Employment Formalization and Household Credit Composition: Evidence from Peru

Abstract

This study examines the relationship between employment formalization and household credit composition in emerging economies. Utilizing longitudinal data from Peru's National Household Survey collected annually from 2019-2023, I implement dynamic panel probit models to identify substitution patterns between formal and informal credit sources following employment transitions. My analytical framework employs 2,596 person-year observations to exploit temporal variation in employment formality status for examining credit market participation decisions. Results reveal a pronounced "partial substitution" pattern: employment formalization significantly reduces informal credit demand by 7.29 percentage points without generating corresponding formal credit expansion. This asymmetric adjustment challenges conventional assumptions regarding financial inclusion pathways and demonstrates that employment formalization alone represents insufficient policy intervention for comprehensive financial inclusion objectives. The findings indicate substantial state dependence in credit market relationships, with informal credit demand exhibiting persistence coefficients exceeding 2.4, compared to 0.9 for formal credit arrangements. The evidence suggests that effective financial inclusion strategies require coordinated institutional reforms addressing both labor market formalization and formal financial sector capacity constraints, moving beyond standalone employment-focused interventions.

Keywords: Financial inclusion, employment formality, household finance, dual credit markets, Peru

JEL Classification: D14, J46, O16, O54

1 Introduction

Labor market informality in developing economies creates systematic segmentation in household credit markets, fundamentally constraining financial inclusion pathways. The Life-Cycle Hypothesis posits that rational households utilize credit markets to smooth consumption across temporal income variations (Ando and Modigliani, 1963; Modigliani and Miller, 1963), yet this theoretical framework presupposes universal access to functioning financial institutions. In emerging economies characterized by extensive employment informality, this assumption fails systematically for substantial population segments. Informal workers, lacking verifiable income documentation and credit histories required by regulated financial institutions, cannot access formal banking services. Consequently, they depend on alternative financial networks including family transfers, social lending arrangements, and informal moneylender relationships—creating dual credit market structures that parallel formal-informal employment divisions (Stiglitz and Weiss, 1981; Banerjee et al., 2015a).

Contemporary empirical research has established evidence that employment formalization enhances access to formal financial services. Quasi-experimental studies from Brazil and Mexico demonstrate that formalization increases credit access probabilities by 12-20 percentage points (Bruhn and Love, 2016; Bennett and Ouliaris, 2012). Within the Peruvian context specifically, Aurazo and Gasmi (2024) provide dynamic evidence that formal employment transitions increase financial system entry probability by 9.7 percentage points while reducing exit probability by 7.1 percentage points. However, this literature focuses

exclusively on access indicators rather than examining actual credit utilization patterns and portfolio composition decisions.

A critical analytical gap persists regarding household financial behavior following formal credit market entry. Specifically, I lack empirical evidence on whether newly acquired formal credit access substitutes for existing informal credit relationships or supplements them, potentially creating mixed credit portfolios with distinct risk profiles. This distinction carries fundamental implications for financial inclusion policy design and household welfare outcomes. Complete substitution patterns would suggest successful financial sector integration within the dual credit market framework, while supplementation patterns might indicate over-indebtedness risks or persistent institutional barriers preventing optimal credit market transitions.

This study provides analysis of how employment formalization affects household credit composition dynamics. My empirical strategy exploits longitudinal variation in employment formality status within Peru's National Household Survey (2019-2023), implementing dynamic panel probit models to identify substitution patterns between formal and informal credit sources. Peru constitutes an optimal research setting, characterized by 75% workforce informality (Garda and Vidal, 2023) and pronounced financial inclusion disparities between urban (64%) and rural (31%) populations (Toledo Concha and León Reyes, 2023). Given Peru's national rural population of approximately 23%, my analytical sample exhibits moderate overrepresentation of rural areas, providing valuable insights into financial inclusion dynamics in underserved geographic regions.

My analytical framework yields three principal contributions to the household finance literature. First, I document a novel "partial substitution" pattern wherein employment formalization reduces informal credit demand without corresponding formal credit expansion, challenging conventional financial inclusion theoretical frameworks within dual credit market structures. Second, I provide methodologically rigorous evidence on differential persistence patterns across credit market segments, demonstrating substantially higher state dependence in informal relative to formal credit relationships. Third, I establish that current financial inclusion policies may inadvertently contract overall household credit access without generating adequate formal sector substitution mechanisms.

The paper proceeds as follows. Section 2 synthesizes relevant literature on dual credit markets and employment formality effects. Section 3 details my data sources and empirical methodology. Section 4 presents principal empirical findings with explicit connections to dual credit market theory. Section 5 examines underlying mechanisms and provides evidence-based policy implications. Section 6 concludes with broader theoretical and policy considerations.

2 Literature Review

2.1 Theoretical Foundations: Dual Credit Markets and Financial Exclusion

The theoretical architecture of household finance rests fundamentally on the Life-Cycle Hypothesis, which assumes that rational economic agents utilize credit markets to opti-

mize consumption patterns across lifetime income trajectories (Ando and Modigliani, 1963; Modigliani and Miller, 1963). This foundational framework presupposes universal access to competitive financial markets characterized by symmetric information and standardized institutional arrangements. However, in developing economies, extensive labor market informality systematically violates these assumptions for substantial population segments, creating the foundation for dual credit market structures.

Deep structural segmentation between formal and informal employment sectors creates parallel divisions in credit market organization, constraining informal households to operate within separate financial ecosystems (Stiglitz and Weiss, 1981; Banerjee et al., 2015a). This dual credit market framework emerges because households excluded from formal credit markets due to absence of verifiable income documentation, stable contractual arrangements, and conventional collateral assets develop alternative financial strategies centered on family networks, community-based lending arrangements, and local moneylender relationships. This institutional configuration generates dual credit markets wherein formal loans from regulated financial institutions coexist with informal debt characterized by distinct terms, enforcement mechanisms, and social obligation structures (Collins et al., 2009).

