Borradores de ECONOMÍA

Financial Development and Monetary Policy Transmission

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Desarrollo financiero y transmisión de la política monetaria*

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Resumen

Este trabajo estima el efecto del desarrollo financiero en la transmisión de la política monetaria. Con este objetivo, el documento utiliza una base de datos que contiene indicadores de desarrollo financiero, tasas de política monetaria, tasas de interés de créditos y depósitos para 43 países para el período 2000-2019 y aplica una estrategia empírica propuesta por Brandao-Marques et al. (2020): en primer lugar, se estiman choques de política monetaria por país utilizando una aproximación a la regla de Taylor que relaciona los cambios en la tasa de política con la tasa de inflación, la brecha del producto y otras variables observables que probablemente influyan en las decisiones de política monetaria; en segundo lugar, los residuos de esta estimación (choques de política) se utilizan en una especificación de un modelo panel que relaciona las tasas activas o pasivas con, entre otros, choques de política y la interacción entre choques de política y medidas de desarrollo financiero. El coeficiente de este término de interacción capta el efecto del desarrollo financiero en la relación entre los choques de política monetaria y las tasas activas o pasivas. Los principales hallazgos del documento son dos: por un lado, el desarrollo financiero fortalece el canal de transmisión de la política monetaria a las tasas de los depósitos; es decir, cambios en la tasa de política en economías con mayor desarrollo financiero inducen cambios mayores (en la misma dirección) en las tasas de depósitos que en el caso de las economías con menor desarrollo financiero. Este resultado está particularmente impulsado por el efecto del desarrollo de las instituciones financieras en la transmisión, ya que el efecto del desarrollo de los mercados financieros resulta ser de menor magnitud. Por otro lado, los resultados obtenidos sugieren que el desarrollo financiero no fortalece la transmisión de la política monetaria a las tasas activas. Esto es consistente con un canal de crédito que se debilita ante el desarrollo financiero en un contexto donde los bancos no pueden sustituir fácilmente las fuentes de financiamiento de corto plazo. Estos resultados resaltan la relevancia del desarrollo financiero para el funcionamiento de la política monetaria y posiblemente implican la necesidad de un papel más activo de las autoridades monetarias en el fomento del desarrollo financiero.

Clasificación JEL: *G10, G18, G20, G28, E44, E52, E58*
***Palabras clave*:** desarrollo financiero, transmisión de política monetaria, choques de política monetaria.

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Abstract

This paper estimates the effect of financial development on the transmission of monetary policy. To do so, the paper employs a panel data set containing financial development indicators, policy rates, lending rates, and deposit rates for 43 countries for the period 2000-2019 and applies the empirical strategy of Brandao-Marques et al. (2020): firstly, monetary policy shocks are estimated using a Taylor-rule specification that relates changes in the policy rate to inflation, the output gap and other observables that are likely to influence monetary policy decisions; secondly, the residuals of this estimation (policy shocks) are used in a specification that relates lending or deposit rates to, among others, policy shocks and the interaction between policy shocks and measures of financial development. The coefficient on this interaction term captures the effect of financial development on the relationship between policy shocks and lending or deposit rates. The main findings of the paper are twofold: on the one hand, financial development does strengthen the monetary policy transmission channel to deposit rates; that is, changes in the policy rate in economies with more financial development induce larger changes (in the same direction) in deposit rates than is the case in economies with less financial development. This result is particularly driven by the effect of the development of financial institutions on policy transmission – the effect of financial markets development turns out to be smaller in magnitude. On the other hand, financial development does not strengthen the transmission of monetary policy to lending rates. This is consistent with a credit channel which weakens in the face of financial development in a context where banks cannot easily substitute short-term funding sources. These results highlight the relevance of financial development for the functioning of monetary policy across countries, and possibly imply the necessity of a more active role of monetary authorities in fostering financial development.

JEL classification: *G10, G18, G20, G28, E44, E52, E58*
***Keywords*:** financial development, monetary policy transmission, monetary policy shocks.

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1 Introduction

This paper estimates empirically the effect of financial development on the transmission of monetary policy. In the context of the paper, financial development is understood as an increase in a certain set of key financial market, financial institutions and financial system indicators compiled and condensed by the International Monetary Fund (IMF) for several countries; and monetary policy transmission is understood as the capacity of monetary policy (that is, changes of the policy rate) to influence bank lending and bank deposit rates. Thus, the paper calculates the extent to which progress in a set of observable metrics of development of financial markets and financial institutions strengthens or weakens the degree in which shocks to monetary policy rates have an effect on deposit and lending rates.

The question of the determinants of monetary policy transmission is of the utmost interest to central banks, particularly of those whose main operational target is some measure of the short-term interest rate (which is the case of a growing number of monetary authorities that operate under an inflation targeting regime, see Atasoy and Turkay (2019)). The literature has explored several 'channels' through which policy decisions on the benchmark interest rate (or more generally, monetary policy decisions) influence aggregate outcomes (Singh et al., 2008): balance sheet channel, lending channel (collectively known as the credit channel, see Bernanke and Gertler (1995)), asset pricing channel, expectations channel, exchange rate channel and risk-taking channel (Borio and Zhu, 2008). It is well understood that the potency of all these channels depends on several structural features of the economy that do not usually fall directly under the control of monetary authorities: the degree of development and competition in the financial system, the availability of banking/non-banking funding alternatives in financial markets, capital mobility constraints, or entry barriers, to name but a few (Cottarelli and Kourelis, 1994). At the same time, the tight link between economic and financial development is well documented (see Sahay et al. (2015); Svirydzenka (2016)): as an economy grows, it is more likely to feature larger financial institutions and financial aggregates, deeper financial markets and more varied alternatives for potential investors and borrowers. In this context, the question on the effects of financial development (as a key feature of economic development) on the potency of monetary policy transmission channels bears special relevance.

According to the literature, financial development and monetary policy transmission may be related in two different, opposing, ways. On the one hand, financial development and financial innovations may reduce the relative importance of banks (more generally, traditional financial institutions) in providing funding to the real sector of the economy by giving rise to deeper, more liquid capital markets. This may result in the weakening of the credit channel, as households and firms may switch away from banks whenever the external finance premium of bank funding increases (Singh et al. (2008); Seth and Kalyanaraman (2017)). In equilibrium, banks are less likely to 'transmit' changes in the policy rate to lending rates. If banks can substitute away from traditional short-term funding (possibly, again, because of financial development), they would also be less likely to 'transmit' changes in the policy rate to deposit rates; but if banks cannot substitute away from traditional short-term funding, they would be more likely to 'transmit' changes in the policy rate to deposit rates. On the other hand, financial development may induce stronger transmission of monetary policy decisions, simply because economic agents operating in high financial development environments are more likely to have some relationship with the financial system, and therefore their choices are more likely to be linked to monetary policy decisions. In addition to this, more liquid and deeper markets tend to feature a larger set of financial instruments/derivatives indexed

to policy rates or to inflation, which implies that changes in policy rates are immediately translated into financial flows for investors and borrowers (Vrolijk, 1997). Seth and Kalyanaraman (2017) argue, from a different perspective, that less developed financial systems tend to transmit changes in policy rates less because loaned funds are less likely to return to the financial system in the form of deposits, with the consequent negative impact on the money multiplier.

