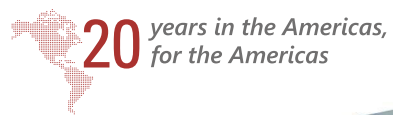




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Financial inclusion transitions in Peru: The role of labour informality*

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*The views expressed here are those of the authors and not necessarily of the BIS or BCRP.

Introduction

- Financial inclusion (access at affordable costs to financial services provided by formal financial intermediaries, including savings, credit, and payments) 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 banked in developing countries (Demirgüç-Kunt et al., 2022).
- Several benefits of financial inclusion: increases productivity and economic growth, fosters digital economy, and enhances financial stability and the effectiveness of the monetary policy.

Motivation

- Financial inclusion (FI) and labour informality (LI) are two key issues in developing countries. Although there are some papers on the relationship between labour informality and financial services (savings, loans), the literature is scarce when the analysis covers the access to bank accounts.
- Peru is one of the least advanced economies in Latin America in terms of FI and one of the countries with the highest degree of LI.
- FI has been traditionally analysed from a static perspective (eg determinants of having a bank account). However, FI transitions (movements into and out) are not explored in the literature like other socio-economic issues (eg energy and income poverty, unemployment)

Research questions

- How labour informality affects financial inclusion? (**Static view**)

- How labour informality (and its movements between formality and informality) affects the probabilities of entry to and exit from the financial system? (**Dynamic view**)

Database

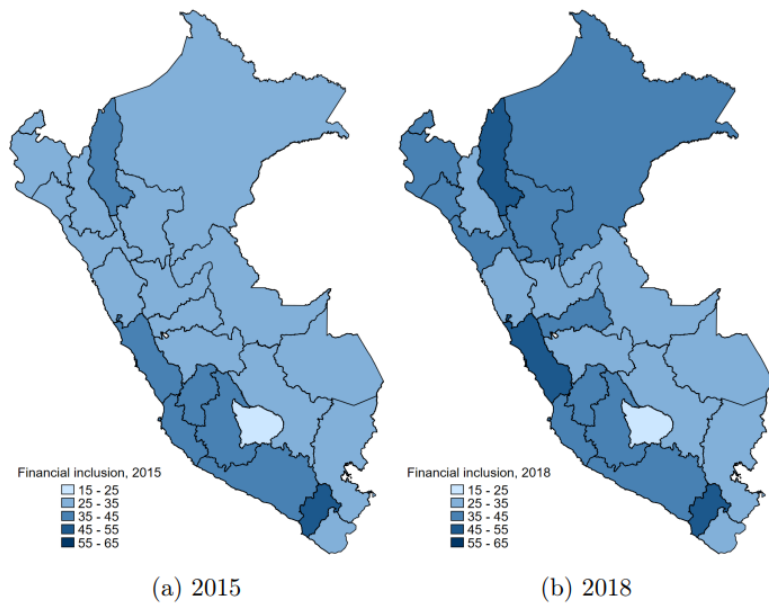
- Encuesta Nacional de Hogares from 2015 to 2018 (4 years).
- Data on:
 - Ownership of accounts and payment cards (financial inclusion)
 - Individual variables: gender, age, education, civil status, labour informality.
 - Household variables: quintile of income, access to the Internet, access to electricity, access to a cell phone, area of residence, receive or not a social subsidy.
 - District variables: quintile of access points density (SBS).

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

How is Peru in terms of financial inclusion?

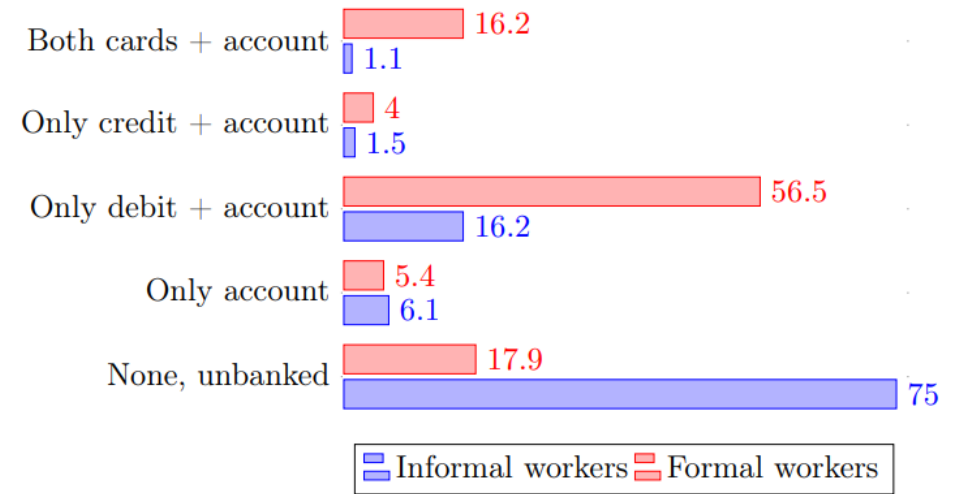
Figure 1: Access to bank accounts/payment cards in Peru: 2015 vs. 2018, % of adult population



Source: ENAHO 2015, 2018

Note: Calculation using population expansion factor. The region with the lowest level (coloured in light blue) is Apurimac, located in the Peruvian highlands.

