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"Labor informality and financial inclusion transitions: Evidence from Peru"

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Labor informality and financial inclusion transitions: Evidence from Peru*

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Abstract

Considered as a cornerstone of development, financial inclusion has become a universal goal, in particular for developing countries that happen to be characterized by a high degree of labor informality. Our aim in this paper is twofold. First, we study how labor informality affects financial inclusion in a static framework. Second, we argue that financial inclusion must be treated as a dynamic process and investigate the effect of movements between formal and informal jobs on the probabilities of entry to and exit from the financial system. We find evidence that financial inclusion is an auto-regressive process and that labor informality reduces the probability of entry to the financial system by 8% whereas it increases the probability of exit from it by 9.3%. As to transitions in the labor market, we find that, relative to workers who get stuck in informal jobs, for those who have and stay with formal jobs, the probability that they enter the financial system is higher by 9% and the probability that they exit from it is lower by 12%. As to the workers who move into labor formality, we find that they are more likely to enter the financial system by 9.7% and less likely to exit from it by 7.1%. Our results add to the many well documented spillover effects of labor formality in developing countries to encourage policies that promote it.

Keywords: Financial inclusion, labor informality, transition probabilities, dynamic random-effect panel probit.

JEL Classification: C23, D14, E26, I31, O17

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1 Introduction

In recent years, financial inclusion, FI hereafter, understood as the extent of access at affordable costs to financial services provided by formal financial intermediaries, including savings, credit, and payments (Carbo et al., 2005; Barajas et al., 2020), has become a prominent goal for developing countries. In 2021, while 76% of the world adult population had an account with a financial institution or use mobile money services, close to 71% of population were unbanked in developing countries (Demirgüc-Kunt et al., 2022). The very importance of FI for developing countries lies in the benefits it provides to the poor and most vulnerable people by increasing productivity and growth and in fostering the transition to a digital economy.

Bettin et al. (2022) provide evidence that FI decreases entry to and increases exit from poverty and as such is an important instrument for fighting it. Shy (2020) shows that, in addition to the fact that they are mostly unbanked, low-income people do not use debit or credit cards, while access to bank accounts and debit instruments are known to stimulate savings (Bachas et al., 2021; Dupas et al., 2018). In addition, FI is the first step towards accessing digital payments and replacing such an inefficient method as cash (Aurazo and Vega, 2021) and is considered as an effective gateway for broader financial services (Committee on Payment and Market Infrastructures and World Bank Group, 2016). Moreover, monetary policies become more effective with higher levels of FI as more people can save or request loans according to changes in interest rates (Menhrota and Yetman, 2014; Prasad, 2014; Hannig and Jansen, 2010; Galí et al., 2004) and it can also favor financial stability (Feghali et al., 2021; Wang and Luo, 2022). Other papers have focused on the importance of financial inclusion on energy poverty (Koomson and Danquah, 2021; Dogan et al., 2021) and environmental benefits (Shahbaz et al., 2022).

Peru is one of the least advanced countries in Latin America in terms of FI. While 51% of the Latin America and the Caribbean region's population over 15 years old had an account in 2014, this figure moved up to 54% in 2017, but in Peru it was only 43% that year putting this country above El Salvador, Nicaragua, and Haiti with 31% and Mexico with 37%. Nevertheless, Peru has significantly increased its FI level over the last years. In 2015, 7.2 million people over 18 years old, which represented 35% of the working-age population, had at least one account or payment card. In 2018, these figures increased to 8.7 million and 40% respectively. This said, in 2018 Peru's shadow economy represented around 45% of the country's total economic activity (Medina and Schneider, 2018) and, according to official reports, close to 75% of the working-age population had persistently informal jobs over the last decade.

Labor informality, LI hereafter, and FI are not independent. A Peruvian worker with a formal job perceives a direct benefit of possessing a bank account, namely, to receive his salary transfer as an account is often required. In contrast, a worker with an informal job typically operates in a cash ecosystem and may view opening a bank account only as a burden. To open an account, formal workers incur less costs than informal workers as the opening procedure as well as the cash-in is usually done by employers. To deposit funds, informal workers are likely to travel to an ATM or visit a bank agent/branch. In addition, LI could limit the access to and usage of other financial/payment products such as credit cards as banks usually ask for a proof of stable income when providing credit lines. The benefits from being able to use digital payment instruments linked to a bank account lose their relevance for informal workers as making transactions with cash is the rule rather than the exception for them.

While it is important to understand the key drivers of an individual's decision to be financially included in a given period, it is at least as important to understand the dynamic process of entering to and exiting from the financial system. From a policy perspective, in particular for developing countries, what really matters is the stability of FI, i.e., that individuals decide to be financially included and to stay over time. Thus, the dynamics of FI is worthwhile investigating, just as the dynamics of other economic phenomenon such as income poverty (Bettin et al., 2022), energy poverty (Alem and Demeke, 2020; Drescher and Janzen, 2021), or unemployment (Biewen, 2009), in a framework that integrates the dynamics of LI. This is the fundamental goal of this paper that has two components.

The first component consists in an analysis of the static relationship between LI and FI and the second in an examination of the dynamics of FI and its relationship with LI. In the former we use a static panel data probit model instrumenting LI with its lag and in the latterwe use a dynamic random-effect panel data probit model to test genuine state dependence of FI and assess the impact of LI on transition probabilities of FI (probabilities of entry to and exit from the financial system) modelling the permanent unobserved heterogeneity with the initial conditions of FI and LI (Wooldridge, 2005). We also investigate how one-year transitions in the labor market, i.e., movements between informal and formal jobs, affect the entry to and exit from the financial system.

We analyze a longitudinal sample that we extracted from the *Encuesta Nacional de Hogares*, which is a nationally representative survey conducted between 2015 and 2018 in Peru and find evidence of there is state dependence of FI that follows an auto-regressive process. We also find that LI reduces the probability of entering the financial system by around 8.0% whereas it increases the probability of exiting it by around 9.3%. As to the dynamics of the LI-FI relationship, our results suggest that, relative to workers who get stuck in informal jobs, those who remain with formal jobs have their probability of entering the financial system increased by 9% and their probability of exiting it reduced by 12%. For those who move into LI, they are more likely to enter the financial system by 9.7% and less likely to exit from it by 7.1% relative to our base category.

The rest of the paper is organized as follows. In section 2, we review some pieces of research that are related to our work, namely, some empirical papers on the determinants of FI and some papers that have estimated transitions probabilities to analyze the dynamics of economic phenomena such as poverty or unemployment. In section 3, we describe the Peruvian database we use and discuss some descriptive evidence provided by the data. In section 4, we give an account of our econometric strategy and in section 5 we discuss the results obtained. In section 6, we conclude the paper by summarizing the key insights of our results, discussing some policy implications, and directing to some avenues for future research that our work suggest.