The question of the effect of financial development on the potency of monetary policy transmission channels is, therefore, an empirical issue. This paper tackles the question by using a panel data set containing financial development indicators (produced by the IMF), policy rates, lending rates, and deposit rates for 43 countries for the period 2000-2019 and applying an empirical strategy akin to Brandao-Marques et al. (2020). Firstly, monetary policy shocks are estimated using a Taylor-rule specification that relates changes in the policy rate to the inflation gap, the output gap and other observables that are likely to influence monetary policy decisions. Secondly, the residuals of this estimation (policy shocks) are used in a specification that relates lending or deposit rates to, among others, the policy shocks and the interaction between policy shocks and measures of financial development. The coefficient on this interaction term captures the effect of financial development on the relationship between policy shocks and lending or deposit rates. A positive (and statistically significant) estimate of this coefficient is interpreted as evidence of financial development strengthening monetary policy transmission, as the effect of policy shocks on bank rates is larger when indicators of financial development are higher (and vice versa if the estimate is negative). The paper uses monetary policy shocks to tackle endogeneity concerns arising from the potential response of monetary authorities to the general performance of the economy (and to financial development itself[1]).

This is the first paper in the literature to study the effect of financial development on monetary policy transmission on lending and deposit rates in a large set of advanced and emerging economies using several alternative indicators of financial development, each of which capturing a different aspect of it (financial markets, financial institutions, access, depth, efficiency). This allows to inspect whether there is a particular "brand" of financial development that relates more to the transmission of changes in the policy rate. Brandao-Marques et al. (2020), using aggregate measures of financial development, find that financial development is relatively unimportant for monetary policy transmission to output and inflation, compared to other institutional features of the economy, such as central bank independence or having inflation targeting regimes. Cecchetti (2001) finds, for the case of European countries, that the transmission of monetary policy is closely related to the development of the financial system in two ways: first, countries that have a legal system more propitious for financial development (that is, with stronger protection for creditors and shareholders) tend to have a less potent lending channel; second, transmission is stronger in countries where firms are more dependent on bank funding, where the financial system is more fragile, and where the banking system is less concentrated. Lerskullawat (2016) finds, for a set of Southeast Asian countries[2], that the development of capital markets (in terms of size and market capitalisation) and of the banking sector (in terms of liquidity) reduces the potency of monetary policy transmission. Singh et al. (2008) also finds that the size and speed of transmission of monetary policy to bank rates (both in the short run and in the long run) are higher in countries with more developed

[1] Ideally, the assessment of monetary policy transmission and its determinants employs changes in policy rates that are orthogonal to economic conditions (observables and otherwise) that may also influence lending and deposit rates.

[2] Indonesia, Malaysia, Singapore, Thailand and The Philippines.

financial markets[3]. Consistent with this, Estrella (2002) finds that higher securitisation of mortgage loans strengthens the transmission of changes in the Federal Funds Rate to mortgage rates. According to Gropp et al. (2007), transmission is faster in jurisdictions with higher competition in the banking system and with larger bond and stock markets. Finally, Sørensen and Werner (2006) find similar results with respect to competition in the banking system.

Consistent with the above-mentioned intuition on the determinants of monetary policy transmission, the main findings of the paper are twofold. On the one hand, financial development does strengthen the monetary policy transmission channel to deposit rates: that is, changes in the policy rate in economies with more financial development induce larger changes (in the same direction) in deposit rates than is the case in economies with less financial development. This result is particularly driven by the effect of the development of financial institutions on policy transmission; the effect of financial markets development turns out to be smaller in magnitude. On the other hand, financial development does not strengthen the transmission of monetary policy to lending rates. As explained above, this is consistent with a credit channel which weakens in the face of financial development in a context where banks cannot easily substitute short-term funding sources. These results are robust to the use of different specifications to estimate policy shocks and to estimate the determinants of monetary policy transmission. The findings of the paper highlight the relevance of financial development for the functioning of monetary policy across countries, and possibly imply the necessity of a more active role of monetary authorities in the promotion of financial development (similar to the case of financial stability: central banks have gradually become actively involved with promoting and preserving financial stability given the impact of its absence on the effectiveness of monetary policy).

The remaining of this paper is organised as follows: Section 2 discusses the empirical strategy and describes the data and information sources. Section 3 analyses the intuition and construction of the financial development measures (more specifically, the Financial Development Index of the IMF). Section 4 presents the results. Finally, Section 5 presents some reflections as concluding comments. An Appendix with summary statistics of the variables and supplementary results is included at the end of the paper.

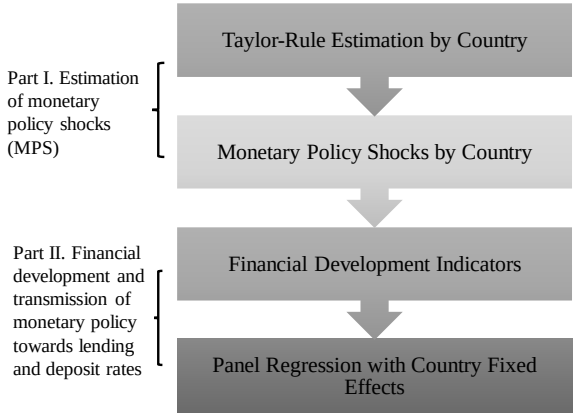
2 Methodology and Data

2.1 Empirical Strategy

The empirical strategy used in this paper follows two stages (Figure 1). In the first stage, monetary policy shocks (MPS) are estimated using a Taylor-Rule model by country. In the second stage, a panel regression specification is estimated that relates lending or deposit rates to, among others, the interaction between the previously estimated MPS and measures of financial development. MPS were included in this specification to account for the endogeneity of the policy rate to observables (lending and deposit rates, but also, crucially, financial development itself). The interaction term between the estimated MPS and financial development variables captures the effect of financial development on the degree of monetary policy transmission to lending or deposit rates.

[3]Their analysis includes only a small set of advanced economies: Australia, Canada, Germany, Indonesia, Malaysia, Republic of Korea, Thailand, The Philippines, the United Kingdom and the United States of America.

Figure 1: Empirical Strategy



Source: Authors' elaboration.

