Financial Access and the Structural Persistence of Labor Informality: Evidence From Mexico

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Abstract

Despite two decades of financial sector expansion and rising educational attainment, labor informality still affects more than half of Mexico's employed workers, suggesting the persistence of structural rather than transitional forces. Using official quarterly Mexican data for 2005–2024, this paper estimates the long-run relationships among labor informality, labor poverty, labor force participation, and access to capital (financial access). The empirical strategy combines an autoregressive distributed lag (ARDL) error-correction model with unit-root and cointegration tests, complemented by OLS estimates using HAC standard errors. Access to capital emerges as the determinant most robustly associated with informality; its negative sign and magnitude remain stable across logarithmic and dynamic specifications and in specifications that include a COVID-19 dummy, whereas the labor force participation channel appears cyclical and becomes statistically insignificant once the pandemic period is explicitly modeled. Labor poverty retains a stable positive association throughout. A negative and statistically significant error-correction coefficient points to gradual mean reversion toward the estimated long-run relationship. Although formal statistical support for cointegration is mixed, the estimated long-run relationships remain sufficiently stable to be interpreted as persistent structural associations rather than causal effects. These findings suggest that enforcement-based formalization policies are unlikely to reduce informality unless accompanied by measures that expand access to productive finance and raise labor incomes, particularly for households and micro- and small-scale enterprises facing binding financial constraints.

Keywords: labor informality, access to capital, financial access, labor poverty, ARDL, cointegration

1. Introduction

Labor informality in Mexico is not a transitional phenomenon awaiting eventual resolution through economic growth. It is a structural feature of the labor market that has persisted through two decades of cyclical expansions and contractions, institutional reforms, and substantial changes in the composition of labor supply. According to the Encuesta Nacional de Ocupación y Empleo (ENOE), the labor informality rate fell from approximately 59% in 2005 to around 55% by end-2024, a trajectory of slow, incomplete formalization that coexisted with sustained improvements in average schooling, rising financial intermediation, and substantial expansion in the productive capital stock. The magnitude involved is far from marginal. By the close of 2025, informal employment accounted for roughly 33 million workers, equivalent to 54.6% of total employment, with the bulk of the year's net job creation concentrated in informal arrangements (INEGI, 2026). That successive gains in human and financial capital have failed to translate into a decisive contraction of informality is the central puzzle this paper sets out to address.

The welfare and macroeconomic consequences of mass informality have been extensively documented across both individual and aggregate dimensions. At the individual level, informality entails job precariousness, exclusion from contributory social protection, and heightened poverty exposure (Cuevas, De la Torre, & Regala, 2016). At the aggregate level, it depresses economy-wide productivity, constrains fiscal capacity, and reinforces a dual labor market structure that limits the scope for inclusive growth, a mechanism the World Bank (2021) identifies as one of the principal channels through which informality perpetuates poverty traps in developing economies. These consequences have motivated an extensive literature on the correlates of informality. Microeconomic studies have traced its links to educational attainment and demographic composition (Cuevas, De la Torre, & Regala, 2016;

Guzmán & Quezada, 2025), while macroeconomic work has emphasized growth cycles and institutional incentives (Palafox, 2024; Varela & Retamoza, 2023). These strands typically examine such determinants in isolation, and few studies model the joint, long-run contribution of labor income precariousness, supply-side pressure on the formal labor market, and capital access at the national aggregate level and quarterly frequency. The role of capital access—a term used here interchangeably with financial access to denote the availability of financing to the non-financial private sector, rather than the physical capital stock—is especially underexplored. If what divides formal from informal production is a productivity gap sustained by financial exclusion, as the dual-economy literature contends, then access to productive finance is not one correlate among many but a candidate structural determinant, one whose long-run effect on aggregate informality in Mexico remains largely unquantified.

It is this joint, long-run perspective that we take up here. The working hypothesis is direct: labor poverty and labor force participation exert upward pressure on informality, while access to capital exerts a countervailing negative effect. Testing this hypothesis draws on 80 quarters of official data (2005Q1–2024Q4) and takes seriously the non-stationarity of the series, a property that cross-sectional and metropolitan-panel designs, whatever their virtues at the individual level, are not built to handle.

This paper makes three contributions. First, it incorporates access to capital as a determinant of informality at the national aggregate level—a dimension underexplored in macroeconomic studies for Mexico—and quantifies its long-run mitigating role over a horizon that encompasses two distinct institutional and conjunctural regimes. Second, the 2005–2024 sample spans the COVID-19 shock and the subsequent labor-market recomposition, episodes whose effects on the structural baseline of informality have not been documented with high-frequency aggregate series. Third, the empirical design—an ARDL error-correction framework supported by unit-root and cointegration diagnostics—separates stable long-run associations from short-run cyclical co-movements, a distinction that proves consequential for interpreting the labor force participation channel and that disciplines the reading of all estimates as structural associations rather than causal effects.

The argument proceeds as follows. Section 2 situates the three proposed channels within the dualist, structuralist, institutional, and neoclassical traditions and reviews the Mexican evidence. Sections 3 and 4 describe the data and lay out an empirical strategy designed for the mixed integration properties of the series. Section 5 presents the results and assesses their robustness; Section 6 develops their policy implications; and Section 7 concludes.