Figure 2: Ownership of payment instruments, by type of job



Source: Panel ENAHO 2015-2018

Note: Sample calculations.

How is Peru in terms of financial inclusion (from a dynamic perspective)?

Table 2: Financial inclusion transition probabilities

		Period t		# Obs
		Financially excluded	Financially included	
Period $t - 1$	Financially excluded	84.7% (persistence rate)	15.3% (entry rate)	39,560
	Financially included	21.9% (exit rate)	78.1%	21,694
# Obs		38,285	22,969	61,254

(a) Overall

		Period t		# Obs
		Financially excluded	Financially included	
Period $t - 1$	Financially excluded	50.4% (persistence rate)	49.6% (entry rate)	2,769
	Financially included	6.5% (exit rate)	93.5%	8,117
# Obs		1,925	8,961	10,886

(b) Formal workers

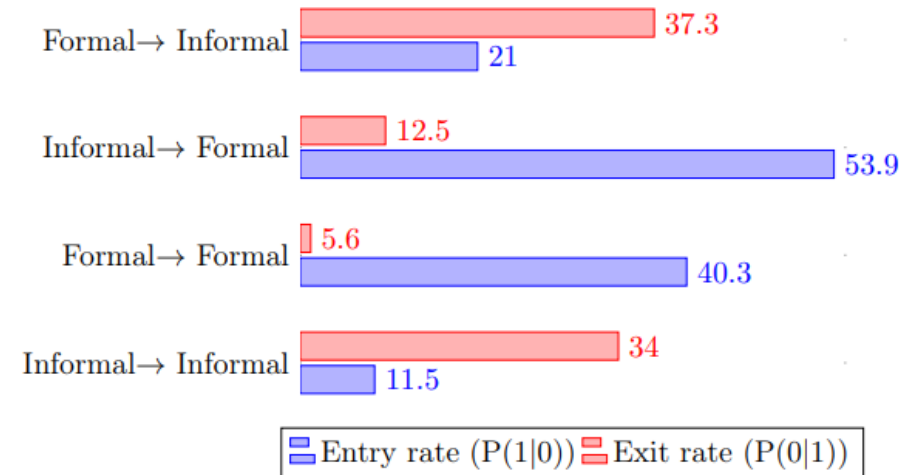
		Period t		# Obs
		Financially excluded	Financially included	
Period $t - 1$	Financially excluded	87.6% (persistence rate)	12.4% (entry rate)	26,652
	Financially included	33.9% (exit rate)	66.1%	8,772
# Obs		26,325	9,099	35,424

(c) Informal workers

Source: Panel ENAHO 2015-2018

Note: Sample calculations.

Figure 3: Financial inclusion transition probabilities by labour market transitions



Source: Panel ENAHO 2015-2018

Note: Sample calculations.

Econometric strategy (I)

- (Static) panel probit

$$y_{i,t} = 1(\gamma L_{i,t-1} + x'_{i,t}\beta + \varepsilon_{i,t} > 0)$$

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 lagged status of the respondent. The vector variable x allows us to control for individual, household and district characteristics.

- Dynamic random-effect panel probit

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

where $y_{i,t}$ and $y_{i,t-1}$ indicate the FI status at respectively period t and period $t - 1$. c_i reflects the individual permanent unobserved heterogeneity and $\varepsilon_{i,t}$ is an error term.

Econometric strategy (II)

- Initial conditions problem

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

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

Equation 2 can then be rewritten as:

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

Transition 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 $t - 1$:

$$entry_{i,t} = Pr(y_{i,t} = 1 | y_{i,t-1} = 0) \quad (5)$$

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

$$exit_{i,t} = Pr(y_{i,t} = 0 | y_{i,t-1} = 1) \quad (6)$$

- Partial effects of LI on the transition probabilities:

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

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

Labour market transitions

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

where $LT_{i,t-1}$ captures the transitions in the labour 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 $t - 1$.

Results

Table 3: Average marginal effects of labor informality on financial inclusion

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

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

Note: The reduced number of observations is partially due to the drop of observations in 2015.

