Iddrisu, Abdul Malik; Danquah, Michael

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The welfare effects of financial inclusion in Ghana

An exploration based on a multidimensional measure of financial inclusion

Abdul Malik Iddrisu[1] and Michael Danquah[2]

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Abstract: Using a nationally representative household survey data set from Ghana, this paper provides empirical evidence regarding the role of financial inclusion or financial exclusion in household welfare. We first compute a multidimensional index of financial inclusion, and then we examine the effect of financial inclusion on household welfare. The study finds that households suffering financial deprivation have lower welfare compared with their financially included counterparts. Also, we observe that poor households experience much larger welfare effects of financial inclusion relative to non-poor households, indicating the potential of financial inclusion for reducing income inequality. Thus, policies that aim to deepen the extent of financial inclusion would be important in the quest to reduce the incidence of poverty and vulnerability as well as inequality.

Key words: financial inclusion, financial exclusion, financial deprivation, household welfare, Ghana

JEL classification: G21, I31, I32

[1] Institute for Fiscal Studies, London, UK, corresponding author: abdulmalikiddrisu@ymail.com [2] UNU-WIDER

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Katajanokanlaituri 6 B, 00160 Helsinki, Finland

1 Introduction

> Financial inclusion is important for improving the living conditions of poor farmers, rural non-farm enterprises and other vulnerable groups. (Dev 2006: 4310)

Financial inclusion—defined as the provision to all, without discrimination, of formal financial services including but not limited to payments, credit, savings, and insurance facilities—is important for poverty reduction and for the achievement of an inclusive economic growth process (Arora 2014; Beck 2015; Cnaan et al. 2012; Fungacova and Weill 2015; Klapper et al. 2016). Indeed, financial inclusion has been perceived in a manner akin to access to basic needs such as water, basic education, and health services (Mehtrotra et al. 2009).[1] Access to financial services enables households to smooth consumption, manage risk, build assets, absorb financial shocks, and enhance their income earning potential (Bruhn and Love 2014; Danquah et al. 2017; Dupas and Robinson 2013; Quartey et al. 2017).

The recognition of the crucial role of financial inclusion in economic development ignited the interest of policy makers across the world, including multinational institutions and governments, to undertake steps to promote financial inclusion. Examples of such efforts include the Maya Declaration on financial inclusion, the G20 Financial Inclusion Action Plan, and the World Bank's strategic plan on the achievement of inclusive access to financial services by 2020. There are also country-level strategies that have been undertaken to promote financial inclusion. For example, the government of Ghana, in collaboration with its development partners, implemented the Rural and Agricultural Finance Programme in 2008. This programme sought to enhance access to sustainable formal financial services for the rural and agricultural population of Ghana.

On the back of these developments, there has been tremendous improvement in the level of financial inclusion, both globally and within countries, notably among countries in the developing world in recent years. Estimates from the Global Findex database show that about 69 per cent of adults globally were financially included in 2017, with only 1.7 billion adults in the world deemed financially excluded. This estimate represents an increase of about seven percentage points from its 2014 level, and about 18 percentage points higher than its 2011 level (Demirgüç-Kunt et al. 2018). In Ghana, about a third of the adult population own a bank account (InterMedia-CGAP 2015).

In spite of the tremendous attention paid to the issue of financial inclusion, and policies designed to promote it, there is very little micro-level evidence that exploits the multifaceted nature of financial inclusion to examine its welfare effects (Churchill and Marisetty 2020; Churchill et al. 2020; Koomson and Ibrahim 2018; Koomson et al. 2020; Zhang and Posso 2017). Available macro-level evidence suggests that countries with greater levels of financial inclusion or financial sector development tend to exhibit lower levels of poverty and inequality (Beck et al. 2007; Neaime and Gaysset 2018; Park and Mercado 2015). Park and Mercado (2015) used data from 37 developing Asian economies to construct an index of financial inclusion for each country and then examine the impact of financial inclusion on poverty and income inequality. The authors established that both poverty and income inequality were significantly negatively associated with the level of financial inclusion in a country. Similarly, Sarma and Pais (2011) relied on data from

[1] Klapper et al. (2016) argue compellingly that the attainment of the post-2015 development agenda—which, among other things, aims to eradicate extreme poverty for all people everywhere by 2030—will be difficult without the promotion of meaningful access to financial services for all.

49 countries to examine the relationship between financial inclusion and development. The authors followed a method advanced earlier by Sarma (2008) to construct a multidimensional index of financial inclusion. They observed that the extent of financial inclusion in a country was significantly positively associated with the level of human development, even though a few exceptions existed.

These macro-level studies, however, tend to overlook the impressive amount of heterogeneity that exists across households and communities in terms of access to financial services. Understanding the relationship between financial inclusion and welfare in the context of such individual- or household-level heterogeneity would be crucial for the design of effective policy interventions. Consequently, this study investigates the effect of financial inclusion on household welfare, using a micro-level data set from Ghana. Ghana is an interesting case study for an examination of the linkage between access to financial services and welfare, as the country has experienced an increased penetration of financial services provision in recent years. In particular, the study provides a comprehensive analysis of the welfare effect of financial inclusion by employing a multidimensional index of financial inclusion. This approach is important, given that financial inclusion is a multidimensional phenomenon involving not just access to formal credit, but also access to other financial services such as savings accounts, payments, and insurance facilities.[2] Our approach involves the following: first, we construct an index of financial inclusion which incorporates four dimensions of access to financial services (access to transaction and payment services, savings facilities, credit facilities, and insurance products), using household-level data. The approach used to compute the financial inclusion index is akin to the computational strategy adopted in the computation of the multidimensional poverty index (e.g., Alkire and Santos 2010). Second, we then apply our index of financial inclusion to a number of welfare indicators, with the goal of providing robust estimates of the effect of financial inclusion on household welfare.

This study is similar to a handful of earlier studies. For instance, Zhang and Posso (2017) employed a multidimensional index of financial inclusion to examine the welfare effects of financial inclusion, using household-level data covering over 6,200 Chinese households. The authors observed that financial inclusion exerted a strong positive influence on household income, and that low-income households benefited relatively more from financial inclusion than high- and middle-income households. Similarly, Koomson et al. (2020) examined the effect of financial inclusion on poverty and vulnerability to poverty in Ghana. The authors observed that an increase in financial inclusion lowered the probability of being poor and vulnerability to poverty. Churchill and Marisetty (2020) used data on Indian households to examine the effect of financial inclusion on poverty. They showed that financial inclusion reduced poverty, and the results were consistent across different measures of poverty and financial inclusion.