Part 1. Estimation of Monetary Policy Shocks (MPS)

In this stage, MPS are estimated using the Taylor-rule specification (1), which follows Brandao-Marques et al. (2020) and relates changes in the policy rate to inflation, the output and inflation gap and other observables that are likely to influence monetary policy decisions[4]:

$$\Delta i_{it} = \alpha_{0i} + \sum_{j=1}^{2} \alpha_{1ij}(y - \overset{\star}{y})_{it-j} + \sum_{j=1}^{2} \alpha_{2ij}(\pi - \overset{\star}{\pi})_{it-j} + \sum_{j=1}^{2} \alpha_{3ij}\Delta neer_{it-j} + \sum_{j=1}^{2} \alpha_{4ij} i_{it-j} + \varepsilon_{it} \qquad (1)$$

where i corresponds to the monetary policy interest rate, the inflation and output gaps are $(y - \overset{\star}{y})$ and $(\pi - \overset{\star}{\pi})$, respectively, and *neer* corresponds to the nominal exchange rate in logs. In this specification, the residual ε is interpreted as the MPS, i.e. changes in the policy rate that do not respond to the output and inflation gaps, nor to the previous dynamics of the monetary policy rate nor to exchange rates movements. Once these MPS are estimated (by ordinary least squares) and standardised[5] by country, they are included in a panel data regression model that estimates the effect of financial development on the transmission of monetary policy.

For robustness purposes, specification (2) was also estimated to calculate MPS. Due to information restrictions, it was estimated only for Colombia, where y represents the output in logs, p the consumer price index in logs and E the forecast from Banco de la República. The estimated MPS were used to compare them with monetary shocks obtained by other authors (see Section 4).

$$\Delta i_{it} = \alpha_{0i} + \alpha_{1i} E_t \Delta y_{it+4} + \alpha_{2i} E_t \pi_{it+4} + \sum_{j=1}^{2} \alpha_{3ij}\Delta y_{it-j} + \sum_{j=1}^{2} \alpha_{4ij}\Delta p_{it-j} + \sum_{j=1}^{2} \alpha_{5ij}\Delta neer_{it-j} + \sum_{j=1}^{2} \alpha_{6ij} i_{it-j} + \varepsilon_{it} \quad (2)$$

[4] In (1) and (2) the difference of the dependent variable is quarter to quarter, while the difference of independent variables is year to year.

[5] The residuals used in the panel were standardised, given that the monetary policy shock between countries can differ in magnitude.

Part 2. Financial Development and Transmission of Monetary Policy

In this part, a panel database for a sample of 43 countries on an annual basis is constructed with macroeconomic variables, financial development indicators and the previously estimated MPS. Using this data set, the following specification is estimated to calculate the effect of financial development measures on monetary policy transmission to lending and deposit rates:

$$r_{it} = u_i + \beta_1 FD_{it} + \beta_2 \hat{\varepsilon}_{it} + \beta_3 \hat{\varepsilon}_{it} * FD_{it} + \beta_4 Z_{it} + \beta_5 i_{it} + \beta_6 X_t + \beta_7 r_{it-1} + \omega_{it} \tag{3}$$

Where r represents the lending or deposit rates, u represents the fixed effects by country, $\hat{\varepsilon}$ the standardised estimated MPS, FD measures of financial development and vector Z includes real GDP growth, the annual variation of the nominal exchange rate and inflation rate. Additionally, a vector X with some global controls was included (Commodity Price Index and VIX). Finally, the dependent variable with one lag is included as part of the exogenous variables, as well as the interaction between the estimated MPS and measures of financial development. The coefficient on this interaction captures the effect of financial development on the relationship between policy shocks and lending or deposit rates. A positive and statistically significant estimate is interpreted as evidence of financial development strengthening monetary policy transmission, as the effect of policy shocks on bank rates is larger when indicators of financial development are higher and vice versa if the estimate is negative.

Lending rates used in this model correspond mostly to those of the most representative loan segment by country, while deposit rates mostly correspond to the rate of 90 days term deposits. An empirical constraint may stem from the fact that it is difficult to ensure standardised data for lending rates across such a diverse panel of countries, while term deposit rates are generally more homogeneous.

In addition to estimating specification (3), this document also evaluates the role of financial development in the transmission of monetary policy, disaggregating financial development by two dimensions according to Svirydzenka (2016)[6]: i) development of financial markets and ii) development of financial institutions (*FM* and *FI*, respectively):

$$r_{it} = u_i + \beta_1 FM_{it} + \beta_2 \hat{\varepsilon}_{it} + \beta_3 \hat{\varepsilon}_{it} * FM_{it} + \beta_4 Z_{it} + \beta_5 i_{it} + \beta_6 X_t + \beta_7 r_{it-1} + \omega_{it} \tag{4}$$

$$r_{it} = u_i + \beta_1 FI_{it} + \beta_2 \hat{\varepsilon}_{it} + \beta_3 \hat{\varepsilon}_{it} * FI_{it} + \beta_4 Z_{it} + \beta_5 i_{it} + \beta_6 X_t + \beta_7 r_{it-1} + \omega_{it} \tag{5}$$

Finally, it might be that case that the effect of financial development on the transmission of changes in the policy rate is asymmetric for different stances of monetary policy. To account for this, specifications (6) and (7) are estimated, adding to the previous model a triple interaction between the financial development variable, the estimated MPS and a monetary policy stance dummy. This dummy takes the value of 1 if: i) the annual variation of the interest rate is positive (contractionary monetary policy (CMP); model (6)), and ii) the annual variation of the interest rate is negative (expansionary monetary policy (EMP); model (7)).

[6]Svirydzenka (2016) created a set of indexes that summarise the stage of financial development by distinguishing between institutional and market development in its depth, access and efficiency. A more detailed description of these concepts is presented in Section 3 of this paper.

$$r_{it} = \bar{x} + \alpha x_{it} * \hat{\varepsilon}_{it} * DummyCMP_{it} \tag{6}$$

$$r_{it} = \bar{x} + \alpha x_{it} * \hat{\varepsilon}_{it} * DummyEMP_{it} \tag{7}$$

Where $\bar{x}$ represents the specification of the models 3, 4 and 5 and x indicates the financial development variable (*FD*, *FM* or *FI*). In this way, the effect of financial development variables on the transmission of monetary policy to loan or deposit rates can be estimated, taking into account whether it is a period of contractionary or expansionary monetary policy.

2.2 Data

This paper uses quarterly information on macroeconomic variables in the first part of the empirical strategy from a sample of 43 emerging and advanced economies for the period 2000-2019[7]. The quarterly change in the monetary policy rate, the annual variation of the nominal exchange rate and inflation and GDP gaps[8] were the main variables used in part 1. Data were sourced from the International Financial Statistics (IFS) of the IMF and central banks. Summary statistics are presented in Appendix A and Appendix B. Subsequently, in the second part of the empirical strategy, a panel database was built with:

1. Macroeconomic variables (real GDP growth, inflation rate, nominal exchange rate and policy rate) and lending and deposit rates, from IFS.
2. Global controls such as the VIX and the commodity price index, from Bloomberg.
3. The estimated MPS calculated previously in part 1 of the empirical strategy.
4. Financial development indicators, from IMF based on Svirydzenka (2016), explained in the following section.

3 Financial Development Index

In order to inspect the nature and magnitude of the relationship between financial development and the transmission of monetary policy, it is first necessary to identify a set of variables that reflect the structural characteristics of the financial system. This is an intrinsically difficult task, given the multidimensional nature of financial institutions and financial markets.

