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Financial development, financial inclusion, and informality: New international evidence

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Financial development, financial inclusion, and informality: New international evidence

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Abstract

This paper explores the empirical relationship between informality and several indicators of financial development (FD) and financial inclusion (FI). We exploit a panel of 152 countries with annual information between 1991 and 2017. Using several panel cointegration techniques and four groups of countries (full sample, developed, developing, and Latin American countries), we find evidence of a negative long-run relationship between informality and several FD/FI indicators. Moreover, long-run weak exogeneity tests indicate that some FD/FI indicators empirically cause less informality. Specifically, we find that in developing countries financial development reduces informality when measured as "financial credit" and "bank credit", whereas financial inclusion reduces informality when measured as "number of bank accounts". Additionally, for both developing countries and the full sample of countries, we find evidence of double causality between informality and financial development when the latter is measured as "bank deposit"; for Latin American countries, evidence of double causality is found when financial inclusion is measured as "number of ATMs". These results suggest that higher credit to the private sector and more bank accounts have contributed to reducing informality in developing countries in the long run.

JEL Classification : C33, G20, E26

Key words : Financial development, financial inclusion, informality, panel cointegration.

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1 Introduction

There are several reasons why informality can be damaging for an economy. For instance, informality makes official indicators unreliable (e.g. unemployment or consumption statistics), and reduces tax revenue needed to finance public services (Schneider and Enste, 2000). Generally, informal workers cannot fully benefit from all public services, such as health services and a pension system. An informal firm remains small in size in order to avoid government control, but this reduces her possibilities of becoming more productive and getting formal financial services at a reasonable cost.

Informality is a phenomenon that affect an important proportion of the world population, especially in developing countries. International statistics from the international labour organization (ILOSTAT) and Medina and Schneider (2020) indicate that informality is higher in developing countries than in developed ones (see Figure 1). Also, the levels of financial development (e.g. the credit to GDP ratio) and financial inclusion (e.g. the percentage of people who report having a debit card) are smaller in developing countries (see Figure 2). Data from the World Bank Enterprise Survey,[1] indicate that informal firms perceive the lack of access to finance is the greatest obstacle to doing business. Thus, higher levels of informality seems to be negatively correlated with financial development (FD) and financial inclusion (FI).[2]

Theoretically, the direction of causality between informality and FD/FI can go either way. On the one hand, informality represents a potential market for some financial institutions, because in many developing countries they can offer financial products to informal workers to finance their informal activities (e.g. a loan to buy a car or a motorcycle to provide informal transportation services); in this case, a bigger informal market will lead to an increase in financial services. However, informality can also reduce FD/FI because it will reduce the availability of financial resources as part of them will be used to check whether entrepreneurs are involved in informal activities. On the other hand, the possibility of getting access to formal credit and financial services might induce informal workers and entrepreneurs to become formal if they perceive that formal financial services will make their activities more profitable, especially if they become formal.

The aim of this paper is to analyze the empirical relationship between informality and FD/FI and the direction of causality in the long-run between them. We use a rich panel of 152 countries with annual information between 1991 and 2017 from the World Bank and Medina and Schneider (2020). The analysis is performed using four groups of countries: developed, developing, Latin American and the full sample of countries. Financial development is measured by six indicators: i) private credit provided by the banking sector as % of GDP, ii) private credit provided by the financial system as % of

[1] Enterprise Surveys (http://www.enterprisesurveys.org), The World Bank.

[2] In the particular case of Peru, even though the economy registered an average growth of 4.7% during the last 20 years, the levels of informality is one of the highest in the world and the average degree of financial developing is less than 50 percent.

GDP, iii) domestic credit to private sector as % of GDP, iv) deposit as % of GDP, v) stock market value traded as % of GDP, and vi) stock market capitalization as % of GDP. Financial inclusion is measured by three indicators: i) the number of bank branches per 100,000 adults, ii) ATM per 1000 adults, and iii) account bank (% age 15+).

Using panel cointegration techniques, we find evidence of a negative long-run relationship between informality and several FD/FI indicators. Moreover, conditional on the existence of cointegration, long-run weak exogeneity tests indicate that some FD/FI indicators empirically cause less informality. Specifically, we find that in developing countries the direction of causality runs from financial development to informality when "financial credit" and "bank credit" are used as FD indicators. Also, in developing countries causality runs from financial inclusion to informality when "number of bank accounts" is used as FI indicator. Double causality is also supported by the data for some specific cases: for the full sample of countries and developing countries, we find evidence of double causality between informality and financial development when the latter is measured as "bank deposit"; for Latin American countries, the results support the existence of double causality when financial inclusion is measured as "number of ATMs".

Overall, the results suggest that increases in financial development and financial inclusion are connected to reductions in informality in the long run. Furthermore, the results for developing countries indicate that higher credit to the private sector and more bank accounts have contributed to reducing informality in the long run.

This paper contributes to the literature that relates informality and the financial system in several ways. First, compared to previous empirical studies, we provide new international evidence on the long-run relationship between informality and FD/FI based on the most recent estimates of informality published by Medina and Schneider (2020), which cover the period 1991-2017. Second, we use several direct indicators to measure financial development - related to banking/financial institutions and capital markets - and financial inclusion. Third, we study the relationship by group of countries: developed, developing, latin american and the full sample of countries. Finally, we rely on several unit root and cointegration tests in order to give robustness to the empirical findings.

The rest of the paper is structured as follows. Section 2 discusses the theoretical relationship between FD, FI and informality and section 3 presents a brief literature review. Section 4 describes the data and provides some summary statistics. The empirical methodology is described in section 5. Section 6 presents and discusses the main results. Finally, section 7 summarizes the main conclusions.

2 Literature review

The term "informal economy" is found in the literature under alternative though not necessarily equivalent names, such as shadow economy, underground economy, hidden economy, black economy, cash economy, among others. Feige (1979, 1996), defines four

types of "underground economy": illegal, unreported, unrecorded and informal; in particular, the informal economy comprises economic activities that circumvent costs and are excluded from the benefits and rights incorporated in laws and administrative rules covering property relationships, commercial licensing, labor contracts, torts, financial credit and social systems. Smith (1994) defines shadow economy as the "market-based production of goods and services, whether legal or illegal, that escapes detection in the official estimates of Gross Domestic Product (p.5)". Ihrig and Moe (2004) define the informal sector as the one which produces legal goods but does not comply with government regulations. Elgin and Öztunali (2012) define the shadow economy as all legal production that takes place outside regulated public and private sector establishments. Schneider and Enste (2000) define shadow economy as: "unreported income from the production of legal goods and services, either from monetary or barter transactions, hence all economic activities that would generally be taxable were they reported to the tax authorities" (p.3). This paper employs Schneider and Enste (2000)'s definition of informality or shadow economy.

Regarding the relationship between informality and financial system, the literature shows that the causal link can go in both directions. Typically, an increase in FD/FI can reduce informality, whereas an increase in informality can either inhibit FD/DI or promote it.

An increase in FD/FI can reduce informality through direct and indirect channels. On the one hand, the productivity gains associated to the access and use of financial services can stimulate informal firms to become formal in order to exploit those benefits more efficiently. Small enterprises can increase their productivity if they have access to financial services, which may entail an incentive to formalise (OECD, 2019). According to Jacolin et al. (2019), the use of mobile financial services (MFS) such as mobile money, mobile credit and savings can reduce the informal sector by improving the access to credit and reducing the demand for cash; i.e. moving from cash to digital payments promotes productivity/profitability by reducing operational costs and making commercial transactions more secure, fluid and cheaper. However, evidence provided analyzed by La Porta and Shleifer (2014), suggests that informal firms barely make a transition to formality, even when they are encouraged or are offered to be subsidized: on average, 91% of registered firms started out as registered. Furthermore, informal firms seem to exists almost disconnected from the formal side of the economy: only 2% of informal firms sell their output to large firms.

On the other hand, an increase in FD/FI can reduce informality indirectly through formal firms. New or existing formal firms can improve their productivity through the use of financial services. The greater productivity will imply a greater demand for formal workers and thus a reduction in the participation of informal workers in the total labor force (Demirgüç-Kunt and Klapper (2013),Beck and Hoseini (2014), Beck et al. (2014), La Porta and Shleifer (2014), Araujo and Rodrigues (2016), and Sirisankanan (2017)).

The existence of informal activities can either promote or reduce FD/FI. The informal sector represents a potential market for some financial institutions, because in many developing countries they can offer financial products to informal workers to finance their informal activities (e.g. a loan to buy a car or a motorcycle to provide informal transportation services); in this case, a bigger informal market will lead to an increase in financial services. This relationship is supported by Lahura (2016) who finds evidence that 1.8 million informal workers in Peru that have access to credit in the financial system. More informality can also reduce FD/FI because part of the financial resources will be used to check whether entrepreneurs are involved in informal activities.

Empirical studies on informality have focused on identifying key determinants and/or predictors of informality. A number of factors have been evaluated such as tax and regulation burden; quality of institutions and government effectiveness; entrepreneur's demographic and socioeconomic characteristics; industry and firm's characteristics; macroeconomic variables; financial indicators, among others.