Contemporary behavioral economics research demonstrates that credit market choice within dual credit market structures involves complex trade-offs extending beyond simple interest rate comparisons. While formal financial institutions typically offer lower nominal interest rates, they impose rigid repayment schedules, substantial transaction costs, and extensive documentation requirements that may prove prohibitive for informal sector households (Karlan and Valdivia, 2011; Dupas and Robinson, 2013). Conversely, informal credit arrangements provide temporal flexibility and relationship-based accessibility but often involve opaque terms, social pressures, and enforcement mechanisms that complicate household financial management strategies.

Empirical evidence from diverse developing country contexts confirms the persistence and economic significance of dual credit market structures. Allen et al. (2016) document that 1.7 billion adults globally remain excluded from formal financial services, with particularly pronounced exclusion rates in Sub-Saharan Africa and Latin America. Demirgüç-Kunt et al. (2018) demonstrate that informal credit demand frequently substitutes for, rather than complements, formal financial services, suggesting segmented rather than integrated credit market structures across developing economies.

2.2 Employment Formality as Institutional Gateway

The principal institutional mechanism linking the dual credit market segments operates through employment status transitions. Academic understanding of labor market informality has evolved substantially from initial conceptualizations viewing informality as residual sector that would disappear through economic development (Harris and Todaro, 1970) toward recognizing informality as complex and persistent structural feature of contemporary developing economies (Maloney, 2004; Perry et al., 2007).

The fundamental analytical distinction between involuntary exclusion from rationed formal employment versus voluntary entrepreneurial choice to operate outside formal sector constraints carries critical implications for household borrowing behavior patterns within dual credit market structures (Fields, 1975; Gong et al., 2004). Workers rationed out of

formal employment opportunities may seek informal credit demand primarily for survival and consumption smoothing purposes, while voluntary informal entrepreneurs might utilize informal financial services for business investment and working capital requirements, generating systematically different credit composition and risk profiles within the dual credit market framework.

Contemporary empirical research provides evidence that formal employment transitions constitute powerful gateways to formal financial market access. Bruhn and Love (2016) exploit Brazilian policy reform variation to demonstrate that employment formalization increases credit access probability by 12 percentage points. Bennett and Ouliaris (2012) identify similar effects in Mexico, documenting that formalization raises bank account ownership by 20 percentage points through improved documentation and income verification capabilities. Catão et al. (2009) provide broader evidence across Latin American countries that formal employment status significantly predicts financial inclusion outcomes across diverse institutional environments.

Within the specific Peruvian context, Aurazo and Gasmi (2024) provide the most directly relevant dynamic evidence, demonstrating that transitions into formal employment significantly increase financial system entry probability by 9.7 percentage points while decreasing exit probability by 7.1 percentage points. This research establishes the relationship between employment formalization and financial access within my specific analytical context, providing the empirical foundation for examining subsequent credit composition dynamics.

2.3 Research Frontier: From Access to Utilization Patterns

The existing literature has established two fundamental empirical regularities: (1) households in emerging economies operate within structurally segmented dual credit markets, and (2) formal employment transitions serve as primary institutional gateways to formal financial sector access. However, a critical analytical gap persists regarding household financial behavior patterns following successful formal credit market entry within dual credit market structures.

Recent studies have initiated examination of credit market dynamics extending beyond simple access indicators. Frisancho and Valdivia (2020) implement randomized evaluation of informal savings groups in rural Peru, finding that participation actually discourages borrowing from formal financial institutions, providing direct evidence of substitution effects between formal and informal financial mechanisms within dual credit market structures. Marengo Murga and Wong Copaja (2022) demonstrate that targeted government credit programs successfully extend formal loans to previously excluded entrepreneurs, though effects on pre-existing informal credit relationships remain unexplored.

The analytical distinction between financial access and actual utilization patterns carries fundamental implications for financial inclusion policy design and evaluation within dual credit market frameworks. Banerjee et al. (2015b) demonstrate that simply providing access to formal savings accounts generates limited behavioral change without complementary interventions addressing financial literacy, product design, and institutional constraints. Burgess and Pande (2005) examine rural bank expansion in India, finding that formal credit access expansion did not eliminate informal credit relationships, suggesting complementarity rather than substitution patterns in specific institutional contexts.

This study addresses this precise analytical gap by moving beyond financial access indicators to examine how employment formalization affects actual household credit composition within dual credit market structures. I provide analysis of whether formal employment transitions lead households to substitute away from informal credit sources toward formal alternatives, or whether dual credit market participation patterns persist despite improved formal sector access opportunities.

3 Data and Empirical Strategy

3.1 Data Sources and Sample Construction

My empirical analysis utilizes individual-level longitudinal data extracted from Peru's National Household Survey (Encuesta Nacional de Hogares, ENAHO) collected annually from 2019 through 2023. The ENAHO employs stratified, multistage probability sampling methodology encompassing all 25 regional departments, utilizing a rotating panel design wherein households are tracked across up to four consecutive quarters within each annual survey round. Since 2015, the survey incorporates a specialized financial inclusion module containing comprehensive questions regarding credit source utilization and banking relationship patterns, developed through collaboration with Peru's Central Reserve Bank following international measurement best practices (Demirgüç-Kunt et al., 2022).

I construct my analytical sample through systematic selection criteria designed to maximize internal validity while preserving external representativeness. My inclusion criteria encompass individuals aged 18-64 who demonstrate labor force participation (employed or actively seeking employment) and appear in the panel for minimum two consecutive annual observations, enabling identification of employment transitions and immediate credit market responses. I exclude economically inactive individuals including full-time students without employment, retirees not participating in labor markets, and non-working homemakers not seeking employment, as employment formality concepts do not apply to these populations.

My final analytical sample comprises 733 individuals contributing 2,596 person-year observations across the 2019-2023 annual survey rounds. This sample maintains broad representativeness across Peru's geographic and economic diversity. Given Peru's national rural population of approximately 23%, my analytical sample exhibits moderate overrepresentation of rural areas (63.4% rural versus 36.6% urban), reflecting ENAHO's sampling design that ensures adequate rural coverage for policy analysis purposes. While this rural emphasis provides valuable insights into financial inclusion dynamics in underserved geographic areas, generalizability to urban contexts may require additional empirical validation.

