



UNIVERSITÀ POLITECNICA DELLE MARCHE

DOCTORAL THESIS

Remittances, financial inclusion, household consumption and welfare

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General summary of the study

This study is broadly divided into two fully developed research papers. The first chapter examined the impact of remittances on inequality in access to financial services in developing countries. The dataset for the study was built from several sources, including Global Findex, World Development Indicators, World Bank, IMF, The Worldwide Governance Indicators and United Nations dataset on bilateral migration. Thus, the study combined micro-level data sources with macro-level information in the analysis. Based on data availability, the study covered 102 developing countries for three years, namely 2011, 2014 and 2017. The study employed fixed effects techniques with and without instrumental variables, and for robustness purpose different definitions of remittances were used in the analysis. One of the key findings is that while there is no evidence that remittances reduce overall variation in financial inclusion in developing countries, they significantly reduce the gender gap in financial inclusion. Based on such findings, the study made appropriate policy recommendations.

The second chapter is a country specific study focused on Ghana. The chapter examined the impact of financial inclusion on household welfare in Ghana, by specifically focusing on how financial inclusion affects household expenditure behavior. The study used the most recent Ghana Living Standard Survey dataset (i.e. GLSS 7), which was collected in 2016/2017. The analysis is divided into two parts: first, the impact of financial inclusion on the level of household expenditure was investigated using propensity score matching (PSM) technique. Second, the impact of financial inclusion on household expenditure budget shares was also examined by employing an instrumental variable approach and PSM for robustness. Each of these two analyses were further performed by dividing the overall sample into subsamples, where the effect of financial inclusion on female-headed households and their male-counterparts was examined, and the effect on rural

households and their urban counterparts was also investigated. Some of the major findings from the study include: (1) both the budget shares and the level of expenditure analyses show an inverse relationship between financial inclusion and household food consumption (2) the two results also show that the effect of financial inclusion yields stronger positive effects on investment in education for male-headed households compared to their female counterparts, while their female counterparts also spend more on investment in housing and consumer durables; (3) financially included rural households were also found to divert resources away from food consumption, temptation goods and the other goods category to investment in education, housing and consumer durables according to the budget shares result. Appropriate policy recommendations were provided based on the findings that emerged.

CHAPTER ONE: Remittances, variation in access to financial services and gender gap in developing countries

1. Introduction

This study seeks to investigate the impacts of remittances on the variation in financial inclusion and gender gap in developing countries. **Table 1** shows the flow of remittances to different regions in the Low- and Middle-Income countries. The region with the highest flow of remittances is East Asia and Pacific, while Sub-Saharan Africa region is last. The reported information shows that remittance inflows to the various regions, as well as the global level have generally shown an upward trend until 2020 where the forecasted figure shows a sharp decline from the previous year. At the global level, the flow of remittances was estimated at \$717 billion in 2019. This figure is forecasted to drop to \$ 666 billion in the year 2020. The decline is expected to continue to 2021, with a further drop to \$ 619 billion. The reduction in the flow of remittances is forecasted to affect all the regions reported in **Table 1**, but the Latin America and Caribbean (LAC) region looks more resilient as the projected remittance flow to this region in the year 2020 is expected to be no different from the 2019 estimated figure of \$ 96 billion. However, the forecasted remittance figure for the LAC region in 2021 shows a decline.

The projected decline in the flow of remittances is expected because of the decline in economic activities resulting from the COVID-19 pandemic. Since the COVID-19 cases were especially high in the major migrant hosting countries like the US and Europe (World Bank, 2020), remittances are expected to drop. Moreover, the World Bank's 2020 Migration and Development Brief 33 report asserts that the adverse impacts of COVID-19 have been higher on migrants, with regards to job loss and income. Other factors accounting for the projected decline in remittances as noted by the World Bank (2020) include the exchange rate and weak oil price. Despite the

projected decline in remittance, it is still expected to perform better than the other international flows.

Table 1

Remittance Flows to Low- and Middle-Income Regions

	2009	2016	2017	2018	2019e	2020f	2021f
	(\$ billion)						
Low and Middle Income	305	440	480	525	548	508	470
East Asia and Pacific	80	128	134	143	147	131	126
Europe and Central Asia	35	40	48	55	57	48	44
Latin America and the Caribbean	55	73	81	89	96	96	88
Middle-East and North Africa	31	51	57	58	60	55	50
South Asia	75	111	117	132	140	135	120
Sub-Saharan Africa	28	38	42	48	48	44	41
World	435	596	642	695	717	666	619

Source: World Bank (2020)

Note: e = estimate; f = forecast

Figure 1 provides the flow of remittances and other international financial inflows to low- and middle-income countries. In the early 1990s, official development assistance (ODA) was higher than remittances and the other two international flows, namely private debt and portfolio equity and foreign direct investment (FDI). However, in recent years remittances have risen higher above ODA and private debt and portfolio equity as depicted in Figure 1. With FDI showing downward trend in recent times, the flow of remittances to low- and middle-income countries have

risen beyond FDI according to the projections in Figure 1. The flow of remittances also appears relatively stable compared to FDI and ODA . However, the projected values for the years 2020 and 2021 show a decline in remittances. According to the World Bank (2020) report (i.e. Migration and Development Brief 33), this is the steepest decline in remittances in recent history, but it is still expected to be higher than FDI and the other international flows.

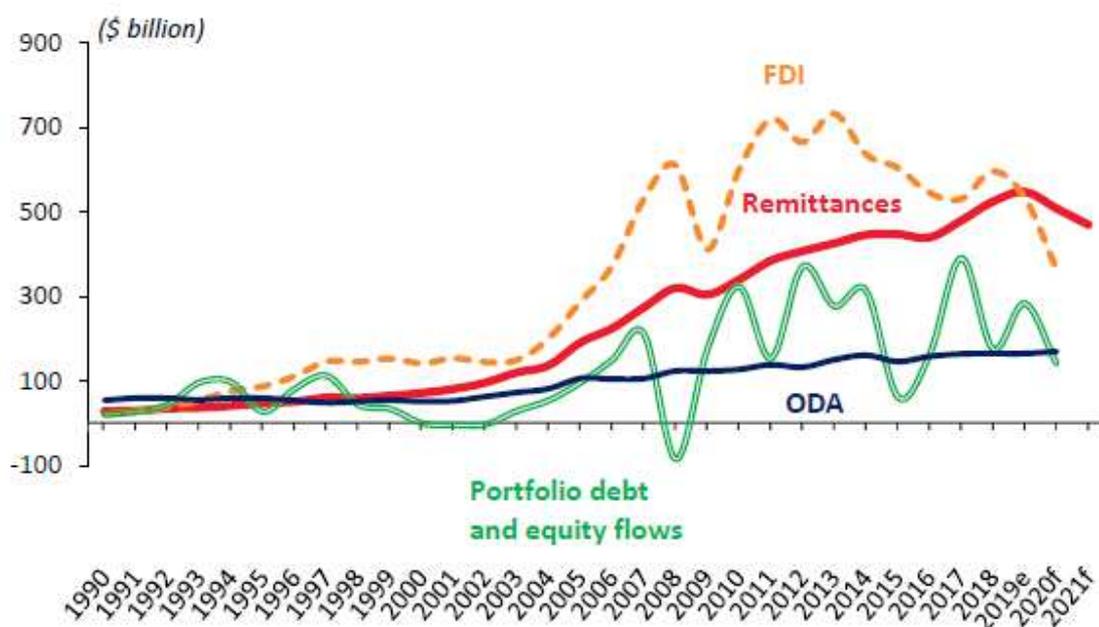


Figure 1. Remittances and other international financial flows to low- and middle-income countries

Sources: World Bank (2020)

According to Figure 2, India is projected first among the top ten remittance recipients, receiving \$76 billion in remittances, followed by China which received \$60 billion and then a large drop to the third position, with Mexico receiving \$41 billion in remittances whilst the country on the last position is Ukraine which received \$14 billion. Whilst these economies receive huge amount of remittances, they constitute a very small percentage of their GDP since they are generally large economies. On the other hand, small economies like Tonga, Haiti, Lebanon among

others are not found among the top ten remittance receiving economies yet receive a chunk of their GDP from remittances. The share of remittances to their GDP is 40, 38, and 36 percent respectively, which shows the extent of their dependence on remittances.

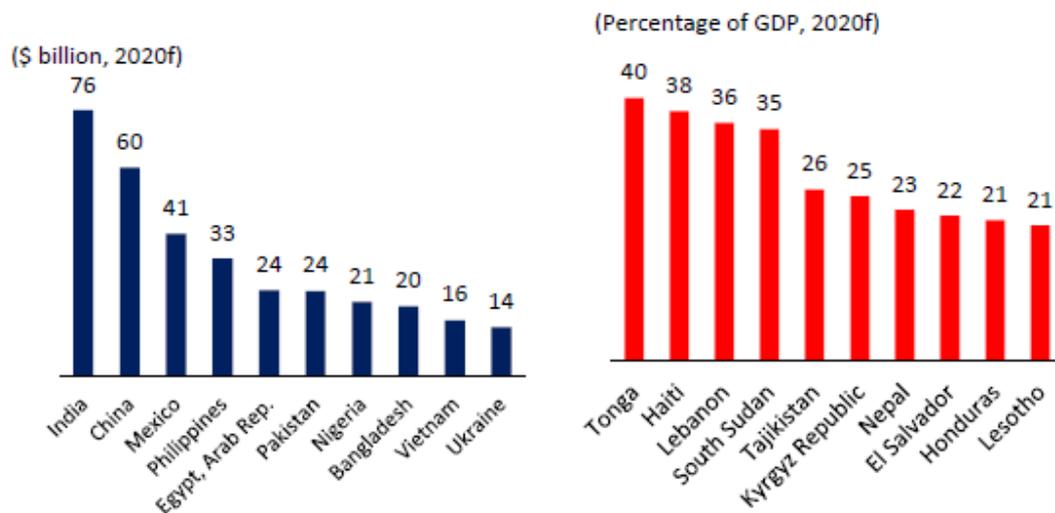


Figure 2. Top remittance recipients and top remittance dependent economies in 2020e

Source: World Bank (2020)

Note: The top recipient countries include several high-income countries such as France and Germany (not shown in the figure), but as a share of GDP, remittance flows to these countries are negligible. GDP = gross domestic product.

Note: e = estimate; f = forecast

Remittances have a wide range of benefits to households and the economy at large. At the household level, remittances could be the lifeline for some poor households. According to IFAD and world Bank (2015), remittances have been referred to as the largest poverty reduction program in the world. Several studies have supported the poverty reduction benefit of remittances (Adam et al., 2008; Adams & Page, 2005; Gupta et al., 2009). Remittances can provide some financial stability to households living in rural areas with volatile income by smoothing their consumption

and improving their welfare. In times of need or crisis, remittances tend to be a very reliable cushion for households and families. Remittances are usually timely and enough to meet the needs of the recipients. This can help in the timely payment of school fees, hospital bills, loans and investment. Despite all the benefits remittance receivers get from remittances, it also has some negative effects at the household level which include reduction in labour supply as recipients become dependent on it; conspicuous consumption among others (Amuedo-Dorantes, 2014).

At the macro level, there are a lot of benefits conferred on remittance receiving economies. According to Amuedo-Dorantes (2014), remittances provide improvement in credit worthiness, economic stability, increase the flow of investment to enhance economic growth and poverty reduction. Amuedo-Dorantes (2014) notes two important characteristics of remittance which are resilience and counter cyclical nature which enables it to ease economic instability. In times of crisis or natural disasters, the flow of remittances increases to meet the increased needs and reduces in the absence of these crisis (IFAD and World Bank; 2015; Yang, 2008). Bugamelli and Paterno (2006) notes that since remittances increase hard currency in the economies of receiving countries, it helps prevent the receiving economies from experiencing unforeseen current account reversals in periods of economic instability. They also noted that remittances attract new investments and improve the credit rating of remittance receiving economies. Notwithstanding the many benefits of remittances on receiving economies, some studies (IFAD and World Bank; 2015; Amuedo-Dorantes, 2014) have reported the tendency of remittances to cause appreciation of the currencies of receiving economies, making exports expensive and imports cheaper.

Some studies have provided link between remittances and financial inclusion (Gani, 2016; Aga and Peria, 2014; IFAD and world Bank, 2015). According to Ratha (2007), when households

receive remittances it augments their income and provide poor households with financial resources. Remittances create a starting point which allows the building of other inclusive and sustainable financial services (IFAD & World Bank, 2015). When individuals or households receive remittances, savings and other financial services could be accessed. This is because receiving remittances can create demand for a safe place to keep excess cash until it is needed, and the remittance receivers would usually turn to the banks for this service (Toxopeus & Lensink, 2008). The idle cash could be saved or invested until the time it is needed. Moreover, when remittances are received from a formal financial institution, the remittance receivers could be enlightened on the financial products that are available (Toxopeus & Lensink, 2008). Thus, while empirical studies on remittances and financial inclusion are scarce, the few available studies report a positive relationship or correlation between the two variables. Factors which promote financial inclusion in general may also impact the gaps in financial inclusion since it is usually the poor and the disadvantaged group who are excluded from accessing the services of the formal financial sector. Therefore, factors which ensure that more people have access to formal financial services may disproportionately benefit the poor and the vulnerable group and thus aid in bridging the gaps in financial inclusion. However, empirical studies that investigate the impact of remittances on variation in financial inclusion and gender gaps are almost non-existent. To have a proper appreciation of the variation in financial inclusion and gender gap situation in developing countries, more details about the problem is provided based on the Findex dataset.

The Findex 2017 survey shows that 69 percent of all adults aged 15years and above have an account as of 2017. This figure is an improvement over the previous surveys where 62 percent and 51 percent were recorded in 2014 and 2011 respectively. Meanwhile, account ownership in developing countries rose from 54 percent in 2014 to 63 percent in 2017. This leaves the number

of unbanked adults globally at 1.7 billion as of 2017 compared to 2 billion in 2014, all of which live in the developing countries since ownership of account is almost universal in high income countries (Demirguc-Kunt et al., 2018). Among the unbanked adults, about half of the total live in just seven developing countries, namely, Pakistan, Nigeria, Mexico, Indonesia, India, China and Bangladesh. In the absence of formal financial services, the unbanked adults may be forced to depend on informal mechanisms for savings and other financial services which may be expensive, insecure, and limited in scope.

While efforts geared towards financial inclusion have seen great strides, the gaps in financial inclusion continue to persist. Globally, the percentage of men with account ownership according to the Findex database was estimated at 72 percent while the percentage of women owning a bank account stood at 65 percent in 2017, thus showing a gender gap of 7 percentage points. This figure is higher for developing countries where gender gap is estimated at 9 percentage points since 2011 (Demirguc-Kunt et al., 2018). It is important to note that gender gap has remained unchanged at their current level since 2011. The size of gender gap in developing countries varies widely. While countries such as Turkey, Pakistan and Bangladesh have a very wide gender gap close to 30 percentage points, countries such as Cambodia and Myanmar do not have significant gender gap. For Argentina, Indonesia, and the Philippines, account ownership among women was higher than men (Demirguc-Kunt et al, 2018).

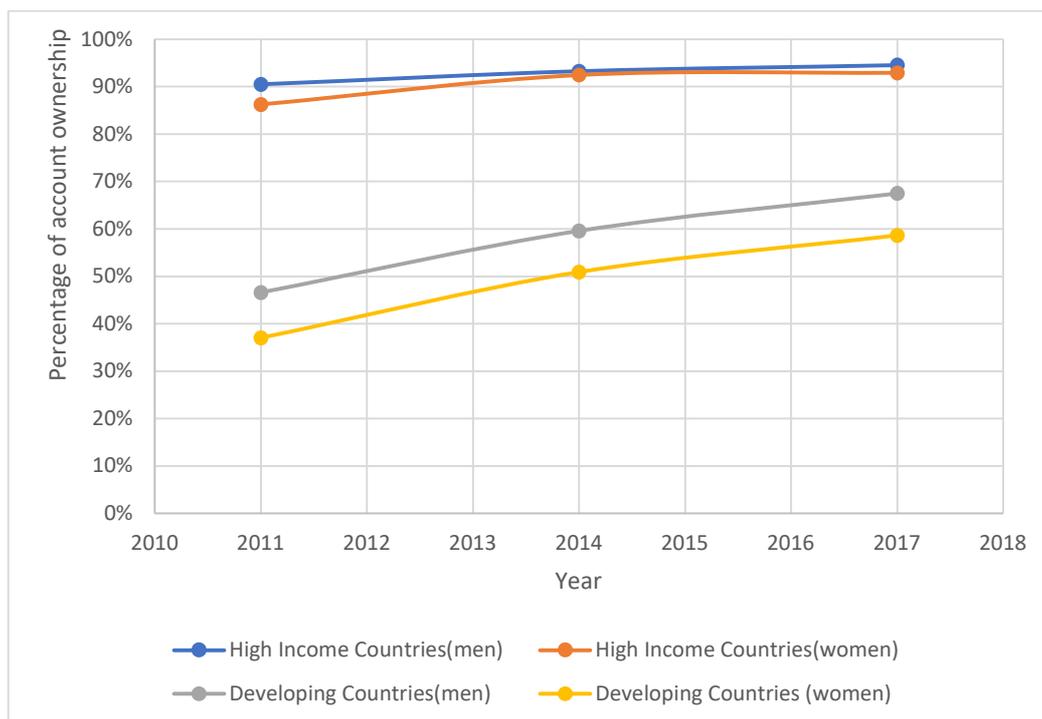


Fig. 3. Gender gap in financial inclusion

Data Source: Global Findex datadase (2017)

Apart from gender gap in account ownership, conspicuous gaps also exist in savings, debit and credit card ownership etc. At the global level, the Findex dataset shows that the percentage of men that saved in a financial institution was 24% versus 21% for women, and thus producing a gender gap of 3 percentage points in 2011. While the percentage of savings improved, the gender gap remained unchanged at 3 percentage points in 2014 but increased to 5 percentage points in 2017. In the case of developing countries, though the percentage of savings is lower than the global level, the pattern of change in the gender gap is identical to that of the global level as it also remained unchanged at 3 percentage points in 2011 and 2014 but increased to 6 percentage points in 2017. With regards to borrowing from financial institution (or using credit card), the gender gap was estimated at 3 percentage points at the global level for the years 2014 and 2017. For the same

years, gender gap recorded for formal borrowings in developing countries was stable at 4 percentage points. Gender gap also exists in credit card ownership, which remained stable at 3 percentage points in 2011, 2014 and 2017 at the global level while for developing countries, gender gap in credit card ownership increased from 2 percentage points in 2011 to 3 percentage points in 2014 and 2017. For debit card ownership, the dataset shows relatively larger increases in gender gap in developing countries and the global level. At the global level the dataset shows a gender gap of 5 percentage points in 2011. This figure increased to 7 percentage points in 2014 and 9 percentage points in 2017. In the case of developing countries, gender gap in debit card ownership was 6 percentage points in 2011, which increased to 8 percentage points in 2014 and 10 percentage points in 2017.

Demirguc-Kunt et al. (2013) notes that financial services usage is significantly related to gender. In explaining factors contributing to the variation in access to financial services between men and women, they assert that gender norms and legal discrimination against women could account for the inequality in financial access faced by women. With regards to gender norms, practices such as early marriages and violence against women explain the variation in financial access while in the case of legal restrictions on women, factors such as restrictions in women's ability to work, be households' heads, receive bequests, and decide the place to live, would reduce the likelihood that women would have access to financial services such as bank accounts, savings and borrowings.

Gender gap in access to financial services can result in gender gap in other economic outcomes. Meanwhile, empirical studies focusing solely on variation in financial inclusion are scarce since the few available studies mostly focus on financial inclusion and as rightly noted by Morsy and Youssef (2017), this situation could imply that some relevant aspects are neglected.

This study departs from focusing on financial inclusion in general but rather on the variation and gender gap in financial inclusion and how these gaps are impacted by remittances in developing countries. Thus, the two main contributions to literature are the following:

1. To investigate the impact of remittances on the overall variation in access to financial services in developing countries.
2. To examine the impact of remittances on the financial inclusion gender gap in developing countries.

To achieve these objectives, the study relied on fixed effects (without instrumental variables) and fixed effects with instrumental variable. The instruments for the study constitute the GDP per capita and the employment rate of the top 5 remittance sending countries. The findings of the study showed that remittances reduce gender gap in financial inclusion in both fixed effects without IV and fixed effects with IV. However, in the case of the overall variation in financial inclusion, the IV estimation provided no evidence that it is impacted by remittances.

The rest of the study is organized as follows: chapter two reviews both theoretical and empirical literature relevant for the study. Chapter three provides details of the methodology employed, while chapter four presents the results and discussion. In chapter 5, the conclusion and policy recommendations are provided.

2. Literature review

The literature review is divided into two parts. In the first part, the study deals with remittances and inequality theories since there are no theories which directly relate remittances to financial inclusion inequality. The study then proceeds to examine the empirical literature on remittances and financial inclusion. In the second part, the study focuses on the gender gap problem in financial inclusion.

2.1 Theories and empirical review of remittances, inequality, and financial inclusion

This section reviews theories and empirical literature relating to the subject of remittances and financial inclusion and inequality. In reviewing theories relevant to the topic of remittances and inequality in access to financial services, the study focuses on remittances and income inequality theories since income inequality leads to inequality in other economic opportunities including financial inclusion inequality. In theory, the impact of remittances on income inequality has been put into three different perspectives based on self-selection of immigrants, whether negative selection or positive selection, and how remittances are spent by households (Bang et al., 2016). According to Borjas (1987), negative selection of immigrants occurs when there is higher inequality in the distribution of wages in the home country of the immigrant and given that there is relatively high correlation between economies, the immigrants to the host country are made up of low skilled workers from the lower tail of the wage distribution in the home country. While positive selection of immigrants involves higher wage inequality in the host country attracting high skilled workers from the home country when there is high correlation between economies.

Bang et al. (2016) notes that theories explaining the relationship between remittances and income inequality can be put into three broad hypotheses based on immigrant's self-selection and

how immigrants' households in the home country spend remittances. The first hypothesis assumes that there is negative selection of immigrants to the host country and that the families of the immigrants in the home country invest a significant portion of the remittances received. Thus, the first hypothesis suggests that remittances may reduce the inequality in the distribution of income in migrants' home countries. The second perspective also assumes that immigrants are negatively selected but families of the immigrants in the home country become dependent on the remittances and cut back on labour supply resulting in increased income inequality. In the last hypothesis, immigrants are assumed to be positively selected. The positive selection implies more remittances to immigrants' families in the home country who already belong to the high-income group and hence worsening the inequality in income distribution of the home country.

The network theory summarizes these hypotheses as it shows that the impact of remittances on income inequality is not monotonic. According to the network theory, the impact of remittances on inequality is a dynamic process which depends on the migration history of the country concerned. When migrants begin to migrate to a new destination, information concerning the new destination, especially in terms of job opportunities, is scarce and therefore migrating is both costly and risky. At this stage, only high-income households can afford the cost of migration and the remittances they receive further widens the income disparities in the home country. However, as more migrants settle in the new destination, the network effect ensures that information on migration becomes widespread, thus resulting in a decline in migration costs. Massey et al (1993) notes that network connections are social capital which aid in securing foreign jobs. According to the authors, once migration reaches a certain threshold, the costs and risk of migrating decline due to expanded networks, causing more people to migrate and therefore a further expansion of networks and an increased probability that migration continues over time.

This situation allows also poor households to send some of their members abroad and receive remittances, which may lower the unequal income distribution in the home country. Thus, the “network effects” theory implies that remittances would have a non-monotonic impact on inequality over time. Various economic literature (Bauer et al., 2002; Munshi, 2003; McKenzie & Rapoport, 2004) also recognize the network effects of migration. Since income inequality is directly correlated with financial access inequality, it is expected that the relationship between remittances and financial inclusion inequality is also not monotonic.

The topic of financial inclusion is gaining a lot of attention in empirical literature where many previous studies have examined its impact on poverty reduction (Koomson et al., 2020; Adams et al., 2008; Du et al., 2005), income inequality (Acosta et al., 2008; Mishra, 2007), and economic growth (Zieseimer, 2012; Meyer & Shera, 2017). While significant efforts have been made in investigating the impact of financial inclusion on the stated economic outcomes, the inequality that exists in access to financial services is still relatively unexplored.

While the concentration of existing studies has been on remittances and financial inclusion, the findings of existing literature on this subject are still mixed. The study of Hossain (2014) conducted for 63 developing countries showed that remittances have negative and significant impact on savings. This phenomenon could be explained by the second hypothesis of Bang et al. (2016) described above, where remittance receiving families become dependent on remittances and reduce their supply of labour. It could also be explained by the fact that remittances encourage conspicuous consumption (Amuedo-Dorantes, 2014) and therefore discourage savings. Several other studies also found negative relationship between remittances and savings including Morton et al. (2010) for 20 remittance receiving countries; Athukorala and Sen (2004) for India; Caceres and Saca (2006) for EL-Salvador.

Yet other existing studies arrived at some differing findings. For instance, Aga and Peria (2014) found that there exists a positive relationship between remittances and financial inclusion for households in five Sub-Saharan African countries. This finding is consistent with the first hypothesis of Bang et al. (2016), which argues that the remittance receiving families of the migrants invest a large share of the remittances received. On the same positive relationship, Anzoategui et al. (2011) investigated the remittance-financial inclusion nexus for El Salvador. The findings revealed that remittances impact financial inclusion positively by encouraging deposit accounts usage. Other studies which also discovered positive relationship include: Gani (2016) for some selected countries in Asia; Baldé (2011) for sub-Saharan Africa; Das and Serieux (2010) for developing economies.

From the foregoing, it is evidenced that existing studies on this subject have focused on remittances and financial inclusion with inconclusive findings. Empirical studies that examine the nexus between remittances and the gaps in financial inclusion are almost non-existent. Gender gap and other forms of inequality exist in a lot of economic outcomes including income, labor force participation rate etc. It is not surprising that inequality and gender gap would also reflect in access to financial services since difference in economic opportunities between groups also affect their access to credit and other financial services.

2.2 Financial inclusion gender gap literature review

On the issue of financial inclusion inequality between men and women, Narain (2009) asserts that the barriers in financial inclusion which limits women access to finance relative to men, restricts the poverty reduction potential of finance as well as economic growth. The foregone macroeconomic gains and development resulting from the gender barriers could be very costly.

Demirguc-Kunt et al. (2013) found that there exist significant gender differences in account ownership, savings, and credit. They also made the following observations: first, the cross-country variation in financial access for women could be attributed to gender norms and legal discrimination against women. They asserted that women are less likely to own an account, save and borrow compared to their male counterparts if they face legal restrictions in their countries regarding their ability to be household head, work, receive bequest and choose where to live. Second, they found gender norms to contribute to the gender gaps in access to financial services. They asserted that violence against women and early marriage practices explain the gender differences between men and women. The findings of Demirguc-Kunt et al. (2013) are consistent with previous studies such as IFC (2011) and World Bank (2012).

Empirical literature on gender gaps in financial inclusion is rather scarce. Apart from Demirguc-Kunt et al. (2013), another study which examined the gender gaps in financial inclusion is Aterido et al (2011). The study examined gender differences in access to financial services using individual-level survey data for a sample of nine countries in Sub-Saharan Africa. The study found that gender gaps in education and level of income, being a household head and employment in the formal sector explain the lower patronage of formal financial services by women. Morsy and Youssef (2017) used a combination of bank-level data and other variables to understand determinants of gender differences in relation to financial services access, focusing on the banking system structure and the socio-economic participation of women. The findings of the study identified three factors which would increase the probability that women are excluded from the formal financial sector. These include: (1) countries with laws and norms which discriminate against women; (2) countries where the participation of women is relatively low compared to their male counterparts; and (3) countries where the state-owned banks dominate the banking system.

For many entrepreneurs, as their businesses grow and the need for additional capital arises, they usually fall on external financing from the financial institutions if they cannot fund it from personal sources. Women's equal and fair access to finance is one key concern of ILO's work with financial service providers (Sykes et al., 2016). There is evidence that no discrimination exists in access to finance between male-owned firms and female-owned firms in Latin America (Bruhn, 2009). Similarly, for high income countries like the United States, United Kingdom, Canada and New Zealand, women who apply for funds do not face arbitrary higher rate of denial relative to their male counterparts (Demirguc-Kunt, et al., 2013). However, greater and more systemic barriers in access to financial services have been reported by women entrepreneurs in many developing countries (Narain, 2009; Demirguc-Kunt et al., 2008; Ellis et al., 2007a and 2007b; Bardasi et al., 2007). There is evidence suggesting that financial service providers prefer group financing schemes for women (D'Espallier, 2011) and that individual loans granted to women are on average smaller than their male counterparts (Frank, 2008). Therefore, young women, especially those interested in taking loans to finance business activities often face "double strike" (Elder & Kring, 2016) as they face discrimination as women and also as young adults. According to evidence from the MENA region, the average size of the approved individual enterprise finance loan for young women was up to just half of those approved for young men (Coury & Rashid, 2015). Even though banks and other financial institutions discriminate against women in lending, these discriminations are not legal.

The low access to credit among women can be explained by many factors. First, there are lower financial literacy rates among women (Lusardi & Tufano, 2009), which makes it difficult for them to explore the loan market. Second, in terms of entrepreneurial abilities, significant differences exist in the level of skills and confidence between male and female (Jain et al., 2018).

For instance, in Vietnam, the percentage of young men who feel confident about their business skills is 40 percent, against 30 percent for females (Jain et al., 2018). There is also evidence (Menzies et al., 2004) that the business background of women is weaker compared to men, including lacking relevant education and business experience. Women also have difficulties in providing collateral or a guarantor for small loans (Chowdhury et al., 2018) and may have weaker credit histories. This implies that on average, the credit scores of women would be lower, which according to Narain (2009) are relevant requirements for lending.

Safavian and Haq (2013) notes that banks in Pakistan require male guarantors, not females; women borrowers require the permission of their husbands, while unmarried women in the country are rarely considered for loans. Meanwhile, a study carried out by Fletschner and Mesbah (2011) in rural Paraguay found that when women are able to take loans without opposition from their husbands and also when a larger share of family assets is under their control, they tend to know more about financial institutions and loan requirements.

The relationship between men and women could be shaped by legal regulation and customary laws which also influence the gender differences in access to resources; differential treatment under the law could result in weak property rights; women do not have title to their land or house to serve as collateral, therefore they may not be considered credit-worthy (Demirguc-Kunt, et al., 2013). Several studies (Demirguc-Kunt, et al., 2008; Ellis et al., 2007b; GEM/IFC, 2005; ILO/AfDB, 2004; Goheer, 2003) have noted that women may be restrained with regards to entering contracts in their own name, property control or possess the right to receive equal share of assets upon divorce or inheritance due to certain societal customs. The adverse credit history of husbands may also affect women because they may be denied credit on the account of their husbands' debt or be required to repay the debt of their husbands' credit (Naidoo & Hilton, 2006;

Blanchard et al., 2005). Women access to financial services may be restricted due to limitations placed on mobility and interactions outside the home and across gender lines (IFC, 2011).

Policies directed at promoting financial inclusion in general or reducing the proportion of adults excluded from accessing financial services may not impact equally on women's financial inclusion. Special attention may be needed to cater for their needs in order to close the existing gender gap.

3. Methodology of study

3.1 Data description

The Global Findex dataset was used in this study to generate variation in financial inclusion and gender gap variables. Through the Findex database, the World Bank collects data on formal and informal financial inclusion of adults (15 years and older) in terms of borrowing, saving, payments etc. The first wave was carried out in 2011 and the subsequent waves followed with a three-year interval. Thus, data on financial inclusion variables exists for 2011, 2014 and 2017 for over 140 economies. The collected data come from nationally representative surveys covering over 150,000 adults in total. The Findex dataset has some advantages and limitations compared to other financial inclusion datasets such as the World Bank Enterprise Surveys and the IMF's Financial Access Survey data. One advantage of the Findex dataset is that it focuses on the users of financial services. The Findex dataset also provides micro level data from individual respondents besides aggregates or country level data. The limitations of the Findex dataset include changes in the questionnaire which may reduce comparability of responses across waves; the short time dimension, which limits the estimation techniques to apply; the absence of a longitudinal design,

which means that individuals in each of the waves are not traceable. The rest of the variables were obtained from WDI, World Bank, IMF, The Worldwide Governance Indicators and the United Nations bilateral migration dataset. Based on data availability, the sample includes 102 developing countries for the years 2011, 2014 and 2017. **Appendix C** reports the names of all the 102 developing countries included in the analysis.

3.2 Developing financial inclusion index

Table 1

Coding of survey responses

	Questions	code
1.	Whether respondent has an account	Yes = 1 No = 0
2.	Whether respondent has a debit card	Yes = 1 No = 0
3.	Whether respondent has a credit card	Yes = 1 No = 0
4.	Whether respondent has borrowed money from a financial institution in the past 12 months	Yes = 1 No = 0
5.	Whether respondent has currently taken a mortgage loan	Yes = 1 No = 0
		Dk = missing
		Rf = missing

Where Dk = Don't know and Rf = Refused to answer

In order to develop a multi-dimensional index to measure variation and gender gap in financial inclusion, five questions were taken from the Findex dataset, as displayed in **Table 1**. The questions cover multiple dimensions of financial inclusion, including accessibility, usage, and intensity. Aslan et al. (2017) also developed financial inclusion inequality and gender gap indexes from multiple dimensions of financial inclusion in a study for developing countries. In the context of Ghana, Koomson et al. (2020) applied multiple correspondent analysis (MCA) to construct a multiple dimensional index of financial inclusion. A multiple dimensional index has the advantage

of incorporating more information from many dimensions. After dropping individuals with missing data and coding responses to binary, the study follows Koomson et al. (2020) to apply the MCA technique to develop an index of financial inclusion scores from the binary dataset. The MCA was computed using the CA with the Burt matrix and scale adjustments, similar to Koomson et al. (2020). **Table 2** reports the result of the MCA. The result shows that dimension 1 alone explains more than 82% of the total inertia. Figure 4 examines the pattern of association between the five questions used in computing the MCA. It is obvious that the “no” responses for all the five questions are clustered together indicating a strong correlation. For the “yes” responses, there is correlation between account, debit card and credit card ownership while borrowing and mortgage are related but share no association with the first three questions.

