves household financial resilience by 48%. The results also suggest that when females save their household's financial resilience is improved by one-third. Amongst female m-money users, the effect is relatively smaller but still significant: household financial resilience increases by 18%.

Regarding the covariates in these regressions, they are broadly consistent with earlier results: individuals who are more likely to be financially resilient are: younger, higher income earners, highly educated, urban dwellers, married. Correspondingly, older, unmarried, rural dwellers and those with lower levels of educational attainments are more likely to be financially vulnerable in the wake of an emergency.

## 7.1 Heterogeneous Impact of Financial Inclusion on Financial Resilience

In this section, we first disentangle the effect of financial inclusion (irrespective of gender) on household resilience in rural and urban localities. We go further to draw out the differences in the impact of women's financial inclusion on financial resilience in these two localities. The results, as displayed in table 5, show that the effect of being financially included on all measures of financial inclusion increases the likelihood of being financially resilient in both rural and urban localities. The results indicate that the effect in urban areas is not significantly different from the effect in rural areas.

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Insert table 5 about here

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However, when we consider the effect from a gender dimension, we see that financial inclusion of women yields a more profound effect on household financial resilience in rural areas compared to urban areas. In fact, on the m-money measure, female users of m-money only significantly improve financial resilience of rural households – the effect on urban households' financial resilience is not significant. We argue that recipients of m-money remittances are more often than not poorer and rural dwellers who need the funds to meet basic and emergency needs such as a poor harvest, damage to property (rain/flood), theft, an illness, injury or death in the family. The scope for improving financial resilience in the rural areas is therefore larger compared to urban areas, which explains the heterogeneous effect of m-money in these two localities.

## 7.2 Mechanisms through which M-money affects Financial Resilience

While there is some evidence to suggest that m-money improves household welfare by enhancing resistance to unanticipated negative shocks through channels such as receipt of remittances for consumption smoothing (Jack and Suri, 2011, 2014), Maweje (2017) reports a contrasting finding: remittance received via m-money has little effect in mitigating the impact of adverse shocks on household consumption. In light of the mixed results, we examine receipt of remittance via m-mobile as a potential mechanism through m-money affect financial resilience.

In the regression analysis, we replace m-money user variable in equations (1) and (2) with a dummy variable representing remittance received via m-money for emergency purpose. We

first estimate the effect on the whole sample and find that those who received remittance via m-money are 11% more likely to be financially resilient in the face of an emergency relative to non-recipient. When we consider the heterogeneities in the impact of remittance received via m-money on financial resilience, focussing on the differences between rural and urban dwellers, some interesting results emerge. In rural Ghana, we find that m-money significantly improves household financial resilience (by 48%) through remittances received. On the contrary, we do not find a positive effect of remittance received via m-money on financial resilience of urban households. The results, as seen through a gender lens (see panel B in table 6), are also broadly consistent with those reported in the first panel in table 6.

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Insert table 6 about here

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Given the heterogeneous effects in rural and urban Ghana and findings from Jack and Suri (2014) and Mawejje (2017), we argue that the effect of remittances received as a mechanism through which m-money affect household resilience to unanticipated negative shock is largely region/country specific.

To the extent that m-money users (particularly senders) tend to experience greater reciprocity in remittances (Jack *et al.*, 2013), individuals who send m-money remittances to family and friends are expected not to be financially vulnerable to negative shocks. We therefore identify ‘sending m-money remittances to family and friends for emergency support in the last 12 months’ as another potential mechanism through which m-money can affect household resilience to shock. Thus, we re-estimate equations (1) and (2), replacing the variable m-money user with a dummy variable, which represents an individual who sends m-money remittances to family and friends for emergency support in the last 12 months. We also report results from the heterogeneous impact (on rural and urban residents), as well as from the gender-differential effects on the whole, rural and urban samples.

In all specifications, we find that sending remittances to family and friends for emergency support is an effective mechanism through which m-money improves household resilience in the face of an emergency. More specifically, financial resilience of the whole sample is improved by 46.8%; financial resilience of rural households is improved by 59.6%; and financial resilience of urban households is improved by 43%. Similar results are reported when the gender-differential effects and heterogeneities in terms of the differences in impact on rural and urban residents are disentangled (see table 7).