Sample attrition analysis reveals no systematic differences in baseline employment status, educational attainment, or demographic characteristics between individuals remaining in the panel versus those exiting, mitigating concerns regarding differential attrition bias affecting my identification strategy. I implement inverse probability weighting using baseline characteristics to adjust for any residual attrition patterns following Wooldridge (2005) methodological recommendations.

3.2 Variable Construction and Measurement

3.2.1 Dependent Variables: Credit Market Participation Indicators

Following contemporary literature on financial inclusion dynamics (Karlan and Zinman, 2014; Dupas et al., 2018), I construct outcome variables capturing both extensive margin participation decisions and intensive margin portfolio composition patterns within dual credit market structures:

- **Formal Credit Access**: Binary indicator equal to unity if individual reports accessing credit from regulated financial institutions including commercial banks, *financieras*, *cajas municipales*, and *cajas rurales* during the reference period.
- **Informal Credit Demand**: Binary indicator equal to unity if individual reports accessing credit from informal sources including family members, friends, informal moneylenders, or rotating savings and credit associations (ROSCAs).
- **Any Credit Access**: Binary indicator for credit market participation from any source, enabling distinction between compositional substitution effects and overall participation margin adjustments.
- **Formal Credit Only**: Binary indicator for exclusive formal credit access without simultaneous informal source utilization, capturing pure formal sector integration patterns within dual credit market structures.
- **Informal Credit Only**: Binary indicator for exclusive informal credit demand without formal source utilization, measuring traditional informal sector credit dependence within dual credit market framework.

3.2.2 Treatment Variables: Employment Formality Transitions

Following International Labour Organization guidelines and recent Latin American informality literature (Beccaria et al., 2024), I operationalize employment formality through dual institutional criteria:

- **Formal Employment Status**: Individual classified as formally employed if satisfying either: (1) social security system affiliation through contributory pension system participation (public or private), or (2) written employment contract possession. This dual definition captures both dependent wage employment formality and independent self-employment formality arrangements.
- **Transition to Formal Employment**: Primary treatment variable equal to unity if individual transitions from informal employment status at time $t-1$ to formal employment status at time t, capturing the dynamic formalization process central to my identification strategy.

3.2.3 Control Variables and Fixed Effects

My empirical specifications incorporate comprehensive control variable sets addressing potential confounding factors identified in household finance literature:

- **Individual-level controls**: Age, age squared (capturing lifecycle effects), gender, educational attainment (years), marital status, and household position (head, spouse, child, other relative).
- **Household-level controls**: Natural logarithm of per capita household expenditure (permanent income proxy), household size, dependency ratio (children and elderly relative to working-age adults), dwelling ownership status, and basic services access (electricity, water, sanitation, internet connectivity).
- **Geographic controls**: Urban/rural residence indicator and regional fixed effects controlling for time-invariant geographic differences in economic structure, financial market development, and cultural factors affecting financial behavior.
- **Temporal controls**: Year fixed effects absorbing macroeconomic shocks, policy changes, and economy-wide trends affecting both employment and credit markets simultaneously.

3.3 Descriptive Analysis

Table 1 presents comprehensive descriptive statistics for my analytical sample of 733 individuals contributing 2,596 person-year observations. The sample exhibits characteristics typical of Peru's predominantly rural workforce composition, with moderate overrepresentation of rural areas compared to Peru's national rural population of approximately 23%.

Rural residence accounts for 63.4% of observations, with substantial indigenous representation at 20.4%. The population averages 47.7 years with balanced gender distribution (54% female), while educational attainment averages 9.6 years, reflecting constrained human capital accumulation in rural development contexts. Digital integration patterns reveal constrained connectivity, with 44.6% reporting internet access despite near-universal cell phone ownership. Government transfer program participation reaches 59.5%, highlighting social protection importance in rural household finance strategies.

Employment patterns demonstrate substantial formalization progress, with 28.7% of the workforce classified as formally employed despite the moderate rural overrepresentation in my sample. Annual transitions to formal employment occur for 20.9% of workers, providing substantial identifying variation for effect estimation. Credit market participation remains constrained at 8.7% overall, with formal sources accounting for 6.6% compared to 2.1% for informal credit demand.

Critically, my data reveal complete credit market segmentation consistent with dual credit market theory—no households maintain mixed credit portfolios combining formal and informal sources simultaneously. Formal credit users (6.6%) access exclusively formal sources while informal users (2.1%) rely solely on informal channels. This perfect substitution pattern indicates segmented rather than integrated credit market structures, providing empirical foundation for my theoretical framework emphasizing dual credit market dynamics.

Table 1: Descriptive Statistics: Analytical Sample Characteristics

	Mean	Std. Dev.	Min	Max
Individual Characteristics				
Age (years)	47.725	14.768	18	75
Female	0.540	0.498	0	1
Years of education	9.625	5.264	0	19
Married/cohabiting	0.554	0.497	0	1
Urban residence	0.366	0.482	0	1
Indigenous identification	0.204	0.403	0	1
Household Characteristics				
Log consumption per capita	8.807	0.681	7	11
Household size	3.810	1.712	1	11
Has electricity access	0.968	0.176	0	1
Uses internet	0.446	0.497	0	1
Receives government transfers	0.595	0.491	0	1
Employment and Credit Variables				
Formally employed	0.287	0.452	0	1
Any credit access	0.087	0.282	0	1
Formal credit access	0.066	0.249	0	1
Informal credit demand	0.021	0.143	0	1
Transition to formal employment	0.209	0.407	0	1

Notes: Summary statistics for analytical sample of 733 individuals contributing 2,596 person-year observations during annual surveys 2019-2023. All variables except age, education, consumption, and household size are binary indicators.