Bose et al. (2008), Ayana and Reilly (2011), Capasso and Jappelli (2013), Bittencourt et al. (2014), Beck et al. (2014), Bayar and Faruk (2016), Bayar and Faruk (2016), Sirisankanan (2017), Jacolin et al. (2019) Canh and Thanh (2020), among other studies, found evidence that several financial indicators have a negative effect on the shadow economy. Financial development is usually measured as Bank credit/GDP and Deposit/GDP; these indicators reflect the financial depth and the opportunity cost of producing in the shadow economy. Financial inclusion, is usually measured as the number of bank account per 100,000 adults; the number of bank branches per 1000 adults; the number of automatic teller machines (ATMs); and the percent of people with debit card.

Most empirical studies that analyze the relationship between FD, FI and informality use panel data information, and can be classified into macro and firm-level (micro) studies. Papers based on macroeconomic data are the majority and include Bose et al. (2008), Beck et al. (2014), Bittencourt et al. (2014), Berdiev and Saunoris (2016), Bayar and Faruk (2016), Habibullah et al. (2017), Sirisankanan (2017), Jacolin et al. (2019), Canh and Thanh (2020), among others. Using different econometric techniques, these papers find that there exists a negative relationship between financial development and the informal economy, i.e. financial development reduces the size of the informal economy. Furthermore, there is also evidence that this effect depends on the level of economic growth/development of the country.

Recently, Canh and Thanh (2020) analyzes the influence of financial development on the shadow economy for 114 economies between 2002-2015. They use aggregate indicators of financial depth, financial access and financial efficiency indicators. Using an autoregressive distributed lag (ARDL) model they find that financial institutions, especially financial institutions' efficiency, had a more significant effect on the shadow economy than financial markets. On the other hand, the negative effects of financial development on the shadow economy were noticeable in LMEs (low and lower-middle income economies) and UMEs

(upper-middle-income economies) and dominant in HIEs (high-income economies) in the long run.

Finally, firm-level panel data from single country/group of countries include Ayana and Reilly (2011),Blackburn et al. (2012), Ellul et al. (2012), Capasso and Jappelli (2013), Beck and Hoseini (2014), Ahamed (2016). Among these studies, Capasso and Jappelli (2013) is the only one that analyzes the causal relation between financial development and the size of the underground economy for Italian regions during the period 1989-2006. They use IV regressions in order to address the endogeneity of financial development, and rely on an instrument based on the characteristics of the 1936 Banking Law. They found that the FD can reduce tax evasion and the size of the underground economy, and that more competitive and innovative sectors display lower levels of underground activity.

Finally, different econometric techniques have been used to analyze the relationship between FD, FI and informality. In the case of studies based on panel data, the econometric techniques include static linear models estimated using pool OLS, difference in difference, and fixed effects/IV estimators; static non-linear models such as probit and tobit models using maximum likelihood; dynamic panel data models estimated using the GMM estimator; and ARDL and panel vector/panel cointegration models.

3 Data and main facts

The literature suggests that, the measure of informality, FD and FI depend on data availability in each country. Table 1 displays the most common FD and FI indicators in the literature. FD is usually measured as Credit/GDP and Deposits/GDP. FI is measured by the number of branches, number of bank accounts, % of people with debit card, and number of automatic teller machines (ATM) normalized by some metric (e.g. per 1000 adults). In the case of informality, Medina and Schneider (2020) and ILOSTAT provide data for several countries (see definitions in Table 1).

Measures of FD and FI are obtained from The Global Financial Development database (GFD).[3] The GFD provides 109 annual indicators that measure several aspects of financial institutions and markets for 214 economies during the period 1960-2016. Indicators of FD include measures of i) financial depth, ii) financial access, iii) efficiency, and iv) stability of financial systems, which capture the key features of both i) financial institutions (banks and insurance companies), and ii) financial markets (such as stock markets and bond markets). Indicators of FI include information of account ownership, payments, savings, credit cards, debit cards, and financial resilience.

In order to maximize the number of countries and years with available data, we use six financial development indicators: i) private credit provided by the banking sector as % of

[3]The information was collected from the World bank's website: i) https://www.worldbank.org/en/publication/gfdr/data. This global database from the World Bank includes information from different sources, in this paper we use the sources of: World Development Indicators (WDI); International Financial Statistics (IFS); International Monetary Fund (IMF); Financial Access Survey (FAS); and Global Financial Inclusion (Global Findex) Database.

GDP, ii) private credit provided by the financial system as % of GDP, iii) domestic credit to private sector as % of GDP, iv) deposit as % of GDP, v) stock marked value traded as % of GDP, and vi) stock marked capitalization as % of GDP. And three financial inclusion indicators: i) the number of bank branches per 100,000 adults, ii) ATM per 1000 adults, and iii) account bank (% age 15+) (a higher percentage of people with a bank account or debit card reflects, among other things, a higher efficiency of the financial sector in granting financial services or products to individuals).

Schneider and Enste (2000) and ILOSTAT provide two alternative measures of informality. Schneider and Enste (2000) estimate the size of the informal economy for developing, transition and OECD countries using a dynamic MIMIC model (multiple−indicators and multiple−causes).[4] ILOSTAT provides a database of key indicators of the labour market for developing and developed economies during the period 2000−2018.[5] These indicators include the share of informal employment in total employment, the share of employed persons in the informal sector, and the share of informal employment outside the informal sector in total employment, structured by gender, urban/rural areas and activities.[6]

Compare to ILOSTAT, Medina and Schneider (2020) provide measures of shadow economy for an extension list of countries for more than 50 years. Therefore, the empirical estimation is based on available data from the World Bank (financial indicators) and Medina and Schneider (2020) (shadow economy) for 152 countries: developed, developing and latim american economies (latam) over the period 1991 to 2017.[7]

Table 2 displays the summary statistics of informality and FD/FI indicators. As we can see, latam countries (38.25%) and developing countries (35.30%) have on average the highest level of informality compared to developed countries (16.04%). Furthermore, financial development is higher in developed countries than in developing and latam countries.

Table 3 summarizes the correlations between shadow economy (Medina and Schneider, 2020) and financial indicators by type of economy; the data display five interesting features. First, credit and deposit indicators are stronger for developing countries than for developed countries. Second, the correlation between informality and each financial indicator in developing economies is greater than developed and latam economies. On the one hand, the correlations of informality with private credit provided by the banking sector as % of GDP (-0.44), private credit provided by the financial system as % of GDP (-0.45), domestic credit as % of GDP (-0.44), deposit as % of GDP (-0.35), value traded (-0.27), and market capitalization (-0.26) suggest that higher levels of financial develop-

[4]The information was collected from Medina and Schneider (2020), available on Table A.1: Size and development of the shadow economy of 158 countries over the period 1991−2015, pp: 61-76.

[5]The construction of this database is based on three surveys conducted by the International Labour Organization: Labour force survey, Household/Income expenditure survey, and Other household survey.

[6]The measure is informal employment as informal employment as a % of total non−agricultural employment (first indicator of informality for the non−agricultural employment provided by the ILOSTAT).

[7]See list of countries in Table 13

ment co-exist with lower levels of informality. On the other hand, the correlations of informality with bank branches (-0.27), bank account (-0.26), and ATM (-0.25), suggest that higher levels of financial inclusion co-exist with lower levels of informality. These correlations suggest that a more developed and inclusive financial system can reduce the size of the informal economy in developing economies. Third, capital market indicators for developing countries have a similar correlation to those for developed countries. Four, financial access indicators have a lower correlation compared to the banking and capital market indicators. However, they are only statistically significant for developing countries and Latin American countries. Five, the correlation between the different financial indicators for Latin American countries is lower than for other groups of countries. However, the bank account and ATM. indicators have a higher correlation for the group of Latin American countries.

Finally, Table 4 shows that FD and FI indicators are positively correlated for each type of countries.

4 Empirical methodology

The empirical methodology assumes the existence of a long-run relationship between informality and financial development. Given a panel for $i = 1, \ldots, N$ countries and $t = 1, 2, \ldots, T$ years, the long-run relationship is described by the following linear panel data model:

$$I_{it} = \beta F_{it} + \gamma_i + u_{it} \tag{1}$$

where F_{it} represents an indicator of financial development for country i and year t, and γ_i is the only deterministic component and represents cross-section dummy variables. In order to estimate the long-run coefficients, I employ standard panel cointegration techniques. First, I test for the presence of unit roots using panel-based unit root tests, which are known to have higher power than unit root tests based on individual time series. If both variables I_{it} and F_{it} are consistent with the unit root hypothesis, I test for cointegration using both residual-based tests for cointegration (Kao, 1999; Pedroni, 2004) and Johansen-Fisher tests (Maddala and Wu, 1999). Once cointegration is established, I estimate the long-run coefficients using Phillips and Moon (1999), Pedroni (2000), and Kao and Chiang (2000) estimators based on Phillips and Hansen (1990) fully modified OLS estimator, and the extensions of the DOLS estimator (Saikkonen, 1992; Stock and Watson, 1993) for panel data proposed by Kao and Chiang (2000), Mark and Sul (1999), Mark and Sul (2003), and Pedroni (2001).

Unit root tests for panel data are similar to the usual tests for time series. Let y_{it} be an AR(1) process for each unit i with exogenous components $x_{i,t}$, including any fixed effects (intercepts) or individual trends:

$$y_{i,t} = \rho_i y_{i,t-1} + x'_{i,t}\delta_i + \varepsilon_{i,t} \tag{2}$$

where $i = 1, 2, \ldots, N$ and $t = 1, 2, \ldots, T_i$. $\varepsilon_{i,t}$ represent an idiosyncratic error term and ρ_i is the autoregressive coefficient for cross section unit i. If $|\rho_i| < 1$, $y_{i,t}$ is said to be weakly (or trend) stationary, whereas if $|\rho_i| = 1$, then $y_{i,t}$ contains a unit root.

