Received 20 February 2024
Revised 11 July 2024
Accepted 12 July 2024

Financial inclusion and household consumption behaviour in Ghana

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Abstract

Purpose – This study aims to investigate the relationship between financial inclusion and household expenditure behaviour among Ghanaian households, by taking into account both formal and informal financial inclusion channels.

Design/methodology/approach – Propensity score matching as well as instrumental variable techniques are applied to data from the Ghana Living Standard Survey to investigate the effect of financial inclusion on the share of total expenditure devoted to different categories, including food, health, education, housing, durables, temptation goods and other goods.

Findings – Informal financial inclusion seems to have no substantial effect on households' consumption behaviour, whereas formal financial inclusion significantly affects it. The study finds that formal financial inclusion is inversely related to the budget share devoted to short-term expenditure (food, temptation goods and other goods such as transport and recreation). Conversely, financially included households spend more on long-term expenditure such as education, housing and consumer durables, thus, suggesting a diversion effect towards investment in long-term physical and human capital.

Practical implications – The investigation of the heterogeneous impact across households (male vs female headed, rural vs urban) has essential policy implications on how financial inclusion can be improved among the disadvantaged groups, and with what effects.

Originality/value – The study focuses on the importance of financial inclusion in Ghana, considering both formal and informal financial inclusion channels. Previous studies only examined the overall effects on household welfare, overlooking the impact on household expenditure composition and consumption shares. The analysis also considers the heterogeneous impact of financial inclusion

JEL classification – D10, G20, G50

The authors are very grateful to Massimo Tamberi, Giorgia Barboni and Andrea Presbitero for fruitful exchanges and discussion during the preparation of this manuscript. The authors also thank Matteo Picchio, Francesca Scaturro and the participants at the seminars at the Department of Economics and Social Sciences (Ancona, Italy) for useful comments and suggestions. All errors are our own.

Funding: We declare that no funds, grants or other support were received during the preparation of this manuscript and that we have no relevant financial or non-financial interests to disclose.

Data availability statement: The data underlying this article were provided by the Ghana Statistical Service (GSS) by permission. Ghana Statistical Service (GSS) requires all users to keep data strictly confidential. Data obtained from GSS are protected by copyright law and, therefore, not for redistribution. Data will be shared on request to the corresponding author with permission of GSS.

Journal of Financial Economic Policy
Vol. 17 No. 3, 2025
pp. 378-412

1757-6385
DOI 10.1108/JFEP-02-2024-0048

on households based on the gender of the household head and the location where households reside (rural, urban).

Keywords Financial inclusion, Household expenditure, Ghana, Economic development: financial markets, Financial economics

Paper type Research paper

1. Introduction

An inclusive financial system is an important infrastructure in every economy as it accelerates progress towards inclusive growth and development (Beck *et al.*, 2007; Demirgüç-Kunt *et al.*, 2017; Sharma, 2016; Klapper *et al.*, 2016; Ababio *et al.*, 2023; Sethi and Acharya, 2018). By providing savings, credit and insurance facilities as well as payment services, the financial system facilitates consumption smoothing, long-term investments in human capital, business creation and expansion (Levine, 1997). Studies show that financial constraints pose significant challenges to most entrepreneurs (Ajide, 2020), hindering the growth and transformation of small and medium enterprises (Abor and Quartey, 2010; Beck and Cull, 2014; Beck and Demirgüç-Kunt, 2006; Beck *et al.*, 2008; Berg and Fuchs, 2013; Bigsten *et al.*, 2003; Quartey *et al.*, 2017). The situation is more pronounced for start-ups and small businesses as large banks prefer to lend to large firms (Berger and Black, 2011), while small businesses have to rely on small local lenders for their credit needs (Adams *et al.*, 2023). At the same time, financial services have been shown to enable the accumulation of lump sums (De Aghion and Morduch, 2005; Rutherford, 2000; Watkins, 2018) and financially included households are found to be economically better off than their financially excluded counterparts (Churchill and Marisetty, 2020; Churchill *et al.*, 2020; Dimova and Adebowale, 2018; Khandker, 2005; Luan *et al.*, 2016; Zhang and Posso, 2019). The effects of financial inclusion are beneficial for the entire population, but particularly for the most vulnerable groups, thus, leading to a substantial reduction in poverty and inequality (Beck *et al.*, 2007; Dimova and Adebowale, 2018; Honohan, 2004; Jalilian and Kirkpatrick, 2005; Levine, 2008; Inoue, 2019), as stated clearly in the United Nations' Sustainable Development Goals 2030 Agenda. Furthermore, the literature acknowledges the gender dimension, as evidence exists that financial inclusion has a higher impact on women's welfare relative to men (Mahato and Jha, 2023).

Account ownership is usually the starting point to access formal financial services for most households (Allen *et al.*, 2016; Demirgüç-Kunt *et al.*, 2020). According to the Global Findex data set, account ownership has been increasing globally from 51% in 2011 to 62% in 2014 and 69% in 2017. In Ghana, although the incidence of financial accounts is still lower compared to the global average, the increase over the same period has been even more pronounced. From as low as 29% in 2011, account ownership by the adult population rose to 41% in 2014 and 58% in 2017, also due to the proliferation of mobile money (MoMo) accounts [1]. This, however, suggests that more than 40% of the resident population is still financially excluded. The unbanked, who usually belong to the poorest group, are forced to resort to informal credit and savings channels, such as borrowing from relatives or saving at home, which are riskier compared to formal savings channels and limit their economic initiative.

Although Ghana represents an interesting case for the recent and rapid surge in MoMo and bank account ownership, studies on the relationship between financial inclusion and household welfare in the country are still scarce and developed only in recent years. The contributions by Danquah *et al.* (2017, 2021), Koomson *et al.* (2020), Koomson and Danquah (2021) and Sakyi-Nyarko *et al.* (2022a, 2022b) all show positive effects of financial inclusion on aggregate measures of household welfare, especially for poor and rural households.

Building on this evidence, this paper introduces a novel perspective, as it focuses on the effects of financial inclusion on the expenditure behaviour of Ghanaian households. In particular, it investigates the impact of financial inclusion on the different categories of expenditure expressed in terms of household budget shares destined to food, education, health, housing, consumer durables, temptation goods and other goods. Having an account is indeed a necessary condition to access many other financial services, such as credit in the form of both short-term and long-term loans, or savings schemes (Allen *et al.*, 2016; Danquah *et al.*, 2017) and can, therefore, be considered as a basic measure of financial inclusion.

We exploit the last wave of the Ghana living standard survey (GLSS 7) carried out in 2016/2017 and make use of both propensity score matching (PSM) and instrumental variable (IV) techniques to take into account and address the potential endogeneity arising from either reverse causality from household expenditure to financial inclusion or omitted variables correlated to both phenomena. When using PSM, the average treatment effect (ATE) (being financially included) was estimated by matching treated households with similar untreated households on the basis of a set of observable characteristics, which are likely to affect treatment assignment. In the IV strategy, we follow the literature (Dogan *et al.*, 2022; Ibrahim and Aliero, 2020; Jack and Suri, 2014; Koomson *et al.*, 2020; Koomson and Danquah, 2021) and use the distance to the nearest financial institution as an instrument for the availability of a bank account and access to other financial services in the household. As robustness, we also compared results on GLSS 7 with those from GLSS 6 to explore how the impact of an increasing level of financial inclusion may have changed over time.

Results show that financial inclusion makes Ghanaian households divert resources away from short-term, and sometimes harmful expenditures, such as temptation goods, towards long-term investment in human and physical capital (education, housing and consumer durables). The overall set of results may probably hint at the substitution effect outweighing the income effect, given that financially included households have on average a total per capita expenditure that is almost twice as large as that of financially excluded households. Results are substantially confirmed, although with heterogeneous patterns, among male-headed and female-headed households. When distinguishing rural from urban households, the former are more likely to modify their budget allocation due to financial inclusion. Finally, we show that results are confirmed when considering data from GLSS 6, thereby supporting the validity of the PSM strategy, and also when using IV estimates, despite possible concerns regarding the fully exogenous nature of the instrument.

Besides providing specific evidence on Ghana, the study contributes more broadly to the international debate on the importance of financial inclusion: although this literature has widened over the last decades, it has mainly focused on the overall effects on household welfare (He *et al.*, 2024; Manja and Badjie, 2023), whereas a specific assessment on the impact on household expenditure composition, apart from microcredit programs (Banerjee and Mullainathan, 2010; Banerjee and Duflo, 2011; De Aghion and Morduch, 2005; Watkins, 2018), is still scant. In addition, the attention devoted by microcredit literature to consumption outcomes mostly refers to expenditure levels, rather than consumption shares (see among the others Banerjee *et al.*, 2015a, 2015b; Cintina and Love, 2019).