This study contributes to the literature in several distinct ways. First, dissimilarly to the approach adopted in most previous studies on this issue, we utilize both income- and consumption-based measures of household welfare to provide robust evidence on the welfare effect of financial inclusion. Second, given the potential variation in the response of household welfare to financial inclusion across households at different levels of the income spectrum, we provide a household poverty status disaggregated analysis of the welfare effects of financial inclusion. Third, we illustrate the relative importance of each of the four main dimensions of financial inclusion (access to a basic bank account, credit, insurance, and savings facilities) in improving household welfare. Also, we exploit the important property of the propensity score matching (PSM) estimation technique to account for the potential endogeneity of financial inclusion and selectivity bias in our

[2] Earlier scholars such as Khandker (2005), Banerjee et al. (2010), and Karlan and Zinman (2010) have provided evidence on the welfare impacts of some of the dimensions of financial inclusion, notably access to credit.

model of household welfare. Lastly, we provide some insights on the potential channels through which financial inclusion might influence household welfare. The empirical estimations show that financial inclusion matters for household welfare, and the magnitude of the effect is larger for poor households than for non-poor households. Thus, providing meaningful access to financial services can be an important vehicle towards the realization of the Sustainable Development Goals.

The rest of the paper proceeds as follows. Section 2 provides an overview of access to financial services and welfare in Ghana, while Section 3 presents a brief theoretical discussion of the link between financial inclusion and welfare. Section 4 provides an overview of the data, the empirical model, and the estimation strategy employed in the paper. Section 5 presents the empirical results of the paper, while Section 6 concludes the study.

2 An overview of access to financial services and welfare in Ghana

The financial system in Ghana is well diversified, with a myriad of formal and informal financial intermediaries providing a wide range of financial services. However, the formal financial sector is dominated by formal banks (known as deposit money banks), with some of them now offering new products and services including a 'zero minimum balance savings account', and mobile banking services that have a large potential to improve the level of financial inclusion. Also, a number of rural and community banks, with representations largely in Ghana's poor rural areas, operate essentially to meet the banking needs of the rural poor. There are also a good number of non-bank financial institutions, including savings and loans companies, microfinance institutions, and insurance companies, which are strategically positioned to meet the financial needs of persons at the margins of society. Currently, Ghana is home to about 35 deposit money banks with an increased penetration of physical bank branches and automated teller machines across Ghana, 71 non-bank financial institutions, 140 rural and community banks, and 319 microfinance institutions.[3]

As a consequence of the high rate of mobile phone subscription in Ghana in recent times,[4] Ghana's mobile banking industry—which offers a variety of services, including payments and savings accounts—is well developed and continues to grow; this is arguably one of the key drivers of financial inclusion in a developing country such as Ghana (Aker and Wilson 2013).[5] The mobile banking industry, however, has an important linkage with the formal banking system, since formal banks provide depository services to mobile money operators. A report from the Financial Inclusion Insights survey for Ghana (InterMedia-CGAP 2015) reveals that about half of adults in Ghana have registered accounts with banks, mobile money, or non-bank financial institutions, while about 59 per cent of adults in Ghana subscribe to an insurance policy. About 67 per cent and ten per cent of Ghanaian adults hold savings products and credit facilities respectively; among those who save money, about 32 per cent keep their savings in a formal bank.

In terms of welfare, the incidence of poverty in Ghana has plummeted, from over 50 per cent in 1991–92 to less than 24 per cent in just two and half decades, with the number of persons deemed

[3] These figures are based on the latest Bank of Ghana compilation of the list of registered financial institutions in Ghana (Bank of Ghana 2018).

[4] About nine out of every ten Ghanaian adults own a mobile phone, while almost all adults (about 96 per cent) in Ghana have access to a mobile phone (InterMedia-CGAP 2015).

[5] As of 2016, Ghana's mobile money system was made up of about 136,769 registered mobile money agents with approximately 8,313,283 mobile money customers (Bank of Ghana 2016).

poor in Ghana currently estimated at around 6.8 million (GSS 2018). Despite this marked performance, however, significant geographical variation exists in the incidence of poverty in Ghana and also in the extent of poverty reduction over the years. A report from the seventh wave of the Ghana Living Standards Surveys (GLSS) shows that the incidence of poverty in Ghana is largely a rural phenomenon, with about 39.5 per cent of rural inhabitants falling within the lowest income quintile, relative to only 7.8 per cent of urban dwellers (GSS 2018). Over the years, the rural economy has consistently accounted for a larger share of the population living below the national poverty line, despite modest improvements over time. For instance, in 2016–17, while the rural population accounted for 50 per cent of Ghana's population, it accounted for 83.2 per cent of those living in poverty. This is consistent with previous poverty profile reports in Ghana based on the earlier rounds of the GLSS (1998–99, 2005–06, and 2012–13), when above three quarters of the total population living below the poverty line in Ghana were residing in rural areas.

Further, on the regional distribution of poverty incidence in Ghana, the GSS (2018) shows that regional poverty incidence ranges from a low of 2.5 per cent in the Greater Accra region to over 70 per cent in the Upper West region, indicating spatial disparities in the incidence of poverty in Ghana. Indeed, the three northern regions of Ghana (Upper East, Upper West, and Northern), which consists mainly of savannah areas, have the highest rates of poverty incidence. The Northern region, for instance, recorded a poverty incidence of 61.1 per cent in 2016–17 and accounted for one fifth (26.1 per cent) of the poor in Ghana, making the region the highest contributor to the level of poverty in Ghana; this is not different from the observed trend in 2005–06. There are also significant regional disparities in the incidence of income inequality in Ghana (Aryeetey et al. 2009).

3 Financial inclusion and welfare: the transmission mechanism

There is broad consensus that financial inclusion—which entails access to safe, easy, and affordable financial services by the poor and disadvantaged groups—is a precondition for the acceleration of growth and the reduction of poverty and income inequality (Swamy 2014). Financial inclusion facilitates greater savings mobilization, increases the efficiency of investment, and allows households to accumulate both human and physical assets (Pande et al. 2012; Rhine et al. 2006). Theoretically, therefore, it is possible to identify several ways in which financial inclusion can impact on household welfare. First, financial inclusion can improve household welfare by providing efficient savings opportunities to households, which in turn increases household savings.