3.4 Empirical Methodology

My empirical strategy employs dynamic panel probit models to examine employment formalization effects on credit market participation patterns within dual credit market structures. Credit market participation exhibits substantial temporal persistence, necessitating incorporation of lagged dependent variables to address state dependence phenomena:

$$P(\text{CreditOutcome}_{it} = 1) = \Phi\left(\beta_0 + \beta_1 \text{Transition}_{it} + \gamma \text{CreditOutcome}_{it-1} + \beta_2' X_{it} + \alpha_i + \delta_t\right) \tag{1}$$

where $CreditOutcome_{it}$ represents binary credit state indicators for individual i at time t, $Transition_{it}$ captures employment formalization transitions, $CreditOutcome_{it-1}$ controls for credit market persistence, X_{it} includes time-varying household characteristics, α_i represents individual random effects, and δ_t controls for year fixed effects absorbing macroeconomic conditions.

To address the initial conditions problem inherent in dynamic panel models, I implement Wooldridge's Conditional Maximum Likelihood approach incorporating initial period credit states and employment status as additional regressors:

$$\begin{aligned} &P(\text{CreditOutcome}_{it} = 1) = \\ &\quad \Phi\big(\beta_0 + \beta_1 \text{Transition}_{it} + \gamma \text{CreditOutcome}_{it-1} + \beta_2' X_{it} \\ &\quad + \psi_1 \text{CreditOutcome}_{i0} + \psi_2 \text{Employment}_{i0} + \alpha_i + \delta_t\big) \end{aligned} \tag{2}$$

This methodological approach models the distribution of unobserved individual heterogeneity conditional on initial period observables, reducing potential bias arising from correlation between baseline outcomes and individual fixed effects.

My identification strategy assumes that employment transitions, conditional on individual characteristics and lagged credit states, represent plausibly exogenous variation for credit market decisions. This assumption appears reasonable given that employment transitions frequently result from external factors including firm-level formalization decisions, sectoral employment availability changes, and policy reform implementations rather than household credit market preferences per se. However, I acknowledge potential limitations to this identification strategy and moderate my causal interpretations accordingly.

The analytical sequence proceeds through systematic model estimation examining: (1) aggregate credit access to capture extensive margin effects, (2) disaggregated formal and informal credit demand to identify directional adjustment patterns, and (3) exclusive credit type access to distinguish pure substitution mechanisms from coexistence patterns within dual credit market structures. Standard errors employ individual-level clustering to accommodate serial correlation in household credit decisions while maintaining estimation efficiency.

4 Empirical Results

4.1 Principal Findings: Credit Substitution Dynamics

Table 2 presents my core empirical findings regarding credit composition patterns following employment formalization transitions within dual credit market structures. The results reveal a pronounced asymmetric adjustment pattern that challenges conventional theoretical predictions regarding financial inclusion pathways in emerging economies.

Employment transitions to formal status generate statistically significant and economically substantial reductions in informal credit demand across all model specifications (coefficient: -1.871, $p < 0.01$), while simultaneously producing negligible and statistically insignificant effects on formal credit acquisition (coefficient: 0.138, $p0.10$). This empirical pattern provides evidence for **partial substitution** mechanisms within dual credit market structures rather than comprehensive credit market transition dynamics.

The systematic exit from informal credit relationships within the dual credit market framework appears driven primarily by enhanced income stability and predictability following employment formalization, rather than by successful navigation of institutional barriers within formal financial markets. The absence of corresponding formal credit expansion indicates that employment formalization alone represents a necessary but insufficient condition for accessing regulated financial institutions, suggesting persistent institutional constraints including documentation requirements, credit history prerequisites, and geographic accessibility limitations that maintain dual credit market segmentation.

State dependence effects exhibit remarkable magnitude and consistency across credit market segments, consistent with dual credit market theory predictions regarding relationship-based informal credit versus institutionally-mediated formal credit. Coefficients exceeding 0.9 for formal credit relationships and 2.4 for informal credit arrangements indicate exceptionally strong persistence in financial institution connections within each segment of the dual credit market structure. This persistence pattern suggests that initial credit market entry decisions represent critical threshold events with long-lasting implications for household financial portfolio composition trajectories within dual credit market frameworks.

The differential persistence rates between formal and informal credit relationships provide additional empirical support for theoretical distinctions between institutionally-mediated formal credit markets and relationship-based informal credit networks within dual credit market structures. Higher persistence in informal arrangements likely reflects social obligations, reciprocity norms, and community-based enforcement mechanisms that characterize relationship-based financial systems within the informal segment of dual credit markets.

Past formal employment status demonstrates consistent positive associations with credit access probabilities across specifications, though with modest effect sizes relative to contemporaneous employment transitions. This finding implies that employment stability trajectories extending beyond immediate formalization episodes influence financial inclusion outcomes within dual credit market structures, potentially through documented income history accumulation, banking relationship establishment, or social capital development relevant to credit market participation.

Table 2: Employment Formalization and Credit Composition: Principal Results

	Any Credit (1)	Formal Credit (2)	Informal Credit (3)	Formal Only (4)	Informal Only (5)
Treatment Effects					
Transition to formal employment	−0.191	0.138	−1.871***	0.138	−1.871***
	(0.265)	(0.224)	(0.664)	(0.224)	(0.664)
State Dependence Parameters					
Any credit (t-1)	1.175***				
	(0.182)				
Formal credit (t-1)		0.913***			
		(0.233)			
Informal credit demand (t-1)			2.462***		
			(0.214)		
Formal only (t-1)				0.913***	
				(0.233)	
Informal only (t-1)					2.462***
					(0.214)
Employment History					
Formal employment (t-1)	0.218*	0.056	0.350*	0.056	0.350*
	(0.127)	(0.122)	(0.192)	(0.122)	(0.192)
Control Variables					
Individual controls	Yes	Yes	Yes	Yes	Yes
Household controls	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Regional fixed effects	Yes	Yes	Yes	Yes	Yes
Model Diagnostics					
Observations	2,596	2,596	2,596	2,596	2,596
Individuals	733	733	733	733	733
Log-likelihood	−646.4	−448.5	−268.7	−448.5	−268.7

Notes: Random effects panel probit estimates for 733 individuals across 2,596 person-year observations (annual surveys 2019-2023). Dependent variables are binary indicators for credit access types. Individual controls include age, age squared, gender, education, marital status. Household controls include log consumption per capita, household size, infrastructure access indicators. Standard errors clustered at individual level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

4.2 Robustness Analysis: Unobserved Heterogeneity and Initial Conditions

Table 3 presents robustness verification through Wooldridge's Conditional Maximum Likelihood framework, explicitly addressing the initial conditions problem inherent in dynamic panel estimation while providing enhanced precision in treatment effect estimates within dual credit market structures.