Finally, the present analysis delves into the heterogenous impact of financial inclusion on different household types by taking into account the gender of the household head and the location (rural vs urban) where households are currently living. Large evidence has been provided in the literature on the gender gap in financial inclusion as an important dimension of the overall existing socio-economic disparities between females and males, especially in developing countries (Ghosh and Vinod, 2017). Besides that, location of residence is also likely to play a fundamental role, with rural households often unable to access basic financial services (Burgess and Pande, 2005).

The rest of the paper is organised as follows: Section 2 provides a general overview of the policy environment related to financial inclusion and welfare in Ghana. Section 3 describes the data and the empirical strategy used in the study, whereas estimated results are presented and discussed in Section 4. Section 5 provides some conclusions and policy recommendations.

2. An overview of the policy environment in Ghana

Ghana's recent economic growth rate has been quite impressive, ranging from 3.7% to 14% for the period 2005–2017 (GSS, 2018). The considerable social and economic development of the last decades allowed the country to achieve the first millennium development goal of halving poverty, from 52.7% of total population in 1993 to 23.4% in 2016. Afterwards, the pace of poverty reduction has slowed, and inequalities persist both between and within regions, particularly in the northern areas of the country. Notwithstanding the devastating impact of COVID-19, which raised poverty level up to 25.5% in 2020 (World Food Programme, 2022), Ghana's economy rebounded from the shock and experienced economic growth rate of 5.4% in 2021 (Kwakye *et al.*, 2022). However, this was short lived as the country is currently plunged into a new crisis, and the population face high cost of living resulting from rapid depreciation of the national currency and a surge in inflation rate, particularly for food, which substantially tightens the household budget.

Successive governments have made efforts to further curb poverty and inequality by introducing social intervention programs such as the Livelihood Empowerment Against Poverty, the Capitation Grant and School Feeding Program and the more recent Free Senior High School Program, which began in 2017.

The development of financial inclusion policies has also been a major strategy adopted by the government to reduce poverty (World Bank, 2018). Ghana's financial sector has expanded rapidly, with its total assets increasing from 53% of GDP in 2010 to 78% of GDP in 2017 (Geiger *et al.*, 2019). The deepening of the financial sector has also been accompanied by increasing access to financial services. According to the Global Findex database, account ownership rose from 29% of the adult total population in 2011 to 58% in 2017 and much of this growth is attributable to the surge in MoMo accounts, which made Ghana the fastest growing MoMo market in Africa (Geiger *et al.*, 2019).

Despite the rapid progress in account ownership, both in Ghana and throughout Africa access to financial services is still rather heterogeneous across certain key demographics such as gender, region of residence, rural-urban dwelling and poverty status (Beck *et al.*, 2015). Women's access to financial services is much lower than their male counterparts, thereby depriving their households of economic opportunities and lowering their standard of living. Rural households continue to lag their urban counterparts though access to financial services [2] (i.e. account ownership) for the former has more than doubled over the 2011–2017 period (see Global Findex database) due to the proliferation of MoMo accounts [3]. As one would expect, financial access is also lower for the poor compared to the nonpoor. In terms of heterogeneity across regions, the five poorest regions (Upper West, Northern, Volta, Upper East and Brong Ahafo) have the lowest rates of financial inclusion.

To address the gaps in the access to financial services, the government has adopted the 2018–2023 National Financial Inclusion and Development Strategy (NFIDS) whose specific aims are to support the financial sector development and to address financial exclusion. Indeed, NFIDS seeks to increase the share of Ghanaian adults with access to financial services from 58% in 2015 to 85% by 2023 (FISPLG, 2022). A specific focus is devoted to the most disadvantaged categories: rural households, women and female-owned business and the poor. The NFIDS is built on five pillars, namely:

(1) financial stability;
(2) access, quality and usage of financial services;
(3) financial infrastructure;
(4) financial consumer protection; and
(5) financial capacity (World Bank, 2018; FISPLG, 2022).

According to the Country Partnership Framework stipulated between Ghana and the World Bank Group for the 2022–2026 period, the World Bank will support the implementation of the NFIDS by investing in the digitalisation of rural and community banks, offering financial literacy programs and helping to connect informal savings group to formal financial services providers. Technical assistance by international institutions will also be provided to strengthen Ghana's Digital Financial Services ecosystem and improve its regulatory framework.

With such a policy environment, Ghana has recently become an interesting case study to investigate the impact of financial inclusion on household welfare. One of the first contributions was by Danquah *et al.* (2017), who showed that financial services provided by Rural and Community Banks exert a significant positive effect on the welfare of rural households. Koomson *et al.* (2020) recently confirmed that financial inclusion, measured through a novel multidimensional index developed by Aslan *et al.* (2017), reduces both the probability of being poor and the exposure to future poverty among Ghanaian households, and that these effects are stronger for female-headed and rural households. A beneficial effect has also been found in terms of household energy poverty (Koomson and Danquah, 2021) and out-of-pocket health expenditures, especially among female-headed and urban households (Koomson *et al.*, 2021). More in general, poor Ghanaian households are those experiencing the largest benefits from financial inclusion in terms of both income- and consumption-based indicators compared to non-poor households (Danquah *et al.*, 2021). Sakyi-Nyarko *et al.* (2022a) show that, besides a significant relationship with overall well-being of Ghanaian households, financial inclusion is positively correlated with food consumption, medical treatment and the probability of school attendance and improves household financial resilience, especially when it is proxied by savings and formal account ownership (Sakyi-Nyarko *et al.*, 2022b). If gender does not seem to make any difference in this relationship, the effect of financial inclusion in rural areas tends to be stronger than in urban areas, thus, recalling the importance of this dimension for geographically dispersed communities.

3. Empirical strategy

3.1 Data description

The main data source for the present study is the seventh round of the GLSS (GLSS 7) collected in 2016/2017 [4]. The previous round (GLSS 6), collected in 2012 / 2013, was also used to test the robustness of our findings. GLSS is a nationally representative household survey collected by the Ghana Statistical Service (GSS) since 1987 to measure the well-being of the resident population. The World Bank is responsible for designing the program, while the national statistical agencies of participating countries implement it. Apart from household demographic information, the GLSS survey covers topics such as access and use of financial services, migration experience, remittances, income, expenditure, employment, sanitation, health and water. A total of 15,000 households were selected in the seventh round of the survey, out of which 14,009 households responded, with a response rate higher than

93%. However, due to missing values on our variables of interest, 212 households (i.e. about 1.5% of the sample) were excluded. Our final GLLS7 sample, therefore, includes 13,797 households.

3.2 Financial inclusion indicator

Though financial inclusion is not an end in itself, it may act as a key facilitator to achieve the sustainable development goals (SDGs) of the United Nations (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 will get access to a transaction account by 2020 (World Bank Group, 2015). The ownership of a deposit account has been largely considered as the necessary gateway to accessing other financial services from a formal institution (Allen *et al.*, 2016; Danquah *et al.*, 2017), even though it is not capturing the intensity of the use of such services (Dupas *et al.*, 2018). Recent evidence on Ghana has shown that also MoMo accounts facilitate the use of formal financial services such as saving and credit, even though this happens mainly through the MoMo platforms rather than through a traditional banking institution (Kodom *et al.*, 2022).

In this spirit, and differently from Koomson *et al.* (2020, 2021), Koomson and Danquah (2021) and Sakyi-Nyarko *et al.* (2022a, 2022b) who all used a multidimensional indicator of financial inclusion for Ghana, we focus on the access dimension by using a dummy variable which refers to the availability of an account or a contribution to a loan/savings scheme at the household level [5]. We consider all types of financial institutions where these types of account or contribution may be held. Our proxy for financial inclusion is very similar to standard access measures based on bank account ownership adopted by international institutions such as the World Bank. According to the Global Findex 2017 edition, 57.7% of Ghanaian population aged 15+ reported having an account at a bank or another type of financial institution, or personally using a MoMo service in the past year. The incidence in GLSS 7 data, as Figure 1 will show, is approximately 57%. We used this measure because it is widely recognised as a fundamental indicator of financial inclusion as it serves as the gateway to gaining access to formal financial services (United Nations, 2016; Demirguc-Kunt *et al.*, 2018), which are crucial for economic participation and development.