Table 2

MCA result

Dimension	Principal inertia	Percent	Cumulative percent
dim 1	0.0885753	82.42	82.42
dim 2	0.0016386	1.52	83.94
Total	0.1074734	100.00	

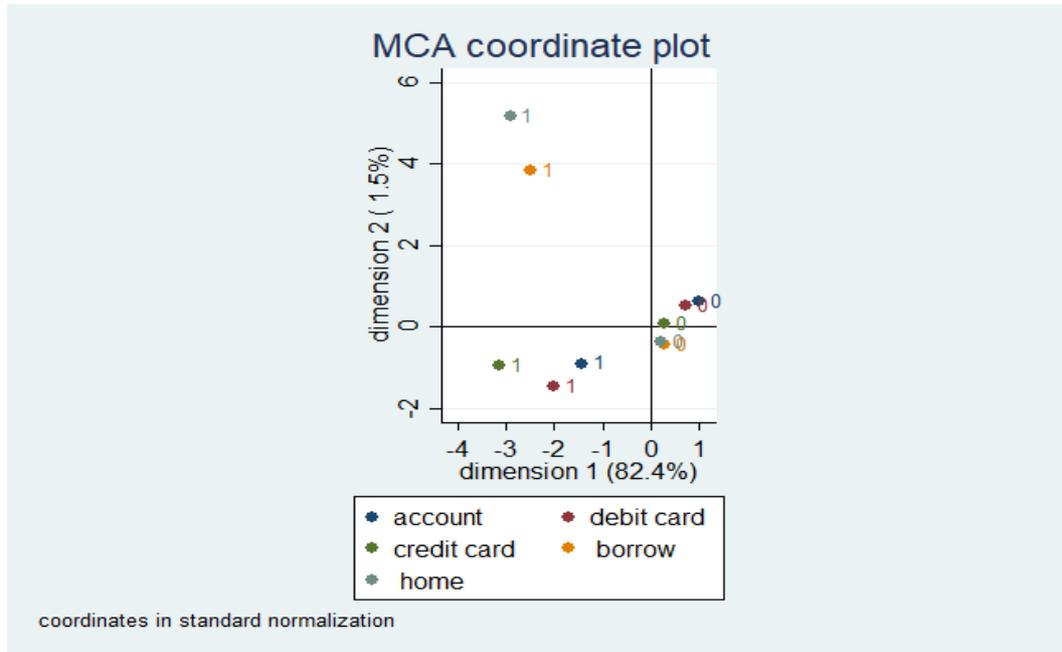


Figure 4. MCA plot

The overall variation in financial inclusion was derived by computing the variance of the financial inclusion scores for each country per year from the micro level dataset. This variable was used as a measure of the unequal access to financial services. Next, financial inclusion gender gap was computed by first obtaining country averages per year for adult males and adult females and then deriving the financial inclusion gender gap as follows:

$$Gender_gap_{it} = male_finc_{it} - female_finc_{it} \quad (1)$$

Where $Gender_gap_{it}$ is the financial inclusion gender gap index measuring the inequality in access to financial services between adult males and adult females. $male_finc_{it}$ is the male financial inclusion index and $female_finc_{it}$ is the female financial inclusion index.

3.3 Empirical model estimation

The empirical model of this study is based on the network theory. The network effect theory asserts that income inequality is a function of remittances as explained in the literature review. This can be stated mathematically as

$$inc_ineq_{it} = f(remit_{it}, X_{it}) \quad (2)$$

Where inc_ineq is income inequality, $remit$ is remittances, X represents the other determinants of income inequality, while i and t are country and time respectively, since the model is based on panel data. But it is known from theory and real life that income inequality is a major cause of inequality in other economic opportunities including financial access inequality. For instance, asymmetric information and adverse selection problems in the credit market compel financial institutions or creditors to demand collaterals before giving out loans. This makes the rich more likely to access credit than the poor since the former have wealth, which can serve as collateral. The impact of income inequality on credit distribution is also supported in empirical literature (Loschiavo, 2016). The distribution of other financial services such as insurance etc, could also be unequal in favour of the rich. From the foregoing, variation in financial inclusion is stated as a function of income inequality as follows:

$$finc_ineq_{it} = f(inc_ineq_{it}) = f(remit_{it}, X_{it}) \quad (3)$$

Where $finc_ineq$ is the variation in financial inclusion. Therefore, the variation in financial inclusion equation is written as follows:

$$finc_ineq_{it} = \beta_1 + \beta_2 remit_{it} + \beta_3 X_{it} + \varepsilon_{it} \quad (4)$$

Where X includes institutional quality and other control variables, which impact variation in financial inclusion. Thus, equation (4) can be rewritten as:

$$finc_ineq_{it} = \beta_1 + \beta_2 remit_{it} + \beta_3 inst_quality_{it} + \beta_4 X_{it} + \varepsilon_{it} \quad (5)$$

Similarly, the financial inclusion gender gap model can be estimated as:

$$Gender_gap_{it} = \beta_1 + \beta_2 remit_{it} + \beta_3 inst_quality_{it} + \beta_4 X_{it} + \varepsilon_{it} \quad (6)$$

The variation in financial inclusion term *finc_ineq* is computed as the variance of the financial inclusion scores of the individual respondents. *remit* represents per capita real annual remittances. The term *inst_quality* stands for institutional quality, which was computed as the average of the six indicators of governance; Rule of Law, Regulatory Quality, Control of Corruption, Voice and Accountability, Political Stability and Absence of Violence and Government Effectiveness. *X* are the other variables which impact variation in financial inclusion, including labor force participation rate (in percentage), real interest rate (in percentage), net foreign direct investment (as a percentage of GDP), trade openness (as a percentage of GDP), number of bank branches (in natural log), and GDP per capita (in natural log) and the squared term of the log transformed GDP per capita. The variables are expressed in either their natural log or percentages, except for cases where the variables contain negative values. The log transformation of the variables helps in dealing with the outlier effects which may be present in the remittance and other variables.

3.4 Instrumental variable estimation technique

The current study seeks to examine the impact of remittances on variation in financial inclusion in developing country using a fixed effects approach to control for the unobserved heterogeneity among countries. While fixed effects approach controls for the individual

heterogeneity (or time invariant factors) which may cause omitted variable biases, it may not completely purge remittances from issues of reverse causality. Hence, despite controlling for the time invariant heterogeneity, remittances may still suffer from endogeneity arising from reverse causality and measurement error problems. On the issue of reverse causality, we know that financial inclusion (or variation in financial inclusion) may also impact remittances since recipients of remittances may need to be financially included in some cases to make the transfer of money possible. Concerning measurement error problems, officially reported remittances are believed to underestimate actual remittances because a large share flows through informal channels (Freund & Spatafora, 2005). In view of this, the study implements instrumental variable estimations to overcome the endogeneity problems associated with remittances.

For a variable to be useful as an instrument, it must fulfill two conditions: first, it must be correlated with the endogenous variable (in this case remittances). Second, it must not be directly correlated with the dependent variable (i.e. be indirectly correlated with the dependent variable through the endogenous variable). To develop a suitable instrument for remittances, the study used the weighted GDP and employment rate of the top five remittance sending countries for each of the countries in the study sample as instrumental variables. These variables can serve as suitable instruments for remittances because it satisfies all the two conditions required. First, the size and frequency of remittances is strongly dependent on the economic condition of the host country. Other things being equal, larger remittances are sent from economies that are expanding than those in recession or contracting. Thus, the economic conditions of the host countries, proxied by their employment rate and GDP per capita would strongly influence the amount of remittances sent to the countries of origin. This suggests that there is correlation between remittances sent to the countries of origin and the host countries' GDP and employment rate which satisfies the first

requirement for a valid instrument. Second, the employment rate and the GDP per capita of the host countries are not likely to affect financial inclusion (or variation in financial inclusion) in the country of origin except through remittances (i.e. indirect effect). The second condition for an instrument to be valid is then satisfied. Thus, the weighted employment rate and GDP per capita of the top five remittance sending countries are expected to be valid instruments for remittances in this study. Other studies, which used the GDP or other measures of economic activities of the host countries as instrumental variables for remittances, include Aggarwal et al. (2011), Azizi (2018) and Azizi (2019).

To construct the weighted GDP per capita and employment rate, the weights must first be computed based on the top five bilateral remittance sending countries for each country. While the World Bank provides information on bilateral remittances, the dataset has some limitations. First, the World Bank's bilateral remittance datasets are not based on officially reported figures, rather, they are estimates based on logical assumptions. The datasets are also dominated by zeros, which makes it less reliable if the zeros are to be understood literally. On the other hand, if the zeros represent missing values, then the available data for most of the countries is scanty. Therefore, the study follows Ratha and Shaw (2006) and Azizi (2018) to construct weights based on the stock of migrants. The study identified the top five remittance sending countries for each country in the study sample by using the bilateral migration dataset provided by the United Nations. Thus, for each country, the top five remittance-source countries are identified by using their top five migrant destination countries (i.e. the top five countries with the highest number of migrants for each of the countries in the study sample). The weights (w_{ijt}) are then computed mathematically as shown in (7):

$$w_{ijt} = \frac{Mig_{ijt}}{\sum Mig_{ijt}} \quad (7)$$

Where the term Mig_{ijt} represents the number of migrants from country i (i.e. country of origin) who are living in the host country j (where $j = 1, 2, \dots, 5$) in year t (where $t = 2011, 2014$ and 2017). Thus, the weights are computed such that their sum over the top five destination countries add up to one for each of the countries in the study sample.

The bilateral migration dataset of the United Nations is only available for the years 1990, 1995, 2000, 2005, 2010, 2015 and 2019. Thus, data is not available for the three years under study (i.e. 2011, 2014 and 2017). Therefore, the study used 2010 bilateral migration data to compute weights for 2011, while 2015 bilateral migration data was used to compute weights for 2017. For the year 2014, since there is no close bilateral migration data to compute the weights, the study used the interpolation of the 2010 and 2015 bilateral migration data to compute weights for 2014. Next, the weighted GDP per capita and the weighted employment rate were developed by multiplying the GDP per capita and the employment rate per capita of the top five remittance-source countries by their respective weights and summed across j per year for each country. That is:

$$GDPPC_TOP5_{it} = \sum_{j=1}^5 w_{ijt} GDPPC_{ijt} \quad (8)$$

$$EMP_TOP5_{it} = \sum_{j=1}^5 w_{ijt} EMP_{ijt} \quad (9)$$

Where $GDPPC$ is the GDP per capita (in PPP constant 2017 international \$) of the host countries, while EMP is the employment rate (measured as employment to population ratio for adults 15 years and above) of the host countries. Both $GDPPC$ and EMP were obtained from WDI.

The variable *GDPPC_TOP5* is the weighted GDP per capita and *EMP_TOP5* is the weighted employment rate of the top 5 remittance-sending countries. These two variables (i.e. *GDPPC_TOP5* and *EMP_TOP5*) were used as instrumental variables for remittances in the study as they satisfy the two conditions for a valid instrument discussed above.

4. Results and discussions

4.1. Micro level dataset descriptive statistics

Having dropped individuals with missing data the study proceeded to provide descriptives of the micro level data on variation in financial inclusion and gender gap. The sample is made up of 102 developing countries grouped into four regions/groups to compare the variation in the use of financial services among the regions. The first group is made up of Sub-Saharan Africa and Middle East & North Africa (AFCM); the second group, Latin America & Caribbean (LAC); the third group, South Asia, East Asia & Pacific (ASIA); the fourth group, Europe & Central Asia (EUSIA). Figure 4 displays the variation in the use of financial services across regions and time. Among the five indicators of financial inclusion, the highest across the 4 regions is account ownership as expected, since it is the starting point to accessing formal financial services for most people (Demirguc-Kunt et al., 2015). The second most used financial service across the regions is debit card ownership while the rest vary across region. Generally, the use of financial services appear to be lower in the AFCM group relative to LAC, ASIA and EUSIA as AFCM lags behind the other three groups in their access to most of the financial services for the 3 years under study. The low access to financial services in the AFCM region may be partly contributed by poverty and low literacy rate in Africa. EUSIA has the highest bar for each of the years and dominates in access to

most of the financial services. EUSIA dominates in account ownership, debit card ownership and credit card ownership. All the 3 regions seem to have attained growth in the use of most of the financial services as indicated by the bars growing taller over time

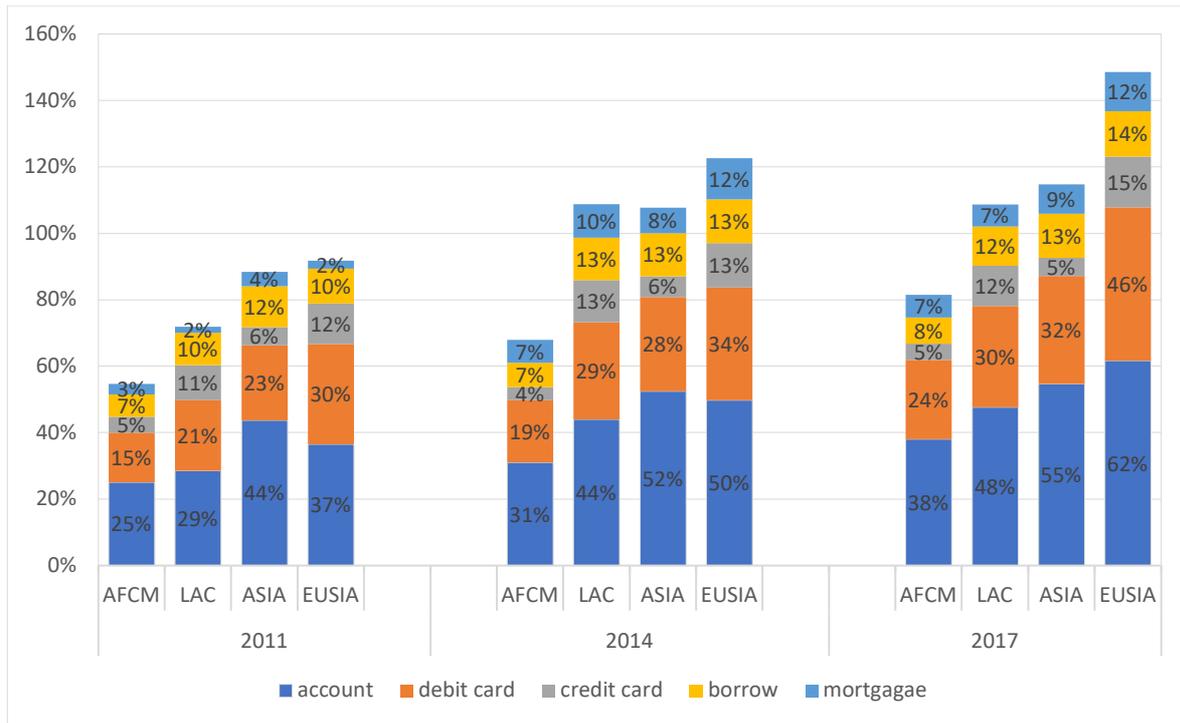


Fig. 4. Variation in access to financial services across regions and years

Data Source: Global Findex database (2017)

Figure 5 and 6 provide information about gender gap in financial inclusion across region and time, respectively. Figure 5 shows that adult females lag behind adult males in access to all financial services in AFCM and LAC. For the ASIA region, the percentage of females who took loans is about the same as their male counterparts. However, the females lag behind the males in the rest of the four categories of financial services. In the case of the EUSIA region, females still lag behind males in their use of the various categories of financial services under study, except for mortgage loans where the percentage of usage is approximately the same for both males and

females. As expected, the most accessed financial service is account ownership in all the regions, and the gender gap in account ownership in AFCM estimated at 9 percentage points is wider than the other regions. The AFCM group also has a wider gender gap in debit card ownership and borrowing. For credit card ownership, LAC and EUSIA have the largest gender gap estimated at approximately 4 percentage points compared to the 2 percentage points of the AFCM and ASIA regions. The EUSIA region, besides showing the highest indicators of financial inclusion, is also the region with the lowest gender gap in general, while the AFCM region generally shows low access/use of financial services and highest gender gap.

In Figure 6, the diagram shows that females lag behind males in financial inclusion across all the three years. The gender gap in account ownership estimated at approximately 6 percentage points in 2011, dropped to about 5 percentage points in 2014 but rose to about 8 percentage points in 2017. Meanwhile, gender gap in debit card ownership showed an upward trend, rising from approximately 3 percentage points in 2011 to about 4 percentage points in 2014 and then 7 percentage points in 2017. Gender gap in credit card ownership was stable at about 2 percentage points in 2011 and 2014 but rose to 3 percentage points in 2017. Similarly, gender gap in borrowing was stable at approximately 1 percentage point in 2011 and 2014 but rose to 2 percentage points in 2017. The gender gap in mortgage was estimated at approximately 1 percentage point in 2011 but rose to about 2 percentage points in 2014 and 2017.

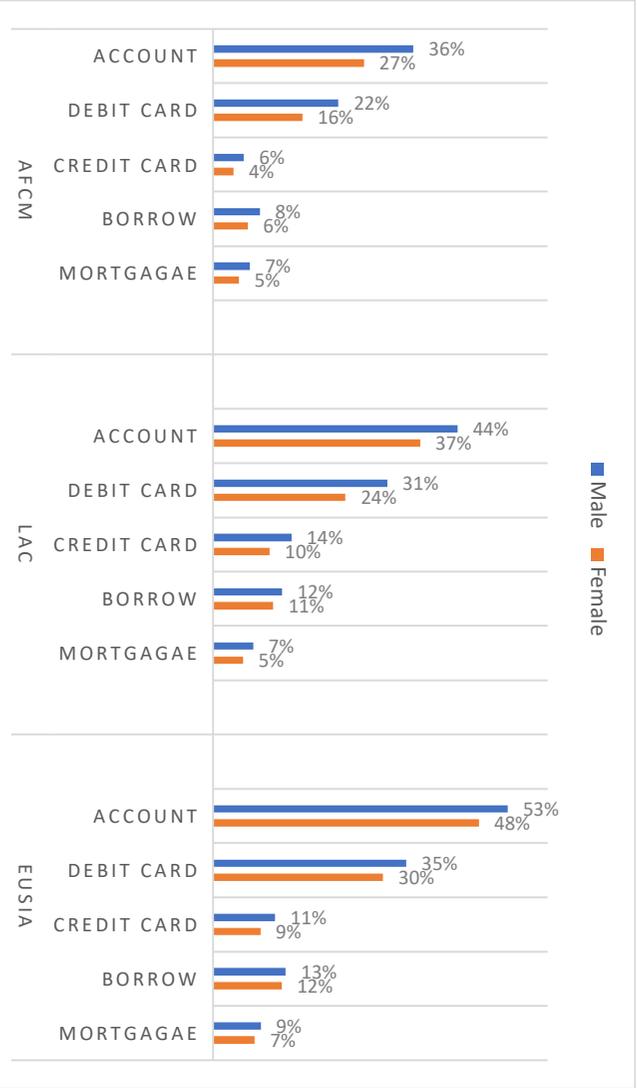


Fig. 5. Gender gap in access to financial services across regions

Data Source: Global Findex database (2017)

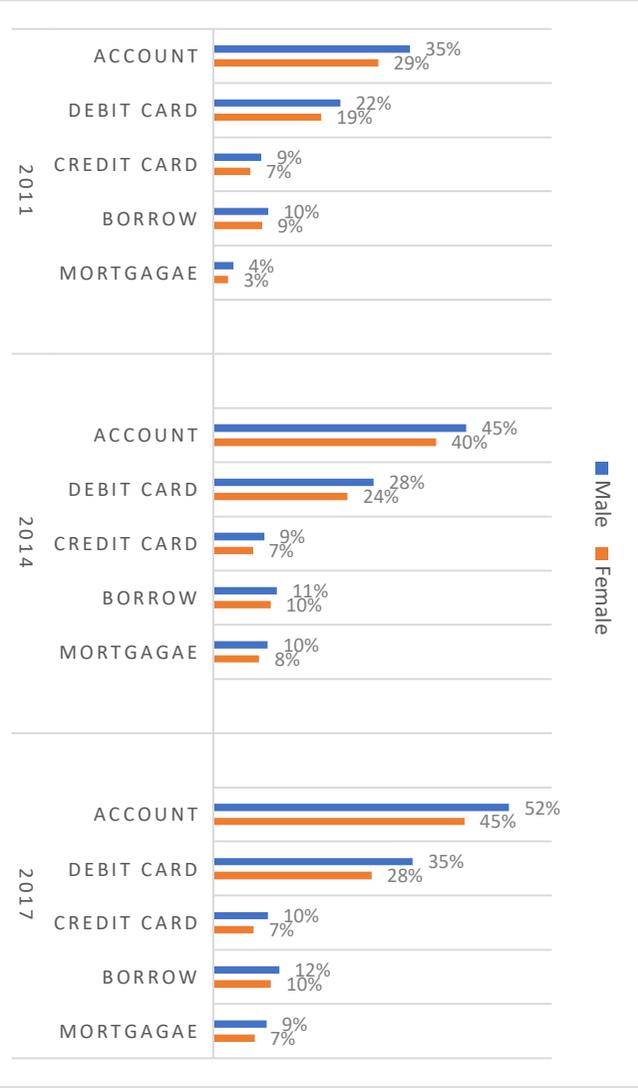


Fig. 6. Gender gap in access to financial services across years

Data Source: Global Findex database (2017)

4.2. Remittances and unequal access to financial services

In this section, the association between remittances and the financial inclusion variables (i.e. variation in financial inclusion and gender gap) is examined via the scatter plot analysis as depicted in Figure 7 and Figure 8. The study also investigates the correlation between the financial inclusion variables and some key control variables such as GDP per capita and financial development (i.e. using bank branches as proxy). The scatter plots are included in the analysis to give a visual representation of the dataset in order to discover the pattern of the relationship between the variables before proceeding to inferential analysis and draw conclusions. From the graphs provided, the relationship between variation in financial inclusion variable and remittances appears to be positive but negative for the financial inclusion gender gap variable and remittances. In the two graphs (i.e. Figure 7 and Figure 8), Angola appears as an outlier. This may be due to the low level of remittances received in Angola. Concerning the key control variables, the relationship between GDP per capita and the financial inclusion variables seems to follow similar pattern, with GDP showing a positive relationship with the variation in financial services variable but inverse relationship with the gender gap variable (i.e. as shown in Figure 9 and Figure 10). In the case of bank branches, Figure 11 shows positive relationship with the variation in financial access variable while no specific pattern is described in Figure 12 where the association between bank branches and financial inclusion gender gap is described. While the graphs appear to show some correlations, these relationships are not clear cut especially the financial inclusion gender gap graphs (i.e. Figure 8, Figure 10 and Figure 12) and could possibly be interpreted in the reverse. This makes inferential analysis relevant to ascertain the exact relationship between these variables.

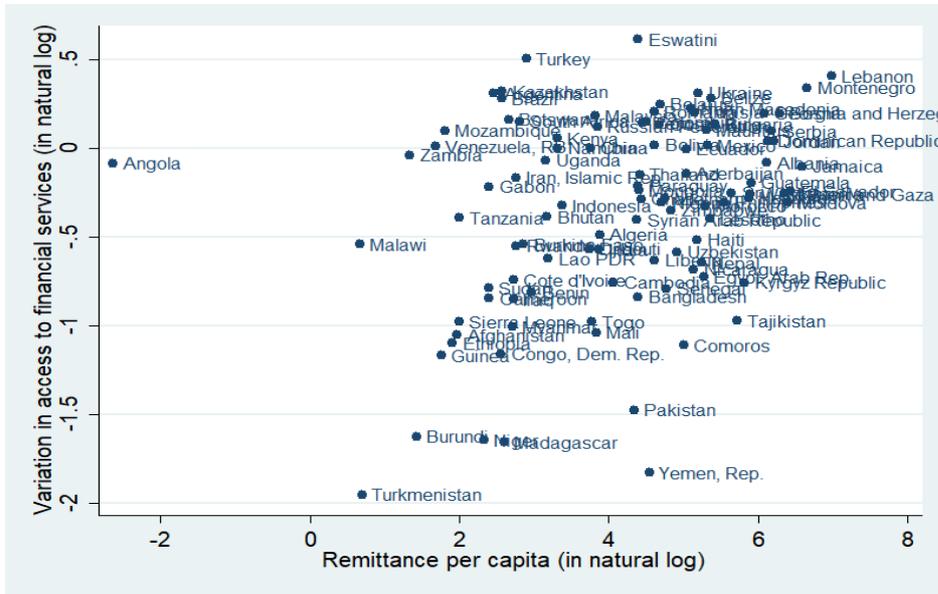


Fig. 7. Relationship between remittances and variation in access to financial services

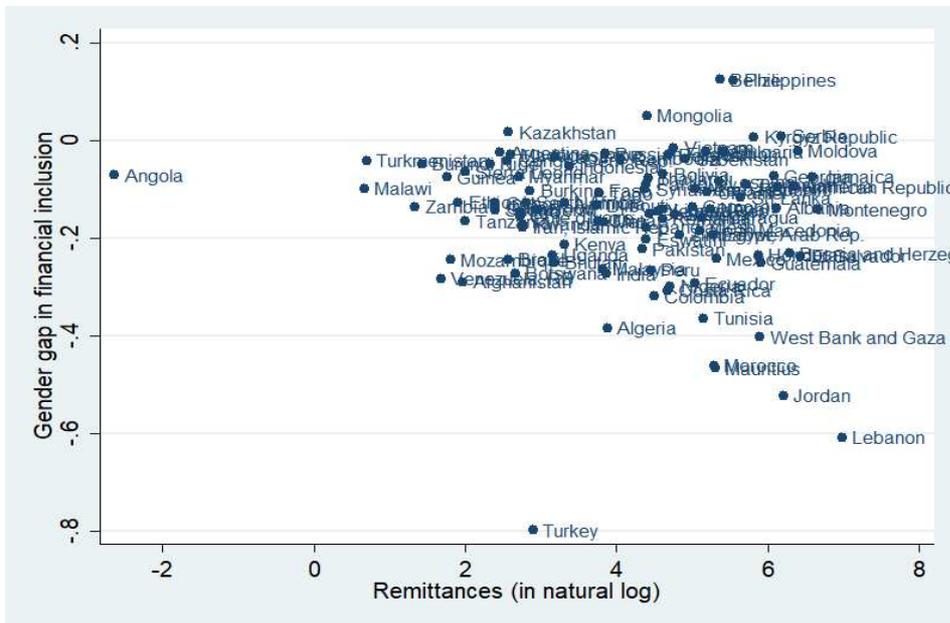


Fig. 8. Relationship between remittance and financial inclusion gender gap

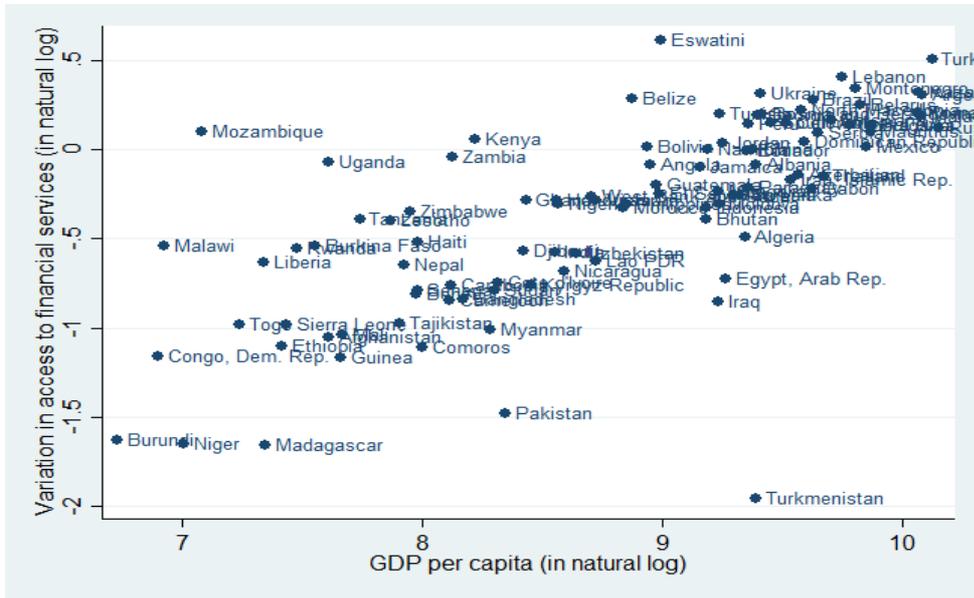


Fig. 9. Relationship between GDP and variation in access to financial services

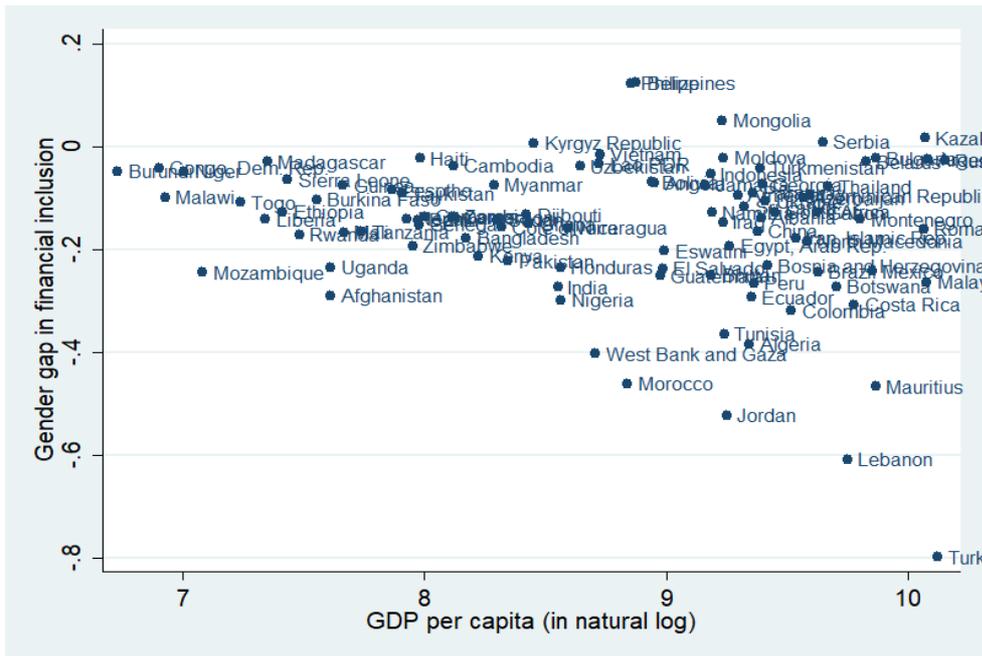


Fig. 10. Relationship between GDP and financial inclusion gender gap

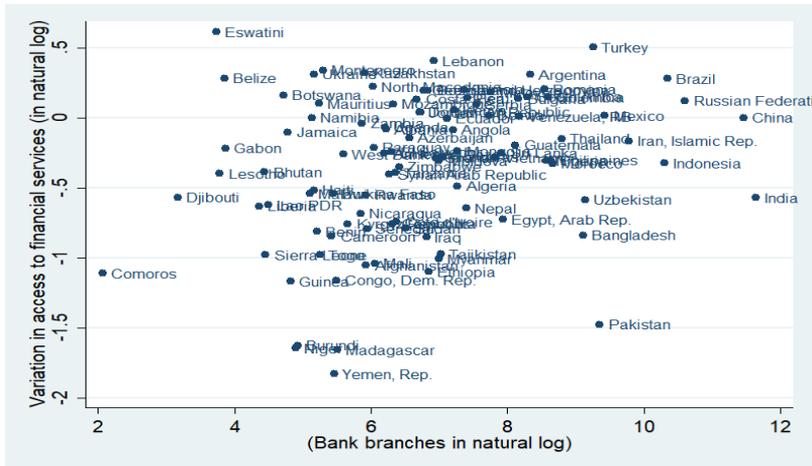


Fig. 11. Relationship between GDP and variation in access to financial services

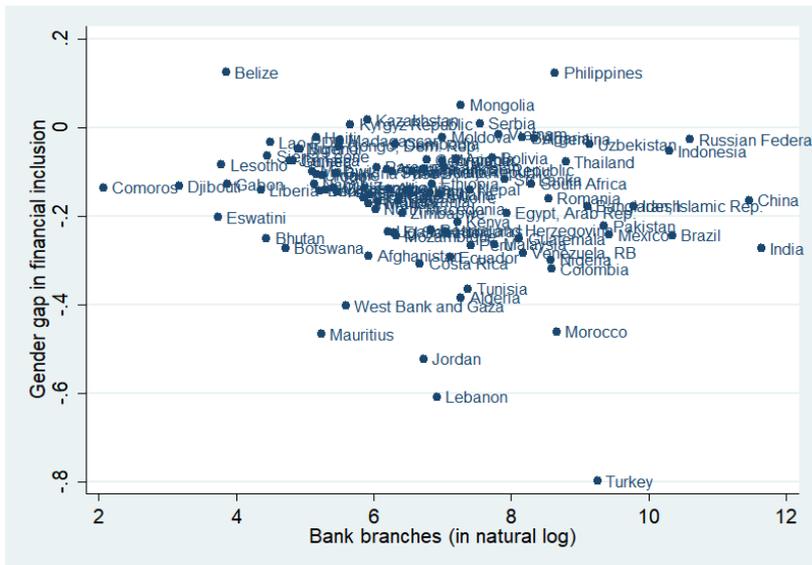


Fig. 12. Relationship between GDP and financial inclusion gender gap

4.3 Results and discussion

The descriptive statistics are provided in **Table 3** and **Appendix A**. **Table 3** displays the descriptive statistics for the original sample (i.e before missing values were dropped in estimations) and the sample with 201 observations used in the IV estimations. The descriptive statistics of the variables are provided on their mean, standard deviation, minimum and maximum

values. The variables are mostly in their log transformed versions or percentages, except for cases where the variables contain some negative values. The log transformation of the variables is necessary because it helps in dealing with outlier effects, which is likely to be associated with remittances and other control variables. The presence of log transformed ratio variables and variables with some negative values explains why some of the reported mean statistics are negative. The same reason accounts for the negative values under minimum and maximum values sections. The number of observations in **Table 3** varies due to missing values in the datasets. In view of this, the panel dataset used in estimation is an unbalanced panel. The correlation statistics between the variables for both the original sample and the sample with 201 observations are reported in **Appendix A**. The correlation tables show that the level of correlation between the variables are generally low. The correlation between the instrumental variables is less than 10 percent (or 0.1) in the two samples which suggests that the degree of correlation between them is very low. The instruments in the two samples also show weak correlation with the financial inclusion variables (i.e. the dependent variables). The same weak correlation is found between the instruments (individually) and remittances (the endogenous variable), except for the GDP per capita instrument which shows a moderate correlation level, a little above 0.5 with remittance per capita and real remittance variables in the two samples. All the other control variables also show weak correlation with the remittance variables except for bank branches which have a correlation score above 0.6 with real remittance in the two samples (i.e. 0.68 for the original sample and 0.66 for the sample with 201 observations). **Appendix C** provides a list of the 102 countries in the original sample as well as the 73 countries used in the IV estimations. Further details are given in the same section (**Appendix C**) about the countries (among the 73) observed three times and those observed two times (singletons were dropped in the estimations).