Each panel unit root test can be classified based on their assumption about the persistence parameter ρ_i. Levine et al. (2002), Breitung (2000), and Hadrid (2000) assume that the persistence parameters are common across cross-sections so that $\rho_i = \rho$ for all i. Im et al. (2003), Maddala and Wu (1999), and Choi (2001) allow ρ_i to be different for each cross-sectional unit. All these tests are based on the null hypothesis of unit root, except for the test proposed by Hadrid (2000) which is built under the null of stationarity.

If both I_{it} and F_{it} are unit root processes, the next step is to test for cointegration between them. I employ both residual-based tests for cointegration Kao (1999); Pedroni (2004) and Johansen-Fisher tests Maddala and Wu (1999). Consider the following panel cointegrating regression for $t = 1, \ldots, T$ periods and $i = 1, \ldots, N$ units:

$$y_{i,t} = \alpha_i + \pi_i t + \beta_{i1} x_{it,1} + \beta_{i2} x_{it,2} + \ldots + \beta_{iK} x_{it,K} + \epsilon_{it} \tag{3}$$

where $k = 1, \ldots, K$, and y and x are assumed to be integrated of order one or I(1). The parameters α_i and π_i represent individual and trend effects. Under the null hypothesis of no cointegration, the residuals $\epsilon_{i,t}$ will be I(1). To test for cointegration, the general approach is to obtain residuals from regression (3) and then test whether those residuals are I(1) by running the following auxiliary regression:

$$\hat{\epsilon}_{it} = \rho_i \hat{\epsilon}_{i,t-1} + \hat{u}_{it} \tag{4}$$

or

$$\hat{\epsilon}_{i,t} = \rho_i \hat{\epsilon}_{it-1} + \sum_{j=1}^{\rho_i} \psi_{ij} \Delta \hat{\epsilon}_{it-j} + \hat{v}_{it} \tag{5}$$

Pedroni (2004) and Kao (1999) follow this approach to test for the null of no cointegration. Pedroni (2004) proposes two tests with different alternative hypothesis: (i) the within-dimension tests with $H_1 : \rho_i = \rho < 1$, and (ii) the between-dimension test with $H_1 : \rho_i < 1$ for all i. In both cases, Pedroni (2004) employs different versions of PP and ADF statistics. The test proposed by Kao (1999) is simlar to Pedroni (2004) except for the fact that it assumes that all the $\beta' s$ in 3 are homogeneous. Maddala and Wu (1999) proposed a panel cointegration test λ build as a combination of N cointegration tests for $i = 1, 2, \ldots, N$ cross-sectional units. If p_i represents the p-value of the individual cointegration test for cross sectional unit i, then under the null of no cointegration for the whole panel of observations:

$$\lambda \equiv -2 \sum_{i=1}^{N} \ln(p_i) \sim \chi^2(2N) \tag{6}$$

If the null of no cointegration is rejected, then it is possible to analyze the short-run dynamics between I_t and F_t using the following vector error correction model (VECM):

$$\begin{aligned}\Delta I_{it} &= \alpha_i^I u_{i,t-1} + \sum_{j=1}^{q} \theta_j^I \Delta I_{i,t-j} + \sum_{j=1}^{q} \phi_i^y \Delta F_{t-i} + \gamma_i^I + v_i^I \\ \Delta F_{it} &= \alpha_i^F u_{i,t-1} + \sum_{j=1}^{q} \theta_j^F \Delta I_{i,t-j} + \sum_{j=1}^{q} \phi_i^F \Delta F_{t-i} + \gamma_i^F + v_i^F\end{aligned} \tag{7}$$

where $u_{i,t-1} = I_{i,t-1} - \beta F_{i,t-1}$, Δ denotes the first-difference transformation and q the lag lentgh. The VECM given by 7 can be estimated using the Engle-Granger the two-step estimator. The first step is the estimation of the long-run parameter β in order to get $\hat{u}_{i,t-1} = I_{i,t-1} - \hat{\beta}$. The second step involves the estimation of 7 using the fixed-effect estimator after replacing $u_{i,t-1}$ by $\hat{u}_{i,t-1}$.

The estimation of the normalized cointegrating vector (i.e. the estimation of β) can be performed using the panel data versions of the Dynamic OLS estimator (Saikkonen, 1992; Stock and Watson, 1993) and the fully modified OLS estimator (Phillips and Hansen, 1990), which eliminate the asymptotic endogeneity and serial correlation. We employ three DOLS estimators: pooled DOLS proposed by Kao and Chiang (2000), weighted DOLS proposed by Mark and Sul (1999, 2003), and group-mean DOLS proposed by Pedroni (2001). In addition, we use three FMOLS estimators: pooled FMOLS proposed by Phillips and Moon (1999), weighted FMOLS proposed by Kao and Chiang (2000) , and group-mean FMOLS proposed by Pedroni (2000, 2001). Kao and Chiang (2000) studied the finite sample properties of pool OLS, DOLS and FMOLS estimators, and conclude that the DOLS estimator is superior to both OLS and FMOLS, for both homogeneous and heterogeneous panels. Therefore, we will prioritize results based on DOLS estimators.

The direction of long-run causality between informality and FD/FI can be evaluated using a standard weak exogeneity test.[8] If $\alpha_i^F = 0$ in 7, then we say that F_{it} is weakly exogenous because it does not react to any deviations from the long-run equilibrium. In this case, F_{it} can be used to make inferences about β and perform conditional forecasts of I_t one-period ahead (Hendry, 1995). Thus, if F_{it} is weakly exogenous, empirical causality runs from FD/FI to informality in the long run.

5 Results

Table 5 displays the p-values from unit root tests.[9] Overall, the results show that informality and all financial indicators are unit root processes. The only exception is "bank account" (column 10) for developed countries, which is stationary according to all the tests except for Hadrid's test. Levin, Lin and Chu test rejects the null of unit root

[8] Hendry (1995) provides an excellent analysis of these concepts when the relevant empirical model contains unit root processes.

[9] The deterministic component of the auxiliary regression includes only an intercept.

only for some specific cases: (i) branches and ATM for the "all countries", (ii) informality and bank account for "developed cuntries", (iii) bank credit, financial credit, market capitalization, branches and ATM for "developing countries", and (iv) branch and ATM for "Latam countries". Choi test rejects the null hypothesis of unit root for ATM only for "all countries" and "developed countries", and for value traded only for "developing countries". Therefore, we can test for cointegration between informality and every FD/FI indicators for all groups of countries, estimate the corresponding error correction models and test for weak exogeneity, with the only exception of "bank account" for developed countries.

Table 6 displays the results from cointegration tests. In this case, the existence of cointegration is conditional on both the indicator and the group of countries considered. All the cointegration tests considered (3 residual-based tests and the Johansen-Fisher test) support the existence of a long-run relationship between informality and financial development for developing countries only when either "financial credit" or "domestic credit" are used. There is also strong evidence of cointegration between informality and financial inclusion for Latin American countries when ATM is used, and for the group "all countries" if FD is measured as "bank account". However, if we also rely on results supported by at least three cointegration tests (for instance all three residual-based tests or two residual-based tests and the Johansen-Fisher test), then we find more evidence of cointegration between informality and FD/FI: for "all countries" if "ATM and "bank deposit" are used; for "developed countries" if financial inclusion is measured by "ATM"; and for "developing countries" when either "bank credit", "bank deposit" or "bank account" are used.

Tables 7 and 8 show the estimated cointegrating vectors for each group of countries and FD/FI indicators, using DOLS and FMOLS estimators, whereas Tables 9 - 12 show the estimation results of the corresponding VECMs (with a lag length equal to 1). Based on these results, long-run causality from FD/FI to informality is strongly supported by the data for some specific indicators and countries.

All countries

For the group "all countries", all tests in Table 6 indicate the existence of a long-run relationship between informality and financial inclusion measured as "bank account". Table 7 indicates that the estimated long-run coefficient for "bank account" is negative and statistically significant for all the estimators considered, ranging between -0.007 (Mark and Sul's estimator) and -0.037 (Kao and Chiang's estimator). Thus, if "bank account" increases in 100 units per 1,000 people then informality will decrease in the long-run between 0.7 and 3.7 percentage points, respectively. The estimated ECMs displayed in Table 9 show no strong evidence of a single causal direction between informality and FD/FI indicators. Pooled and weighted DOLS estimators and pooled FMOLS indicate that "bank account" is weakly exogenous (the cointegrating error term is not statistically

significant), which means that an increase in "bank account" anticipates a reduction in informality in the long run. However, group-mean DOLS and group-mean FMOLS estimators indicate that informality and 'bank account" mutually cause each other in the long run (the cointegrating error term is statistically different from zero in both error correction equations). According to the weighted FMOLS, long-run causality runs from informality to "bank account".

Three out of the four cointegration tests considered support the presence of cointegration between informality and financial inclusion measured as "ATM", and between informality and financial development measured as either "bank deposit" or "bank credit". For the case of bank deposit, the estimated long-run coeffcient ranges between -0.078 (Mark and Sul's estimator) and -0.214 (Pedroni's DOLS estimator), which means that if "bank credit" increases in 10 percenatge points then informality will decrease between 0.78 and 2.14 percentage points, respectively. In this case, Table 9 shows strong evidence of a bi-directional long-run causality between informality and FD/FI indicators. For the case of ATM and bank deposit, the results support the existence of both bi-directional causality and causality from ATM/bank deposit to informality.