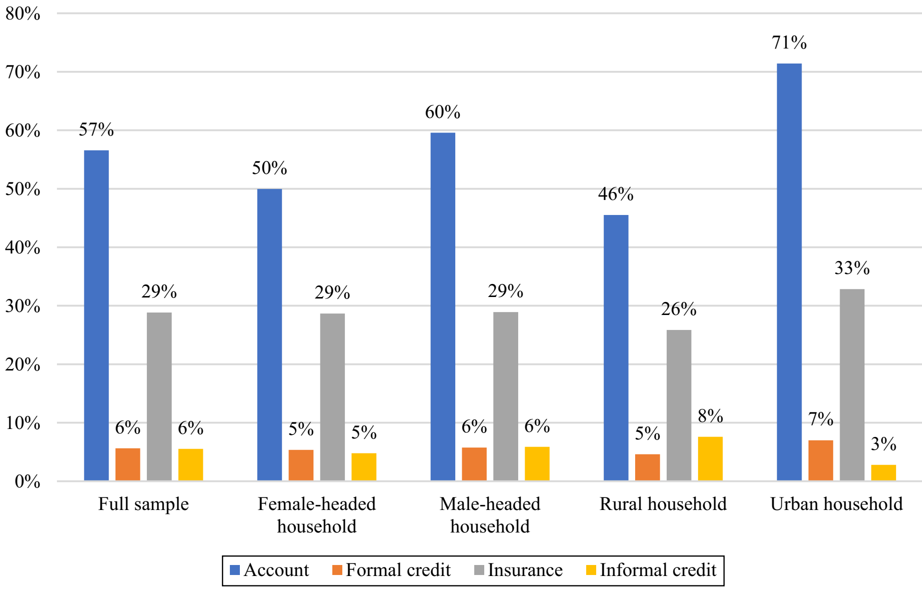
We also consider two alternative measures of formal financial inclusion, such as credit access and insurance coverage available at the household level, as well as an informal financial inclusion indicator that captures credit access from informal sources (relatives, friends etc.).

3.3 Empirical specification

The theoretical foundation of our empirical setting is the Working–Leser model [6], which considers budget shares as a linear function of the logarithm of total expenditure. We, therefore, estimate equation (1) to examine the impact of financial inclusion on household budget shares in Ghana:

$$B_{ij} = \gamma + \alpha FI_i + EXP_i + X'_i\beta + \varepsilon_{ij} \tag{1}$$

where B_{ij} is the share of good j in total annual expenditure of household i. The different typologies of household expenditure have been grouped into seven categories (j = 1,…,7): food, education, health, housing, consumer durables, temptation goods and other goods. For a detailed definition of what is included in each category, see Table 1. In other words, B_{ij} is the annual budget share for each of the j categories of expenditure for household i. FIi is a dummy variable equal to 1 if household i is financially included, as described above, and 0



Source: Figure by authors

Figure 1. Financial inclusion of GLSS 7 households

otherwise. *log* EXP_i is the logarithm of total expenditure of household *i*, whereas X'_i is a vector of other control variables, described in detail in Table 2. We consider the main characteristics of the household head: age (also squared), gender, marital status, schooling, employment status and nationality. In addition, we control for several household characteristics: size (also squared), number of children (under 5 years and under 15 years, respectively), number of members above 64 years, number of female and male components aged 15–64 and location of residence.

3.4 Methodology and identification issues

In our framework of analysis, financial inclusion may be endogenous due to either reverse causality or omitted variable bias. We, therefore, use both IV (Adams and Cuecuecha, 2010, 2013) and matching techniques (Randazzo and Piracha, 2019) to address this problem. However, due to the challenge of finding exogenous instruments, our study primarily uses the PSM technique and the IV approach is included as a robustness check.

In the analysis of the impact of financial inclusion, the PSM method developed by Rosenbaum and Rubin (1983) and Heckman *et al.* (1998) involves pairing financially included households with financially excluded counterparts who have similar propensity scores based on a set of observed characteristics. This quasi-experimental method offers advantages over other methods such as IV and OLS supplemented by the Heckman two-step procedure, as it does not require either a specific parametric functional form and/or valid exclusion restrictions (De and Ratha, 2012). According to Dehejia and Wahba (2002), PSM

Table 1. Household expenditure categories

Expenditure category	Description	Broader expenditure classification	Description
Food	Non-purchased food		
	Purchased food		
Health	Outpatient services	Long-term expenditure	Health, education, housing, durables
	Medical products, equipment and appliances		
Education	Pre-primary school	Short-term expenditure	Food, temptation goods, other goods
	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.		

Source: Table by authors

provides more accurate estimates of treatment effects compared to parametric techniques. PSM is extremely simple in estimating treatment effects (Heckman *et al.*, 1998) and it is also particularly useful for studying household expenditure decisions because it can help address the issue of selection bias that arises from differences in socioeconomic characteristics between households that receive treatment and those that do not (Kakhkharov and Ahunov, 2022). When the treatment is randomly assigned to households with similar characteristics, we can proxy the untreated (unobservable) outcome with the outcome of similar untreated households.

Within this approach, a single index value known as the propensity score is computed to summarise the observable characteristics of each unit before receiving any treatment. This score helps to match households who receive the treatment with those who do not. The treatment itself is indicated by a dummy variable FI_i, which is set to one if household i is financially included and zero if not. B_{ij1} and B_{ij0} represent the outcome variable (i.e. the budget share for good j for household i) with and without the treatment, respectively. In principle, the treatment effect for household i would be determined by comparing the outcome with and without the treatment. While it is possible to observe the outcome conditional on the treatment, the non-treatment outcome is not observable. This is because in our specific context of analysis a household cannot be observed in a situation of both financial inclusion and exclusion simultaneously.

Table 2. Variable definitions (to integrate with the definition of long-term expenditure and short-term expenditure)

Variable name	Type	Definition
Dependent variables		
Long-term expenditure	Continuous	Share of expenditure on long-term goods on total expenditure
Food expenditure	Continuous	Share of expenditure on food on total expenditure
Health expenditure	Continuous	Share of expenditure on health on total expenditure
Education expenditure	Continuous	Share of expenditure on education on total expenditure
Housing expenditure	Continuous	Share of expenditure on housing on total expenditure
Consumer durable expenditure	Continuous	Share of expenditure on consumer durables on total expenditure
Temptation goods	Continuous	Share of expenditure on temptation goods on total expenditure
Other goods expenditure	Continuous	Share of expenditure on other goods on total expenditure
Variable of interest		
Account ownership	Dummy	If at least one household member has account or is contributing to a loan/savings scheme: Yes = 1, No = 0
Formal credit	Dummy	If any household member obtained formal credit
Insurance	Dummy	If any household member has insurance
Informal credit	Dummy	If any household member obtained informal credit
Control variables		
Log total household expenditure per capita	Continuous	Annual total expenditure per capita of household
School attendance	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 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 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 head		
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

(*continued*)

Table 2. Continued

Variable name	Type	Definition
Separated	Dummy	If household head is separated: Yes = 1, No = 0
Widowed	Dummy	If household head is widowed: Yes = 1, No = 0
Location		
Rural	Dummy	If household lives in the rural area: Yes = 1, No = 0 (urban). Rural and urban areas are distinguished on the basis of population density: rural areas refer to settlements with fewer than 5,000 people, while urban areas refer to settlements with 5,000 or more people
Northern	Dummy	If household lives in the North of Ghana: Yes = 1, No = 0 (South)
Ecological zone		
Savannah	Dummy	If household lives in the Savannah: Yes = 1, No = 0
Forest	Dummy	If household lives in the Forest area: Yes = 1, No = 0
Coastal	Dummy	If household lives in the Coastal area: Yes = 1, No = 0
Accra	Dummy	If household lives in Accra: Yes = 1, No = 0
Year dummy	Dummy	If year is 2016/2017 (GLSS 7): Yes = 1, No = 0
Instrumental variable		
Distance to nearest financial institution	Continuous	Regional average distance (in km) to the nearest financial institution (computed at the regional level for 10 regions)

Source: Table by authors

The PSM technique as designed by Rosenbaum and Rubin (1983) addresses the problem arising from the counterfactual outcomes which cannot be observed by estimating:

$$\mathrm{E}\left(B_{ij1} - B_{ij0} | FI_i = 1\right) = E\left(B_{ij1} | FI_i = 1\right) - E\left(B_{ij0} | FI_i = 0\right) \tag{2}$$

that is measuring the impact of the treatment FI_i (financial inclusion) by comparing the observed outcomes of the treated and the control groups.

This estimation hinges on some critical assumptions. The first one is the *conditional independence assumption*, which states that after conditioning on a set of observable variables X_i, treatment assignment is independent of the potential outcomes:

$$FI_i \perp (B_{ij1} - B_{ij0}) | X_{ij} \tag{3}$$

In other words, conditional on some observable characteristics X_i untreated households can be compared to treated households, as if the treatment has been fully randomised. With PSM, therefore, the issues of selection bias traditionally affecting non-experimental methods can be limited, if not fully overcome.

The second essential requirement of the PSM procedure is the presence of a *common support*, that is a large range of propensity score for which it is possible to find a match between treated and control households. In other words, households with similar characteristics would have a positive and equal probability of receiving or not receiving the treatment.

The first step of the PSM methodology, hence, involves estimating the probability of households being financially included based on their observed characteristics by means of a logit model. This generates propensity scores, which are the predicted probability of being financially included given the observable characteristics considered in the model. As stated above, if there is no overlap in the propensity score distribution between the treated and the untreated sample, it would not be possible to find a match for treated households, and subsequent estimates would not be valid.