Results (II)

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

	(1)	(2)	(3)	(4)
L.fin	0.565*** (0.059)	0.593*** (0.082)	0.367*** (0.066)	0.570*** (0.078)
L.informal	-0.403*** (0.063)	-0.382*** (0.076)	-0.463*** (0.060)	-0.362*** (0.074)
L.fin × L.informal		-0.035 (0.069)	0.050 (0.056)	-0.047 (0.067)
$\ln \sigma_{\alpha}^2$	-0.227 (0.124)	-0.227 (0.124)	-0.060 (0.088)	-0.102 (0.109)
Log-likelihood	-11152.58	-11152.44	-18101.23	-12939.56
# Obs	27,177	27,177	43,759	31,595
# groups	17,742	17,742	26,399	20,448
Individual controls	✓	✓	✓	✓
Household controls	✓	✓		✓
District controls	✓	✓		
Average marginal effects (Informal Vs Formal (base))				
Δ entry probability		-0.080*** (0.017)	-0.093*** (0.013)	-0.073*** (0.016)
Δ exit probability		0.093*** (0.016)	0.088*** (0.013)	0.088*** (0.015)

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

Note: The reduced number of observations is partially due to the drop of observations in 2015.

Results (III)

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

	(1)	(2)	(3)	(4)
L.fin	1.229*** (0.041)	1.231*** (0.046)	1.241*** (0.035)	1.257*** (0.043)
L.Formal → Formal	0.378*** (0.109)	0.318** (0.128)	0.490*** (0.095)	0.314** (0.122)
L.Informal → Formal	0.270*** (0.075)	0.344*** (0.116)	0.416*** (0.086)	0.366*** (0.110)
L.Formal → Informal	-0.021 (0.123)	0.039 (0.145)	0.284*** (0.108)	0.059 (0.138)
L.fin × L.Formal → Formal		0.085 (0.105)	0.115 (0.081)	0.111 (0.100)
L.fin × L.Informal → Formal		-0.115 (0.145)	-0.220** (0.110)	-0.175 (0.137)
L.fin × L.Formal → Informal		-0.122 (0.157)	-0.286** (0.121)	-0.131 (0.151)
$\ln \sigma_{\alpha}^2$	-12.91 (31839)	-11.71 (9604)	-11.69 (6611)	-11.72 (9582)
Log-likelihood	-3932.23	-3931.11	-6600.56	-4504.65
# Obs	10,220	10,220	17,030	11,737
# groups	7,849	7,849	12,434	9,035
Individual controls	✓	✓	✓	✓
Household controls	✓	✓		✓
District controls	✓	✓		
Average marginal effects				
Δ entry probability (Base: Informal → Informal)				
Formal → Formal		0.090** (0.038)	0.139*** (0.030)	0.088** (0.036)
Informal → Formal		0.097*** (0.035)	0.116*** (0.026)	0.104*** (0.033)
Formal → Informal		0.010 (0.038)	0.076** (0.031)	0.016 (0.037)
Δ exit probability (Base: Informal → Informal)				
Formal → Formal		-0.120*** (0.033)	-0.188*** (0.025)	-0.126*** (0.031)
Informal → Formal		-0.071*** (0.027)	-0.066*** (0.023)	-0.059** (0.026)
Formal → Informal		0.027 (0.046)	0.001 (0.038)	0.023 (0.045)

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

Note: The reduced number of observations is partially due to the drop of observations in 2015 and 2016.

Results (IV)

- Labour informality has a negative and significant impact on the probability of having a bank account/payment card.
- Having an informal job:
 - Reduces the likelihood of entry to the financial system by around 8pp.
 - Increases the probability of exit from the financial system by about 9.3pp
- Workers who stay in formal jobs increase their likelihood of entry by 9pp, and their probability of exit decreases by 12pp relative to those who get stuck in informal jobs.
- Those who move into labour formality are more likely to enter the financial system by 9.7pp and less likely to exit from it by 7.1pp.

Concluding remarks

- Our results show that labour formality plays a crucial role in the expansion of financial inclusion both temporarily (static perspective) and over time (dynamic perspective).
- Fighting labour informality should not only increase ownership of bank accounts and/or payment cards in a given period but also help to have a higher (smaller) portion of banked people entering (exiting from) the financial system.
- Other public policies and private efforts might be necessary to enhance financial inclusion:
 - Reduce withdrawal and deposit fees,
 - Increase merchant acceptance of digital payments,
 - Enhance trust in the financial institutions, and
 - Develop products with features that meet consumer needs such as instantaneous, secure, user-friendly, etc.