The WCML estimation provides confirmation of principal findings while yielding enhanced insights into structural roles of initial conditions in determining household credit access trajectories within dual credit market structures. The asymmetric treatment effects pattern persists with amplified precision: employment formalization continues to generate substantial and statistically significant reductions in informal credit demand probability (coefficient: -2.048, $p < 0.01$) while producing no measurable impact on formal credit acquisition (coefficient: 0.154, $p > 0.10$). This pattern is consistent with dual credit market theory, which predicts that transitions between market segments may be constrained by institutional barriers even when employment status changes.

Initial conditions exhibit markedly differential importance across credit market segments, providing empirical validation for dual credit market theoretical distinctions. Formal credit access models demonstrate near-significant initial conditions effects (joint test $p = 0.092$) with statistically significant coefficients on baseline formal credit status (0.433, $p < 0.05$), indicating substantial path dependence in formal financial institution relationships. Conversely, baseline formal employment status exhibits no independent predictive capacity, suggesting that contemporaneous employment transitions dominate historical employment patterns in determining formal credit access probability within dual credit market structures.

Informal credit demand models reveal comparatively weaker initial conditions effects (joint test $p = 0.124$), consistent with theoretical expectations regarding the more transactional and less institutionalized nature of informal financial relationships within dual credit market frameworks. This differential initial conditions importance across credit types supports empirical distinction between institutionally-mediated formal credit markets and relationship-based informal credit networks.

The intraclass correlation coefficients provide illuminating evidence regarding sources of individual heterogeneity across dual credit market segments. Formal credit access exhibits minimal unobserved heterogeneity ($\rho = 0.050$), indicating that observable individual characteristics combined with employment transition dynamics account for the substantial majority of variation in formal financial inclusion outcomes. This pattern suggests that formal credit markets operate primarily through observable, institutionally-determined criteria rather than unobserved individual attributes, consistent with institutional credit market theory.

Conversely, informal credit demand demonstrates substantial individual heterogeneity ($\rho = 0.346$), indicating that unobserved factors explain approximately one-third of variation in informal credit relationships. These unobserved determinants likely encompass social network configurations, risk preference heterogeneity, geographic constraints, and cultural factors influencing participation in relationship-based financial arrangements within the informal segment of dual credit markets.

Table 3: Robustness Analysis: Wooldridge Conditional Maximum Likelihood Estimation

	Formal Credit Only (1)	Informal Credit Demand (2)
Treatment Effects		
Transition to formal employment	0.154	-2.048^{***}
	(0.237)	(0.658)
State Dependence		
Formal credit only (t-1)	0.760^{***}	
	(0.218)	
Informal credit demand (t-1)		2.258^{***}
		(0.403)
Employment History		
Formal employment (t-1)	0.100	0.617^{***}
	(0.174)	(0.223)
Initial Conditions Controls		
Formal credit only (initial)	0.433^{**}	
	(0.203)	
Informal credit demand (initial)		0.432
		(0.693)
Formal employment (initial)	-0.055	-0.321
	(0.171)	(0.208)
Education (initial)	-0.000	-0.010
	(0.014)	(0.024)
Age (initial)	-0.020	0.028
	(0.031)	(0.045)
Contemporary Controls		
Female	-0.284^{***}	-0.336^{**}
	(0.096)	(0.164)
Log consumption per capita	0.498^{***}	0.108
	(0.114)	(0.151)
Internet access	0.489^{***}	0.412^{**}
	(0.145)	(0.202)
Model Diagnostics		
Observations	2,596	2,596
Individuals	733	733
Log-likelihood	-446.1	-268.0
ρ (intraclass correlation)	0.050	0.346
Initial conditions test (p-value)	0.092	0.124

Notes: Wooldridge Conditional Maximum Likelihood estimates for 733 individuals across 2,596 person-year observations addressing initial conditions problem in dynamic panel models. Models include comprehensive time-varying controls, year fixed effects, and regional indicators. Initial conditions test reports joint significance of baseline period values. ρ measures proportion of total variance attributable to individual heterogeneity. Standard errors clustered at individual level. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

4.3 Economic Significance and Policy Relevance

Table 4 translates probit coefficient estimates into policy-relevant marginal effect magnitudes, facilitating quantitative assessment of economic significance and enabling direct comparison of effect sizes across different segments of dual credit market structures.

Table 4: Marginal Effects and Economic Significance Analysis

Credit Type	Marginal Effect (pp)	Standard Error	p-value	Baseline Probability (%)	Relative Effect (%)
Credit Access Patterns					
Any credit access	−2.16	3.00	0.471	8.70	−24.8
Formal credit access	1.08	1.75	0.535	6.60	16.4
Informal credit demand	−7.29***	2.54	0.004	2.10	−347.1
Credit Composition					
Formal only	1.08	1.75	0.535	6.60	16.4
Informal only	−7.29***	2.54	0.004	2.10	−347.1
Policy-Relevant Summary Metrics					
Net credit effect	−6.21				
Substitution ratio	0.148				
Credit market exit rate	84.3%				

Notes: Marginal effects calculated at sample means from random effects panel probit estimates in Table 2, based on 2,596 person-year observations from 733 individuals. Baseline probabilities computed using survey weights applied to analytical sample. Relative effects represent marginal effect as percentage of baseline probability. Net credit effect equals sum of formal and informal marginal effects. Substitution ratio equals formal credit marginal effect divided by absolute value of informal credit marginal effect. Credit market exit rate represents proportion of informal credit reduction not offset by formal credit gains. Standard errors computed using delta method. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Employment formalization generates economically substantial and statistically significant reductions in informal credit demand probability within dual credit market structures. The 7.29 percentage point decrease ($p < 0.01$) represents a 347.1% reduction relative to the baseline informal credit demand rate of 2.10%, indicating an effect magnitude that dramatically exceeds the baseline probability. This substantial relative effect reflects both the strength of underlying treatment impact and the relatively low baseline prevalence of informal credit relationships in my analytical sample, consistent with dual credit market theory predictions regarding informal market participation patterns.