2 Related literature

Our work is directly related to the literature on the determinants of FI and somehow indirectly, rather from a methodological standpoint, to the literature that analyzes the dynamics of economic phenomena such as poverty and unemployment by estimating transitions probabilities. We overview some recent contributions to these two strands of research in turn.

2.1 The determinants of financial inclusion

FI may be thought of being of two types. A broad type reflects the fact that individuals and businesses have access to useful and affordable financial products and services that meet their needs, such as transactions, payments, savings, credit, and insurance, and are delivered in a responsible and sustainable way.[1] A narrower type merely indicates that adults and businesses have access to banking accounts. In recent years, FI has aroused the interest of multilateral organizations, policymakers, and academics around the world. In 2011, the Maya Declaration, set out by the Group of Twenty (G20), called for global efforts to advance FI worldwide in order to reduce poverty and ensure financial stability. Many governmental authorities, especially in developing countries, have been since implementing national FI strategies that have involved both private and public entities, including central bank (Morales et al., 2021). Moreover, multilateral organizations have developed a set of surveys to monitor the degree of development of FI around the planet as is the case of the World Bank that created the series of Global Findex databases (Morales et al., 2021).[2]

While the importance of FI for alleviating poverty and promoting innovation, in particular, the digitization of a key sector of the economy is widely recognized, improving means to measure it as well as to identify its determinants still occupy a large part of researchers agendas. Tram et al. (2021) construct a composite financial inclusion index for developing countries that incorporates three dimensions, namely, penetration, availability, and use of financial services including mobile money. Some studies have examined the individual determinants of financial inclusion. Allen et al. (2016) explore the individual and country characteristics that allow effective policies to promote financial inclusion among the most vulnerable population and find that the likelihood of having an account is greater for richer, more educated, older, urban, employed, married, or separated individuals. In addition, a greater level of financial inclusion is associated with lower account costs, greater proximity to financial intermediaries, stronger legal rights, and more politically stable environments.

Along these lines, Fungacova and Weil (2015) find results showing that income level, education, and age are associated with a higher probability of being financially included in China while Zins and Weil (2016) find that being a man, richer, more educated, and older favor FI in Africa with a stronger effect of education and income. Likewise, a few papers papers on some specific developing countries such as Argentina (Tuesta et al., 2015), Mexico (Martinez and Woodruff, 2009), Colombia (Murcia, 2007), Brazil (Kumar, 2005), and Pakistan (Nenova et al., 2009) have used national surveys or the Global Findex and found

[1] See `https://www.worldbank.org/en/topic/financialinclusion/overview#1`.

[2] These yearly Global Findex databases that started in 2011 are public and can be accessed at https://globalfindex.worldbank.org/. The 2021 version was released on June 29, 2022.

that individual-related variables such as household income, educational level, geographical area, gender, property rights, distrust, consumption habits, and experience of past shocks, among others, are significant determinants of access to and/or use of financial products.

For the case of Peru, our country of interest, Alfageme and Ramirez-Rondán (2018) and Aurazo and Vega (2021) have analyzed the determinants of FI at respectively the household level and individual level. Alfageme and Ramirez-Rondán (2018) find a positive relationship between FI and income, education, and age of the head of the household and a negative relationship with the fact the household lives in rural areas and is poor. Considering FI as a necessary step for using digital payments to overcome a problem of selection bias, Aurazo and Vega (2021) find that, among others, labor informality decreases the probability of having an account, a debit card, or a credit card. In fact, although it is well-recognized that the informal and the financial economies are related, only a few papers have analyzed the impact of LI on FI. Our paper attempts to fill this gap. Our presumption is that LI plays an important role in promoting financial inclusion through access to bank accounts or debit/credit cards.

2.2 Transition probabilities

While many studies have analyzed the determinants of FI, they have failed to investigate its dynamics, more specifically, the factors that affect a person's decision to enter the financial system and exit from it at various points in time. This is all the more surprising since this is the approach that has traditionally been adopted to analyze income poverty (Bettin et al., 2022; Schotte et al., 2018), energy poverty (Alem and Demeke, 2020; Drescher and Janzen, 2021), and unemployment (Sarkar et al., 2019) and yielded results that provided guidance to policy makers to determine social welfare entry and/or exit enhancing measures.

There is indeed a vast literature on the dynamics of poverty and unemployment that has examined data on household/individual's transitions spanning several years or even decades. Concerning FI though, since it is a relatively recent topic in academic and policy circles, the available data are much more limited. Despite this constraint, the importance of the IF to developing countries should not discourage us from exploring its dynamics. One way of doing this is to examine what information available data convey on FI transition probabilities, i.e., as specified in poverty and unemployment studies, the probabilities that a household/an individual enters to and exits from the financial system. This is one of our research purposes and, in that respect, this paper should be viewed as a contribution to a literature on FI dynamics that is likely to emerge.

The literature on the estimation of transition probabilities can be classified into two strands according to the class of models used. (Capellari and Jenkins, 2008). A first approach consists in using limited dependent variables of the Probit or Logit type to separately estimate the entry and exit probabilities. However, as is well known these studies may face a sample selection bias. On the one hand, the sample considered in the entry regression includes individuals who were in at a given period and out in the previous period. On the other hand, the exit decisions at a given period are observed only for individuals who were previously in. Thus, the initial value of the dependent variable is potentially endogenous (Heckman, 1981). To overcome this problem, the switching regression model estimators are used (Capellari and Jenkins, 2004; Jeon, 2008; Sarkar et al., 2019), which are similar to Heckman's two-step estimator.[3]

A second approach consists in using lagged dependent variable models, more specifically, dynamic random effects probit models with unobserved heterogeneity and state dependence. This is for instance the approach used by Drescher and Janzen (2021) who provide evidence of genuine state dependence effects in energy poverty in data on German households. They find that households are more likely to face energy poverty at a given period if they were energy-poor in the previous period. Likewise, Alem and Demeke (2020) find evidence of sate dependence in energy poverty in Ethiopian data using a similar approach. More recently, Bettin et al. (2022) used Italian data to analyze the impact of FI on the dynamics of poverty, i.e., on the transition probabilities into and out of poverty using a dynamic random effects panel probit model and found that past status of poverty affects current one.

Our paper is mostly related to this second stream of the empirical literature that uses dynamic random effect probit models since we are interested in exploring whether FI should be treated as an auto-regressive process reflecting the fact that there exists genuine state dependence, i.e., that the FI status in the previous period can determine the current one. To the best of our knowledge, this paper is the first attempt to analyze FI as a dynamic process. Our results might prove useful for policymakers who should realize that it is not only important that people have an account and/or a debit or credit card, but also that unbanked people may and actually do become banked as well as banked people may or may not stay banked over time.

3 Data and descriptive evidence

This section describes the data used and discusses some descriptive evidence on the dynamics of FI and transition probabilities that we will analyze more deeply in the next sections.