Table 3

Descriptive statistics of variables

Variable	Original sample					IV sample				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Instrumental variables:										
Employment (in natural log)	306	-0.5847	0.1497	-1.3522	-0.2443	201	-0.5760	0.1290	-0.9944	-0.2466
GDP per capita (in natural log)	306	10.1462	0.7563	7.6124	11.2334	201	10.1536	0.7771	7.7027	11.2334
Dependent variables:										
Overall variation in financial inclusion (in natural log)	275	-0.3530	0.6199	-3.7346	0.6178	201	-0.3117	0.5686	-2.2581	0.5554
Gender gap in financial inclusion	275	-0.1610	0.1586	-1.0616	0.1859	201	-0.1582	0.1474	-0.7213	0.1859
Variables of interest:										
Real remittance per capita (in natural log)	306	4.0689	1.6735	-4.8042	7.1558	201	4.3638	1.6034	-4.8042	7.1558
Remittance as a ratio of GDP (in natural log)	299	-3.7515	1.7222	-12.9874	-0.8312	201	-3.5159	1.5974	-12.9874	-0.8312
Real remittance (in natural log)	306	20.6089	1.9425	12.1985	24.8951	201	21.0537	1.8013	12.1985	24.8951
Control variables										
Institutional quality	306	-0.5304	0.5264	-1.9732	0.8407	201	-0.4090	0.4758	-1.6575	0.8407
Real interest rate (in %)	244	6.0485	8.7432	-33.5970	52.4368	201	6.4503	8.4203	-12.8569	52.4368
FDI (as a % of GDP)	302	4.2104	6.7516	-6.0572	86.9895	201	4.1493	7.1828	-4.3369	86.9895
Trade (as a % of GDP)	294	76.0376	36.6246	0.2004	304.3287	201	74.0923	32.1519	23.9344	200.3846
Labor force participation rate (in %)	306	65.5815	11.6231	37.9570	89.9840	201	66.1598	10.7094	41.5320	89.9840
GDP per capita (in natural log)	296	8.7651	0.8913	6.6510	10.2450	201	8.8256	0.8960	6.7482	10.2107
GDP per capita squared	296	77.6179	15.3030	44.2361	104.9598	201	78.6895	15.3877	45.5379	104.2577
Branches of commercial banks (in natural log)	284	6.7252	1.7798	1.6094	11.8542	201	7.0154	1.6743	3.6889	11.8542

Notes: variables are in their natural log form except where variables are expressed in percentages or contain negative values.

In this study, fixed effects estimation technique was chosen over random effects because the unobserved country characteristics are expected to be correlated with the regressors. Various specifications were employed to test for robustness of results. This includes (1) using fewer sets of control variables, (2) testing for the presence of non-linearities in the remittance variable, and

(3) interacting remittances with bank branches since the number or presence of bank branches can influence the decision of remittance recipients to open bank accounts or access other financial services. These analyses are carried out only for the fixed effects models (i.e. without instrument variable). The fixed effects models without IV are discussed first in **Table 4** and **5**.

Despite controlling for individual heterogeneity in the fixed effects models, the study recognizes the potential endogeneity of the remittance variable arising from reverse causality, measurement error and omitted variable bias. In view of this, fixed effects instrumental variable estimation technique was also employed to overcome the endogeneity problem. The instruments used in the study are the GDP and employment levels of the top five remittance sending countries. The first stage regression is carried out separately for each of the instruments to examine the strength and relationship with the endogenous variable (i.e. remittances), after which the joint effect is also investigated so that the most suitable is employed in the analysis. The first stage regression results are reported in **Table 6** while the second stage regressions are reported in **Table 7** and **8**. The study also tests for robustness in **Table 9** to **11**.

4.3.1. Fixed effects estimation technique

Table 4

Effect of remittances on overall variation in financial inclusion

	Dependent variable: Variation in access to financial services (in natural log)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Real remittance per capita (in natural log)	-0.279***	-0.289***	-0.534**	-0.500*	-0.112*	-0.578**	-0.122*
Real remittance per capita squared term		0.014		0.013	0.018*		
Real remittance* Branches of commercial banks			0.064*	0.058		0.068*	
Control variables:							
Institutional quality					0.029	-0.001	0.049
Real interest rate					0.006	0.004	0.004
FDI (as a % of GDP)					0.010***	0.011***	0.011***
Trade (as a % of GDP)					-0.002	0.000	-0.001
Labor force participation rate					-0.036**	-0.034**	-0.034**
GDP per capita (in natural log)					8.682**	8.810**	7.959**
GDP per capita squared					-0.445**	-0.456**	-0.401**
Branches of commercial banks (in natural log)			0.027	0.055	0.010	-0.244	0.015
Year dummies	Yes						
Number of groups	94	94	89	89	73	73	73
Observations	267	267	247	247	201	201	201

Variables are in their natural log except where variables are expressed in percentages or contain negative values.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

Table 5

Effect of remittances on gender gap in financial inclusion

	Dependent variable: Gender gap in financial inclusion						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Real remittance per capita (in natural log)	-0.020	-0.023	0.055	0.064	-0.046**	-0.094	-0.049**
Real remittance per capita squared term		0.003		0.003	0.004		
Real remittance* Branches of commercial banks			-0.015	-0.016	0.007	0.007	
Control variables:							
Institutional quality					-0.074	-0.075	-0.070
Real interest rate					0.001	0.001	0.001
FDI (as a % of GDP)					0.001	0.001	0.001
Trade (as a % of GDP)					0.000	0.001	0.000
Labor force participation rate					0.003	0.003	0.003
GDP per capita (in natural log)					-0.139	-0.209	-0.294
GDP per capita squared					0.008	0.012	0.018
Branches of commercial banks (in natural log)			0.042	0.049	-0.022	-0.046	-0.020
Year dummies	Yes						
Number of groups	94	94	89	89	73	73	73
Observations	267	267	247	247	201	201	201

Variables are in their natural log except where variables are expressed in percentages or contain negative values.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

In **Table 4**, the results of the fixed effects regression on variation in financial inclusion are reported. The regression results show that the remittance variable is negatively related to the variation in financial inclusion across all the seven specifications. The coefficients of model 1 and 7 (models without interaction terms) suggest that increase in remittances reduces the variation in access to financial services. This phenomenon may arise from many factors. First, a greater share of the remittances to developing countries may go to the low income (or vulnerable) group relative

to the high-income group. The improvement in their living standards arising from the receipt of remittances can improve their access to financial services. Second, if the channel for the transfer of money is through financial institutions, the recipients, if they belong to the unbanked population, may have the opportunity to be introduced to financial services, which may create some demand for some financial services such as savings account etc. The financial inclusion gender gap results presented in **Table 5** also shows inverse relationship between remittances and gender gap in financial inclusion. However, it is insignificant in most of the models except for model 7 (i.e. in the case of models without interaction terms). Thus, the findings from **Table 4** and **5** show that remittances aid in the reduction of the variation and the gender gap in financial inclusion in developing countries. When the models with interaction terms are considered, **Table 5** and **6** show that the significance level for the interacted terms are generally low. Further investigations may be required to produce evidence of non-linearities of remittances or the influence of bank branches on the relationship between remittances and the financial inclusion variables.

Moving on to the control variables¹, **Table 4** shows that foreign direct investment (FDI) is positively related to overall variation in financial inclusion at 1 percent significance level, while labour force participation rate is negatively related to overall variation in financial inclusion at 5 percent significance level. The positive sign of FDI may suggest that the flow of capital to developing countries benefits the high-skilled workers in the form of increased wages and salaries due to the resulting increase in demand for their services. Since the high-skilled workers are usually in the middle- or high-income category, increase in FDI may exacerbate inequality, including financial access, because inequality in income may translate into inequality in other economic

¹ Population size (in natural log) was also included as a control variable in the baseline models (reported in Appendix B) but excluded from the models for analysis because it may be highly correlated with remittance per capita. Cultural and social norms variable was also excluded from the analysis because it contains so many missing values for the sample under study.

outcomes. Meanwhile, the negative sign of the labour force participation rate may imply that increase in the rate of the economically active population increases access to financial services for the vulnerable group or the unbanked group. This is because as the rate of the economically active population increases, people in the low income group who usually form the unbanked group (or group with limited access to financial services) may be empowered to access financial services if they are gainfully employed. The GDP per capita and its squared term also describes an inverted U-shaped relationship between economic growth and overall variation in financial inclusion. This relationship could mean that at the initial phase, when the level of economic development is low, increase in economic growth benefits few people or a small share of the population which may also increase their access to financial services and thus, increasing the uneven access to financial services. However, beyond a certain threshold, economic growth may become inclusive and therefore provide easy access to financial services which would result in a decline in the unequal access to financial services. The rest of the control variables in **Table 4** are not statistically significant. For the gender gap financial inclusion model in **Table 5**, the results show that all the control variables are statistically insignificant.

4.3.2 Instrumental variable fixed effects estimation technique

Table 6

First stage regression results

	Dependent variable: Real remittances per capita (in natural log)		
	One instrument (1)	One instrument (2)	Two instruments (3)
Excluded instruments:			
Employment (in natural log)	-5.2174*** (1.6733)	-	-7.0411*** (1.6755)
GDP per capita (in natural log)	-	1.3861** (0.6232)	2.1700*** (0.6122)
Control variables:			
Institutional quality	0.2271 (0.3574)	0.3116 (0.3716)	0.5386 (0.3513)
Real interest rate	0.0225*** (0.0081)	0.0206** (0.0084)	0.0169** (0.0079)
FDI (as a % of GDP)	0.0133 (0.0054)	0.0148*** (0.0056)	0.0176*** (0.0053)
Trade (as a % of GDP)	-0.0017 (0.0037)	-0.0013 (0.0038)	-0.0035 (0.0035)
Labor force participation rate	0.0238 (0.0219)	0.0145 (0.0221)	0.0286 (0.0209)
GDP per capita (in natural log)	-11.1720** (5.0136)	-6.7946 (4.9818)	-10.3986** (4.7777)
GDP per capita squared	0.6148** (0.2735)	0.3614 (0.2714)	0.6176** (0.2606)
Branches of commercial banks (in natural log)	-0.0419 (0.1797)	-0.0478 (0.1835)	-0.0898 (0.1720)
Year dummies			Yes
F test of excluded instruments:			
F(2, 116)	9.72	4.95	11.63
Prob > F	0.0023	0.0281	0.0000
Number of groups	73	73	73
Observations	201	201	201

Variables are in their natural logs except where variables are expressed in percentages or contain negative values.

Std. Err. are standard errors.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

Due to issues of reverse causality, measurement errors and omitted variable bias suspected to be associated with remittances in the empirical model, the study also employed instrumental variable technique. Results for the first stage regression is reported in **Table 6**, while the second stage regression results for variation in access to financial services and gender gap are presented in **Table 7** and **8** respectively. In **Table 6**, the first stage regression results are presented for single instrument case (i.e. model 1 and 2) and for the case of two instruments (i.e. model 3). The results show that the GDP per capita (model 2) has the expected positive sign (but significant at 5%), which means that, increase in the host countries' GDP per capita may benefit migrants in the form of higher incomes, which would translate into higher remittances to the countries of origin. Surprisingly, the employment rate (model 1) shows inverse relationship with remittances. The inverse relationship means that migrants send more remittances to their countries of origin when employment rate is low, but less remittances when employment rate is high. This phenomenon may arise by the fact that, when employment rate is low, the uncertainty about future employment or the risk of becoming unemployed in the future might make migrants spend less on consumption and send more money home for investment purpose, to cushion them against future job loss. However, in the face of high employment rate, migrants may not be bothered about future job loss, and hence may spend more on consumption or luxury and remit less for investment purpose. The F statistics in the single instrument models (i.e. model 1 and 2) are lower than 10, which suggests that the instruments are not strongly associated with remittances when they are individually assessed. In model 3, the joint significance of the two instruments is accessed. The signs of the individual instruments are maintained, each of them is highly significant at 1% and their joint significance is higher than 10, implying that the two instruments are strongly associated with remittances when they are jointly considered. Since the joint impact of the two instruments is

higher than 10, the study employed them jointly in the second stage regression in **Table 7** and **8**. For the other variables, real interest rate shows positive and significant relationship with remittance. This is expected, as high interest rate would serve as incentive for migrants to invest more in the home country, and thus remittances would increase, while the reverse would occur if interest rate is low. FDI is also positively signed and significant (in model 2 and 3), suggesting that FDI increases remittances. The GDP per capita and its squared term describe a U-shaped relationship with remittances (but significant in only model 1 and 3). This means that, at the initial stage of economic development, economic growth reduces remittances up to a point, beyond which further growth increases remittances.

Table 7 reports the results of the IV version of the variation in financial inclusion model. From the results, remittance is negatively signed, just like **Table 4**, which reports fixed effects (i.e. without instrument variables) for financial inclusion variation model. However, unlike **Table 4** where remittances show some significance, **Table 7** result (IV version) shows that the impact of remittances on the variation in financial inclusion is statistically insignificant. This means that, for the period under study, there is no enough evidence to suggest that remittances reduce the variation in financial inclusion in developing countries. Larger dataset may be required in the future for further investigations on this subject. In the case of the gender gap financial inclusion model presented in **Table 8**, the effect of remittances on financial inclusion gender gap is inversely related and significant at 1 percent significance level. The coefficient of -0.1474 suggests that if remittances increase by 1 percent, the gender gap in financial inclusion will decrease by 0.001474 (i.e. 0.1474/100). The same inverse relationship was found earlier for the gender gap model without IV (i.e. **Tables 5**). This could mean that most of the remittance recipients in developing countries are women, in which case the receipt of remittances introduces more women to financial

services, especially if financial institutions are the channels through which remittances are received. The inverse relationship could also mean that female remittance recipients save or invest their remittance income on financial assets more than their male counterparts. The inverse relationship discovered is good because reduction in financial inclusion gender gap may lead to reduction in gender gap in other economic outcomes and welfare. **Table 7** and **8** also present some postestimation tests on the instrumental variables as evidenced in the Cragg-Donald Wald F statistic for weak identification test and the Sargan statistic for over identification test. The Cragg-Donald Wald F statistic which tests the strength of instrumental variables shows that the instruments are strongly correlated with the endogenous variable and thus confirming the F-test of excluded instruments result in the first stage regression. The study also passed the Sargan test, proving that the instruments are exogenous (i.e. not correlated with the error term). Thus, the instrumental variables used in the two models passed the two conditions necessary for instruments to be valid.

Table 7

Effect of remittances on overall variation in financial inclusion

Dependent variable: Overall variation in financial inclusion (in natural log)			
	Coefficient	Std. Err.	t-statistic
Real remittance per capita (in natural log)	-0.1187	0.1533	-0.77
Control variables:			
Institutional quality	0.0481	0.2520	0.19
Real interest rate	0.0041	0.0068	0.6
FDI (as a % of GDP)	0.0105**	0.0042	2.48
Trade (as a % of GDP)	-0.0008	0.0026	-0.31
Labor force participation rate	-0.0339**	0.0154	-2.2
GDP per capita (in natural log)	7.9793**	3.5836	2.23
GDP per capita squared	-0.4024**	0.1976	-2.04
Branches of commercial banks (in natural log)	0.0148	0.1264	0.12
Year dummies	Yes		
Weak identification test: Cragg-Donald Wald F statistic	11.635		
Overidentification test of all instruments:			
	Sargan statistic	0.182	
	Chi-sq(1) P-val	0.6693	
Number of groups	73		
Observations	201		

Variables are in their natural logs except where variables are expressed in percentages or contain negative values.

Std. Err. are standard errors.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

Table 8

Effect of remittances on financial inclusion gender gap

Dependent variable: Gender gap in financial inclusion			
	Coefficient	Std. Err.	t-statistic
Real remittance per capita (in natural log)	-0.1474***	0.0543	-2.71
Control variables:			
Institutional quality	-0.0553	0.0893	-0.62
Real interest rate	0.0034	0.0024	1.41
FDI (as a % of GDP)	0.0018	0.0015	1.2
Trade (as a % of GDP)	0.0005	0.0009	0.49
Labor force participation rate	0.0045	0.0055	0.83
GDP per capita (in natural log)	-0.9518	1.2707	-0.75
GDP per capita squared	0.0589	0.0701	0.84
Branches of commercial banks (in natural log)	-0.0208	0.0448	-0.46
Year dummies	Yes		
Weak identification test: Cragg-Donald Wald F statistic	11.635		
Overidentification test of all instruments:			
Sargan statistic	2.431		
Chi-sq(1) P-val	0.1189		
Number of groups	73		
Observations	201		

Variables are in their natural logs except where variables are expressed in percentages or contain negative values.

Std. Err. are standard errors.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

4.3.3 Robustness check for the instrumental variable fixed effects estimation

To check the robustness of the instrumental variable estimations, the study carried out IV estimation of both the variation in financial inclusion and gender gap models. Other measures of remittances, such as remittance as a ratio of GDP and real remittances were used in the estimation to serve as robustness checks for the IV results presented in **Table 6 to 8**. The first stage regression

results are reported in **Table 9**. The signs of the excluded instruments and the significance level are consistent with **Table 6**. The other control variables exhibit similar characteristics, in terms of the signs and significant levels, except for the GDP per capita variable which shows 10 percent significance level in the first stage model with real remittances, instead of 5 percent significance level found in the other first stage models with real remittance per capita and remittance as a ratio of GDP. The F-test of excluded instruments are also greater than 10 for the two models, confirming that the instruments are strongly correlated with remittances and therefore relevant as instruments for the endogenous variable (i.e. remittances).

The second stage regressions for the variation in financial inclusion models are displayed in **Table 10**. The two regression results show that remittances are inversely related to the variation in financial inclusion, but the effect is not statistically significant, which is consistent with **Table 7** results (i.e. IV fixed effects models). The signs and significance level of the control variables are identical to **Table 7**. In the case of the gender gap financial inclusion model, the robustness check results presented in **Table 11** show that remittances are inversely related to gender gap in financial inclusion, and the impact is statistically significant at 1 percent level. This finding is also consistent with the IV model in **Table 8**. Thus, all three models confirm that remittances (measured in three different ways) reduce gender gap in financial inclusion. The Cragg-Donald F-statistic and the Sargan statistic also confirm the relevance and exogeneity of the instrumental variables in both the variation in financial inclusion models and the financial inclusion gender gap models.

Table 9

First stage regression results

	Dependent variable: Remittance as a ratio of GDP (in natural log)		Dependent variable: Real remittance (in natural log)	
	Coefficient	t-statistic	Coefficient	t-statistic
Excluded instruments:				
Employment (in natural log)	-7.0477*** (1.6770)	-4.2	-7.3342*** (1.6977)	-4.32
GDP per capita (in natural log)	2.1770*** (0.6127)	3.55	2.2537*** (0.6202)	3.63
Control variables:				
Institutional quality	0.5328 (0.3516)	1.52	0.5414 (0.3559)	1.52
Real interest rate	0.0168** (0.0079)	2.13	0.0169** (0.0080)	2.11
FDI (as a % of GDP)	0.0176*** (0.0053)	3.34	0.0169*** (0.0053)	3.17
Trade (as a % of GDP)	-0.0034 (0.0035)	-0.97	-0.0043 (0.0036)	-1.21
Labor force participation rate	0.0284 (0.0209)	1.36	0.0267 (0.0212)	1.26
GDP per capita (in natural log)	-11.2833** (4.7818)	-2.36	-9.0900* (4.8408)	-1.88
GDP per capita squared	0.6113** (0.2608)	2.34	0.5308** (0.2640)	2.01
Branches of commercial banks (in natural log)	-0.1023 (0.1722)	-0.59	-0.0196 (0.1743)	-0.11
Year dummies	Yes		Yes	
F test of excluded instruments:				
F(2, 116)	11.66		12.27	
Prob > F	0.0000		0.0000	
Number of groups	73		73	
Observations	201		201	

Variables are in their natural logs except where variables are expressed in percentages or contain negative values.

Figures in parenthesis are standard errors.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

Table 10

Effect of remittances on overall variation in financial inclusion

	Dependent variable: Overall variation in financial inclusion		Dependent variable: Overall variation in financial inclusion	
	Coefficient	t-statistic	Coefficient	t-statistic
Remittance as a ratio of GDP (in natural log)	-0.1186 (-0.1186)	-0.77	-	-
Real remittance (in natural log)	-	-	-0.1139 (0.1476)	-0.77
Control variables:				
Institutional quality	0.0473 (0.2519)	0.19	0.0460 (0.2522)	0.18
Real interest rate	0.0041 (0.0068)	0.6	0.0040 (0.0067)	0.59
FDI (as a % of GDP)	0.0105** (0.0042)	2.48	0.0103** (0.0041)	2.49
Trade (as a % of GDP)	-0.0008 (0.0026)	-0.31	-0.0009 (0.0026)	-0.34
Labor force participation rate	-0.0339** (0.0154)	-2.2	-0.0342** (0.0154)	-2.22
GDP per capita (in natural log)	7.8753** (3.6235)	2.17	8.1780** (3.5260)	2.32
GDP per capita squared	-0.4032** (0.1972)	-2.04	-0.4153** (0.1932)	-2.15
Branches of commercial banks (in natural log)	0.0133 (0.1265)	0.11	0.0232 (0.1271)	0.18
Year dummies	Yes		Yes	
Weak identification test:				
Cragg-Donald Wald F statistic		11.657	12.269	
Overidentification test:				
Sargan statistic		0.181	0.183	
Chi-sq(1) P-val		0.6701	0.6687	
Number of groups		73	73	
Observations		201	201	

Variables are in their natural logs except where variables are expressed in percentages or contain negative values. Figures in parenthesis are standard errors.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

Table 11

Effect of remittances on financial inclusion gender gap

	Dependent variable: Gender gap in financial inclusion		Dependent variable: Gender gap in financial inclusion	
	Coefficient	t-statistic	Coefficient	t-statistic
Remittance as a ratio of GDP (in natural log)	-0.1470*** (0.0542)	-2.71	-	-
Real remittance (in natural log)	-	-	-0.1418*** (0.0516)	-2.75
Control variables:				
Institutional quality	-0.0564 (0.0893)	-0.63	-0.0580 (0.0882)	-0.66
Real interest rate	0.0034 (0.0024)	1.4	0.0033 (0.0024)	1.39
FDI (as a % of GDP)	0.0018 (0.0015)	1.19	0.0016 (0.0014)	1.1
Trade (as a % of GDP)	0.0005 (0.0009)	0.5	0.0003 (0.0009)	0.38
Labor force participation rate	0.0045 (0.0055)	0.82	0.0041 (0.0054)	0.76
GDP per capita (in natural log)	-1.0792 (1.2845)	-0.84	-0.7065 (1.2331)	-0.57
GDP per capita squared	0.0578 (0.0699)	0.83	0.0430 (0.0676)	0.64
Branches of commercial banks (in natural log)	-0.0226 (0.0448)	-0.5	-0.0103 (0.0445)	-0.23
Year dummies	Yes		Yes	
Weak identification test:				
Cragg-Donald Wald F statistic	11.657		12.269	
Overidentification test:				
Sargan statistic	2.446		2.472	
Chi-sq(1) P-val	0.1178		0.1159	
Number of groups	73		73	
Observations	201		201	

Variables are in their natural logs except where variables are expressed in percentages or contain negative values. Figures in parenthesis are standard errors.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

5. Conclusion and policy recommendation

In this study, the impact of remittances on the variation in financial inclusion and gender gap was investigated using fixed effects approach. Due to the limited data availability for the financial inclusion variables, the time dimension used in the study spans just three years (i.e. 2011, 2014 and 2017). Issues of reverse causality and measurement errors suspected to be associated with remittances led to the inclusion of instrumental variable approach in the analysis. To check the robustness of findings, the study estimated two additional IV models to serve as robustness check for the main IV fixed effects models. These models were estimated with different definitions for the remittance variable (i.e. remittances as a ratio of GDP and real remittances). Findings emanating from the study show that the impact of remittances on the variation in financial inclusion models and gender gap depicts inverse relationship. However, while remittance reduces gender gap in financial inclusion at 1 percent significance level, its effect on the variation in financial inclusion is not statistically significant (in the IV version). These findings are robust across different definitions of remittances. The first stage regression results also showed that the instrumental variables are strongly correlated with the endogenous variable. The Cragg-Donald Wald F statistics also confirmed that the IVs are not weakly correlated with the endogenous variable while the Sargan statistics showed that the instruments are exogenous, and thus, satisfying the two conditions for a valid instrument.

Regarding policy recommendations, the inverse relationship between remittances and financial inclusion gender gap suggests that increase in remittances reduces the gender gap in financial inclusion. This might mean that most of the recipients of remittances are women as

mentioned earlier. It might also mean that remittances generally improve the economic status of women, thereby reducing the gender gap in many economic outcomes including access to financial services. In this regard, the study recommends that policies which seek to increase the flow of remittances be pursued. An example of such policies may include reducing the cost of transferring money (i.e. remittances) to developing countries. If the cost of money transfer to developing countries is low, it may increase the flow of remittances to these countries, and given that women are the major recipients, gender gap in financial inclusion would continue to decline. Another way of improving the flow of remittances to developing countries is by making many options for transferring money to developing countries available. Safe and affordable channels that meet the needs and circumstances of both documented and undocumented migrants be provided to facilitate the transfer of money from these groups to their countries of origin. This way, the flow of remittances would increase, and if women are the major recipients of remittances, this may lead to increase in their use of financial services such as savings, investment of idle cash in financial assets etc, which would further reduce the gap in financial inclusion.

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Appendix A

Correlation of variables for the original sample.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Employment (in natural log) – instrumental	1.00														
2	GDP per capita (in natural log) – instrument	-0.05	1.00													
3	Overall variation in financial inclusion (in natural log)	-0.13	0.42	1.00												
4	Gender gap in financial inclusion	0.06	-0.13	-0.28	1.00											
5	Real remittance per capita (in natural log)	-0.22	0.51	0.23	-0.15	1.00										
6	Remittance as a ratio of GDP (in natural log)	-0.05	0.16	-0.21	-0.01	0.81	1.00									
7	Real remittance (in natural log)	0.15	0.59	0.08	-0.13	0.59	0.45	1.00								
8	Institutional quality	-0.16	0.24	0.52	-0.14	0.13	-0.21	-0.16	1.00							
9	Real interest rate (in %)	-0.03	0.00	-0.13	-0.01	-0.07	0.06	-0.08	-0.08	1.00						
10	FDI (as a % of GDP)	0.03	0.00	-0.02	0.10	0.07	0.16	-0.14	0.03	0.01	1.00					
11	Trade (as a % of GDP)	-0.15	0.18	0.20	0.09	0.27	0.18	-0.16	0.31	-0.13	0.26	1.00				
12	Labor force participation rate (in %)	0.25	-0.27	-0.05	0.32	-0.43	-0.29	-0.30	0.07	0.22	0.12	0.05	1.00			
13	GDP per capita (in natural log)	-0.22	0.65	0.68	-0.20	0.41	-0.19	0.31	0.53	-0.27	-0.15	0.21	-0.27	1.00		
14	GDP per capita squared	-0.22	0.63	0.68	-0.20	0.39	-0.20	0.30	0.54	-0.27	-0.14	0.21	-0.26	1.00	1.00	
15	Branches of commercial banks (in natural log)	0.24	0.48	0.19	-0.05	0.03	-0.21	0.68	0.00	-0.10	-0.21	-0.29	-0.09	0.43	0.42	1.00

Correlation of variables for the 73 countries (i.e. 201 observations used in the IV estimation)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Employment (in natural log)	1.00														
2	GDP per capita (in natural log)	-0.08	1.00													
3	Overall variation in financial inclusion (in natural log)	-0.16	0.43	1.00												
4	Gender gap in financial inclusion	0.07	-0.16	-0.29	1.00											
5	Real remittance per capita (in natural log)	-0.23	0.51	0.23	-0.17	1.00										
6	Remittance as a ratio of GDP (in natural log)	-0.03	0.15	-0.20	-0.02	0.82	1.00									
7	Real remittance (in natural log)	0.14	0.59	0.09	-0.13	0.60	0.47	1.00								
8	Institutional quality	-0.24	0.24	0.54	-0.14	0.14	-0.21	-0.16	1.00							
9	Real interest rate (in %)	-0.03	0.00	-0.13	-0.01	-0.07	0.06	-0.08	-0.08	1.00						
10	FDI (as a % of GDP)	0.03	0.00	-0.01	0.10	0.11	0.17	-0.11	0.05	0.01	1.00					
11	Trade (as a % of GDP)	-0.21	0.18	0.19	0.08	0.28	0.19	-0.14	0.31	-0.14	0.26	1.00				
12	Labor force participation rate (in %)	0.21	-0.28	-0.06	0.33	-0.44	-0.29	-0.34	0.06	0.22	0.12	0.04	1.00			
13	GDP per capita (in natural log)	-0.29	0.66	0.70	-0.21	0.40	-0.19	0.31	0.52	-0.27	-0.11	0.22	-0.29	1.00		
14	GDP per capita squared	-0.29	0.65	0.70	-0.20	0.38	-0.21	0.29	0.53	-0.26	-0.10	0.22	-0.27	1.00	1.00	
15	Branches of commercial banks (in natural log)	0.18	0.49	0.20	-0.04	0.02	-0.22	0.66	-0.01	-0.10	-0.21	-0.30	-0.15	0.43	0.42	1.00

Appendix B

Effect of remittances on overall variation in financial inclusion

Dependent variable: Overall variation in financial inclusion (in natural log)			
	Coef.	Std. Err.	t
Real remittance per capita (in natural log)	-0.1490**	0.0639	-2.33
Control variables:			
Institutional quality	0.0746	0.2492	0.3
Real interest rate	0.0043	0.0059	0.74
FDI (as a % of GDP)	0.0123***	0.0040	3.12
Trade (as a % of GDP)	0.0005	0.0027	0.2
Labor force participation rate	-0.0290*	0.0154	-1.88
GDP per capita (in natural log)	5.2377	3.7449	1.4
GDP per capita squared	-0.2248	0.2110	-1.07
Branches of commercial banks (in natural log)	-0.1128	0.1438	-0.78
Population (in natural log)	1.7302*	0.9589	1.8
Year dummies	Yes		
Number of groups	73		
Number of observations	201		

Variables are in their natural log except where variables are expressed in percentages or contain negative values.

Std. Err. are standard errors.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

Effect of remittances on financial inclusion gender gap

Dependent variable: Financial inclusion gender gap (in natural log)			
	Coef.	Std. Err.	t
Real remittance per capita (in natural log)	-0.0380*	0.0205	-1.85
Control variables:			
Institutional quality	-0.0796	0.0800	-1
Real interest rate	0.0009	0.0019	0.5
FDI (as a % of GDP)	-0.0001	0.0013	-0.11
Trade (as a % of GDP)	0.0000	0.0009	-0.02
Labor force participation rate	0.0013	0.0049	0.26
GDP per capita (in natural log)	0.7596	1.2028	0.63
GDP per capita squared	-0.0505	0.0678	-0.75
Branches of commercial banks (in natural log)	0.0289	0.0462	0.63
Population (in natural log)	-0.6698**	0.3080	-2.17
Year dummies	Yes		
Number of groups	73		
Number of observations	201		

Variables are in their natural log except where variables are expressed in percentages or contain negative values.

Std. Err. are standard errors.

* Significant at the 0.10 level.

** Significant at the 0.05 level.

*** Significant at the 0.01 level.

Appendix C

Names of the 102 countries in the original dataset							
1	Afghanistan	28	Djibouti	55	Madagascar	80	Senegal
2	Albania	29	Dominican Republic	56	Malawi	81	Serbia
3	Algeria	30	Ecuador	57	Malaysia	82	Sierra Leone
4	Angola	31	Egypt, Arab Rep.	58	Mali	83	South Africa
5	Argentina	32	El Salvador	59	Mauritius	84	Sri Lanka
6	Armenia	33	Eswatini	60	Mexico	85	Sudan
7	Azerbaijan	34	Ethiopia	61	Moldova	86	Syrian Arab Republic
8	Bangladesh	35	Gabon	62	Mongolia	87	Tajikistan
9	Belarus	36	Georgia	63	Montenegro	88	Tanzania
10	Belize	37	Ghana	64	Morocco	89	Thailand
11	Benin	38	Guatemala	65	Mozambique	90	Togo
12	Bhutan	39	Guinea	66	Myanmar	91	Tunisia
13	Bolivia	40	Haiti	67	Namibia	92	Turkey
14	Bosnia and Herzegovina	41	Honduras	68	Nepal	93	Turkmenistan
15	Botswana	42	India	69	Nicaragua	94	Uganda
16	Brazil	43	Indonesia	70	Niger	95	Ukraine
17	Bulgaria	44	Iran, Islamic Rep.	71	Nigeria	96	Uzbekistan
18	Burkina Faso	45	Iraq	72	North Macedonia	97	Venezuela, RB
19	Burundi	46	Jamaica	73	Pakistan	98	Vietnam
20	Cambodia	47	Jordan	74	Paraguay	99	West Bank and Gaza (or State of Palestine)
21	Cameroon	48	Kazakhstan	75	Peru	100	Yemen, Rep.
22	China	49	Kenya	76	Philippines	101	Zambia
23	Colombia	50	Kyrgyz Republic	77	Romania	102	Zimbabwe
24	Comoros	51	Lao PDR	78	Russian Federation		
25	Congo, Dem. Rep.	52	Lebanon	79	Rwanda		
26	Costa Rica	53	Lesotho				
27	Cote d'Ivoire	54	Liberia				

Names of the 73 countries used in the IV estimations						Countries observed 3 times				Countries observed 2 times	
1	Albania	26	Honduras	51	North Macedonia	1	Albania	29	Malaysia	1	Angola
2	Algeria	27	India	52	Pakistan	2	Algeria	30	Mali	2	Azerbaijan
3	Angola	28	Indonesia	53	Paraguay	3	Argentina	31	Mauritius	3	Burundi
4	Argentina	29	Iraq	54	Peru	4	Armenia	32	Mexico	4	China
5	Armenia	30	Jamaica	55	Philippines	5	Bangladesh	33	Moldova	5	Congo, Dem. Rep.
6	Azerbaijan	31	Jordan	56	Romania	6	Benin	34	Mongolia	6	Cote d'Ivoire
7	Bangladesh	32	Kenya	57	Russian Federation	7	Bolivia	35	Montenegro	7	Iraq
8	Benin	33	Kyrgyz Republic	58	Rwanda	8	Bosnia and Herzegovina	36	Nicaragua	8	Jamaica
9	Bolivia	34	Lebanon	59	Senegal	9	Botswana	37	Niger	9	Lesotho
10	Bosnia and Herzegovina	35	Lesotho	60	Serbia	10	Brazil	38	Nigeria	10	Liberia
11	Botswana	36	Liberia	61	South Africa	11	Bulgaria	39	North Macedonia	11	Myanmar
12	Brazil	37	Madagascar	62	Sri Lanka	12	Burkina Faso	40	Pakistan	12	Namibia
13	Bulgaria	38	Malawi	63	Tajikistan	13	Colombia	41	Peru	13	Paraguay
14	Burkina Faso	39	Malaysia	64	Tanzania	14	Costa Rica	42	Philippines	14	Serbia
15	Burundi	40	Mali	65	Thailand	15	Dominican Republic	43	Romania	15	Sri Lanka
16	China	41	Mauritius	66	Togo	16	Egypt, Arab Rep.	44	Russian Federation	16	Tanzania
17	Colombia	42	Mexico	67	Uganda	17	Georgia	45	Rwanda	17	Uzbekistan
18	Congo, Dem. Rep.	43	Moldova	68	Ukraine	18	Guatemala	46	Senegal	18	Zimbabwe
19	Costa Rica	44	Mongolia	69	Uzbekistan	19	Haiti	47	South Africa		
20	Cote d'Ivoire	45	Montenegro	70	Vietnam	20	Honduras	48	Tajikistan		
21	Dominican Republic	46	Myanmar	71	West Bank and Gaza (or State of Palestine)	21	India	49	Thailand		
22	Egypt, Arab Rep.	47	Namibia	72	Zambia	22	Indonesia	50	Togo		
23	Georgia	48	Nicaragua	73	Zimbabwe	23	Jordan	51	Uganda		
24	Guatemala	49	Niger			24	Kenya	52	Ukraine		
25	Haiti	50	Nigeria			25	Kyrgyz Republic	53	Vietnam		
						26	Lebanon	54	West Bank and Gaza (or State of Palestine)		
						27	Madagascar	55	Zambia		
						28	Malawi				

CHAPTER TWO: Financial inclusion, household welfare and consumption in Ghana

Abstract

Although financial inclusion benefits all groups of people, its impact on the marginalized is of particular interest as it contributes to smoothen consumption, empower the poor, provide funds for essential services such as food, health, education, among others. This study examines the effect of financial inclusion on the welfare and the expenditure behavior of households in Ghana. The study is based on the seventh round of the Ghana Living Standard Survey. The effect of financial inclusion was examined on the level of household expenditure as well as on household budget shares by using propensity score matching techniques and instrumental variable techniques. The categories of expenditure considered in this study includes food, health, education, housing, consumer durables, temptation goods and other goods.