Therefore, although simple indicators have been widely used in the literature to measure the deepness of the system, such as portfolio size and credit volume for credit institutions or market capitalization for financial markets (both as a proportion of GDP), they only partially reflect the state of the overall system and do not provide a comprehensive assessment of its development. Although the banking sector is typically the most important part of the system, the former indicator excludes the activity of other important non-bank institutions, such as pension funds, insurance companies or mutual funds. In the same way, the later indicator excludes the activity of market operations in terms of frequency, turnover

[7] See the full list of countries in Appendix A.

[8] Inflation and GDP gaps were estimated by removing the trend component of the series using the Hodrick and Prescott methodology.

or volume, and does not include other investment and diversification alternatives such as those available in the debt market.

To overcome these weaknesses, Svirydzenka (2016) created a set of indexes that summarise the stage of financial development by distinguishing between institutional and market development in its dimensions of depth, access and efficiency[9]. The latter two dimensions are added because the provision of financial services in an optimal and useful way for society in terms of macroeconomic results are only achieved if: 1) these services are accessible to a large part of the population and companies and 2) the system makes adequate use of resources to provide services at low cost.

3.1 Variables

A total of 20 financial variables were considered for the construction of the indices: 12 that account for the development of financial institutions (Table 1) and 8 that represent the development of financial markets (Table 2). These were selected to ensure a broad sample of countries over a sufficiently long period of time[10].

Most of the variables for the financial institutions category have a direct interpretation associated with them, that is, a higher value represents a higher degree of development. In contrast, only 4 variables, belonging to the category of efficiency of institutional development, have an inverse interpretation: 1) *accounting value of bank's net interest revenue as a share of its average interest-bearing assets*; 2) *difference between lending rate and deposit rate*; 3) *bank's income that has been generated by non-interest related activities as a percentage of total income* and 4) *operating expenses of a bank as a share of the value of total assets*. Higher values of the first two variables represent worse performance in terms of efficiency in the intermediation of savings to investment, while higher values of the other two variables measure worse performance in terms of operating efficiency. On the other hand, the return on assets (ROA) and equity (ROE), which belong to the same category, do have a direct interpretation, since it is normally expected that more efficient financial institutions tend to be more profitable. However, Svirydzenka (2016) highlights that the latter are limited measures since the relationship does not necessarily hold in periods of economic boom (inefficient institutions may report profits given the economic cycle) or in the presence of adverse shocks (efficient institutions may generate losses). Other available variables, such as concentration indicators, are not included within this category, given that there is no clear conclusion in the literature on whether more concentrated financial systems are more or less efficient (Svirydzenka, 2016).

Regarding financial markets, variables reflecting stock and debt market development are included also in a direct sense. Thus, in the depth dimension, in addition to the traditional capitalisation indicator, the degree of activity is considered through the *total value of all listed shares traded as a percentage of GDP*. The development of debt markets is considered through the *outstanding amount of public international*

[9]Svirydzenka (2016) includes only variables that capture the key characteristics of financial systems (depth, access and efficiency), which are independent of their underlying factors (institutional, legal or regulatory framework) or their outcomes (system stability or ability to support growth).

[10]For instance, Svirydzenka (2016) highlights that, in the dimension of depth of financial institutions, it is preferred to include the variable *ratio of life insurances and non-life insurance premium volume to GDP* over *ratio of assets of insurance companies to GDP* due to the greater coverage in countries (153 vs. 128) and in years (since 1990 vs. since 2000). It also mentions that the access and efficiency dimensions use variables mainly from the banking sector, due to the lack of information for other financial institutions

debt securities as a percentage of GDP[11], *debt securities of financial corporations as percentage of GDP* and *debt securities of nonfinancial corporations as percentage of GDP*. The access dimension includes the stock market concentration variable *value of listed shares outside the ten largest companies over the total value of all listed shares*, to reflect the ease of entry into the stock market for new or small issuers. Finally, the efficiency dimension is based on the notion that a higher stock market turnover means greater liquidity, which reflects greater market efficiency.

Table 1: Development of Financial Institutions - Variables

Category	Financial Institutions Indicators - FI	Direction to FI
Depth	Private credit by deposit money banks and other financial institutions (% GDP)	+
	Ratio of assets of pension funds (% GDP)	+
	Ratio of assets of mutual funds (% GDP)	+
	Ratio of life insurance and nonlife insurance premium volume (% GDP)	+
Access	Number of commercial bank branches per 100,000 adults	+
	Number of ATMs per 100,000 adults	+
Efficiency	Accounting value of bank's net interest revenue (% average interest-bearing assets)	-
	Difference between lending rate and deposit rate	-
	Bank's income that has been generated by noninterest related activities (% total income)	-
	Operating expenses of a bank (% value of all assets held)	-
	Commercial banks' after-tax net income to yearly averaged total assets (ROA)	+
	Commercial banks' after-tax net income to yearly averaged equity (ROE)	+

Source: Svirydzenka (2016); Global Financial Development Database - World Bank; Financial Development Index Database - IMF.

Table 2: Development of Financial Markets - Variables

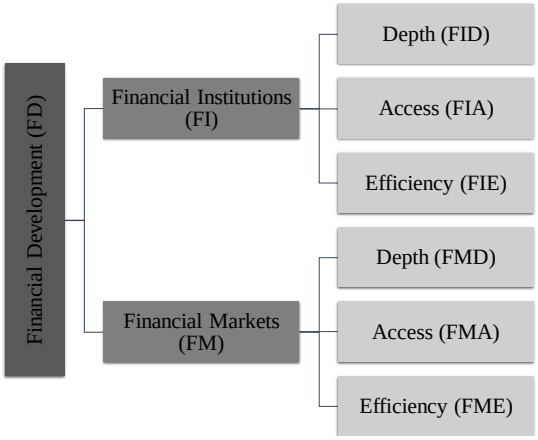
Category	Financial Market Indicators - FM	Direction to FM
Depth	Total value of all listed shares in a stock market (% GDP)	+
	Total value of all traded shares in a stock market exchange (% GDP)	+
	Amount of public international debt securities (outstanding amount) (% GDP)	+
	Total debt securities of financial corporations (% GDP)	+
	Total debt securities of nonfinancial corporations (% GDP)	+
Access	Value of listed shares outside of the ten largest companies (% total value of all listed shares) *	+
	Number of financial and nonfinancial corporate issuers on the domestic and external debt market in a given year per 100,000 adults	+
Efficiency	Total value of shares traded during a given period divided by the average market capitalization	+

* Reflects the number of distinct issuers: a company with multiple emissions is counted only once. Source: Svirydzenka (2016); Global Financial Development Database - World Bank; Financial Development Index Database - IMF.

Svirydzenka (2016) constructed 9 indexes (Figure 2) employing a 4-stage procedure based on principal component analysis. See details of methodology in Appendix D.

[11] Svirydzenka (2016) highlights that the outstanding volumes of domestic sovereign debt securities were not included due to the low coverage of countries (18 in total).

Figure 2: Aggregation of Financial Development Variables



Source: Svirydzenka (2016); Authors' elaboration.