3.1 The Encuesta Nacional de Hogares

The data we analyze is extracted from the Encuesta Nacional de Hogares (ENAHO), which is a Peruvian nationally representative household survey. The survey is conducted quarterly and aggregated yearly, and we use yearly data from 2015 to 2018. Each of these surveys contains an employment module that collects answers of individuals to questions on their socio-demographic attributes and, since 2015, on FI and payments, in particular, on access to accounts and payment instruments (debit and credit cards) provided by financial entities.[4] Using the answers to these questions, we created our main variable of interest, namely FI understood as the access to an account, a debit card, or credit card. In addition, individuals

[3] This entails estimating the probability of being in the initial condition and calculating the inverse Mills ratio to be included as a correcting factor in the estimation of the entry and exit probability models (Sarkar et al., 2019).

[4] While this employment module of the surveys is conducted on people over 14 years of age, because of Peruvian law, questions on FI and payments are answered only by adults over 18 years old. ENAHO also contains information on how people pay (cash, debit or credit card, mobile/Internet banking) their purchases of nine different categories of products (groceries, ready-to-eat food, laundry, utilities, cooking fuel, personal hygiene, clothing and footwear, furniture, and household appliances).

provide information on their labor informality status whereby a person saying that she/he has an informal employment means that this person works in the formal or informal sector, but does not enjoy all the social benefits of a job, e.g., does not have paid vacations.

The overall ENAHO databases of 2015 through 2018 contain more than 300,000 observations of which we kept only those on individuals who were asked questions at least two consecutive years. We ended up building a database of 102,578 observations that we used to analyze the dynamics of FI, i.e., its one-year movements.[5]

We merged this employment module data with data from two other ENAHO's modules containing various information items at the household level such as spending, area of residence (urban or rural), house infrastructure features (access to internet, electricity, mobile phone), and whether the household is beneficiary from any social program (*JUNTOS*, *BECA 18* and *PENSION 65*). We also merged the database with data from the Peru's banking supervisory agency containing information on the number of bank branches, ATM, and bank agents at the district level from 2015 to 2018. To create quintiles of the per capita household spending and financial network density, we use household and district databases and then generate the quintiles by year.[6] Table 1 shows the descriptive statistics of our variables in the database.

Table 1: Descriptive statistics

Variable	Description	Obs.	Mean	Std. Dev
Financial inclusion	Yes=1, No=0	100,663	0.364	0.48
Labor informality	Informal=1, Formal=0	76,375	0.767	0.42
Individual characteristics				
Age	18-24 years=1, 25-40=2, 41-64=3 , 65+=4	102,578	2.714	1.04
Education	Elementary=1, High-school=2, Univ=3 , No univ=4	102,516	2.059	1.06
Gender	Man=0, Woman=1	102,578	0.526	0.50
Civil status	Married=1, Other=0	102,578	0.346	0.48
Household characteristics				
Residence area	Rural=1, Urban=0	102,578	0.313	0.46
Receive social program	Yes=1, No=0	81,254	0.267	0.44
Access to internet	Yes=1, No=0	94,470	0.253	0.43
Access to mobile phone	Yes=1, No=0	94,470	0.903	0.30
Access to electricity	Yes=1, No=0	94,470	0,929	0.26
Per capita spending (PCS)	Total daily spending per household member	100,762	20.27	16.13
Quintile of spending	Quintile=1 (lowest),..., Quintile 5 (highest)	94,470	2.715	1.38
District characteristics				
Total access points	Sum of bank branches, ATM and bank agents	88,404	606.96	929.79
Financial network density (FND)	Total access point per km square	88,404	13.90	45.49
Quintile of FND	Quintile=1 (lowest),..., Quintile 5 (highest)	88,404	4.02	1.35

3.2 Descriptive evidence

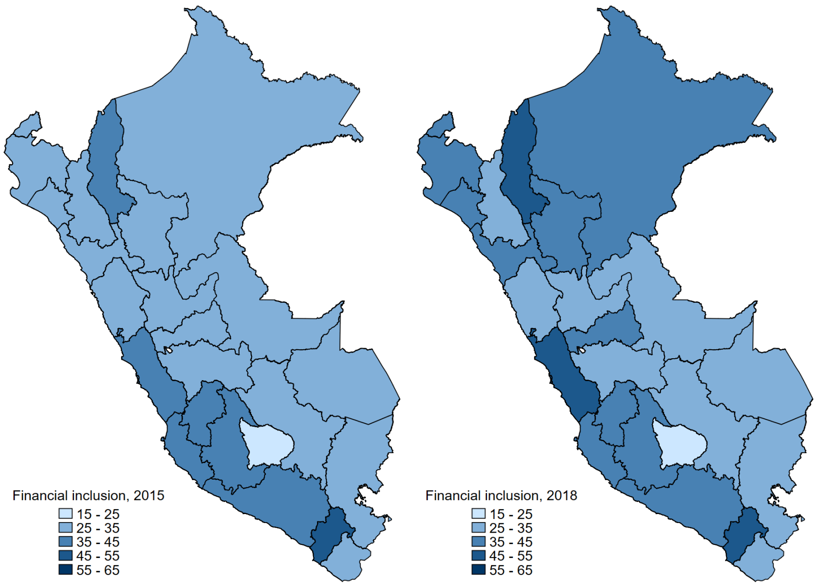
An examination of our database suggests that FI, gauged by the number of individuals possessing at least one financial instrument among a bank account, a debit card, and a credit card has been increasing, but rather slowly in Peru. In 2015, 7.2 million people over 18 years of age, representing 35% of the working-age population, had at least one account or payment card and in 2018 these figures increased to 8.7 million and 40% respectively. Across the Peruvian regions, the development of FI is concentrated among southern coastal regions and close to 1/3 of the regions have increased their level of FI between 2015 and

[5]All the ENAHO databases can be downloaded freely (in Spanish) from `http://iinei.inei.gob.pe/microdatos/`.

[6]Thus, the quintiles differ not only among households and districts, but also over time.

2018 although the increment is moderate.[7] See Figure 1.