2. Literature Review

Labor informality in Mexico encompasses workers employed in informal economic units and, within formally registered firms, those lacking social security coverage and statutory labor protections (Varela & Retamoza, 2023). Explaining its persistence has engaged several distinct theoretical traditions that are complementary rather than competing, each illuminating a different dimension of the phenomenon. Rather than cataloguing these contributions study by study, the review that follows is organized around the mechanisms they propose; its purpose is to establish what the existing evidence can and cannot say about the joint, long-run determination of aggregate informality, and thereby to delimit the gap this paper addresses (Section 2.3).

2.1 Theoretical Approaches

The dualist tradition treats informality as a residual that expands when formal employment growth is insufficient to absorb labor supply, so that informality functions as a structural safety valve rather than a voluntary or preferred mode of employment. In Mexico, Palafox (2024), using a Blanchard–Quah–identified SVAR model, documents a significant negative relationship between economic growth and the informality rate, confirming that cyclical contractions push workers into the informal sector. This behavioral regularity is consistent with dual labor market theory (Ryan & McNabb, 1990), but its implication for the present analysis cuts deeper than the business cycle. If informality contracts only when formal employment grows, then the structural forces limiting formal sector expansion (labor poverty, inadequate capital access, and weak productive dynamism) become binding constraints, not the cycle itself.

The structuralist tradition departs from this framing by treating informality not as a residual but as a functional element of the productive system (Tokman & Délano, 2001; Jiménez, 2012). Under this view, the informal sector coexists with and subsidizes the formal sector, reducing effective labor costs, absorbing low-productivity workers, and enabling capital accumulation that would otherwise require higher wages or more extensive social protection. Labor poverty and financial exclusion, in this reading, are not merely correlates of informality but conditions that actively reproduce the productive segmentation sustaining it. Varela and Retamoza (2023) provide aggregate-level support for this interpretation, finding that informality responds to structural determinants such as economic growth, schooling, and public expenditure, with slow-moving, persistent dynamics inconsistent with a purely transitional or cyclical account.

La Porta and Shleifer (2014), synthesizing cross-country evidence, frame this debate in terms of productivity rather than regulatory compliance. In their dual-economy account, informal firms are not primarily formal sector evaders but technologically inferior units whose low productivity levels preclude their bearing the fixed costs of formality. This perspective sharpens the analytical role of capital access in our analysis. If the formal–informal divide reflects a productivity gap rooted in financial exclusion, then easing capital constraints, rather than intensifying enforcement, is the structurally appropriate policy response. In Mexico, this mechanism is compounded by the country's dual social insurance architecture, which Levy (2008) and, in formal modeling terms, Antón, Hernández, and Levy (2013) show imposes disproportionately high and non-linear marginal formalization costs on low-wage workers and small productive units. In their account, the bundling of contributory benefits with payroll taxation depresses real wages and total factor productivity, reinforcing the very productive segmentation that capital access could, in principle, help dissolve.

The institutional approach locates the informality decision in the cost–benefit calculus of regulatory compliance. When taxes, minimum wages, and registration costs impose burdens that exceed the productivity thresholds of small economic units, formalization becomes financially infeasible, and informality emerges as a rational response rather than a market failure (Edwards & Cox-Edwards, 2000). Robles and Ambriz (2024), applying structural equation models to Mexico over 1980–2022, find that increases in taxes, minimum wages, and unemployment rates are associated with higher informality. These results underscore the importance of the capital access variable, since capital constraints amplify the relative cost of formality and reduce the subset of productive units for which compliance is economically viable.

Neoclassical theory characterizes labor market equilibrium in terms of labor supply and demand (Cuthbertson & Taylor, 1987). When labor force participation expands faster than the formal sector's absorptive capacity, particularly in the absence of robust social protection, excess labor supply is absorbed into informal employment (Todaro, 1969; Casarreal & Cruz, 2021). This mechanism implies that the relationship between labor force participation and informality depends on the economy's productive capacity. In a rapidly expanding formal sector, higher participation may translate into formal employment, whereas in structurally constrained economies it is more likely to increase informal employment. The relationship is therefore expected to be conditional rather than universal, a proposition that the empirical strategy outlined in Section 4 is designed to evaluate.

A further channel through which capital access bears on informality operates via human capital theory (Becker, 1964). Financial and productive resources lower the entry costs of formal registration. These costs, which span compliance expenditures, legal fees, and the cash-flow burden of contributory social security, would otherwise trap households and small units in subsistence-level informal activities. Guzmán and Quezada (2025), using metropolitan-panel data, find a negative and significant effect of schooling on informality, consistent with the broader capital-access mechanism. At the individual level, Guillermo-Peón and Estrada (2025), through probit estimates on ENOE microdata, show that economic precariousness raises the probability of informality and generates intergenerational persistence, indicating that the labor poverty channel is self-reinforcing across cohorts and cannot be addressed by formalization incentives aimed at current workers alone. Valuable as this micro-level evidence is for identifying who becomes informal, its cross-sectional and short-panel designs cannot recover economy-wide long-run relationships, nor confront the non-stationarity of the aggregate series through which structural persistence manifests itself.

2.2 Sociodemographic and Macroeconomic Determinants

Sociodemographic heterogeneity shapes the distribution of informality across the population in ways that aggregate indicators can only partially capture. Hualde and Mancini (2024) identify schooling attainment, gender, and regional marginalization as persistent sources of differential exposure. Cuevas et al. (2016), using probit models on ENOE data, confirm that women, young workers, and residents of marginalized territories face structurally higher probabilities of informality, with each additional year of schooling reducing this probability through both the human capital channel and differential access to labor markets with stronger institutional enforcement. Regional patterns have been further disrupted by the pandemic. Rodríguez et al. (2024), applying logit models, document that the probability of informality increased after 2020 and that spatial disparities between central-southern and northern Mexico widened, suggesting that the COVID-19 shock deepened structural unevenness rather than triggering a uniform national transition.