The extant literature suggests that access to savings instruments increases savings (Ashraf et al. 2006). An increase in savings will potentially raise the quantity of investible resources owned by a household, which can positively impact on household welfare. Second, by raising the volume of aggregate savings, financial inclusion is able to improve credit penetration, thereby enhancing the likelihood that hitherto excluded households will obtain access to credit. This may positively impact on household welfare. In particular, by obtaining access to credit, households can invest in education, health, and nutrition, engage in new business creation, or expand an existing business, with potentially positive impacts on household welfare.

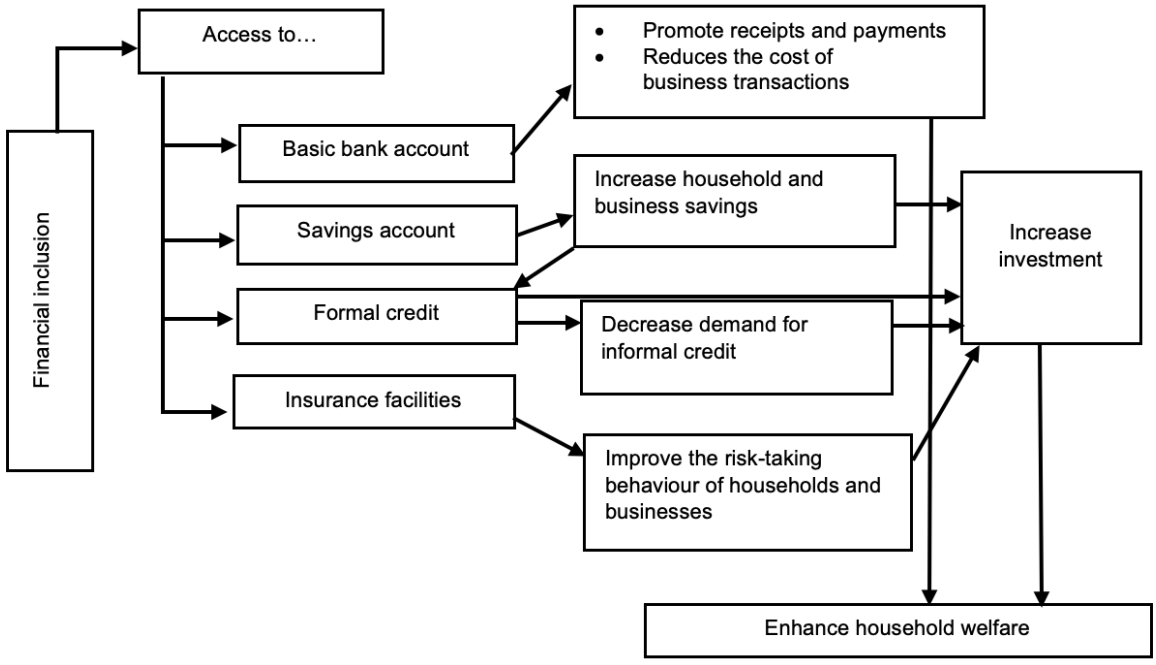
Third, by improving the availability of loanable funds, financial inclusion may more generally lead to a diversification of the loan portfolios of financial intermediaries, and this may reduce the average credit risk of loans, which then enhances the recycling of funds. This will lead to an increase in overall economic activity and hence an improvement in household welfare. Fourth, access to formal credit by households, notably the poor, may motivate them to reduce their demand for credit from informal sources such as money lenders, which characteristically charge above market interest rates. Fifth, access to a formal bank account or transaction account may

facilitate households' business activities in terms of payment for goods and services as well as the receipt of payments for goods and services. It may also improve households' receipt of remittances. All of this may contribute to an improvement in household welfare. A study by Lusardi (2010) shows that having a bank account makes liquidity management and payments easy, and thus reduces the cost of business transactions.

Finally, by providing households with insurance facilities, financial inclusion allows households to invest in risky but profitable activities with potentially positive impacts on household welfare. Access to financial services also enables households to react better to economic and health-related shocks by providing households with liquidity support when such unexpected events occur, thus reducing households' vulnerability to poverty. Among low-income agricultural households, for instance, access to insurance facilities may prevent such households from falling into poverty when they are hit by shocks related to crop yield or commodity prices.

The above discussion is summarized in Figure 1.

Figure 1: Schematic representation of the channels through which financial inclusion affects household welfare



Source: author's illustration.

4 Data, empirical model, and estimation strategy

The data set used in this study comes from the seventh round of the GLSS (GLSS 7), which was conducted in 2016–17. The GLSS are nationally representative household surveys with detailed information collected at the individual and household levels. GLSS 7 covered a sample of 14,009 and 59,864 households and individuals respectively. The data contains detailed information on a number of socio-demographic and economic characteristics of individuals and households, including for example the age and sex of individuals, educational attainment, household size, household income, household consumption expenditures, and access to financial services such as credit, savings accounts, bank accounts, and insurance facilities.

To examine the welfare effects of financial inclusion, we specify a model of the form:

$$y_i = \beta Fin_i + \gamma X_i + \alpha_i + \varepsilon_i \quad [1]$$

y_i is the dependent variable, and it is a measure of household i's welfare. We proxy household welfare using a number of indicators: (1) household annual consumption expenditure per adult equivalent; (2) household annual food expenditure per adult equivalent; (3) household income; (4) household poverty status (one if non-poor, zero otherwise). The computation of the household poverty status variable is based on the moderate poverty line, i.e. GHC1,760.86 (GSS 2018). Fin_i is our main independent variable, and it is a measure of household i's financial deprivation status (the computation of this index is discussed below). X_i represents a vector of control variables that have been identified in the previous literature as important correlates of household welfare. Among others, these include demographic variables (age of household head and its square, gender of household head, highest educational attainment of household head, occupation of household head, and household size) and contextual factors, i.e. urban versus rural (e.g., Churchill and Marisetty 2020; Danquah et al. 2017). α_i captures a regional-level dummy variable that controls for regional-level fixed effects. Lastly, ε_i is the random error term.

