The Gender-Differential Effect of Financial Inclusion on Household Financial Resilience

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ABSTRACT This paper applies the kernel propensity score matching difference-in-differences method to examine gender-differential effects of financial inclusion on household financial resilience, using repeated cross-sectional data from two successive large-scale surveys of Ghanaian households. Applying standardised indices for financial inclusion and financial resilience, we find that financial inclusion significantly improves household financial resilience. Results from gender and locality disaggregated analyses suggest that the effect of financial inclusion on household resilience does not significantly vary by gender or locality. Results from different measures of financial inclusion show that savings and formal account ownership yield more pronounced resilience effect, with mobile money (m-money) exerting the least impact. Remittances via m-money – sending and receiving (a proxy for social capital) – provide significant financial resilience effects, with generally stronger effects in rural than in urban areas, especially for females.

KEYWORDS: Financial inclusion; Mobile Money; Savings; Gender; Financial resilience

1. Introduction

Financial inclusion is accredited to improving welfare. For example, its positive effects on consumption (Aportela, 1999), savings (Ashraf, Karlan, & Yin, 2006), foreign remittances (Yang & Choi, 2007), micro-entrepreneurs (Attanasio, Augsburg, De Haas, Fitzsimons, & Harmgart, 2014; Dupas & Robinson, 2013), and risk mitigation (Karlan, Osei, Osei-Akoto, & Udry, 2014). Financial inclusion also provides increased resilience by offering 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 (Holloway, Niazi, & Rouse, 2017; Swamy, 2014). This is because women disproportionately experience poverty, emanating from unequal divisions of labour and a lack of equal access and control over economic resources (Duflo, 2012; Holloway et al., 2017). Larson, Castellanos, and Jensen (2019) find that when Honduran women have access to credit, their households are less likely to be faced with food insecurity. Similar welfare effects are found in Tanzania (Salia, 2014); in Malaysia (Al-shami, Razali, & Rashid, 2018); and in Bangladesh (Mahmud, Shah, & Becker, 2012).

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Despite theoretical and empirical evidence linking financial inclusion of women to the economic uplifting of their households as a result of improved economic empowerment, another strand of literature presents contrasting findings (Kabeer, 2001; Montgomery & Weiss, 2011; Mosley, 2001; Navajas, Schreiner, Meyer, Gonzalez-Vega, & Rodriguez-Meza, 2000). It argues that financial inclusion can lead to adverse outcomes, particularly for females when credit is only available at usurious rates, undermining the affordability of the financial product or service (Ganle, Afriyie, & Segbefia, 2015). Borrowers initially become better off as they due to improved living conditions, however they become worse off when they are required to pay back the loans at high rates, and the net effect of becoming financially included reduces to zero after a threshold point. As women are more frequently excluded from the financial system, they may be considered relatively riskier applicants as first-time borrowers, especially as they lack credit history, and consequently, attract higher interest rates (Alesina, Lotti, & Mistrulli, 2013).

Much of the literature on financial inclusion and resilience concentrates on access to and availability of credit, especially micro-credit (Demirguc-Kunt, Klapper, & Singer, 2017). However, there is increasing evidence that savings provide a buffer against shocks (Karlan, Ratan, & Zinman, 2014). According to a recent comprehensive review: ‘Accessing savings opportunities appears to have small but much more consistently positive effects’ (Duvendack & Mader, 2019). Given these mixed results from the literature, and its emphasis on credit, there is a strong motivation, first to provide a further assessment of the impact of women’s financial inclusion on their households’ financial resilience and well-being, and second, to focus this assessment more closely on financial products and services other than credit, especially savings.

In this paper, we examine the gender-differential impact of financial inclusion on household financial resilience using data from repeated cross-sectional surveys (RCS) that we carried out in Ghana in 2017 and 2019. These surveys were based on representative sample households throughout Ghana, and they aimed 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 group changes over time with respect to financial resilience of Ghana’s financially included groups and financially excluded groups. We use a differences-in-differences (DID) method combined with Kernel Propensity Score Matching (KPSM) to analyse the RCS data, where cross-sections are considered before and after a policy intervention. Specifically, we compare the differences between the household financial resilience of financially included persons (intervention group) and that of financially excluded persons (control group) across the two time periods. We perform this analysis in two ways: first using the whole sample, then second, we split the sample into gender, and perform the analysis separately on each group. We develop a multidimensional index for financial inclusion using three distinct indicators of financial inclusion: formal account owner, saver (in formal or informal accounts), and mobile money (m-money) account user as the treatment interventions. We also use a standardised financial resilience index computed using two distinct definitions of financially resilient households: those that have never or rarely gone without cash income in the past 12 months; and those who would likely to find a lump-sum to meet an emergency within the next month.

The contribution of this paper to the literature can be seen against the backdrop of large discrepancies in the welfare implications of financial inclusion of women, which we argue are due partly to methodological. For example, Belayeth Hussain et al. (2019) offer interesting results on the gender-differential impact of financial inclusion on household financial resilience, but they rely on a single cross-sectional survey. Despite acknowledging the potential of informal finance in bridging the financial gap between rich and poor, this paper attaches greater emphasis to formal finance, but focuses particularly on saving and m-money usage, as more effective ways of improving a household’s economic well-being. In addition, by testing the hypothesis that women’s financial inclusion improves household financial resilience, we offer new empirical evidence on the impact
that broadening financial access to women could, for example, help facilitate a more inclusive recovery in the wake of adverse economic shocks, such as that caused by the COVID-19 pandemic.

The rest of the paper is structured as follows. Section 2 describes the survey process and sampling methodology. Section 3 provides a descriptive analysis of the data, the financial inclusion landscape in Ghana, and gender-specific differences in financial inclusion. Section 4 outlines the empirical strategy and methodology employed. Section 5 presents the empirical results while Section 6 concludes.

2. Survey and sampling methodology

The datasets used in this analysis were obtained through two rounds of household surveys administered by the authors in 2017 and 2019 in all regions of Ghana. To obtain national representation, we use census information to build a sample that shares characteristics proportionate to the actual national population. Accordingly, the baseline survey was stratified into ten administrative regions, which contain 216 districts in total as in 2010 Population and Housing Census. A multi-stage cluster sampling was conducted to narrow down the survey areas. The first stage involves the division of the survey areas (regional strata) into smaller distinct geographic areas (districts). Each regional stratum contains a number of districts. Next, we find the approximate population size for each district, and use ENA software – based on the probability proportional to size software (PPS) – to randomly allocate enumeration areas to each geographic unit (district). The sampled districts are shown in Figure 1.

To select households within these identified clusters (enumeration areas), systematic random sampling was employed. Various random route procedures were then used to select households – interval sampling from randomly generated starting points (for example, school, church/chapel/mosque, health clinics or market) and random start (any number from 1 to 100). These procedures were used to select, 1000 households. Within these households, a sample of 1000 individuals (one per household defined as persons aged 18 and above) were randomly selected for interview by means of the last birthday method instead of the Kish Grid, commonly used. This was due local sensitiveness in age disclosure, which is a requirement for the Kish Grid method. It is also simpler for training and implementation (Salmon & Nichols, 1983).