Several findings emerged from the analysis. First, the results of the levels and budget shares show that financial inclusion is inversely related to expenditure on food. However, financially included female-headed households dominate their male counterparts in housing expenditure and consumer durables, while their male counterparts spend more on human capital goods such as education. For urban households and their rural counterparts, the budget share results showed that financially included rural households divert resources away from food consumption, temptation goods and the other goods category to investment in education, housing, and consumer durables. Meanwhile, the same budget share results showed that the impact of financial inclusion on urban households is generally not statistically significant. The varying impact of financial inclusion on the level of expenditure and household budget shares have essential policy implications on how financial inclusion can be improved among the disadvantaged group.

1. Introduction

An inclusive financial system is an important infrastructure in every economy as it accelerates progress towards inclusive growth and development. One important element of financial inclusion for poor households is the availability of a safe place to save. Savings can serve as a buffer against future shocks (Prina, 2015). This means that financial inclusion can help poor households smoothen their consumption over time by providing a safe place to save money in good times so that in bad times they would have enough resources to maintain their consumption level. Apart from savings, financial inclusion can also help poor people obtain credit to start a business or allow small businesses obtain loans to expand their operations. This suggests that financial inclusion may allow growth to become more inclusive, benefiting not only the rich or high-income group but also the poor and vulnerable groups which may lead to reduction in poverty and inequality.

According to Demirguc-Kunt et al. (2015), account ownership is the starting point to accessing formal financial services for most people. Account ownership has been increasing globally from 51% in 2011 to 62% in 2014 and 69% in 2017 according to the Global Findex dataset 2017. In the case of Ghana, the Findex dataset shows that account ownership lags the global estimate. From as low as 29% in 2011, account ownership of adults in Ghana rose to 41% in 2014 and 58% in 2017. The significant increase in account ownership in Ghana was largely contributed by the proliferation of mobile money accounts, which rose from 13% to 39% in 2014 and 2017 respectively. This suggests that more than 30% of the Ghanaian population is unbanked. Most of the unbanked population, who are likely to belong to the poor group, may resort to informal channels, such as saving at home, with relatives, or savings club which are risky. The inaccessibility of formal savings channels may not only put the poor at the risk of losing their

money but also deny them the opportunity to access credit. The lack of credit access among the unbanked may also limit the economic initiative of micro-entrepreneurs who may need credit to create or expand their businesses.

The importance of financial inclusion is therefore enormous in providing savings, credit, payment services and insurance facilities for consumption smoothing, education, health, and business expansion. According to Zhang and Posso (2019), financial inclusion is key among the policies designed for inclusive development in most developing countries. Financial inclusion also plays a major role in inequality and poverty reduction (Dimova & Adebawale, 2018). It provides poor and vulnerable households the opportunity to borrow and invest in education, health or business enterprises which has the capacity to improve their standard of living and reduce the income inequality gap. While existing study on Ghana examined the effects of financial inclusion on poverty and vulnerability to poverty (Koomson et al., 2020), the present study seeks to investigate the impact of financial inclusion on household welfare in Ghana. To be more specific, the objectives of the study are two-fold; first, the study examines the effect of financial inclusion on the budget share of households for the full sample and subsamples based on location (urban/rural) and gender of household head. Second, the study focuses on the level of expenditure to examine the effect of financial inclusion for the full sample and subsamples. The last wave of the Ghana Living Standard Survey (GLSS 7) carried out in 2016/2017 was used in the analysis.

Studies on financial inclusion and household welfare in Ghana are scarce. One exception is the analysis by Koomson et al. (2020) who showed that financial inclusion reduces poverty and vulnerability to poverty among Ghanaian households. The present study seeks to fill this gap and departs from Koomson et al. (2020) as it focuses on the effects of financial inclusion on household expenditure behaviour in Ghana. The paper makes two main contributions to literature:

1. The study investigates the impact of financial inclusion on the categories of household expenditure. This includes examining the impact of financial inclusion on both levels of expenditure and budget shares.
2. The study delves into the heterogenous impact of financial inclusion on different household types based on gender and location.

The rest of the paper is organized as follows: chapter two reviews relevant theories and empirical literature. Chapter three provides details of the empirical model and estimation method employed in the study while chapter four reports the estimated results and discussions. In chapter five, the conclusion and policy recommendations of the study are presented.

2. Literature review

The literature review for this study is divided into three sections. The first section considers literature which focuses on a narrow definition of financial inclusion based on account ownership and its related impact on the welfare and financial wellbeing of households (or individuals) in developing countries. The second section also concentrates on developing countries, but it delves into the effect of microcredit on consumption, investment, and wealth acquisition of households (or individuals). In the third section, the study focuses mainly on developed countries to examine the effect of financial inclusion on many economic outcomes.

2.1. Impact of account ownership on consumption and welfare of developing countries.

The impacts of account ownership on various economic outcomes have been studied in extant literature. Mallick and Zhang (2019) used longitudinal household survey data for 2011, 2013 and 2015 waves to study the effects of financial inclusion (i.e. transaction account ownership in formal financial institution) on household welfare in China. The authors employed the innovative method of heteroscedasticity-based identification techniques in their analysis. The study found that, account ownership increases overall household consumption, but the impact varies across different income groups. Moreover, the study showed that financial inclusion disproportionately benefits urban dwellers compared to rural dwellers. This is not surprising as urban dwellers are generally better-off economically than their rural counterparts and therefore can more easily access certain services such as credit. There is also likely to be disparity in the amounts given out to the two groups.

Several empirical studies have employed randomization techniques to investigate the effects of account ownership on some welfare indicators of households and individuals. One notable example is the study conducted by Dupas and Robinson (2013). The authors test the hypothesis that formal savings hinders the growth of businesses in poor countries by using rural Kenya as a case study. Specifically, the study was carried out around a rural market center called Bumala Town in the years 2006, 2007 and 2008 based on self-employed individuals who were either market vendors or bicycle-taxi drivers. The treated group was randomly given the opportunity to open bank accounts for free, while the control group was not financially assisted in opening bank account. Though the withdrawal fees were high, the study found that a significant share of the market women used the account, increased their savings, productive investment, and private expenditures. However, the study found no evidence of impact on bicycle-taxi drivers. This

study suggests that making financial inclusion affordable and accessible in poor countries may increase the assets and welfare of women. Still on the randomization of bank accounts, Prina (2015) carried out the field experiment in the surrounding area of Pokhara, which is the second largest city in Nepal. A total of 19 slums were used in the experiment, located in the rural, semi-rural areas and the outskirts of the city. The study focused on female household heads. The treated sample had the option to open a bank account without a fee at the local branch, while the control group was denied this option but were not prevented from opening an account in another financial institution. The study made the following findings: (1) there was high rate of account opening and use due to the waving of fees and proximity of the banks; (2) the impacts of treatment on welfare variables such as income, assets and aggregate expenditures were inconclusive; (3) treatment resulted in reallocation across the categories of expenditures and improved their resilience to shocks; (4) treatment led to improvement in the financial wellbeing of households, but the mechanism could not be explained. Thus, unlike the case of Dupas and Robinson (2013) where improvement in welfare could be seen via increase in expenditures, Prina (2015) showed no evidence of improvement in the welfare of women in Nepal. Surprisingly, treated households in Nepal reported of improvement in the self-perception of their financial wellbeing, but the mechanism could not be identified. This is in contrast with Dupas and Robinson (2013), which clearly recorded improvement in the savings and productive investments of the treated group and thus lending support for the improvement in their financial wellbeing.

2.2. Impact of credit on consumption and welfare of developing countries

One of the important elements of financial inclusion which can improve the welfare of the poor or the low-income group is access to credit. Amendola et al. (2016), used household survey

data collected in 2014 to investigate the impact of credit on the welfare of Mauritians by means of an instrumental variable approach. The authors discovered that urban dwellers were more likely to access credit. Furthermore, the study showed that greater credit access was seemingly associated with higher investment in human capital (i.e. education) but a reduction in the consumption of household production. Meanwhile, Dimova and Adebawale (2018) found that financial inclusion generally increases household expenditure in Nigeria.

In the quasi-experiment of Kaboski and Townsend (2011, 2012), the impact of microloan was examined using the “Million Baht Village Fund” program as a natural experiment. The program is among the largest microfinance initiatives sponsored by the government of Thailand. The program involved giving one million Baht to each village regardless of the number of households in the villages. Each village was expected to give credit to only its members (i.e. non-members of a village were not eligible to take loans) without gender restrictions. Their findings showed that consumption and income increased at the start of the program, but the increase was short term, as it converged back to trend, suggesting that the notion of consumption smoothing was not applicable. The authors argued that this phenomenon resembles a situation where the availability of credit influences households to spend their precautionary balance on consumption. Another strand of literature has investigated the impact of microcredit by employing randomized control trial experiments. Banerjee et al. (2015a) employed a randomized approach to evaluate the impact of microcredit group-lending program in India, focusing on the city of Hyderabad. A total of 52 neighborhoods were randomly selected in Hyderabad and lending activities carried out in these neighborhoods, which gave rise to an increase in the proportion of borrowers. Yet, there was no evidence of significant increase in consumption. Specifically, human capital expenditure such as health and education expenditures were not significantly impacted by the microcredit. Similarly,

expenditure on food was not significant but consumer durables increased significantly while temptation goods declined. The findings suggest the diversion of resources from tempting goods to consumer durables, occurring as a result of microcredit access. Another randomized control trial was carried out in Morocco by Crepon et al. (2011). In this experiment, 81 matched pairs of villages were randomized to ensure that only one of the villages in the matched pairs got the microloan while the other was denied. Some of the characteristics of the program involve the following: screening of applicants was minimal lending was carried out to groups and interest rates were low. Their finding on the impact of microfinance on consumption was similar to Banerjee et al. (2015a), the study found no evidence of microcredit impacting average consumption. Attanasio et al. (2011) in a control trial in Mongolia, the authors randomized the locations for offering both individual and group liabilities. The characteristics of the group liability loans were quite different from the ones offered in Morocco in some respects but similar in other respects. In terms of the differences, the group liability program offered smaller sized loans and restricted borrowing to females. However, like the Morocco microcredit program, screening of applicants was very limited and interest rates were also low. The findings of Attanasio et al. (2011) showed evidence of increased food consumption and ownership of consumer durables while ownership of land, residential tent and vehicles declined. The difference in the characteristics of the lending program of Attanasio et al. may account for the difference in the findings. One of the characteristics of the lending program involved gender restriction in favour of females, and thus gender gap in living conditions may explain the increased expenditure on a basic need such as food. In the case of Bosnia-Herzegovina, Augsburg et al. (2012) examined an individual lending program which was also characterized by low interest rates and small sized loans but there was no gender restrictions and screening of applicants was more rigorously than in a classic microloan product. The loan

officer employed a scoring model which required that selected borrowers be marginal borrowers. However, the selection of applicants for loans was based on applicants who were successful at the interview, so that randomization was carried out on the group of applicants that emerged successful in the interview. Among other things, the study found that the poorer group reduced consumption but there was no evidence of any impact on consumer durable goods. For the richer group, the lending program resulted in a reduction in savings. Banerjee (2013) notes that these outcomes may have emerged because the loans issued were not large enough to cover the increasing needs of these two groups (i.e. the poorer and richer groups). In an earlier study, Karlan and Zinman (2010) studied a type of microcredit product with characteristics that differ even more from a typical microloan. It required a significant screening procedure, and the interest rates were high (the average annual rate was set at 200%) but there was no gender restriction on the eligibility of the bank's clients. The randomization was done within the group of the marginally rejected loan applicants from the screening exercise, so that a fraction of them was offered the loan. The disbursed loans were spent on many items ranging from the payment of food, education, home repairs, transportation, social events to repayment of other loans. Despite the unfavourable conditions associated with the loans, the outcome was surprisingly impressive, as it resulted in increase in income. The success of the loan may be due to the fact that it helped the recipients to continue to stay in employment for the study period or deal with other emergencies (Banerjee, 2013). Other positive effects of the microcredit program on the recipients included reduced hunger and improved positive outlook about their future prospects. However, there was increased depression and stress among recipients. The burden of paying the high interest may account for the increased depression and stress among recipients. It may also be due to the significant amount of screening carried out on loan applicants or the anxiety/uncertainty associated with the

randomization procedure. The correlation of randomization trial with stress is documented in literature (Fernald et al., 2008).

While credit access makes it possible for poor individuals or households to increase investment without necessarily cutting back on their current consumption, none of the reviewed studies recorded long term increment in physical capital arising from the microloans. Investment in human capital such as health and education were not positively impacted by the microcredit. These findings could mean that borrowers who needed credit were denied access while the recipients did not actually need credit or that the loan amounts received were not large enough for profitable investments. Wrong use of the received loans may also account for the lack of improvement in physical and human capital, and therefore the welfare of most of the loan recipients.

Despite the mixed findings observed from the literature discussed above, there is still another strand of literature which found no transformative effects of credit. One of such studies is Banerjee et al. (2015b) conducted for six countries in four continents, the countries include Bosnia and Herzegovina, Ethiopia, India, Mexico, Mongolia, and Morocco. The start dates for treatment varied across countries and fell within the range 2003 - 2010, while end dates ranged from 2006 to 2012. Four out of the six treatment programs followed the traditional way of lending to a group, while the one in Bosnia and Herzegovina issued individual loans and the one in Mongolia issued both individual and group loans. The interest rates also varied across the countries. Lenders looked for certain characteristics from borrowers to determine legibility for loans. Some of the programs targeted only female borrowers (three out of the six programs), but most of the programs set minimum and maximum ages for legibility. Apart from India, the programs ran in the other five countries targeted only micro entrepreneurs. While some of the lenders required business plans

from their borrowers, others limited borrowings to business owners or those who were planning to do so. The findings of the study showed that though modest positive effects of treatment were consistently found across the studies, these effects are not transformative. Similarly, Meager (2019) applied Bayesian hierarchical models to jointly estimate the average effect of microcredit as well as the heterogeneity in the effects based on seven studies of randomized evaluations of microcredit. The study found that the impact of microcredit on household consumption and business was not likely to be transformative. Another study which also found no transformative effect of microcredit includes Banerjee et al. (2017) for India, while Van Rooyen et al. (2012) concludes that microcredit benefits and at the same time harms the poor.

2.3. The impact of financial inclusion in developed countries

The discussion so far has focused on the impacts of financial inclusion on socio-economic outcomes of developing countries since the majority of the unbanked live in these countries. Notwithstanding, financial exclusion is an important matter for developed countries too (Coffinet & Jadeau, 2017), as those likely to be affected are the low-income group, the unemployed and low education category (Ampudia & Ehrmann, 2015). Some of the recent studies on the socio-economic impacts of financial inclusion for developed countries include Bettin et al. (2020) who used the Bank of Italy's Survey on Household Income and Wealth for the period 2002 – 2016 to investigate the effect of financial inclusion on transitions into and out of poverty. Employing a dynamic random-effects probit model, the study found that financial inclusion reduces the probability that non-poor households will become poor and assists poor households to transit out of poverty. Stein and Yannelis (2020) used dataset obtained from the Freedman's Savings Bank to examine the impact of financial inclusion among previously unbanked group in the United States

on some economic outcomes such as human capital, labour and wealth outcomes. The study employed instrumental variable technique in the analyses, and the results showed that all outcomes are likely to increase for families with accounts. Similarly, Fitzpatrick (2015) employed instrumental variable and a two-sample instrumental variable approach to study the impact of account ownership on credit and consumption among households in UK. The study isolated the impact of the Child Benefit and the Electronic Transfer Mandate in the analysis. Using survey data for pre-mandate period (April 1996–March 2003) and post mandate period (April 2005–March 2008), the study found that increase in account ownership is associated with increase in household durables. One weakness of the study is that it failed to consider the impact on investment goods (i.e. human and physical capital) which is critical in raising the standard of living of the households. Celerier and Matray (2019) also found that financial inclusion increases households' asset accumulation (in the form of consumer durables and interest-bearing accounts) and financial security in the United States. Though the discussion on the impact of financial inclusion has so far pointed to the positive side for the developed countries, it is interesting to mention that other studies have documented some adverse outcomes of financial inclusion. Melzer (2011) examined the effect of payday loans on the expenditures of low-income households in the United States. Payday loans are small short-term loans with high interest rate which are usually accessed by the low- and middle-income customers. According to the findings of the study, while evidence could not be found to support the claim that credit access reduces economic hardship, the results showed that access to loans made it more difficult for households to pay their rent, mortgage, and utilities. Also, Skiba and Tobacman (2019) found that payday loans increase personal bankruptcy and adversely affect household's cash flow, which in turn leads to bankruptcy filings. Similarly, Bhutta

et al. (2015) found that the effects of payday loans on the indicators of financial well-being of borrowers such as their credit scores etc are close to zero for the United States.

The lack of consensus in the credit and financial inclusion literature makes new studies in this field relevant.

3. Method of study

3.1 Data description

The data source for the present study is the round seven of the Ghana Living Standard Survey (GLSS 7) collected in 2016/2017. GLSS is a household nationwide survey data collected by the Ghana Statistical Service (GSS) since 1987 to measure the well-being of the population in Ghana. The World Bank is responsible for designing the program while the national agencies of participating countries implement it. The first round of the survey was carried out in 1987/1988. Since then, six more rounds have been completed for the following periods: 1988/1989, 1991/1992, 1998/1999, 2005/2006, 2012/2013 and 2016/2017. Apart from the demographic household information covered in the GLSS7 survey, it covers topics such as financial services, migration, remittances, income, expenditure, poverty, employment, sanitation, health, water etc. A total of 15,000 households were covered in the seventh round of the survey, out of which 14,009 households responded, constituting over 93 percent response rate. However, due to missing values, 212 households (i.e. constituting about 1.5 percent of the sample that responded) were dropped after merging of files, leaving the study sample at 13,797 households.

3.2. Financial inclusion indicator

Though financial inclusion is not an end in itself, it is a key facilitator to achieving the Sustainable Development Goals (SDGs) of the United Nations. The seventeen SDGs of the United Nations which can be placed under the thematic areas of poverty eradication, protection of the planet and ensuring prosperity for all by 2030 (Kuada, 2019), would require a powerful tool such as financial inclusion to make these goals achievable (Klapper et al., 2016). In October 2013, the president of the World Bank set forth the universal financial access 2020 goal, which aimed at ensuring that all financially excluded adults get access to a transaction account by 2020 (World Bank Group, 2015). Thus, the World Bank focuses on the basic entry point of financial inclusion since transaction account is the gateway to accessing several other financial services. Though this aim has not been successfully achieved, it is important to examine the impact of financial inclusion on the welfare of individuals or households. Unlike Koomson et al. (2020) which used multidimensional measure of financial inclusion for Ghana, the current study measures financial inclusion by focusing on a dummy variable. In the GLSS 7 questionnaire, respondents were asked the question “Does (NAME) have a bank account or is contributing to a loan/savings scheme?”, where “NAME” refers to the name of each member of a household. The study assigned 1 for households with at least one bank account or a loan/savings scheme, and 0 otherwise. This question considers all the types of financial institution where NAME’s account or contribution is being held: commercial bank, investment/mortgage, community/rural bank, savings and loans scheme, cooperative/credit union, susu scheme, mobile money, among others.

3.3. Empirical methodology for the model on expenditure levels

The present study modified the model of Banerjee et al. (2015) to investigate the relationship between the level of household expenditure and financial inclusion. The empirical model is specified as:

$$C_{ij} = \gamma + \alpha FI_i + \phi \log EXP_i + X_i' \beta + \varepsilon_{ij} \quad (1)$$

Where C_{ij} is household i expenditure on good j , and j refers to the categories of household expenditure: food expenditure, education expenditure, health expenditure, housing expenditure, expenditure on consumer durables, temptation goods expenditure and expenditure on the other goods. Details of the categories of household expenditure have been provided in **Table 1**. FI_i is the treatment and refers to the dummy variable for financially included households described above. The parameter α measures the average treatment effect (ATE) while the term $\log EXP_i$ is a control variable measuring total household expenditure per capita in natural log. X_i' includes the other control variables previously defined in **Table 2**. γ is the constant term.

The study focused on household expenditure instead of income as a proxy for household welfare because the latter is difficult to measure in developing countries such as Ghana. The computations of household expenditure can be carried out easier by aggregating the different expenditure categories, than using income sources. This is particularly true in the agricultural sector, which employs a large proportion of the labor force.

Issues of self-selection omitted variable bias and reverse causality associated with financial inclusion in the empirical model can bias results and lead to misleading findings. One common way of solving this problem is through instrumental variable approach. However, in practice, finding appropriate instrument can be a daunting task. And given that the dependent variables are in monetary values, instrumental variable such as distance to the nearest financial institution will

be less exogenous. Rosenbaum and Rubin (1983) proposed addressing endogeneity using propensity scores. This approach uses matching to address the non-random selection of the treatment population after which the average treatment effect on the treated (ATET) is estimated. To derive the ATET, let T_i represent the financial inclusion status of households which equals 1 if the i th household is financially included, thus, if household i has member(s) with accounts or contributing to a loan/savings scheme. In this case, the potential outcome of household i if it is financially included is represented by Y_{i1} , and Y_{i0} if it is financially excluded. Thus, the treatment effect of financial inclusion is given by:

$$\Delta_i = Y_{i1} - Y_{i0} \quad (2)$$

Where Y_i refers to the outcome variables which include total household consumption expenditure and categories of expenditure including food, health, education, housing, consumer durables, temptation goods and the other goods categories. The budget shares for the categories of household expenditure were also considered. The ATET is computed as

$$ATET = E(Y_{i1} - Y_{i0} | T = 1) \quad (3)$$

The identification problem in estimating ATET arises from the fact that the counterfactual (i.e. Y_{i0}) cannot be observed but the financially excluded households are used as the counterfactuals in matching techniques to represent what the financially included outcomes would be if they were financially excluded. Here, treated households are matched with the untreated households (i.e. the control group) with similar characteristics based on the covariates. For propensity score matching to be valid, it must satisfy the conditional independence assumption which states that treatment assignment is independent of potential outcomes, after conditioning on a set of observed covariates X . This is expressed as:

$$T_i \perp (Y_{i1} - Y_{i0}) | X_i \quad (4)$$

3.4. Empirical methodology for the model on budget shares

When considering budget shares as dependent variables, the theoretical foundation is based on the Working-Leser model, which makes budget shares a linear function of the logarithm of total expenditure. We therefore estimate (5) to examine the impact of financial inclusion on household budget shares in Ghana.

$$B_{ij} = \gamma + \alpha FI_i + \phi \log EXP_i + X_i' \beta + \varepsilon_{ij} \quad (5)$$

Where B_{ij} is household i share of good j in total expenditure. The j typologies of household expenditure have been grouped into seven categories food, education, health, housing, consumer durables, temptation goods and the other goods category. Thus, B_{ij} are the annual budget shares of the seven categories of household expenditure. FI_i is a dummy variable equal to 1 if household is financially included, that is if a household has member(s) with accounts or contributing to a loan/savings scheme. The term $\log EXP_i$ refers to the logarithm of total expenditure, γ is the constant term while the vector X_i' is a vector of other control variables which have been described in **Table 2**.

As mentioned earlier, the variable of interest (i.e. financial inclusion) in this study may be endogenous due to either reverse causality or omitted variable bias. Therefore, the proposed study employs instrumental variable and matching techniques to address this problem. Other studies on household budget shares which addressed endogeneity by applying instrumental variable techniques include Adams and Cuecuecha (2010) and Adams and Cuecuecha (2013), while Randazzo and Piracha (2019) employed matching techniques to address endogeneity problem. For the instrumental variable approach, a probit two-stage least square estimation technique was adopted to solve the endogeneity problem. For a variable to be suitable as instrument, it must

satisfy two conditions: the variable must be correlated with the endogenous variable but have no direct correlation with the dependent variable. The study uses the distance to the nearest financial institution (calculated as a regional average across the 10 regions of Ghana) as instrument because it has direct correlation with financial inclusion but is not directly related to household expenditure. Demirgüç-Kunt and Klapper (2013) asserts that one of the common reasons reported for not having accounts relates to the distance to the nearest bank. The farther away a bank is, the more costly to access in terms of time and money (transport cost) and therefore the lower financial services are accessed. However, distance to the nearest financial institution may not necessarily influence household expenditure except through access to financial services (indirect effect through financial inclusion). Some of the recent empirical literature which used the distance to the nearest financial institution as instrument include Koomson et al. (2020) and Ibrahim and Aliero (2020). Despite the use of distance as instrument for financial inclusion in previous studies, it may not be completely exogenous. The major factor which can influence distance is the level of household income (Bair & Tritah, 2019). People consider proximity to access certain essential services or facilities such as schools, shopping malls, hospitals, banks etc when they are choosing places of residence. Because of the high demand for places where these facilities are available, the major determinant of access is the ability to afford. Therefore, following Bair and Tritah (2019), the study controls for the income level, but we use total expenditure as a proxy for income since in Ghana it is a more reliable measure as discussed before. One of the requirements for a variable to serve as a good instrument is that it must be strongly correlated with the endogenous variable. In this regard, the study conducted several tests to check for the suitability of the variable (distance to nearest financial institution) as instrument for financial inclusion.

The study does not apply direct two-stage least square because that procedure does not consider the binary nature of financial inclusion as rightly noted by Cerulli (2014). The present study applies probit two-stage least square technique to examine the effect of financial inclusion on household budget shares. Following Cerulli (2014), the probit two-stage least square with heterogeneous response to treatment involves the following four steps. First, probit regression is performed with FI_i as the dependent variable, on the other control variables X_i and the instrumental variable $Distance_i$, to obtain P_T , which is the predicted probability of FI_i . Second, FI_i is regressed on $(1, X_i, P_T)$ using OLS to obtain the fitted values \widehat{FI}_i . Third, the budget share B_{ij} is regressed on $[1, X_i, \widehat{FI}_i, \widehat{FI}_i(X_i - \mu_X)]$ using OLS. Fourth, the estimated parameters are substituted into the sample formulas, the other causal effects are recovered, and bootstrap is performed to get the standard errors for testing ATET and ATENT. To test the robustness of the estimated results, the study also applied the Propensity score matching technique which has been discussed in section 3.3.

Equation (4) shows the specification of the probit first stage regression. The probit first stage is performed to obtain the predicted probability of being financially included (represented by P_T):

$$Pr(Y = FI_i | X_i, Z_i) = b + \theta Distance_i + \emptyset \log EXP_i + X_i' \beta + v_i \quad (6)$$

Where FI_i refers to households who own accounts or contribute to a loan/savings scheme. Z_i is the instrumental variable while X_i' is a vector of exogeneous variables which have been defined in **Table 2**. In the second stage the study performed two stage least square regressions via OLS. Here, the first step involves running FI_i on P_T as shown in (7)

$$\widehat{FI}_i = \gamma + \alpha P_T + \emptyset \log EXP_i + X_i' \beta + \varepsilon_{ij} \quad (7)$$

Where \widehat{FI}_i is the fitted values from (7). Next, the study runs the outcome variable B_{ij} on \widehat{FI}_i as specified in (8):

$$B_{ij} = \sigma + \alpha\widehat{FI}_i + \phi\log EXP_i + X_i'\beta + \varepsilon_{ij} \quad (8)$$

Where α is relatively a more efficient estimator of the Average Treatment Effect (ATE) than direct-2sls (Cerulli, 2014). The Probit two-stage regression was implemented in Stata using the IVTREATREG module developed by Cerulli (2014). But the response to treatment may be heterogenous. For instance, the impact of treatment may vary based on factors such as literacy status, employment status etc. In order to estimate the ATE of the models with heterogeneous effects, additional regressors $(X_i - \mu_X)\widehat{FI}_i$ are added to (8). The ATE is the effect of treatment if all the population are treated. To estimate the effect of treatment on the treated households (ATET) and the untreated households (ATENT), the estimated parameters and bootstrapping procedures are used to obtain standard errors for testing ATET and ATENT. The robust standard error and bootstrapping techniques applied in the estimation helps to overcome potential errors or correlation problems which may arise from model specifications or the estimation procedure.

Table 1

Description of household expenditure categories

Expenditure category	Description
Food	Non-purchased food Purchased food
Health	Outpatient services Medical products, equipment and appliances
Education	Pre-Primary School Primary and Junior Secondary School Senior Secondary School Post-secondary School Tertiary
Housing	Actual rent Imputed rent
Consumer durables	Clothing; footwear; household appliances; furniture and furnishing; glassware, tableware, kitchenware and utensils
Temptation goods	Alcoholic beverages Tobacco Narcotics
Other goods	Transport, communication, recreation, restaurants and hotels, household textiles, miscellaneous, non-alcoholic beverages, utilities etc

Table 2

Variable definitions

Variable	Variable type	Definition
Household characteristics:		
Account ownership/financially included	Dummy	If at least one household member has account or is contributing to a loan/savings scheme: Yes=1, No=0
Total household expenditure per capita	Continuous	Annual total expenditure per capita of household
Literacy	Dummy	If household head has ever attended school: Yes=1, No=0
Gender of household head	Dummy	Female=1, Male=0
Employed	Dummy	If household head is currently employed Yes=1, No=0
Household size	Discrete random	Number of people in a household
Household size squared	Discrete random	-
Age of household head	Continuous	Age in years
Age of household head squared	Continuous	-
Number of household members under 5	Discrete random	Number of children within age range 0-4years in a household
Presence of under 15 household members	Dummy	If there exist any member of a household within 0-14 years: Yes=1, No=0
Number of household members over 64	Discrete random	Number of old adults in a household aged 65 years and above
Number of male household members within the age range 15-64	Discrete random	Number of male household members who are 15 years and older but less than 64 years.
Number of female household members within the age range 15-64	Discrete random	Number of female household members who are 15 years and older but less than 64 years.
Nationality	Dummy	If household head is a Ghanaian: Yes=1, No=0
Marital status of household heads:		
Consensual union	Dummy	If household head is in consensual union: Yes=1, No=0
Divorced	Dummy	If household head is divorced: Yes=1, No=0
Married	Dummy	If household head is married: Yes=1, No=0
Never married	Dummy	If household head is never married: Yes=1, No=0
Separated	Dummy	If household head is separated: Yes=1, No=0
Widowed	Dummy	If household head is widowed: Yes=1, No=0
Distance to nearest financial institution	Continuous	Regional average distance (in kilometers) to nearest financial institution -10 regions
Location:		
Rural	Dummy	If household is located in the rural area: Yes=1, No=0
Northern	Dummy	If household is located in the Northern parts of Ghana: Yes=1, No=0
Ecological zone:		
Savannah	Dummy	If household is located in the Savannah parts of Ghana: Yes=1, No=0
Forest	Dummy	If household is located in the Forest parts of Ghana: Yes=1, No=0
Coastal	Dummy	If household is located in the Coastal parts of Ghana: Yes=1, No=0
Accra	Dummy	If household is located in Accra: Yes=1, No=0

4. Results and discussion

4.1. Sample descriptive statistics

The total sample used for the analysis is 13,797 households after 212 households were dropped due to missing values. Out of the study sample, 7,805 households (or 56.57 percent) are financially included while 5,992 (or 43.43 percent) are not. Since one of the aims of this paper is to examine the impact of financial inclusion on expenditure behavior of households, the study first presents descriptive statistics on household expenditure. The present study categorizes household expenditure into seven major categories as displayed in **Table 1**, with detailed description for each of the categories. **Table 3** provides the average per capita expenditure for each of the seven categories of household expenditure for both the treated sample (financially included households) and untreated sample (financially excluded households). Similar information is contained in **Table 5** for all the samples used in the study. **Table 3** shows that the per capita expenditure of the households who are financially included constitutes more than 65 percent of the total household expenditure. The expenditure gap between treated and untreated samples is widest for the other goods category (GH¢1,202.358). For the temptation goods category, the untreated sample dominates with a gap of GH¢3.29311.

Table 5 shows that the annual total per capita expenditure of households in Ghana is approximately GH¢3,840. The largest gap is observed between rural (GH¢2,558) and urban households (GH¢ 5,561) producing a gap of GH¢3,003 while the male-headed households' per capita expenditure (GH¢3,849) and female-headed households' per capita expenditure (GH¢3,820) produce the smallest gap of GH¢28. Thus, available data does not show large differences in the consumption levels of male- and female-headed households in Ghana. However, the categories of expenditure between the two household types show different pattern of

expenditure. Female-headed households in Ghana spend a larger part of their budget on food (GH¢1,447) which is about 38 percent of their total expenditure while in the case of their male counterparts, the other goods category comprising of transportation, communication, recreation etc dominate their expenditure (GH¢1,728) constituting 45 percent of their total expenditure. Thus, despite the levels of the consumption expenditures of the two household types not being largely different, their needs/wants differ. Education expenditure is the third most important expenditure category after food expenditure and the other goods category in the two household types. Female-headed households tend to spend more on education than the male-headed households. For the female-headed households, temptation goods is the expenditure category that takes the least amount (GH¢8) while for the male-headed households, the least category of expenditure is health expenditure (GH¢26). The female-headed household dominates their male counterparts in food, health, education and housing expenditures while the male-headed households dominate in consumer durables, temptation goods and the other goods category. Thus, the female-headed households spend more on food and investment goods (i.e. health, education and housing) while their male counterparts spend more on non-essential goods. For rural and urban households, the latter dominates the former in all the categories of expenditure except for temptation goods where both rural (GH¢ 30.3143) and urban households (GH¢ 30.15154) have identical expenditures.