At the macroeconomic level, the growth–informality nexus is real but asymmetric. Per capita income growth reduces informality in the long run, and public expenditure on education and social policy plays a complementary mitigating role, yet these relationships attenuate sharply during severe contractions (Varela & Retamoza, 2023; Palafox, 2024). Labor inspection offers an instructive case of policy design under productive constraints. Samaniego and Fernández (2024) show that increased enforcement can induce formalization at the margin but also generate employment destruction and accelerated turnover when the productive conditions necessary to sustain formality are absent, a cautionary result for coercive formalization strategies. What this aggregate literature has yet to incorporate, however, is the financing channel: growth, fiscal, and institutional determinants are typically modeled in isolation, while the role that dual-economy theory assigns to financial access remains either a theoretical proposition (Levy, 2008; Antón, Hernández, & Levy, 2013) or a micro-level account of credit barriers (Hernández-Trillo & Martínez-Gutiérrez, 2022), rather than a quantified determinant of the national informality rate.

2.3 Critical Assessment and Contribution of This Paper

Three mechanisms emerge as consistent candidates for aggregate empirical investigation across this body of literature: the subsistence trap embedded in labor poverty, the supply-side pressure captured by labor force participation, and the enabling function of capital access in lowering the costs of formalization. Yet the evidence supporting each mechanism remains fragmented in ways that limit what can be inferred about their joint operation, and three limitations stand out.

First, the literature is methodologically segmented. Microeconometric studies based on ENOE microdata or metropolitan panels (Cuevas et al., 2016; Rodríguez et al., 2024; Guillermo-Peón & Estrada, 2025; Guzmán & Quezada, 2025) are well suited to documenting individual heterogeneity but cannot, by construction, recover economy-wide long-run relationships, while the aggregate studies (Varela & Retamoza, 2023; Palafox, 2024; Robles & Ambriz, 2024) examine growth, fiscal, and institutional determinants one channel at a time, leaving the joint operation of labor poverty, labor supply pressure, and financing conditions unexamined. Second, and most directly relevant to this paper, financial access is conspicuously absent from the aggregate empirical work on Mexican informality: its centrality is asserted by dual-economy theory (La Porta & Shleifer, 2014) and by the institutional analyses of Levy (2008) and Antón et al. (2013), and micro-level evidence confirms that credit constraints bind for small firms (Hernández-Trillo & Martínez-Gutiérrez, 2022), but its long-run association with the national informality rate has not been quantified. Third, the time-series properties of the aggregate evidence are rarely confronted: existing macroeconomic studies seldom distinguish stable long-run relationships from short-run cyclical co-movement, and none models the COVID-19 break with high-frequency national data, even though the pandemic visibly distorted measured informality.

We designed the empirical analysis around these three gaps: we model labor poverty, labor force participation, and access to capital jointly, at the national level and quarterly frequency, over a sample (2005Q1–2024Q4) that spans the pandemic shock, within an ARDL error-correction framework that accommodates the mixed integration properties of the series and separates long-run structural associations from short-run dynamics. It is this design that allows our central question—whether financial access operates as a structural determinant of informality rather than one correlate among many—to be addressed at the aggregate level for Mexico.

3. Data and Variables

We use quarterly data for the period 2005Q1–2024Q4 (80 observations), obtained from four official Mexican institutions: the National Institute of Statistics and Geography (INEGI), the National Council for the Evaluation of Social Development Policy (CONEVAL), the Bank of Mexico (Banxico), and the Ministry of Finance and Public Credit (SHCP). All variables are expressed as proportions of the relevant population or aggregate.

The dependent variable, the labor informality rate, is defined as the share of employed individuals working under informal conditions, as measured by the ENOE (Note 1). The explanatory variables are as follows: labor poverty, defined as the share of individuals whose labor income is lower than the cost of the basic food basket, as reported by CONEVAL (Note 2); labor force participation, defined as the economic activity rate of the population aged 15 and over, obtained from the ENOE; and access to capital, defined as the availability of financing to the non-financial private sector, expressed as a percentage of GDP and constructed using data from Banxico and SHCP. Throughout the paper, the terms access to capital and financial access are used interchangeably to refer to this dimension of financial conditions; importantly, this variable does not capture the physical capital stock. Table 1 summarizes variable definitions and data sources.

Table 1. Variable definitions and sources

Variable	ID	Definition	Source
Labor informality	*INF_LA*	Share of the employed population in informal employment (ENOE).	INEGI
Labor poverty	*POB_LA*	Share of people with labor income below the food basket.	CONEVAL
Labor force participation	*PAR_LA*	Economic participation rate of the population aged 15 and over.	INEGI
Access to capital	*ACC_CA*	Financing to the non-financial private sector as a proportion of GDP.	Banxico, SHCP

Notes: Quarterly frequency, 2005Q1–2024Q4 (N = 80). All variables are expressed as proportions.

The labor informality rate averaged 57.4% over the sample period, with a standard deviation of 1.8 percentage points (Table 2). Its minimum value of 50.9%, recorded in 2020Q2, should be interpreted with caution (Note 3). This observation reflects not only compositional changes in informal employment but, more importantly, the sharp withdrawal of low-income informal workers from labor force participation during the pandemic-related lockdowns, which temporarily depressed the measured informality rate below its structural level before it rebounded in subsequent quarters (Figure 1). Access to capital exhibits the greatest dispersion among the explanatory variables, increasing from 25.5% to a peak of 62.3% in 2020Q2 before partially reverting in the following quarters (Note 4).