Both surveys were conducted in the same way; but we did not attempt to revisit the same households because of the potential problem of attrition, which in similar settings has often been found to be severe. Our sample, therefore, constitute a repeated cross-section (RCS), each with 1000 nationally representative observations. 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.

The surveys consisted of over 100 questions each, ask how individuals access formal, informal and m-money financial services, usage of these services; levels of satisfaction; and barriers to access and use. The surveys captured dimensions of financial inclusion, which are missing from most surveys. The surveys also obtained data on savings, borrowings, payments, negative shock mitigations and socio-economic characteristics (age, income level, level of education, employment status, rural/urban locality, etc.) of the respondents. Details of the survey and its findings are available in Sakyi-Nyarko (2018), with a summary in Jiang, Sakyi-Nyarko, Ahmad, and Green (2021).

3. Descriptive analysis of the survey data

The data show that informal finance in Ghana has mainly been about savings mobilisation (e.g. Susu¹), and financial arrangements involve lending (e.g. money lenders). The loans have often been characterised by small amounts, short repayment periods and usurious interest rates: features of an inefficient financial system. Considering this, we focus on formal finance, including m-money. Formal finance is defined as accounts with any commercial and savings banks, microfinance institutions, and rural and community banks.
3.1. Financial inclusion: socio-economic characteristics

The survey data reported in Table 2 show that on all three measures of financial inclusion, rural dwellers are less financially included compared to their urban counterparts, consistent with the findings of Allen, Demirguc-Kunt, Klapper, and Peria (2016). Commercial banks have shied away from rural areas banking services. Beck and Cull (2013) and Narain (2009) attribute this to the costs associated with providing rural banking services. But rapid mobile phone penetration in Ghana in recent years (86 per cent of survey respondents in 2017 and 97.5 per cent in 2019), banks in collaboration with mobile network operators (MNOs) have leveraged this to offer digital financial services in the rural areas.

High-income earners are more likely to be financially included compared to low-income earners, especially given some of the financial requirements associated with some financial products and services (Allen et al., 2016; Zins & Weill, 2016). According to the data, high-income earners are more likely to have a formal account, saved in the last 12 months, and to use m-money accounts. They are also more likely to send rather than to receive remittances. M-money is more cost-effective than other traditional methods of sending such remittances (such as delivering cash via public transport).
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 |
|------------------------------------------|------------------------------------------|------------------------------------------|----------------------------------|
| Rural Population                         | 39.30                                    | 43.20                                    | 44.69^2                         | WDI; 2017                        |
| Urban Population                         | 60.70                                    | 56.80                                    | 55.31^2                         | 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; 2017^3                     |
| 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                                    | 76.42^4                         | UNESCO; 2010                     |

1. WDI: World Bank (2019) World Development Indicators; UNESCO: 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. Household characteristics by measures of financial inclusion

| Variable                                | Formal Account (%) | Savings (%) | Mobile Money (%) |
|-----------------------------------------|--------------------|-------------|------------------|
|                                        | 2017               | 2019        | 2017             | 2019        | 2017             | 2019             |
| Female                                  | 17.9               | 20.2        | 21.6             | 34.0        | 13.3             | 46.8             |
| Male                                    | 26.8***            | 16.1***     | 26.9             | 30.2**      | 21.6***          | 45.8             |
| Rural                                   | 20.0               | 15.4        | 18.4             | 25.4        | 11.1             | 40.2             |
| Urban                                   | 24.7***            | 20.9        | 30.1             | 38.8***     | 23.8***          | 52.4             |
| Low Income Earner                       | 15.7               | 10.1        | 13.7             | 19.0        | 16.9             | 29.7             |
| High Income Earner                      | 20.8***            | 26.2***     | 26.6***          | 45.1***     | 8.3***           | 62.8***          |
| Mobile owner                            | 42.9               | 36.0        | 47.2             | 63.4        | 34.1             | 91.3             |
| Non mobile owner                        | 1.8***             | 0.30***     | 1.3***           | 0.8***      | 0.8***           | 1.3***           |
| Married/partner                         | 25.9               | 20.9        | 30.1             | 37.3        | 16.1             | 50.2             |
| Unmarried/living alone                  | 18.6***            | 15.4***     | 18.3***          | 26.8***     | 18.5             | 42.4**           |
| Secondary or higher                     | 30.3               | 28.9        | 24.5             | 43.2        | 20.9             | 56.8             |
| Primary school or less                  | 14.4***            | 7.4***      | 24.0             | 20.9***     | 14.0***          | 35.8***          |
| 18–25                                   | 7.9                | 5.0         | 9.0              | 13.2        | 8.6              | 20.7             |
| 26–35                                   | 17.4***            | 15.1***     | 17.6***          | 21.8        | 13.2**           | 31.4***          |
| 36–45                                   | 11.4**             | 9.2         | 13.7***          | 17.4**      | 8.3              | 22.9             |
| 46–55                                   | 4.3                | 4.8         | 5.3              | 7.6         | 2.8*             | 10.6***          |
| Over 55                                 | 3.7                | 2.2**       | 2.9***           | 4.2***      | 2.0**            | 7.0***           |
| Employed                                | 33.6               | 30.0        | 37.4             | 54.4        | 24.3             | 73.9             |
| Unemployed                              | 11.1***            | 6.3**       | 11.1***          | 9.7***      | 10.6***          | 18.7***          |

Entries show the percentage of all respondents with the stated characteristics, e.g. in 2017, 17.9 per cent of respondents were female and reported having a formal account.

The significance of t-tests of the difference in means between any two groups on the same date (e.g. male-female) is shown by asterisks: ***p < 0.01, **p < 0.05, *p < 0.1.
The data show that individuals who own a mobile phone are more financially included, using all financial inclusion measures. There is a wide gap between the mobile phone owners who are financially included and mobile phone non-owners who are financially included. Married individuals and persons living with their partners are more financially included. While there are not necessarily a priori expectations for this, the extra responsibilities that come with marriage or partnership are likely to motivate the need for savings habit.

Individuals who have attained at least secondary education are more financially included than those with only primary education or no formal education. 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 clear to them. It is this group of ‘highly educated’ individuals who can affect the design of these financial products, and thus are more likely to be financially included. This is consistent with the findings of the Alliance for Financial Inclusion (AFI) (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 rural areas where providers of formal financial services providers usually avoid, financial exclusion of the uneducated or those educated just at the basic level will be more prevalent.

Table 2 presents household characteristics of the data, which show that out of 44 per cent of respondents who had a formal account in 2017, only 7.9 per cent fell in the youngest age bracket, falling to 5 per cent in 2019. Again, the youngest age bracket constitutes only a minority of respondents who have saved in the last 12 months, implying a weak savings culture amongst the youngest group of respondents. However, by 2019, m-money use among the youngest age group rose sharply. Most of the savers fall within 26–35-years bracket. Older folks appear to be less financially included and save less, implying a non-linear relationship between age and financial inclusion (Fungáčová & Weill, 2015).