Developed countries

For the group "developed countries", all the residual-based test for cointegration in Table 6 support the existence of a long-run relationship between informality and financial inclusion measured as "ATM". Table 8 indicates that the estimated long-run coefficient for "ATM" is negative and statistically significant for all the estimators considered, ranging between -0.023 (Mark and Sul's estimator) and -0.055 (Kao and Chiang's estimator). This means that if "ATM" increases in 10 units per 100,000 people, then informality will decrease between 0.34 and 0.71 percentage points, respectively.

The estimated ECMs displayed in Table 10 show evidence that either ATM causes informality in the long-run or they both cause other simultaneously. Pooled and weighted DOLS estimators and pooled FMOLS indicate that "ATM" is weakly exogenous (the cointegrating error term is not statistically significant), which means that an increase in "ATM" anticipates a reduction in informality in the long run. On the other hand, pooled and weighted FMOLS and group-mean DOLS indicate that informality and 'bank account" mutually cause each other in the long run (the cointegrating error term is statistically different from zero in both error correction equations).

Table 6 also provides partial evidence of cointegration between informality and either "bank deposit", "value traded" and "market capitalization" (two out of four tests support the existence of cointegration). The estimated long-run coefficients are negative and statistically significant according to all the tests considered (with the exception of Pedroni's DOLS and FMOLS estimmators). According to Table 10, for all DOLS and FMOLS estimators (except the case based on Kao and Chiang's FMOLS estimator) there is evidence that "market capitalization" causes informality in the long-run. There is mixed evidence

on the direction of causality for "bank deposit" and "value traded".

Developing countries

For developing countries, both residual-based tests and Johansen-Fisher test support the existence of cointegration between informality and financial development when the latter is measured by "financial credit" or "domestic credit". Also, all residual-based tests indicate that "bank credit', "bank deposit", "bank account" and "ATM" cointegrate individually with informality.

Table 8 indicates that the estimated long-run coefficients for all the indicators that cointegrate with informality are negative and statistically significant, with the exception of ATM (only for GM-DOLS and GM-FMOLS estimators). For the case of "financial credit", the estimated long-run coefficient ranges between -0.165 (Phillips and Moon's FMOLS estimator) and -0.247 (Pedroni's DOLS estimator). This means that if "financial credit" increases in 10 porcentage points, then informality will decrease between 1.65 and 2.47 percentage points, respectively. The estimated long-run coefficient for "domestic credit" ranges between -0.146 (Mark and Sul's DOLS estimator) and -0.250 (Pedroni's FMOLS estimator) and has a similar interpretation.

The estimated ECMs displayed in Table 10 show evidence that either "financial credit" causes informality in the long-run or they both cause other simultaneously. Results based on all DOLS estimators indicate that "financial credit" is weakly exogenous (the cointegrating error term is not statistically significant), which means that an increase in "financial credit" anticipates a reduction in informality in the long run. On the other hand, results based on all FMOLS estimators indicate that informality and 'financial credit" mutually cause each other in the long run (the cointegrating error term is statistically different from zero in both error correction equations).

A strong result from the estimated ECMs is that there is double causality between "bank deposit" and "informality", which is supported by all DOLS and FMOLS estimators. Considering only DOLS estimators, there is strong evidence that financial development is weakly exogenous when measured as "financial credit" and "bank credit", whereas financial inclusion is weakly exogenous when measured as "bank account". However, when considering only FMOLS estimators, there is strong evidence of double causality between informality and financial development when the latter is measured as "financial credit", "domestic credit"' or "bank credit".

Latin American countries

In the case of Latin American countries, both residual-based tests and Johansen-Fisher test support the existence of cointegration between informality and financial inclusion when the latter is measured by "ATM". For the rest of FD/FI indicators, evidence of cointegration is weak: either it is supported only by one out of six tests or the estimated sign is not as expected.

Table 8 indicates that the estimated long-run coefficient for "ATM" is negative and statistically significant, ranging between -0.064 (Mark and Sul's DOLS estimator) and -0.271 (Pedroni's FMOLS estimator). This means that if "ATM" increases in 10 units per 100,000 informality will decrease between 0.64 and 2.71 percentage points in the long run. Results from the estimated ECMs displayed in Table 10 show strong evidence of double causality between "ATM" and informality in the long-run.

Long-run causality from FD/FI to informality is found only when the cointegrating vector is estimated using DOLS and for "financial credit", "bank deposit" and "bank account". However, cointegration between informality and each of these indicators is only supported by the Johansen-Fisher test.

6 Conclusions

This paper explored the empirical relationship between informality and the financial system, using several indicators of financial development (FD) and financial inclusion (FI). We used a panel of 152 countries with annual information between 1991 and 2017. Given the non-stationarity of the series, we employed panel cointegration techniques to analyse the relationship between informality and FD/FI and the direction of causality.

This paper contributes to the literature in several ways. First, compared to previous empirical studies, we provide new international evidence on the long-run relationship between informality and FD/FI by using the latest estimates of informality provided by Medina and Schneider (2020). Second, we use several direct indicators to measure financial development - related to banking/financial institutions and capital markets - and financial inclusion, allowing a direct interpretation of each estimated coefficient. Third, we provide evidence for developed, developing and Latin American economies separetely and as a group. Finally, we rely not only on a single test or estimator but on several available ones in order to give robustness to the empirical findings.

In general, the results provide evidence of a negative long-run relationship between informality and several FD/FI indicators. However, the direction of causality is not unique and depends on both the group of countries and the FD/FI indicators considered. We found strong evidence of a negative long-run relationship between informality and financial development for developing countries if either "financial credit", "domestic credit", "bank credit", "bank deposit" or "bank account" are used. There is also strong evidence of cointegration between informality and financial inclusion for Latin American countries when ATM is used. For the group "all countries" the results support cointegration if financial inclusion is measured as "bank account" or "ATM", and if financial development is measured as "bank deposit". In the case of developed countries, cointegration is supported if financial inclusion is measured as "ATM".

We also find strong evidence on the direction of causality between informality and FD/FI, for some indicators and group of countries. Based on the results obtained from

DOLS estimators, which are superior to FMOLS estimators (Kao and Chiang, 2000), we find strong evidence that the direction of causality runs from financial development to informality in "developing countries" when "financial credit" and "bank credit" are used as FD indicators. Also, causality runs from financial inclusion to informality in "developing countries" when "bank account" is used as FI indicator. Double causality is strongly supported by the data for some countries and indicators. Specifically, for "all countries" and "developing countries", we find evidence of double causality between informality and financial development when the latter is measured as "bank deposit"; for Latin American countries, evidence of double causality is found when financial inclusion is measured as "ATM".

Overall, the results suggest that increases in financial development and financial inclusion are connected to reductions in informality in the long run. Does it mean that any policy that promotes any form of financial development or financial inclusion may contribute to the reduction of informality in the long run? Not necessarily because there might be a third variable, such as the evolution of institutions, that drives both variables in the long run. However, based on weak exogeneity results for developing countries, we find evidence that higher credit to the private sector and more bank accounts have contributed to reducing informality in the long run.

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Table 1. Most used measures of FD/FI and informality

Indicators	Description	Sector
Financial Development		
(1) Private credit provided by banking sector (% of GDP)	Private credit by deposit money banks to GDP.	Banking sector
(2) Private credit provided by financial system (% of GDP)	Private credit by deposit money banks and others financial institutions to GDP.	Banking sector
(3) Total deposit (% of GDP)	Demand, time and saving deposits in banks and others financial institutions as a share of GDP.	Banking sector
(4) Private credit provided by banking sector (% of GDP)	Private credit by deposit money banks to GDP.	Banking sector
(5) The ratio of M2 to GDP	The total value of demand, time and saving deposits at domestic deposit money banks as a share of GDP.	Banking sector
(6) Stock marked value traded as % of GDP	The value of shares traded is the total number of shares traded, both domestic and foreign, multiplied by their respective matching prices.	Stock market sector
(7) Stock marked capitalization as % of GDP	Market capitalization (also known as market value) is the share price times the number of shares outstanding (including their several classes) for listed domestic companies.	Stock market sector
(8) Stock market turnover ratio	Stock marked value traded to capitalization.	Stock market sector
Financial Inclusion		
(1) Bank branches per 100,000 adults	100,000*reported number of commercial bank branches/adult population in the reporting country.	Banking sector
(2) Account bank (% age 15+)	The percentage of respondents with an account at a bank, credit union, another financial institution including respondents who reported having a debit card (% age 15+).	Banking sector
(3) ATMs per 1000 adults	100,000*Number of ATMs/adult population in the reporting country.	Banking sector
(4) Debit card (% age 15+)	All jobs in unregistered and/or small−scale private unincorporated enterprises that produce goods or services meant for sale or barter.	Banking sector
(5) Mobile financial services	mobile money, mobile credit, savings.	Banking sector
Informality		
(1) Informal employment (% of total non−agricultural employment)	All jobs in unregistered and/or small−scale private unincorporated enterprises that produce goods or services meant for sale or barter.	ILOSTAT
(2) Informal economy (% GDP)	All economic activities that contribute to the officially calculated (or observed) gross national product but are currently unregistered.	Medina and Schneider (2018)