Figure 1: Financial inclusion in Peru: 2015 vs. 2018



(a) 2015　　(b) 2018

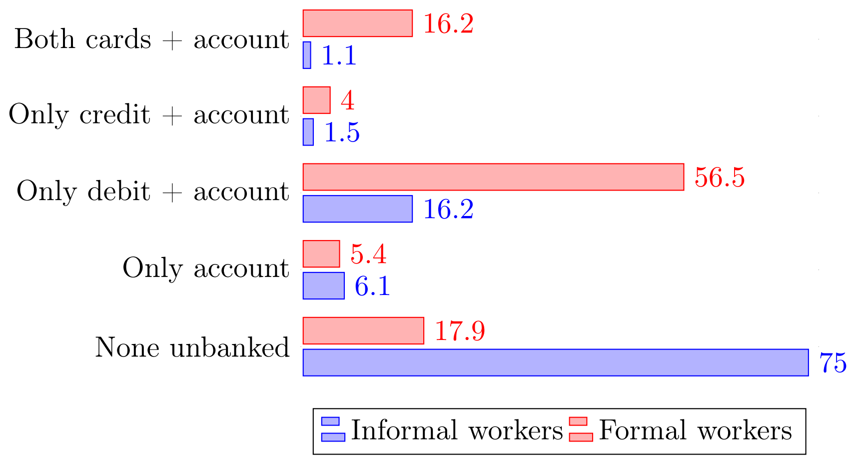
Source: ENAHO 2015, 2018

As indicated, Peru is one of the economies with the highest level of LI in the world, with more than 7 out of 10 workers being informal. Figure 2 shows that 3 out 4 workers with an informal job are unbanked while only less than 2 out of 10 with a formal job are not financially included. This might partially be explained by the fact that formal employers, i.e., those registered with the administration, are mandated by law to disburse their employees' salaries to bank accounts. Informal employers that bypass the legal burden of registration do not face this legal constraint and pay their employees in cash although, in practice, even formal employers do that.

Disaggregating by payment instrument (see Figure 2), we find that almost 65% of informal workers who are financially included have only debit cards while 1 out of 5 formal workers who are financially included has both a credit card and a debit card. This might be a consequence of the fact that financial institutions often ask for proof of stable income before providing credit lines and credit cards to people. This suggests that LI constrains not only access to accounts, but also to other financial payment products such as credit cards. In addition, informal workers are less banked due to the fact that they have to incur some costs to open an account and to cash-in (travel time to go to a bank branch or an ATM) while in the case of formal workers the bulk of these costs is generally paid by employers.

[7] Peru is organized in 195 provinces grouped into 25 regions, except for Lima Province which does not belong to any region. According to official reports, FI should have increased significantly in 2021 due to the pandemic crisis during which the Peruvian government facilitated account opening in the state-owned bank Banco de la Nacion.

Figure 2: Financial inclusion and labor informality by financial instrument



Source: Panel ENAHO 2015-2018

We now examine FI from a dynamic perspective and explore the process of entry to and exit from the financial system. Entry refers to a situation where an individual who was not financially included in period $t-1$, i.e., had no account, debit card or credit card, becomes financially included at period t, i.e., has at least one of these payment instruments. Exit occurs when an individual who was banked at period $t-1$ moves out of the financial system at period t. Table 2 panel (a) below gives the entry and exit rates in the data that proxy the probabilities of being in and out of FI unconditional of LI. We see that on average 15.3% of unbanked people move into the financial system in the next year (entry rate) while 21.9% of banked people move out of the financial system in the next year (exit rate).

Table 2 panel (b) and (c) give the transition probabilities of FI conditional on the LI status. We see that the entry rate to the financial system for formal workers is 49.6%, i.e., almost 1 out of 2 formal workers who were unbanked in the previous year moves into the financial system the next year, whereas 6.5% of formal workers who were financially included in the previous year exit the financial system the following year. The opposite occurs for informal workers, with only 12.4% of those unbanked moves into the financial system, whereas the exit rate is 33.9% which means that almost 4 out of 10 informal workers who were banked decide to move out of the financial system, i.e., close their bank account, return their debit card and/or credit card.

One can also consider transitions in the labor market. In particular, a person can move from informal to formal jobs, vice versa, remain in the informal sector, or remain in the formal sector. Figure 3 gives the corresponding FI transitions conditional on labor market transitions. For those who remain in the informal sector in consecutive periods, the entry rate to the financial system is 11.5% while the exit rate from financial inclusion is 34%. The entry rate is much greater for those who remain with formal jobs (40.3%) or move into labor formality (53.9%), and on the contrary, the exit rate for these two categories are smaller (5.6% and 12.5%, respectively). Finally, for those who move out labor formality, their entry

Table 2: Financial inclusion transitions

		Period t	
		Financially excluded	Financially included
Period $t-1$	Financially excluded	84.7% (persistence rate)	15.3% (entry rate)
	Financially included	21.9% (exit rate)	78.1%

(a) Overall

		Period t	
		Financially excluded	Financially included
Period $t-1$	Financially excluded	50.4% (persistence rate)	49.6% (entry rate)
	Financially included	6.5% (exit rate)	93.5%

(b) Formal workers

		Period t	
		Financially excluded	Financially included
Period $t-1$	Financially excluded	87.6% (persistence rate)	12.4% (entry rate)
	Financially included	33.9% (exit rate)	66.1%

(c) Informal workers

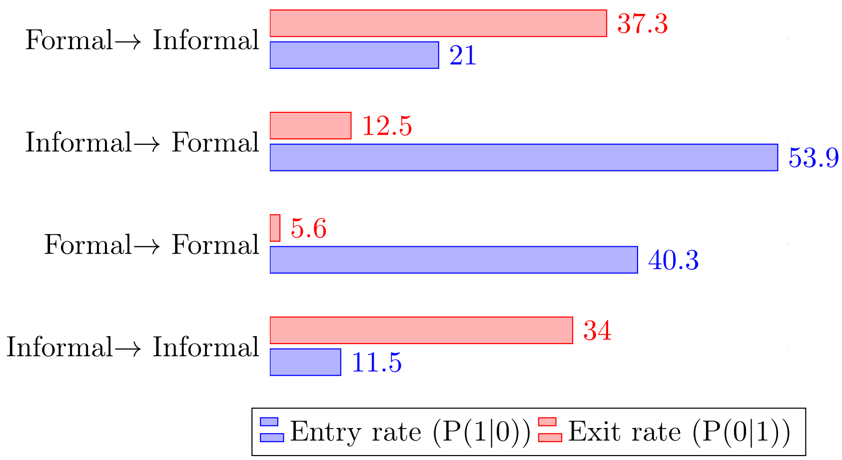
Source: Panel ENAHO 2015-2018

rate is 21% while the exit rate is 37.3%. This may suggest that the entry rate is higher and exit rate is smaller for those who remain with formal jobs or moves into formality.

4 Econometric strategy

A first set of econometric analyses of the data might be qualified as "static" in the sense that the determinants of FI will be inferred from examining the data from the surveys without properly accounting for the dynamics. A potential contribution of these analyses would be to investigate the role of LI and of course to take care of its endogeneity through instrumenting it in an informative way. A second set of analyses will exploit the dynamic nature of the data, in particular, using a first-order Markov process, i.e., testing whether the past status of FI matters for its current status. Since the ENAHO surveys compiles answers of a panel of individuals, we will use short T with large N dynamic panel data techniques of the type described in Hsiao (2010) and Pesaran (2015). This second approach will also raise the problem of endogeneity bias that we propose to tackle by modeling the transitions in and out of the financial and formal labor systems. So, first in a static approach we analyze the determinants of individual's FI focusing on the impact of LI and controlling for relevant

Figure 3: Financial inclusion transitions by labor market transition



Source: Panel ENAHO 2015-2018

variables. Second, in a dynamic approach we study how LI and transitions in the labor market, i.e., movements between informal and formal jobs affect the probabilities of entry to and exit from the financial system.