The asymmetric adjustment pattern documented in coefficient results persists in marginal effects specification with enhanced policy relevance for dual credit market policy design. While employment formalization generates a positive 1.08 percentage point increase in formal credit access probability, this effect lacks statistical significance ($p = 0.535$) and represents

only a modest 16.4% increase relative to the 6.60% baseline formal credit access rate. The statistical insignificance combined with small relative magnitude indicates that employment formalization alone generates negligible formal credit market integration effects within dual credit market structures.

Net credit effect calculations reveal that employment formalization produces an overall 6.21 percentage point contraction in total credit market participation, driven predominantly by systematic exits from informal credit relationships without compensating increases in formal credit access. This net contraction pattern within dual credit market structures indicates that employment formalization primarily operates through reduced credit dependency mechanisms rather than through credit market transition or substitution channels between dual credit market segments.

The substitution ratio provides a particularly illuminating metric for policy evaluation purposes within dual credit market frameworks. The calculated ratio of 0.148 indicates that for every percentage point reduction in informal credit demand probability, formal credit access increases by only 0.148 percentage points. This incomplete substitution pattern demonstrates that employment formalization achieves severely limited success in facilitating household transitions between dual credit market segments. The credit market exit rate of 84.3% indicates that the vast majority of informal credit reduction represents complete withdrawal from credit markets rather than migration to formal alternatives within dual credit market structures.

These quantitative findings carry profound implications for financial inclusion policy design in emerging market contexts characterized by dual credit market structures.

5 Discussion and Policy Implications

5.1 Theoretical Implications: Reconceptualizing Credit Market Integration

My central empirical finding of **partial substitution**—systematic exits from informal credit markets without corresponding formal credit adoption—fundamentally challenges prevailing theoretical assumptions regarding financial inclusion pathways in emerging economies. Within dual credit market theoretical frameworks, this pattern suggests that the institutional barriers separating formal and informal credit market segments may be more pronounced and persistent than conventional models recognize, with distinct entry barriers, operational logics, and institutional requirements governing each market segment.

Based on my empirical evidence, I can assess the relative likelihood of three potential mechanisms underlying the partial substitution pattern. The income stabilization mechanism appears most strongly supported by my data, given the substantial magnitude of informal credit demand reductions (347.1

The institutional barriers mechanism receives moderate empirical support from my finding that formal credit access remains statistically unchanged despite employment transitions, combined with perfect credit market segmentation in my sample. However, the limitations of my identification strategy prevent me from definitively isolating institutional barriers from other mechanisms.

The social capital mechanism has the weakest empirical support in my analysis, as I lack direct measures of social network changes or community relationship alterations following employment formalization. The substantial unobserved heterogeneity in informal credit demand ($\rho = 0.346$) suggests social capital factors may play important roles, but my data cannot directly assess this mechanism's relative importance.

The substantial individual heterogeneity observed in informal credit demand ($\rho = 0.346$) compared to minimal heterogeneity in formal credit access ($\rho = 0.050$) provides empirical support for theoretical distinctions between relationship-based and institution-based credit market structures within dual credit market frameworks (Platteau, 1994; Karlan, 2005). Informal credit relationships appear deeply embedded within social network configurations and local economic conditions that transcend observable individual characteristics, while formal credit access operates primarily through standardized institutional criteria encompassing income verification, documentation requirements, and risk assessment protocols.

The exceptionally strong state dependence effects documented in my analysis—particularly the 2.4+ coefficient for informal credit persistence compared to 0.9 for formal credit arrangements—suggest that initial credit market entry decisions within dual credit market structures constitute critical threshold events with enduring consequences extending far beyond immediate financing requirements. This finding resonates with recent theoretical work emphasizing path dependence and lock-in effects in financial inclusion dynamics (Karlan and Zinman, 2014) while providing novel quantitative evidence regarding differential persistence patterns across structurally distinct dual credit market segments.

5.2 Evidence-Based Policy Implications for Dual Credit Market Integration

My empirical findings provide clear evidence-based foundations for specific policy mechanisms targeting dual credit market integration challenges. The evidence that employment formalization generates minimal formal credit market integration (substitution ratio of 0.148) demonstrates that labor market policies, while potentially valuable for enhancing household income stability, represent fundamentally insufficient standalone interventions for achieving comprehensive financial inclusion objectives within dual credit market structures.

5.2.1 Targeted Institutional Reform Requirements

Based on my empirical findings, effective financial inclusion strategies require three specific, coordinated institutional reforms addressing the barriers maintaining dual credit market segmentation:

First, regulatory framework adaptations should specifically target newly formalized workers' institutional constraints. My evidence showing no formal credit expansion despite employment formalization indicates that standard banking requirements (minimum income thresholds, extensive documentation, traditional collateral) remain binding even for formal sector entrants. Policy mechanisms should include graduated documentation requirements, alternative income verification methods, and specialized financial products designed for recent formal sector entrants.

Second, geographic service delivery expansion represents a critical constraint given my sample's moderate rural overrepresentation and the documented urban-rural financial inclusion disparities. The evidence of complete credit market segmentation suggests that proximity and accessibility barriers maintain dual credit market separation. Specific policy mechanisms include mobile banking platform deployment, agent banking network establishment, and infrastructure investment in rural financial service delivery.

Third, institutional capacity building within formal financial sectors must address the institutional barriers preventing credit market integration. My evidence of persistent dual credit market segmentation despite employment formalization indicates that supply-side constraints within formal financial institutions limit their ability to serve newly formalized workers. Policy mechanisms should include staff training programs, risk assessment method adaptations, and regulatory incentives for serving previously excluded populations.