3.2 Indices by Income Classification

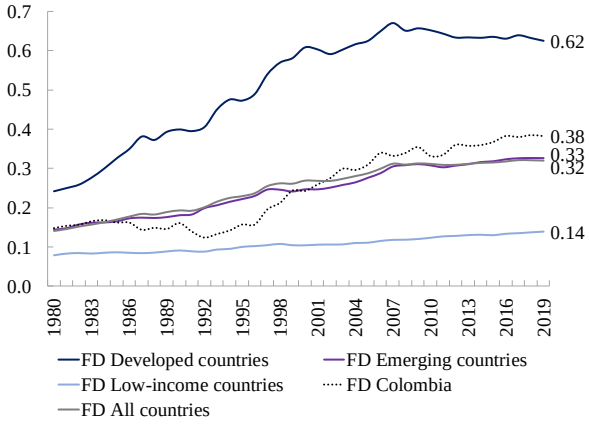
Information is available for 183 countries: 44 in Africa, 35 in Asia and the Pacific, 41 in Europe, 28 in the Middle East and Central Asia, and 35 in the Western Hemisphere (Appendix E). According to the IMF income classification, 36 countries are developed, 81 are emerging countries and 66 are developing and low-income countries (Appendix F). As expected, developed countries have a higher Financial Development Index (FD) on average that almost doubles the FD of all the countries considered in 2019 (Figure 3A). For this group, a rapid increase in the index is observed until the beginning of the global financial crisis of 2007, at which point the FD stagnates and even shows a slight decrease. Alternatively, the FD of emerging countries and the FD of all countries have historically followed similar dynamics and have grown at a lower pace. Finally, the FD of low-income countries increased at a more moderate rate over the same period.

The financial institutions development index (FI) (Figure 3B) shows a regular and measured historical growth for all countries. Particularly notable is the upward trend observed in developed countries until the 2007 crisis, after which this trend reversed. The financial markets development index (FM) (Figure 3C) showed slow growth that partially slowed at the beginning of the century, when the index stabilised in a range between 0.19 and 0.23 for all countries. Since then, the favourable evolution of FD has responded to a greater extent to the performance of FI compared to FM. Only in the 1990s FM shows significant growth in developed and emerging countries, which boosted the evolution of FD for all countries.

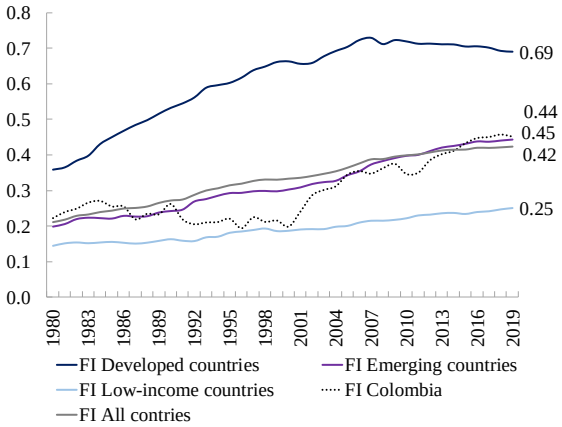
In summary, all countries have experienced a generalised advance, although at different paces, towards financial development; a result that goes parallel to economic growth since with the normal advance of society, deeper financial institutions and markets are expected, facilitating access to a larger part of the population and performing with greater efficiency. Given this common factor across countries, it becomes especially important to evaluate its potential impact on monetary policy transmission channels.

Figure 3: Financial Development Indices

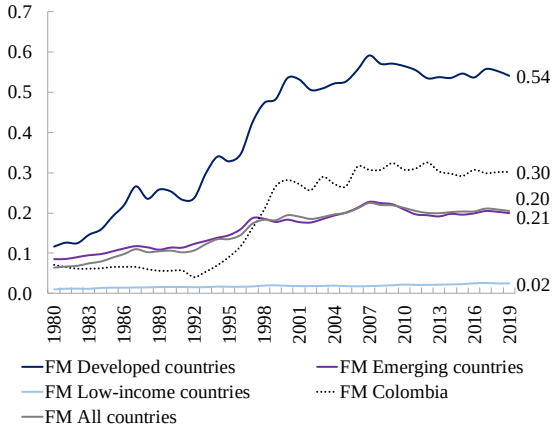
(A) Financial Development Index - FD



(B) Financial Institutions Development Index - FI



(C) Financial Markets Development Index - FM



Source: Financial Development Index Database - IMF; Authors' elaboration.

4 Results

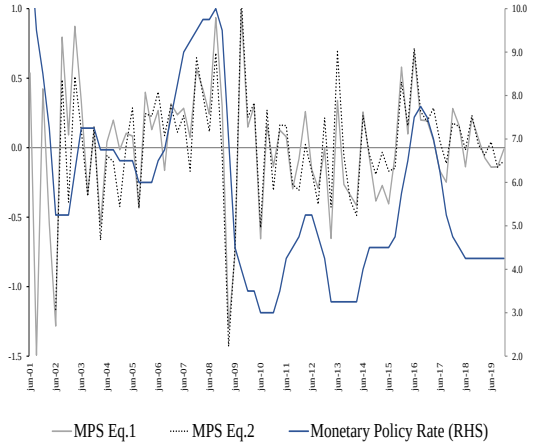
4.1 Monetary Policy Shocks

As an illustration, Figure 4 shows MPS estimated for the Colombian economy using the models specified in equation (1) and equation (2). The descriptive statistics and the estimates for each country in the sample are reported in Appendix A, Appendix B, and Appendix C. Results are robust to various specifications (Panel A), and are similar to MPS estimated in previous research (Panel B; blue line corresponds to estimations in Pirateque-Niño et al. (2022) which employs measures of credit intensity and purple line to estimations in López-Piñeros et al. (2020) who follow Romer and Romer (2004)).

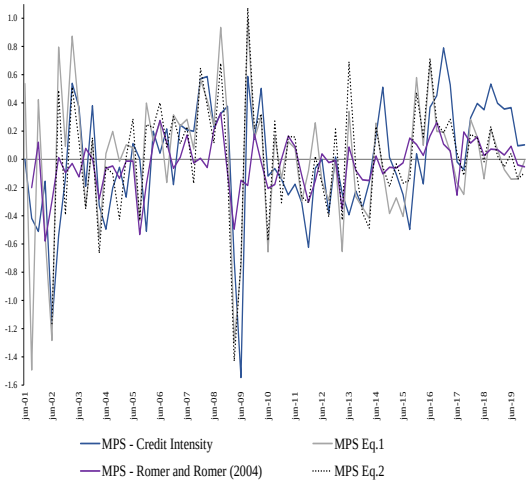
For the period under scrutiny, the results suggest that a negative value of the MPS coincides with a decreasing monetary policy rate. In contrast, a positive value of the MPS matches periods of increases in the monetary policy rate. The biggest negative MPS are registered in 2001 and 2009, when the policy rate decreased in a few months around 500 basis points (bps) and 600 bps, respectively.