4.1 Static approach: Panel probit

A first approach that we adopt to analyze the relationship between FI and LI is static in the sense that individuals' transitions between formal and informal segments of the labor market are not taken into account when predicting their movements in and out of the financial payment system. As discussed above, LI is clearly a potential predictor of FI. However, the former will clearly be plagued with endogeneity. One way to tackle this difficulty is by using standard two-stage estimation techniques such as IV. In particular, we may run regressions in which FI in year t is the dependent variable and use labor status in year $t-1$ as an independent variable. This should take care of any potential endogeneity of LI which may stem from reverse causality and feedback effects from FI to LI and from common omitted variables affecting both FI and LI.

More specifically, we may employ a simple panel probit model as follows:

$$y_{i,t} = \mathbb{1}(\gamma L_{i,t-1} + x_{it}'\beta + \varepsilon_{i,t} > 0) \tag{1}$$

where $y_{i,t}$ is a dichotomous variable that indicates the FI status of individual i in year t. Our variable of interest, $L_{i,t-1}$, is also a dichotomous variable that indicates the LI status of the respondent. Note that we use the lag of LI to avoid any endogeneity problem associated with reverse causality. As discussed, LI can affect the decision to have an account or not, but the reverse can also occur since individuals may like to remain out of the financial system to avoid any traceability of their informality. The vector variable x allows us to control for individual characteristics such as education, age, gender, civil status (married or not), household characteristics such as urban vs. rural localization and per capita spending, and district characteristics relevant to FI such as the density of access points.[8]

4.2 Dynamic approach: Dynamic random-effect panel Probit

Our analysis of FI from a dynamic perspective allows us to test two hypothesis. The first is whether or not there exists a genuine state dependence of FI, i.e., it should be treated as a dynamic process such as poverty and unemployment rather than just a static one. The second hypothesis we seek to test is whether there exists a link between FI and LI and in the affirmative measure it. The latter hypothesis consists in determining how having an informal job can affect the probabilities of entry and exit from the financial system.

In order to estimate movements into and out of FI, we follow the literature on transition probabilities in income poverty (Bettin et al., 2022), energy poverty (Alem and Demeke, 2020; Drescher and Janzen, 2021), and unemployment (Biewen, 2009) and use a first-order Markov model of the form:

$$y_{i,t} = \mathbb{1}(\psi y_{i,t-1} + \gamma L_{i,t-1} + \eta y_{i,t-1} \times L_{i,t-1} + x'_{it}\beta + c_i + \varepsilon_{i,t} > 0) \tag{2}$$

where $y_{i,t}$ and $y_{i,t-1}$ indicate the FI status at respectively period t and period $t-1$. To study how LI affects FI transitions, we include a binary variable $L_{i,t-1}$ equal to 1 if individual i at period $t-1$ has an informal job and 0 otherwise as well as its interaction with the lag of FI. We include the vector variable $x_{i,t}$ to capture the effect of time-constant and time-varying household and district characteristics as discussed in Equation 1. Finally, c_i reflects the individual permanent unobserved heterogeneity and $\varepsilon_{i,t}$ is an error term.

There are two difficulties we have to overcome in order to have unbiased estimators. First, there exists endogeneity because of simultaneity between FI and LI. To circumvent this issue, we include the lagged value of LI instead of its current one. The second difficulty relates to the individual unobserved heterogeneity term c_i and its correlation with the lag of the FI variable, i.e., the so called "initial conditions problem" due to the fact that the initial observations do not necessarily correspond to the beginning of the stochastic process. To overcome this problem, we apply the Wooldridge Conditional Maximum Likelihood (WCML) estimator (Wooldridge, 2005) by modelling the distribution of the unobserved heterogeneity conditional on the initial dependent variable (FI) and explanatory variables (LI). We assume that:

$$c_i|(y_{i,0}, L_{i,0}) \sim \delta_1 y_{i,0} + \delta_2 L_{i,0} + \alpha_i \tag{3}$$

where $y_{i,0}$ and $L_{i,0}$ specify the initial conditions for respectively FI and LI and $\alpha_i \sim N(0, \sigma_\alpha^2)$ and is uncorrelated with the initial conditions variables $y_{i,0}$ and $L_{i,0}$.

Equation 2 can thus be rewritten as:

$$y_{i,t} = \mathbb{1}(\psi y_{i,t-1} + \gamma L_{i,t-1} + \eta y_{i,t-1} \times L_{i,t-1} + x'_{it}\beta + \delta_1 y_{i,0} + \delta_2 L_{i,0} + \alpha_i + \varepsilon_{i,t} > 0) \tag{4}$$

[8] Note that in light of our discussion above, setting y and L both equal to 1 if an individual is financially included, i.e., possesses a bank account, a debit card or a credit card, and has an informal job, one expects γ to be negative as having an informal job should decrease the probability of being financially included.

and the transition probability for individual i at time t can be expressed as:

$$Pr(y_{it}=1|\alpha_i, y_{i0}, L_{i0}) = \Phi[\psi y_{i,t-1}+\gamma L_{i,t-1}+\eta y_{i,t-1}\times L_{i,t-1}+x'_{it}\beta+\delta_1 y_{i,0}+\delta_2 L_{i,0}+\alpha_i] \quad (5)$$

where Φ is the cdf of the normal distribution. The likelihood function for individual i is thus given by:

$$L_i = \int \left\{ \prod_{t=2}^{T} \Phi[(\psi y_{i,t-1} + \gamma L_{i,t-1} + \eta y_{i,t-1} \times L_{i,t-1} + x'_{it}\beta + \delta_1 y_{i,0} + \delta_2 L_{i,0} + \alpha_i)(2y_{i,t}-1)] \right\} \phi(a)da \quad (6)$$

where ϕ is the density of the normal distribution.