3.2. Gender and financial inclusion

The RCS data show that ownership of a formal account (single or joined) stood at 44.7 per cent in 2017 and 36.3 per cent in 2019. In 2017 48.5 per cent reported to have saved in the last 12 months compared to 64.1 per cent in 2019. In 2017, a further 31.3 per cent of savers with no formal account had a m-money account instead, and this rose to 95 per cent in 2019. We acknowledge that informal financial instruments can serve as media for savings. But m-money accounts may also be used for small savings. For the purposes of this paper therefore, we define the financially included as persons with access either to a formal account or to a m-money account, or to someone who has saved in the last 12 months (or any combination of these), thus focussing the analysis on formal and m-money account ownership, usage and savings.

M-money accounts rose from 34.9 per cent penetration in 2017 to 92.6 per cent penetration in 2019. This facilitates collaboration between banks and mobile network operators (MNOs) to introduce digital financial services, particularly in the rural areas. This financial inclusion ecosystem has gained ground primarily because of the rural-urban divide in Ghana. Rural-urban migration to work and send money back home is common (Ackah & Medvedev, 2010). M-money is a cost-effective and efficient alternative of remitting money – with a fee of 1 per cent (free for amounts less than GHC100 during the COVID-19 pandemic) of the amount being transferred (Bank of Ghana, 2020), this mode of transferring money is significantly less than the cost associated with the other traditional ways.

The data show that only 38.7 per cent of female respondents were formal account owners in 2017, compared to 50 per cent of male respondents (Figure 2). There was also a gender gap in saving, though smaller: 46.7 per cent female while 50.1 per cent males. But gender gap is much wider for m-money penetration, 40.2 per cent of male respondents own a registered m-money account, as opposed to 28.7 per cent of female respondents.

However, the gender gap has been bridged on all three measures of financial inclusion in 2019 survey. In fact, the gender gap became in favour of females for formal account ownership and savings
Ghana suffered from microfinance and banking crises between 2018 and 2019 (Bank of Ghana, 2018, 2019), this may have impacted on confidence in the formal financial system. It is, therefore, not surprising to see a significant decline in formal account ownership between 2017 and 2019 particularly amongst men, with female account owners only rising marginally over the period. It appears that there may be a substitution effect between formal account penetration and m-money usage over the period. There is evidence in this RCS data that the progress made with regards to women’s financial inclusion vis-à-vis men’s financial inclusion supports the earlier findings of Morawczynski (2009). What the data do not show, and what the paper seeks to examine, is, as more women become financially included, does their financial inclusion contribute to their household’s economic well-being, and if so, how does it contribute?

![Figure 2](image2.png)

**Figure 2.** Financial inclusion by gender – 2017 survey data.

![Figure 3](image3.png)

**Figure 3.** Financial inclusion by gender – 2019 survey data.
3.3. Financial inclusion and financial resilience

Financial resilience refers to an individual’s ability to manage adverse economic outcomes, especially, the unanticipated ones. We use two different measures of resilience. First, individuals were asked to state how often, on a scale of 1–5, their family had gone without cash income in the last 12 months, where 1 indicates ‘most of the time’, 2 indicates ‘often’, 3 means ‘sometimes’, 4, ‘rarely’, and 5 ‘never’. A binary variable (‘cash income’) was created out of these responses where 1 represents individuals whose family has rarely or never gone without cash income, and 0 otherwise. Second, we asked individuals to state how possible it would be for them to access emergency funds 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’. A binary variable (‘emergency funds’) was created where 1 represents individuals who find it very possible or somewhat possible to access emergency funds, and 0 otherwise.

Cash income is a backward-looking measure, but it has the advantage of conveying the actual experience of the respondents. However, loss of cash income may not necessarily mean lack of resilience, although the more frequent the loss of income, the more likely it will undermine financial resilience. It is a forward-looking measure of resilience and is more consumption-oriented in that the conjectured emergency is one necessitating a significant additional expenditure. Consumption-based measures of hardship are more informative than income-based measures (Deaton, 2005), and, therefore, we prefer the second measure. However, it can be argued that this measure is potentially flawed as it is based on the respondent’s perception rather than directly on their recent experience. We did not ask precise quantitative questions about recent spending because responses to such questions are notoriously unreliable, unless the time horizon is too short (Browning, Crossley, & Weber, 2003).

To address the main research question, ‘does financial inclusion affect household financial resilience?’, we develop a standardised index for both our treatment and outcome variables based on Kling, Liebman, and Katz (2007). The multi-stage procedure for computing the index involve the following: for the financial inclusion index, each of the three elements is first de-meaned and standardised to the level of the control group at baseline. Secondly, we summed up the standardised variables, resulting in an index defined as equal weighted average of z-scores of the elements of financial inclusion (formal account ownership, m-money usage, and savings). Finally, the resulting index is again de-meaned and standardised with respect to the baseline of the control group. The ‘derived’ index is a condensed version of all the alternative measures for financial inclusion, where a higher index represents greater financial inclusion. Subsequently, we create a dummy treatment variable where an individual whose score on the index is equal to or greater than the median is classified as financially included (represented by 1 and 0 otherwise). The same procedures are applied to compute the outcome variable. However, unlike the financial inclusion index, the outcome index is a continuous variable.

In general, those who are not financially included on any of our three definitions are less likely to be financially resilient than those who are financially included (Table 3). However, although rates of financial inclusion increased between 2017 and 2019, this was not accompanied by an across-the-board rise in financial resilience. Financial resilience, defined by conjectured access to emergency money, mostly improved for the financially excluded but not for the financially included; whereas financial resilience, defined by rarely having gone without cash income, uniformly deteriorated for the included, excluded, males and females alike. Some of these developments might be attributable in part to time-specific macro factors. According to one estimate, Ghana’s real GDP per capita increased by 4.5 per cent in 2017 but showed virtually no change in 2019. Our Difference in Difference – Kernel Propensity Score Matching (DID-KPSM) analysis identifies more precisely the causes of the changes in financial resilience experienced by Ghanaian households during these years.
4. Empirical strategy and methodology

Two major financial developments in Ghana in 2018/2019, between the two surveys, amount to a natural (policy) experiment upon which we apply DID combined with KPSM to identify as far as possible the impact of financial inclusion on household financial resilience.

The first of these developments was the launch of m-money interoperability in 2018, taking full flight in 2019, allowing direct and seamless transfer of funds between m-money wallets provided by different networks, as well as bank accounts. Until May 2018, it was only possible to transfer m-money to someone who uses the same network (e.g. MTN to MTN). In addition, formal account holders are also able to receive m-money from m-money users into their formal accounts and vice versa. Ghana was one of the first countries to mandate and fully implement m-money interoperability; and in the following 12 months, total m-money transactions increased by 45 per cent (Bank of Ghana, 2019). The second development in late 2018 was that banks were required to meet new minimum capital requirements of GHS400m ($86.4 m), an increase of 230 per cent. The recapitalisation was to protect the banking sector.