Figure 4: Estimated MPS - Colombia

(a) MPS and level of Monetary Policy Rate



(b) MPS estimation under different specifications



Source: authors' calculations.

4.2 Financial Development and Monetary Policy Transmission

Tables 3 and 4 present estimation results using lending and deposit rates as dependent variables, respectively, for Equations (3), (4) and (5) using the monetary policy shocks estimated in the first part of the empirical strategy. The term 'L' in the third, fifth and seventh columns of each table implies that estimations were performed including one lag for macroeconomic control variables.

To assess the impact of financial development on monetary policy transmission, the coefficient of interest is β_3 in the aforementioned equations. In Tables 3 and 4 these estimates are presented in rows corresponding to the terms $\hat{\varepsilon_{it}} * F\bar{x}_{it}$, for the three financial development indices ($F\bar{x}$). Results suggest evidence that the level of financial development of a country strengthens the monetary policy transmission channel to deposit rates, where coefficients are positive and statistically significant, but not to lending rates. This result is particularly driven by the effect of the development of financial institutions on policy transmission, while the effect of financial markets development turns out to be smaller in magnitude. In particular, the statistically significant coefficient for FI (3.070) almost doubles the one of the FM (1.307). A robustness check using the alternative estimation method of Arellano-Bond linear dynamic panel does not change these results (see Appendix G).

Regarding deposit rates, the sign of the statistically significant coefficients implies that changes in the policy rate in economies with more financial development induce larger changes (in the same direction) in deposit rates than is the case of economies with less financial development. As for the impact of financial development on the transmission of monetary policy to lending rates, coefficients are not statistically significant for the aggregate financial development index, nor for its financial institutions component. Those results are consistent with a credit channel which weakens in the face of financial development in a context where banks cannot easily substitute short-term funding sources. Furthermore, as the size of a financial system increases, the number of institutions and the supply of lending vehicles also tend

to increase, leading to an equilibrium in which monetary policy shocks are transmitted less to loan markets. However, estimations suggest that a higher level of financial markets development strengthens the monetary policy transmission channel to lending rates. This is consistent with Vrolijk (1997), who argues that a more liquid and deeper financial market tends to feature a larger set of financial instruments indexed to policy rates or to inflation, implying that changes in policy rates are easily translated into financial flows.

Figure 5 shows the marginal effect of changes in each financial development index on deposit rates following equation (8). Results suggest that marginal effect on deposit rates is positive (negative) for higher (lower) levels of financial development indices. In other words, a relatively high level of financial development is required before monetary policy shocks transmit in the same direction to deposit rates.

$$\frac{\partial \hat{r_{it}}}{\partial \hat{\varepsilon_{it}}} = \hat{\beta_2} + \hat{\beta_3} Index_{it} \tag{8}$$

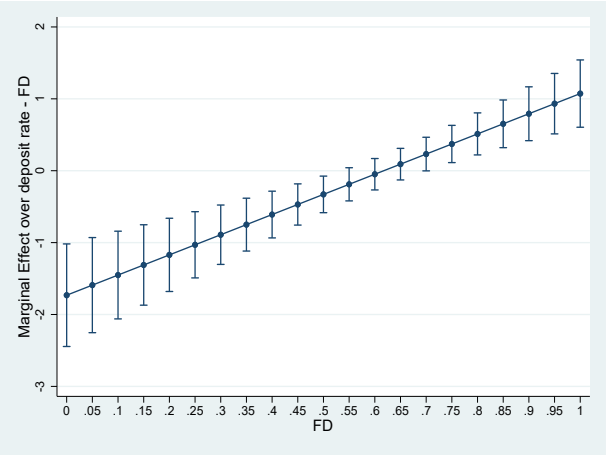
$$Index_{it} = FD_{it}, FM_{it}, FI_{it}$$

Table 5 presents estimation results for equations (6) and (7). Here, the coefficients of interest are the triple interactions between the MPS, the financial development indices and the monetary policy stance dummy. Results suggest that in contractionary monetary policy periods, greater financial development induces a stronger transmission of monetary policy to deposit rates than in other periods (Table 5, first column). On the other hand, in expansionary monetary policy periods, greater financial institutions development induce stronger transmission to deposit rates than in other periods.

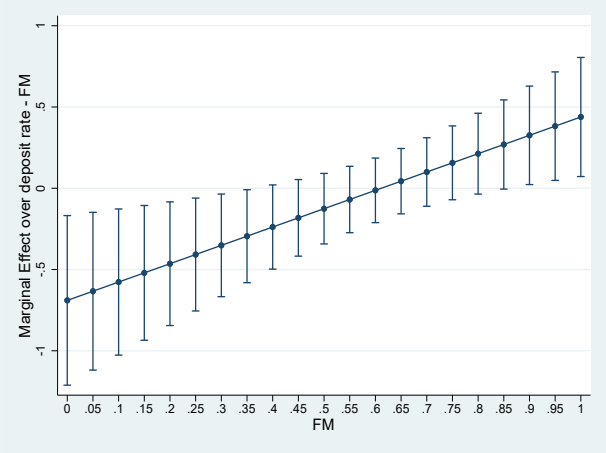
Finally, figures 6 and 7 present the fitted values of deposit rates using the estimated coefficients of these equations, i.e., for different levels of policy shocks, differentiating periods of expansionary and contractionary monetary policy, respectively. For this, three levels for each financial development index are set: low (0.25), medium (0.5), and high (0.75) (see Appendix H for examples of countries close to each level). In general, deposit rates are lower in countries with high financial development. Positive monetary policy shocks during expansionary periods (Figure 6) tend to correlate with reductions in the deposit rate. These reductions are smaller when financial development is higher - this encapsulates the main result of the paper: deposit rates tend to respond in the same direction of monetary policy shocks in a larger degree (smaller reduction) when financial development is higher. Panel (c) shows how this is particularly driven by the development of financial institutions. In the latter case, contractionary monetary policy shocks do not correlate with changes in the deposit rate when the development of financial institutions is high; in contrast, when it is low, deposit rates tend to move in the opposite direction to policy shocks. In periods of contractionary monetary policy (Figure 7), monetary policy shocks tend to correlate with movements in the same direction of deposit rates. In this case, the slope of the fitted values line is larger when financial development is high - again, this encapsulates the main result of the paper: deposit rates respond more in the same direction of policy rates when financial development is higher.