Table 3

Summary statistics on categories of household per capita expenditure (real average values)

Expenditure category	Financially included (Treated)		Financially excluded (Untreated)	
	GH¢	(%)	GH¢	(%)
Food expenditure per capita	1385.536	56.8671	1050.911	43.1329
Health expenditure per capita	33.12777	62.7269	19.68489	37.2731
Education expenditure per capita	414.7848	76.5485	127.0738	23.4515
Housing expenditure per capita	291.1921	62.6604	173.5223	37.3396
Consumer durables expenditure per capita	498.3459	68.6650	227.4184	31.3350
Temptation goods	28.8146	47.2973	32.1077	52.7027
Other goods expenditure per capita	2153.7040	69.3613	951.3460	30.6387
Total household expenditure per capita	4805.505	65.0485	2582.064	34.9515
Observations	7,805	56.57	5,992	43.43

Table 4 presents the budget allocation of households for the seven categories of household expenditure. The information reveals that generally (based on the full sample statistics), Ghanaian households spend a larger proportion of their budget on food consumption. The same is true for the untreated sample while the treated sample allocates greater proportion of their budget on the consumption of other goods (such as recreation, transports, communication etc). Expenditure on human capital such as health and education are low in both groups. On the same issue of human capital, **Table 5** shows that literacy rate is high among the treated sample (82 percent), while for the untreated sample, it is estimated at approximately 57 percent. Male-headed households also dominate female-headed households in literacy rates by 8 percentage points while in the case of urban and rural households, the former dominates the latter by 25 percentage points. Household heads who are employed are generally low, estimated at about 34 percent for the treated and 14

percent for the untreated. The employment gap of 20 percentage points between the treated and untreated households is almost identical to the gap between rural and urban households which is over 19 percentage points. The group with the lowest employment gap is the male-headed and female-headed households where the former dominates the latter by 16 percentage points. The average number of household members within the working age category (15-64) is more than two except for the female-headed sample where the number is lower.

On other issues, about 31 percent of the household heads are females. **Table 5** also shows that approximately 99 percent of household heads are Ghanaians. Majority of Ghanaians are rural dwellers, constituting about 57 percent. There is also huge disparity in the distribution of the population between the northern and southern regions. The northern parts accommodate nearly 30 percent of the Ghanaian population. Household heads who are married dominate those in the other categories, making up more than 55 percent. Among the treated sample, nearly six persons out of ten who are household heads are married while for the untreated sample the figure is estimated at approximately 50 percent. The case is similar for urban and rural households where 59 percent and 49 percent of urban and rural household heads respectively are married. But the gap seems quite wide for male and female household heads where only 21 percent of households headed by females are married while 36 percent are widowed. Thus, majority of the households headed by women in Ghana are single parents who have lost their husbands. For their male counterparts, the married group dominates with 71 percent of them married.

Table 4

Summary statistics on average budget share of household expenditure categories

Expenditure category	Full sample	Financially included (Treated)	Financially excluded (Untreated)
Food expenditure	0.3908	0.3490	0.4453
Health expenditure	0.0081	0.0078	0.0084
Education expenditure	0.0810	0.0965	0.0609
Housing expenditure	0.0776	0.0679	0.0903
Consumer durable expenditure	0.1002	0.1074	0.0908
Temptation goods	0.0105	0.0071	0.0149
Other goods expenditure	0.3318	0.3643	0.2895
	1.0000	1.0000	1.0000

Table 5

Summary statistics (mean values) of households

Variable	Full sample	Treated sample	Untreated sample	Female-headed household	Male-headed household	Rural household	Urban household
Household expenditure in real GH¢:							
Total household expenditure per capita	3839.871	4805.505	2582.064	3820.294	3848.761	2557.599	5560.74
Total household food expenditure per capita	1240.209	1385.536	1050.911	1447.265	1146.175	1065.706	1474.402
Total household health expenditure per capita	27.28956	33.12777	19.68489	30.72084	25.73124	19.94869	37.14136
Total household education expenditure per capita	289.8327	414.7848	127.0738	307.2202	281.9362	169.7514	450.9876
Total household housing expenditure per capita	240.0884	291.1921	173.5223	253.6517	233.9286	145.6088	366.8846
Total household expenditure per capita on durables	380.6828	498.3459	227.4184	355.1693	392.2698	259.479	543.3441
Total household expenditure per capita on temptation goods	30.24481	28.81462	32.10773	8.200094	40.25647	30.3143	30.15154
Total household expenditure per capita on other goods	1631.523	2153.704	951.346	1418.067	1728.465	866.7915	2657.829
Household characteristics:							
Financial inclusion (Yes=1, No=0)	0.5657	-	-	0.499652	0.5957	0.455097	0.71414
Literacy (Ever attended sch: Yes=1, No=0)	0.7103	0.8200	0.5674	0.652124	0.73672	0.603213	0.854015
Gender of household head (Female=1, Male=0)	0.3123	0.2758	0.3598	-	-	0.281432	0.35376
Employed (Yes=1, No=0)	0.2524	0.3420	0.1357	0.140636	0.30312	0.169365	0.363775
Household size	4.2099	4.2865	4.1101	3.399861	4.577782	4.693144	3.561365
Household size squared	25.9717	26.5235	25.2530	16.18891	30.41463	31.70984	18.27092
Age of household head	46.2719	44.8050	48.1827	49.48573	44.81239	47.42221	44.72823
Age of household head squared	2394.4820	2224.1900	2616.3000	2729.819	2242.188	2515.73	2231.761
Number of household members under 5	0.5478	0.5293	0.5719	0.371316	0.627951	0.638376	0.426243
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.6504	0.6542	0.6455	0.627292	0.66094	0.709208	0.57155
Number of household members over 64	0.2419	0.1978	0.2992	0.275006	0.226813	0.28978	0.177559
Number of male household members within the age range 15-64	1.1016	1.1926	0.9831	0.50731	1.371522	1.178978	0.997793
Number of female household members within the age range 15-64	1.2299	1.2988	1.1402	1.33929	1.180228	1.285353	1.155491
Nationality (Dummy: Ghanaian=1, Foreigner=0)	0.9873	0.9898	0.9841	0.991413	0.985455	0.98811	0.98625
Location:							
Rural (Dummy: Rural=1, Urban=0)	0.5730	0.4610	0.7190	0.516361	0.598756	-	-
Northern (Northern=1, Southern=0)	0.2978	0.2457	0.3657	0.205848	0.339587	0.404629	0.154473
Ecological zone:							
Savannah (Dummy: Savannah=1, 0=otherwise)	0.3558	0.2963	0.4332	0.258529	0.399979	0.47407	0.19708
Forest (Dummy: Forest=1, 0=otherwise)	0.3986	0.4113	0.3820	0.442562	0.378584	0.382621	0.419963
Coastal (Dummy: Coastal=1, 0=otherwise)	0.2028	0.2324	0.1642	0.25087	0.180965	0.143309	0.282635
Accra (Dummy: Accra=1, 0=otherwise)	0.0428	0.0600	0.0205	0.048039	0.0404722	0	0.1003225
Marital status of household heads:							
Consensual union	0.0897	0.0837	0.0976	0.071478	0.098019	0.095118	0.082499
Divorced	0.0620	0.0519	0.0753	0.136923	0.028035	0.057045	0.068749
Married	0.5509	0.5901	0.4998	0.209329	0.70605	0.592841	0.494653
Never married	0.1250	0.1408	0.1045	0.125087	0.125	0.077663	0.188593
Separated	0.0434	0.0407	0.0469	0.092133	0.02129	0.039464	0.048718
Widowed	0.1289	0.0928	0.1759	0.36505	0.021606	0.13787	0.116788
Distance to nearest financial institution (in kilometers)	12.2209	11.2104	13.5372	10.96151	12.79289	13.35278	10.70192
Observations	13,797	7,805	5,992	4,309	9,488	7,906	5,891

4.2. Empirical findings

The empirical analysis of this study is divided into two major parts, with the first part focusing on the effect of financial inclusion on the level of household expenditure while the second part discussed the effects of financial inclusion on household budget shares. Each of these parts are subdivided into three sections: full sample, female- and male-headed households, and rural and urban households' analysis. In the first part (i.e. the level of expenditure analysis), the first section presented the results of the full sample and discussed it in detail. Matching techniques were adopted to examine the impact of financial inclusion on the expenditure behavior of households in Ghana. The first section reported the findings of the full sample, followed by the second section which discussed the treatment effects of financial inclusion on male- and female-headed households, and then the last section dealt with rural- and -urban households to ascertain the varying impacts of financial inclusion on these households. For the second part, the study employed both Probit two-stage least squares and Propensity score matching techniques to examine the impact of financial inclusion on budget share expenditure of households in Ghana. Regarding the Probit two-stage least squares technique, the study estimated models with and without heterogenous treatment effects and then proceeded to provide average treatment effect on the treated (ATET) and average treatment effect on the untreated (ATENT), as well as their distributions via graphs. In section 4.4.2. a similar procedure was followed to examine the heterogenous response to treatment (being financially included) for female- and male-headed households, in order to ascertain the varying impacts of financial inclusion on the two household types. Section 4.4.3. compared rural households to urban ones, following the same procedure outlined above. The distributions of ATE, ATET and ATENT for the different subsamples are found in the **Appendix B**.

4.3. Financial inclusion and the level of household expenditure

In this section, the effect of financial inclusion on household expenditure is investigated using Propensity score matching technique on the raw dataset and the truncated dataset (i.e. top 1% outliers were dropped). To ensure the robustness of results, the treated observations are matched with different number of nearest neighbors, but the selected baseline is the specification with one neighbor matching. The rationale for this choice is to ensure that the matched neighbors in the baseline specification are highly similar so that there will be high level of balancedness of covariates (balancedness tables are reported in **Appendix E**).

The matching technique applied in this study allows the dependent variables (i.e. consumption and categories of consumption) to be conditionally independent of financial inclusion (i.e. treatment) by conditioning on the covariates. Therefore, the balancedness of the covariates is important if the results of the PSM are to be valid. The study checks covariate balancedness using standardized differences and variance ratios for both the full sample and subsample analyses. A covariate is said to be perfectly balanced if the standardized difference is zero and the variance ratio is one. The reported tables for the standardized differences and the variance ratios in **Appendix E** show that most of the covariates are balanced, including total expenditure (which is generally balanced and serving as a proxy for income) which has the capacity to trivialize the results if a good balance is not found for it. The tables show that most of the reported covariates have standardized differences (i.e. post matching) close to zero and variance ratios (i.e. post matching) close to one and therefore provide a good balance on the average. This suggests that the results of the matching technique employed in this study is credible to a large extent.

The study acknowledges that the presence of outliers can distort the statistical analyses. An extremely large value which deviates significantly from the regression line can bias results by pulling the

regression line away from the best fit position. In order to overcome the outlier effects, the study dropped the top 1 percent outliers (i.e. top 1% with the highest consumption level) from each of the categories of expenditure. The study did not trim both tails because it is likely that households in the lower tail may be found in both the treated and untreated samples since opening bank account is free in Ghana. However, those in the upper tail (in terms of consumption expenditure) may be rare in the untreated group. This analysis was carried out to serve as a robustness check for the full sample and the subsample results (trimmed results reported in **Appendix A**). Thus, whether the expenditure pattern between households remains unchanged in the absence of the top 1% heavy consumers.

This section focuses on the level of household expenditure to discover the magnitude of impact of treatment on the categories of household expenditure. The first set of results is related to total household consumption expenditure, where both the average treatment effect (ATE) and the average treatment effect on the treated (ATET) have been provided for each matching type. This analysis is carried out on the original sample and the truncated sample reported in **Appendix A**. In the second set of results, the ATE and the ATET are reported for the various categories of household expenditures for both the original sample and the subsamples.

4.3.1. Financial inclusion and total household expenditure analysis

The full sample ATE and ATET results are presented in **Table 7**. The results show that financial inclusion has a large and statistically significant impact on household expenditure. The ATET coefficient suggests that, on average, financial inclusion raises total household expenditure by GH¢ 1693.902. The ATE and the ATET values are consistent across the matching types in terms of sign and significance level and their magnitudes do not differ largely. Comparing this

amount to the average per capita household expenditure of GH¢ 3,839.871 (in **Table 5**) shows that financial inclusion can increase household expenditure by approximately 44 percent. However, comparing the same figure (i.e. GH¢ 1693.902) to the treated sample's average per capita expenditure of GH¢ 4805.505, shows an increase of 35 percent in the expenditure of financially included households. This signifies that financial inclusion has a substantial positive impact in improving the welfare of Ghanaian households. The balanced table of covariates (reported in Appendix E) shows the covariates are generally balanced, and thus giving credibility to the results in **Table 7**.

Table 7

Impact of financial inclusion on household expenditure (Full sample)

Propensity score matching		Total household Expenditure	Standard error	z-test
One nearest neighbor	ATE	1439.003***	65.47361	21.98
	ATET	1693.902***	82.81409	20.45
Two nearest neighbors	ATE	1412.28***	62.11249	22.74
	ATET	1649.32***	77.22984	21.36
Three nearest neighbors	ATE	1454.225***	60.4048	24.07
	ATET	1699.356***	73.9104	22.99
Five nearest neighbors	ATE	1472.582***	57.47377	25.62
	ATET	1736.562***	71.28808	24.36
Ten nearest neighbors	ATE	1481.216***	58.30091	25.41
	ATET	1750.009***	70.49639	24.82
Observations		13,797		

***Significance at 1%, **significance at 5%, and *significance at 10%. Expenditure items are expressed in real per capita values. The balancedness of covariates are reported in Appendix E.

4.3.2. Financial inclusion and the categories of household expenditure analysis

4.3.2a. Financial inclusion and the categories of household expenditure analysis (full sample)

Table 8 provides the full sample ATE and ATET results for the categories of household expenditure. The results show that financial inclusion is positively related to all the categories of household expenditure except for food and temptation goods which are negatively signed across all the matching types. The ATE and the ATET for food expenditure are -122.3183 and -112.3783 respectively, though the latter is not significant. The same negative sign is found for the truncated sample in **Appendix A**, still with insignificant ATET. The inverse relationship implies that financial inclusion instrument such as savings may provide households a safe place to keep their excess cash instead of spending it on food. Households may also cut back on food consumption and save for future investment in physical or human capital.

Concerning health expenditure, the ATE and ATET are all positive and statistically significant not only in the raw sample results but also in the truncated sample results in **Appendix A**. Though the treatment effects (i.e. ATE and ATET) in **Table 8** are low, they constitute large proportions of the average household health expenditure. The ATET value of 7.099448 constitutes 26 percent increase in the health expenditure of households if this figure is compared with the average household health expenditure of GH¢ 27.28956 in **Table 5**. Increase in health expenditure can improve human capital in Ghana since it forms part of human capital investment. Raghupathi and Raghupathi (2020) asserts that health expenditure is positively correlated with productivity and the level of income earnings. Thus, a healthy person can work more hours than unhealthy person and therefore their earnings will also differ according to their output. Apart from increase in earnings, investment in health also improves the quality of life. Education expenditure is another

type of human capital investment. **Table 8** shows that the impact of financial inclusion on education is positive and highly significant. Apart from the other goods category (which is an aggregation of several components), the impact of financial inclusion is higher on education expenditure compared with all the other categories of household expenditure with positive sign. The ATET of 150.9174 suggests that financially included households spend approximately GH¢151 more on education than their counterparts who are not financially included. The GH¢150.9174 constitutes about 52 percent increase in education expenditure when it is compared with the full sample average of GH¢289.8327 in **Table 5**. The increased investment in human capital such as health and education can boost productivity in both the short-term and the long-term periods since it improves labor well-being and efficiency. The positive relationship between financial inclusion and the human capital variables such as education and health expenditure are also supported by the truncated sample in **Appendix A**.

The next categories of household expenditure are housing expenditure and consumer durables. The consumer durables ATET coefficient of 109.7618 is the second highest among the positively signed single expenditure categories (i.e. excluding the other goods category). This suggests that on average, financially included Ghanaian households spend GH¢109.7618 more on consumer durables than what they would have spent if they were not financially included. In the case of housing expenditure, both the ATE and ATET are not statistically significant but the truncated sample results show that ATE and ATET are significant and positively signed.

Expenditure on temptation goods show that both ATE and ATET are negatively signed across all the matching types but insignificant for the latter (though **Appendix A** reports significant ATET coefficients at 10 and 1 percent significant levels across the matching types). The ATE value of -7.647499 suggests that if all households were financially included, they would spend

nearly GH¢ 8 less on temptation goods. Though the amount seems relatively low in **Table 8**, when it is compared with the full sample's average per capita expenditure (in **Table 5**), it constitutes approximately 25 percent reduction in the consumption of temptation goods. This shows that the level of expenditure allocated to temptation goods is generally low among Ghanaian households. **Table 5** shows that it is the second lowest after health expenditure, with a per capita average value of GH¢ 30. Temptation goods, which are composed of alcoholic beverages, tobacco and narcotics are socially undesirable goods (or demerit goods) that may be harmful to consumers. The addictive property of this category of goods often results in its over consumption, which may adversely affect household savings and expenditure on other essential goods. Reduction in the expenditure on temptation goods arising from financial inclusion may help in improving the well-being and welfare of households because it may either result in increased savings of households or increased expenditure on essential commodities.

The other goods category of household expenditure shows the highest ATET coefficient in both **Table 8** and **Appendix A**, though it is insignificant in the baseline matching (one nearest neighbor) in **Table 8**, five nearest neighbors and ten nearest neighbors show statistically significant ATET. The truncated sample in **Appendix** also shows that the ATET is highly significant at 1 percent significance level across all the matching types. The high ATE and ATET coefficients are expected as the other goods category is made up of many components including transport, communication, recreation, restaurants and hotels, household textiles, miscellaneous, non-alcoholic beverages, utilities etc (as described in **Table 1**).

Table 8

Impact of financial inclusion on categories of household expenditure (Full sample)

Propensity score matching		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
One nearest neighbor	ATE	-122.3183***	5.690301**	99.22703***	-23.31052	79.35686***	-7.647499***	165.7222*
	ATET	-112.3783	7.099448**	150.9174***	-41.48316	109.7618***	-4.430755	254.298
Two nearest neighbors	ATE	-118.4273***	4.701142**	103.6072***	-19.13109	87.02374***	-7.7976***	145.9875
	ATET	-98.80603	6.591936**	159.0171***	-35.24084	122.5986***	-4.539307	222.2334
Three nearest neighbors	ATE	-110.5277***	4.63341**	101.4671***	-4.348855	87.75646***	-7.920226***	166.4026*
	ATET	-81.00433	6.914263**	152.8385***	-9.746853	124.4947***	-4.091879	263.0213*
Five nearest neighbors	ATE	-111.0714***	3.723264*	96.38276***	5.690788	84.17249***	-7.72845***	183.1624**
	ATET	-85.77547	5.77533*	142.6914***	7.975331	119.5023***	-4.361419	290.9317**
Ten nearest neighbors	ATE	-114.1177***	3.534968	96.07195***	14.10539	88.87908***	-7.917522***	213.5716***
	ATET	-90.29298	5.746368*	141.9682***	22.29189	126.7149***	-4.354712	347.1579***
Observations		13,797	13,797	13,797	13,797	13,797	13,797	13,797

***Significance at 1%, **significance at 5%, and *significance at 10%. Expenditure items are expressed in real per capita values. The balancedness of covariates are reported in Appendix E.

4.3.2b. Financial inclusion and the categories of household expenditure analysis for female- and male-headed households

In **Table 9**, the treatment effects of financial inclusion on the level of household expenditure in female-headed households and male-headed households are discussed. Panel 1 deals with the treatment effects of financial inclusion on female-headed households while panel 2 covers the male-headed households. Across all the matching types, male-headed households seem to dominate in health and education expenditure arising from financial inclusion. This is also true for the truncated sample in **Appendix A**. For the male-headed households, the impacts of financial inclusion on health and education as measured by the ATET are 9.0986 and 168.9881 respectively, as shown in **Table 9**. Suggesting that on average, financially included male-headed households spend approximately GH¢ 9 more on health and GH¢ 169 more on education than what they would have spent if they were financially excluded. The ATET value for female-headed households is

not statistically significant for health expenditure across all the matching types (the same is true in **Appendix A**). In the case of education expenditure, the baseline ATET is insignificant, but the other matching types are statistically significant.

The next finding that is of concern is the effects of financial inclusion on housing and consumer durables. As can be seen in **Table 9** as well as **Appendix A**, unlike the health and education expenditures, housing and consumer durables appear to show larger ATET for female-headed households compared to their male counterparts. For male-headed households, **Table 9** shows that the ATETs are negatively signed and statistically insignificant. Female headed households who are financially included spend GH¢ 68.5413 more on investment in housing. For consumer durables, the baseline ATET for female headed households is GH¢123.5475 but GH¢ 81.6395 for their male counterparts. Thus, while female-headed households who are financially included spend on average GH¢ 124 more on consumer durables, while their male counterparts spend GH¢ 82 more.

The impact of financial inclusion on temptation goods in the two household types are also analyzed in **Table 9**. The ATET for female-headed households shows a positive sign but statistically significant (the same can be seen in **Appendix A**). On the contrary, the ATET for male headed households are negatively signed and significant across all the matching types. According to the baseline results (i.e. which is One nearest neighbor) the ATET for male headed-households is GH¢ -11.4382. Both **Table 9** and the truncated sample in **Appendix A** show that male-headed households have larger ATET values for temptation goods (i.e. in absolute terms) than their female counterparts. In percentage terms (i.e. compared to the average per capita expenditure on temptation goods), the ATET value of GH¢ -11.4382 suggest a 38 percent decrease in the consumption of temptation goods such as narcotics, tobacco and alcoholic beverages for male-

headed households. Thus, unlike the female-headed households, the financially included households headed by males either divert resources that would otherwise be spent on temptation goods to savings or investment in other essential goods. The varied impacts of financial inclusion on temptation goods in the two household types may be due to the differences in the level of consumption of temptation goods in these two household types as shown in **Table 5**. It is also documented in literature that men consume more alcohol (Obot & Room, 2005) and tobacco (World Health Organization, 2010) than women, and therefore the availability of a safe place to save (via financial inclusion) is more likely to significantly reduce the consumption of temptation goods in male-headed households where it is relatively more consumed.

The other goods category shows the highest impact of financial inclusion in the two household types. This is not surprising as the other goods category is composed of so many parts (as described in **Table 1**). Female-headed households appear to have statistically significant ATETs across the five matching types, while in the case of their male counterparts the ATET are statistically insignificant in the first three matching types. With one nearest neighbor as the reference point, female-headed households also show larger ATET of GH¢ 276.3919 while their male counterparts recorded ATET value of GH¢185.7622 but statistically insignificant (though the five and ten nearest neighbors report significant ATETs).

The discussions emanating from the results of the female and male headed households show that male-headed households who are financially included seem to spend more on health and education while their female headed households spend more on housing and consumer durables. Thus, the impact of financial inclusion on the two household types tends to vary. Female-headed households who are financially included appear to dominate their male counterparts in consumer durables and housing expenditure (i.e a form of physical capital). Meanwhile, male-headed

households tend to spend more on human capital than their female counterparts. This finding may be due to the gender gap in literacy rates recorded in **Table 5**. This is because household heads who are literate are more likely to know the benefits of human capital investment than their counterparts who are uneducated.

Table 9

Financial inclusion and the level of household expenditure (female -and male-headed households)

Panel 1: Female-headed households								
Propensity score matching		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
One nearest neighbor	ATE	-150.433	2.08194	43.7767*	39.5970***	83.3277***	-0.6119	136.2728**
	ATET	-114.0388	5.03919	60.0801	68.5413***	123.5475***	2.3113	276.3919**
Two nearest neighbors	ATE	-72.16564	2.53372	49.8605**	51.1203***	86.4492***	-0.5845	162.0507***
	ATET	14.35823	5.20963	74.6853**	87.0442***	123.952***	1.8519	318.0562***
Three nearest neighbors	ATE	-59.24961	2.71425	57.2935***	48.4972***	79.0166***	-1.0163	147.5384**
	ATET	41.3261	5.00783	89.9404***	87.8108***	114.3094***	1.0420	306.9349***
Five nearest neighbors	ATE	-66.77039	3.29920	62.3058***	50.7618***	80.7710***	-1.2764	127.8038*
	ATET	28.91213	5.07660	99.6480***	92.3138***	116.1049***	0.3846	255.9864**
Ten nearest neighbors	ATE	-59.28324*	0.62991	62.5895***	48.7633***	80.6587***	-1.0770	155.2596**
	ATET	54.4431	0.30144	100.9848***	88.4035***	118.2102***	0.6327	311.2732***
Observations		4,309	4,309	4,309	4,309	4,309	4,309	4,309
Panel 2: Male-headed households								
Propensity score matching								
One nearest neighbor	ATE	-107.4428	6.0190***	113.8635***	-41.1087	62.3868***	-13.6216***	145.0912
	ATET	-99.26285	9.0986***	168.9881***	-70.6889	81.6395***	-11.4382**	185.7622
Two nearest neighbors	ATE	-157.5216**	6.5065***	121.6721***	-37.4546	72.5029***	-12.8707***	179.676*
	ATET	-173.0341	9.7387***	182.8717***	-64.1287	98.4342***	-9.4389*	249.8372
Three nearest neighbors	ATE	-149.9162**	6.9675***	111.2912***	-20.8224	71.5875***	-12.5035***	162.3964
	ATET	-161.9554	10.3415***	164.4887***	-37.1108	96.1962***	-8.7661*	219.2336
Five nearest neighbors	ATE	-134.8235**	7.1613***	108.5027***	-7.4158	76.3980***	-12.0623***	208.8356**
	ATET	-139.8474	10.4461***	159.0345***	-15.6486	103.5626***	-8.2133	294.612*
Ten nearest neighbors	ATE	-135.0457*	7.0493***	111.2597***	0.6525	81.9465***	-12.2160***	237.5671***
	ATET	-145.6483	10.4414***	163.6122***	-1.6723	113.7063***	-8.5769	348.6045***
Observations		9,488	9,488	9,488	9,488	9,488	9,488	9,488

***Significance at 1%, **significance at 5%, and *significance at 10%. Expenditure items are expressed in real per capita values. The balancedness of covariates are reported in Appendix E.

4.3.2c. Financial inclusion and the categories of household expenditure analysis for rural and urban households

One striking observation in **Table 10** is the spending behavior of financially included rural households. The results from the table show that financially included households in the rural areas tend to divert their resources away from food consumption and temptation goods to investment in education, consumer durables and the other goods category (**Appendix A** also follows the same pattern but also reports increased investment in housing). This pattern of resource diversion behaviour recorded for financially included rural dwellers is not the same for their urban counterparts. The consumption of temptation goods is about the same level in both rural and urban households (as shown in **Table 5**), but financial inclusion impact households' consumption of temptation goods differently in the two household types. This may suggest that the reasons accounting for the consumption of temptation goods in the two household types are entirely different. Unlike urban areas, the consumption of temptation goods among rural households may be due to the limited or lack of financial institutions in the rural areas to provide a safe and reliable place to keep excess/idle cash. This may explain why financial inclusion significantly reduces the consumption of temptation goods in the rural areas but not urban where financial institutions are easier to access. The availability of saving facilities also cause rural dwellers to reduce the consumption of food and save for the future. Financial inclusion results in GH¢154.9576 reduction in food consumption and GH¢ 10.04234 reduction in the consumption of temptation goods. In absolute terms, the GH¢ 10.04234 reduction in the consumption of temptation goods may be low, it constitutes about 38 percent of the full sample's average per capita consumption of temptation goods (in **Table 5**). In addition, GH¢11 is a good amount to save in rural areas where the level of poverty is higher. Moreover, the GH¢11 is a per capita figure (as are all the monetary figures in

this study), and hence in rural areas where households keep larger family size, saving GH¢11 per household member may be large enough to invest or spend on other essential goods.

For urban households, financial inclusion does not significantly impact food, temptation goods and the other goods category, but results in increase in health and education expenditures as shown in the baseline matching (i.e. one nearest neighbor matching). Rural households appear to spend more on consumer durables (except in the 10 nearest neighbor matching) and the other goods category than their urban counterparts, while their urban counterparts seem to spend more on health and education compared to the rural households.

Table 10

Financial inclusion and level of household expenditure (rural and urban households)

Panel 1: Rural households								
Propensity score matching		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
One nearest neighbor	ATE	-136.6146***	1.639583	72.08059***	1.289999	55.32044***	-11.34205***	144.7708***
	ATET	-154.9576***	3.57254	113.3726***	1.636144	88.25502***	-10.04234**	243.4713***
Two nearest neighbors	ATE	-137.2999***	2.675695	61.76865***	4.636811	54.01615***	-12.2112***	131.0698***
	ATET	-132.2309***	3.445428	95.71419***	14.93698	88.6559***	-11.38251***	234.4864***
Three nearest neighbors	ATE	-131.1296***	2.678433	61.34958***	0.912774	55.14602***	-12.64948***	138.1815***
	ATET	-123.1622***	3.754309	93.38997***	7.092268	86.74764***	-11.79876***	247.8904***
Five nearest neighbors	ATE	-144.9625***	1.728599	60.47671***	1.817145	55.49903***	-12.57929***	127.0051***
	ATET	-147.4644***	2.351004	91.59769***	10.0512	86.19501***	-11.6541***	226.359***
Ten nearest neighbors	ATE	-147.6207***	1.821905	62.27309***	2.119514	56.63324***	-12.21245***	136.6868***
	ATET	-146.5108***	1.916364	94.31483***	9.553917	87.08876***	-10.74313***	229.2239**
Observations		7,906	7,906	7,906	7,906	7,906	7,906	7,906
Panel 2: Urban households								
Propensity score matching								
One nearest neighbor	ATE	7.192602	9.711717**	132.0168***	-81.7777	67.64297	-3.481741	85.4418
	ATET	39.08206	11.29938**	166.0873***	-120.9612	73.31835	-0.144486	147.5003
Two nearest neighbors	ATE	-22.60283	9.76244**	125.6545***	-46.67264	78.39849**	-2.531839	27.05536
	ATET	5.114412	12.99714***	159.2303***	-68.71383	84.56996	-0.2502727	63.00646
Three nearest neighbors	ATE	-118.9344	9.592793**	115.8811***	-17.10809	72.61826**	-1.683458	28.21302
	ATET	-126.1616	13.19767***	146.8497**	-26.00612	79.44449*	0.4602138	77.5034
Five nearest neighbors	ATE	-164.8085	9.290005**	119.3852***	11.58542	69.13829**	-2.712656	-48.37122
	ATET	-191.4965	12.48013**	153.7256**	13.0418	72.86208	-0.883128	-35.96176
Ten nearest neighbors	ATE	-99.13328	9.110553**	123.3411***	12.2261	81.60794**	-1.999089	9.01889
	ATET	-105.4285	12.65549***	158.793***	13.35963	91.39191**	0.7948005	34.07481
Observations		5,891	5,891	5,891	5,891	5,891	5,891	5,891

***Significance at 1%, **significance at 5%, and *significance at 10%. Expenditure items are expressed in real per capita values. The balancedness of covariates are reported in Appendix E.

4.4. Financial inclusion and household budget share analysis

4.4.1. Full sample analysis of the impact of financial inclusion on household expenditure behavior

As mentioned earlier, financial inclusion could be endogenous due to the problem of omitted variable bias. To ensure robustness, the study applies both instrumental variable approach and propensity score matching (reported in **Appendix C** while the balancedness table for the matching is provided in **Appendix E**). The present study performs the test for endogeneity in order to verify the endogeneity status of the treatment variable. While this can be easily done, testing the exogeneity of the instrument may be quite complex in a single instrument case (i.e. exact identification case). Carrying out a test on the exogeneity of instrument requires access to more than one instrument (i.e. over identification case), in which case the joint exogeneity of the instruments can be tested but not each single instrument, as testing the latter is not possible (Cerulli, 2012). Therefore, the study relies on the strength of the correlation between the instrumental variable and financial inclusion, which is one of the conditions of a good instrument. The result presented in **Table 11** proves the endogeneity of the financial inclusion variable in most cases. Therefore, the instrumental variable estimation technique employed in this study is appropriate.

Table 11

Test for endogeneity

Tests	Food	Health	Education	Housing	Durables	Temp	Other
Durbin (score) chi2(1)	6.5693**	0.0259	42.5772***	16.3719***	3.7246*	8.8807***	11.7335***
Wu-Hausman F(1,13770)	6.5596**	0.0258	42.6255***	16.3593***	3.7183*	8.86903***	11.7205***

***Significance at 1%, **significance at 5%, and *significance at 10%

Table 12

Probit first-stage regression (full sample)

	Dependent variable: financial inclusion		
	Coef.	Std error	z-stat
Distance to nearest financial institution (in kilometers)	-0.0465***	0.0029	-15.94
Household characteristics:			
Total household expenditure per capita (in natural log)	0.6658***	0.0214	31.1
Literacy (Ever attended sch: Yes=1, No=0)	0.4503***	0.0318	14.17
Sex (Female=1, Male=0)	-0.0479	0.0359	-1.33
Employed (Yes=1, No=0)	0.4295***	0.0308	13.95
Household size	0.1710***	0.0185	9.26
Household size squared	-0.0070***	0.0009	-7.84
Age of household head	0.0054	0.0051	1.06
Age of household head squared	-0.0001	0.0001	-1.31
Number of household members under 5	-0.0227	0.0211	-1.07
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.1615***	0.0413	3.91
Number of household members over 64	0.0811**	0.0352	2.3
Number of male household members within the age range 15-64	0.0785***	0.0186	4.21
Number of female household members within the age range 15-64	0.1120***	0.0189	5.94
Nationality (Dummy: Ghanaian=1, Foreigner=0)	0.1469	0.1074	1.37
Marital status of household head: (Married = base category)			
Consensual union	-0.2559***	0.0445	-5.75
Divorced	-0.2058***	0.0544	-3.79
Never married	-0.0794	0.0500	-1.59
Separated	-0.1517**	0.0616	-2.46
Widowed	-0.1594***	0.0471	-3.39
Location:			
Rural (Dummy: Rural=1, Urban=0)	-0.2543***	0.0277	-9.17
Northern (Northern=1, Southern=0)	0.6137***	0.0614	10
Ecological zone: (Accra = base category)			
Savannah (Dummy: Savannah=1, 0=otherwise)	0.2266***	0.0823	2.75
Forest (Dummy: Forest=1, 0=otherwise)	0.2217***	0.0686	3.23
Coastal (Dummy: Coastal=1, 0=otherwise)	0.1890***	0.0695	2.72
Constant	-6.1429***	0.2634	-23.32
Observations	13797		

***Significance at 1%, **significance at 5%, and *significance at 10%. Robust standard errors were used in estimation.

Table 13

Test for strength of instrumental variable

Tests	Statistics
F test of excluded instruments: F(1, 13771) Prob > F	247.78 0.0000
Weak identification test: Cragg-Donald Wald F statistic	265.60
Kleibergen-Paap Wald rk F statistic	247.78
Observations	13797

Robust standard errors were used in estimation.