In the second step, we use the estimated propensity scores to match financially included with financially excluded households through the nearest-neighbour matching with replacement. In this method, each financially included household is matched with one or more financially excluded counterparts that have the closest propensity score; results presented in the paper include 1, 3 and 10 neighbours, respectively. The replacement procedure allows a financially excluded household to be used as a match for financially included household more than once. While matching with replacement may affect the estimated variance, the alternative approach of matching without replacement increases the potential for bias by matching with control observations whose scores may differ significantly (Kakhkharov and Ahunov, 2022).

To test the robustness of the estimated results, the IV technique is also applied. When following the IV approach, any suitable instrument must satisfy two conditions: the variable must be correlated with the endogenous variable but have no direct correlation with the dependent variable. We use the distance to the nearest financial institution calculated as a regional average across the 10 regions of Ghana because it has a direct correlation with financial inclusion but at the same time is not likely to exert a direct effect on household budget shares, unless via financial inclusion. Some of the recent empirical literature which used the distance to the nearest financial institution as an instrument for financial inclusion include Ibrahim and Aliero (2020), Jack and Suri (2014), Koomson *et al.* (2020) and Koomson and Danquah (2021). Demirgüç-Kunt and Klapper (2013) show that one of the most common reasons reported for not having any account is the distance to the nearest bank. The farther away a bank is, the more costly becomes its access in terms of time and money (transport costs). According to Allen *et al.* (2014), population density is a powerful determinant of bank branch penetration rates across African countries, therefore, households living in remote regions are unlikely to be served by a local bank branch and experience lower levels of financial inclusion. At the same time, the distance to the nearest financial institution is supposed to influence household budget shares mostly through the access to financial services. People may well consider proximity to certain essential services or facilities such as schools, shopping malls, hospitals and banks when choosing where to live [7], and this would significantly impact their expenditure patterns; however, the final place of residence (and, hence, the distance to major services such as financial institutions) is likely to be highly correlated with a household's standard of living. The demand for places where these facilities are available is indeed high, and the major determinant of access is often the ability to afford the higher costs to live there. Following Bair and Tritah (2019), who suggest controlling for the income level to strengthen the instrument's reliability, we take household total expenditure as a proxy for income, since it can be considered a more adequate measure in the GLSS to capture the real standard of living of households [8]. Even including the log of household total expenditure in our specification, however, the distance from a financial institution can hardly be considered fully exogenous to household budget shares. The absence of a solid instrument leads us to keep PSM as the baseline estimation strategy, and present IV results as robustness.

The IV strategy is applied by means of a probit two-stage least square estimation. We do not apply direct two-stage least square (or the standard OLS procedure) because that procedure would not consider the binary nature of financial inclusion, as rightly noted by Cerulli (2014). Following Cerulli (2014), the probit two-stage least square with heterogeneous response to treatment involves the following four steps. Firstly, a probit regression is performed with FI_i as the dependent variable, on the other control variables X_i and the IV $Distance_i$, to obtain P_T, which is the predicted probability of FI_i. Secondly, FI_i is regressed on $(1, X_i, P_T)$ using OLS to obtain the fitted values $\widehat{FI}_i$. Thirdly, the budget share B_{ij} is regressed on $\left[1, X_i, \widehat{FI}_i, \widehat{FI}_i(X_i - \mu_X)\right]$ using OLS. Fourthly, 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 average treatment effect on the treated (ATET) and ATENT. Additional technical details are provided in Appendix 4.

3.5 Descriptive statistics

The full sample used for the analysis is made up of 13,797 households, out of which 7,805 households (56.57%) are financially included while 5,992 (43.43%) are not. In the GLSS 6 sample, financially included households are 8,023 out of 16,752 households, thus, representing 47.89% percent of the total. Table 3 shows the average per capita household expenditure and the budget allocation for the categories of expenditure described in Table 1 by level of financial inclusion. Total per capita expenditure of financially included households is almost twice as large as that of financially excluded households. Ghanaian households generally spend the largest share of their budget on food consumption. The same is true for the untreated sample whereas the treated sample allocates a greater proportion of their budget to consumption of other goods (such as recreation, transport and communication). Expenditure on human capital such as health and education is low in both groups. The *p*-values for the

Table 3. Average household consumption and budget shares by expenditure category

Expenditure category	Full sample	Financially included (treated)	Financially excluded (untreated)	*t*-test (untreated – treated)
Total consumption per capita (in Ghana cedis)	3,839.871	4,805.505	2,582.064	−2,223.441***
Food expenditure	0.3908	0.3490	0.4453	0.0963***
Health expenditure	0.0081	0.0078	0.0084	0.0006
Education expenditure	0.0810	0.0965	0.0609	−0.0356***
Housing expenditure	0.0776	0.0679	0.0903	0.0224***
Consumer durables expenditure	0.1002	0.1074	0.0908	−0.0166***
Temptation goods	0.0105	0.0071	0.0149	0.0079***
Other goods expenditure	0.3318	0.3643	0.2895	−0.0749***
	1.00	1.00	1.00	
Broader expenditure classification				
Long-term expenditure	0.2668	0.2796	0.2503	−0.0293***
Short-term expenditure	0.7332	0.7204	0.7497	0.0293***
	1.00	1.00	1.00	

Notes: Significance level: ***1%. Financially included (or treated) refers to households with account or contributing to savings or loan schemes. The *t*-test was computed with unequal variance
Source: Table by authors

t-test reported in the last column show that, apart from health expenditure, we observe significant differences between financially included and excluded households in terms of budget shares across all spending categories. This result is confirmed when grouping categories into a broader classification, as short-term (long-term) expenditure tends to be significantly lower (higher) among treated households.

Total expenditure per capita is also significantly different between treated and untreated households. This has to be kept in mind when looking at our estimation results: given the higher average level of per capita expenditure of financially included households, the decrease in the share devoted to a specific category might not necessarily represent a decrease in the associated level of spending, but rather a situation in which the substitution effect prevails over the income effect.

Figure 1 depicts the level of financial inclusion among households in Ghana using various dimensions. Having a deposit account or participating in savings/loan programs is the most significant factor. According to our main measure of financial inclusion, therefore, 57% of households in GLSS 7 are financially included, closely aligning with the Global Findex estimate for Ghana, which is equal to 58%. The next most prevalent indicator of financial inclusion is access to insurance, which benefits 29% of Ghanaian households. Both formal and informal credit access appears to be relatively low, estimated at around 6%. When looking at different subgroups, having a bank account remains the most important factor for financial inclusion across all groups, as expected, as it is often the first step towards broader financial inclusion. However, female-headed households significantly lag behind male-headed households by approximately 10 percentage points. Access to insurance seems irrespective of the gender of the household head, whereas male-headed households slightly outpace their female counterparts in access to formal and informal credit. When distinguishing between rural and urban households, urban households have the upper hand in all financial inclusion indicators, except for informal credit access, where rural households lead. Notably, the ownership of bank accounts is quite widespread among urban households (71%) and still limited among rural households (33%).

Table A1 shows the main characteristics of the households in the full sample and in all subsamples of the GLSS 7 data set. On average, about 31% of the household heads are females, with a larger incidence among the untreated sample (36%) compared to the treated one (28%). Household heads are mostly married (55%). Among the treated sample, nearly 6 out of 10 household heads are married whereas the figure is approximately 50% in the untreated sample. The gap gets wider when comparing male- and female-headed households: less than 30% of female household heads is married or in a consensual union, whereas 37% is widowed and slightly less than 25% is either separated or divorced. Among male-headed households, the vast majority of heads are married (71%).

The majority of households are rural dwellers (57%), but the share gets much larger among the untreated sample (72%). There is also huge disparity in the distribution of the population between the northern and southern regions. The northern part hosts nearly 30% of the Ghanaian population.

The rate of school attendance is higher among the treated sample (82%) compared to the untreated sample (57%). Male-headed households dominate female-headed households in school attendance rates by 8 percentage points; when distinguishing between urban and rural households, the former dominates the latter by 25 percentage points. The share of household heads who are employed is low on average: about 34% among the treated and 14% among the untreated households. Such a large employment gap is also registered between rural and urban households (over 19 percentage points). The average number of household members within the working age category (15 – 64 years) is more than two except for the female-headed sample, where the incidence is lower.

4. Results and discussion

The discussion of the empirical findings is divided into three sections: we first focus on the baseline results on the full sample, then discuss some robustness checks regarding different aspects of our empirical strategy and finally move to the heterogeneity analysis by considering female- versus male-headed households and rural versus urban households. As explained in sub-section 3.4, the analysis is based on PSM techniques to deal with endogeneity concerns. The ATE and the ATET are reported for three specifications which differ according to the number of matches (1, 3 and 10) selected within the nearest neighbour matching methodology.