Table 2. Descriptive statistics

	Informality	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
All countries										
Mean	30.98	34.36	36.81	38.87	38.11	22.59	48.22	18.97	565.82	43.01
Median	31.20	22.72	23.58	26.13	26.52	4.19	28.00	12.94	396.79	32.00
Maximum	70.50	972.21	972.21	361.76	972.19	822.32	1098.94	287.24	3379.81	313.14
Minimum	5.10	0.01	0.01	0.06	0.01	0.00	0.01	0.13	0.00	0.00
Std. Dev.	12.88	37.71	40.36	38.63	42.79	51.68	78.11	24.48	547.74	45.65
Skewness	0.20	6.07	5.20	2.40	5.67	6.40	7.99	5.74	1.51	1.92
Kurtosis	2.58	101.95	77.80	11.62	72.69	66.60	94.14	53.42	5.93	8.03
JB (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	4212	8230	8258	8149	8182	2946	2895	2437	1239	2290
Developed countries										
Mean	16.04	67.72	73.62	76.53	70.37	41.53	69.01	39.72	1438.34	97.67
Median	13.90	58.10	65.98	68.23	56.55	14.01	43.56	30.82	1276.89	87.45
Maximum	34.50	260.70	260.70	308.98	472.05	822.32	1098.94	287.24	2314.54	313.14
Minimum	5.10	4.92	6.70	0.06	5.37	0.00	0.27	1.43	625.96	31.70
Std. Dev.	6.46	40.58	44.51	46.35	53.83	72.52	109.07	40.91	532.03	54.24
Skewness	0.58	1.00	0.97	1.02	3.06	4.77	6.50	4.11	0.22	1.37
Kurtosis	2.28	3.90	3.85	3.94	15.75	36.68	55.22	22.31	1.68	4.74
JB (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00
Observations	945	1804	1812	1759	1759	1186	1183	515	82	499
Developing countries										
Mean	35.30	25.00	26.46	28.51	29.28	9.83	33.85	13.41	503.98	27.78
Median	34.90	17.77	18.33	20.68	19.80	1.86	20.81	10.07	349.55	20.77
Maximum	70.50	972.21	972.21	361.76	972.19	331.27	328.36	92.17	3379.81	185.32
Minimum	11.00	0.01	0.01	0.16	0.01	0.00	0.01	0.13	0.00	0.00
Std. Dev.	10.89	30.97	32.28	28.53	34.29	22.91	39.94	12.88	493.59	27.96
Skewness	0.31	12.43	11.06	4.01	9.46	5.84	2.60	1.91	1.74	1.49
Kurtosis	2.99	291.94	245.37	32.50	191.70	54.60	12.59	8.50	7.89	5.78
JB (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	3267	6426	6446	6390	6423	1760	1712	1922	1157	1791
Latam countries										
Mean	38.25	24.73	26.47	30.02	24.85	4.08	22.26	15.43	719.39	37.82
Median	37.40	20.53	21.37	24.82	19.82	1.11	14.72	13.81	668.14	33.88
Maximum	70.50	91.91	108.61	134.11	88.73	38.83	136.53	40.75	2133.16	122.78
Minimum	14.10	1.61	1.61	1.68	1.58	0.00	0.34	3.98	53.17	1.86
Std. Dev.	11.54	15.51	17.19	18.75	15.38	6.93	25.01	7.09	420.25	25.64
Skewness	0.34	1.36	1.55	1.66	1.16	2.73	1.96	0.89	0.89	1.59
Kurtosis	2.93	4.70	5.83	6.66	3.99	10.95	6.86	3.84	3.80	5.60
JB (p-value)	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	513	1128	1128	1124	1127	386	365	269	172	255

Notes: JB is the Jarque Bera test. Financial indicators are measured as % of GDP, except financial inclusion indicators (see Table 1 for definitions details and Table 13 for group of countries).

Table 3. Correlations between Informality and FD/FI

Indicator	Correlation	Probability	Observations
All countries			
Bank Credit	−0.63	0.00	3027
Fin. Credit	−0.61	0.00	3035
Dom. Credit	−0.60	0.00	3093
Bank Depos.	−0.49	0.00	3041
Value Traded	−0.38	0.00	1380
Market Cap.	−0.36	0.00	1345
Branch	−0.42	0.00	1574
Bank Acc.	−0.35	0.00	649
ATM	−0.50	0.00	1386
Developed countries			
Bank Credit	−0.39	0.00	636
Fin. Credit	−0.33	0.00	644
Dom. Credit	−0.26	0.00	650
Bank Depos.	−0.15	0.00	646
Value Traded	−0.20	0.00	528
Market Cap.	−0.31	0.00	517
Branch	0.26	0.00	351
Bank Acc.	0.02	0.93	25
ATM	−0.03	0.54	349
Developing countries			
Bank Credit	−0.44	0.00	2391
Fin. Credit	−0.45	0.00	2391
Dom. Credit	−0.44	0.00	2443
Bank Depos.	−0.35	0.00	2395
Value Traded	−0.27	0.00	852
Market Cap.	−0.27	0.00	828
Branch	−0.27	0.00	1223
Bank Acc.	−0.26	0.00	624
ATM	−0.25	0.00	1037
Latam countries			
Bank Credit	−0.06	0.21	432
Fin. Credit	−0.16	0.00	432
Dom. Credit	−0.17	0.00	432
Bank Depos.	0.10	0.04	432
Value Traded	−0.21	0.01	162
Market Cap.	−0.37	0.00	183
Branch	0.18	0.01	209
Bank Acc.	−0.32	0.00	110
ATM	−0.22	0.00	190

Notes: The first number in the entry of the table is the correlation, the second one is the probability that the correlation is zero, and the third one is the number of common observations used to calculate the correlation. (See list of countries in Table 13)

Table 4. Correlations between FD/FI indicators

Indicator	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
All countries									
Bank Credit	1.00	0.99	0.97	0.78	0.49	0.48	0.63	0.57	0.63
Fin. Credit	0.99	1.00	0.98	0.80	0.47	0.46	0.61	0.58	0.60
Dom. Credit	0.97	0.98	1.00	0.78	0.48	0.47	0.62	0.57	0.62
Bank Depos.	0.78	0.80	0.78	1.00	0.31	0.41	0.49	0.40	0.46
Value Traded	0.49	0.47	0.48	0.31	1.00	0.62	0.14	−0.13	0.49
Market Cap.	0.48	0.46	0.47	0.41	0.62	1.00	0.09	0.22	0.32
Branch	0.63	0.61	0.62	0.49	0.14	0.09	1.00	0.65	0.55
Bank Acc.	0.57	0.58	0.57	0.40	−0.13	0.22	0.65	1.00	0.66
ATM	0.63	0.60	0.62	0.46	0.49	0.32	0.55	0.66	1.00
Developed countries									
Bank Credit	1.00	0.98	0.96	0.68	0.39	0.40	0.39	-0.10	0.15
Fin. Credit	0.98	1.00	0.98	0.75	0.39	0.39	0.38	-0.10	0.12
Dom. Credit	0.96	0.98	1.00	0.76	0.40	0.40	0.39	-0.11	0.18
Bank Depos.	0.68	0.75	0.76	1.00	0.27	0.33	0.26	-0.04	0.21
Value Traded	0.39	0.39	0.40	0.27	1.00	0.75	-0.07	-0.48	0.51
Market Cap.	0.40	0.39	0.40	0.33	0.75	1.00	-0.03	-0.37	0.42
Branch	0.39	0.38	0.39	0.26	-0.07	-0.03	1.00	-0.54	0.03
Bank Acc.	-0.10	-0.10	-0.11	-0.04	-0.48	-0.37	-0.54	1.00	-0.18
ATM	0.15	0.12	0.18	0.21	0.51	0.42	0.03	-0.18	1.00
Developing countries									
Bank Credit	1.00	0.99	0.96	0.79	0.45	0.56	0.53	0.51	0.55
Fin. Credit	0.99	1.00	0.97	0.78	0.42	0.56	0.49	0.53	0.52
Dom. Credit	0.96	0.97	1.0	0.72	0.42	0.56	0.51	0.52	0.54
Bank Depos.	0.79	0.78	0.72	1.00	0.19	0.44	0.38	0.38	0.30
Value Traded	0.45	0.4	0.42	0.19	1.00	0.50	−0.05	−0.16	0.08
Market Cap.	0.56	0.56	0.56	0.44	0.50	1.00	0.00	0.29	0.12
Branch	0.53	0.49	0.51	0.38	−0.05	0.00	1.00	0.75	0.62
Bank Acc.	0.51	0.53	0.52	0.38	−0.16	0.29	0.75	1.00	0.65
ATM	0.55	0.52	0.54	0.30	0.08	0.12	0.62	0.65	1.00
Latam countries									
Bank Credit	1.00	0.98	0.91	0.80	0.22	0.48	0.60	0.48	0.39
Fin. Credit	0.98	1.00	0.92	0.79	0.29	0.61	0.53	0.55	0.39
Dom. Credit	0.91	0.92	1.00	0.70	0.19	0.52	0.50	0.61	0.36
Bank Depos.	0.80	0.79	0.70	1.00	0.23	0.35	0.47	0.02	0.23
Value Traded	0.22	0.29	0.19	0.23	1.00	0.56	0.34	0.14	0.74
Market Cap.	0.48	0.61	0.52	0.35	0.56	1.00	0.10	0.50	0.34
Branch	0.60	0.53	0.50	0.47	0.34	0.10	1.00	0.41	0.33
Bank Acc.	0.48	0.55	0.61	0.02	0.14	0.50	0.41	1.00	0.19
ATM	0.39	0.39	0.36	0.23	0.74	0.34	0.33	0.19	1.00