Table 2. Descriptive statistics

Variable	Mean	S.D.	Min.	Max.
INF_LA	0.5737	0.0179	0.5090	0.5990
POB_LA	0.3979	0.0269	0.3470	0.4600
PAR_LA	0.5964	0.0144	0.4920	0.6110
ACC_CA	0.4140	0.0861	0.2550	0.6230

Note: N = 80 quarterly observations (2005Q1–2024Q4).

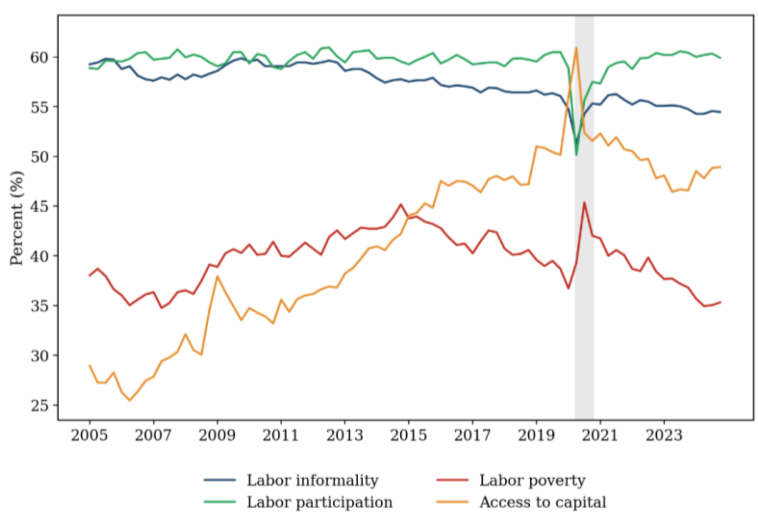

Figure 1. Quarterly trends in the study variables, 2005–2024

Note: The shaded area corresponds to the COVID-19 shock quarters (2020Q2–2020Q4).

4. Empirical Strategy

The analysis begins with a linear model relating labor informality to the three structural factors:

$$INF\_LA_t = \beta_0 + \beta_1 \, POB\_LA_t + \beta_2 \, PAR\_LA_t + \beta_3 \, ACC\_CA_t + u_t \quad (1)$$

where $\beta_1>0$, $\beta_2>0$, and $\beta_3<0$ are the maintained hypotheses. Because the analysis relies on quarterly macroeconomic time series, the stochastic properties of the variables must first be established. Regressions in levels involving non-stationary series may produce spurious relationships that arise in finite samples irrespective of the underlying economic structure (Granger & Newbold, 1974), and the appropriate estimation framework depends critically on whether the variables share a cointegrating vector. The empirical strategy therefore proceeds in four stages. Taken together, these stages are designed to confront the statistical properties of the series directly—their order of integration, the mixed I(0)/I(1) structure, residual serial correlation and heteroskedasticity, the pronounced inertia of macroeconomic ratios, and the pandemic break—so that inference rests on consistent and robust estimates with asymptotically valid standard errors rather than on the levels regression alone.

First, the integration order of each variable is assessed through augmented Dickey–Fuller (ADF) and Phillips–Perron tests, both with a unit-root null, complemented by the KPSS test, whose null is stationarity. Employing tests with opposing null hypotheses reduces the risk of classification error inherent in any single test framework, a concern of relevance in samples of moderate length such as this one.

Second, given the possibility of mixed orders of integration, the existence of a long-run relationship is examined by testing the stationarity of the residuals from the levels regression. The Engle–Granger procedure is the primary vehicle for this assessment. Because it is known to exhibit low power in finite samples and sensitivity to lag length, its results are cross-validated against the error-correction dynamics of the ARDL model estimated in the fourth stage.

Third, equation (1) is estimated by OLS and evaluated against the classical assumptions, namely multicollinearity (variance inflation factors and the regressor correlation matrix), homoskedasticity (White and Breusch–Pagan tests), and absence of autocorrelation (Durbin–Watson and Breusch–Godfrey tests). When departures from classical assumptions are detected, inference is based on HAC Newey–West standard errors, preserving asymptotic validity without imposing a specific parametric model of the disturbance process (Note 5).

Fourth, to explicitly model adjustment dynamics, an autoregressive distributed lag (ARDL) model is specified and its error-correction representation derived. Unlike Johansen-type procedures, the ARDL framework does not require that all variables be integrated of the same order, making it particularly suited to the mixed I(0)/I(1) structure documented in the first stage (Pesaran, Shin, & Smith, 2001). The bounds F-test associated with this representation provides the formal test for the existence of a long-run relationship, with the error-correction coefficient interpreted as evidence on the speed of adjustment. A potential identification concern is reverse causality between labor informality and labor poverty, because informal employment itself tends to suppress labor income, which could render POB_LA endogenous. This concern is acknowledged in the interpretation of results and in the limitations discussed in Section 7. Because identifying a valid external instrument at the national quarterly frequency is difficult, we interpret the estimated coefficients primarily as structural associations rather than definitive causal effects. As a robustness exercise, Section 5.6 instruments labor poverty with its own lagged values to assess whether the principal findings are sensitive to potential reverse causality.