4.1 Constructing an index of financial deprivation

We closely follow the methodological procedure used in the computation of the multidimensional poverty index to compute an index of financial deprivation (Alkire and Santos 2010; Dotter and Klasen 2014). Obviously, the measurement of a concept rests strongly on how it is defined. We define financial inclusion as access to useful and affordable financial products and services that satisfy the transactions and payments, savings, credit, and insurance needs of individuals (Demirgüç-Kunt and Klapper 2013; World Bank 2017). Based on this definition of financial inclusion, our measure of financial deprivation makes use of four dimensions of financial inclusion—transactions and payments, savings, credit, and insurance—and for each dimension relevant indicators are identified as a measure.

The first dimension of financial inclusion is access to transaction and payment services. A plausible proxy for this component is a variable that provides information on whether any member of a household has access to a bank account. The second dimension of financial inclusion is access to savings facilities. This dimension can be represented by a variable that captures whether any member within a household has access to a savings product or account. The third dimension of financial inclusion is access to credit facilities. We represent this dimension by a variable that contains information on whether any member of a household has a loan from a formal financial institution. The last dimension of financial inclusion is access to insurance, and it is represented by a variable that contains information on whether any member of a household has subscribed to an insurance facility.

A household—and therefore all its members—is financially deprived in a given indicator if no member of the household has access to that financial product or service. For instance, a household is said to be deprived of access to credit if no member of that household has access to a credit facility from a formal financial institution. To put this differently, a household is considered non-deprived of access to credit if there is at least one member of that household who has access to formal credit. Given that each dimension is linked to an indicator, and the cut-offs for the indicators are specified, we now attach weights to each dimension of financial deprivation. Our strategy is to weigh each dimension equally (¼). Since no dimension is represented by more than one indicator, it implies that each indicator has a weight of ¼. Given this, for each household we compute a deprivation score for each indicator. An overall deprivation score—which is the weighted sum of the deprivation scores for each indicator—is computed to give an idea of the extent to which a household is financially deprived. The overall deprivation score ranges from zero to 100, and higher values indicate higher levels of financial deprivation.

Using the deprivation score, we then compute a binary measure of financial deprivation (an index of financial inclusion, that is, Fin_i in equation [1]), using a cross-dimensional cut-off of 50 per cent (equivalent to ½ of the weighted indicators) to classify households into financially deprived and non-deprived households. Fin_i is equal to one if a household is financially deprived and zero otherwise. Hence, a household is financially deprived or excluded if its deprivation score is higher than 50 per cent, and the converse is also true. That is, households that lack access to at least two dimensions of financial inclusion are considered financially deprived. We check the robustness of this measure to the use of two other cut-offs—25 per cent and 75 per cent—as well as to the exclusion of each of the four dimensions of financial inclusion, one at a time, in computing the financial deprivation index.

Table 1 depicts the various dimensions of financial inclusion and the associated indicators. The summary statistics of the variables used in the empirical analysis in this paper are presented in Table A1 in the Appendix. Regarding the key variables in this paper, we observe, for instance, that about 34 per cent of households are financially deprived, while over 63 per cent of households in the sample are non-poor.

Table 1: Dimensions, indicators, deprivation cut-offs, and weights

Dimension (weight)	Indicator (weight)	Deprived if…
Transaction and payments (¼)	Bank account (¼)	No member of a household has a bank account
Savings (¼)	Savings account (¼)	No member of a household has a savings account
Credit (¼)	Formal credit (¼)	No member of a household has a loan from a formal financial institution
Insurance (¼)	Insurance policy (¼)	No member of a household subscribes to an insurance policy

Source: authors' compilation.

4.2 Empirical estimation strategy: accounting for a potential endogeneity problem and selectivity bias

It is possible that equation [1] might suffer from a potential endogeneity problem and issues of sample selectivity bias. Specifically, an endogeneity problem may exist because while households' welfare can be affected by their level of financial deprivation, there is also reason to suspect conversely that households' level of financial deprivation can be affected by their level of economic welfare. Indeed, it is plausible to assume that less economically endowed households are relatively more likely to be financially deprived than their economically better-off counterparts. Regarding the issue of sample selectivity bias, we believe that the problem of selection bias may arise due to the fact that individuals and/or households decide whether to participate in financial transactions, and these decisions may be driven by certain observable or unobservable factors peculiar to these households. For instance, the decision to take a loan from a formal financial institution may depend on the entrepreneurial drive of the individual.

The presence of selection bias implies that one cannot obtain meaningful estimates of the impact of programme participation on a given outcome variable just by comparing the outcomes of programme participants and those of non-participants. Implicit in this is the idea that programme non-participants may not serve as a good comparison group with those who have participated. Consequently, we use the PSM method to shed light on the impact of financial inclusion on household welfare (Caliendo and Kopeinig 2008; Dehejia and Wahba 2002; Ravallion 2001; Rosenbaum and Rubin 1983; Smith and Todd 2005). In this paper, we include the following covariates in the estimation of the propensity scores: age and sex of household head, educational attainment of household head, sector of work of household head, household size, and locality (rural versus urban dummy, and north versus south dummy). Once the propensity scores are estimated, matching methods can be used to match treated households with comparable untreated ones conditional only on the propensity score. We adhere to the advances made by Caliendo and Kopeinig (2008) and use a number of different matching algorithms in order to ensure the reliability of our PSM estimates.

5 Empirical results

5.1 Baseline results: effect of financial inclusion on household welfare

Table 2 presents the baseline results of the effect of financial inclusion on household welfare. In Model I of Table 2, household welfare is measured by (log) household total annual consumption expenditure per adult equivalent, while in Model II of Table 2, the dependent variable is household total annual food consumption expenditure per adult equivalent. Total annual household income is used as a measure of household welfare in Model III, whereas a binary indicator of household poverty status (equal to one if a household is non-poor) is the dependent variable in Model IV. Models I–III are estimated using the ordinary least squares (OLS) estimation technique, while Model IV is estimated using the binary probit estimation technique; Model IV presents the marginal effects. In all estimations, we cluster standard errors at the household level to account for potential heteroscedasticity. Also, we control for regional fixed effects in all estimations.