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Insert table 7 about here

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In summary, households of recipients (female) of m-money remittances are more likely to be financially resilient only in rural areas, whereas for senders (female) of m-money remittance their households' financial resilience is significantly improved irrespective of locality. Could it be that senders of m-money are generally better-off individuals thus expected to be financially resilient anyway, or because they tend to experience greater reciprocity in remittances? Although this warrants further investigation, our results broadly underscore the importance of m-money remittance (sending and/or receiving) as an effective mechanism through which household financial resilience – particularly in rural areas – are improved.

## **8. Conclusion**

Using household data obtained from two rounds of surveys implemented in Ghana to understand the how individuals access formal and m-money financial services, as well as the extent of usage of formal accounts, m-money, and patterns of savings, we examined how all these dimensions and aspects of financial inclusion influence household financial resilience, especially from the gender dimension. The main results provide new robust evidence that financial inclusion of women is equally an important contributory factor to household's financial resilience irrespective of locality (rural/urban).

We examined the potential mechanisms through which m-money in particular improves the likelihood of a household weathering the effects of a negative shock in times of emergency. We found that in rural Ghana, receipt of m-money remittances provides significant insurance effect for the users' households, with the insurance effect diminishing and even going into the negative in urban areas. However, senders (female) of m-money remittances are more likely to improve their household's financial resilience to shock irrespective of the user's gender and locality.

In terms of policy implications, two results stand out. The main results confirm that in times of an external shock (such as the COVID-19 pandemic), households are less likely to endure the concomitant income changes. In the same regression analysis, the results suggest that financially included households are more likely to be resilient to the consequences of a negative shock. The results also suggest that financial inclusion of women significantly improves households' financial resilience to adverse effects of an external shock. These results can be



extended in several directions and in many diverse ways from a policy perspective. For example, in these times of COVID-19, it is imperative for governments of African countries to provide an enabling environment for financial inclusion (especially of women) to be enhanced and deepened, as it can play an important role in mitigating the socio-economic impact of the COVID-19 pandemic, as well as contributing to an inclusive recovery process.

## References

- Ahmad, A. H., Jiang, F., Green, C., & Sakyi-Nyarko, C. (2020). Mobile money, financial inclusion and development: Finance and Well-being in Developing Countries: Does Access to mobile money improve Household Well-being? Loughborough University Working Paper.
- Aker, J. C., Boumnijel, R., McClelland, A., & Tierney, N. (2016). Payment mechanisms and antipoverty programs: Evidence from a mobile money cash transfer experiment in Niger. *Economic Development and Cultural Change*, 65(1), 1-37.
- Allen, F., Demirguc-Kunt, A., Klapper, L., & Peria, M. M. (2012). Foundations of Financial Inclusion. *Policy Research Working Paper*, 6290.
- Alliance for Financial Inclusion. (2016). "AFI Annual Report 2016." Accessed 10 September 2020. [www.afi-global.org/publications/2498/2016-AFI-Annual-Report](http://www.afi-global.org/publications/2498/2016-AFI-Annual-Report).
- Aportela, F. (1999). Effects of financial access on savings by low-income people.
- Ashraf, N., Karlan, D., & Yin, W. (2006). Tying Odysseus to the mast: Evidence from a commitment savings product in the Philippines. *The Quarterly Journal of Economics*, 121(2), 635-672.
- Attanasio, O., Augsburg, B., De Haas, R., Fitzsimons, E., & Harmgart, H. (2014). Group lending or individual lending? Evidence from a randomised field experiment in Mongolia (No. SP II 2014-303). WZB Discussion Paper.
- Bank of Ghana (2019). Annual Report, 2019, Accra, Ghana
- Beck, T., & Cull, R. (2013). Banking in Africa. The World Bank.
- CGAP. (2000). The Consultative Group to Assist the Poorest: Focus on Poverty. Washington, DC: CGAP.