5. Results

5.1 Unit-Root Tests

Table 3 reports the unit-root test results. In levels, labor informality, labor poverty, and access to capital display the characteristic signature of I(1) processes, since the ADF and Phillips–Perron statistics fail to reject the unit-root null while the KPSS test simultaneously rejects stationarity. Labor force participation, by contrast, is stationary in levels under all three criteria. Because it is I(0), its inclusion alongside I(1) regressors precludes the application of standard Johansen cointegration procedures and motivates the ARDL framework adopted in the fourth empirical stage. In first differences, all four series are stationary.

Table 3. Unit-root tests

Variable	ADF	PP	KPSS	ADF (Δ)	KPSS
INF_LA	−1.10	−1.53	1.22***	−8.44***	0.11
POB_LA	−2.13	−2.11	0.32	−8.59***	0.27
PAR_LA	−5.64***	−5.65***	0.20	−9.30***	0.24
ACC_CA	−1.43	−1.19	1.31***	−8.83***	0.19

Note: ADF: augmented Dickey–Fuller; PP: Phillips–Perron; *** denotes rejection of the null at 1%. Optimal lags by the Akaike information criterion.

5.2 Cointegration Test

The Engle–Granger test applied to the residuals from the levels regression yields an ADF statistic of −4.85 in the no-lag specification, exceeding in absolute value the 1% critical value of approximately −4.30 for three regressors and thus formally rejecting the null hypothesis of no cointegration. This result is, however, sensitive to lag selection. Once additional lags are included, the test statistic approaches the non-rejection region, reducing confidence in the inference. The evidence of cointegration should therefore be regarded as suggestive rather than conclusive.

For models combining I(0) and I(1) regressors, such as the present specification, the ARDL error-correction framework provides a more appropriate basis for inference than the Engle–Granger two-step procedure. Rather than relying on the stationarity of estimated residuals, the ARDL approach tests directly for the existence of a long-run relationship through the bounds-testing procedure.

As a direct test of the long-run relationship within the ARDL framework, the bounds F-test of Pesaran, Shin, and Smith (2001) evaluates the joint significance of the lagged level terms in the conditional error-correction model (Case III: unrestricted intercept, no deterministic trend, and $k=3$ regressors). The computed statistic ($F=1.61$) lies below the lower I(0) critical bound at all conventional significance levels (2.72 at 10%, 3.23 at 5%, and 4.29 at 1%) and, consequently, also below the corresponding upper I(1) bounds (3.77, 4.35, and 5.61, respectively) reported by Pesaran et al. (2001). It likewise falls below the higher small-sample critical values proposed by Narayan (2005) for samples of approximately 80 observations. The companion t-bounds test for the speed-of-adjustment coefficient ($t= -2.40$) also fails to exceed its corresponding lower critical bound. Taken together, these results provide no evidence of a long-run levels relationship among the variables.

This conclusion is consistent with the lag sensitivity observed in the Engle–Granger test and supports the conservative interpretation adopted throughout the analysis. Although the estimated error-correction coefficient is negative and statistically significant under conventional t-tests (Section 5.5), its significance does not survive evaluation under the non-standard bounds distribution. Accordingly, the estimated long-run coefficients are more appropriately interpreted as stable structural associations than as parameters of a well-established cointegrating relationship.

5.3 Levels Model and Diagnostics

Table 4 reports the main regression results. The baseline OLS specification (Model 1) explains 86.1% of the variation in the labor informality rate ($R^2=0.861$; adjusted $R^2=0.856$; $F=157.1$, $p<0.001$). All three explanatory variables exhibit the theoretically expected signs and are individually significant at the 1% level. Labor poverty (0.292) and labor force participation (0.263) are positively associated with labor informality, whereas access to capital (−0.179) exhibits a negative association. Model 2 reports identical coefficient estimates using HAC Newey–West standard errors to account for the autocorrelation and heteroskedasticity documented in Section 5.4. All coefficients remain statistically significant under this more conservative inferential framework, confirming that the estimated relationships are robust to the observed disturbance properties of the data.

The log-log specification (Model 3) expresses the results in elasticity form. A 1% increase in labor poverty is associated with a 0.23% increase in labor informality, whereas a 1% increase in access to capital is associated with a 0.12% reduction. These elasticities suggest that both mechanisms operate through gradual adjustment processes rather than through abrupt contemporaneous shocks, with capital access promoting the gradual expansion of productive and financial resources and labor poverty reflecting the cumulative deterioration of household income conditions.

Table 4. Determinants of labor informality: regression results

	(1)	(2)	(3)	(4)	(5)
	OLS	HAC	Log-log	Dynamic	COVID
Labor poverty	0.292***	0.292***	0.230***	0.189***	0.300***
	(0.030)	(0.059)	(0.038)	(0.024)	(0.055)
Labor participation	0.263***	0.263***	0.343***	0.254***	0.113
	(0.057)	(0.056)	(0.047)	(0.040)	(0.071)
Access to capital	−0.179***	−0.179***	−0.123***	−0.094***	−0.177***
	(0.010)	(0.017)	(0.011)	(0.012)	(0.016)
Informality (t−1)	—	—	—	0.479***	—
				(0.054)	
COVID dummy	—	—	—	—	−0.015***
					(0.005)
Constant	0.375***	0.375***	−0.277***	0.111***	0.461***
	(0.037)	(0.031)	(0.030)	(0.039)	(0.038)
Observations	80	80	80	79	80
R^2	0.861	0.861	0.868	0.933	0.872
Adjusted R^2	0.856	0.856	0.863	0.929	0.865
Durbin–Watson	0.93	—	—	1.53	—

Note: Standard errors in parentheses. (1) OLS; (2) HAC Newey–West standard errors (4 lags); (3) log-log specification (elasticities) with HAC errors; (4) model with a lagged dependent variable; (5) OLS with a dummy for quarters 2020Q2–2020Q4 and HAC errors. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$.