The specification of the auto-regressive process for FI allows us to estimate the transition probabilities, i.e., the probabilities of FI in t conditional FI in $t-1$. We focus on the entry and exit probabilities. Entry of individual i is measured by the probability that this individual becomes financially included in period t given that she/he was not banked in period $t-1$–:

$$entry_{i,t} = Pr(y_{i,t}=1|y_{i,t-1}=0) \quad (7)$$

Similarly, exit of individual i is measured her/his probability that she/he moves out of the financial system in period t given that she/he was banked in period $t-1$:

$$exit_{i,t} = Pr(y_{i,t}=0|y_{i,t-1}=1) \quad (8)$$

To measure the impact of LI (relative to formality) on the entry and exit probabilities, we compute the partial effects as

$$\Delta entry_{i,t} = Pr(y_{i,t}=1|y_{i,t-1}=0, L_{i,t-1}=1) - Pr(y_{i,t}=1|y_{i,t-1}=0, L_{i,t-1}=0) \quad (9)$$

and

$$\Delta exit_{i,t} = Pr(y_{i,t}=0|y_{i,t-1}=1, L_{i,t-1}=1) - Pr(y_{i,t}=0|y_{i,t-1}=1, L_{i,t-1}=0) \quad (10)$$

In addition, we are interested in the way labor market transitions, i.e, movements between informal and formal jobs affects the entry and exit probabilities into the financial system. Our view is that understanding how people go from informal to formal jobs, vice versa, or remain in informal or formal jobs should yield insights on the dynamic process of entry to and exit from the financial payment system. Our hypothesis is that transitions in the labor market have an impact on those in the financial payment system.

In the Peruvian context, as people can potentially perceive no real benefit in opening an account, one may expect that moving from a formal job to an informal one should increase the probability of exiting the financial system. On the opposite, moving from an informal job to a formal one is likely to increase the probability of entering into the financial system. Moreover, people remaining in informal jobs are more likely to move out of the financial system as they may not perceive any benefits from having an account unless they have previously used digital payments.[9] The opposite occurs for people who remain in formal jobs as they are more likely to open an account, although not necessarily voluntarily, and less likely to close it.

For that purpose, we have considered the following model specification:

$$y_{i,t} = \mathbb{1}(\psi y_{i,t-1} + \gamma LT_{i,t-1} + \eta y_{i,t-1} \times LT_{i,t-1} + x'_{it}\beta + \alpha_i + \varepsilon_{i,t} > 0) \tag{11}$$

where $LT_{i,t-1}$ captures the transitions in the labor market which takes values from 1 to 4, where 1 indicates that the respondent has an informal job in both periods $t-2$ and $t-1$, 2 that the respondent has formal jobs in these two periods, 3 that the respondent moves from an informal job in period $t-2$ to a formal job in period $t-1$, and 4 that the respondent moves from a formal job in period $t-2$ to an informal job in period $t-1$.

Note that our base category is that the respondent remains in informal jobs in both period $t-2$ and $t-1$. Note also that we use the movements between informality and formality at periods $t-2$ and $t-1$ to avoid any issue of endogeneity with labor market transitions at period t since LI at period t is endogenous as discussed above. The rest of the variables are the same as those used before, the individual unobserved heterogeneity is modeled as in Equation 3, and initial conditions for FI and LI are used.[10] The partial effects of each transition in the labor market on the entry and exit probabilities of FI are similar to those given in Equations 9 and 10, but now each of the estimates is relative to the base category of remaining with informal jobs in both periods.

5 Results

We now discuss the estimation results obtained using the static and dynamic models presented in the previous section.

5.1 Static panel probit

We ran four different specifications using the static panel probit model presented in Equation 1. The results exhibited in column (1) of this table are obtained with (lagged) LI as the unique explanatory variable for FI. Those shown in column (2) are obtained when adding individual characteristics such as age, education, gender and civil status (married or not) as controls. Those shown in column (3) are obtained when further controlling for household characteristics such as place of residence (urban vs rural), whether the household is a beneficiary of a social program, has access to internet, access to mobile phone, access to electricity, and its quintile of per capita spending. Finally, the results shown in column (4)

[9] We ran several econometric specifications with the lagged variable of digital payments, i.e., whether the individual reports paying with debit card, credit card, or Internet/mobile banking at least one of the nine categories purchased, for instance, specifications where digital payments is crossed with FI, LI, and transitions in the labor market. However, the coefficient associated with this variable as well as the changes in entry and exit probabilities turned out not to be statistically significant. These results are available from authors upon request.

[10] Note that, by construction, the initial condition for the transitions in the labor market is the same as that for LI.

are obtained by also controlling for district characteristics such as its quintile of the financial network density.

The estimation results are shown in Table A.1 in the Appendix. We see that overall they are consistent with those reported in the literature on the determinants of FI, in particular, the higher the level of education, the higher the probability of having an account and the same result holds for spending and access to internet. Perhaps, one of the most surprising results is that the financial network density does not have any significant impact on being financially included. Table 3 shows the marginal effects of LI on the probability of FI. We see that the marginal impact of having an informal job relative to a formal job remains negative and statistically significant across the four specifications. When we control for individual, household, and district characteristics, having an informal job decreases the probability of being financially included by 30% relative to having a formal job.

Table 3: Marginal effects of labor informality on financial inclusion

	(1)	(2)	(3)	(4)
L.informal	-0.440***	-0.323***	-0.299***	-0.300***
	(0.006)	(0.007)	(0.008)	(0.008)
Obs	46,052	46,048	33,187	28,573
Individual controls		✓	✓	✓
Household controls			✓	✓
District controls				✓

Standard errors in parentheses; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

5.2 Dynamic random-effect panel probit

Static identification of the determinants of the decision of individuals/households to be financial included in a given time period provides an incomplete picture of FI, leaving out the important question of whether these individuals/households are persistently or only temporarily financially included. Dynamic random-effects panel probit models have widely been used to study entry, exit, and persistence in the context of various social phenomena such as unemployment, income poverty, energy poverty, health, among others. In our context, the main challenge that the use of these models make us face is to account for the unobserved heterogeneity that can make individuals/households permanently more or less prone to experience FI (or financial exclusion) in any given period as well as feedback effects from previous periods spent under bancarization on the observed determinants of current FI.

To explore these dynamic effects, we first test the existence of state dependence of FI, i.e., whether being or not financially included in period $t-1$ does matter for being or not financial included in period t. A positive answer will allow us to validate our econometric strategy for analyzing how LI affects the probabilities of entry to and exit from the financial system. Table 4 reports the results obtained for our econometric specification shown in Equation 4 with (column (1)) and without (column (2)) interaction terms between the lags of LI and FI. For convenience, we report in the table only the estimated parameters for the key variables, the average partial effects of LI on FI, and the statistics for permanent unobserved heterogeneity. The complete results for full specification are given in Table A.2 in the Appendix.

First, our results show that there exists a statistically significant state dependence between FI and its lag under both specifications. As our dependent variable FI is equal to 1 whether the individual is banked and 0 otherwise, this result implies that being financially included is a persistent phenomenon, namely, being financially included/excluded in the previous year increases the likelihood of being financially included/excluded in the current year. This result suggests that FI, or equivalently financial exclusion, should be viewed as an auto-regressive and not a static phenomenon just like energy or income poverty as highlighted in the literature. In addition, the estimated log of the variance of the permanent unobserved heterogeneity ($ln\sigma^2_\alpha$) reveals a significant role of the unobserved heterogeneity in predicting the probability of having an informal job and being financially included.