In this context, we can conclude that only financially included groups were exposed to these two policy interventions. Thus, we effectively have two groups: those who were treated by the policy intervention (i.e. financially included groups) and those who were not treated (financially excluded groups).
groups) and who act as a control to enable us to conduct pre-post intervention analysis. We do this using a kernel propensity score matching difference-in-differences approach.

To achieve the principal objective of the paper, we use a financial inclusion index and a standardised index for resilience. The former comprises three key binary measures: ownership of a formal account; savings (individuals who have saved with a formal financial institution in the past 12 months); and usage of m-money in the last 12 months. The index for resilience is computed as explained in Section 3 using two measures: individuals whose family has rarely or never gone without cash income in the last 12 months; and individuals who would find it very possible or somewhat possible to access emergency funds in the next month. Table S1 (in Supplementary Material) provides definitions of all the variables.

We begin by estimating the impact of financial inclusion on household financial resilience, without the gender dimension, using the Difference in Difference (DID) method combined with Kernel Propensity Score Matching (KPSM). 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 time-invariant 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 (Athey & Imbens, 2006; Cameron, 2009).

However, the validity of the DID estimates assumes that in the absence of treatment (i.e. any measure of financial inclusion) the difference between the financially excluded (control group) and financially included (treatment group) at the second time point (i.e. the follow-up survey in 2019) would have been the same as in the first time point (i.e. the initial survey in 2017). This is referred to as the parallel trend assumption. To ensure that this assumption holds, we employ KPSM to match treated individuals with similar non-treated individuals based on observed characteristics, then apply the DID on the matched individuals. Thus, to estimate the gender-differential effect of the different forms of financial inclusion on household financial resilience, we apply DID plus KPSM on the RCS. We summarise these two methods next.

DID estimates the average financial resilience effect of savings, m-money and formal finance by using the differences between the control group and the treatment group as an approximation of the counterfactual as:

\[ \tau^{DID} = E(Y_1^T - Y_0^T | T_1 = 1) - E(Y_1^C - Y_0^C | T_1 = 0) \] (1)

where \( T_1 = 1 \) denotes individuals, who are treated at time \( t = 1 \), in this case having ownership of a formal account, ownership of a savings account or access to m-money in 2019; \( T_1 = 0 \) refers those who lack treatment with each of the above forms of financial inclusion. DID works on the assumption that the effect of any unobservable that constitutes time-invariant differences between the treatment and control group across the two time periods are differenced out. Combining this restriction with equation (1), provides model for the realised outcome as:

\[ Y_i = \alpha + \beta T_i + \gamma t_i + \delta(T_i \ast t_i) + X_i + \varepsilon_i \] (2)

where \( Y_i \) is a continuous variable representing a financial resilience index computed using these two measures: whether an individual’s family rarely goes without cash income, or whether the individual is likely to be able to come up with emergency funds within a month; \( T_i \) represents the treated individual (financially included individual); \( t_i \) is the year dummy variable (1 for post-treatment: 2019; and 0 for pre-treatment: 2017); \( X_i \) are baseline controls (gender, employment, education, age, locality, marital status, phone ownership, negative external shock); and \( \varepsilon_i \) is a random unobserved error. \( \alpha \) is a constant term; \( \beta \) is the treatment group-specific effect to account for average permanent differences between treatment and control groups; \( \gamma \) is the time trend common to the two different
groups of financial users and non-users; \( \delta \) is the estimated effect of the treatment (i.e. the regression coefficient on the interaction between the type of treated group \( T_i \) and time \( t_i \)); and \( \Phi \) represents the impact of the controls. Standard errors are calculated as clustered at the location level. Equation (2) is estimated as a standard linear model.

We verify any parallel trend by employing KPSM to match treated and comparison groups on a set of observable characteristics. Intuitively, propensity score matching aims to match individuals between the control and treatment groups. It seeks to enable observational study to mimic the design of an experimental study that finds a control group of respondents who are similar to the treated group in all relevant baseline characteristics (Rosenbaum & Rubin, 1983). The unobserved counterfactual outcome is imputed by matching the financially included respondents with non-included respondents who are as close as possible regarding the relevant baseline characteristics. Kernel matching constructs the counterfactual using all control observations within a defined neighbourhood and assigns a positive weight to all observations within the neighbourhood and only observations in the neighbourhood (Blundell & Costa Dias, 2009).

As argued by Heckman, LaLonde, and Smith (1999), finding an appropriate counterfactual is a challenging task in impact evaluation. Heckman et al. (1999) and Smith and Todd (2001) show how KPSM constructs a counterfactual comparison group for impact evaluation. KPSM estimates the average effect of the intervention (formal finance, savings, m-money) and takes the form of:

\[
ATT = E(\Delta|X, T = 1) = E(Y^1 - Y^0|X, T = 1) = E(Y^1|X = 1) - E(Y^0|X, T = 1)
\]

(3)

where \( ATT \) measures the average impact of the intervention on the treated and their household; \( X \) is the same set of pre-treatment control variables. The expression \( E(Y^0|X, T = 1) \) denotes the counterfactual outcome, which is not observed; while KPSM statistically produces this counterfactual outcome for the treated by generating the probability of being a user of the form of the intervention (i.e. formal account, savings, m-money). It then matches the financial user and non-user who have similar propensity scores. Specifically, KPSM estimates the average impact of the above interventions on users (and their household) by constructing a statistical comparison group based on the probability of being a financial user \( T \) conditional on the observed characteristics \( X \), given by the propensity score: \( P(X) = Pr(T = 1|x) \) (Abadie and Imbens 2006; Khandker, Baqui Khalily, & Samad, 2010; Rosenbaum & Rubin, 1983).

Unlike traditional regression-based techniques, KPSM has the inherent advantage of using characteristics not affected by an intervention but correlated with both the outcome variable and the intervention. As argued by Heckman et al. (1999), KPSM produces relatively low-bias and reliable estimates when: (a) the treatment and control groups are all drawn from the same data source; (b) treatment and control groups are both exposed to similar economic conditions; and (c) there are variables that can be used to explain the variations in the outcome variable and also identify self-selection into the programme or usage of the intervention.

Given the estimated propensity scores, \( P(X) \), and under the main assumptions, i.e. conditional independence, independent and identically distributed observations, and a common support, we estimate equation (2) using the KPSM-DID approach. Respondents whose propensity score fell outside the area of overlap between the different classes of financial users and corresponding non-financial users were dropped, thus fulfilling the assumption of common support. The distribution is presented in Figure 4.

As shown in Table A2, the \( t \) test shows that on average the treated group is comparable to the control group on any of the observed characteristic at baseline – the difference between the two groups is statistically insignificant at 0.05 significance level.