4.1 Full sample analysis

As mentioned earlier, financial inclusion could be endogenous with respect to household expenditure due to both reverse causality and omitted variables. To limit such biases, PSM estimates are discussed as our baseline model, and the results of the endogeneity test [9] on the treatment variable confirm that PSM is appropriate and necessary to get unbiased estimates of the effects of interest.

Results reported in Table 4 show that irrespective of the number of matches used to perform PSM estimates, financial inclusion proxied by account ownership significantly increases the budget share spent on long-term expenditure, which includes health, education, housing and durable goods. The effect is obviously negative and significant on the complementary share of household short-term expenditure. This suggests a positive diversion of resources from short-term, and sometimes even harmful expenses to long-term investments and may be linked either to the financial education programs often provided by microfinance institutions or to the fact that even engaging in alternative finance, such as MoMo services, may serve as a form of financial education (Agabalinda and Steel, 2021). Indeed, this evidence is mostly confirmed when looking at single expenditure categories.

The investment in education significantly increases with financial inclusion. Both the ATEs and the ATETs are positive and significant and show that on average households spend nearly 1.2 percentage points more of their budget on education if they are financially included. Any increase in education spending is good, as it boosts the human capital capacity of the country, especially a developing one (Adams and Cuecuecha, 2013), thereby exerting positive externalities at the aggregate level (Moretti, 2004; Klenow and Rodriguez-Clare, 2005; Gennaioli *et al.*, 2013). Results are in line with the evidence provided by Sakyi-Nyarko *et al.* (2022a) who show an increase in the probability of school attendance in Ghanaian financially included households.

Differently from Koomson *et al.* (2021) and Sakyi-Nyarko *et al.* (2022a), who provided evidence of significantly higher levels of health expenditure in financially included households, we get less consistent results in terms of budget share devoted to health. When looking at the ATEs, the statistical significance of the impact fades as the number of matches increases within the nearest neighbour procedure, whereas ATET coefficients, albeit positive, are never statistically significant.

Financially included households also spend a higher share of their total budget on consumer durables [10] (approximately +1.8 percentage points) compared to financially excluded households. The evidence is instead much weaker and inconsistent regarding housing expenditure. This could be partly explained by the fact that according to the

Table 4. PSM estimates of the impact of financial inclusion (account) on household budget shares – full sample of GLSS 7

	ATE			ATET		
	One nearest neighbour	Three nearest neighbours	Ten nearest neighbours	One nearest neighbour	Three nearest neighbours	Ten nearest neighbours
Long-term expenditure	0.0317*** (0.0041)	0.0340*** (0.0037)	0.0355*** (0.003)	0.0282*** (0.0061)	0.0293*** (0.0054)	0.0314*** (0.004)
By expenditure category						
Food	−0.0467*** (0.0045)	−0.0478*** (0.0042)	−0.0486*** (0.0039)	−0.0483*** (0.0061)	−0.0484*** (0.0057)	−0.0506*** (0.0051)
Health	0.0013** (0.0006)	0.0009* (0.0005)	0.0007 (0.0005)	0.0008 (0.0006)	0.0008 (0.0005)	0.0007 (0.0005)
Education	0.0114*** (0.0027)	0.0124*** (0.0026)	0.0125*** (0.0022)	0.0117*** (0.0039)	0.0122*** (0.0038)	0.0118*** (0.0031)
Housing	0.0012 (0.003)	0.0022 (0.0024)	0.0040** (0.0018)	−0.002 (0.0046)	−0.0017 (0.0036)	0.0014 (0.0040)
Durables	0.0178*** (0.0017)	0.0185*** (0.0015)	0.0183*** (0.0015)	0.0176*** (0.0021)	0.0181*** (0.0018)	0.0176*** (0.0018)
Temptation	−0.0035*** (0.0007)	−0.0037*** (0.0006)	−0.0037*** (0.0006)	−0.0022*** (0.0007)	−0.0025*** (0.0006)	−0.0025*** (0.0006)
Other	0.0185*** (0.0047)	0.0175*** (0.004)	0.0168*** (0.0035)	0.0223*** (0.0069)	0.0216*** (0.0058)	0.0218*** (0.0049)
Observations	13,797	13,797	13,797	13,797	13,797	13,797

Notes: Significance levels: ***1%, **5% and *10%. Robust standard errors in parentheses. The treatment regression was estimated using logistic regression. Financially included (or treated) refers to households with account or contributing to savings or loan schemes. The balance assessment of covariates is reported in the supplementary on-line Table A3
Source: Table by authors

unconditional means reported in Table 3, the budget share on housing is higher among financially excluded households compared to financially included ones.

When looking at short-term expenditure, financially included households spend on average 5 percentage points less of their budget on food compared to what they would have spent if they had not been financially included. Given the much higher level of per capita expenditure of financially included households, this result might be interpreted as the prevalence of the substitution effect over the income effect and is not necessarily associated with a reduction in the level of household food expenditure. Expenditure on temptation goods also shows a negative and significant relationship with financial inclusion [11], although the magnitude of the effect is low. The ATE and ATET coefficients show that financially included households reduce their budget allocation for goods such as alcohol, tobacco and narcotics by about 0.2–0.4 percentage points. Such a low diversion effect may be due to some kind of addiction in the consumption of these goods. As for the other goods category, the ATE and ATET are all positive and significant. Households in Ghana, therefore, increase the budget share spent on telecommunication, transport and recreation when they are financially included. This apparently counterintuitive result could be complementary to long-term investments in human and physical capital. Transport expenditure could indeed rise as children attend school, as well as telecommunication expenditure associated with investments in durable goods such as fixed phone, personal computer and access to internet or satellite tv receiver.

4.2 Robustness checks

In Tables 5–7, we provide estimates obtained through several robustness checks. The first exercise takes into account alternative proxies for financial inclusion. Results in Tables 5 are obtained by alternatively defining financially included households as those whose members:

- have access to formal credit;
- have one or more insurance contracts; and
- have access to informal credit from relatives or friends.

Even though the share of households accessing formal credit is pretty low compared to that accessing insurance (approximately 6% vs 29%, see Figure 1), the budget share devoted to long-term expenditure seems to be much more sensitive to credit rather than insurance availability. Indeed, ATEs and ATETs are consistently positive and significant when financial inclusion is proxied with access to formal credit, whereas the effect is significant only in terms of ATETs as far as insurance is considered and with smaller magnitude. Negative ATEs, although hardly significant, are instead associated to informal credit, thereby reinforcing the idea that the positive effects are mostly associated to the financial education contents received through the interaction with either formal financial institutions or alternative finance services, such as MoMos.

The second robustness check we propose is relative to the sample considered in our analysis. Baseline estimates are replicated on the previous wave of the survey, GLSS 6, to check whether the significant impact of financial inclusion on household consumption patterns is a very recent phenomenon, mostly related to the rapid and dramatic surge of new financial services such as MoMos, or if we could already detect it in the 2012 / 2013 round. According to the results presented in Table 6, the positive impact of financial inclusion on the budget share devoted to long-term expenditure was strongly significant also in the GLSS 6 household sample, and the magnitude of the effects is very close to the one computed in

Table 5. PSM estimates of the impact of financial inclusion on household budget shares – different proxies for financial inclusion

	ATE			ATET		
	One nearest neighbour	Three nearest neighbours	Ten nearest neighbours	One nearest neighbour	Three nearest neighbours	Ten nearest neighbours
Formal credit	0.0241*** (0.0085)	0.0263*** (0.0081)	0.0273*** (0.0075)	0.0258*** (0.0076)	0.0294*** (0.0060)	0.0303*** (0.0055)
Insurance	0.002 (0.0030)	0.0036 (0.0026)	0.0027 (0.0025)	0.0078** (0.0034)	0.0072** (0.0028)	0.0050* (0.0026)
Informal credit	−0.0078 (0.0067)	−0.0055 (0.0058)	−0.0110* (0.0062)	0.0043 (0.0073)	0.0021 (0.0058)	0.0008 (0.0052)
Observations	13,787	13,787	13,787	13,787	13,787	13,787

Notes: Significance levels: ***1%, **5% and *10%. Robust standard errors in parentheses. The treatment regression was estimated using logistic regression. Financially included (or treated) refers to households with account or contributing to savings or loan schemes
Source: Table by authors

Table 6. PSM estimates of the impact of financial inclusion on household budget shares – full sample of GLSS 6

	ATE			ATET		
	One nearest neighbour	Three nearest neighbours	Ten nearest neighbours	One nearest neighbour	Three nearest neighbours	Ten nearest neighbours
Long-term expenditure	0.0292*** (0.0028)	0.0288*** (0.0024)	0.0293*** (0.0023)	0.0286*** (0.0044)	0.0314*** (0.0035)	0.0330*** (0.0033)
Observations	16,752	16,752	16,752	16,752	16,752	16,752

Note: Significance level: ***1%. Robust standard errors in parentheses. The treatment regression was estimated using logistic regression. Financially included (or treated) refers to households with account or contributing to savings or loan schemes
Source: Table by authors

Table 7. IV estimates of treatment effects with heterogeneous response to treatment: ATE, ATET and ATENT

	Long-term expenditure
ATE	0.2323*** (0.0201)
ATET	0.2660*** (0.0209)
ATENT	0.1884*** (0.0215)
First-stage regression information	
Distance to nearest financial institution	−0.0181***
Weak instrument tests	
F statistic (1, 13,772)	224.69
Kleibergen–Paap Wald rk *F* statistic	224.686
Observations	13,797

Notes: Significance levels: ***1%. Bootstrapped standard errors in parentheses (1,000 replications). First-stage results are reported in Appendix 3
Source: Table by authors

Table 4 for GLSS 7. More precisely, ATEs slightly increase over time from GLSS 6 to GLSS 7, whereas ATETs have a modest decline.