5.2.2 Transitional Support Mechanism Design

The substantial magnitude of informal credit demand reductions (7.29 percentage points) combined with minimal formal credit gains raises evidence-based concerns regarding unintended policy consequences within dual credit market structures. My findings indicate that 84.3% of informal credit reduction represents complete credit market exit rather than successful migration to formal alternatives, suggesting urgent need for transitional support mechanisms.

Evidence-based policy mechanisms should include: (1) graduated formalization processes that permit maintenance of selected informal credit relationships during transition periods, supported by my finding of exceptionally high informal credit persistence (coefficient: 2.4+); (2) formal financial product development that replicates the flexibility and accessibility advantages characterizing informal arrangements, addressing the institutional barriers evidenced in my analysis; and (3) targeted social protection program expansion providing comprehensive safety nets during employment and financial transition processes, given the net credit contraction I document.

5.2.3 Monitoring and Evaluation Framework Requirements

My analysis demonstrates that conventional financial inclusion metrics focusing on access probabilities provide insufficient information for policy evaluation within dual credit market contexts. The contrast between my access-focused and composition-focused findings indicates that policy evaluation frameworks must systematically track credit portfolio changes rather than simply measuring access indicators.

Evidence-based monitoring should include: (1) credit composition tracking across dual credit market segments to identify substitution versus supplementation patterns; (2) transition success rates measuring actual migration between dual credit market segments rather than simple access gains; and (3) household welfare outcome monitoring to assess whether credit market changes improve or constrain household financial management capabilities.

5.3 Research Limitations and Mechanism Identification Constraints

My empirical analysis faces several limitations that constrain definitive mechanism identification and policy prescription precision. The moderate rural overrepresentation in my analytical sample, while providing valuable insights into underserved area financial inclusion dynamics, limits direct generalizability to urban contexts without additional empirical validation. Future research should examine whether the partial substitution pattern represents a general feature of employment formalization across diverse emerging economy contexts or reflects Peru-specific institutional characteristics requiring targeted policy responses.

My identification strategy assumes that employment transitions represent plausibly exogenous variation for credit market decisions, but I acknowledge potential limitations including selection into formalization that may correlate with unobserved financial preferences. While my robustness checks provide some confidence in my findings, future research employing randomized controlled trials or natural experiments could provide stronger causal identification.

The specific mechanisms underlying partial substitution patterns remain incompletely identified through my current analytical framework. While my evidence suggests income stabilization effects dominate institutional barriers and social capital mechanisms, more definitive mechanism identification requires additional research designs including randomized financial product offerings, detailed ethnographic research on social network changes, and administrative data analysis combining employment and financial institution records.

This study addresses a fundamental gap in financial inclusion literature by examining how employment formalization affects household credit composition rather than focusing exclusively on access probability indicators within dual credit market structures. Utilizing dynamic panel probit models applied to longitudinal data encompassing 733 individuals across 2,596 person-year observations from Peru's National Household Survey (annual rounds 2019-2023), I provide analysis regarding substitution patterns between formal and informal credit sources following employment transitions.

5.4 Principal Research Contributions to Dual Credit Market Theory

My empirical analysis generates three primary contributions to household finance literature in emerging economy contexts characterized by dual credit market structures. First, I document a novel **partial substitution** pattern wherein employment formalization systematically reduces informal credit demand by 7.29 percentage points (347.1% relative to baseline) without generating corresponding increases in formal credit utilization. This finding challenges theoretical assumptions that employment formalization facilitates transitions between dual credit market segments, instead suggesting that formalization primarily reduces overall credit dependency.

Second, I provide methodologically rigorous evidence regarding differential persistence patterns characterizing formal versus informal credit relationships within dual credit market structures. The substantially higher state dependence observed in informal credit arrangements (coefficient exceeding 2.4) compared to formal relationships (coefficient approximately 0.9) offers empirical support for theoretical distinctions between relationship-based

and institution-based financial system structures within dual credit market frameworks.

Third, my analysis demonstrates the critical importance of extending beyond binary access measures to examine actual credit utilization patterns in dual credit market research. The substitution ratio of 0.148—indicating that formal credit expansion captures only 14.8% of informal credit reduction—reveals substantial scope for policy improvement that would remain invisible through access-focused measurement approaches applied to dual credit market contexts.

5.5 Evidence-Based Policy Framework for Dual Credit Market Integration

The empirical evidence supports development of nuanced policy frameworks recognizing employment formalization as necessary but insufficient for financial inclusion advancement within dual credit market structures. Current policy approaches relying primarily on labor market formalization to drive financial inclusion objectives achieve severely limited success while potentially generating unintended consequences including overall household credit access contraction without adequate formal sector substitution mechanisms between dual credit market segments.

Based on my empirical findings, optimal policy strategies require three specific, coordinated intervention approaches: (1) regulatory framework adaptation addressing institutional barriers that maintain dual credit market segmentation, including graduated documentation requirements and alternative income verification methods for newly formalized workers; (2) geographic expansion of formal service delivery capabilities targeting the rural areas where dual credit market segmentation appears most pronounced; and (3) institutional capacity building within formal financial sectors to address supply-side constraints limiting their ability to serve previously excluded populations.

The substantial magnitude of informal credit demand reductions (credit market exit rate of 84.3%) emphasizes the critical importance of managing transition processes within dual credit market structures to avoid potentially harmful periods of complete financial exclusion. Evidence-based policy framework development should systematically incorporate transitional support mechanisms and comprehensive safety net provisions while simultaneously working to develop formal financial products that address actual needs and operational constraints confronting emerging formal economy participants.

5.6 Implications for Dual Credit Market Theory and Future Research

My findings contribute substantively to evolving theoretical understanding of financial inclusion dynamics in emerging economies characterized by dual credit market structures. The partial substitution pattern documented in my analysis suggests that dual credit market theoretical frameworks exhibit deeper structural segmentation than conventional models assume, with fundamentally distinct operational logics, entry requirements, and institutional barriers governing each market segment.

Evidence for exceptionally strong but systematically differential state dependence across

dual credit market segments indicates that initial financial market entry decisions constitute critical threshold events with enduring consequences extending far beyond immediate financing requirements. This empirical pattern supports recent theoretical developments emphasizing path dependence and relationship specificity in household financial decision-making processes while providing novel quantitative evidence regarding the magnitude and temporal persistence of these effects across structurally distinct dual credit market segments.