- Dupas, P., & Robinson, J. (2013). Why don't the poor save more? Evidence from health savings experiments. *American Economic Review*, 103(4), 1138-71.
- Eriksen, S. H., & Kelly, P. M. (2007). Developing credible vulnerability indicators for climate adaptation policy assessment. *Mitigation and adaptation strategies for global change*, 12(4), 495-524.
- Fungáčová, Z., & Weill, L. (2015). Understanding financial inclusion in China. *China Economic Review*, 34, 196-206.
- Holloway, K., Niazi, Z., & Rouse, R. (2017). Women's economic empowerment through financial inclusion: A review of existing evidence and remaining knowledge gaps. New Haven, CT: Innovations for Poverty Action: Financial Inclusion Program.
- Belayeth Hussain, A. H. M., Endut, N., Das, S., Chowdhury, M. T. A., Haque, N., Sultana, S., & Ahmed, K. J. (2019). Does financial inclusion increase financial resilience? Evidence from Bangladesh. *Development in Practice*, 29(6), 798-807.
- Jack, W., & Suri, T. (2011). M-money: The economics of M-PESA (No. w16721). *National Bureau of Economic Research*.
- Jack, W., & Suri, T. (2014). Risk sharing and transactions costs: Evidence from Kenya's mobile money revolution. *American Economic Review*, 104(1), 183-223.
- Jack, W., Ray, A. and Suri, T. (2013) Transaction networks: Evidence from mobile money in Kenya. *American Economic Review: Papers and Proceedings* 103 (3): 356-361.
- Kabeer, N. (2001). Conflicts over credit: re-evaluating the empowerment potential of loans to women in rural Bangladesh. *World Development*, 29(1), 63-84.
- Karlan, D., Osei, R., Osei-Akoto, I., & Udry, C. (2014). Agricultural decisions after relaxing credit and risk constraints. *The Quarterly Journal of Economics*, 129(2), 597-652.

- Kelegama, S., & Tilakaratane, G. (2014). Financial inclusion, regulation, and education in Sri Lanka.
- Lusardi, A., and O. S. Mitchell. 2006. *Financial Literacy and Planning: Implications for Retirement Wellbeing*. Philadelphia: Pension Research Council, University of Pennsylvania.
- Mawejje, J. (2017). Financial inclusion and household risk management: survey evidence from Uganda. *African Economic Research Consortium Thematic Research Paper*.
- Montgomery, H., & Weiss, J. (2011). Can commercially oriented microfinance help meet the millennium development goals? Evidence from Pakistan. *World Development*, 39(1), 87-109.
- Morawczynski, O. (2009). Exploring the usage and impact of “transformational” mobile financial services: the case of M-PESA in Kenya. *Journal of Eastern African Studies*, 3(3), 509-525.
- Mosley, P. (2001). Microfinance and poverty in Bolivia. *Journal of Development Studies*, 37, 101-132. <http://dx.doi.org/10.1080/00220380412331322061>.
- Narain, S. (2009). *Gender and access to finance*. The World Bank.
- Navajas, S., Schreiner, M., Meyer, R. L., Gonzalez-Vega, C., & Rodriguez-Meza, J. (2000). Microcredit and the Poorest of the Poor: Theory and Evidence from Bolivia. *World Development*, 28(2), 333-346.
- Ramji, M. (2009). “Financial Inclusion in Gulbarga: Finding Usage in Access.” Working Paper Series No. 26. Sri City: Institute for Financial Management and Research.
- Salmon, C. T., & Nichols, J. S. (1983). The next-birthday method of respondent selection. *Public Opinion Quarterly*, 47(2), 270-276.

Swamy, V. (2014). Financial inclusion, gender dimension, and economic impact on poor households. *World Development*, 56, 1-15.

Yang, D., & Choi, H. (2007). Are remittances insurance? Evidence from rainfall shocks in the Philippines. *The World Bank Economic Review*, 21(2), 219-248.

Zins, A., & Weill, L. (2016). The determinants of financial inclusion in Africa. *Review of Development Finance*, 6(1), 46-57.

**Table 1 Ghana: Survey and Population Characteristics**

	Survey: 2017 (% of survey: 1000 aged 18+)	Survey: 2019 (% of survey: 1000 aged 18+)	Ghana Population (% of population aged 15+)	Source and date of Population Data <sup>1</sup>
Rural Population	39.30	43.20	44.69 <sup>2</sup>	WDI; 2017
Urban Population	60.70	56.80	55.31 <sup>2</sup>	WDI; 2017
Female Population	46.40	50.70	49.05	WDI; 2017
Male Population	53.60	49.30	50.95	WDI; 2017
Age 18-25	25.70	21.60	31.73	WDI; 2017 <sup>3</sup>
Age 26-35	31.90	32.40	24.88	WDI; 2017
Age 36-45	23.10	24.70	18.23	WDI; 2017
Age 46-55	10.20	12.20	12.25	WDI; 2017
Age 56 and Over	9.10	9.10	12.90	WDI; 2017
Un-employed/Inactive	35.90	20.80	24.88	WDI; 2017
Employed	64.10	79.20	75.12	WDI; 2017
Uneducated	18.40	7.00	23.58	UNESCO; 2010
Educated to Primary School or above	81.40	93.00	76.42 <sup>4</sup>	UNESCO; 2010

Notes:

1. WDI: World Bank (2019) World Development Indicators; UNESCO: UNESCO (2019) UIS Database.
2. The WDI data is in percent of the total population.
3. The WDI data is for 15 – 25-year olds
4. Estimated literacy rate of population aged 15+

**Table 2 Definition of variables**

Variable	Definition
Formal Account	An individual who owns a formal account from a financial institution (e.g. banks, savings and loans company, etc.
Saver	Individuals who have saved money in the past 12 months represented by 1, and 0 if not saved in the past 12 months
M-money user	Individuals who have used M-money in the past 12 months represented by 1, and 0 if not saved in the past 12 months
M-money remittance receiver	Individuals who have received in the past 12 months represented by 1, and 0 if not saved in the past 12 months
Female	Female = 1; Male = 0
Rural	Rural = 1; Urban = 0
Age	Age groups: 18-25; 26-35; 36-45; 46-55; 56 and over
Higher income earner	Dummy variable where individuals who earn more than GHC 12,000 <i>p.a</i> is represented by 1 and 0 otherwise
Highly educated	Dummy variable where individuals with at least senior secondary education is represented by 1 and 0 otherwise
Married or living with partner	Married or living with partner = 1; not married = 0
Shock	Extent of unexpected loss of income, assets or personal items suffered by family in the last 12 months: “no loss suffered”, “small”, “moderate”, “large”, “very large”

**Table 3 Household characteristics by the various measures of financial inclusion**

Variable	Formal Account (%)		Savings (%)		Mobile Money (%)	
	2017	2019	2017	2019	2017	2019
Female	17.90	20.2	21.60	34	13.30	46.8
Male	26.80***	16.1**	26.90	30.2**	21.60***	45.8
Rural	20.00	15.4	18.40	25.4	11.10	40.2
Urban	24.70***	20.9	30.10	38.8***	23.80***	52.4
Low Income Earner	20.80	10.1	26.60	19	16.90	29.7
High Income Earner	15.70***	26.2***	13.70***	45.1***	8.30***	62.8***
Mobile owner	42.90	36.00	47.20	63.4	34.10	91.3
Non mobile owner	1.80***	3.00**	1.30***	0.8***	0.80***	1.3***
Married/partner	25.90	20.9	30.10	37.4	16.10	50.2
Unmarried/living alone	18.60***	15.4	18.30***	26.8***	18.50**	42.4
Secondary or higher	41.00	35.5	43.30	61.3	32.80	87.9
Primary school or less	3.60***	0.8***	5.20***	2.9***	2.10***	5.1***
18-25	7.90	5.00	9.00	13.2	8.60	20.7
26-35	17.40***	15.1***	17.60***	21.8	13.20***	31.4***
36-45	11.40**	9.2	13.70***	17.4**	8.30	22.9
46-55	4.30	4.8	5.30	7.6	2.80*	10.6***
Over 55	3.70	2.2**	2.90***	4.2***	2.00***	7.00***
Employed	33.60	30	37.40	54.5	24.30	73.9
Unemployed	11.10***	6.3**	11.10	9.7***	10.60***	18.7***
Financially resilient	41.30	26.1	44.60	49.2	31.90	76.0
Not financially resilient	3.40***	10.2***	3.90***	15.0***	3.00***	16.6***

\*\*\*p<0.001, \*\*p<0.01, \*p<0.05



**Table 4 Financial Inclusion and Financial Resilience—DID**

Financial Resilience (1/0)	Simple Probit		
	(1) Formal account	(2) Saver	(3) MM user
d2019	-.3344*** (0.000)	-.3676*** (0.000)	-.3526*** (0.000)
Financial inclusion	-.4287*** (0.000)	-.3269*** (0.000)	-.1501 (0.000)
<b>d2019*financial inclusion</b>	<b>.6767*** (0.000)</b>	<b>.6257*** (0.000)</b>	<b>.4724*** (0.000)</b>
Rural	-.0822*** (0.000)	-.0992*** (0.000)	-.0997*** (0.000)
Female	.0154 (0.496)	.0339 (0.135)	.0442* (0.062)
Age	-.0001 (0.989)	-.0112 (0.296)	-.0038 (0.731)
High income earner	.0834*** (0.001)	.0335 (0.180)	.0328 (0.208)
Highly educated	.0653** (0.034)	.0171 (0.562)	.0093 (0.766)
Marital	.0299 (0.229)	.0428* (0.090)	.0451* (0.086)
Shock	-.0414*** (0.000)	.0200 (0.026)	-.0511*** (0.000)
Observation	1691	1691	1691
<b>Panel B: Effect of financial inclusion disaggregated by gender of respondent</b>			
d2019	-.0918 (0.002)	-.1522*** (0.000)	-.1265*** (0.005)
Female*Financial Inclusion	-.2603*** (0.000)	-.2151*** (0.003)	-.2281** (0.028)
<b>d2019*female_financial inclusion</b>	<b>.4797*** (0.000)</b>	<b>.4119*** (0.000)</b>	<b>.3508*** (0.002)</b>
Control for socioeconomic factors	Yes	Yes	Yes