Figure 5: Marginal Effects of FD on Monetary Policy Transmission to Deposit Rates

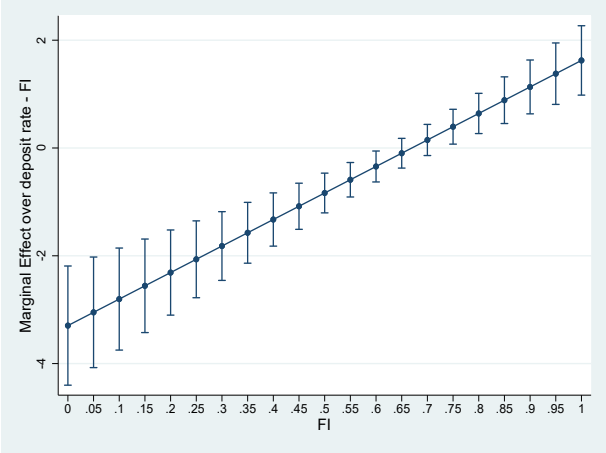
(a) Financial Development Index



(b) Financial Markets Index



(c) Financial Institutions Index



The figure plots marginal effects of financial development indices to changes in monetary policy shocks. Panel (a) shows marginal effects calculated using the estimated coefficients reported in Table 3 column (3), panel (b) shows marginal effects calculated using the estimated coefficients reported in Table 3 column (4), and panel (c) shows marginal effects calculated using the estimated coefficients reported in Table 3 column (5). Y-axis is in percentage units. Source: authors' calculations.

Table 3: Results: Deposit Rate as dependent variable

	Equation					
Exogenous variables	**(3)**	**(3L)**	**(4)**	**(4L)**	**(5)**	**(5L)**
$\hat{\varepsilon_{it}}$	-2.008***	-0.408	-1.374***	-0.311	-2.693***	-0.427
FD_{it}	0.593	0.295				
$\hat{\varepsilon_{it}} * FD_{it}$	2.218***	0.316				
FM_{it}			-0.171	-1.286		
$\hat{\varepsilon_{it}} * FM_{it}$			1.307***	0.201		
FI_{it}					0.747	2.055*
$\hat{\varepsilon_{it}} * FI_{it}$					3.070***	0.290
i_{it}	0.638***	0.443***	0.636***	0.436***	0.637***	0.444***
y_{it}	-0.094***	-0.047***	-0.097***	-0.047**	-0.091***	-0.041**
π_{it}	0.169***	0.058***	0.174***	0.062***	0.160**	0.054*
$neer_{it}$	0.006	0.001	0.005	0.000	0.006	0.000
VIX_t	-0.004	0.008	-0.006	0.009**	-0.002	0.009
CPI_t	0.004***	0.006***	0.004***	0.006***	0.004***	0.005***
$DepositRate_{i,t-1}$	0.219***	0.210***	0.213***	0.207***	0.227***	0.213***
Constant	-0.374	-0.385	0.106	0.391	-0.553	-1.544*
Observations	630	630	630	630	630	630
F Test p-value	0.000	0.000	0.000	0.000	0.000	0.000

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

*** Statistically significant at the 1% level.

y_{it}: Real GDP growth; π_{it}: Inflation rate; $neer_{it}$: Annual variation of the nominal exchange rate

Source: authors' calculations.

Table 4: Results: Lending Rate as dependent variable

	Equation					
Exogenous variables	**(3)**	**(3L)**	**(4)**	**(4L)**	**(5)**	**(5L)**
$\hat{\varepsilon_{it}}$	-1.366*	-0.246	-0.9936*	-0.347	-1.820**	-0.193
FD_{it}	-2.203	-2.807				
$\hat{\varepsilon_{it}} * FD_{it}$	1.315	-0.273				
FM_{it}			-1.230	-1.225**		
$\hat{\varepsilon_{it}} * FM_{it}$			0.787***	-0.155		
FI_{it}					-1.465	-2.062
$\hat{\varepsilon_{it}} * FI_{it}$					1.871	-0.340
i_{it}	0.707***	0.644***	0.703***	0.647***	0.713***	0.655***
y_{it}	-0.078*	-0.076**	-0.075*	-0.071**	-0.082*	-0.078**
π_{it}	0.036	0.053	0.035	0.051	0.034	0.050
$neer_{it}$	0.006*	0.008**	0.005	0.009**	0.007**	0.009***
VIX_t	-0.006	-0.015	-0.006	0.015	-0.008	0.017
CPI_t	0.004**	0.005***	0.004*	0.004**	0.004**	0.005***
$LendingRate_{i,t-1}$	0.489***	0.505***	0.493***	0.510***	0.492***	0.510***
Constant	2.449**	2.706**	1.787**	1.650**	2.128***	2.422**
Observations	624	624	624	624	624	624
F Test p-value	0.000	0.000	0.000	0.000	0.000	0.000

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

*** Statistically significant at the 1% level.

y_{it}: Real GDP growth; π_{it}: Inflation rate; $neer_{it}$: Annual variation of the nominal exchange rate

Source: authors' calculations.

Table 5: Results on Deposit Rate - Contractionary and Expansionary periods

	Equation					
Exogenous variables	**(6)**	**(7)**	**(6)**	**(7)**	**(6)**	**(7)**
$\hat{\varepsilon_{it}}$	-1.606***	-0.202	-0.656*	0.037	-3.382***	0.154
$DummyMP$	-1.421*	1.615***	-0.855*	1.185***	-2.529**	2.376**
$\hat{\varepsilon_{it}} * DummyMP$	1.401	-1.571	0.767	-0.7552	3.708*	-4.071**
FD_{it}	-9.461**	-6.589				
$\hat{\varepsilon_{it}} * FD_{it}$	1.762***	1.741				
$DummyMP * FD_{it}$	2.150*	-1.694***				
$\hat{\varepsilon_{it}} * FD_{it} * DummyMP$	0.150*	0.039				
FM_{it}			-5.172*	-3.963		
$\hat{\varepsilon_{it}} * FM_{it}$			0.189	1.491		
$DummyMP * FM_{it}$			1.057	-0.985**		
$\hat{\varepsilon_{it}} * FM_{it} * DummyMP$			1.515	-1.630		
FI_{it}					-6.332*	-2.712
$\hat{\varepsilon_{it}} * FI_{it}$					4.402***	0.981
$DummyMP * FI_{it}$					3.731**	-2.689**
$\hat{\varepsilon_{it}} * FI_{it} * DummyMP$					-3.711	4.111*
i_{it}	0.103*	0.103*	0.098	0.099*	0.136**	0.140**
y_{it}	-0.140***	-0.109***	-0.126***	-0.097**	-0.144***	-0.110***
π_{it}	0.600***	0.606***	0.622***	0.627***	0.560***	0.561***
$neer_{it}$	0.001	-0.001	-0.001	-0.001	0.002	0.000
VIX_t	0.043***	0.032**	0.043***	0.031**	0.042***	0.033**
CPI_t	-0.008**	-0.008**	-0.010**	-0.009**	-0.008**	-0.008**
$Constant$	7.283**	5.364**	4.580***	3.629**	5.901**	3.260*
Observations	675	675	675	675	675	675