Results for the first stage regression (**Table 12**) shows that distance to the nearest financial institution is highly significant and can therefore serve as instrumental variable for financial inclusion (the endogenous treatment variable). As expected, the negative sign suggests that households living close to financial institutions are more likely to access financial services than their counterparts who stay farther away. **Table 13** gives credence to the validity of distance to nearest financial institution as instrument for financial inclusion as all the three statistics indicate that the instrumental variable (distance to the nearest financial institution) has a strong inverse relationship with financial inclusion. **Table 12** also shows that household heads who are literate are more likely to be financially included compared to those who are not literate. This could be explained by the fact that people who go to school may have the opportunity to benefit from financial educational programmes often organized to instil the habit of savings into students at a young age. Moreover, educated persons are more likely to understand or know the benefits of financial inclusion. Though not statistically significant, the results show that female headed households are less likely than their male counterparts to have accounts or be financially included.

The gender gap in education may explain this phenomenon. The study also finds that households with large number of members within the working age limit (15-64), are more likely to be financially included regardless of their gender. Other findings emanating from **Table 12** include the impacts of location and marital status of household heads. Compared to urban dwellers, rural dwellers are less likely to be financially included. Surprisingly, the results show that households in the northern parts of Ghana are more likely to be financially included than their southern counterparts. Similarly, the ecological zone results also suggest that, compared to households dwelling in Accra (the capital city of Ghana), households living in the Savannah, Forest or Coastal zones are more to be financially included, contrary to expectations. Finally, household heads in other categories of marital statuses are less likely to be financially included than their married counterparts.

The second stage regression results are two-fold: homogeneous and heterogenous response to treatment. **Table 14** presents results for the case of homogeneity (i.e. assuming financial inclusion has homogenous effect). The results show that the average treatment effect (ATE) of being financially included is that it reduces households budget allocation for food consumption. On average, financially included households spend about 9 percent less on food consumption. Meanwhile, investment in human capital variable such as education increases with financial inclusion. The coefficient of the educational variable makes it the most impacted expenditure item in the budgets of financially included households. Specifically, households spend nearly 9 percent more of their budget on education if they are financially included. Increase in spending on education is good for Ghana as it boosts the human capital capacity of the country (Adams & Cuecuecha, 2013). Aside education, another important human capital variable is health expenditure. Though the marginal impact of financial inclusion on the budget share of health

expenditure of households is not statistically significant, it has a positive sign. Ghanaian households also spend more on housing when they are financially included. Financially included households spend approximately 4 percent more on housing. This could suggest increased investment in physical capital arising from being financially included. These results are not surprising because, financial inclusion makes savings and access to credit possible, and this has the potential to facilitate investment in both physical and human capital. **Table 14** also shows that Ghanaian households who are financially included increase spending on consumer durables. Financial inclusion increases spending on consumer durables by approximately 3 percent. On the other hand, financial inclusion reduces consumption of temptation goods by approximately 2 percent. This suggests diversion of resources from harmful goods to essential goods. With regards to expenditure on the other goods category, which include items such as communication, transport, recreation etc, households tend to spend less on these goods when they are financially included. Financially included households reduce their spending on the other goods category by approximately 5 percent. Thus, the above findings could auger well in improving the standard of living of households in Ghana through channeling of resources away from goods/services which may not be socially desirable (or desirable healthwise) to investment goods.

Table 14

Impact of financial inclusion on household budget allocations (with homogenous response to treatment)

	Food	Health	Education	Housing	Durables	Temptation	Other
Household characteristics:							
Financial inclusion (Yes=1, No=0)	-0.0940***	0.0012	0.0855***	0.0365***	0.0330***	-0.0155***	-0.0466**
Total household expenditure per capita (in natural log)	0.0083	0.0002	-0.0019	-0.0633***	-0.0064***	0.0012	0.0619***
Literacy (Ever attended sch: Yes=1, No=0)	-0.0316***	-0.0010	0.0085**	-0.0016	0.0032	0.0004	0.0221***
Sex (Female=1, Male=0)	0.0358***	-0.0002	0.0284***	-0.0013	-0.0009	-0.0114***	-0.0504***
Employed (Yes=1, No=0)	-0.0240***	-0.0007	-0.0032	0.0028	0.0040**	0.0007	0.0203***
Household size	0.0127***	-0.0010***	0.0274***	-0.0199***	-0.0043***	-0.0011**	-0.0139***
Household size squared	-0.0009***	1.54e-05	-0.0009***	0.0009***	0.0001	0.0001***	0.0007***
Age of household head	0.0032***	9.41e-07	-0.0006*	0.0006**	-0.0019***	0.0011***	-0.0024***
Age of household head squared	2.56e-05***	3.82e-07	9.22e-06***	-3.81e-06	1.26e-05***	-9.31e-06***	1.65e-05***
Number of household members under 5	0.0168***	0.0026***	-0.0329***	-0.0024**	0.0043***	0.0008*	0.0108***
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.0192***	0.0011	0.0249***	-0.0225***	0.0066***	-0.0015	-0.0279***
Number of household members over 64	0.0126***	0.0013*	-0.0215***	0.0190***	-0.0030*	0.0021**	-0.0105***
Number of male household members within the age range 15-64	-0.0122***	-0.0002	0.0042**	0.0054***	0.0002	0.0002	0.0025
Number of female household members within the age range 15-64	0.0005	0.0002	0.0012	0.0040***	0.0027***	-0.0014***	-0.0072***
Nationality (Ghanaian=1, Foreigner=0)	-0.0015	0.0004	0.0156**	-0.0005	0.0017	0.0016	-0.0172
Marital status of household head: (Married = base category)							
Consensual union	-0.0053	-0.0001	-0.0004	-0.0112***	-0.0007	0.0030***	0.0147***
Divorced	-0.0420***	-0.0002	0.0157***	-0.0014	-0.0067**	0.0038***	0.0308***
Never married	-0.0898***	-0.0023***	0.0074**	0.0120***	-0.0123***	0.0041***	0.0810***
Separated	-0.0405***	0.0026*	0.0020	-0.0012	-0.0110***	0.0084***	0.0397***
Widowed	-0.0212***	-0.0015*	0.0100***	-0.0032	-0.0050**	0.0021*	0.0186***
Location:							
Rural (Dummy: Rural=1, Urban=0)	0.0937***	0.0010*	-0.0043*	-0.0142***	0.0032*	0.0046***	-0.0839***
Northern (Northern=1, Southern=0)	-0.0474***	0.0023**	-0.0039	0.0282***	0.0016	0.0119***	0.0072
Ecological zone: (Accra = base category)							
Savannah (Dummy: Savannah=1, 0=otherwise)	0.0702***	0.0011	-0.0077	-0.0464***	0.0373***	-0.0036**	-0.0509***
Forest (Dummy: Forest=1, 0=otherwise)	0.0475***	0.0002	0.0111**	-0.0362***	0.0313***	-0.0043***	-0.0496***
Coastal (Dummy: Coastal=1, 0=otherwise)	0.0253***	0.0009	0.0008	-0.0215***	0.0198***	-0.0040***	-0.0213***
Constant	0.1972***	0.0050	-0.0680**	0.6308***	0.1615***	-0.0145*	0.0881**
Observation	13,797	13,797	13,797	13,797	13,797	13,797	13,797

***Significance at 1%, **significance at 5%, and *significance at 10%. Robust standard errors were used in estimation.

Other findings made from some of the key control variables are also discussed here. Literacy status of the household head appears significant in some of the models and the sign changes across the individual categories of household expenditure. Compared to the uneducated household heads, their counterparts who are literate, tend to spend less on food but more on education and the other goods category. On gender issues, female heads, compared to their male counterparts spend more on food and education but less on temptation goods and the other goods category. Household heads who are employed spend relatively less on food but more on consumer durables and the other goods category than their unemployed counterparts. Older household heads tend to spend more on food, housing, and temptation goods but less on education, consumer durables and the other goods category. Concerning the effect of the marital status of household heads, the results show that compared to household heads who are married, those in the other categories spend less on food and consumer durables (significant in 4 out of 5 cases), but more on education (significant in 3 out of 5 cases), temptation goods and the other goods category (significant in all 5 cases). For health and housing expenditures, the impact of marital status is mixed. On location variables, rural dwellers, compared to their urban counterparts spend a higher proportion on food, health, consumer durables and temptation goods but less on education, housing, and the other goods category. Northern dwellers also spend more on health, housing, and temptation goods but less on food than their southern counterparts.

The next section discusses the results of estimating probit two-stage least square with heterogenous response to treatment. While the average treatment effect (ATE), average treatment effect on the treated (ATET) and average treatment effect on the untreated (ATENT) are the same for the case of homogeneous response to treatment, they differ for heterogeneous response. **Table 15** reports the case of the ATE which suggests that the heterogenous treatment response model for

food expenditure is higher than the case of homogeneous response to treatment. The ATE coefficient of -0.1210 suggests that, on average, households who are financially included spend about 12 percent less of their food budget. The same inverse relationship between financial inclusion and household budget share for food is found in **Appendix C** where propensity score matching was carried out on household budget shares. The ATE coefficient is the average impact of treatment if the entire sample were financially included. The results of the ATET and the ATENT are reported in **Table 16**, where bootstrapping procedure with 1000 replications was applied to obtain standard errors for testing the ATET and the ATENT. The signs of both ATET and ATENT for food are also negative and significant (the same is true for ATET in **Appendix C**) but the ATET has the highest magnitude compared to ATE and ATENT as seen in **Table 15** and **Table 16**. The ATET coefficient of -0.1390 shows that financially included households would spend about 14 percent less of their food budget than what they would have spent if they were not financially included, while the ATENT coefficient of -0.0975 predicts that households who are not financially included would reduce their budget allocation for food by nearly 10 percent if they were financially included. The cutback in budget allocation for food arising from financial inclusion would be an economically wise decision if it is spent on investment goods, such as human capital or physical capital. The negative sign for food in **Table 15** and **Table 16**, is consistent with the negative sign in **Table 8**, where the latter reports an inverse relationship between financial inclusion and the level of household expenditure for food.

Like the level of expenditure findings, financial inclusion is also positively related to the health budget share of households (the positive sign is also consistent with the propensity score matching in **Appendix C**). The magnitude of the coefficients (i.e. ATE, ATET and ATENT) are also very low and insignificant (though the ATET appears significant in the propensity score

matching in **Appendix C**). Another important human capital component in the expenditure of the household is education. **Table 15** and **Table 16** show financial inclusion increases household expenditure on education which is also consistent with the propensity score matching in **Appendix C**. The ATET for education is 0.1069 which is the second highest positive impact of financial inclusion on household budget shares in **Table 16**. Financially included households in Ghana allocate a greater proportion of their budget to education than most of the other categories of expenditure. The positive and significant sign is consistent with the level of expenditure results. The ATET value shows that financially included households spend nearly 11 percent more on education than what they would have spent if they were not financially included. The ATE coefficient of 0.0987 (**Table 11**) is lower than the ATET value. It suggests that, on average, households would spend approximately 10 percent more on education if they were all financially included. The ATENT coefficient of 0.0881 is the lowest (i.e. compared to the ATE and ATET of education). It implies that financially excluded households would spend nearly 9 percent more on education if they were financially included. Thus, both the homogenous and heterogenous models confirm the significant impact that financial inclusion has on household expenditure on education. The positive impact of financial inclusion on education expenditure is of prime importance as education is beneficial not only to the individual but also to society because of the positive externalities it confers on other people. Moretti (2004) asserts that the benefit of human capital to the individual is only a partial reflection of the total benefit to society. The impact of education on the income level of households and economic development cannot be overlooked. Klenow and Rodriguez-Clare (2005) argues that one of the factors which accounts for the differences in income level is human capital. Gennaioli et al. (2013) makes similar argument by asserting that the differences in the level of development among subnational regions are attributable to human

capital. This suggests that education (which is a form of human capital) is a necessary input for growth and development in every country or region, and therefore increased investment in education is an economically wise investment as it benefits the individual and the economy at large. Therefore, the free basic school policy and the recently implemented free senior high school policy in 2017 in Ghana are steps in the right direction if economic growth and improvement in the standard of living of the populace are to be achieved.

Though the level of expenditure results in **Table 8** shows that the other goods category is the most impacted expenditure category from financial inclusion, in the case of the budget share results, housing expenditure leads. The difference in findings may be explained by the difference in the measurement (or definition) of the dependent variable. While the first part (i.e. section 4.3.) used levels, the current part employed budget shares, which gives room for the different findings. The ATET in **Table 16** suggests that financial inclusion causes households to spend more on their housing budget share contrary to the propensity score matching in **Appendix C** where the coefficients are insignificant and unstable). The ATET value of 0.1167 in **Table 16** suggests that, on average, financially included households increase their housing budget by approximately 12 percent than their counterparts who are not financially included. This category of household expenditure is the most impacted expenditure item in the budget of the households in Ghana. Investment in housing can be a form of physical capital for the households in Ghana, which can help improve their standard of living. Unlike other forms of investment, housing investment is usually associated with substantial appreciation in value and tends to generate steady cash flow for owners. According to Dasgupta et al. (2014), the largest class of assets of families is made up of investment in housing. Large scale investment in housing could be beneficial not only to individual families or households but also to the economy at large in employment creation. Collier and

Venables (2013) note that, particularly in developing countries, where labour intensive technology is predominant, housing construction contributes to providing jobs.

Expenditure on consumer durables is also positively signed and significant which is also true for the propensity score matching in **Appendix C** (as well as the levels analysis in **Table 8**). The coefficient of the ATET in **Table 18** suggests that treated households spend about 3 percent more on consumer durables. The ATENT seems to yield higher impact than the ATET. The coefficient of 0.0343, predicts that on average, financially excluded households would spend 3.4 percent more on consumer durables if they were financially included. Increase in expenditure on consumer durables may provide some short-term comfort to the households in Ghana. Though the benefits of consumer durables may last only for the short term, yet it is still relevant as short-term well-being and comfort may have some influence on long term progress.

Temptation goods shows a negative and significant relationship with financial inclusion, but the magnitude of the effect is low, consistent with the level of expenditure analysis in **Table 8**. The same is true for the propensity score matching in **Appendix C**, which also shows low and significant inverse relationship. The ATET coefficient of -0.0110 in **Table 16** shows that financial inclusion reduces households budget allocation for goods such as alcohol, tobacco, and narcotics. The ATET coefficient only shows about 1 percent reduction in the budget allocation for temptation goods. The low impact of financial inclusion on temptation goods may be due to addictions in the consumption of these goods. Though **Table 4** (budget share summary statistics) and **Table 5** (summary statistics for level of expenditure) show low allocation of households' resources for temptation goods, financial inclusion does not reduce the little allocated resources for temptation goods by a large margin, probably due to the habit formed in the consumption of these goods.

In the case of household expenditure on the other goods category, the impact of financial inclusion also results in a decline in the consumption of these goods as shown by the negative coefficients of the ATE, ATET and ATENT. Unlike temptation goods, the decline in the other goods category is relatively larger. The negative sign of the other goods category contrasts the propensity score matching in **Appendix C** and the level of expenditure results. Some of the reasons which may account for this include differences in methodological background and differences in the measurement/computation of the dependent variables. The coefficient -0.1050, shows that households who are financially included tend to spend less on other goods such as telecommunication, transport, recreation etc. This finding might be beneficial for households in Ghana if financial inclusion results in saving of excess cash for human and physical capital investment. The positive and the relatively larger magnitude of the treatment effect coefficients for education and housing could suggest diversion of resources away from the other goods category to investment in education and housing.

Table 15

Impact of financial inclusion on household budget allocation (with heterogeneous response to treatment)

	Food	Health	Education	Housing	Durables	Temptation	Other
Household characteristics:							
Financial inclusion (Yes=1, No=0)	-0.1210***	0.0026	0.0987***	0.0883***	0.0314***	-0.0114**	-0.0886***
Total household expenditure per capita (in natural log)	0.0931***	0.0014	-0.0076**	-0.1567***	-0.0030	0.0042**	0.0686***
Literacy (Ever attended sch: Yes=1, No=0)	-0.0310***	-0.0007	-0.0036	0.0093*	0.0038	0.0002	0.0220**
Sex (Female=1, Male=0)	0.0222*	-0.0046**	0.0211***	-0.0185***	-0.0029	-0.0226***	0.0054
Employed (Yes=1, No=0)	-0.0400**	-0.0016	-0.0168**	0.0160*	-0.0009	0.0037	0.0396***
Household size	0.0222***	-0.0004	-0.0072	-0.0293***	0.0019	-0.0001	0.0128**
Household size squared	-0.0010***	3.86e-06	0.0007*	0.0009***	-0.0003***	0.0001	-0.0004
Age of household head	0.0048***	3.65e-05	0.0013*	0.0007	-0.0014**	0.0018***	-0.0071***
Age of household head squared	-4.07e-05***	7.44e-07	1.24e-05**	-6.74e-06	1.19e-05**	-1.41e-05***	0.0001***
Number of household members under 5	0.0077	0.0025**	-0.0131***	-0.0093**	0.0063**	0.0029**	0.0029
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.0261**	0.0007	0.0415***	-0.0589***	0.0143***	-0.0037	-0.0198*
Number of household members over 64	0.0047	-0.0010	0.0156**	0.0132*	-0.0073	0.0010	-0.0263***
Number of male household members within the age range 15-64	-0.0207***	-0.0016	0.0133**	0.0063	0.0017	-0.0007	0.0016
Number of female household members within the age range 15-64	0.0005	-0.0005	0.0084*	0.0048	0.0045*	-0.0049***	-0.0128**
Nationality (Ghanaian=1, Foreigner=0)	-0.0233	0.0017	0.0068	0.0242	0.0135	0.0039	-0.0269
Marital status of household head: (Married = base category)							
Consensual union	-0.0153	-0.0013	0.0185***	0.0013	0.0180***	0.0054*	-0.0266**
Divorced	-0.0641***	0.0007	-0.0049	0.0023	0.0027	0.0086*	0.0547***
Never married	-0.1670***	-0.0059***	0.0065	0.0222**	0.0067	0.0080	0.1296***
Separated	-0.0654***	0.0083*	0.0082	0.0057	-0.0003	0.0078	0.0357**
Widowed	-0.0139	-0.0008	0.0096	0.0132*	-0.0039	0.0046	-0.0088
Location:							
Rural (Dummy: Rural=1, Urban=0)	0.1516***	0.0016	-0.0044	-0.0221***	0.0024	0.0136***	-0.1428***
Northern (Northern=1, Southern=0)	-0.0453***	0.0041*	-0.0225***	0.0482***	-0.0145*	0.0206***	0.0094
Ecological zone: (Accra = base category)							
Savannah (Dummy: Savannah=1, 0=otherwise)	0.2116***	0.0051	0.0462*	-0.0892***	0.0650***	-0.0069	-0.2318***
Forest (Dummy: Forest=1, 0=otherwise)	0.2099***	0.0025	0.0538**	-0.0625***	0.0459***	-0.0061	-0.2434***
Coastal (Dummy: Coastal=1, 0=otherwise)	0.1719***	0.0050	0.0550**	-0.0532***	0.0413***	-0.0086	-0.2114***
Constant	-0.6415***	-0.0066	-0.0351	1.3837***	0.0625*	-0.0656***	0.3025***
Observation	13,797	13,797	13,797	13,797	13,797	13,797	13,797

***Significance at 1%, **significance at 5%, and *significance at 10%. Robust standard errors were used in estimation. Additional regressors $(X_i - \mu_X)\bar{F}_i$ were included in the regressions to compute the heterogenous response but not reported.

Table 16

Average treatment effect on the treated (ATET) and the untreated (ATENT)

	Food	Health	Education	Housing	Durables	Temptation	Other
ATET	-0.1390***	0.0022	0.1069***	0.1167***	0.0292***	-0.0110**	-0.1050***
ATENT	-0.0975***	0.0030	0.0881***	0.0513***	0.0343***	-0.0121***	-0.0672***
Obs	13,797	13,797	13,797	13,797	13,797	13,797	13,797

***Significance at 1% and **significance at 5%. Specified bootstrap replication is 1000.

Figure 1-7 show the distribution of ATE, ATET and ATENT for each of the categories of household expenditure. Generally, the ATET shows the highest modal values for each of the expenditure categories except for the other goods category where the ATENT shows the highest modal value. Figure 1 shows that the distribution of food expenditure is concentrated on the negative values, consistent with the treatment effects results in **Table 16**. The modal value of the ATET points to a figure around -0.14 which is nearly identical with **Table 16** ATET value of -0.1390. Suggesting that financially included households would spend about 14 percent less on food than what they would spend if they were not financially included. The distribution of the ATE, ATET and ATENT for health, education, housing, and consumer durables are concentrated on the positive values while the distribution for temptation goods and the other goods category are concentrated on the negative values, consistent with the treatment effects results in **Table 16**. The modal values of the ATET for all the categories of household expenditure are also identical with the ATET of **Table 16**.

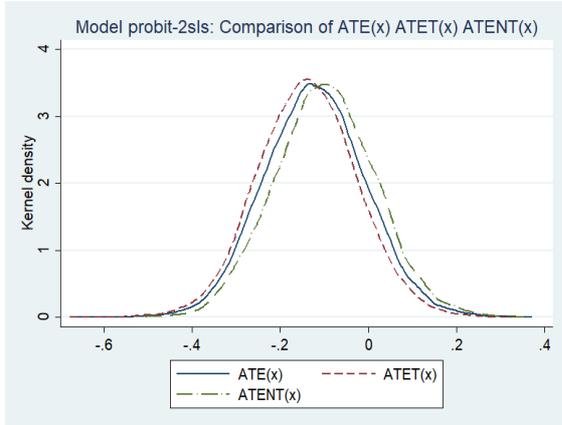


Figure 1: Budget allocation for food expenditure

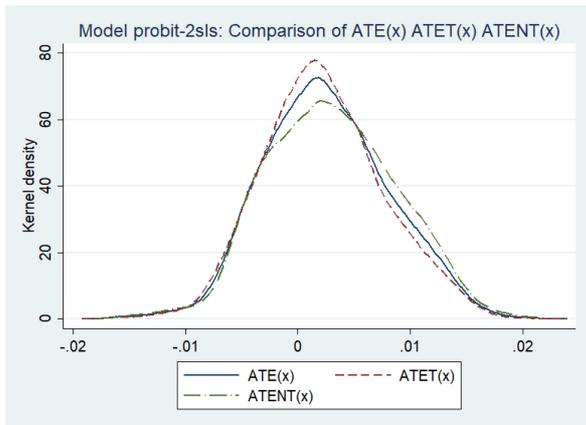


Figure 2: Budget allocation for health expenditure

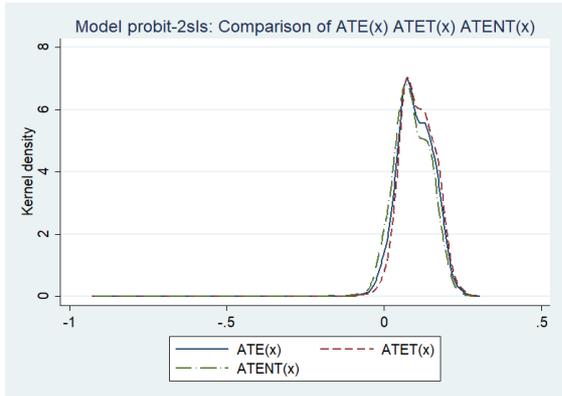


Figure 3: Budget allocation for education expenditure

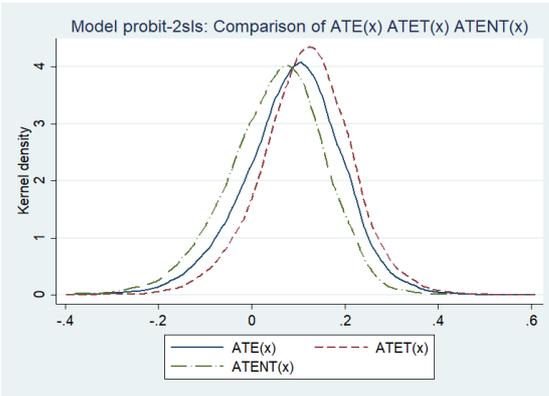


Figure 4: Budget allocation for housing expenditure

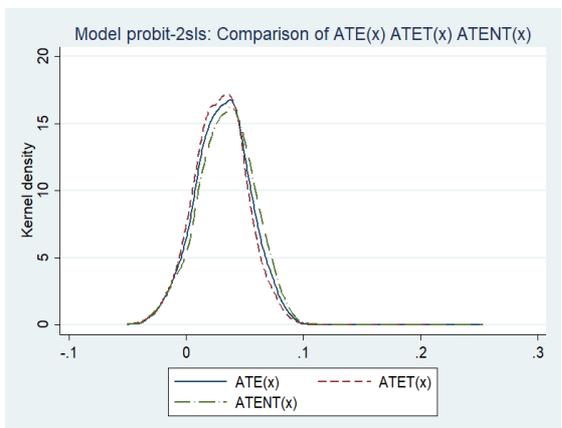


Figure 5: Budget allocation for consumer durables

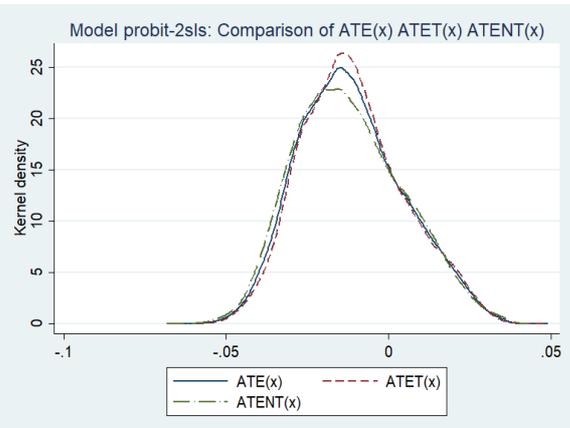


Figure 6: Budget allocation for temptation goods

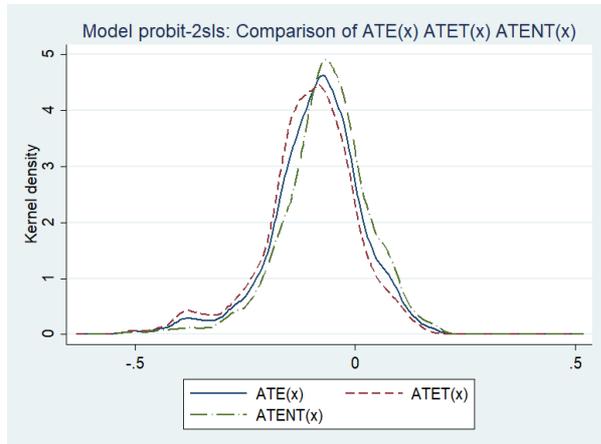


Figure 7: Budget allocation for other goods category

4.4.2. Effects of financial inclusion on expenditure behavior of female- and male-headed households

In this section the treatment effect of financially included female-headed households is compared with their male counterparts. The results of the first stage regression for both household types are reported in **Appendix D**. The instrumental variable (distance to nearest financial institution) is highly significant in both regressions, and thus giving credence to the suitability of the variable as instrument. The result in **Table 17** gives further credence to the suitability of the instrumental variable as the reported statistics are highly significant.

From **Tables 17**, the average treatment effects on female-headed and male-headed households are reported. One thing that is very noticeable in the results for female-headed households and male-headed households in **Tables 17**, is the effect of treatment on food expenditure. There seems to be a significant difference in the magnitude of the impact of the treatment variable (i.e. financial inclusion) on food expenditure in the two household types. Specifically, the ATET shows that financially included female-headed households spend approximately 22 percent less on food, while their counterparts (male-headed households) spend

nearly 10 percent less, showing a gap of seemingly 12 percentage points. Thus, financially included female-headed households appear to save more on their budget allocation for food than their male counterparts. The treatment effect of financial inclusion on housing expenditure also seems to be significantly larger for female-headed households compared to their male counterparts. The ATET on housing expenditure for female-headed households (18 percent increase) and male-headed households (11 percent increase) seems to produce a gap of 7 percentage points while the ATENT appears to show a gap of 10 percentage points in favour of female-headed households. Since investment in housing is a form of physical capital, this finding may suggest that female-headed households engage in investment in physical capital (i.e. in the form of housing investment) more than their male counterparts. The seemingly dominance of financially included female-headed households in housing investment is also consistent with the level of expenditure results in **Table 11**. Financially included female-headed households also spend 4 percent more on consumer durables while their male counterparts spend approximately 3 percent more according to the budget share results in **Table 17**.

On the other hand, male-headed households who are financially included appear to spend more on education than their female counterparts (**Table 17**). This is consistent with the level of expenditure analysis in **Table 9**. The budget share results show that the ATET for households headed by males is approximately 10 percent, against the 8 percent for households headed by females. While the gap of 2 percentage points in education expenditure is significantly lower than the gap of 7 percentage points in housing expenditure, it does not necessarily mean that the 7 percentage points would yield a larger amount (in terms of expenditure level) than the 2 percentage points. This would depend on the amount originally allocated to these two categories of expenditure, and as can be seen in **Table 5**, the descriptive statistics show a larger annual average

per capita expenditure for education in the two household types than housing expenditure. This explains why the effect of financial inclusion on the level of expenditure on education seems to produce a larger gap (in absolute terms) than the effect of financial inclusion on the level of expenditure on housing (in **Table 9**), despite the budget share results showing a larger gap in the latter.

The impact of financial inclusion on temptation goods and the other goods category also seems to be larger for male-headed households (in absolute terms) than female headed households. While financial inclusion leads to a reduction in the consumption of temptation goods for male-headed households, it is positively related to female-headed households though not statistically significant in the latter. The signs are consistent with **Table 9** where the level of expenditure results are reported, with the ATETs showing positive and insignificant signs for female-headed households. The ATET for the other goods category shows that the impact of financial inclusion is stronger for male-headed household, leading to a 13 percent reduction in the budget allocation for this category of goods, while financially included female-headed households reduce their consumption of these goods by 9 percent. This conflicts with the positive sign found in the level of expenditure analysis in **Table 9**. But as mentioned earlier, difference in the measurement of the dependent variable can cause this phenomenon. The signs and significance of the estimated parameters were checked for robustness via the propensity score matching and the results (reported in **Appendix C**) shows that the signs and significances of the estimated parameters (i.e. ATET) are mostly consistent for most of the variables in the two household types.

Table 17

Average treatment effect on the treated (ATET) and the untreated (ATENT) for female- and male-headed households

	Female-headed households		Male-headed households	
	ATET	ATENT	ATET	ATENT
Food	-0.2244***	-0.2103***	-0.0995***	-0.0488*
Health	0.0046	0.0059	0.0016	0.0011
Education	0.0800**	0.0625*	0.1049***	0.0860***
Housing	0.1788***	0.1282***	0.1105***	0.0287**
Durables	0.0432*	0.0537**	0.02794**	0.02789**
Temptation	0.0073	0.0060	-0.0177***	-0.0214***
Other	-0.0895**	-0.0460	-0.1277***	-0.0735***
Observations	4,309	4,309	9,488	9,488
First stage regression information		Coeff	Coeff	
Distance to nearest financial institution (in kilometers)		-0.04508*** [-7.33]	-0.04510*** [-13.44]	
Strength of instrumental variable test				
Kleibergen-Paap Wald rk F statistic		47.10	185.87	

***Significance at 1% and **significance at 5%. Specified bootstrap replication is 1000. Z-statistics are in square brackets.

4.4.3. Effects of financial inclusion on expenditure behavior of rural and urban households

This section discusses the effects of financial inclusion on the expenditure behavior of rural and urban households. The coastal dummy variable which is an ecological zone variable was dropped for rural households due to correlation problem. Distance to nearest financial institution (the instrumental variable) is still significant and has the expected sign for the two household types as shown in **Table 18**. The validity of the instrumental variable is also supported by the reported statistics in **Table 18**.

Results of **Table 18** appear completely different from the level of expenditure results in **Table 10**, especially in the way the estimated parameters are statistically insignificant for urban households in the budget share results. Meanwhile, in the case of the rural households, the estimated parameters appear significant for most of the expenditure categories. For rural households, the ATETs show that financial inclusion causes households to divert resources away from food, temptation goods and the other goods category to investment in education, housing and consumer durables. Specifically, financially included households in rural areas cutback on their budget share for food consumption by 18 percent, temptation goods by 3 percent, and the other goods category by 7 percent. At the same time their budget for education increases by 15 percent, housing increases by 8 percent while durable goods increase by 5 percent. Comparing the results of **Table 18** for rural households to the level of expenditure results in **Table 10** shows that the signs for food, education, consumer durables and temptation goods are consistent while the other categories of expenditure differ. As mentioned earlier, differences in the way the dependent variable is measured could result in heterogeneous impacts of financial inclusion. Budget shares and levels of expenditure represent different quantities and therefore the treatment effects of financial inclusion on the two variables may also vary in sign, magnitude, and the level of significance. Results for urban households (i.e. the ATET results) are not statistically significant except for the other goods category where it is only significant at 10 percent. The estimated parameters of the ATETs of the urban households also show that most of the expenditure categories are statistically insignificant as presented in **Appendix D**.

Table 18

Average treatment effect on the treated (ATET) and the untreated (ATENT) for rural and urban households

	Rural households		Urban households	
	ATET	ATENT	ATET	ATENT
Food	-0.1770***	-0.1261***	-0.0156	0.0216
Health	-0.0004	0.0002	0.0044	0.0054
Education	0.1541***	0.1470***	0.0465	0.0253
Housing	0.0756***	0.0226	0.0818	0.0365
Durables	0.0524***	0.0614***	0.0366	0.0382
Temptation	-0.0317***	-0.0293***	0.0082	0.0079
Other	-0.0730***	-0.0757***	-0.1619*	-0.1348*
Observations	7,906	7,906	5,891	5,891
First stage regression information		Coeff	Coeff	
Distance to nearest financial institution (in kilometers)		-0.0467*** [-13.43]	-0.0356*** [-6.34]	
Strength of instrumental variable test				
Kleibergen-Paap Wald rk F statistic		187.89	39.55	

***Significance at 1% and **significance at 5%. Specified bootstrap replication is 1000. Z-statistics are in square brackets.

5. Conclusion and policy recommendations

Access to financial services is a basic requirement for improving standard of living, meanwhile the rate of financial inclusion remains low in Ghana. This study investigates the impact of financial inclusion on household welfare in Ghana. Both levels and budget shares were considered in the analysis to ascertain how financial inclusion influences the spending behaviors of households in Ghana. Motivated by the World Bank's goal of universal financial access (i.e. universal account ownership) by the year 2020, the current study examines the impact of financial inclusion on the welfare of Ghanaian households. Future studies may use composite measures of

financial inclusion which take into consideration multidimensional aspects such as access, intensity etc. Future studies may also conduct a study on the current wave and the previous waves to compare findings.

To ensure that the findings are robust, various techniques were employed. For the level of consumption analysis, the study applied propensity score matching on the raw and truncated datasets (i.e. dropped the top 1% outliers) and the results were compared. The signs and significance level from the two datasets are generally identical but most of the coefficients are larger in the former (i.e. raw dataset). The budget share analysis was also carried out by applying instrumental variable technique and propensity score matching. The validity of the propensity score matching results was assessed by providing a balancedness table of covariates for both the level of expenditure analysis and the budget shares in **Appendix E**.