We finally propose an alternative methodology, to test the robustness of our baseline results. Table 7 shows IV estimates obtained by means of a probit two-stage least square estimation, where the distance to the nearest financial institution is used as instrument in the first-stage regression. Due to data challenges [12], distance to the nearest financial institution is calculated as a regional average across the 10 regions of Ghana. We already discussed the limitations of this identification strategy in sub-section 3.4. Despite such an imperfect instrument, however, baseline PSM results are confirmed, as the coefficients on the treatment effects reported in Table 7 are all positive and strongly significant. From the first-stage regression, we can see that the distance to the nearest financial institution is highly significant in explaining financial inclusion among Ghanaian households. 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, as found also in Koomson *et al.* (2020) and Koomson and Danquah (2021) for the Ghana context. The F statistic apparently supports the validity and the strength of the instrument as its values are significantly larger compared to the usual threshold of 10.

4.3 Heterogeneity analysis

In this section, we perform a heterogeneity analysis by considering two different dimensions. Firstly, we compare the effect of financial inclusion between female-headed and male-headed households. Later on, we distinguish between rural and urban households. Results are all provided in Table 8.

The impact of financial inclusion on the budget share for long-term expenditure seems not to vary that much according to the gender of the household head. All ATEs and ATETs are positive and strongly significant for both female-headed and male-headed households. The magnitude of the effects is larger in most cases for female-headed households, in line with the large literature in development economics highlighting the more pronounced welfare-increasing use of financial resources administered by female household heads, especially in terms of education and health expenditure [13]. However, the impact is positive and

Table 8. PSM estimates on the impact of financial inclusion (account) on the budget share for long-term expenditure by gender of the household head and location of residence

	ATE			ATET		
	One nearest neighbour	Three nearest neighbours	Ten nearest neighbours	One nearest neighbour	Three nearest neighbours	Ten nearest neighbours
By gender of the household head						
Female headed	0.0403*** (0.0074)	0.0351*** (0.0059)	0.0367*** (0.0045)	0.0359*** (0.0118)	0.0272*** (0.0087)	0.0316*** (0.0055)
Observations	4,309	4,309	4,309	4,309	4,309	4,309
Male headed	0.0316*** (0.0041)	0.0339*** (0.0038)	0.0334*** (0.0039)	0.0273*** (0.0053)	0.0291*** (0.0048)	0.0294*** (0.0051)
Observations	9,488	9,488	9,488	9,488	9,488	9,488
By location of residence						
Rural	0.0369*** (0.0042)	0.0355*** (0.0039)	0.0360*** (0.0037)	0.0362*** (0.0054)	0.0312*** (0.0052)	0.0325*** (0.0048)
Observations	7,906	7,906	7,906	7,906	7,906	7,906
Urban	0.0186** (0.0086)	0.0234*** (0.0079)	0.0266*** (0.0062)	0.0130 (0.0114)	0.0186* (0.0104)	0.0245*** (0.0079)
Observations	5,891	5,891	5,891	5,891	5,891	5,891

Notes: Significance levels: ***1%, **5% and *10%. Robust standard errors in parentheses. The treatment regression was estimated using logistic regression. Financially included (or treated) refers to households with account or contributing to savings or loan schemes. The balance assessment of covariates is reported in the supplementary on-line Table A4 (gender) and Table A5 (location of residence)
Source: Table by authors

significant also for male-headed households, and this might be explained by the fact that financial inclusion – mostly through the associated financial education programs – provides financial knowledge which enables individuals to make informed financial decisions (Yang *et al.*, 2023). This can raise males' awareness of their previously neglected responsibilities as far as children's education is concerned, whereas females traditionally care more about their children welfare irrespective of their own level of financial inclusion. Previous evidence on Ghana provided by Donkoh and Amikuzuno (2011), who made use of GLSS 5, showed that in general Ghanaian male-headed households spend more on education compared to their female-headed counterparts and our results could be consistent with this trend. Indeed, if we consider the different subcategories, we find evidence that female-headed financially included households seem more likely to engage in investment in physical capital, as the effects of financial inclusion on both housing and consumer durables expenditure are significantly larger for female-headed households compared to their male counterparts, whereas male-headed households who are financially included appear to spend more on education.

When distinguishing rural and urban households, we observe that the effects are larger in magnitude for rural households, compared to both urban households and to the full GLSS 7 sample. This evidence somehow recalls the one provided by Koomson *et al.* (2020) from GLSS7, according to which better financial inclusion reduces to a greater extent both the current probability of being poor and the future risk of poverty for rural households compared to urban ones. Financial inclusion causes rural households to divert resources away from food and temptation goods towards investment in education, consumer durables, transport, telecommunication and recreation activities. On the other hand, the budget share devoted to temptation goods (education) by urban households does not decrease(increase) significantly with financial inclusion [14].

5. Conclusion and policy recommendations

As the World Bank's goal of universal financial access (i.e. universal account ownership) by the year 2020 clearly states, access to financial services represents a basic requirement for improving the standard of living, especially when it comes to the poorest sections of the population. Despite significant improvements in the recent years, the rate of financial inclusion remains rather low in Ghana. This study has investigated the impact of financial inclusion on household welfare to ascertain how it may influence the spending behaviour of Ghanaian households.

The analysis was carried out by applying both PSM and IV techniques for robustness check. While the study did not find evidence that access to informal financial services impacts households' expenditure allocation decisions, it found that formal financial services substantially do. In general, formal financial inclusion positively affects the budget allocated to long-term expenditure, such as physical and human capital investment. On the other hand, among formal financially included households we find evidence of a lower short-term expenditure in food and temptation goods. Despite informal financial inclusion does not show any significant impact on household consumption decisions, it is still important for many Ghanaians who do not have access to formal financial services, particularly those in the rural areas (see Figure 1). In this respect, it might be useful to implement basic financial literacy initiatives that introduce formal financial services and their functioning also in very remote areas. When taking into account the possible heterogeneity according to households' main characteristics, the positive effect of formal financial inclusion on the budget share devoted to long-term expenditure is higher among female-headed compared to male-headed households. Therefore, promoting financial inclusion initiatives tailored to women and improving their access to formal financial services such as savings, credit and insurance would also contribute to strengthen the drivers of long-term growth. On the other hand, when looking at specific expenditure subcategories, male-headed financially included households seem to increase long-term investment in children's education whereas their female counterparts do not. This may be a direct consequence of the gender gap in school attendance rates registered in Ghana between male and female household heads: since a larger share of male household heads has formal education, they are also more likely to be aware of the importance of human capital investment. Higher levels of parental school attendance indeed tend to reduce the probability of children not attending school (Sackey, 2007). Increasing girls' enrolment in school in Ghana would be essential to close this gap because they may gain awareness about the relevance of investing more in education, whether they become household heads in the future or not. Therefore, providing more scholarships to women in Ghana may enhance this initiative. In the short run, educating female heads on the benefits from human capital investments, and on the importance of guaranteeing equal access to education to both female and male children in line with the SDG Agenda, may also play an important role.

Our study also shows that the impact of financial inclusion among urban households is generally weaker. Meanwhile, financially included rural households divert resources away from food and temptation goods to invest in both human and physical capital, which will improve the standard of living and eventually create good premises for aggregate growth in the longer term.

However, less than one out of two rural households in Ghana has access to a transaction account, compared to 7 out of 10 among their urban counterparts. It is, therefore, important for Ghanaian policymakers to put in more efforts to increase the level of financial inclusion among rural households. To achieve this aim, the supply of financial products and services in the rural areas of the country must be improved through initiatives such as mobile banking, agent banking networks and community banking, but at the same time rural, often poorly educated households, should benefit from financial education programs, which are crucial in making people understand and become aware of the importance of financial inclusion and long-term investments (Grohmann *et al.*, 2018), such as those in human capital discussed earlier. An improved supply of financial services could indeed be helpless if there is no demand, or if households do not make a wise use of such services.