*Notes:*

Each column represents a different measure of financial inclusion in the Simple Probit Model. Columns (1), (2) and (3) measure financial inclusion as a dummy variable representing our three measures of financial inclusion (formal account ownership, saver and mobile money user) of financial inclusion. 1 indicates: individuals who own a formal account (zero otherwise); individuals who have saved in the past 12 months (zero otherwise); individuals who have used mobile money in the past 12 months (zero otherwise) respectively. All regressions are estimated using the probit command in Stata. Marginal effects are reported. Robust standard errors where (\*) (\*\*) (\*\*\*) denotes (0.1) (0.05) (0.01) significance levels.

**Table 5 Heterogeneous Effect of Financial Inclusion on Financial Resilience–DID**

Wellbeing	Formal Account		Saver		Mobile Money user	
	Rural	Urban	Rural	Urban	Rural	Urban
d2019	-.4280*** (0.000)	-.2746*** (0.000)	-.3661*** (0.000)	-.3629*** (0.000)	-.3356*** (0.002)	-.3574*** (0.000)
Financial inclusion	-.5718 (0.000)	-.3350*** (0.000)	-.3533*** (0.000)	-.2999*** (0.000)	-.2012*** (0.002)	-.1156** (0.020)
<b>d2019*financial inclusion</b>	<b>.7510*** (0.000)</b>	<b>.6322*** (0.000)</b>	<b>.6216*** (0.000)</b>	<b>.6226*** (0.000)</b>	<b>.4403*** (0.000)</b>	<b>.4939** (0.000)</b>
Age	-.0135 (0.390)	.0068 (0.636)	-.0233 (0.148)	-.0063 (0.660)	-.0178 (0.297)	.0036 (0.811)
Female	.0101 (0.394)	.0260 (0.665)	.0237 (0.493)	.0483 (0.109)	-.0178 (0.297)	.0036 (0.811)
High income earner	.0659* (0.066)	.1000*** (0.006)	.0306 (0.393)	.0420 (0.253)	.0173 (0.642)	.0388 (0.311)
Highly educated	.0874** (0.050)	.0674 (0.119)	-.0162 (0.692)	.0413 (0.328)	-.0341 (0.439)	.0530 (0.239)
Marital	.0097 (0.791)	.0572 (0.086)	.0185 (0.628)	.0663** (0.046)	.0116 (0.771)	.0742** (0.031)
Shock	-.0626*** (0.000)	-.0274** (0.021)	-.0418*** (0.002)	-.0049 (0.691)	-.0773*** (0.000)	-.0340*** (0.006)
Observation	719	972	719	972	719	972
<b>Panel B: Effect of financial inclusion disaggregated by gender of respondent</b>						
d2019	-.1652*** (0.000)	-.0373 (0.382)	-.1522*** (0.000)	-.0328 (0.453)	-.1265*** (0.005)	.0181 (0.688)
Female*financial inclusion	-.3908*** (0.000)	-.1728*** (0.004)	-.2151*** (0.003)	-.0876 (0.103)	-.2281** (0.000)	-.0375 (0.573)
<b>d2019*female_financial inclusion</b>	<b>.6199*** (0.000)</b>	<b>.3853*** (0.000)</b>	<b>.4119*** (0.000)</b>	<b>.2676*** (0.000)</b>	<b>.3508*** (0.002)</b>	<b>.0886 (0.256)</b>
Control for socioeconomic factors	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* All regressions are estimated using the probit command in Stata. Marginal effects are reported. Robust standard errors where (\*) (\*\*) (\*\*\*) denotes (0.1) (0.05) (0.001) significant levels respectively