The dynamic specification (Model 4) incorporates the lagged dependent variable and reveals substantial persistence in labor informality, with an autoregressive coefficient of 0.479, implying a half-life of approximately one quarter for deviations from the long-run path. After controlling for this persistence, labor poverty and access to capital retain their expected signs and remain statistically significant, whereas the coefficient on labor force participation loses precision, providing an initial indication that its influence is more sensitive to cyclical conditions than the other two determinants.

This pattern is reinforced in Model 5, which introduces a dummy variable capturing the COVID-19 shock (2020Q2–2020Q4). The dummy variable enters with a negative and statistically significant coefficient (−0.015), consistent with the temporary compression of measured labor informality discussed in Section 3. Importantly, the estimated coefficients for labor poverty and access to capital remain virtually unchanged relative to Model 2, whereas labor force participation becomes statistically insignificant. This pattern of differential robustness is one of our central findings. Among the three explanatory variables, access to capital displays the greatest robustness, remaining statistically significant, correctly signed, and remarkably stable in magnitude across all specifications. Labor poverty likewise maintains a consistently positive and stable association with labor informality, whereas labor force participation appears to be considerably more sensitive to cyclical fluctuations. These findings are consistent with the interpretation that access to capital serves as a structural determinant of labor informality rather than a factor driven primarily by short-run business cycle conditions.

5.4 Model Diagnostics

Table 5 summarizes the specification tests. The variance inflation factors range between 1.09 and 1.22, and pairwise correlations among regressors do not exceed 0.35 in absolute value, ruling out meaningful multicollinearity. The diagnostic picture for the disturbance term is more nuanced. The White test detects heteroskedasticity ($p<0.01$), though the Breusch–Pagan test does not corroborate this finding ($p=0.692$), a discrepancy consistent with the former test capturing quadratic and cross-product terms in the variance function that the latter ignores. More consequentially, the Breusch–Godfrey test and the Durbin–Watson statistic of 0.93 jointly provide strong evidence of positive autocorrelation, reflecting the inertial dynamics characteristic of slowly moving macroeconomic ratios. Inference throughout is accordingly based on HAC standard errors. The dynamic model's Durbin–Watson statistic of 1.53 confirms that explicitly incorporating persistence substantially reduces residual autocorrelation. The Jarque–Bera test does not reject residual normality (p=0.686), supporting the validity of asymptotic inference in this finite sample.

Table 5. Diagnostic tests for the levels model

Test	Statistic	p-value / criterion
VIF	1.22	< 5 (no multicollinearity)
Maximum correlation among regressors	0.34	< 0.8
White	34.72	0.000
Breusch–Pagan	1.46	0.692
Breusch–Godfrey, 1 lag	24.45	0.000
Breusch–Godfrey, 4 lags	26.17	0.000
Durbin–Watson	0.93	positive autocorrelation
Jarque–Bera	0.75	0.686

Note: The inference in Table 4 uses HAC Newey–West standard errors to correct for heteroskedasticity and autocorrelation.

5.5 Error-Correction Model (ARDL)

Table 6 reports the ARDL (1, 2, 1, 1) specification selected by the Akaike Information Criterion from among models retaining all three explanatory variables, subject to a maximum lag length of two quarters. This lag restriction is appropriate for quarterly data given the available sample size, and the estimated error-correction results remain robust across neighboring lag specifications.

The estimated long-run multipliers reproduce the sign pattern obtained in the levels regressions. Labor poverty exhibits a positive long-run association with labor informality (0.327, p = 0.070), while access to capital remains negatively associated (−0.180, p=0.040). In contrast, labor force participation yields a positive but highly imprecise long-run coefficient (0.092, p=0.719), consistent with the lack of robustness documented across the alternative specifications reported in Section 5.3.

Table 6. Error-correction model (ARDL)

	Coefficient	p-value
Long-run relationship		
Labor poverty	0.327	0.070
Labor force participation	0.092	0.719
Access to capital	−0.180	0.040
Short-run dynamics		
Δ Labor poverty	0.080	0.019
Δ Labor force participation	0.423	0.000
Δ Access to capital	0.020	0.507
Error-correction term (ECT)	−0.167	0.019
Durbin–Watson	2.30	

Figure 2. Actual vs. fitted values and residuals of the levels model

Note: The residual is expressed in percentage points. The largest deviation corresponds to the COVID-19 shock.

The short-run dynamics reveal a differentiated transmission mechanism. Changes in labor force participation display the strongest contemporaneous association with labor informality (0.423, $p<0.001$), whereas the short-run coefficient on access to capital is statistically indistinguishable from zero ($p=0.507$). This result suggests that the influence of capital access operates primarily through longer-run adjustments rather than through short-term quarterly fluctuations.

The estimated error-correction coefficient is −0.167 ($p=0.019$), indicating that approximately 17% of the deviation from the estimated long-run equilibrium is corrected each quarter, implying a mean-reversion half-life of roughly four quarters. Its negative sign is consistent with an error-correcting adjustment process. However, when interpreted jointly with the bounds test reported in Section 5.2, which does not provide evidence of a statistically significant long-run levels relationship, this coefficient should be viewed as characterizing mean-reverting dynamics rather than as evidence of a well-established cointegrating relationship among the variables (Figure 2).