Notes: The number in the table is the correlation. (See list of countries in Table 13)

Table 5. Unit root tests

	Informality	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
All countries										
Levin, Lin and Chu	0.802	0.218	0.314	1.000	1.000	0.797	0.281	0.000	1.000	0.011
Hadrid	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Im, Pesaran and Shin	1.000	0.997	0.999	1.000	1.000	0.436	0.508	1.000	1.000	1.000
Maddala and Wu - ADF Fisher	1.000	1.000	1.000	1.000	1.000	0.867	0.959	0.992	1.000	0.787
Choi - PP Fisher	1.000	1.000	1.000	1.000	1.000	0.267	0.721	0.486	0.889	0.018
Number of cross-sections	152	129	129	130	129	57	55	125	50	114
Number of observations	3833	5415	5446	5566	5527	1565	1514	1573	600	1412
Developed countries										
Levin, Lin and Chu	0.027	0.903	0.871	0.853	0.829	0.742	0.888	0.421	0.029	0.445
Hadrid	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.029	0.000
Im, Pesaran and Shin	0.989	1.000	1.000	1.000	1.000	0.777	0.858	1.000	0.044	0.764
Maddala and Wu - ADF Fisher	0.999	1.000	1.000	1.000	1.000	0.974	0.991	0.991	0.055	0.236
Choi - PP Fisher	1.000	1.000	0.999	0.999	1.000	0.864	0.738	0.838	0.000	0.005
Number of cross-sections	33	26	26	26	26	21	20	26	2	26
Number of observations	818	1193	1199	1205	1229	650	629	332	23	332
Developing countries										
Levin, Lin and Chu	0.968	0.026	0.078	1.000	1.000	0.710	0.031	0.000	1.000	0.010
Hadrid	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Im, Pesaran and Shin	1.000	0.826	0.914	1.000	1.000	0.212	0.204	1.000	1.000	1.000
Maddala and Wu - ADF Fisher	1.000	0.982	0.995	1.000	1.000	0.501	0.691	0.938	1.000	0.906
Choi - PP Fisher	1.000	0.998	0.999	1.000	1.000	0.066	0.581	0.296	0.999	0.176
Number of cross-sections	119	103	103	104	103	36	35	99	48	88
Number of observations	3015	4222	4247	4361	4298	915	885	1241	577	1080
Latam countries										
Levin, Lin and Chu	0.657	0.999	1.000	0.984	0.994	0.904	0.113	0.009	1.000	0.005
Hadrid	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Im, Pesaran and Shin	0.999	0.994	0.999	0.966	1.000	0.682	0.220	0.773	1.000	0.907
Maddala and Wu - ADF Fisher	1.000	0.967	0.997	0.592	1.000	0.717	0.349	0.769	0.989	0.859
Choi - PP Fisher	0.991	0.990	0.994	0.768	1.000	0.555	0.313	0.635	0.981	0.434
Number of cross-sections	19	17	17	17	17	7	8	16	8	15
Number of observations	476	889	889	906	908	228	232	197	100	185

Notes: Each entry represent the p-value for the corresponding test and series. The null hypothesis is rejected if the p-value is less than 0.05. All tests are built under the null hypothesis of a unit root, with the exception of the test proposed by Hadrid (2000) which is based on the null hypothesis of stationarity. Maddala and Wu and Choi tests combine the p-values from individuals unit root tests. Im, Pesaran and Shin test combines the t-statistics from individual unit roots tests. Table 13 contains the list of countries.

Table 6. Panel cointegration tests

	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
All countries									
Residual-based tests									
Pedroni-Common AR coefficients									
ADF statistic	0.191	0.175	0.248	0.000	0.999	0.653	0.000	0.000	0.000
Pedroni-Individual AR coefficients									
ADF statistic	0.043	0.065	0.168	0.000	1.000	0.973	0.000	0.000	0.000
Kao									
ADF statistic	0.000	0.000	0.000	0.000	0.000	0.000	0.160	0.000	0.034
Johansen-Fisher test									
Maddala and Wu									
No cointegration	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
At least one cointegrating vector	0.093	0.195	0.030	0.002	0.560	0.466	0.000	0.123	0.000
Developed countries									
Residual-based tests									
Pedroni-Common AR coefficients									
ADF statistic	0.967	0.975	0.984	0.069	0.965	0.927	0.000	0.223	0.000
Pedroni-Individual AR coefficients									
ADF statistic	0.941	0.968	0.988	0.002	1.000	0.998	0.000	0.421	0.000
Kao									
ADF statistic	0.014	0.026	0.003	0.350	0.000	0.000	0.217	0.001	0.049
Johansen-Fisher test									
Maddala and Wu									
No cointegration	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.118	0.000
At least one cointegrating vector	0.001	0.003	0.015	0.011	0.696	0.387	0.000	0.162	0.000
Developing countries									
Residual-based tests									
Pedroni-Common AR coefficients									
ADF statistic	0.033	0.027	0.031	0.001	0.996	0.270	0.000	0.000	0.000
Pedroni-Individual AR coefficients									
ADF statistic	0.003	0.004	0.012	0.001	1.000	0.603	0.000	0.000	0.000
Kao									
ADF statistic	0.003	0.002	0.000	0.000	0.000	0.000	0.077	0.000	0.003
Johansen-Fisher test									
Maddala and Wu									
No cointegration	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
At least one cointegrating vector	0.044	0.099	0.271	0.015	0.948	0.819	0.000	0.000	0.000
Latam countries									
Residual-based tests									
Pedroni-Common AR coefficients									
ADF statistic	0.498	0.492	0.668	0.843	0.538	0.207	0.111	0.166	0.003
Pedroni-Individual AR coefficients									
ADF statistic	0.482	0.397	0.767	0.976	0.725	0.356	0.148	0.280	0.025
Kao									
ADF statistic	0.089	0.217	0.418	0.082	0.006	0.028	0.094	0.409	0.035
Johansen-Fisher test									
Maddala and Wu									
No cointegration	0.000	0.000	0.006	0.000	0.000	0.067	0.000	0.000	0.000
At least one cointegrating vector	0.157	0.365	0.836	0.128	0.951	0.800	0.000	0.335	0.415

Notes: The table displays the p-values for the corresponding test and variable. The null hypothesis of no cointegration is rejected if the p-value is less than 0.05. Table 13 contains the list of countries.

Table 7. Estimation of cointegrating vectors

	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
All countries									
Dynamic OLS									
Kao and Chiang (2000)									
Coeff.	−0.082	−0.079	−0.072	−0.139	−0.042	−0.058	−0.094	−0.008	−0.061
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mark and Sul(1999)									
Coeff.	−0.078	−0.076	−0.065	−0.133	−0.039	−0.061	−0.077	−0.007	−0.057
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pedroni(2001)									
Coeff.	−0.214	−0.205	−0.208	−0.299	−0.203	−0.089	−0.354	−0.024	−0.052
p-value	0.000	0.000	0.000	0.000	0.472	0.000	0.020	0.000	0.394
Fully-modified OLS									
Phillips and Moon (1999)									
Coeff.	−0.086	−0.082	−0.078	−0.138	−0.038	−0.062	−0.085	−0.008	−0.066
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Kao and Chiang(2000)									
Coeff.	−0.130	−0.127	−0.114	−0.183	−0.180	−0.196	−0.153	−0.037	−0.108
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000
Pedroni(2000, 2001)									
Coeff.	−0.201	−0.191	−0.205	−0.287	−0.248	−0.092	−0.377	−0.025	−0.066
p-value	0.000	0.000	0.000	0.000	0.216	0.000	0.004	0.000	0.212

Notes: The table displays the long-run coefficients and the corresponding p-values. Levels of significance: *** p<0.01, ** p<0.05, * p<0.1.
(See list of countries in Table 13)