The results in Table 2 suggest that financial deprivation (Fin_i) is negatively correlated with household welfare, and the relationship is significant. This indicates that households that are financially excluded experience lower welfare levels compared with those that are financially included. Specifically, the coefficient estimate of financial inclusion on household welfare in the OLS estimations is in the order of ten per cent to 22 per cent, depending on the measure of household welfare used. We observe that the total annual consumption expenditure of financially deprived households is about 20 per cent less than that of financially included households, while households that are financially included have approximately 22 per cent more income than their financially excluded counterparts. Also, considering the estimated marginal effects from the probit estimation, we see that financially deprived households are about 5.7 per cent less likely to be non-poor than their financially included counterparts (see Model IV of Table 2). These results are consistent with our a priori expectations and also line up with the results of earlier scholars (Burgess and Pande 2005; Koomson et al. 2020; Zhang and Posso 2017). Further, we observe that the gender of the household head is a significant predictor of household welfare as measured by income. Male-headed households have about 34 per cent more income compared with female-headed households; this is consistent with the conclusions of Mallick and Rafi (2009).

Table 2: Baseline estimation: effect of financial inclusion on household welfare

	I	II	III	IV
Variables	lwelfare	lfoodx	Income	Mfx_non-poor
Finc$_i$	-0.198***	-0.098	-0.219*	-0.057**
	(0.057)	(0.060)	(0.116)	(0.024)
Age_head	-0.002	-0.004	0.038	0.000
	(0.014)	(0.014)	(0.187)	(0.003)
Age_head2	0.000	0.000	-0.001	0.000
	(0.000)	(0.000)	(0.001)	(0.000)
Sexhead (*base: female*)	0.038	0.011	0.340***	0.044**
	(0.047)	(0.052)	(0.091)	(0.018)
Household_size	-0.129***	-0.151***	0.328***	-0.016***
	(0.009)	(0.010)	(0.027)	(0.003)
Other controls	Yes	Yes	Yes	Yes
Constant	8.685***	8.087***	0.411***	
	(0.320)	(0.335)	(0.437)	
Observations	818	818	818	780
Adjusted R-squared	0.440	0.395	0.429	
Region FE	Yes	Yes	Yes	Yes
F-statistic	27.34	22.89	16.19	

Note: standard errors clustered at household level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Other controls included in the models but not reported in Table 2 are household head's educational attainment and occupation as well as household locality.

Source: authors' calculations based on data from GSS (2018).

5.2 Effect of financial inclusion on household welfare: household poverty status disaggregated estimations

The empirical results on the effect of financial inclusion on the welfare of poor and non-poor households are presented in Table 3. Model I reports the results for non-poor households, while Model II presents the results for poor households. The results in Table 3 are intriguing. We observe that financial inclusion importantly explains the welfare of both poor and non-poor households, albeit with varying magnitudes. Specifically, we find that while the welfare effect of financial inclusion is around 15 per cent for non-poor households, it is about 40 per cent for poor households. This implies that poor households experience much larger welfare effects of financial inclusion relative to non-poor households. Thus, our evidence shows that financial inclusion not only improves household welfare but may also help to bridge the income gap between the poor and the rich.

Table 3: Effect of financial inclusion on household welfare: household poverty status disaggregated estimations

Variables	I Non-poor households	II Poor households
Finc$_i$	-0.154***	-0.402*
	(0.045)	(0.226)
Age_head	-0.010	0.009
	(0.012)	(0.044)
Age_head2	0.000	-0.000
	(0.000)	(0.000)
Sexhead (*base: female*)	0.000	-0.104
	(0.042)	(0.163)
Household_size	-0.112***	0.122***
	(0.009)	(0.022)
Other controls	Yes	Yes
Constant	9.050***	7.092***
	(0.292)	(1.084)
Observations	728	90
Adjusted R-squared	0.362	0.249
Region FE	Yes	Yes
F-statistic	21.82	3.217

Note: standard errors clustered at household level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Other controls included in the models but not reported in Table 3 are household head's educational attainment and occupation as well as household locality.

Source: authors' calculations based on data from GSS (2018).

5.3 Effect of financial inclusion on household welfare: effect of various dimensions of financial inclusion

While financial inclusion is broadly seen as an important driver of household welfare, the question of which aspect of financial inclusion matters the most in the explanation of household welfare remains an important issue in the development literature. In this section, we discuss the relative importance of each of our four dimensions of financial inclusion—access to a bank account, access to credit, access to insurance, and access to a savings account—for household welfare. The results related to this discussion are presented in Table 4. The measure of household welfare we examine in this respect is (log) household consumption expenditure per adult equivalent. In Models I–IV

in Table 4, financial deprivation is measured by the lack of a bank account (Bank_account), the lack a credit facility (Access_credit), the lack of an insurance facility (Access_insurance), and the lack of a savings account (Savings_account).

Overall, we find that each of the various dimensions of financial inclusion importantly explains household welfare, albeit with varying magnitudes. The coefficient estimates of financial deprivation are statistically significant at the one per cent level in all instances. In particular, the results suggest that access to a bank account has the largest effect on household welfare, with a magnitude of about 24.4 per cent, while access to credit has the lowest effect on household welfare (about 13.9 per cent). The effect of access to a bank account on household welfare indicates that households that have at least one member with a bank account have about 24 per cent more consumption spending than those without a bank account holder. In terms of the effect of access to credit, the evidence suggests that households that have access to a credit facility have about 13.9 per cent more consumption expenditure than those without a credit facility. Similarly, we observe that access to insurance facilities raises household welfare by about 15 per cent, while access to a savings account improves household welfare by about 20 per cent (see Models III and IV in Table 4 respectively).

Table 4: Financial inclusion and household welfare: effect of the various dimensions of financial inclusion

	Dependent variable: (log) household consumption per equivalent adult			
Variables	I	II	III	IV
Bank_account	-0.244***			
	(0.014)			
Access_credit		-0.139***		
		(0.045)		
Access_insurance			-0.150***	
			(0.015)	
Savings_account				-0.198***
				(0.013)
Controls included	Yes	Yes	Yes	Yes
Constant	8.148***	8.721***	8.056***	8.139***
	(0.093)	(0.322)	(0.067)	(0.068)
Observations	818	818	8,710	8,712
Adjusted R-squared	0.519	0.451	0.508	0.514
Region FE	Yes	Yes	Yes	Yes
F-statistic	375.51	26.80	356.37	366.38

Note: robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Other controls included in the models but not reported in Table 4 are household head's age, sex, educational attainment, and occupation, as well as household size and locality.

Source: authors' calculations based on data from GSS (2018).