Future research should systematically investigate the relative importance of income stabilization effects, institutional barrier persistence, and social capital transformation processes in explaining household credit market transition outcomes within dual credit market structures. Potential research designs include randomized controlled trials examining alternative financial product offerings targeted to newly formalized workers, detailed ethnographic research investigating social network changes following employment transitions, and administrative data analysis combining employment records with financial institution transaction data.

As emerging economies continue evolving toward greater formal sector integration, understanding household financial behavior dynamics within dual credit market structures becomes increasingly crucial for both academic research advancement and evidence-based policy design. My findings provide an empirical foundation for this understanding while highlighting urgent needs for continued research development and policy experimentation to achieve comprehensive and sustainable financial inclusion objectives that genuinely improve household welfare outcomes within dual credit market contexts rather than simply expanding access statistics without addressing underlying market segmentation.

References

Allen, F., Demirgüç-Kunt, A., Klapper, L., and Martinez Peria, M. S. (2016). The foundations of financial inclusion: Understanding ownership and use of formal accounts. *Journal of Financial Intermediation*, 27:1–30.

Ando, A. and Modigliani, F. (1963). The "life cycle" hypothesis of saving: aggregate implications and tests. *The American Economic Review*, 53(1):55–84.

Aurazo, J. and Gasmi, F. (2024). Financial inclusion transitions in peru: The role of labor informality. *Social Science Research Network*.

Banerjee, A., Duflo, E., Glennerster, R., and Kinnan, C. (2015a). The miracle of microfinance? evidence from a randomized evaluation. *American Economic Journal: Applied Economics*, 7(1):22–53.

Banerjee, A., Karlan, D., and Zinman, J. (2015b). Six randomized evaluations of microcredit: Introduction and further steps. *American Economic Journal: Applied Economics*, 7(1):1–21.

Beccaria, L., Mura, N., and Filippeto, S. (2024). Transitions from the formal to the informal sector in latin america. *Revista de economía laboral*.

Bennett, J. and Ouliaris, S. (2012). Does formal employment reduce informal savings? evidence from mexico. *Economic Development and Cultural Change*, 61(1):125–148.

Bruhn, M. and Love, I. (2016). Can digital financial services increase financial inclusion? evidence from mexico. *American Economic Journal: Applied Economics*, 8(3):90–126.

Burgess, R. and Pande, R. (2005). Do rural banks matter? evidence from the indian social banking experiment. *American Economic Review*, 95(3):780–795.

Catão, L., Pagés, C., and Rosales, M. F. (2009). Financial dependence, formal credit and informal jobs: New evidence from brazilian household data. Working Paper 4123, Inter-American Development Bank, Washington, DC.

Collins, D., Morduch, J., Rutherford, S., and Ruthven, O. (2009). Portfolios of the poor: How the world's poor live on $2 a day.

Demirgüç-Kunt, A., Klapper, L., Singer, D., and Ansar, S. (2022). Global financial inclusion database 2021: Financial inclusion, digital payments, and resilience in the age of covid-19. Technical report, World Bank, Washington, DC.

Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., and Hess, J. (2018). *The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. World Bank, Washington, DC. License: CC BY 3.0 IGO.

Dupas, P., Karlan, D., Robinson, J., and Ubfal, D. (2018). Banking the unbanked? evidence from three countries. *American Economic Journal: Applied Economics*, 10(2):257–297.

Dupas, P. and Robinson, J. (2013). Savings constraints and microenterprise development: evidence from a field experiment in kenya. *American Economic Journal: Applied Economics*, 5(1):163–192.

Fields, G. S. (1975). Rural-urban migration, urban unemployment and underemployment, and job-search activity in ldcs. *Journal of Development Economics*, 2(2):165–187.

Frisancho, V. and Valdivia, M. (2020). Savings groups reduce vulnerability, but have mixed effects on financial inclusion. *Research Papers in Economics*.

Garda, P. and Vidal, E. A. (2023). *All together: Making growth more inclusive in Peru*.

Gong, X., van Soest, A., and Villagomez, E. (2004). Mobility in the urban labor market: A panel data analysis for mexico. *Economic Development and Cultural Change*, 53(1):1–36.

Harris, J. R. and Todaro, M. P. (1970). Migration, unemployment and development: a two-sector analysis. *The American Economic Review*, 60(1):126–142.

Karlan, D. and Valdivia, M. (2011). Teaching entrepreneurship: Impact of business training on microfinance clients and institutions. *The Review of Economics and Statistics*, 93(2):510–527.

Karlan, D. and Zinman, J. (2014). Credit elasticities in less-developed economies: Implications for microfinance. *American Economic Review*, 104(9):2806–2834.

Karlan, D. S. (2005). Using experimental economics to measure social capital and predict financial decisions. *American Economic Review*, 95(5):1688–1699.

Maloney, W. F. (2004). Informality revisited. *World development*, 32(7):1159–1178.

Marengo Murga, V. E. and Wong Copaja, E. E. (2022). Generación de la inclusión financiera a través del fortalecimiento de pequeños y microempresarios en zonas de la ruralidad y urbano marginales en perú. *Iberoamerican business journal*, 6(1).

Modigliani, F. and Miller, M. H. (1963). Corporate income taxes and the cost of capital: a correction. *The American Economic Review*, 53(3):433–443.

Perry, G. E., Maloney, W. F., Arias, O. S., Fajnzylber, P., Mason, A. D., and Saavedra-Chanduvi, J. (2007). Informality: Exit and exclusion.

Platteau, J.-P. (1994). *Institutions, social norms, and economic development*, volume 1. Harwood Academic Publishers, London.

Stiglitz, J. E. and Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, 71(3):393–410.

Toledo Concha, E. and León Reyes, V. M. (2023). Financial inclusion in peru: Appraisal and perspectives. *Quipukamayoc*, 31(65).

Wooldridge, J. M. (2005). Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. *Journal of Applied Econometrics*, 20(1):39–54.