Notes

1. For a recent review on the relationship between mobile money and financial inclusion in Sub-Saharan Africa, see Ahmad *et al.* (2020). More in general, Aker and Mbiti (2010) explore the main channels through which mobile phones may affect economic development in Africa whereas Allen *et al.* (2014) and Beck *et al.* (2015) discuss the role of technological innovation in promoting African financial development and financial inclusion.
2. This observation aligns with Lenka and Barik (2018), who found that rural households lagged behind their urban counterparts in terms of financial inclusion in India.
3. Allen *et al.* (2014) pointed out that technological innovations which enable users of financial services to be located far away from financial institutions is essential to promote financial inclusion outside major cities in all African countries, given that the difficulty in achieving the minimum viable scale would keep bank branch penetration rates structurally low in sparsely populated, low-income regions.

4. The first round of the survey was carried out in 1987/1988. Since then, six more rounds have been completed in the following periods: 1988/1989, 1991/1992, 1998/1999, 2005/2006, 2012/2013 and 2016/2017.
5. In the GLSS questionnaire (see Section 12, Part A, Question 1), 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 respondent is the household head. We assigned 1 to households with at least one bank account or a loan/savings scheme, and 0 otherwise.
6. Recent empirical applications of the Working–Leser model include Randazzo and Piracha (2019) and De Vreyer *et al.* (2020), both based on household data from Senegal.
7. Indeed, if we consider the community-level distance to the nearest bank, we can easily see that it is positively correlated with the distance to other services such as daily or periodic markets, schools, doctors and hospital (see Appendix A2).
8. The inclusion of total expenditure is also required by the Working–Leser model, as discussed at the beginning of sub-section 3.3.
9. Endogeneity tests: Durbin (score) $chi^2(1) = 67.2934$ ($p = 0.0000$), Wu–Hausman $F(1,13,770) = 67.4909$ ($p = 0.0000$).
10. Similarly, expenditure in consumer durables gets higher among households participating in microcredit programs (Banerjee 2013; Banerjee *et al.*, 2015b; Cintina and Love, 2019).
11. Angelucci *et al.* (2015), Banerjee *et al.* (2015b) and Meager (2019) provide similar evidence of lower spending on temptation goods as far as access to credit within microcredit programs is considered.
12. We were not able to match properly the community-specific measure of distance to the nearest bank branch from the GLSS community questionnaire with the household-level data. Besides that, many of the districts where surveyed households declared to live were not identified as a macrocategory in the community-level data set. As a result, merging the data sets at either the community or the district level – to get a more granular measure of the distance from a banking institution – would lead to dropping too many households from the analysis. Because of this issue, we could not rely on a precise instrument nor accurately capture the difference in the distance to the nearest financial institution across rural and urban households.
13. For health, see among others Duflo (2003) and Qian (2008). For education, see Heintz (2006), Qian (2008) and Duflo (2012). Rink and Barros (2021) on the other hand recently showed that culturally empowered women spend more on welfare enhancing goods, such as food and groceries, but are less likely to save.
14. The complete set of results for all goods categories for female versus male headed and rural versus urban households is available from the authors upon request.

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Appendix 1

Table A1. Summary statistics (mean values), full sample and subsamples

Variable	Full sample	Treated sample	Untreated sample	Female headed	Male headed	Rural	Urban
Household characteristics:							
Financial inclusion (Yes = 1, No = 0)	0.5657	–	–	0.4997	0.5957	0.4551	0.7141
School attendance (Yes = 1, No = 0)	0.7103	0.8200	0.5674	0.6521	0.7367	0.6032	0.8540
Gender of household head (Female = 1, Male = 0)	0.3123	0.2758	0.3598	–	–	0.2814	0.3538
Employed (Yes = 1, No = 0)	0.2524	0.3420	0.1357	0.1406	0.3031	0.1694	0.3638
Household size	4.2099	4.2865	4.1101	3.3999	4.5778	4.6931	3.5614
Household size squared	25.9717	26.5235	25.2530	16.1889	30.4146	31.7098	18.2709
Age of household head	46.2719	44.8050	48.1827	49.4857	44.8124	47.4222	44.7282
Age of household head squared	2,394.4820	2,224.1900	2,616.3000	2,729.819	2,242.188	2,515.73	2,231.7610
Number of household members under 5	0.5478	0.5293	0.5719	0.3713	0.6280	0.6384	0.4262
Presence of under 15 household members (Dummy: Yes = 1, No = 0)	0.6504	0.6542	0.6455	0.6273	0.6609	0.7092	0.5715
Number of household members over 64	0.2419	0.1978	0.2992	0.2750	0.2268	0.2898	0.1776
Number of male members within the age range 15–64	1.1016	1.1926	0.9831	0.5073	1.3715	1.1790	0.9978
Number of female members within the age range 15–64	1.2299	1.2988	1.1402	1.3393	1.1802	1.2853	1.1555
Nationality (Dummy: Ghanaian = 1, Foreigner = 0)	0.9873	0.9898	0.9841	0.9914	0.9855	0.9881	0.9862
Location							
Rural (Dummy: Rural = 1, Urban = 0)	0.5730	0.4610	0.7190	0.5164	0.5988	–	–
Northern (Northern = 1, Southern = 0)	0.2978	0.2457	0.3657	0.2058	0.3396	0.4046	0.1545
Ecological zone:							
Savannah (Dummy: Savannah = 1, 0 = otherwise)	0.3558	0.2963	0.4332	0.2585	0.3999	0.4741	0.1971
Forest (Dummy: Forest = 1, 0 = otherwise)	0.3986	0.4113	0.3820	0.4426	0.3786	0.3826	0.4200
Coastal (Dummy: Coastal = 1, 0 = otherwise)	0.2028	0.2324	0.1642	0.2509	0.1810	0.1433	0.2826
Accra (Dummy: Accra = 1, 0 = otherwise)	0.0428	0.0600	0.0205	0.0480	0.0405	–	0.1003
Marital status of household heads:							
Consensual union	0.0897	0.0837	0.0976	0.0715	0.0980	0.0951	0.0825
Divorced	0.0620	0.0519	0.0753	0.1369	0.0280	0.0570	0.0687
Married	0.5509	0.5901	0.4998	0.2093	0.7061	0.5928	0.4947
Never married	0.1250	0.1408	0.1045	0.1251	0.1250	0.0777	0.1886
Separated	0.0434	0.0407	0.0469	0.0921	0.0213	0.0395	0.0487
Widowed	0.1289	0.0928	0.1759	0.3650	0.0216	0.137	0.1168
Distance to nearest financial institution (kilometres)	8.5696	7.5622	9.8818	7.3862	9.1071	9.9432	6.7261
Observations	13,797	7,805	5,992	4,309	9,488	7,906	5,891

Source: Table by authors

Table A2. Community-level distances from selected services – correlation matrix

	Bank	Periodic/daily market	Junior high school	Senior high school	Doctor	Hospital
Bank	1					
Periodic/daily market	0.3678**	1				
Junior high school	0.4351**	0.2376**	1			
Senior high school	0.7230**	0.3338**	0.4408**	1		
Doctor	0.7222**	0.3181**	0.3768**	0.6824**	1	
Hospital	0.6821**	0.3049**	0.3555**	0.6554**	0.9483**	1

Note: Significance level: **5%
Source: Table by authors

Appendix 2

Table A3. Balance assessment of covariates for GLSS 7 full sample – related to baseline estimates in Table 4

	Standardised mean differences		Variance ratio	
	Raw	Matched	Raw	Matched
Log total household expenditure per capita	0.704	0.071	1.04	1.073
Sex (Female = 1, Male = 0)	−0.181	−0.005	0.867	0.995
Age of household head	−0.211	−0.002	0.735	1.006
Age of household head squared	−0.238	0.000	0.661	1.052
School attendance (Yes = 1, No = 0)	0.570	0.049	0.601	0.925
Employed (Yes = 1, No = 0)	0.499	0.010	1.919	1.007
Household size	0.061	−0.094	0.975	0.862
Household size squared	0.032	−0.094	0.978	0.962
Number of household members under 5	−0.052	−0.021	0.808	0.92
Presence of under 15 household members (Dummy: Yes = 1, No = 0)	0.018	−0.046	0.989	1.033
Number of household members over 64	−0.198	−0.020	0.736	1.029
Number of male household members within the age range 15–64	0.212	−0.083	1.158	0.739
Number of female household members within the age range 15–64	0.156	−0.082	1.119	0.743
Nationality (Ghanaian = 1, Foreigner = 0)	0.049	0.034	0.650	0.737
Consensual union	−0.049	0.042	0.870	1.142
Divorced	−0.096	0.016	0.707	1.070
Never married	0.111	−0.016	1.293	0.968
Separated	−0.030	−0.006	0.874	0.974
Widowed	−0.246	−0.032	0.581	0.918
Rural (Dummy: Rural = 1, Urban = 0)	−0.543	−0.005	1.230	0.999
Northern (Northern = 1, Southern = 0)	−0.262	−0.08	0.799	0.918
Savannah (Dummy: Savannah = 1, 0 = otherwise)	−0.287	−0.074	0.849	0.942
Forest (Dummy: Forest = 1, 0 = otherwise)	0.060	0.043	1.026	1.018
Coastal (Dummy: Coastal = 1, 0 = otherwise)	0.172	0.052	1.300	1.072
	Raw	Matched		
Number of observations	13,797	15,610		
Treated observations	7,805	7,805		
Control observations	5,992	7,805		