5.4 Robustness check 1: test of alternative computations of financial inclusion index

In this section, we test the robustness of our financial inclusion index to alternative computations of the measure. In doing so, we re-estimate the financial inclusion index by excluding one dimension of our four-pillar financial inclusion index each time, in four separate instances. In other words, we recompute the financial deprivation index using only three of the four dimensions (that is, omitting a dimension in each case). This produces four different measures of financial inclusion: FincBA is the re-estimated financial deprivation index when access to a bank account is excluded from the computation of Fin_i; FincFC is the re-estimated financial deprivation index when we

exclude access to formal credit from the computation of Fin_i; FincINS is the re-estimated financial deprivation index when access to insurance products is excluded from the computation of Fin_i; FincSAV is the re-estimated financial deprivation index when we exclude access to a savings account from the computation of Fin_i. In each instance, the financial deprivation index is a binary, equal to one when a household's deprivation score is higher than 33.33 per cent and zero otherwise. That is, a household is considered to be financially excluded if it does not have access to at least one of the three dimensions of financial inclusion.

The results from this exercise (presented in Table 5) are consistent with our earlier findings on the effect of financial inclusion on household welfare. In Table 5, Models I–IV present the coefficients of financial deprivation in a model of household welfare when FincBA, FincFC, FincINS, and FincSAV are used as the measure of financial deprivation respectively. For example, we observe that financial deprivation measured by FincBA reduces household welfare by about 20 per cent. Strikingly, the coefficient of the financial deprivation indicator in each of the four different specifications is remarkably close to our initial estimates of the welfare effect of financial deprivation (see Table 2, Model I). These findings support the reliability of our index of financial inclusion.

Table 5: Financial inclusion and household welfare: test of alternative computations of the financial inclusion index

	Dependent variable: (log) household consumption per equivalent adult			
	I	II	III	IV
$Finc_i$ excluding:	Bank account	Formal credit	Insurance	Savings account
FincBA	-0.202***			
	(0.045)			
FincFC		-0.236***		
		(0.013)		
FincINS			-0.166***	
			(0.052)	
FincSAV				-0.187***
				(0.049)
Controls included	Yes	Yes	Yes	Yes
Constant	8.766***	8.191***	8.659***	8.763***
	(0.321)	(0.068)	(0.322)	(0.320)
Observations	818	8,710	818	818
Adjusted R-squared	0.459	0.519	0.453	0.455
Region FE	Yes	Yes	Yes	Yes
F-statistic	27.42	371.60	27.24	27.01

Note: robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Other controls included in the models but not reported in Table 5 are household head's age, sex, educational attainment, and occupation, as well as household size and locality.

Source: authors' calculations based on data from GSS (2018).

5.5 Robustness check 2: test of the use of two other cut-off points (extreme lower and upper bounds)

Table 6 presents the results of a re-estimated financial inclusion index using two alternative cross-dimensional cut-off points: a cut-off of 75 per cent (an upper bound), which classifies a household as financially deprived only if it is deprived in more than three (or all) of the four dimensions of financial deprivation; and a cut-off of 25 per cent (a lower bound), which classifies a household as financially included if it is non-deprived in only one of the four dimensions of financial inclusion. Models I and II in Table 6 present the empirical results of the effect of financial inclusion on household welfare when our financial deprivation indicator is derived using the cut-offs of 75 per cent and 25 per cent respectively. In both estimations, we observe a significant influence of financial deprivation on household welfare; this is significant at the one per cent level and thus corroborates our baseline estimations. This lends credence to our measure of financial inclusion.

Table 6: Financial inclusion and household welfare: a test of the use of different cut-offs

	Cut-offs used to construct $Finc_i$	
	I	II
Variables	75%	25%
Dependent variable: (log) household total consumption expenditure per adult equivalent		
$Finc_i$	-0.196***	-0.188***
	(0.055)	(0.045)
Controls included	Yes	Yes
Constant	8.536***	8.753***
	(0.324)	(0.322)
Observations	818	818
Adjusted R-squared	0.445	0.457
Region FE	Yes	Yes
F-statistic	27.16	27.28

Note: robust standard errors in parentheses. Dependent variable is (log) household total consumption expenditure per adult equivalent. *** p<0.01, ** p<0.05, * p<0.1. Other controls included in the models but not reported in Table 6 are household head's age, sex, educational attainment, and occupation, as well as household size and locality.

Source: authors' calculations based on data from GSS (2018).

5.6 Robustness check 3: accounting for a potential problem of endogeneity and selectivity bias

As discussed earlier, we use the PSM technique to account for the potential endogeneity and selectivity bias problem in our estimation of equation [1]. The findings in this respect are summarized in Table 7. Given that the reliability of the match is an important step in estimating the average treatment effect on the treated (ATT), we conduct a sensitivity test on our match; the balancing test shows that all the variables used to estimate the propensity scores attain a good balance (see Table A2 and Figure A1 in the Appendix). By accounting for the potential endogeneity of financial inclusion in our model of household welfare, we observe that financially included households exhibit higher welfare levels than their financially excluded counterparts. The corresponding ATT is -0.50 with a significance level of one per cent; the estimated coefficient is the same regardless of the matching algorithm employed. However, it noteworthy that the PSM coefficient is more than twice that of the baseline estimation, indicating a downward bias in the baseline results. Similarly, the estimated ATT for non-poor households is about four times the ATT we obtain in the baseline estimation, while that for poor households is much lower than we find in the baseline estimation. Overall, the PSM estimates are qualitatively similar to our baseline

estimates of the welfare effect of financial inclusion. Hence, we conclude that our results on the effect of financial inclusion on household welfare are robust to the controls for potential endogeneity and self-selectivity bias.

Table 7: Endogeneity-corrected estimation of the effect of financial inclusion on household welfare

		Finc$_i$ (index of financial deprivation)	
		Observed coefficient	Standard error
PSM estimations with different matching methods			
Nearest-neighbour matching	1-NN	-0.501***	0.066
	2-NN	-0.501***	0.066
	3-NN	-0.501***	0.071
Radius matching		-0.501***	0.070
Kernel matching		-0.501***	0.065
Local linear matching		-0.501***	0.073
PSM estimation by household poverty status			
Non-poor households		-0.595***	0.169
Poor households		-0.162***	0.046
Baseline result			
OLS		-0.198***	0.057
OLS estimation by household poverty status			
Non-poor households		-0.154***	0.045
Poor households		-0.402*	0.226

Note: bootstrap standard errors with 100 replications reported in PSM estimations. Coefficients reported in the PSM estimation are the ATT. Robust standard errors reported in simple OLS estimations. Sample size used in full sample estimations is 818. Sample size used in household poverty status disaggregated models is 728 for non-poor households model and 87 for poor households model. *** p<0.01, ** p<0.05, * p<0.1.