5.6 Robustness to Potential Endogeneity

As anticipated in Section 4, labor poverty may be endogenous because labor informality itself tends to depress labor income, so that POB_LA could be correlated with the regression disturbance. Given the difficulty of identifying a valid external instrument at the national quarterly frequency, we address this concern through two complementary robustness exercises. First, labor poverty is instrumented using its first and second lags in a two-stage least squares (2SLS) specification. Second, the contemporaneous measure of labor poverty is replaced by its one-quarter lag, treating it as predetermined. The objective of these exercises is not to establish causal identification but to assess whether the principal empirical findings are sensitive to this potential source of endogeneity.

Table 7. Robustness to the endogeneity of labor poverty

	(1) Baseline (HAC)	(2) 2SLS (IV)	(3) Predetermined
Labor poverty	0.292*** (0.059)	0.358*** (0.055)	0.316*** (0.052)
Labor force participation	0.263*** (0.056)	0.272*** (0.055)	0.184*** (0.052)
Access to capital	−0.179*** (0.017)	−0.183*** (0.016)	−0.188*** (0.017)
First-stage F	—	105.0	—
Observations	80	78	78

Note: (1) reproduces the HAC N-W levels estimates of Table 4; (2) instruments labor poverty with its first and second lags (2SLS, kernel/HAC standard errors); (3) replaces contemporaneous labor poverty with its one-quarter lag. Standard errors in parentheses. ***$p<0.01$.

6. Discussion and Policy Implications

Read together, the estimates yield a consistent account of the forces shaping labor informality in Mexico. Labor informality is positively associated with labor poverty and labor force participation, whereas greater access to capital is consistently associated with lower levels of informality. Each of these relationships corresponds to a distinct theoretical perspective discussed in Section 2 and points to different policy priorities. Overall, the results suggest that labor informality is shaped primarily by structural economic conditions rather than by compliance decisions alone.

The estimated coefficient on labor poverty remains positive and highly stable across the OLS, HAC, logarithmic, dynamic, and COVID-19-adjusted specifications, providing robust aggregate evidence in support of the dualist and structuralist perspectives. When labor income falls below the subsistence threshold, workers are more likely to accept informal employment as their only feasible alternative. This mechanism is consistent with the SVAR evidence reported by Palafox (2024) and with the individual-level findings of Guillermo-Peón and Estrada (2025), who document a similar relationship using ENOE microdata. Evidence at the microeconomic level further suggests that labor poverty contributes to the intergenerational persistence of informality, implying that temporary formalization incentives alone are unlikely to break this cycle. Instead, policies that strengthen labor incomes while improving productive opportunities—such as targeted wage subsidies, non-contributory social protection, or formalization incentives linked to productive employment—are more likely to generate lasting reductions in informality. Additional support for this interpretation comes from the 2019 minimum-wage reform. Exploiting the differential increase implemented along Mexico's northern border, Campos-Vázquez and Esquivel (2023) show that the reform reduced labor income poverty, measured using the same CONEVAL methodology employed here, by between 2.6 and 3.0 percentage points while facilitating transitions from informal to formal employment. Taken together, these findings suggest that policies aimed at strengthening labor incomes can simultaneously reduce labor poverty and labor informality.

The positive long-run association between labor force participation and labor informality is less robust than the poverty channel but remains broadly consistent with theories of labor market segmentation (Rodríguez et al., 2024; Varela & Retamoza, 2023). Throughout the sample period, growth in formal employment appears to have lagged behind the expansion of labor supply, diverting part of the additional workforce into informal activities. However, the coefficient loses statistical significance once the COVID-19 period is explicitly modeled, indicating that this relationship is more sensitive to cyclical labor market conditions than to a stable structural mechanism. This distinction has direct policy implications. Measures aimed solely at increasing labor market participation are unlikely to reduce informality unless accompanied by policies that expand formal labor demand, including incentives for productive investment, business creation, and administrative simplification that lowers the costs of operating formally.

Among the explanatory variables considered, access to capital emerges as our most robust empirical finding. Its coefficient remains negative, statistically significant, and highly stable across all model specifications, including the long-run estimates obtained from the ARDL model. At the same time, the absence of a statistically significant contemporaneous effect in the short-run dynamics suggests that access to capital operates primarily as a long-run structural condition rather than through quarter-to-quarter fluctuations. This interpretation is consistent with the dual-economy framework proposed by La Porta and Shleifer (2014). If persistent informality reflects productivity constraints rather than regulatory noncompliance alone, expanding access to productive finance can relax those constraints by enabling investment, technological upgrading, and business expansion, thereby allowing firms to surpass the productivity threshold required for formal operation.

This mechanism is particularly relevant in the Mexican institutional context. Levy (2008) and Antón, Hernández, and Levy (2013) argue that the country's social protection system imposes disproportionately high formalization costs on low-productivity firms and low-wage workers, thereby creating incentives to remain informal. Expanding access to productive finance can mitigate these distortions by raising productivity instead of relying exclusively on stronger enforcement. Evidence from the World Bank (2021) indicates that limited access to finance contributes to persistent productivity gaps in highly informal economies through lower capital accumulation and slower technological adoption. In Mexico, Hernández-Trillo and Martínez-Gutiérrez (2022) document substantial barriers that prevent small firms from obtaining formal credit, suggesting that these financial constraints remain binding in practice. Consequently, policy measures such as partial credit guarantees, development banking programs, and temporary social security contribution subsidies targeted at micro- and small enterprises could facilitate formalization by strengthening productive capacity rather than by intensifying regulatory enforcement. This interpretation is reinforced by the findings of Samaniego and Fernández (2024), who show that stricter enforcement in the absence of improved productive conditions tends to reduce employment rather than generate sustained formalization. The evidence therefore suggests that productive finance should be viewed as a complement to, rather than a substitute for, labor market regulation.