**Table 6 M-money remittance received and Financial Resilience–DID**

Financial Resilience (1/0)	Simple Probit		
	(1) Whole sample	(2) Rural	(3) Urban
d2019	-.0238 (0.457)	-.1612*** (0.000)	.0824* (0.072)
M-money	-.0852* (0.079)	-.3007*** (0.003)	-.0031 (0.948)
<b>d2019*M-money</b>	<b>.1108*</b> <b>(0.054)</b>	<b>.4812***</b> <b>(0.000)</b>	<b>-.0871***</b> <b>(0.220)</b>
Rural	-.0936*** (0.000)		
Female	.0472** (0.049)	.0452 (0.205)	.0561* (0.077)
Age	-.0125 (0.263)	-.0197 (0.237)	-.0074 (0.623)
High income earner	.0374 (0.153)	.0289 (0.427)	.0380 (0.326)
Highly educated	.0130 (0.676)	-.0392 (0.352)	.0543 (0.231)
Marital	.0549** (0.039)	.0029 (0.941)	.0824** (0.018)
Shock	-.0461*** (0.000)	-.0700*** (0.000)	-.0305** (0.015)
Observation	1691	719	972
<b>Panel B: Effect of M-money (received for emergency purposes) disaggregated by gender of respondent</b>			
d2019	-.0114 (0.695)	-.1108*** (0.007)	.0658*** (0.115)
Female*M-money	-.0434 (0.544)	-.4241** (0.031)	.0524 (0.523)
<b>d2019*female_M-money</b>	<b>.1135**</b> <b>(0.058)</b>	<b>.6521***</b> <b>(0.001)</b>	<b>-.1060</b> <b>(0.267)</b>
Control for socioeconomic factors	Yes	Yes	Yes

*Notes:*

Each column represents a different sample in the Simple Probit Model. In these regressions, we examine the mechanism through which mobile money influences household financial resilience. Thus, we use remittances received via mobile money for emergency purposes as the variable of interest. We dichotomise the variable so that individuals who received mobile money in the past 12 months is represented by 1, and 0 otherwise. All regressions are estimated using the probit command in Stata. Marginal effects are reported. Robust standard errors where (\*) (\*\*) (\*\*\*) denotes (0.1) (0.05) (0.01) significance levels.

**Table 7 M-money remittance sent and Financial Resilience–DID**

Financial Resilience (1/0)	Simple Probit		
	(1) Whole sample	(2) Rural	(3) Urban
d2019	-.1478*** (0.000)	-.1964*** (0.000)	-.1189*** (0.008)
M-money	-.2140*** (0.000)	-.3335*** (0.000)	-.1810*** (0.001)
<b>d2019*M-money</b>	<b>.4683 *** (0.000)</b>	<b>.5961 *** (0.000)</b>	<b>.4301 *** (0.000)</b>
Rural	-.1001*** (0.000)		
Female	.0472** (0.049)	.0324 (0.359)	.0266 (0.395)
Age	-.0108 (0.320)	-.0202 (0.216)	-.0076 (0.604)
High income earner	.0418 (0.102)	.0235 (0.519)	.0555 (0.141)
Highly educated	.0056 (0.853)	-.0529 (0.202)	.0560 (0.202)
Marital	.0340 (0.191)	-.0094 (0.812)	.0689** (0.044)
Shock	-.0488*** (0.000)	-.0770 *** (0.000)	-.0306 ** (0.011)
Observation	1691	719	972

**Panel B: Effect of M-money (received for emergency purposes) disaggregated by gender of respondent**

d2019	-.0493* (0.091)	-.1044** (0.011)	-.0024*** (0.955)
Female*M-money	-.0930 (0.211)	-.2255** (0.240)	-.0849 (0.297)
<b>d2019*female_M-money</b>	<b>.2873*** (0.000)</b>	<b>.4632** (0.019)</b>	<b>.2437*** (0.010)</b>
Control for socioeconomic factors	Yes	Yes	Yes

*Notes:*

Each column represents a different sample in the Simple Probit Model. In these regressions, we examine the mechanism through which mobile money influences household financial resilience. Thus, we use m-money remittances sent to family and friends for emergency purposes as the variable of interest. We dichotomise the variable so that individuals who sent m-money to family and friends for emergency support in the past 12 months is represented by 1, and 0 otherwise. All regressions are estimated using the probit command in Stata. Marginal effects are reported. Robust standard errors where (\*) (\*\*) (\*\*\*) denotes (0.1) (0.05) (0.01) significance levels.

## Appendix

### A1 Measures of financial inclusion

Measures of Financial Inclusion	Selected Micro Indicators
Formal account	“Ownership of formal account”
Saver	“Individuals who have saved in the last 12 months”
M-money user	“Individuals who have used m-money in the last 12 months”