To fulfil the conditional independence assumption, we selected control variables (gender, employment, education, age, locality, marital status, phone ownership, negative external shock) well informed by the theoretical and empirical literature to be determinants of financial inclusion at baseline (Fungáčová & Weill, 2015; Zins & Weill, 2016), but which cannot be directly influenced
by financial inclusion. As demonstrated by Zins and Weill (2016), groups such as rural residents, women, less educated, and unemployed are typically excluded from the formal financial system, thus are key determinants of financial inclusion. In view of this, we included variables such as gender, locality (rural/urban), employment, and education in estimating the propensity score. Results for first stage PSM are reported in Table A1 in the appendix.

The inclusion of phone ownership, marital status, and age in estimating the propensity score was informed by Fungáčová and Weill (2015) and Demirgüç-Kunt, Klapper, and Randall (2013), who found these variables to be strong determinants of financial inclusion. Although these studies highlight income as another key determinant, we exclude it from our analysis. This is because there was a refusal rate of over 35 per cent on the income question in the first survey, resulting in a considerable loss of data.

Since the gender effects constitute the centrality of our paper, we re-estimate equation (2) using the matched sample estimated in equation (3) where \( T_i \) is now either a financially included female or financially included male. All other parameters and variables remain the same.

5. Empirical results

5.1. Financial inclusion and household resilience: an aggregated index analysis

We use multidimensional financial inclusion and resilience indices discussed in Section 3.3. The treatment group is a dummy variable representing individuals whose financial inclusion index score is greater than the median score, which also equates to individuals who use at least two of the financial products (savings, formal account, and mobile money). The outcome variable is a continuous variable, the higher the score, the stronger the resilience. The results are discussed in the context of marginal effects. In Table 4, under columns (2) & (3), we present the gender-differential effects, comparing the resilience effect of men’s financial inclusion to that of women. The distributional results for rural and urban households are also presented in Table 4 panel B and C.

We find that households of financially included persons (those who use at least two financial products) are approximately 44 per cent more likely to be financially resilient. Looking at how the effects vary by gender of the treated, we see that although financially included men improve their household’s resilience by about 24 per cent, with women’s financial inclusion yielding a lesser resilience effect of 19 per cent, the statistical test for the equality of regression coefficient suggests that the difference is not statistically significant (Table A3)\(^4\).

In terms of the distributional effect for rural and urban households, the results suggest that the effect of being financially included significantly increases the likelihood of the user’s household being financially resilient irrespective of locality. Interestingly, the resilience effect is greater in rural than in urban areas, although the z-statistic leads us to conclude that difference is insignificant (i.e. \( z = 0.3773; p > 0.05 \)). Similarly, both men and women’s financial inclusion exerts a greater resilience effect in rural areas, compared to urban areas, however, based on the z-statistic we cannot conclude that either effect is significantly more pronounced for rural households (see Table A2).

5.2. Different measures of financial inclusion

On all three measures of financial inclusion, we find that those who are financially included are more likely to be financially resilient. Savings yields the strongest effect on household financial resilience, increasing its probability by an estimated ~39 per cent, with a lesser impact of formal account penetration (~36 per cent) and m-money (~28 per cent). While the savings effect and formal finance effect are similar in statistical terms, the m-money effect is statistically different from the savings and formal finance effects (Table A2 & Table 5).

The above differential results are consistent with the theoretical arguments that although formal finance opens a broader range of financial services, actual usage of a formal account, in this case
savings, is actually what has a direct bearing on economic well-being. The shock-absorbing effect of savings is also found in Belayeth Hussain et al. (2019) and Bharadwaj, Jack, and Suri (2019). In terms of m-money, its effect is not as strong as savings or formal account perhaps because as observed in Ahmad, Jiang, Green, and Sakyi-Nyarko (2020) m-money is mainly used for remittances, with the amounts involved being relatively small, thus more suitable for day-to-day purchases. That notwithstanding, using m-money is more cost-effective than formal finance, offering its users considerable cost savings (Aker, Boumnijel, McClelland, & Tierney, 2016), which help cushion the household against unexpected small income losses. The negative coefficients on d2019 reflect our earlier observation that financial resilience decreased for many respondents between 2017 and 2019, possibly due to less favourable macroeconomic outcomes (Section 3), and this shows the importance of controlling for common trends in the analysis. Overall, these results confirm the burgeoning realisation that ‘our knowledge of the impact of financial inclusion can only be as good as our measurement of it’ (Pesqué-Cela, Tian, Luo, Tobin, & Kling, 2021, p. 317).

Although we examine how the different measures of financial inclusion relate to the two proxies of financial resilience from both locality and gender dimensions, we report the results in a separate file as Supplementary Materials in order to keep our main presentation compact.

5.3. Remittance function of m-money and its effect on financial resilience

Given the above results with respect to financial inclusion amongst women, we seek to examine in this section, through a gender lens, the results obtained when more precise measures of financial inclusion are used, focussing on m-money remittances (sent or received) for emergency support. It may be that broad measures of financial inclusion such as formal account ownership and m-money usage may be too generic to be used to gauge household welfare effects. We focus on m-money transactions as these are the likely to be of most importance to the otherwise financially excluded,

Figure 4. Propensity score distribution among treatment and comparison observations. Source: Authors’ estimates.
Table 4. Disaggregated results (by gender and locality) – Effect of financial inclusion on household financial resilience: Kernel propensity score matching DID

| Financial Resilience Index | Finanially Included (both sexes) | Financially Included Female | Financially Included Male |
|---------------------------|----------------------------------|----------------------------|--------------------------|
| d2019                     | −.2403***                       | −.0062                     | −.0369*                  |
|                           | −.022                           | −.023                      | −.022                    |
| Measure of financial inclusion | −.2960***                     | −.1345***                  | −.1868***                |
|                           | −.025                           | −.028                      | −.023                    |
| ATT                       | .4378***                        | .1933***                   | .2385***                 |
|                           | −.031                           | −.033                      | −.031                    |
| Bonferroni-adjusted p-values | 0                             | 0                          | 0                        |
| Rsquare                   | 0.09                            | 0.03                       | 0.05                     |
| Observation               | 1971                            | 1983                       | 1981                     |

Panel B: ATT in rural areas

| Financial Resilience Index | Finanially Included (both sexes) | Financially Included Female | Financially Included Male |
|---------------------------|----------------------------------|----------------------------|--------------------------|
| d2019                     | −.2179***                       | 0.0138                     | −.0703**                 |
|                           | −.036                           | −.039                      | −.035                    |
| Measure of financial inclusion | −.2993***                     | −.1244***                  | −.2352***                |
|                           | −.04                            | −.046                      | −.036                    |
| ATT                       | .4177***                        | .1914***                   | .2527***                 |
|                           | −.05                            | −.035                      | −.049                    |
| Bonferroni-adjusted p-values | 0                             | 0                          | 0                        |
| Rsquare                   | 0.08                            | 0.04                       | 0.06                     |
| Observation               | 815                             | 759                        | 822                      |