Table 8. Estimation of cointegration vectors

	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
Developed countries									
Dynamic OLS									
Kao and Chiang (2000)									
Coeff.	−0.034	−0.035	−0.034	−0.086	−0.034	−0.034	0.029	−0.008	−0.028
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.024	0.002	0.000
Mark and Sul(1999)									
Coeff.	−0.034	−0.035	−0.035	−0.079	−0.032	−0.037	0.018	−0.007	−0.023
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.028	0.010	0.000
Pedroni(2001)									
Coeff.	−0.054	−0.048	−0.039	−0.134	0.022	−0.038	0.104	−0.005	−0.051
p-value	0.000	0.000	0.000	0.000	0.739	0.000	0.158	0.039	0.000
Fully-modified OLS									
Phillips and Moon (1999)									
Coeff.	−0.035	−0.036	−0.035	−0.087	−0.032	−0.038	0.034	−0.010	−0.032
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000
Kao and Chiang(2000)									
Coeff.	−0.071	−0.063	−0.069	−0.127	−0.134	−0.154	−0.009	0.057	−0.055
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.600	0.737	0.026
Pedroni(2000, 2001)									
Coeff.	−0.050	−0.045	−0.040	−0.124	0.020	−0.041	0.101	−0.007	−0.054
p-value	0.000	0.000	0.000	0.000	0.715	0.000	0.097	0.001	0.000
Developing countries									
Dynamic OLS									
Kao and Chiang (2000)									
Coeff.	−0.193	−0.179	−0.151	−0.170	−0.059	−0.079	−0.217	−0.008	−0.070
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mark and Sul(1999)									
Coeff.	−0.192	−0.170	−0.146	−0.181	−0.047	−0.085	−0.240	−0.007	−0.074
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pedroni(2001)									
Coeff.	−0.257	−0.247	−0.254	−0.344	−0.342	−0.120	−0.484	−0.025	−0.052
p-value	0.000	0.000	0.000	0.000	0.452	0.000	0.013	0.000	0.518
Fully-modified OLS									
Phillips and Moon (1999)									
Coeff.	−0.179	−0.165	−0.154	−0.165	−0.047	−0.080	−0.233	−0.008	−0.074
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Kao and Chiang(2000)									
Coeff.	−0.199	−0.184	−0.177	−0.207	−0.231	−0.241	−0.310	−0.037	−0.121
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000
Pedroni(2000, 2001)									
Coeff.	−0.242	−0.231	−0.250	−0.331	−0.413	−0.122	−0.512	−0.026	−0.069
p-value	0.000	0.000	0.000	0.000	0.201	0.000	0.002	0.000	0.320
Latam countries									
Dynamic OLS									
Kao and Chiang (2000)									
Coeff.	−0.203	−0.200	−0.125	−0.285	−0.219	−0.173	−0.346	−0.006	−0.072
p-value	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.004	0.000
Mark and Sul(1999)									
Coeff.	−0.192	−0.191	−0.100	−0.272	−0.264	−0.144	−0.363	−0.005	−0.064
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pedroni(2001)									
Coeff.	−0.244	−0.265	−0.211	−0.273	−0.084	−0.070	−0.921	−0.010	−0.260
p-value	0.000	0.000	0.000	0.000	0.682	0.001	0.000	0.001	0.000
Fully-modified OLS									
Phillips and Moon (1999)									
Coeff.	−0.208	−0.190	−0.144	−0.285	−0.228	−0.179	−0.379	−0.008	−0.082
p-value	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000
Kao and Chiang(2000)									
Coeff.	−0.200	−0.177	−0.133	−0.282	−0.311	−0.211	−0.446	0.017	−0.149
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.492	0.000
Pedroni(2000, 2001)									
Coeff.	−0.228	−0.242	−0.216	−0.273	−0.105	−0.075	−1.015	−0.010	−0.271
p-value	0.000	0.000	0.000	0.000	0.528	0.001	0.000	0.000	0.000

Notes: The table displays the long-run coefficients and the corresponding p-values. Levels of significance: *** p<0.01, ** p<0.05, * p<0.1.
(See list of countries in Table 13)

Table 9. Estimation of error correction model - All countries

	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
Dynamic OLS									
Kao and Chiang (2000)									
Informality									
Cointegrating error	−0.127	−0.141	−0.153	−0.150	−0.169	−0.176	−0.387	−0.332	−0.430
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	−0.065	−0.068	−0.098	−0.173	0.113	−0.045	0.040	−0.785	−0.234
p-value	0.214	0.225	0.121	0.001	0.583	0.837	0.184	0.640	0.013
Mark and Sul (1999)									
Informality									
Cointegrating error	−0.128	−0.142	−0.155	−0.152	−0.170	−0.176	−0.389	−0.335	−0.432
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	−0.058	−0.063	−0.075	−0.170	0.147	−0.093	0.048	−0.546	−0.203
p-value	0.269	0.262	0.235	0.002	0.475	0.672	0.113	0.744	0.030
Pedroni (2001)									
Informality									
Cointegrating error	−0.066	−0.051	−0.067	−0.057	−0.048	−0.149	−0.252	−0.062	−0.385
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.000
Financial Indicator									
Cointegrating error	−0.292	−0.284	−0.381	−0.298	−1.293	−0.497	−0.060	−2.770	−0.133
p-value	0.000	0.000	0.000	0.000	0.000	0.014	0.021	0.018	0.133
Fully modified OLS									
Phillips and Moon (1999)									
Informality									
Cointegrating error	−0.186	−0.181	−0.186	−0.187	−0.165	−0.172	−0.362	−0.340	−0.387
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	−0.315	−0.345	−0.318	−0.565	−0.318	−0.083	0.036	−1.098	−0.263
p-value	0.000	0.000	0.000	0.000	0.104	0.678	0.199	0.473	0.003
Kao and Chiang (2000)									
Informality									
Cointegrating error	−0.164	−0.152	−0.168	−0.166	−0.057	−0.070	−0.349	−0.015	−0.331
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.483	0.000
Financial Indicator									
Cointegrating error	−0.421	−0.444	−0.434	−0.618	−1.382	−1.069	0.008	−2.426	−0.532
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.772	0.003	0.000
Pedroni (2000, 2001)									
Informality									
Cointegrating error	−0.116	−0.103	−0.101	−0.108	−0.033	−0.152	−0.250	−0.088	−0.387
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000
Financial Indicator									
Cointegrating error	−0.492	−0.484	−0.548	−0.605	−1.223	−0.580	−0.066	−3.066	−0.259
p-value	0.000	0.000	0.000	0.000	0.000	0.002	0.008	0.007	0.003

Table 10. Estimation of error correction model - Developed countries

	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
Dynamic OLS									
Kao and Chiang (2000)									
Informality									
Cointegrating error	−0.185	−0.177	−0.202	−0.123	−0.219	−0.222	−0.532	−0.310	−0.529
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.368	0.000
Financial Indicator									
Cointegrating error	−0.096	−0.041	−0.329	0.054	0.011	−0.313	0.619	−30.610	−0.375
p-value	0.765	0.901	0.362	0.817	0.984	0.512	0.000	0.342	0.474
Mark and Sul (1999)									
Informality									
Cointegrating error	−0.185	−0.179	−0.201	−0.134	−0.221	−0.219	−0.528	−0.374	−0.532
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.260	0.000
Financial Indicator									
Cointegrating error	−0.090	−0.027	−0.338	0.050	0.052	−0.428	0.570	−17.876	−0.094
p-value	0.778	0.935	0.349	0.832	0.924	0.365	0.001	0.570	0.858
Pedroni (2001)									
Informality									
Cointegrating error	−0.123	−0.127	−0.159	−0.039	−0.202	−0.202	−0.362	−0.397	−0.433
p-value	0.000	0.000	0.000	0.178	0.000	0.000	0.000	0.189	0.000
Financial Indicator									
Cointegrating error	−0.077	−0.302	−0.196	−0.506	2.721	−0.506	0.603	−0.267	−1.608
p-value	0.800	0.339	0.571	0.011	0.000	0.279	0.000	0.993	0.001
Fully modified OLS									
Phillips and Moon (1999)									
Informality									
Cointegrating error	−0.155	−0.154	−0.169	−0.152	−0.194	−0.219	−0.459	−0.353	−0.475
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.296	0.000
Financial Indicator									
Cointegrating error	−0.492	−0.571	−0.435	−1.225	−0.927	−0.577	0.481	−38.827	−0.200
p-value	0.081	0.050	0.182	0.000	0.069	0.213	0.003	0.207	0.674
Kao and Chiang (2000)									
Informality									
Cointegrating error	−0.081	−0.083	−0.095	−0.091	−0.034	−0.081	−0.433	−0.080	−0.415
p-value	0.002	0.001	0.000	0.001	0.068	0.000	0.000	0.023	0.000
Financial Indicator									
Cointegrating error	−1.085	−1.005	−1.125	−1.253	−2.227	−1.622	0.326	7.648	−1.247
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.039	0.011	0.006
Pedroni (2000, 2001)									
Informality									
Cointegrating error	−0.127	−0.132	−0.159	−0.094	−0.220	−0.215	−0.395	−0.530	−0.417
p-value	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.082	0.000
Financial Indicator									
Cointegrating error	−0.802	−0.753	−0.585	−1.259	2.217	−0.699	0.583	−6.698	−1.221
p-value	0.003	0.008	0.069	0.000	0.000	0.126	0.000	0.819	0.007

Table 11. Estimation of error correction model - Developing countries

	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
Dynamic OLS									
Kao and Chiang (2000)									
Informality									
Cointegrating error	−0.121	−0.144	−0.154	−0.163	−0.159	−0.170	−0.392	−0.334	−0.428
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	0.017	−0.014	−0.015	−0.196	0.063	−0.019	0.012	−0.507	−0.124
p-value	0.629	0.723	0.744	0.000	0.775	0.939	0.665	0.754	0.112
Mark and Sul (1999)									
Informality									
Cointegrating error	−0.121	−0.147	−0.155	−0.161	−0.162	−0.169	−0.389	−0.336	−0.426
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	0.017	−0.012	−0.012	−0.202	0.141	−0.094	0.006	−0.338	−0.140
p-value	0.626	0.766	0.794	0.000	0.526	0.711	0.824	0.834	0.074
Pedroni (2001)									
Informality									
Cointegrating error	−0.109	−0.094	−0.103	−0.084	−0.029	−0.129	−0.298	−0.060	−0.382
p-value	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.045	0.000
Financial Indicator									
Cointegrating error	−0.035	−0.053	−0.093	−0.197	−0.900	−0.453	−0.058	−2.048	−0.025
p-value	0.265	0.101	0.021	0.000	0.000	0.044	0.020	0.066	0.733
Fully modified OLS									
Phillips and Moon (1999)									
Informality									
Cointegrating error	−0.196	−0.195	−0.198	−0.197	−0.161	−0.162	−0.366	−0.339	−0.384
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	−0.279	−0.312	−0.295	−0.515	−0.274	−0.028	−0.001	−1.029	−0.172
p-value	0.000	0.000	0.000	0.000	0.195	0.904	0.973	0.487	0.018
Kao and Chiang (2000)									
Informality									
Cointegrating error	−0.191	−0.189	−0.191	−0.184	−0.057	−0.053	−0.354	−0.016	−0.328
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.456	0.000
Financial Indicator									
Cointegrating error	−0.293	−0.326	−0.320	−0.555	−1.118	−0.879	−0.020	−1.953	−0.341
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.418	0.013	0.000
Pedroni (2000, 2001)									
Informality									
Cointegrating error	−0.175	−0.169	−0.158	−0.129	−0.021	−0.132	−0.296	−0.085	−0.387
p-value	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.004	0.000
Financial Indicator									
Cointegrating error	−0.314	−0.348	−0.365	−0.562	−0.810	−0.558	−0.064	−2.489	−0.152
p-value	0.000	0.000	0.000	0.000	0.000	0.007	0.007	0.022	0.036