7. Conclusions

The persistence of labor informality in Mexico has often been interpreted primarily as a problem of compliance, whereby workers and firms remain outside the formal sector and enforcement mechanisms prove insufficient to induce formalization. The evidence presented in this study supports a different interpretation. Using quarterly data spanning the period 2005–2024 and a range of complementary econometric specifications, the analysis consistently identifies access to capital as the factor most robustly associated with labor informality. Its estimated coefficient remains negative, statistically significant, and stable in magnitude across increasingly demanding specifications, even after accounting for the COVID-19 shock and the pronounced persistence of the series. Considered alongside the productivity-based perspective of La Porta and Shleifer (2014) and the institutional framework developed by Levy (2008), these findings suggest that financial constraints constitute an important structural correlate of labor informality. The gradual easing of capital constraints observed over the sample period also parallels the slow decline in labor informality, while the estimated long-run relationship remains robust across the alternative empirical specifications considered.

A central contribution of the study lies in the use of a time-series approach to distinguish relatively stable structural relationships from short-run cyclical dynamics. Labor force participation, which is positively associated with labor informality in the baseline specifications, loses statistical significance once the COVID-19 period is explicitly incorporated into the analysis, indicating that its apparent influence is largely associated with cyclical labor market conditions rather than with a persistent structural relationship. By contrast, labor poverty and access to capital remain robust across the alternative specifications. Such a distinction is difficult to establish using cross-sectional or short-panel data and has important policy implications. Policies aimed primarily at mitigating cyclical fluctuations are unlikely to generate sustained reductions in labor informality if the underlying structural constraints remain unchanged.

Several limitations should nevertheless be acknowledged. First, the measure of access to capital combines household credit, microenterprise credit, and broader productive financing, each of which may influence labor informality through different channels. Second, the empirical model does not explicitly account for factors such as sectoral composition, labor inspection intensity, or social expenditure, all of which may explain part of the variation currently captured by the included regressors (Robles & Ambriz, 2024; Samaniego & Fernández, 2024). Third, the use of national aggregate data necessarily masks the substantial regional heterogeneity documented by Rodríguez et al. (2024). Finally, although the well-established feedback from labor informality to labor income implies that the estimated coefficient on labor poverty should be interpreted as reflecting a structural association rather than a causal effect, the robustness analysis reported in Section 5.6 shows that instrumenting labor poverty with its own lags leaves the estimated coefficient on access to capital virtually unchanged. This result suggests that the principal finding is unlikely to be driven by reverse causality. Although these limitations qualify the interpretation of individual coefficients, they do not alter the central empirical conclusion.

Future research could build on these findings in several directions. Disaggregating access to capital by recipient and type of financial instrument would help clarify the mechanisms through which financial constraints influence labor informality. Extending the analysis to quarterly state-level data would make it possible to examine the regional heterogeneity concealed by national aggregates, while the application of alternative long-run estimators, including FMOLS, DOLS, and instrumental-variable approaches, could provide additional evidence regarding the robustness of the estimated long-run relationships. Overall, the evidence suggests that durable reductions in labor informality are unlikely to be achieved through enforcement measures alone. Instead, policies that expand productive access to finance while strengthening labor incomes—particularly among households and micro- and small-scale productive units facing binding financial constraints—are more likely to promote sustained formalization by addressing the structural conditions associated with labor informality.

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Authors' contributions

Ramiro Esqueda-Walle conceived and designed the study, supervised the research process, interpreted the findings, and led the writing and critical revision of the manuscript. Olegario Méndez Cabrera contributed to the methodological design, data analysis, interpretation of results, and critical review of the manuscript. Jimena Sánchez Saavedra participated in data collection, data processing, literature review, and manuscript revision. Dulce Hernández Hernández contributed to data collection, data validation, literature review, and manuscript editing. All authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Notes

Note 1. The dependent variable corresponds to INEGI's Labor Informality Rate (TIL), which measures, without double counting, the share of employed persons working under informal conditions. It includes workers in informal economic units as well as workers whose employment relationship is not recognized by the economic unit that uses their services, including employees in registered firms who lack access to social security.

Note 2. Labor poverty corresponds to CONEVAL's Labor Poverty Index (ITLP) and is defined as the share of the population whose real per capita labor income is insufficient to purchase the food basket.

Note 3. Field operations for the ENOE were suspended during 2020Q2 because of the COVID-19 emergency. Estimates for that quarter are based on the telephone-based *Encuesta Telefónica de Ocupación y Empleo* (ETOE), while those from 2020Q3 onward correspond to the *Encuesta Nacional de Ocupación y Empleo, Nueva Edición* (ENOEN). INEGI explicitly advises against treating the ETOE as a methodological continuation of the ENOE, reinforcing the need for caution in interpreting the 2020Q2 observation.

Note 4. The peak in access to capital observed in 2020Q2 is partly mechanical. Because the variable is expressed as a share of GDP, the sharp contraction in nominal GDP during the pandemic mechanically increased the ratio even in the absence of a proportional increase in financing. The COVID-19 dummy included in Section 5.3 captures part of this mechanical effect.

Note 5. The Newey–West bandwidth is set to four lags, consistent with the quarterly frequency of the data and the conventional bandwidth selection rule for HAC estimation.

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