Source: authors' calculations based on data from GSS (2018).

5.7 Potential transmission channels: financial inclusion and household welfare

There are a number of channels through which financial inclusion can have a positive impact on household welfare. These channels include: (1) improvement in the production capacity (or incomes) of businesses including farm and non-farm enterprises through the provision of risk insurance, access to credit, efficient payment services, and opportunities to save and invest in large-scale projects; (2) improvement in the ability of households to accumulate human capital assets such as education and health; (3) provision of insurance to protect households against idiosyncratic shocks. In this section, however, we pay attention to the role of financial inclusion in business income, namely, the impact of financial inclusion on households' farm and non-farm business incomes. Panels A and B of Table 8 present the empirical results on the effect of financial inclusion on non-farm income and agricultural income respectively. In each case, Model I presents estimates of the effect of financial inclusion on enterprise income, using our computed financial deprivation index as a measure of financial inclusion; the subsequent models explore the possibility of differences in the effect of each of the four dimensions of financial inclusion on enterprise income.

Our results reveal that financial inclusion strongly improves households' non-farm enterprise incomes, but this is not the case for households' agricultural incomes (see Panel B, Model I). Specifically, we observe that financial inclusion improves households' non-farm income by about 91 per cent (see Panel A, Model I). That is, among a subsample of households that operate non-farm enterprises, households that are financially included earn over 91 per cent more income from their non-farm enterprises compared with those that are financially excluded. However, among a subsample of agricultural households, households that are financially deprived are not significantly

worse off in terms of earnings from agricultural activities relative to those that are financially included. In terms of the effect of the various dimensions of financial inclusion on enterprise income, we observe that all four dimensions of financial inclusion significantly explain households' non-farm enterprise incomes (see Panel A, Models II–V). However, this is not entirely true for households' farm income. We find that while access to a bank account, insurance, and savings account improves households' agricultural incomes, access to credit does not significantly influence households' agricultural incomes. This finding can be attributed to the acute lack of access to adequate credit facilities from formal financial intermediaries among households or individuals engaged in agricultural activities. The evidence here suggests generally that the welfare effect of financial inclusion can be seen in the positive impact of access to financial services on the performance of households' farm and non-farm enterprises.

Table 8: Effect of financial inclusion on households' farm and non-farm enterprise income

	Model				
Variables	I	II	III	IV	V
Panel A: dependent variable: (log) household total non-farm enterprise income (Income_nf)					
$Finc_i$	-0.906*				
	(0.507)				
Bank_account		-0.817***			
		(0.127)			
Access_credit			-0.117***		
			(0.045)		
Access_insurance				-0.092***	
				(0.002)	
Savings_account					-0.870***
					(0.132)
Panel B: dependent variable: (log) household total agricultural income (Income_agr)					
$Finc_i$	-0.123				
	(0.134)				
Bank_account		-0.548*			
		(0.319)			
Access_credit			-0.295		
			(0.211)		
Access_insurance				-0.252***	
				(0.054)	
Savings_account					-0.201***
					(0.041)

Note: robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All models estimated with the inclusion of a host of other control variables, such as age and sex of household head, educational attainment, and locality. All estimations control for region fixed effects.

Source: authors' calculations based on data from GSS (2018).

6 Concluding remarks

In this study, we examined the welfare effects of financial inclusion, using a nationally representative household survey data set from Ghana. The study elicits a number of interesting results. First, our results strongly suggest that financially deprived households have lower welfare levels compared with their financially included counterparts. Second, we show that financial inclusion has a much larger impact on the welfare of poor households than on the welfare of non-poor households. This suggests that beyond improving household welfare, financial inclusion may also help to bridge the income gap between the poor and the rich. Third, our results show that all four dimensions of financial inclusion independently affect household welfare; however, we observe some differences across household poverty status.

Finally, on the possible channels through which financial inclusion might impact on household welfare, we show that financial inclusion impacts on household welfare via its effect on households' farm and non-farm enterprise incomes. In sum, our results imply that improved access to formal financial services for households, especially poor households, will not only improve household welfare but will also facilitate reductions in inequality. Thus, development policy practitioners and national governments must continue to deepen the extent of financial inclusion in order to ensure the realization of the Sustainable Development Goals, in particular the reduction in the incidence of poverty, vulnerability, and inequality.

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Appendix

Table A1: Descriptive statistics of regression variables

Variable	Description	Mean	Std dev.	Range
Measures of household welfare				
lwelfare	Continuous: this is the log of household total consumption (including food and non-food) expenditure per equivalent adult, adjusted for variations in prices across households.	7.7	0.89	3.7–12.2
lfoodx	Continuous: this is the log of household total food expenditure per equivalent adult, adjusted for variations in prices across households.	7.01	0.90	2.3–10.4
Income	Continuous: this is the log of household total gross income per annum.	25.6	25.3	3.2–210.0
Non-poor	Binary: this is a binary measure of household welfare, and it takes a value of 1 if the household is classified as non-poor (based on the upper poverty line) and 0 otherwise.	0.64	0.48	0–1
Income_agr	Continuous: this is the log of household total gross income from agricultural activities per annum.	19.68	27.89	3.2–210.0
Income_nf	Continuous: this is the log of household total gross income from non-farm activities per annum.	3.23	6.07	0–73.1
$Finc_i$	Binary: this is a measure of households' level of financial inclusion, and it takes a value of 1 if a household is financially excluded (or deprived) and 0 if it is financially included.	0.34	0.47	0–1
Age_head	Continuous: this captures the age of the household head.	46.24	15.9	15–99
Age_head2	Continuous: this captures the square of the age of the household head.	2391.4	1635.5	225–9801
Hsize	Continuous: this captures the size of the household.	6.14	3.54	1–28
Sexhead	Binary: this captures the gender of the household head, and it assumes a value of 1 if the head is male and 0 otherwise.	0.69	0.46	0–1
No education	Binary: this measures the educational attainment of the household head, and it assumes a value of 1 if the head has no education and 0 otherwise.	0.34	0.47	0–1
Basic_education	Binary: this measures the educational attainment of the household head, and it assumes a value of 1 if the head's highest educational attainment is basic education and 0 otherwise.	0.19	0.39	0–1
Secondary_education	Binary: this measures the educational attainment of the household head, and it assumes a value of 1 if the head's highest educational attainment is secondary education and 0 otherwise.	0.36	0.48	0–1
Post-secondary_education	Binary: this measures the educational attainment of the household head, and it assumes a value of 1 if the head's highest educational attainment is post-secondary education and 0 otherwise.	0.06	0.22	0–1