Panel C: ATT in urban areas

| Financial Resilience Index | Finanially Included (both sexes) | Financially Included Female | Financially Included Male |
|---------------------------|----------------------------------|----------------------------|--------------------------|
| d2019                     | −.1992***                       | −.0268                     | −.0015                   |
|                           | −.029                           | −.03                      | −.028                    |
| Measure of financial inclusion | −.2239***                     | −.1076***                  | −.1414***                |
|                           | −.032                           | −.035                      | −.03                     |
| ATT                       | .3933***                        | .1587**                    | .2053***                 |
|                           | −.041                           | −.043                      | −.04                     |
| Bonferroni-adjusted p-values | 0                             | 0                          | 0                        |
| Rsquare                   | 0.08                            | 0.03                       | 0.04                     |
| Observation               | 1119                            | 1120                       | 1162                     |

Each column represents a different category of the treated group in the Linear Regression Model. Columns (1), (2) and (3) measure financial inclusion as a dummy variable representing three financially included groups: financially included group (gender neutral), financially included female, and financially included male respectively. All regressions are estimated using the diff command in Stata. Marginal effects are reported. Robust standard errors where (*) (**) (***) denotes (0.1) (0.05) (0.01) significance levels.

especially those in rural areas who may not find it possible to access formal financial institutions. There is evidence that m-money access improves household welfare by enhancing resistance to unanticipated negative shocks especially through receipt of remittances through family and social networks (Jack & Suri, 2011, 2014). Ahmad et al. (2020) report that this effect is particularly clear when m-money remittances are used as the determining variable. Exceptionally, Mawejje (2017) reports that m-money remittances received have little effect in mitigating the impact of adverse shocks on household consumption in Uganda. We therefore examine receipt and sending of remittances via m-money as more direct ways of improving financial resilience.

We replace the financially included male and female variables in equation (2) using the matched units estimated in equation (3) with two separate binary variables representing women and men who have received or sent (respectively) m-money remittances from or to family, friends, or others for emergency purposes. We first estimate the effect of men and women’s receipt of m-money remittances. The results suggest that the household resilience effect is similar for male (\( b = 0.072; SE = \))
Table 5. Financial inclusion and household financial resilience: Kernel propensity score matching DID (All samples)

| Financial Resilience Index | Whole sample |
|---------------------------|--------------|
|                           | -1           | -2           | -3           |
| d2019                     | -.2114***    | -.1406***    | -.2431***    |
|                           | -.022        | -.022        | -.022        |
| Measure of financial inclusion | -.2458***    | -.2627***    | -.1093***    |
|                           | -.024        | -.021        | -.029        |
| ATT                       | .3923***     | .3644***     | .2811***     |
|                           | -.031        | -.032        | -.031        |
| Bonferroni-adjusted p-values | 0           | 0            | 0            |
| Rsquare                   | 0.07         | 0.08         | 0.07         |
| Observation               | 1980         | 1984         | 1979         |

Panel B: ATT in rural areas

|                           | -1           | -2           | -3           |
| d2019                     | -.1530***    | -.1507***    | -.2190***    |
|                           | -.036        | -.037        | -.041        |
| Measure of financial inclusion | -.2107***    | -.2760***    | -.1768***    |
|                           | -.038        | -.034        | -.052        |
| ATT                       | .3403***     | .3550***     | .2451***     |
|                           | -.05         | -.052        | -.049        |
| Bonferroni-adjusted p-values | 0           | 0            | 0            |
| Rsquare                   | 0.05         | 0.08         | 0.03         |
| Observation               | 817          | 808          | 818          |

Panel C: ATT in urban areas

|                           | -1           | -2           | -3           |
| d2019                     | -.1891***    | -.084        | -.2518***    |
|                           | -.029        | -.027        | -.029        |
| Measure of financial inclusion | -.2267***    | -.2024***    | -.0745**     |
|                           | -.031        | -.026        | -.034        |
| ATT                       | .3711***     | .3188**      | .3112***     |
|                           | -.041        | -.039        | -.041        |
| Bonferroni-adjusted p-values | 0           | 0            | 0            |
| Rsquare                   | 0.07         | 0.07         | 0.1          |
| Observation               | 1104         | 1162         | 1161         |

Each column represents a different category of the treated group in the Linear Regression Model. Columns (1), (2) and (3) measure financial inclusion as a dummy variable representing three financially included groups: savers, formal account owners, and m-money users. All regressions are estimated using the diff command in Stata. Marginal effects are reported. Robust standard errors where (*) (**) (***) denotes (0.1) (0.05) (0.01) significance levels.

0.032) and female (b = 0.082; SE = 0.035) m-money remittance receivers (table S8 in Supplementary Material, panel A).

When we turn to the rural/urban split, we see that for both women and men’s financial inclusion (as measured by receipt of m-money remittances) the resilience effect is significantly greater in rural households compared to urban households. More specifically financially included rural women have a substantially greater probability of better household financial resilience (30.5 per cent), higher than for financially included rural males (13 per cent). These findings for urban and rural Ghana combined with those of Jack and Suri (2014) for Kenya, Maweje (2017) for Uganda, and Ahmad et al. (2020) for Ghana strongly suggest that m-money remittances can positively affect household resilience to unanticipated negative shocks, but that the magnitude of the effect may be region- or country-specific.

To the extent that m-money users (particularly senders) tend to experience greater reciprocity in remittances (Jack, Ray, & Suri, 2013), individuals who send m-money remittances to family and friends are also expected to be less financially vulnerable to negative shocks. We therefore re-estimate equation (2) again (with the matched units), replacing the treatment variable with dummy variables for male and female users who sent m-money remittances to family and friends or others for
emergency purposes, representing another dimension by which financial inclusion can affect household financial resilience (table S8 and S9 in Supplementary material).

6. Conclusion
Using household data obtained from two rounds of surveys in Ghana to understand how individuals access formal and m-money financial services, as well as the extent of usage of formal accounts, m-money, and savings habits, we examined how these characteristics of financial inclusion influence household financial resilience, especially from the gender dimension. The main results provide new robust evidence that financial inclusion plays an important role in contributing to a household’s financial resilience irrespective of gender and locality (rural/urban), and that savings are a key component of financial inclusion in promoting resilience.

The central result is that irrespective of the measures used, or of the gender of the individual, financial inclusion invariably has a greater impact on financial resilience for those in rural areas than for those in urban areas. This suggests that even a modest improvement in financial inclusion in rural areas are likely to have big impact on household resilience. We also found that there were important differences among the impact of the different measures of financial inclusion. In particular, the ability to save is generally reliably more effective in improving resilience than either owning a formal account or a m-money account, either of which may be owned but not used.

We also investigated more alternative measures of m-money use that may affect financial resilience. We found that in rural Ghana, sending of m-money remittances (being a proxy for social capital) irrespective of gender provided financial resilience effect for the user’s household, with a generally stronger effect in rural than in urban areas, especially for males. Receipt of m-money remittances also provided financial resilience, yielding a much stronger effect in rural areas, especially for females.