Secondly, LI, i.e., the status of having an informal job at period $t-1$ has a negative and significant impact on the probability of being financially included in period t under both specifications. This result is quiet consistent with our previous discussion. It highlights a key role for LI in helping people to escape financial exclusion since formal workers are often obliged to open an account to receive their salaries and the opening procedures are typically done by their employers rather than by the employees themselves. In contrast, informal workers mostly receive their salaries in cash and the account opening procedure not being done by their employers might be seen as just a cost. They are thus less likely to have an account, a debit card or a credit card.

To measure the impact of LI on getting in and out of FI, we include an interaction term between the lags of these two variables as in Bettin et al. (2022). The coefficient associated with the interaction term turns out not to be statistically significant. However, single coefficients may not be informative about the sign and magnitude of the average partial effects of LI on the probability of being banked as well as on the entry to and exit from the financial system. The average partial effects are statistically significant on both the entry and exit rates as shown at the bottom of Table 4. Thus, on the average, having an informal job reduces the probability of entering the financial system by around 8%, whereas it increases the probability of exiting from it around 9.3%. This result suggests that labor formality has a sizeable effect, specifically on preventing people from exiting the financial system.

We now move forward and analyze how labor market transitions affect movements into and out of FI as specified in Equation 11. The estimation results are presented in Table 5. Again, we consider two model specifications, with (column (1)) and without (column (2)) interaction terms between the lags of FI and each labor market transition probability. As before, our results strongly suggest that there exists a state dependence between current and lagged FI statuses. Except for that of moving from labor formality into informality, the coefficients associated with each labor market transition probability are positive and statistically significant saying that when any of these probabilities increases in period $t-1$, the probability of having an account, a debit card or a credit card in period t increases relative to the base category, i.e., remaining with informal jobs in both periods. Finally, the interaction terms are not significant, but again, recall that its single value and magnitude

Table 4: Dynamic random-effects panel probit estimates (with labor informality)

	(1)	(2)
L.fin	0.565***	0.593***
	(0.059)	(0.082)
L.informal	-0.403***	-0.382***
	(0.063)	(0.076)
L.fin $\times$ L.informal		-0.035
		(0.069)
$ln\ \sigma_\alpha^2$	-0.223	-0.227
	(0.124)	(0.124)
Log-likelihood	-11152.58	-11152.44
# Obs	27,177	27,177
# groups	17,742	17,742
Individual controls	✓	✓
Household controls	✓	✓
District controls	✓	✓
Δ entry		-0.080***
		(0.017)
Δ exit		0.093***
		(0.016)

Robust standard errors in parentheses; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

cannot be interpreted. The results for the full specification are given in Table A.3 in the Appendix.

Table 5 reports the average partial effects of each labor market transitions (relative to being stuck in informal jobs) on the probability of entry to and exit from the financial system. Our results suggest that workers who remain with formal jobs see their probability of entry increased by 9% and their probability of exit decreased by 12% relative to those workers who get stuck in informal jobs. For those who move into labor formality, they are more likely to enter the financial system by 9.7% and less likely to exit from it by 7.1% relative to our base category. Finally, moving into LI turns out not to have a significant impact on the entry and exit probabilities of FI relative to our base category. In sum, our results suggest that LI plays a crucial role in both preventing that a person enters the financial system and ensuring that this person moves out of the financial system.

6 Conclusion

This paper provides empirical evidence of the relationship between financial inclusion and labor informality using micro data from Peru, which is a developing economy characterized by a high degree of shadow economy, persistent labor informality, and increasing-but-low level of financial inclusion. To the best of our knowledge, the empirical literature has treated financial inclusion only in a static framework despite the fact that other economic phenomenon such as income poverty, energy poverty, and unemployment have been analyzed

Table 5: Dynamic random-effects panel probit estimates (with labor market transitions)

	(1)	(2)
L.fin	1.229***	1.231***
	(0.041)	(0.046)
Formal → Formal	0.378***	0.318**
	(0.109)	(0.128)
Informal → Formal	0.270***	0.344***
	(0.075)	(0.116)
Formal → Informal	-0.021	0.039
	(0.123)	(0.145)
L.fin × Formal → Formal		0.085
		(0.105)
L.fin × Informal → Formal		-0.115
		(0.145)
L.fin × Formal → Informal		-0.122
		(0.157)
$ln\ \sigma^2_\alpha$	-12.90	-11.70
	(31839)	(9604)
Log-likelihood	-3932.23	-3931.11
# Obs	10,220	10,220
# groups	7,849	7,849
Individual controls	✓	✓
Household controls	✓	✓
District controls	✓	✓
Δ entry (Base category: Informal → Informal)		
Formal → Formal		0.090**
		(0.038)
Informal → Formal		0.097***
		(0.035)
Formal → Informal		0.010
		(0.038)
Δ exit (Base category: Informal → Informal)		
Formal → Formal		-0.120***
		(0.033)
Informal → Formal		-0.071***
		(0.027)
Formal → Informal		0.003
		(0.046)

Robust standard errors in parentheses; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

as dynamic processes. Our paper has attempted to fill this gap. Its novelty is in the application of a dynamic random-effect probit panel modeling framework to financial inclusion to test how labor informality and movements into and out of informaliy/formality affect the probabilities of entry to and exit from financial inclusion.

We provide empirical evidence of the existence of a genuine state dependence of financial inclusion, i.e., the current status of financial inclusion (or equivalently, financial exclusion) is affected by its lagged status. Focusing on labor informality as a determinant of financial inclusion, we find that having an informal job reduces the probability of becoming financially included (entry probability) by about 8.0% and increases the probability of becoming financially excluded (exit probability) by 9.3%. Moreover, examining whether movements between informal and formal jobs affect the likelihood of having an account, a credit card, or a debit card, we find that relative to workers who get stuck in informal jobs, those with formal ones that keep them are more likely to become financially included by 9% and less likely to become financially excluded 12%. For those who move from informal to formal jobs, they are more likely to become financially included by by 9.7% and less likely to become financial excluded by 7.1%.

The results reported in this paper shed light on a facet of labor informality that has been traditionally viewed through its direct economic effect in developing countries. Using data on Peru, we provide empirical evidence on an indirect channel. We find that fighting labor informality would increase financially inclusion that is know to foster economic development, alleviate poverty, migrate towards modern digital payment systems, and increase the effectiveness of monetary policies and financial stability. These spillover positive effects of labor formality strongly militate for encouraging government policies geared to promote it. While the results found in this paper are interesting, of its main messages is that since financial inclusion has become a universal goal throughout the developing world, it should be deeply analyzed as a dynamic process. While we are well aware that our results may be limited by the fact that our database includes only 4 years of surveys and that for technical reasons we had to drop many observations, we are optimistic that this paper opens a promising avenue for future research on the dynamics of financial inclusion.