Some of the key findings that emerged from the full sample budget share results show that among the positively signed coefficients, the impact of financial inclusion on household budget shares is highest for the housing expenditure followed by education expenditure with ATET values of nearly 12 percent and 11 percent respectively (according to **Table 16**). The reduction in temptation goods is just about 1 percent but 11 percent for the other goods category while health expenditure is the lowest and statistically insignificant. However, while the budget share results provide the percentage increase in the budget share allocation, it does not tell the magnitude of impact of financial inclusion on the categories of household expenditure to allow comparison and better appreciation of the impact. The level of expenditure results is therefore provided which gives some interesting findings. First, contrary to the budget share results the impact of financial inclusion is largest on the “Other goods” category compared to all the other categories of expenditure, followed by education. The large ATET value of the “Other goods” category is not

surprising since it has many components. Thus, knowledge of the impact of financial inclusion on the budget shares may show how financial inclusion causes resources to be diverted from one expenditure category to the other while the level of expenditure results show how much (in absolute terms) the standard of living is impacted by financial inclusion. Therefore, knowledge of both is necessary for policy implications.

On the subsample key findings, female-headed households dominate male-headed households on housing expenditure in both budget share and level of expenditure. Specifically, the budget share results show that financial inclusion results in female-headed households spending about 18 percent more on housing, while their counterparts spend 11 percent more. Still on housing expenditure, the level of expenditure results show that the ATET value for female-headed households is GH¢ 68.5413 but their male counterparts ATET is negative and insignificant. The female headed households also seem to dominate in consumer durables, and the “Other goods” category (for level analysis only in case of the “Other goods” category), arising from being financially included. Meanwhile, male-headed households dominate in health (in levels analysis only) and education expenditure, compared to their female counterparts. Thus, according to the findings of the study, male-headed households tend to invest more on human capital than their female counterparts. Closing this gap would require addressing factors contributing to creating the disparity in these two households. One factor such as lower financial literacy rate among women in Ghana may be contributed by the lower literacy rates for women compared to their male counterparts as shown in **Table 5**. **Table 5** shows a gender gap of 9 percentage points in literacy rates between male household heads and female household heads. Therefore, increasing girls’ enrollment in school may be the starting point to closing this gap because, if these girls become household heads in future, they would invest more on human capital such as education since they

are aware of the benefits. Educating female heads on the importance/benefits of investing more on human capital may also help.

For urban households and their rural counterparts, the study showed that the impact of financial inclusion on the level of expenditure on education is larger in magnitude for the urban households than the rural households across all the matching types. This is in contrast with the budget share results where the impact of financial inclusion on urban households is generally not statistically significant. Meanwhile financially included rural households dominate their urban counterparts in the other goods category. The low literacy rate in the rural areas compared to the urban (**Table 5**) may also be instrumental in the existing gap in investment in education. **Table 5** reports literacy gap of 25 percentage points in favour of urban households. Educational programmes suggested earlier would be relevant here too in order to enlighten rural dwellers about the benefits of investing in the education of their children, rather than spending the benefits of financial inclusion on recreation and other less important goods.

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Appendix A

Impact of financial inclusion on categories of household expenditure

		Trimmed sample (Top 1% outliers)						
Propensity score matching		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
One nearest neighbor	ATE	-68.42791***	0.5192044	50.28152***	26.17534***	62.76397***	-4.662598***	176.4597***
	ATET	-19.20472	1.395873	67.39114***	43.42519***	85.22812***	-3.286883*	260.2649***
Two nearest neighbors	ATE	-73.86611***	.8615525	49.96113***	27.99405***	68.20044***	-4.612588***	199.5659***
	ATET	-29.09526	1.688681	65.90011***	43.73703***	93.46544***	-2.706644*	300.04***
Three nearest neighbors	ATE	-75.44656***	0.9211288	49.07073***	29.60566***	71.59187***	-5.439948***	199.5118***
	ATET	-33.1191	1.942713	65.23643***	47.98043***	99.11399***	-4.090068***	309.3526***
Five nearest neighbors	ATE	-70.00272***	0.9568651	45.79668***	26.6318***	72.96579***	-5.586631***	194.1252***
	ATET	-27.00039	2.292653*	60.06796***	43.20567***	100.0089***	-4.479777***	299.8809***
Ten nearest neighbors	ATE	-56.38018***	0.9450794	45.39007***	28.83923***	76.14441***	-5.995742***	196.1012***
	ATET	-3.065736	2.252703	60.72763***	46.90412***	104.6789***	-5.19648***	306.3745***
Observations		13,660	13,660	13,660	13,659	13,660	13,660	13,660

***Significance at 1%, **significance at 5%, and *significance at 10%. Expenditure items are expressed in real per capita values.

Financial inclusion and level of household expenditure (female -and male-headed households)

Trimmed sample (Top 1% outliers)								
Panel 1: Female-headed households								
Propensity score matching		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
One nearest neighbor	ATE	-57.8490*	-2.3483	33.5253***	30.3260***	75.4768***	0.1324	141.1579***
	ATET	60.9179	-3.0594	45.2222**	53.2371***	101.0599***	1.0405	217.3968***
Two nearest neighbors	ATE	-53.2545*	-1.2447	29.6696**	36.7849***	76.0429***	-0.2919	130.6521***
	ATET	63.5556	-2.1291	43.0715**	67.4025***	110.106***	0.2727	228.936***
Three nearest neighbors	ATE	-44.2676	-1.4899	31.1714**	33.486***	80.2858***	-0.4483	141.5894***
	ATET	68.1095	-1.8231	44.4933**	63.5194***	118.1778***	0.1620	263.4353***
Five nearest neighbors	ATE	-37.4374	-1.8192	35.3032***	33.6034***	81.0198***	-0.4175	145.1018***
	ATET	75.9662	-1.9733	50.5053***	61.5126***	118.6836***	0.2259	271.5995***
Ten nearest neighbors	ATE	-51.3687*	-1.6731	40.0588***	33.0073***	82.5138***	-0.4362	149.7244***
	ATET	57.4506	-1.6917	59.3473***	63.0411***	117.2129***	0.1909	280.2089***
Observations		4,266	4,266	4,266	4,265	4,265	4,265	4,266
Panel 2: Male-headed households								
Propensity score matching								
One nearest neighbor	ATE	-55.1671*	2.1122	44.5789***	34.4805***	59.1753***	-10.5020***	113.8226*
	ATET	-26.4335	3.5857	63.0652***	49.2539***	72.3881***	-10.4535***	151.4184
Two nearest neighbors	ATE	-57.5466**	2.8198**	53.4465***	33.9957***	58.2992***	-9.0596***	155.6805***
	ATET	-23.3170	4.2280**	77.4924***	48.6791***	73.6271***	-7.9168***	227.3947***
Three nearest neighbors	ATE	-64.0311**	2.5285**	46.9640***	32.2630***	60.1063***	-9.1751***	163.5954***
	ATET	-37.6381	3.8596**	65.0672***	46.3489***	78.0117***	-8.0739***	240.9839***
Five nearest neighbors	ATE	-62.269**	2.7844**	44.8039***	34.2718***	66.0639***	-8.8634***	169.407***
	ATET	-35.7980	4.2367***	59.4184***	49.3414***	88.6647***	-7.1659***	240.1908***
Ten nearest neighbors	ATE	-55.8612**	2.6611**	50.3178***	31.3948***	69.4770***	-8.9407***	176.1035***
	ATET	-24.6612	4.0692***	68.0049***	45.0421***	93.6021***	-7.2368***	253.8429***
Observations		9,394	9,394	9,394	9,394	9,394	9,394	9,394

***Significance at 1%, **significance at 5%, and *significance at 10%. Expenditure items are expressed in real per capita values.

Financial inclusion and level of household expenditure (rural and urban households)

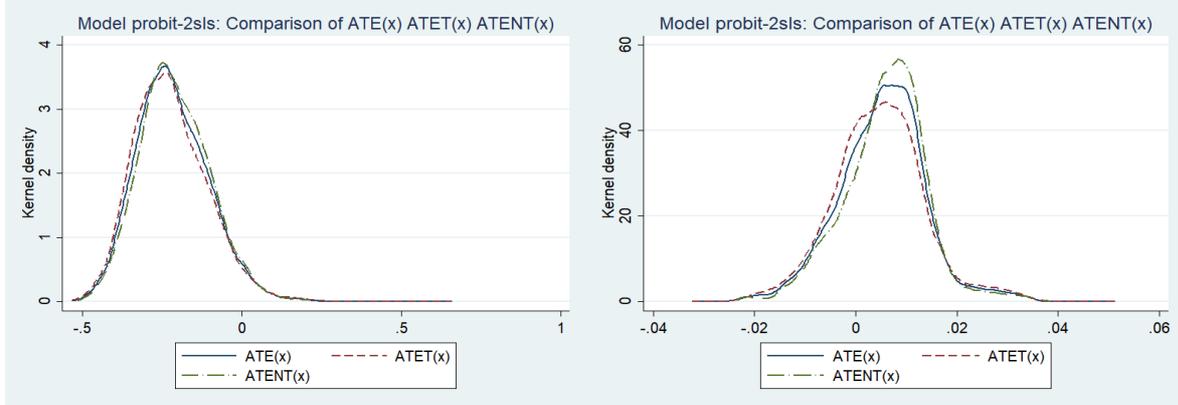
Panel 1: Rural households								
Propensity score matching		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
One nearest neighbor	ATE	-124.0625***	0.5319441	40.62988***	6.168223**	47.94434***	-8.25576***	129.0985***
	ATET	-105.499***	0.6405171	56.84064***	15.85137***	67.86447***	-7.054211***	228.7309***
Two nearest neighbors	ATE	-122.4914***	0.2433765	36.19811***	4.221711**	46.27495***	-8.571849***	113.9054***
	ATET	-100.7858***	0.2321739	43.27831***	13.38351***	59.9504***	-9.123961***	195.2878***
Three nearest neighbors	ATE	-122.1502***	0.4936269	34.85407***	4.383367**	46.02158***	-8.147126***	122.3532***
	ATET	-95.3584***	0.2650761	44.11706***	13.65539***	63.8685***	-7.972401***	199.5879***
Five nearest neighbors	ATE	-116.938***	0.1968642	34.70696***	4.053928**	44.28749***	-8.353798***	116.877***
	ATET	-87.82425***	0.1253503	45.29748***	12.69506***	62.76637***	-8.771946***	193.9863***
Ten nearest neighbors	ATE	-110.5298***	-0.0026478	33.07311***	4.9419***	44.40497***	-8.406712***	110.3873***
	ATET	-82.66038***	-0.0056114	43.68766***	14.26603***	62.55459***	-8.73895***	179.046***
Observations		7,827	7,827	7,827	7,827	7,827	7,827	7,827

Panel 2: Urban households								
Propensity score matching		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
One nearest neighbor	ATE	-2.814625	2.961086	44.80966	49.35702*	105.538***	-2.137395	65.55123
	ATET	32.93154	3.37292	53.6438	58.11037	122.4005***	-1.973521	81.82875
Two nearest neighbors	ATE	-18.7866	4.602872**	44.1744	40.27012**	99.98293***	-3.324902	71.18724
	ATET	7.917889	6.142945***	51.43826	46.19609*	116.7879***	-3.195555	103.9442
Three nearest neighbors	ATE	-21.04364	4.474712**	38.65759	44.55125***	94.58851***	-3.924713	54.48827
	ATET	5.959431	6.447569***	43.72643	52.7303**	106.0456***	-3.798811	82.76679
Five nearest neighbors	ATE	-19.86476	4.322824**	41.2642	50.98665***	87.50214***	-3.211544	63.94122
	ATET	5.577275	5.903613***	46.17465	61.63488***	95.59418***	-2.734332	101.6503
Ten nearest neighbors	ATE	-13.42016	4.349569**	43.32782	49.10903***	107.7175***	-1.803657	40.85377
	ATET	14.40209	5.806249***	49.16649	59.25811***	125.3603***	-0.7887652	70.22944
Observations		5,833	5,833	5,833	5,832	5,833	5,833	5,833

***Significance at 1%, **significance at 5%, and *significance at 10%. Expenditure items are expressed in real per capita values.

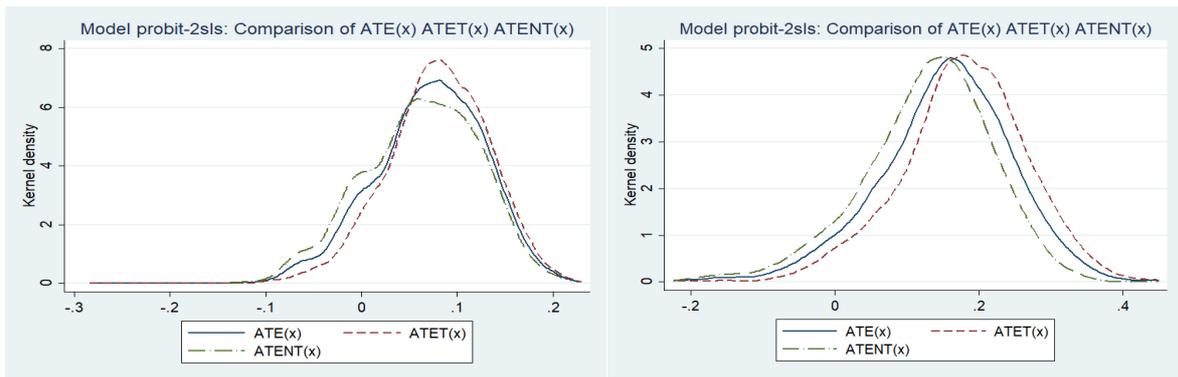
Appendix B

ATE, ATET, and ATENT distribution for female-headed households



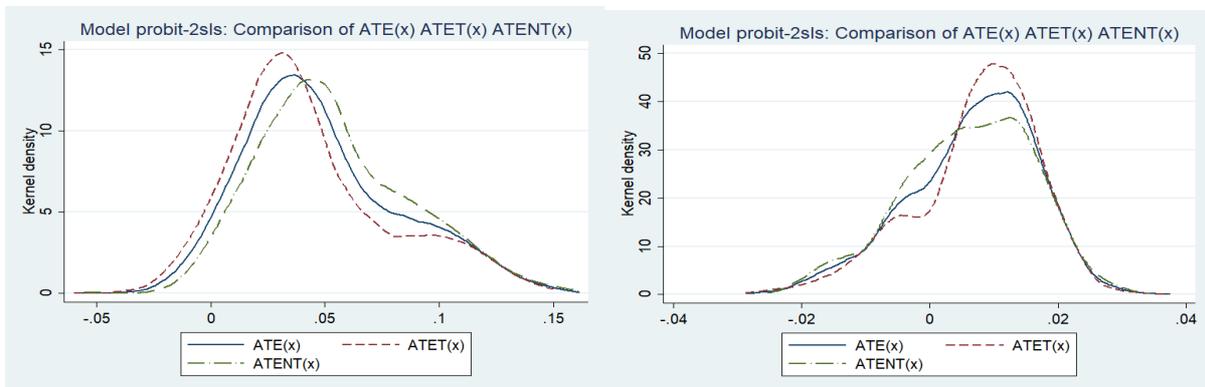
Households' budget allocation for food expenditure

Households' budget allocation for health expenditure



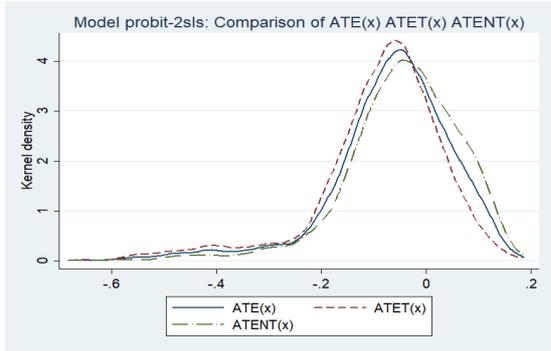
Households' budget allocation for education expenditure

Households' budget allocation for housing expenditure



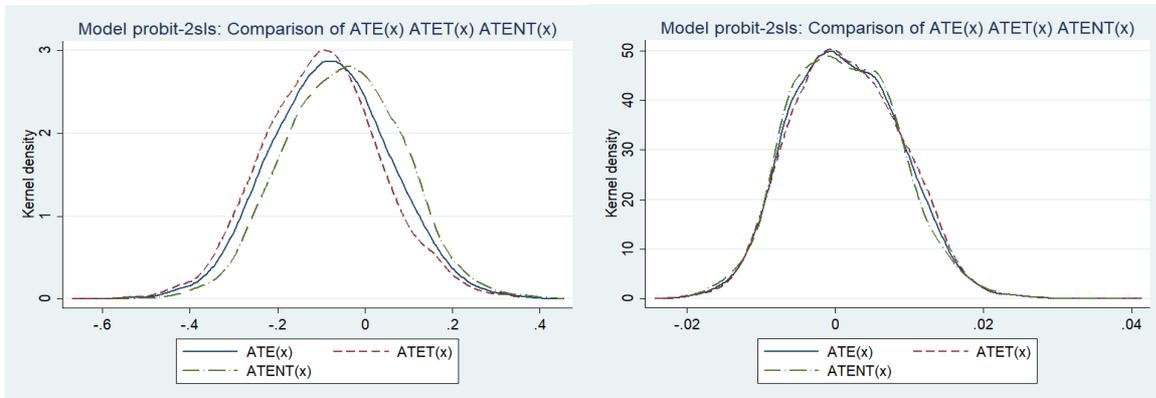
Households' budget allocation on consumer durables

Households' budget allocation for temptation goods



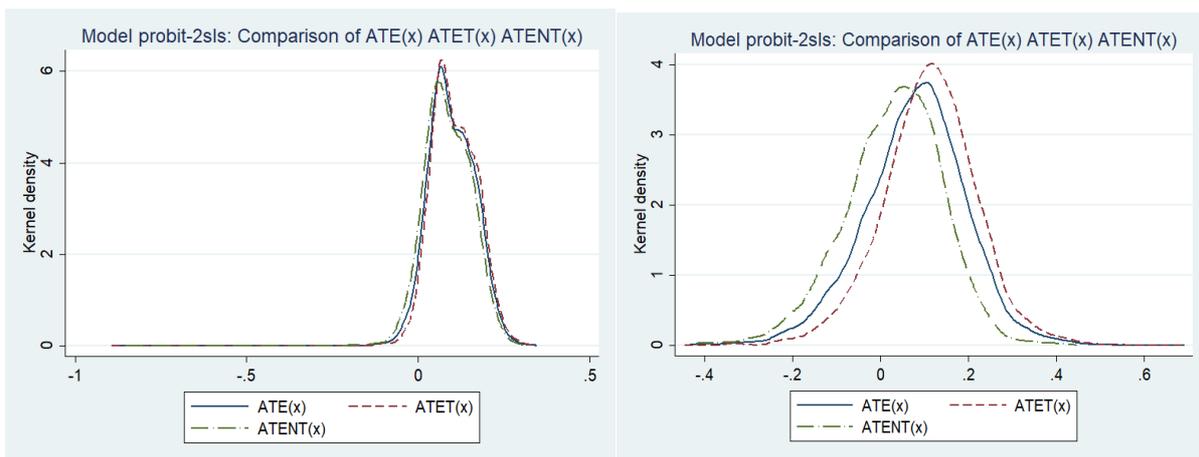
Households' budget allocation for other goods

ATE, ATET, and ATENT distribution for male-headed households



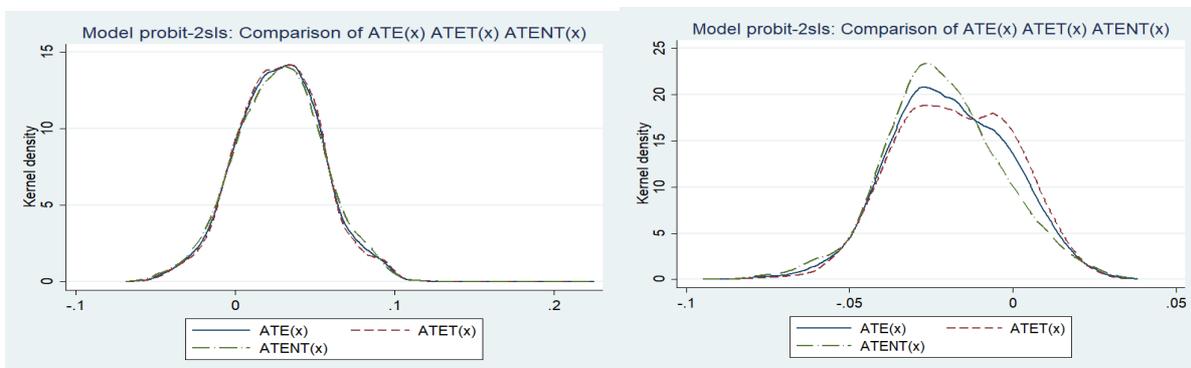
Households' budget allocation for food expenditure

Households' budget allocation for health expenditure



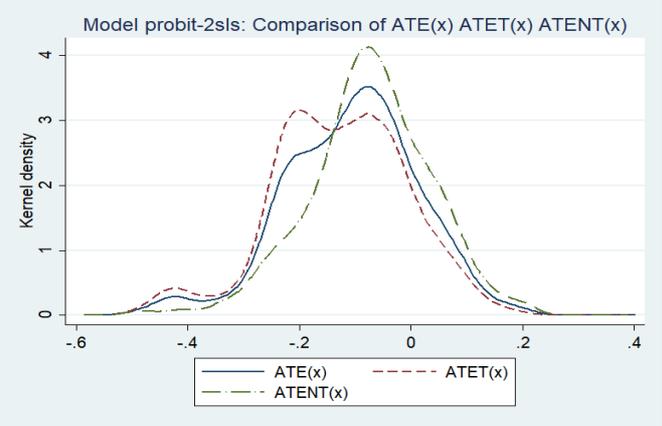
Households' budget allocation for education expenditure

Households' budget allocation on housing expenditure



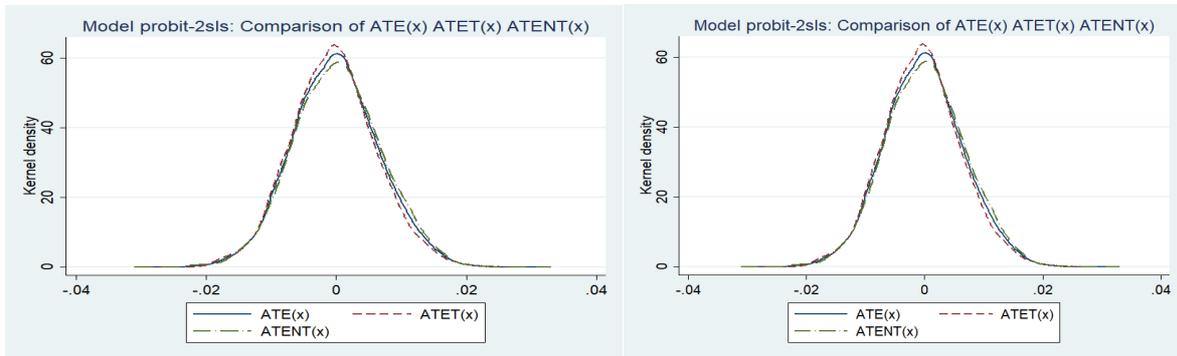
Households' budget allocation on consumer durables

Households' budget allocation for temptation goods



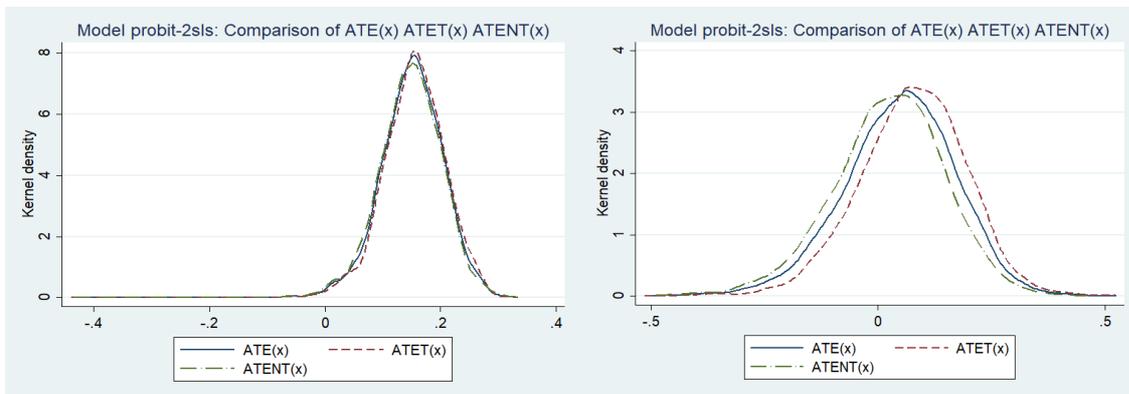
Households' budget allocation on other goods

ATE, ATET, and ATENT distribution for rural households



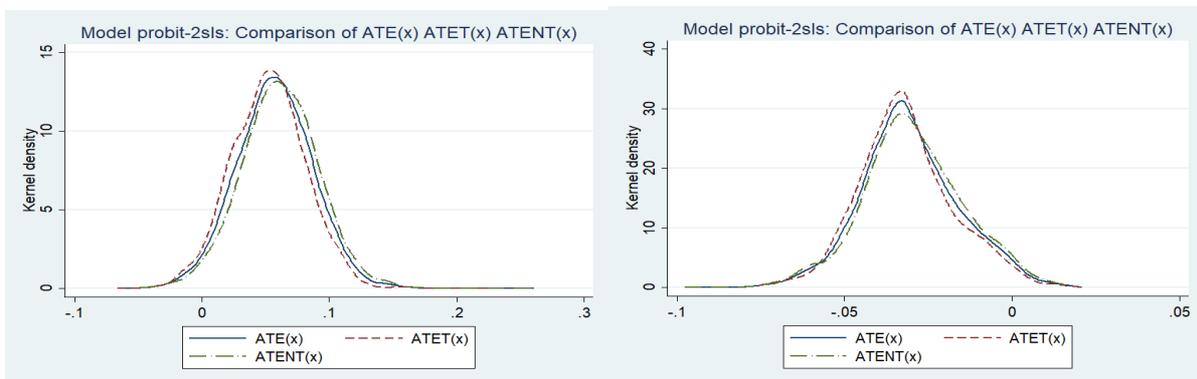
Households' budget allocation for food expenditure

Households' budget allocation for health expenditure



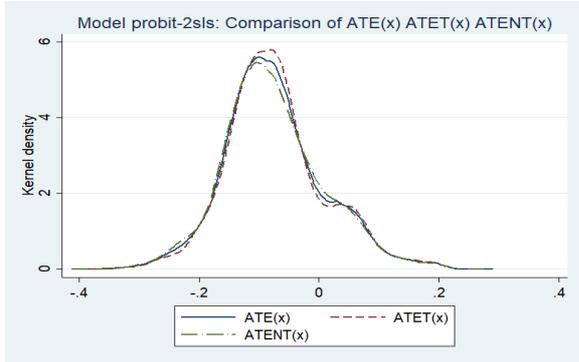
Households' budget allocation for education expenditure

Households' budget allocation for housing expenditure



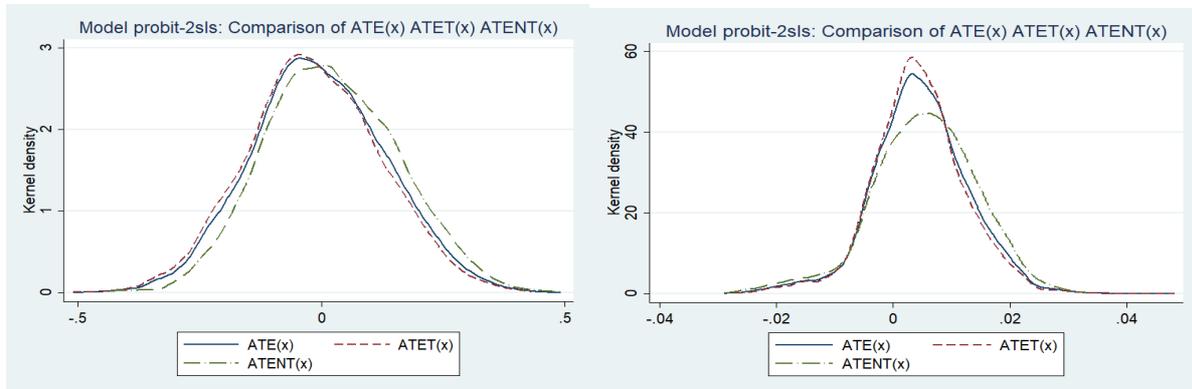
Households' budget allocation for durables

Households' budget allocation for temptation goods



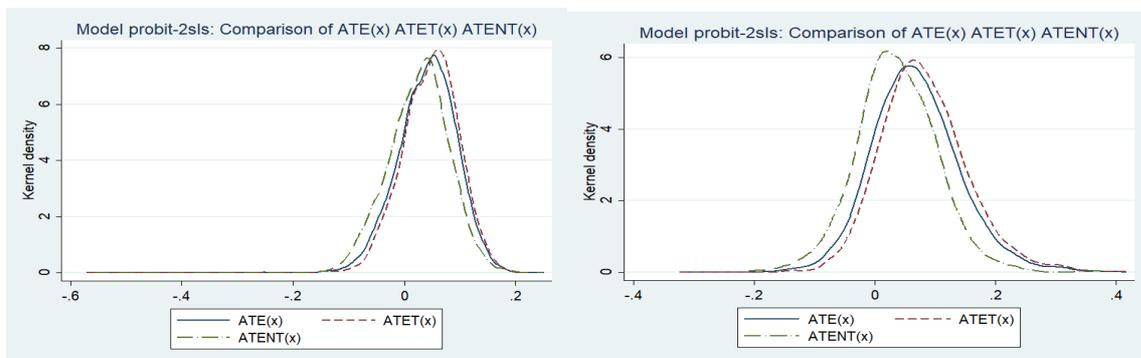
Households' budget allocation for other goods

ATE, ATET, and ATENT distribution for urban households



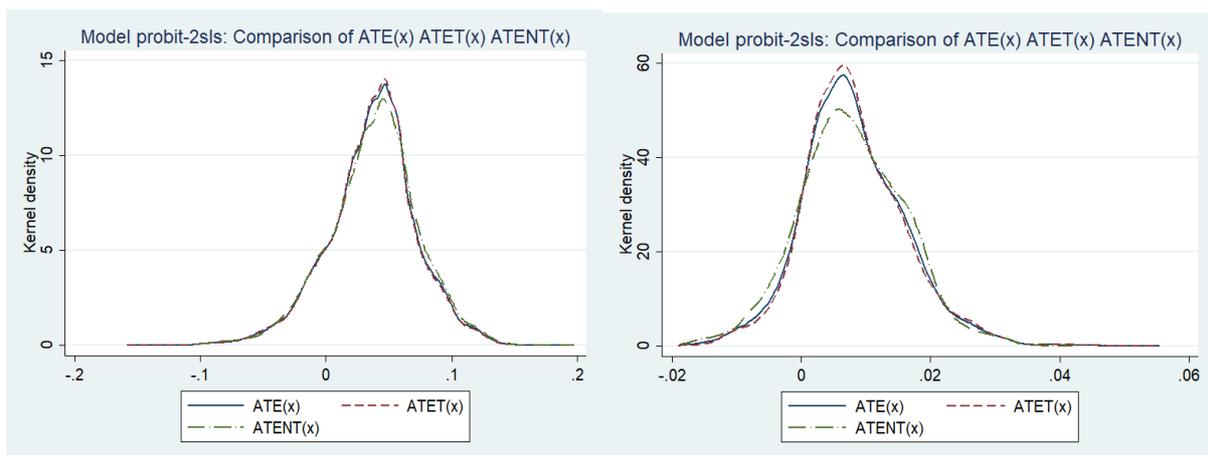
Households' budget allocation for food expenditure

Households' budget allocation for health expenditure



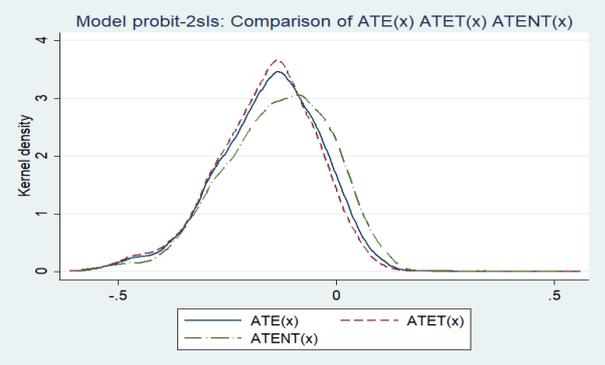
Households' budget allocation for education expenditure

Households' budget allocation for housing expenditure



Households' budget allocation for consumer durables

Households' budget allocation for temptation goods



Households' budget allocation for other goods

Appendix C

Impact of financial inclusion on categories of household budget expenditure (Full sample)

Propensity score matching		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
One nearest neighbor	ATE	-.0467309***	.0013235**	.0113987***	.00119	.0178121***	-.0035133***	.01852***
	ATET	-.048274***	.0008426	.0116664***	-.0019662	.017637***	-.0022242***	.0223185***
Two nearest neighbors	ATE	-.0474474***	.0010473*	.0127381***	.0020424	.0187522***	-.0036443***	.0165116***
	ATET	-.0475715***	.000818	.0134698***	-.0025569	.0187269***	-.002381***	.0194947***
Three nearest neighbors	ATE	-.0477619***	.0009382*	.0123939***	.0022044	.0184639***	-.0036908***	.0174523***
	ATET	-.0484061***	.0008024	.0121733***	-.0017418	.0180864***	-.0025193***	.0216052***
Five nearest neighbors	ATE	-.0483349***	.0007349	.0124648***	.0036185*	.0177835***	-.0037512***	.0174844***
	ATET	-.0499407***	.0005839	.0120503***	.0005255	.0172493***	-.0026086***	.0221402***
Ten nearest neighbors	ATE	-.0486024***	.0006744	.0125116***	.0040096**	.0183081***	-.0037331***	.0168319***
	ATET	-.0506223***	.0006655	.0118021***	.0013701	.0175608***	-.0025365***	.0217603***
Observations		13,797	13,797	13,797	13,797	13,797	13,797	13,797

***Significance at 1%, **significance at 5%, and *significance at 10%. The balancedness of covariates are reported in Appendix E.