It is interesting to note that, comparing men and women, the effect of men’s financial inclusion on household resilience is not statistically different from women’s, suggesting that women contribute to their household’s well-being as much as men. However, comparing rural and urban females we find that the effect of inclusion in rural areas is generally stronger than in urban areas, and this underscores the importance of financial inclusion in necessarily more geographically dispersed communities.

In terms of policy implications, two results stand out. The results confirm that in times of an external shock, households that have at least a member being financially included would be more likely to endure the adverse changes that result. The results also suggest that women who use m-money for remittance purposes, especially in rural areas, are more likely to significantly improve their households’ financial resilience to any adverse effects of an external shock. These implications can be extended in several directions. For example, in times of severe macro-economic stress, such as COVID-19 has brought on, it is imperative for governments of African countries to provide an enabling environment for financial inclusion (especially of women) to thrive, as it can play an important role in mitigating the socio-economic impact of the shock, as well as contributing to an inclusive recovery process.

Notes
1. *Susu* is form a traditional method of saving where for a small fee savers are provided with an informal means to save and access their own money, and gain some limited access to credit, a form of microfinance.
2. Respondents were asked how possible it was for them to come up with a sum of money to pay for an emergency within the next month. The sum was set at approximately 10 per cent of Ghana’s Gross National Income per capita: GH₵800 in 2017 and GH₵1,100 in 2019 respectively.
3. https://www.focus-economics.com/countries/Ghana; accessed May 7th, 2021.
4. The test is carried out using $z = \frac{b_1 - b_2}{SE_{b1} + SE_{b2}}$
where $b_1$ and its corresponding $SE$ are the coefficient and standard error of the variable of interest from the first regression model, while $b_2$ and its corresponding $SE$ are the coefficient and standard error of the variable of interest from the second regression model. We accept the null hypothesis that $b_{male} = b_{female}$ ($z = -1.247; p > 0.05$). For full details, see Paternoster, Brame, Mazerolle, and Piquero (1998)
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References

Abadie, A., & Imbens, G. (2006). Large sample properties of matching estimators for Average Treatment Effects. *Econometrica*, 74(1), 235–267.

Ackah, C., & Medvedev, D. (2010). *Internal migration in Ghana: Determinants and welfare impacts*. Policy Research working paper; no. WPS 5273. World Bank. Retrieved 24 September 2020. https://openknowledge.worldbank.org/handle/10986/3760

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 Papers. Manuscript submitted for publication 4 April 2020.

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.

Al-shami, S. S. A., Razali, R. M., & Rashid, N. (2018). The effect of microcredit on women empowerment in welfare and decisions making in Malaysia. *Social Indicators Research*, 137(3), 1073–1090.

Alesina, A. F., Lotti, F., & Mistrulli, P. E. (2013, January). Do women pay more for credit? Evidence from Italy. *Journal of the European Economic Association*, 11(S1), 45–66.

Allen, F., Demirguc-Kunt, A., Klapper, L., & Peria, M. M. (2016). The foundations of financial inclusion: Understanding ownership and use of formal accounts. *Journal of Financial Intermediation*, 27, 1–30.

Alliance for Financial Inclusion (AFI). (2016). *AFI Annual Report 2016*. AFI. Retrieved 24 September 2019. www.afi-global.org/publications/2498/2016-AFI-Annual-Report

Aportela, F. (1999). Effects of financial access on savings by low-income people. Banco de México. Retrieved September 14, from https://citeserx.ist.psu.edu/viewdoc/download?doi=10.1.1.194.5270&rep=rep1&type=pdf

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.

Athey, S., & Imbens, G. (2006). Identification and inference in nonlinear difference in differences models. *Econometrica*, 74(2), 431–497.

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. (2018). Annual report 2018, Accra, Ghana. *Bank of Ghana*. Retrieved 2 December 2019. Retrieved from https://www.bog.gov.gh/wp-content/uploads/2019/07/AnnRep-2018.pdf

Bank of Ghana. (2019). Annual report 2019, Accra, Ghana. *Bank of Ghana*. Retrieved May 6, 2020, from https://www.bog.gov.gh/wp-content/uploads/2020/06/AnnRep-2019.pdf

Bank of Ghana. (2020). 2020 banking sector report, Accra, Ghana. *Bank of Ghana*. Retrieved June 5, 2019, from https://www. bog.gov.gh/monetary_policy_rpts/banking-sector-report-report-may-2020/

Beck, T., & Cull, R. (2013). Banking in Africa. *Policy Research Working Paper no. 6684*, Washington D.C., The World Bank.
Belayth 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.

Bharadwaj, P., Jack, W., & Suri, T. (2019). Fintech and household resilience to shocks: Evidence from digital loans in Kenya. NBER Working Paper, No. w25604, National Bureau of Economic Research.

Blundell, R., & Costa Dias, M. (2009). Alternative approaches to evaluation in empirical microeconomics. The Journal of Human Resources, 44(3), 565–640.

Browning, M., Crossley, T. F., & Weber, G. (2003). Asking consumption questions in general purpose surveys. The Economic Journal, 113(491), F540–F567.

Cameron, A. C. (2009). Microeconometrics: Current methods and some recent developments. In T. C. Mills & K. Patterson (Eds.), Palgrave handbook of econometrics (pp. 729–774). London: Palgrave Macmillan.

Deaton, A. (2005). Measuring Poverty in a Growing World (or Measuring Growth in a Poor World). Review of Economics and Statistics, 87(1), 1–19.

Demirguc-Kunt, A., Klapper, L., & Randall, D. (2013). Islamic finance and financial inclusion: Measuring use of and demand for formal financial services among muslim adults (Policy Research Working Paper No. 6642). Journal of Economic Development, 27, 97–105.

Demirguc-Kunt, A., Klapper, L., & Singer, D. (2017, April). Financial inclusion and inclusive growth a review of recent empirical evidence. World Bank Policy Research Working Paper, WPS8040.

Duflo, E. (2012). Women empowerment and economic development. Journal of Economic Literature, 50(4), 1051–1079.

Dupas, P., & Robinson, J. (2013). Why don’t the poor save more? Evidence from health savings experiments. American Economic Review, 103(4), 1138–1171.

Duvvendack, M., & Mader, P. (2019). Impact of financial inclusion in low- and middle-income countries: A systematic review of reviews. Campbell Systematic Reviews, 15(1–2): e1012. Retrieved November 2020, from .

Fungadóvá, Z., & Weill, L. (2015). Understanding financial inclusion in China. China Economic Review, 34, 196–206.

Ganle, J. K., Afriyie, K., & Segbefia, A. Y. (2015). Microcredit: Empowerment and disempowerment of rural women in Ghana. World Development, 66, 335–345.

Heckman, J. J., LaLonde, R. J., & Smith, J. A. (1999). The economics and econometrics of active labour market programs. In O. C. Ashenfelter & D. Card (Eds.), Handbook of labour economics, Vol. 3 (pp. 1865–2097). Amsterdam: Elsevier.

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.

Jack, W., Ray, A., & Suri, T. (2013). Transaction networks: Evidence from mobile money in Kenya. American Economic Review: Papers and Proceedings, 103(3), 356–361.