Appendix

Table A.1: Static panel probit estimates

	(1)	(2)	(3)	(4)
L.informal	-2.067***	-1.584***	-1.571***	-1.552***
	(0.033)	(0.034)	(0.043)	(0.045)
High-school		0.256***	0.204***	0.230***
		(0.033)	(0.043)	(0.046)
Non-university		1.182***	0.998***	1.033***
		(0.046)	(0.061)	(0.064)
University		1.810***	1.475***	1.496***
		(0.052)	(0.067)	(0.070)
Female		0.292***	0.388***	0.322***
		(0.027)	(0.033)	(0.034)
25-40 years		0.602***	0.625***	0.580***
		(0.048)	(0.059)	(0.061)
41-64 years		0.469***	0.369***	0.339***
		(0.050)	(0.061)	(0.064)
65 years +		0.588***	0.394***	0.337***
		(0.054)	(0.065)	(0.069)
Married		0.090***	0.101***	0.101***
		(0.029)	(0.035)	(0.037)
Rural area			0.029	0.009
			(0.043)	(0.048)
Social program			1.370***	1.293***
			(0.047)	(0.050)
Internet			0.356***	0.345***
			(0.040)	(0.042)
Mobile phone			0.058	0.054
			(0.053)	(0.058)
Electricity			0.016	0.065
			(0.063)	(0.071)
Quintile 2 of PCS			0.242***	0.244***
			(0.043)	(0.047)
Quintile 3 of PCS			0.572***	0.514***
			(0.050)	(0.054)
Quintile 4 of PCS			1.018***	0.987***
			(0.057)	(0.060)
Quintile 5 of PCS			1.487***	1.441***
			(0.066)	(0.070)
Quintile 2 of FND				0.096
				(0.067)
Quintile 3 of FND				0.119*
				(0.067)
Quintile 4 of FND				0.094
				(0.063)
Quintile 5 of FND				-0.012
				(0.062)
ρ	0.681	0.682	0.700	0.689
Obs	46,052	46,048	33,187	28,573

Standard errors in parentheses; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.
(*) PCS: Household per capita spending, FND: Financial network density.

Table A.2: Dynamic random-effects panel probit estimates (with labor informality)

	(1)	(2)
L.fin	0.565***	0.593***
	(0.059)	(0.082)
L.informal	-0.403***	-0.382***
	(0.063)	(0.076)
L.fin × L.informal		-0.035
		(0.069)
High-school	0.133***	0.133***
	(0.037)	(0.037)
Non-university	0.539***	0.538***
	(0.054)	(0.054)
University	0.729***	0.728***
	(0.058)	(0.058)
Female	0.164***	0.165***
	(0.028)	(0.028)
25-40 years	0.189***	0.189***
	(0.054)	(0.054)
41-64 years	0.063	0.063
	(0.055)	(0.055)
65 years +	0.036	0.037
	(0.058)	(0.058)
Married	0.070**	0.070**
	(0.030)	(0.030)
Rural area	0.020	0.020
	(0.039)	(0.039)
Social program	0.758***	0.759***
	(0.045)	(0.045)
Internet	0.186***	0.186***
	(0.037)	(0.037)
Mobile phone	-0.005	-0.005
	(0.049)	(0.048)
Electricity	0.015	0.015
	(0.057)	(0.057)
Quintile 2 of PCS	0.200***	0.200***
	(0.040)	(0.040)
Quintile 3 of PCS	0.365***	0.365***
	(0.047)	(0.047)
Quintile 4 of PCS	0.667***	0.668***
	(0.055)	(0.054)
Quintile 5 of PCS	0.920***	0.920***
	(0.063)	(0.063)
Quintile 2 of FND	0.052	0.052
	(0.056)	(0.056)
Quintile 3 of FND	0.036	0.036
	(0.056)	(0.056)
Quintile 4 of FND	0.022	0.022
	(0.052)	(0.052)
Quintile 5 of FND	-0.064	-0.064
	(0.051)	(0.051)
fin0	1.452***	1.452***
	(0.096)	(0.096)
informal0	-0.318***	-0.316***
	(0.069)	(0.069)
_cons	-1.648***	-1.669***
	(0.114)	(0.121)
lnsig2u	-0.227*	-0.227*
	(0.124)	(0.124)
Obs	27,177	27,177

Standard errors in parentheses; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.
(*) PCS: Household per capita spending, FND: Financial network density.

Table A.3: Dynamic random-effects panel probit: Regression results

	(1)	(2)
L.fin	1.229***	1.231***
	(0.041)	(0.046)
L.Formal→Formal	0.378***	0.318**
	(0.109)	(0.128)
L.Informal→Formal	0.270***	0.344***
	(0.075)	(0.116)
L.Formal→Informal	-0.021	0.039
	(0.123)	(0.145)
L.fin×Formal→Formal		0.085
		(0.105)
L.fin×Informal→Formal		-0.115
		(0.145)
L.fin×Formal→Informal		-0.122
		(0.157)
High-school	0.097**	0.096**
	(0.043)	(0.043)
Non-university	0.374***	0.371***
	(0.066)	(0.066)
University	0.506***	0.505***
	(0.071)	(0.071)
Female	0.127***	0.127***
	(0.033)	(0.034)
25-40 years	-0.076	-0.076
	(0.072)	(0.072)
41-64 years	-0.156**	-0.158**
	(0.074)	(0.074)
65 years +	-0.130*	-0.131*
	(0.076)	(0.076)
Married	0.026	0.025
	(0.034)	(0.034)
Rural area	0.082*	0.082*
	(0.044)	(0.044)
Social program	0.585***	0.585***
	(0.055)	(0.055)
Internet	0.104**	0.105**
	(0.047)	(0.047)
Mobile phone	-0.073	-0.074
	(0.059)	(0.059)
Electricity	0.062	0.062
	(0.067)	(0.067)
Quintile 2 of PCS	0.183***	0.183***
	(0.050)	(0.050)
Quintile 3 of PCS	0.347***	0.347***
	(0.061)	(0.061)
Quintile 4 of PCS	0.486***	0.487***
	(0.069)	(0.070)
Quintile 5 of PCS	0.669***	0.670***
	(0.078)	(0.079)
Quintile 2 of FND	0.095	0.095
	(0.067)	(0.067)
Quintile 3 of FND	0.078	0.079
	(0.064)	(0.064)
Quintile 4 of FND	0.071	0.072
	(0.059)	(0.059)
Quintile 5 of FND	0.010	0.010
	(0.058)	(0.058)
fin0	0.815***	0.813***
	(0.062)	(0.062)
informal0	-0.146	-0.143
	(0.102)	(0.102)
_cons	-1.691***	-1.693***
	(0.174)	(0.174)
lnsig2u	-12.907	-11.705
	(31839.534)	(9604.926)
Obs	10,220	10,220

Standard errors in parentheses; *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.
(*) PCS: Household per capita spending, FND: Financial network density.

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