Tertiary_education	Binary: this measures the educational attainment of the household head, and it assumes a value of 1 if the head's highest educational attainment is tertiary education and 0 otherwise.	0.05	0.23	0–1
Agriculture	Binary: this captures the sector of employment of the household head, and it takes a value of 1 if the head's main occupation is in agriculture and 0 otherwise.	0.47	0.50	0–1
Industry	Binary: this captures the sector of employment of the household head, and it takes a value of 1 if the head's main occupation is industrial activity and 0 otherwise.	0.17	0.37	0–1
Services	Binary: this captures the sector of employment of the household head, and it takes a value of 1 if the head's main occupation is in services and 0 otherwise.	0.36	0.48	0–1
Urban	Binary: this measures the geographical location of the household, and it takes a value of 1 if the location is urban and 0 otherwise.	0.36	0.48	0–1
Regional dummies (a measure of the geographical location of households)				
Western	Binary: this takes a value of 1 if the household is located in the Western region and 0 otherwise.	0.09	0.28	0–
Central	Binary: this takes a value of 1 if the household is located in the Central region and 0 otherwise.	0.09	0.28	0–1
Greater Accra	Binary: this takes a value of 1 if the household is located in the Greater Accra region and 0 otherwise.	0.08	0.27	0–1
Volta	Binary: this takes a value of 1 if the household is located in the Volta region and 0 otherwise.	0.10	0.30	0–1
Eastern	Binary: this takes a value of 1 if the household is located in the Eastern region and 0 otherwise.	0.08	0.28	0–1
Ashanti	Binary: this takes a value of 1 if the household is located in the Ashanti region and 0 otherwise.	0.10	0.29	0–1
Brong Ahafo	Binary: this takes a value of 1 if the household is located in the Brong Ahafo region and 0 otherwise.	0.09	0.28	0–1
Northern	Binary: this takes a value of 1 if the household is located in the Northern region and 0 otherwise.	0.15	0.35	0–1
Upper East	Binary: this takes a value of 1 if the household is located in the Upper East region and 0 otherwise.	0.12	0.33	0–1
Upper West	Binary: this takes a value of 1 if the household is located in the Upper West region and 0 otherwise.	0.11	0.32	0–1

Note: upper poverty line set at GHC1,760.86.

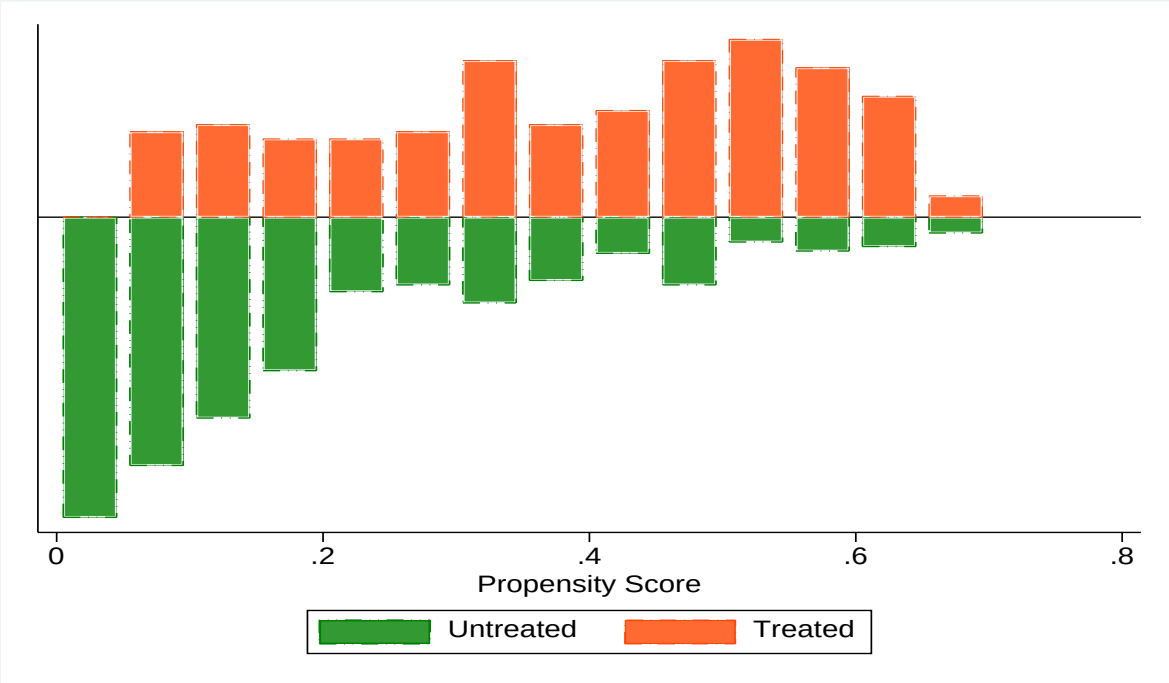
Source: authors' calculations based on data from GSS (2018).

Table A2: Test of covariate balance (PSM estimation)

	Mean		%bias	t-test	
Variable	Treated	Control		*t*	*P > [t]*
Age_head	44.792	45.218	-3.3	-0.32	0.749
Age_head2	2192	2208	-1.3	-0.12	0.902
Hsize	4.263	4.508	-9.8	-1.04	0.300
Sexhead	0.614	0.569	9.6	0.92	0.358
Basic_education	0.132	0.157	-7.5	-0.71	0.475
Secondary_education	0.284	0.299	-3.2	-0.33	0.740
Post-secondary_education	0.010	0	4.7	-1.42	0.157
Tertiary_education	0.005	0.0	2.1	1.00	0.318
Industry	0.137	0.137	0.0	0.00	1.000
Services	0.203	0.213	-2.3	-0.25	0.805
Urban	0.249	0.223	6.1	0.59	0.554

Source: authors' calculations based on data from GSS (2018).

Figure A1: Propensity score graph



Source: authors' illustration based on data from GSS (2018).