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.

Jiang, F., Sakyi-Nyarko, C., Ahmad, A. H., & Green, C. J. (2021).forthcoming. Mobile Money, Financial Inclusion and Poverty: Key Results from Two New Surveys in Ghana. Ch 10. In A. H. Ahmad, D. T. Llewellyn, and V. Murinde (Eds.), Inclusive financial development (pp. 189-223). (New Horizons in Money and Finance) Cheltenham, Edward Elgar.

Kabeer, N. (2001). Conflicts over credit: Re-evaluating the empowerment potential of loans to women in rural Bangladesh. World Development, 29(1), 63–94.

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.

Karlan, D., Ratan, A. L., & Zinman, J. (2014). Savings by and For the Poor: A Research Review and Agenda. Review of Income and Wealth, 60(1), 36–78.

Khandker, S. R., Baqui Khalily, M. A., & Samad, H. A. (2010). Seasonal and Extreme Poverty in Bangladesh: Evaluating an Ultra-Poor Microfinance Project. Policy Research Working Paper 5331, Washington D.C., World Bank.

Kling, J. R., Lieberman, J. B., & Katz, L. F. (2007). Experimental analysis of neighbourhood effects. Econometrica, 75(1), 83–119.

Larson, J. B., Castellanos, P., & Jensen, L. (2019). Gender, household food security, and dietary diversity in western Honduras. Global Food Security, 20, 170–179.

Mahmud, S., Shah, N. M., & Becker, S. (2012). Measurement of women’s empowerment in rural Bangladesh. World Development, 40(3), 610–619.

Maweje, J. (2017). Financial inclusion and household risk management: Survey evidence from Uganda. AERC Thematic Research Paper. Nairobi, African Economic Research Consortium.

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(4), 101–132.

Narain, S. (2009). Gender and access to finance. Analytical Working Paper. Washington D.C: 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.
Paternoster, R., Brame, R., Mazerolle, P., & Piquero, A. (1998). Using the correct statistical test for the equality of regression coefficients. *Criminology, 36*(4), 859–866.

Pesqué-Cela, V., Tian, L., Luo, D., Tobin, D., & Kling, G. (2021). Defining and measuring financial inclusion: A systematic review and confirmatory factor analysis. *Journal of International Development, 33*(2), 316–341.

Rosenbaum, P., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika, 70*(1), 41–55.

Sakyi-Nyarko, C. (2018). *Investigating the nature and extent of the relationship between financial inclusion and human development in African and the Middle East, with a special focus on Ghana* (Doctoral Dissertation). Loughborough University, England, Loughborough.

Salia, P. J. (2014). The effect of microcredit on the household welfare (empirical evidence from women micro-entrepreneurs in Tanzania). *International Journal of Academic Research in Business and Social Sciences, 4*(5), 259.

Salmon, C. T., & Nichols, J. S. (1983). The next-birthday method of respondent selection. *Public Opinion Quarterly, 47*(2), 270–276.

Smith, J. A., & Todd, P. E. (2001). Reconciling conflicting evidence on the performance of propensity-score matching methods. *American Economic Review, 91*(2), 112–118.

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

World Bank. (2019). World Development Indicators. Washington DC, World Bank. Retrieved January 3, 2019, from https://datacatalog.worldbank.org/dataset/world-development-indicators.

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.
APPENDIX

Table A1. Probit regression – First stage results of propensity score matching (PSM)

| Variable          | financially included (1/0) |
|-------------------|----------------------------|
| female            | −0.335***                  |
|                   | (−3.62)                   |
| highly educated   | 1.052***                  |
|                   | (10.53)                   |
| rural             | −0.139                    |
|                   | (−1.45)                   |
| mobile            | 1.256***                  |
|                   | (5.92)                    |
| marital           | −0.118                    |
|                   | (−1.07)                   |
| A18-25            | −0.359                    |
|                   | (−1.82)                   |
| A26-35            | 0.0982                    |
|                   | (0.51)                    |
| A36-45            | 0.152                     |
|                   | (0.75)                    |
| A46-55            | −0.0549                   |
|                   | (−0.24)                   |
| employment        | 0.725***                  |
|                   | (6.11)                    |
| Zshock            | 0.184***                  |
|                   | (6.22)                    |
| constant          | −2.461***                 |
|                   | (−8.94)                   |

*Observations 984*

η statistics in parentheses
* p < 0.1, ** p < 0.05, *** p < 0.01

Table A2. Test of comparability between matched treated and control groups

| Variable          | Treated Control | t | p    |
|-------------------|-----------------|---|------|
| female            | .3897 .4531     | −1.87 | 0.061 |
| highly educated   | .6268 .6338     | −0.21 | 0.832 |
| rural             | .4155 .3685     | 0.140 | 0.161 |
| mobile            | .9812 .9930     | −1.52 | 0.129 |
| marital           | .5751 .6315     | −1.68 | 0.093 |
| A18-25            | .1808 .1643     | 0.63 | 0.526 |
| A26-35            | .3944 .3803     | 0.42 | 0.673 |
| A36-45            | .2676 .3239     | −1.80 | 0.072 |
| A45-55            | .0962 .0962     | −0.00 | 1.000 |
| employment        | .7817 .8146     | −1.19 | 0.233 |
| Zshock            | 2.775 2.554     | 1.94 | 0.053 |

η statistics in parentheses
* p < 0.05, ** p < 0.01, *** p < 0.001
### Table A3. Test for equality of regression coefficients

|                          | FI In Urban Sample (Both Sex) | FI Men (Whole Sample) | FI Men (Rural Sample) | FI Women (Rural Sample) | Female Remittance Receiver (Rural) | Female Remittance Receiver (Urban Sample) | Male Remittance Receiver (Whole Sample) | Male Remittance Receiver (Rural) |
|--------------------------|-------------------------------|-----------------------|-----------------------|-------------------------|-----------------------------------|-------------------------------------------|----------------------------------------|----------------------------------|
| FI in Rural Sample (Both Sex) | $z = 0.377$; p-value = 0.353 |                       |                       |                         |                                   |                                           |                                        |                                  |
| FI Women (Whole Sample)   |                               |                       |                       |                         |                                   |                                           |                                        |                                  |
| FI Men (Urban Sample)     |                               |                       |                       |                         |                                   |                                           |                                        |                                  |
| FI Women (Urban Sample)   |                               |                       |                       |                         |                                   |                                           |                                        |                                  |
| Saver                    |                               |                       |                       |                         | $z = 0.626$; p-value = 0.266      |                                           |                                        |                                  |
| Formal Account Owner      |                               |                       |                       |                         | $z = 2.536$; p-value = 0.006      |                                           |                                        |                                  |
| Female Remittance Receiver (Rural) |                       |                       |                       |                         | $z = 1.87$; p-value = 0.031       |                                           |                                        |                                  |
| Female Remittance Receiver (Urban Sample) |                       |                       |                       |                         |                                   |                                           |                                        |                                  |

*Note: $FI =$ Financially Included