Notes: The standardised mean difference and variance ratio provide information about the distributional properties of the matched sample. A covariate has a good balance if the standardised difference (the "matched" column) is close to zero and the variance ratio (the "matched" column) is close to one. While there is no consensus on the threshold for a good balance, it is generally accepted if the standardised mean difference is less than 0.1 and the variance ratio is less than 2 (Zhang *et al.*, 2019). The information about the balance of covariates is based on the one nearest neighbour
Source: Table by authors

Table A4. Balance assessment of covariates for male- and female-headed households

Variables	Female-headed households: Standardised mean differences – Raw	Female-headed households: Standardised mean differences – Matched	Female-headed households: Variance ratio – Raw	Female-headed households: Variance ratio – Matched	Male-headed households: Standardised mean differences – Raw	Male-headed households: Standardised mean differences – Matched	Male-headed households: Variance ratio – Raw	Male-headed households: Variance ratio – Matched
Log total household expenditure per capita	0.585	0.078	1.060	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
School attendance (Yes = 1, No = 0)	0.460	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	−0.010	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	−0.050	1.015	1.037
Number of household members over 64	−0.294	−0.130	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	0.650
Number of female household members within the age range 15–64	0.345	−0.083	1.040	0.638	0.100	−0.112	1.097	0.683
Nationality (Ghanaian = 1, Foreigner = 0)	0.065	0.000	0.484	1.000	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	0.000	1.555	1.000	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	−0.100	0.018	0.518	1.155
Rural (Dummy: Rural = 1, Urban = 0)	−0.481	0.040	1.033	1.018	−0.611	−0.007	1.398	1.000
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	0.960
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)	0.070	0.059	1.084	1.069	0.255	0.095	1.576	1.153
	Raw	Matched			Raw	Matched		
Number of observations	4,309	4,309			9,488	11,304		
Treated observations	2,153	2,153			5,652	5,652		
Control observations	2,153	2,153			3,836	5,652		

Notes: The standardised mean difference and variance ratio provide information about the distributional properties of the matched sample. A covariate has a good balance if the standardised difference (the "matched" column) is close to zero and the variance ratio (the "matched" column) is close to one. While there is no consensus on the threshold for a good balance, it is generally accepted if the standardised mean difference is less than 0.1 and the variance ratio is less than 2 (Zhang *et al.*, 2019). The information about the balance of covariates is based on one nearest neighbour
Source: Table by authors

Table A5. Balance assessment of covariates for rural and urban households

Variables	Rural households: Standardised mean differences Raw	Matched	Variance ratio Raw	Matched	Urban households: Standardised mean differences Raw	Matched	Variance ratio Raw	Matched
Log total household expenditure per capita	0.471	0.073	1.064	1.084	0.620	0.069	1.065	1.006
Sex (Female = 1, Male = 0)	−0.174	0.0300	0.840	1.039	−0.338	0.030	0.854	1.027
Age of household head	−0.173	−0.027	0.791	0.967	−0.189	0.008	0.680	0.972
Age of household head squared	−0.194	−0.03	0.715	0.969	−0.229	0.003	0.626	1.012
School attendance (Yes = 1, No = 0)	0.444	0.065	0.810	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	0.010	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	1.260	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	0.910	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	0.650	1.038	−0.127	−0.024	0.662	0.918
Never married	0.067	0.010	1.237	1.030	−0.02	−0.029	0.969	0.956
Separated	−0.029	−0.009	0.872	0.958	−0.067	0.035	0.760	1.175
Widowed	−0.218	0.005	0.620	1.013	−0.288	0.023	0.531	1.070
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)	–	–	–	–	0.080	0.105	1.084	1.115
		Raw	Matched		Raw	Matched		
Number of observations		7,906	7,196		5,891	8,414		
Treated observations		3,598	3,598		4,207	4,207		
Control observations		4,308	3,598		1,684	4,207		

Notes: The standardised mean difference and variance ratio provide information about the distributional properties of the matched sample. A covariate has a good balance if the standardised difference (the "matched" column) is close to zero and the variance ratio (the "matched" column) is close to one. While there is no consensus on the threshold for a good balance, it is generally accepted if the standardised mean difference is less than 0.1 and the variance ratio is less than 2 (Zhang *et al.*, 2019). The information about the balance of covariates is based on one nearest neighbour
Source: Table by authors

Appendix 3

Table A6. Probit IV first-stage regression of the model in Table 7

	Coef.	Std. err.
Distance to nearest financial institution (in kilometres)	−0.0570***	0.0037
Log total household expenditure per capita	0.6489***	0.0214
Literacy (ever attended school: Yes = 1, No = 0)	0.4622***	0.0317
Sex (Female = 1, Male = 0)	−0.0434	0.0359
Employed (Yes = 1, No = 0)	0.4316***	0.0308
Household size	0.1670***	0.0184
Household size squared	−0.0069***	0.0009
Age of household head	0.0057	0.0051
Age of household head squared	−0.0001	0.0001
Number of household members under 5	−0.0255	0.0211
Presence of under 15 household members (Dummy: Yes = 1, No = 0)	0.1659***	0.0412
Number of household members over 64	0.0894**	0.0352
Number of male members within the age range 15–64	0.0811***	0.0186
Number of female members within the age range 15–64	0.1130***	0.0188
Nationality (Ghanaian = 1, Foreigner = 0)	0.1198	0.1074
Consensual union	−0.2610***	0.0445
Divorced	−0.2119***	0.0543
Never married	−0.0860*	0.0499
Separated	−0.1473**	0.0616
Widowed	−0.1565***	0.0471
Rural (Dummy: Rural = 1, Urban = 0)	−0.2402***	0.0277
Northern (Northern = 1, Southern = 0)	0.6793***	0.0642
Savannah (Dummy: Savannah = 1, 0 = otherwise)	0.3399***	0.0835
Forest (Dummy: Forest = 1, 0 = otherwise)	0.2738***	0.0696
Coastal (Dummy: Coastal = 1, 0 = otherwise)	0.2561***	0.0702
Constant	−6.1741***	0.2632
Observations	13,797	
Weak instrument tests		
F statistic (1, 13,772)	224.69	
Kleibergen–Paap Wald rk F statistic	224.686	
Observations	13,797	

Notes: Significance levels: ***1%, **5% and *10%. Robust standard errors in parentheses. The dependent variable is the financial inclusion dummy related to account ownership
Source: Table by authors

Appendix 4

Equation (4.1) 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):

$$Pr(Y = FI_i | X_i, Z_i) = b + \theta Distance_i + EXP_i + X'_i\beta + v_i \tag{4.1}$$

where FI_i refers to households who own accounts or contribute to a loan/savings scheme. Z_i is the IV ($Distance_i$) while X'_i is the vector of control variables included also in equation (1) and defined in Table 2. In the second stage, we perform two-stage least square regressions via OLS. Here, the first step involves running FI_i on P_T as shown in equation (4.2):

$$FI_i = \gamma + \alpha P_T + EXP_i + X'_i\beta + \varepsilon_{ij} \tag{4.2}$$

and $\widehat{FI_i}$ is the fitted values obtained from (4.2).

We then regress the outcome variable B_{ij} on $\widehat{FI_i}$ as specified in (4.3):

$$B_{ij} = \sigma + \alpha\widehat{FI_i} + EXP_i + X'_i\beta + \varepsilon_{ij} \tag{4.3}$$

where α is a more efficient estimator of the average treatment effect (ATE) than the direct-2SLS (Cerulli, 2014). However, the response to treatment (i.e. financial inclusion) may be heterogeneous. For instance, the impact of financial inclusion may vary according to factors such as education and employment status. To estimate the treatment effect parameters of the models with heterogeneous effects, additional regressors $(X_i - \mu_X)\widehat{FI_i}$ are added to (4.3). The ATE is the effect of the treatment if the entire population gets treated. To estimate the effect of treatment on the treated households (ATET) and the untreated households (ATENT) and their significance levels, bootstrapping procedures are used to obtain standard errors for ATET and ATENT.

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