Financial inclusion and the categories of household budget expenditure (female -and male-headed households)

Panel 1: Female-headed households								
Propensity score matching		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
One nearest neighbor	ATE	-0.0449***	0.0004	0.0090	0.0116***	0.0192***	-0.0007	0.0054
	ATET	-0.0431***	0.0005	0.0068	0.0096***	0.0190***	0.0002	0.0071
Two nearest neighbors	ATE	-0.0404***	0.0004	0.0057	0.0110***	0.0178***	-0.0006	0.0061
	ATET	-0.0373***	0.0004	0.0011	0.0103***	0.0162***	0.0002	0.0090
Three nearest neighbors	ATE	-0.0392***	0.0006	0.0073	0.0106***	0.0166***	-0.0008	0.0049
	ATET	-0.0378***	0.0005	0.0030	0.0098***	0.0140***	0.0002	0.0104
Five nearest neighbors	ATE	-0.0406***	0.0007	0.0094**	0.0099***	0.0171***	-0.0007	0.0041
	ATET	-0.0403***	0.0006	0.0063	0.0101***	0.0141***	0.0002	0.0090
Ten nearest neighbors	ATE	-0.0413***	0.0003	0.0095***	0.0089***	0.0180***	-0.0006	0.0052
	ATET	-0.0410***	-0.0002	0.0071	0.0097***	0.0150***	0.0003	0.0091
Observations		4,309	4,309	4,309	4,309	4,309	4,309	4,309
Panel 2: Male-headed households								
Propensity score matching								
One nearest neighbor	ATE	-0.0484***	0.0010	0.0135***	0.0007	0.0163***	-0.0052***	0.0220***
	ATET	-0.0452***	0.0011*	0.0166***	-0.0059	0.0155***	-0.0042***	0.0222***
Two nearest neighbors	ATE	-0.0516***	0.0012**	0.0143***	0.0015	0.0168***	-0.0048***	0.0225***
	ATET	-0.0514***	0.0013**	0.0181***	-0.0051*	0.0161***	-0.0036***	0.0248***
Three nearest neighbors	ATE	-0.0498***	0.0013**	0.0129***	0.0034	0.0162***	-0.0047***	0.0207***
	ATET	-0.0488***	0.0014***	0.0149***	-0.0028	0.0156***	-0.0032***	0.0229***
Five nearest neighbors	ATE	-0.0508***	0.0014**	0.0121***	0.0037	0.0167***	-0.0049***	0.0218***
	ATET	-0.0502***	0.0014***	0.0136***	-0.0013	0.0161***	-0.0034***	0.0239***
Ten nearest neighbors	ATE	-0.0498***	0.0014**	0.0119***	0.0030	0.0171***	-0.0050***	0.0215***
	ATET	-0.0495***	0.0015***	0.0133***	-0.0019	0.0164***	-0.0034***	0.0235***
Observations		9,488	9,488	9,488	9,488	9,488	9,488	9,488

***Significance at 1%, **significance at 5%, and *significance at 10%. The balancedness of covariates are reported in Appendix E.

Financial inclusion and the categories of household budget expenditure (rural -and urban households)

Panel 1: Rural households		Food	Health	Education	Housing	Durables	Temptation goods	Other goods
Propensity score matching								
Two nearest neighbors	ATE	-.0577235***	.0007098	.0180131***	.0009294	.0172393***	-.0053872***	.0262192***
	ATET	-.0638765***	.0008877	.0217134***	-.0048242	.0183766***	-.0038345***	.0315576***
One nearest neighbor	ATE	-.0567047***	.0008993	.0164107***	.0025023	.0174225***	-.0055399***	.02501***
	ATET	-.0648875***	.0007973	.0187331***	-.001525	.0178814***	-.0044251***	.0334258***
Three nearest neighbors	ATE	-.055186***	.0008226	.0155881***	.0014614	.0176653***	-.0058711***	.0255198***
	ATET	-.0614373***	.0009933*	.0165104***	-.0032231	.0169423***	-.0045591***	.0347735***
Five nearest neighbors	ATE	-.0551784***	.0007269	.0159189***	.0022327	.0184308***	-.0060563***	.0239252***
	ATET	-.0625878***	.000802	.0166278***	-.0016965	.0176573***	-.0047244***	.0339216***
Ten nearest neighbors	ATE	-.0562396***	.0007446	.0156333***	.0015525	.0180759***	-.0058465***	.0260797***
	ATET	-.0623465***	.0006673	.0166766***	-.001695	.016827***	-.0043191***	.0341897***
Observations		7,906	7,906	7,906	7,906	7,906	7,906	7,906
Panel 2: Urban households								
Propensity score matching								
One nearest neighbor	ATE	-.0216279***	.0010855	.0048745	-.001941	.0146039***	-.0013326**	.0043376
	ATET	-.0217014**	.0008129	.0037465	-.0048263	.0133084***	-.0008035	.0094634
Two nearest neighbors	ATE	-.021711***	.0012727*	.0061935	-.0010174	.015521***	-.0013351**	.0010765
	ATET	-.0212308**	.0013985**	.0049641	-.0035935	.0134923***	-.0009851	.0059545
Three nearest neighbors	ATE	-.025077***	.0011172	.0063172	.0010935	.0149131***	-.0011737*	.0028097
	ATET	-.0268545**	.0013655*	.0046546	-.0002761	.0129054***	-.0009868	.009192
Five nearest neighbors	ATE	-.025889***	.0011978	.0069308	.0036014	.0157957***	-.0013232**	-.0003134
	ATET	-.0282383**	.001389**	.0061815	.0031723	.0139734***	-.0011215	.0046435
Ten nearest neighbors	ATE	-.0250985***	.0010782	.0066239	.0028022	.0160497***	-.0013414**	-.000114
	ATET	-.027375***	.001432**	.0058236	.0021687	.0150662***	-.001094	.0039785
Observations		5,891	5,891	5,891	5,891	5,891	5,891	5,891

***Significance at 1%, **significance at 5%, and *significance at 10%. The balancedness of covariates are reported in Appendix E.

Appendix D

Probit first-stage regressions for female- and male-headed households

	Female-headed household		Male-headed household	
	Coef.	z-stat	Coef.	z-stat
Distance to nearest financial institution (in kilometers)	-0.04508***	-7.33	-0.04510***	-13.44
Household characteristics:				
Total household expenditure per capita (in natural log)	0.63026***	16.1	0.68833***	26.63
Literacy (Ever attended sch: Yes=1, No=0)	0.32961***	6.19	0.52009***	13.02
Employed (Yes=1, No=0)	0.45669***	7.01	0.39722***	11.2
Household size	0.22797***	5.41	0.15701***	7.19
Household size squared	-0.01248***	-4.07	-0.00548***	-5.51
Age of household head	0.01280	1.47	0.00014	0.02
Age of household head squared	-0.00013	-1.55	-0.00002	-0.24
Number of household members under 5	-0.03939	-0.96	-0.01560	-0.62
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.17392**	2.55	0.13412**	2.48
Number of household members over 64	0.03388	0.5	0.09287**	2.2
Number of male household members within the age range 15-64	0.17105***	4.84	0.03533	1.59
Number of female household members within the age range 15-64	0.10448***	3.07	0.10759***	4.52
Nationality (Dummy: Ghanaian=1, Foreigner=0)	0.20460	0.84	0.15498	1.28
Marital status of household head: (Married = base category)				
Consensual union	-0.30460***	-3.33	-0.26513***	-5.14
Divorced	-0.10848	-1.48	-0.39106***	-4.27
Never married	0.07575	0.88	-0.18300***	-2.9
Separated	-0.01447	-0.18	-0.39073***	-3.88
Widowed	-0.20393***	-3.23	-0.20209**	-1.97
Location:				
Rural (Dummy: Rural=1, Urban=0)	-0.23669***	-5.06	-0.26797***	-7.7
Northern (Northern=1, Southern=0)	0.73343***	6.36	0.57206***	7.83
Ecological zone: (Accra = base category)				
Savannah (Dummy: Savannah=1, 0=otherwise)	0.27359**	1.99	0.18827*	1.79
Forest (Dummy: Forest=1, 0=otherwise)	0.24346**	2.23	0.19614**	2.18
Coastal (Dummy: Coastal=1, 0=otherwise)	0.20216*	1.86	0.17738*	1.94
Constant	-6.31227***	-12.55	-6.09300***	-19.34
Observations	4,309		9,488	

***Significance at 1%, **significance at 5%, and *significance at 10%. Robust standard errors were used in estimation

Impact of financial inclusion on household budget allocations for female-headed households (with heterogeneous response to treatment)

	Food	Health	Education	Housing	Durables	Temptation	Other
Household characteristics:							
Financial inclusion (Yes=1, No=0)	-0.2174***	0.0052	0.0713**	0.1535***	0.0485**	0.0067	-0.0677*
Total household expenditure per capita (in natural log)	0.0994***	0.0014	0.0065	-0.1450***	0.0011	-0.0005	0.0370***
Literacy (Ever attended sch: Yes=1, No=0)	-0.0144	-0.0027	-0.0024	0.0044	0.0007	0.0010	0.0135
Employed (Yes=1, No=0)	-0.0226	0.0055	-0.0239*	0.0032	0.0098	-0.0003	0.0283
Household size	0.0642***	-0.0016	0.0287***	-0.0744***	-0.0065	-0.0012	-0.0092
Household size squared	-0.0052***	6.93e-06	-0.0009	0.0047***	0.0005	-9.18e-07	0.0009
Age of household head	0.0114***	-0.0004	-0.0006	-0.0005	-0.0023**	-0.0002	-0.0074***
Age of household head squared	-0.0001***	2.92e-06	4.61e-06	4.42e-06	1.34e-05	1.40e-06	0.0001***
Number of household members under 5	0.0304**	0.0017	-0.0316***	-0.0074	0.0032	0.0001	0.0036
Presence of under 15 household members (Dummy: Yes=1, No=0)	-0.0126	0.0023	0.0169	-0.0279***	0.0148*	-0.0025	0.0091
Number of household members over 64	-0.0276	0.0054*	0.0086	-0.0048	0.0094	0.0060*	0.0030
Number of male household members within the age range 15-64	-0.0190	0.0024	0.0045	-0.0023	-0.0029	0.0032	0.0140
Number of female household members within the age range 15-64	-0.0154	0.0015	0.0035	-0.0047	0.0040	-0.0001	0.0112
Nationality (Dummy: Ghanaian=1, Foreigner=0)	0.0602	0.0069*	-0.0024	-0.0208	0.0044	0.0044	-0.0526
Marital status of household head: (Married = base category)							
Consensual union	-0.0413	0.0011	0.0350**	-0.0044	0.0088	0.0048**	-0.0040
Divorced	-0.0095	-0.0005	-0.0017	-0.0251*	0.0190*	0.0005	0.0172
Never married	-0.0893**	-0.0085**	0.0065	-0.0256	-0.0065	-0.0022	0.1256***
Separated	-0.0304	0.0104*	0.0145	-0.0099	0.0080	0.0008	0.0067
Widowed	-0.0109	0.0006	0.0138	0.0073	0.0066	0.0019	-0.0193
Location:							
Rural (Dummy: Rural=1, Urban=0)	0.1259***	0.0007	-0.0017	-0.0274***	0.0013	0.0040***	-0.1029***
Northern (Northern=1, Southern=0)	-0.0028	-0.0019	-0.0076	0.0361***	-0.0230	0.0177***	-0.0186
Ecological zone: (Accra = base category)							
Savannah (Dummy: Savannah=1, 0=otherwise)	0.2060***	0.0178	0.0257	-0.0359	0.1050***	0.0047	-0.3233***
Forest (Dummy: Forest=1, 0=otherwise)	0.1710***	0.0155	0.0363	-0.0117	0.0869***	0.0049	-0.3029***
Coastal (Dummy: Coastal=1, 0=otherwise)	0.1622***	0.0129	0.0462	-0.0070	0.0831***	0.0030	-0.3005***
Constant	-0.9311***	-0.0147	-0.1105	1.4000***	0.0409	-0.0054	0.6207***
Observations	4,309	4,309	4,309	4,309	4,309	4,309	4,309

***Significance at 1%, **significance at 5%, and *significance at 10%. Robust standard errors were used in estimation. Additional regressors $(X_i - \mu_X)\bar{F}I_i$ were included in the regressions to compute the heterogenous response but not reported.

Impact of financial inclusion on household budget allocations for male-headed households (with heterogeneous response to treatment)

	Food	Health	Education	Housing	Durables	Temptation	Other
Household characteristics:							
Financial inclusion (Yes=1, No=0)	-0.0790***	0.0014	0.0973***	0.0774***	0.0279**	-0.0192***	-0.1058***
Total household expenditure per capita (in natural log)	0.0931***	0.0019	-0.0103**	-0.1672***	-0.0073*	0.0077***	0.0821***
Literacy (Ever attended sch: Yes=1, No=0)	-0.0373**	0.0003	-0.0051	0.0108	0.0093	0.0013	0.0207
Employed (Yes=1, No=0)	-0.0396**	-0.0041*	-0.0077	0.0213*	-0.0076	0.0071	0.0306*
Household size	0.0243***	-0.0002	-0.0168***	-0.0245***	0.0020	-0.0002	0.0156**
Household size squared	-0.0010***	8.54e-06	0.0008***	0.0006**	-0.0003***	0.0001	-0.0002
Age of household head	0.0020	0.0002	0.0022**	0.0019*	-0.0016*	0.0027***	-0.0073***
Age of household head squared	1.99e-05	-5.80e-07	-1.62e-05*	-2.04e-05*	1.58e-05*	-2.21e-05***	0.0001***
Number of household members under 5	0.0006	0.0019	0.0012	-0.0118**	0.0052	0.0040*	-0.0010
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.0391**	0.0018	0.0402***	-0.0595***	0.0193***	-0.0041	-0.0367**
Number of household members over 64	0.0083	-0.0047	0.0189**	0.0270***	-0.0146**	0.0012	-0.0361***
Number of male household members within the age range 15-64	-0.0219***	-0.0031**	0.0218***	0.0150***	0.0005	-0.0021	-0.0103
Number of female household members within the age range 15-64	-0.0032	-0.0006	0.0084	0.0128**	0.0041	-0.0058***	-0.0157**
Nationality (Dummy: Ghanaian=1, Foreigner=0)	-0.0645*	-0.0006	0.0091	0.0372*	0.0163	0.0025	-4.57e-05
Marital status of household head: (Married = base category)							
Consensual union	0.0036	-0.0016	0.0094	0.0035	0.0245***	0.0028	-0.0422***
Divorced	-0.0980***	0.0043	-0.0088	0.0337**	-0.0137	0.0166*	0.0659**
Never married	-0.1791***	-0.0038	0.0020	0.0464***	0.0087	0.0092	0.1166***
Separated	-0.0758*	0.0065	-0.0067	0.0266	-0.0024	0.0102	0.0416
Widowed	0.0028	-0.0003	-0.0138	0.0491**	-0.0128	0.0062	-0.0313
Location:							
Rural (Dummy: Rural=1, Urban=0)	0.1929***	0.0044*	-0.0021	-0.0175*	-0.0005	0.0255***	-0.2027***
Northern (Northern=1, Southern=0)	-0.0569***	0.0063**	-0.0259***	0.0501***	-0.0108	0.0229***	0.0144
Ecological zone: (Accra = base category)							
Savannah (Dummy: Savannah=1, 0=otherwise)	0.2751***	-0.0031	0.0602*	-0.1369***	0.0429**	-0.0285**	-0.2098**
Forest (Dummy: Forest=1, 0=otherwise)	0.2880***	-0.0074	0.0711**	-0.1097***	0.0279	-0.0280**	-0.2420***
Coastal (Dummy: Coastal=1, 0=otherwise)	0.2345***	0.0010	0.0699**	-0.1013***	0.0183	-0.0310**	-0.1913**
Constant	-0.6378***	-0.0096	-0.0428	1.4281***	0.1125**	-0.1034***	0.2530**
Observations	9,488	9,488	9,488	9,488	9,488	9,488	9,488

***Significance at 1%, **significance at 5%, and *significance at 10%. Robust standard errors were used in estimation. Additional regressors $(X_i - \mu_X)\bar{F}_i$ were included in the regressions to compute the heterogenous response but not reported.

Probit first-stage regressions for rural and urban households

Dependent variable: financial inclusion	Rural households		Urban households	
	Coef.	z-stat	Coef.	z-stat
Distance to nearest financial institution (in kilometers)	-0.0467***	-13.43	-0.0356***	-6.34
Household characteristics:				
Total household expenditure per capita (in natural log)	0.6077***	23.49	0.8369***	21.08
Literacy (Ever attended sch: Yes=1, No=0)	0.4533***	11.73	0.4709***	8.24
Sex (Female=1, Male=0)	0.0389	0.81	-0.1640***	-2.94
Employed (Yes=1, No=0)	0.4499***	10.35	0.3871***	8.71
Household size	0.1659***	7.66	0.2490***	6.59
Household size squared	-0.0064***	-6.47	-0.0142***	-6.2
Age of household head	0.0025	0.38	0.0090	1.08
Age of household head squared	-3.21e-05	-0.51	-0.0001	-1.17
Number of household members under 5	-0.0292	-1.15	0.0089	0.23
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.1492***	2.79	0.1561**	2.29
Number of household members over 64	0.0689*	1.66	0.0726	1.07
Number of male household members within the age range 15-64	0.0965***	4.33	0.0534	1.56
Number of female household members within the age range 15-64	0.1063***	4.57	0.1271***	3.86
Nationality (Dummy: Ghanaian=1, Foreigner=0)	0.2410	1.62	0.0380	0.24
Marital status of household head: (Married = base category)				
Consensual union	-0.2413***	-4.25	-0.2331***	-3.19
Divorced	-0.2132***	-2.88	-0.1855**	-2.28
Never married	0.0239	0.33	-0.1537**	-2.11
Separated	-0.0924	-1.11	-0.2184**	-2.36
Widowed	-0.1653***	-2.7	-0.1531**	-2.04
Location:				
Northern (Northern=1, Southern=0)	0.6199***	8.59	0.3463***	2.85
Ecological zone: (Accra = base category)				
Savannah (Dummy: Savannah=1, 0=otherwise)	0.0302	0.42	0.2872**	2.55
Forest (Dummy: Forest=1, 0=otherwise)	-0.0399	-0.84	0.3190***	4.2
Coastal (Dummy: Coastal=1, 0=otherwise)	-	-	0.2000***	2.66
Constant	-5.8107***	-18.84	-7.7548***	-16.92
Observations	7,906		5,891	

***Significance at 1%, **significance at 5%, and *significance at 10%. Robust standard errors were used in estimation. Coastal dummy variable dropped for rural households due to correlation.

Impact of financial inclusion on household budget allocations for rural households (with heterogeneous response to treatment)

	Food	Health	Education	Housing	Durables	Temptation	Other
Household characteristics:							
Financial inclusion (Yes=1, No=0)	-0.1492***	-0.0001	0.1502***	0.0467***	0.0573***	-0.0304***	-0.0745***
Total household expenditure per capita (in natural log)	0.0833***	0.0025*	-0.0054	-0.1605***	-0.0025	0.0069***	0.0758***
Literacy (Ever attended sch: Yes=1, No=0)	-0.0189	-0.0005	-0.0170**	0.0154**	-0.0063	0.0033	0.0240*
Sex (Female=1, Male=0)	0.0198	-0.0046*	0.0172**	-0.0194**	-0.0075	-0.0253***	0.0198
Employed (Yes=1, No=0)	-0.0425**	-0.0003	-0.0270**	0.0381***	-0.0130	0.0078	0.0370**
Household size	0.0227***	-0.0013	0.0018	-0.0342***	0.0008	0.0004	0.0098
Household size squared	-0.0009***	2.9e-05	0.0004	0.0011***	-0.0002**	3.27e-05	-0.0003
Age of household head	0.0028	0.0003	0.0017*	0.0014	-0.0014*	0.0019***	-0.0067***
Age of household head squared	-2.58e-05	-2.23e-06	-1.42e-05	-1.38e-05	9.66e-06	-1.58e-05***	0.0001***
Number of household members under 5	-0.0044	0.0036***	-0.0132***	-0.0111**	0.0090***	0.0037*	0.0124*
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.0199	0.0022	0.0333***	-0.0534***	0.0078	-0.0022	-0.0077
Number of household members over 64	-0.0115	-0.0008	0.0086	0.0219**	-0.0039	0.0022	-0.0166
Number of male household members within the age range 15-64	-0.0200**	-0.0014	0.0026	0.0109**	0.0002	0.0001	0.0076
Number of female household members within the age range 15-64	-0.0016	-0.0001	-0.0015	0.0103**	0.0040	-0.0049***	-0.0062
Nationality (Dummy: Ghanaian=1, Foreigner=0)	-0.0470	0.0033	0.0042	0.0190	0.0070	0.0041	0.0094
Marital status of household head: (Married = base category)							
Consensual union	0.0229	-0.0012	0.0109	-0.0039	0.0221***	0.0066	-0.0574***
Divorced	-0.0597**	0.0021	-0.0080	-0.0037	-0.0036	0.0120	0.0609**
Never married	-0.1822***	-0.0057**	0.0206*	0.0309**	0.0043	0.0106	0.1215***
Separated	-0.0570	0.0025	-0.0010	0.0013	-0.0055	0.0185**	0.0413
Widowed	-0.0008	-0.0009	0.0021	0.0127	-0.0051	0.0068	-0.0149
Location:							
Northern (Northern=1, Southern=0)	-0.0372*	0.0050	-0.0287***	0.0544***	-0.0179*	0.0211***	0.0034
Ecological zone: (Accra = base category)							
Savannah (Dummy: Savannah=1, 0=otherwise)	0.0186	0.0010	0.0082	-0.0367***	0.0227**	0.0019	-0.0155
Forest (Dummy: Forest=1, 0=otherwise)	0.0311**	-0.0022	0.0041	-0.0100	0.0073	0.0026	-0.0329**
Constant	-0.1453	-0.0186	-0.0292	1.3258***	0.1188***	-0.0854***	-0.1662**
Observations	7,906	7,906	7,906	7,906	7,906	7,906	7,906

***Significance at 1%, **significance at 5%, and *significance at 10%. Robust standard errors were used in estimation. Additional regressors $(X_i - \mu_X)\widehat{F}I_i$ were included in the regressions to compute the heterogenous response but not reported. Coastal dummy variable dropped for rural households due to correlation.

Impact of financial inclusion on household budget allocations for urban households (with heterogeneous response to treatment)

	Food	Health	Education	Housing	Durables	Temptation	Other
Household characteristics:							
Financial inclusion (Yes=1, No=0)	-0.0050	0.0047	0.0405	0.0689**	0.0371*	0.0081*	-0.1542***
Total household expenditure per capita (in natural log)	0.0781***	-0.0034	-0.0039	-0.1219***	-0.0034	-0.0024	0.0569***
Literacy (Ever attended sch: Yes=1, No=0)	-0.0520**	0.0058	0.0021	0.0012	0.0326***	-0.0028	0.0131
Sex (Female=1, Male=0)	0.0996***	-0.0003	0.0140	-0.0252**	0.0215**	-0.0143***	-0.0952***
Employed (Yes=1, No=0)	-0.0474*	-0.0006	-0.0058	-0.0002	-0.0019	0.0004	0.0556*
Household size	0.0311	-0.0004	-0.0003	-0.0420**	-0.0032	-0.0013	0.0162
Household size squared	-0.0016	-0.0001	0.0013	0.0019	0.0001	4.7e-05	-0.0016
Age of household head	0.0087***	-0.0005	0.0002	-0.0005	-0.0023*	0.0008*	-0.0063**
Age of household head squared	-0.0001*	4.36e-06	1.21e-05	1.25e-05	2.18e-05*	-4.99e-06	3.3e-05
Number of household members under 5	0.0628***	0.0021	-0.0435***	-0.0004	0.0137*	0.0005	-0.0351**
Presence of under 15 household members (Dummy: Yes=1, No=0)	-0.0170	-0.0027	0.0656***	-0.0279*	0.0203	-0.0031	-0.0352
Number of household members over 64	0.0192	0.0026	0.0258	-0.0345**	-0.0001	0.0003	-0.0133
Number of male household members within the age range 15-64	-0.0244	0.0004	0.0010	-0.0024	0.0146**	-0.0033*	0.0139
Number of female household members within the age range 15-64	0.0200	-0.0009	0.0075	-0.0020	0.0015	-0.0027*	-0.0234
Nationality (Dummy: Ghanaian=1, Foreigner=0)	0.0290	-0.0015	-0.0021	0.0534	0.0164	0.0022	-0.0975
Marital status of household head: (Married = base category)							
Consensual union	-0.0801**	-0.0010	0.0150	-0.0210*	-0.0249*	0.0059	0.1061***
Divorced	-0.0715*	-0.0080*	0.0061	-0.0046	0.0261	0.0026	0.0493
Never married	-0.1183***	-0.0084**	-0.0263	-0.0046	0.0170	0.0054	0.1353***
Separated	-0.1345***	0.0121	0.0296*	-0.0089	0.0009	0.0038	0.0969***
Widowed	-0.0586*	-0.0035	0.0100	-0.0014	0.0079	0.0022	0.0434
Location:							
Northern (Northern=1, Southern=0)	0.0065	0.0022	-0.0217	0.0000	-0.0138	0.0092***	0.0176
Ecological zone: (Accra = base category)							
Savannah (Dummy: Savannah=1, 0=otherwise)	0.2225***	0.0033	0.0198	-0.1003***	0.0945***	-0.0070	-0.2328***
Forest (Dummy: Forest=1, 0=otherwise)	0.1839***	0.0031	0.0217	-0.0434**	0.0419***	-0.0062	-0.2010***
Coastal (Dummy: Coastal=1, 0=otherwise)	0.1807***	0.0094*	0.0359*	-0.0321*	0.0390***	-0.0030	-0.2299***
Constant	-0.8252***	0.0417	0.0305	1.1704***	0.0325	0.0144	0.5357**
Observation	5,891	5,891	5,891	5,891	5,891	5,891	5,891

***Significance at 1%, **significance at 5%, and *significance at 10%. Robust standard errors were used in estimation. Additional regressors $(X_i - \mu_X)\widehat{FI}_i$ were included in the regressions to compute the heterogenous response but not reported.

Appendix E

	Total household consumption				Consumption categories (levels and budget shares)			
	Standardized differences		Variance ratio		Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched	Raw	Matched	Raw	Matched
Total household expenditure per capita (in natural log)	-	-	-	-	0.704	0.071	1.04	1.073
Sex (Female=1, Male=0)	-0.181	-0.013	0.867	0.987	-0.181	-0.005	0.867	0.995
Age of household head	-0.211	0.026	0.735	1.026	-0.211	-0.002	0.735	1.006
Age of household head squared	-0.238	0.027	0.661	1.079	-0.238	0	0.661	1.052
Literacy (Ever attended sch: Yes=1, No=0)	0.57	0.021	0.601	0.966	0.57	0.049	0.601	0.925
Employed (Yes=1, No=0)	0.499	-0.001	1.919	0.999	0.499	0.01	1.919	1.007
Household size	0.061	-0.027	0.975	0.963	0.061	-0.094	0.975	0.862
Household size squared	0.032	-0.025	0.978	1.086	0.032	-0.094	0.978	0.962
Number of household members under 5	-0.052	-0.021	0.808	0.947	-0.052	-0.021	0.808	0.92
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.018	-0.033	0.989	1.023	0.018	-0.046	0.989	1.033
Number of household members over 64	-0.198	0.029	0.736	1.092	-0.198	-0.02	0.736	1.029
Number of male household members within the age range 15-64	0.212	0.001	1.158	0.97	0.212	-0.083	1.158	0.739
Number of female household members within the age range 15-64	0.156	-0.033	1.119	0.832	0.156	-0.082	1.119	0.743
Nationality (Ghanaian=1, Foreigner=0)	0.049	-0.029	0.65	1.352	0.049	0.034	0.65	0.737
Consensual union	-0.049	0.005	0.87	1.014	-0.049	0.042	0.87	1.142
Divorced	-0.096	0.016	0.707	1.068	-0.096	0.016	0.707	1.07
Never married	0.111	-0.049	1.293	0.909	0.111	-0.016	1.293	0.968
Separated	-0.03	0.009	0.874	1.041	-0.03	-0.006	0.874	0.974
Widowed	-0.246	-0.007	0.581	0.982	-0.246	-0.032	0.581	0.918
Rural (Dummy: Rural=1, Urban=0)	-0.543	0.004	1.23	1.001	-0.543	-0.005	1.23	0.999
Northern (Northern=1, Southern=0)	-0.262	-0.034	0.799	0.962	-0.262	-0.08	0.799	0.918
Savannah (Dummy: Savannah=1, 0=otherwise)	-0.287	-0.025	0.849	0.979	-0.287	-0.074	0.849	0.942
Forest (Dummy: Forest=1, 0=otherwise)	0.06	0.008	1.026	1.003	0.06	0.043	1.026	1.018
Coastal (Dummy: Coastal=1, 0=otherwise)	0.172	0.007	1.3	1.009	0.172	0.052	1.3	1.072
	Raw	Matched				Raw	Matched	
Number of obs	13,797	15,610				13,797	15,610	
Treated obs	7,805	7,805				7,805	7,805	
Control obs	5,992	7,805				5,992	7,805	

Note: a covariate has a good balance if the standardized difference (the “matched” column) is close to zero and the variance ratio (the “matched” column) is close to one.

Level of expenditure and budget share matching								
	Female-headed households				Male-headed households			
	Standardized differences		Variance ratio		Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched	Raw	Matched	Raw	Matched
Total household expenditure per capita (in natural log)	0.585	0.078	1.06	1.149	0.784	0.055	1.045	1.055
Age of household head	-0.324	-0.051	0.724	0.974	-0.123	0.045	0.782	0.963
Age of household head squared	-0.355	-0.051	0.629	0.961	-0.146	0.035	0.725	1.036
Literacy (Ever attended sch: Yes=1, No=0)	0.46	0.051	0.738	0.943	0.608	0.074	0.543	0.878
Employed (Yes=1, No=0)	0.356	0.041	2.192	1.066	0.525	-0.006	1.718	0.998
Household size	0.207	-0.053	1.247	1.137	-0.031	-0.106	0.908	0.806
Household size squared	0.183	-0.01	1.804	1.595	-0.039	-0.116	0.859	0.797
Number of household members under 5	-0.018	0.067	0.915	1.106	-0.104	-0.004	0.753	0.892
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.083	0.043	0.957	0.976	-0.022	-0.05	1.015	1.037
Number of household members over 64	-0.294	-0.13	0.731	0.622	-0.149	-0.002	0.722	1.123
Number of male household members within the age range 15-64	0.251	-0.037	1.726	1.078	0.11	-0.095	1.126	0.65
Number of female household members within the age range 15-64	0.345	-0.083	1.04	0.638	0.1	-0.112	1.097	0.683
Nationality (Ghanaian=1, Foreigner=0)	0.065	0	0.484	1	0.051	0.055	0.663	0.646
Consensual union	-0.086	-0.006	0.749	0.979	-0.045	0.018	0.885	1.053
Divorced	0.011	-0.129	1.024	0.789	-0.134	0.033	0.46	1.287
Never married	0.191	0	1.555	1	0.074	-0.039	1.186	0.924
Separated	0.079	0.044	1.251	1.127	-0.075	-0.017	0.609	0.882
Widowed	-0.292	-0.009	0.847	0.992	-0.1	0.018	0.518	1.155
Rural (Dummy: Rural=1, Urban=0)	-0.481	0.04	1.033	1.018	-0.611	-0.007	1.398	1
Northern (Northern=1, Southern=0)	-0.113	-0.036	0.848	0.945	-0.367	-0.079	0.798	0.928
Savannah (Dummy: Savannah=1, 0=otherwise)	-0.137	-0.043	0.859	0.949	-0.398	-0.058	0.874	0.96
Forest (Dummy: Forest=1, 0=otherwise)	-0.018	-0.015	0.996	0.996	0.115	-0.006	1.062	0.998
Coastal (Dummy: Coastal=1, 0=otherwise)	0.07	0.059	1.084	1.069	0.255	0.095	1.576	1.153
	Raw	Matched				Raw	Matched	
Number of obs	4,309	4,309				9,488	11,304	
Treated obs	2,153	2,153				5,652	5,652	
Control obs	2,153	2,153				3,836	5,652	

Note: a covariate has a good balance if the standardized difference (the “matched” column) is close to zero and the variance ratio (the “matched” column) is close to one.

Level of expenditure and budget shares matching								
	Rural households				Urban households			
	Standardized differences		Variance ratio		Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched	Raw	Matched	Raw	Matched
Total household expenditure per capita (in natural log)	0.471	0.073	1.064	1.084	0.62	0.069	1.065	1.006
Sex (Female=1, Male=0)	-0.174	0.03	0.84	1.039	-0.338	0.03	0.854	1.027
Age of household head	-0.173	-0.027	0.791	0.967	-0.189	0.008	0.68	0.972
Age of household head squared	-0.194	-0.03	0.715	0.969	-0.229	0.003	0.626	1.012
Literacy (Ever attended sch: Yes=1, No=0)	0.444	0.065	0.81	0.944	0.491	0.043	0.419	0.891
Employed (Yes=1, No=0)	0.376	0.069	1.967	1.091	0.465	0.01	1.456	1.003
Household size	0.184	-0.119	1.114	0.866	0.166	-0.132	1.031	0.736
Household size squared	0.136	-0.113	1.26	0.975	0.116	-0.158	1.178	0.647
Number of household members under 5	0.005	-0.088	0.847	0.849	0.038	0.006	1.011	1.059
Presence of under 15 household members (Dummy: Yes=1, No=0)	0.101	-0.047	0.91	1.054	0.101	-0.011	0.975	1.004
Number of household members over 64	-0.131	-0.032	0.821	0.841	-0.194	-0.088	0.777	0.871
Number of male household members within the age range 15-64	0.288	-0.103	1.282	0.656	0.259	-0.114	1.132	0.699
Number of female household members within the age range 15-64	0.224	-0.071	1.236	0.867	0.165	-0.061	1.003	0.737
Nationality (Ghanaian=1, Foreigner=0)	0.075	-0.013	0.486	1.173	0.034	0.093	0.761	0.506
Consensual union	-0.035	0.024	0.907	1.073	-0.048	0.051	0.867	1.182
Divorced	-0.109	0.008	0.65	1.038	-0.127	-0.024	0.662	0.918
Never married	0.067	0.01	1.237	1.03	-0.02	-0.029	0.969	0.956
Separated	-0.029	-0.009	0.872	0.958	-0.067	0.035	0.76	1.175
Widowed	-0.218	0.005	0.62	1.013	-0.288	0.023	0.531	1.07
Northern (Northern=1, Southern=0)	-0.108	-0.085	0.958	0.965	-0.187	-0.028	0.716	0.943
Savannah (Dummy: Savannah=1, 0=otherwise)	-0.119	-0.097	0.986	0.987	-0.214	-0.034	0.741	0.944
Forest (Dummy: Forest=1, 0=otherwise)	0.053	0.058	1.026	1.028	0.027	-0.105	1.009	0.979
Coastal (Dummy: Coastal=1, 0=otherwise)	-	-	-	-	0.08	0.105	1.084	1.115
		Raw	Matched		Raw	Matched		
Number of obs		7,906	7,196		5,891	8,414		
Treated obs		3,598	3,598		4,207	4,207		
Control obs		4,308	3,598		1,684	4,207		

Note: a covariate has a good balance if the standardized difference (the “matched” column) is close to zero and the variance ratio (the “matched” column) is close to one.