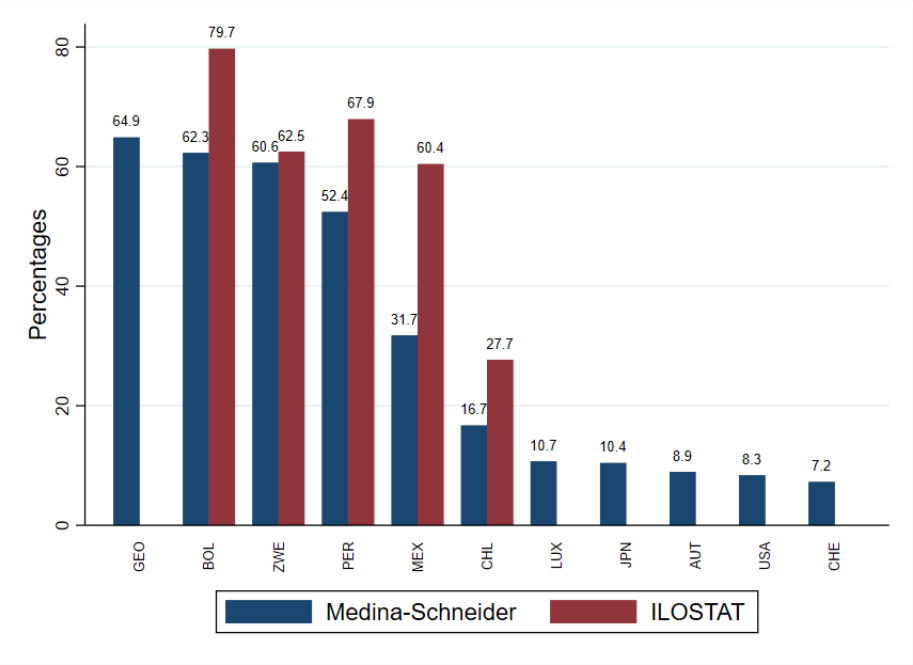
Table 12. Estimation of error correction model - Latam countries

	Bank Credit	Fin. Credit	Dom. Credit	Bank Depos.	Value Traded	Market Cap.	Branch	Bank Acc.	ATM
Dynamic OLS									
Kao and Chiang (2000)									
Informality									
Cointegrating error	−0.088	−0.104	−0.161	−0.090	−0.168	−0.179	−0.356	−0.367	−0.402
p-value	0.036	0.025	0.000	0.027	0.000	0.001	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	−0.103	−0.023	−0.259	−0.087	0.105	0.114	−0.043	−6.777	−0.602
p-value	0.055	0.692	0.000	0.094	0.128	0.754	0.317	0.113	0.020
Mark and Sul (1999)									
Informality									
Cointegrating error	−0.092	−0.110	−0.165	−0.093	−0.173	−0.171	−0.354	−0.372	−0.401
p-value	0.028	0.018	0.000	0.022	0.000	0.001	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	−0.105	−0.025	−0.243	−0.088	0.087	0.276	−0.045	−6.041	−0.565
p-value	0.050	0.658	0.001	0.091	0.214	0.441	0.296	0.155	0.028
Pedroni (2001)									
Informality									
Cointegrating error	−0.066	−0.061	−0.132	−0.088	−0.114	−0.121	−0.149	−0.310	−0.136
p-value	0.105	0.161	0.001	0.033	0.010	0.011	0.010	0.001	0.004
Financial Indicator									
Cointegrating error	−0.085	−0.019	−0.274	−0.080	0.122	0.554	−0.084	−8.095	−0.663
p-value	0.100	0.726	0.000	0.127	0.051	0.079	0.021	0.053	0.000
Fully modified OLS									
Phillips and Moon (1999)									
Informality									
Cointegrating error	−0.101	−0.146	−0.146	−0.126	−0.170	−0.165	−0.363	−0.380	−0.375
p-value	0.008	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	−0.285	−0.257	−0.366	−0.240	0.104	0.349	−0.033	−7.280	−0.650
p-value	0.000	0.000	0.000	0.000	0.128	0.278	0.413	0.060	0.010
Kao and Chiang (2000)									
Informality									
Cointegrating error	−0.103	−0.149	−0.148	−0.127	−0.173	−0.161	−0.352	−0.164	−0.304
p-value	0.007	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000
Financial Indicator									
Cointegrating error	−0.282	−0.252	−0.356	−0.239	0.066	0.141	−0.042	0.416	−0.810
p-value	0.000	0.000	0.000	0.000	0.348	0.655	0.313	0.832	0.001
Pedroni (2000, 2001)									
Informality									
Cointegrating error	−0.095	−0.127	−0.124	−0.127	−0.156	−0.129	−0.134	−0.362	−0.129
p-value	0.013	0.001	0.001	0.000	0.001	0.003	0.013	0.000	0.005
Financial Indicator									
Cointegrating error	−0.291	−0.270	−0.413	−0.237	0.148	0.829	−0.071	−7.960	−0.647
p-value	0.000	0.000	0.000	0.000	0.022	0.004	0.036	0.040	0.000

Table 13. List of countries

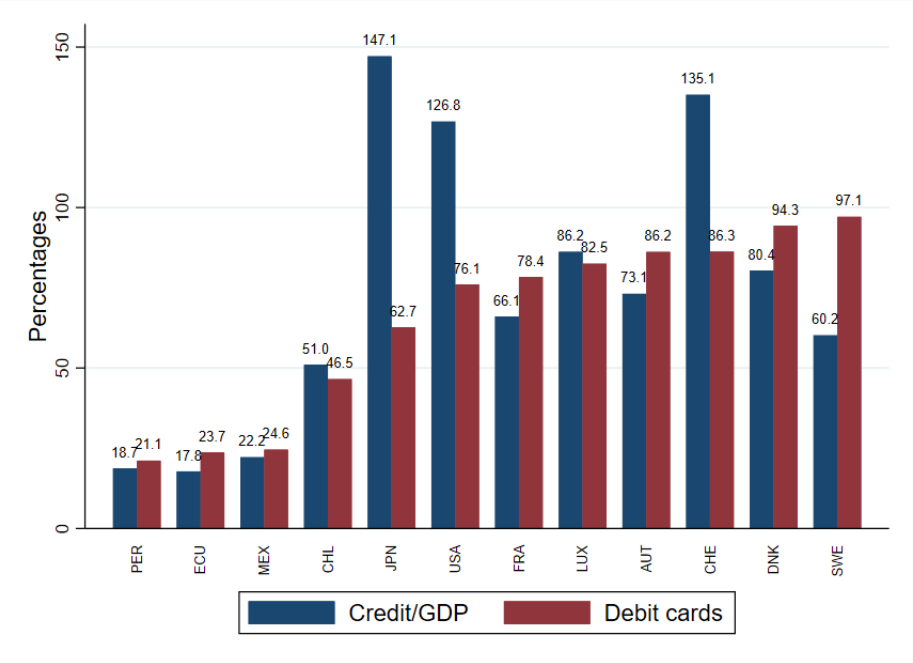
Developed economies		
Australia	Austria	Belgium
Canada	Cyprus	Czech Republic
Denmark	Estonia	Finland
France	Germany	Greece
Hong Kong SAR	Iceland	Ireland
Israel	Italy	Japan
Korea	Latvia	Lithuania
Luxembourg	Malta	Macao SAR
Netherlands	New Zealand	Norway
Portugal	Puerto Rico	San Marino
Singapore	Slovak Republic	Slovenia
Spain	Sweden	Switzerland
Taiwan Province of China	United Kingdom	United States
Latam economies		
Belize	Costa Rica	El Salvador
Guatemala	Honduras	Mexico
Nicaragua	Panama	Argentina
Bolivia	Brazil	Chile
Colombia	Ecuador	Guyana
Paraguay	Peru	Suriname
Uruguay	Venezuela	

Source: IMF (2016), "World Economic Outlook". The rest of countries are developing economies.



Source: Measures of Informality: i) Medina and Schneider (2020) and ii) *ILOSTAT*.

Figure 1. Levels of informality compared to developed countries



Source: Global Financial Development Database (World Bank).

Figure 2. Lower levels of financial development and financial inclusion