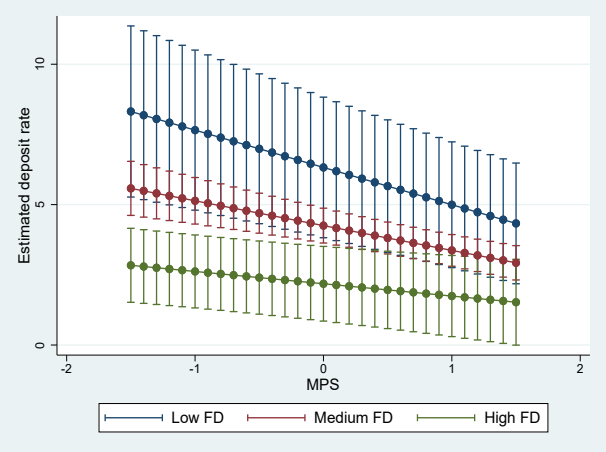
* Statistically significant at the 10% level; ** Statistically significant at the 5% level;*** Statistically significant at the 1% level.

y_{it}: Real GDP growth; π_{it}: Inflation rate; $neer_{it}$: Annual variation of the nominal exchange rate

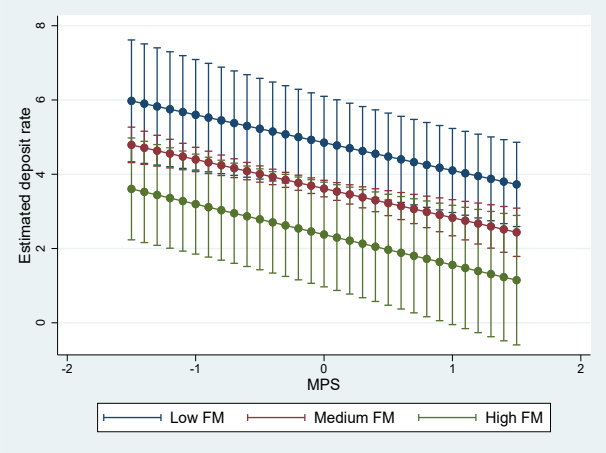
Source: authors' calculations.

Figure 6: Fitted values of Deposit Rate to different levels of MPS - Periods of reductions in the monetary policy rate

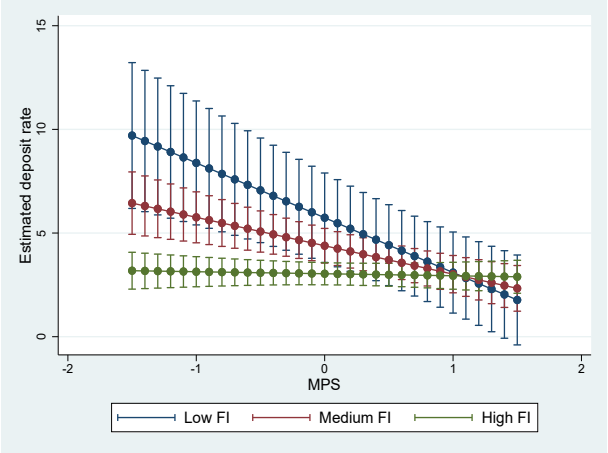
(a) By levels of Financial Development Index



(b) By levels Financial Markets Index



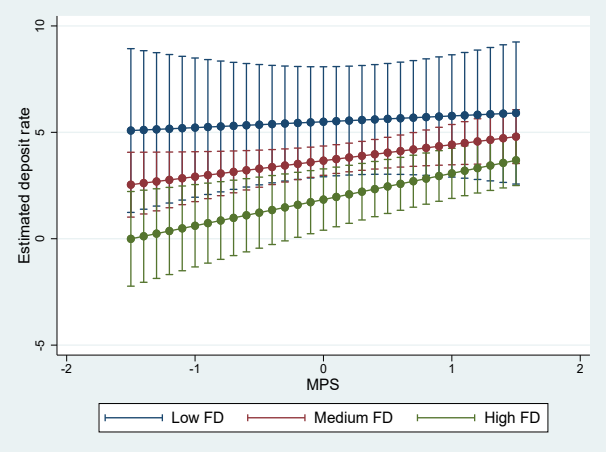
(c) By levels Financial Institutions Index



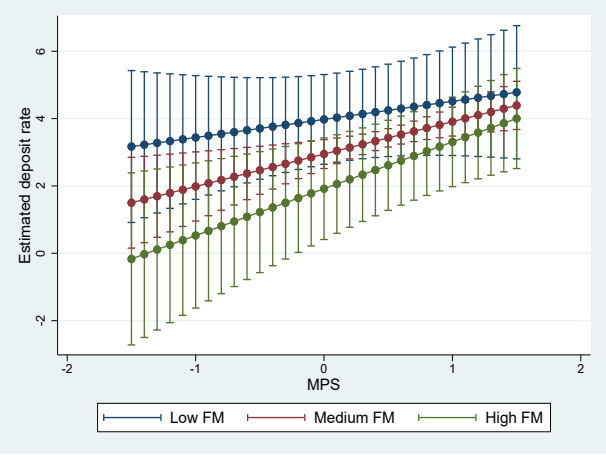
The figure plots fitted values of deposit rates to different levels of monetary policy shocks considering levels of low (0.25), medium (0.5), and high (0.75) financial development, only for periods of reductions in the monetary policy rate. Panel (a) shows fitted values calculated using the estimated coefficients reported in Table 4 column (3), panel (b) shows fitted values calculated using the estimated coefficients reported in Table 3 column (4), and panel (c) shows fitted values calculated using the estimated coefficients reported in Table 3 column (5). Y-axis units is percentage. Source: authors' calculations.

Figure 7: Fitted values of Deposit Rate to different levels of MPS - Periods of increases in the monetary policy rate

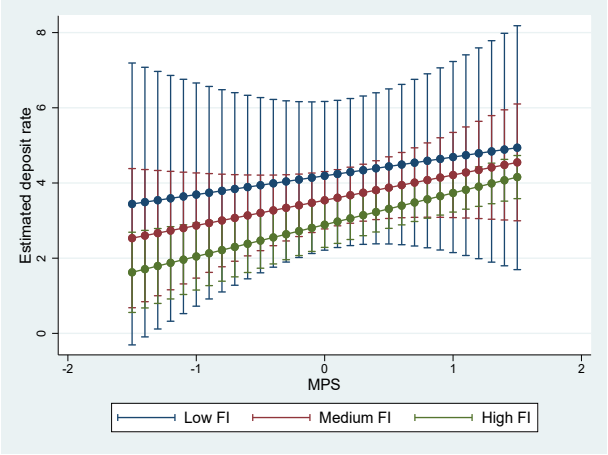
(a) By levels of Financial Development Index



(b) By levels Financial Markets Index



(c) By levels Financial Institutions Index



The figure plots fitted values of deposit rates to different levels of monetary policy shocks considering levels of low (0.25), medium (0.5), and high (0.75) financial development, only for periods of increases in the monetary policy rate. Panel (a) shows fitted values calculated using the estimated coefficients reported in Table 4 column (3), panel (b) shows fitted values calculated using the estimated coefficients reported in Table 3 column (4), and panel (c) shows fitted values calculated using the estimated coefficients reported in Table 3 column (5). Y-axis units is percentage. Source: authors' calculations.

5 Concluding remarks

The transmission of monetary policy to the general structure of interest rates depends on a number of cyclical and structural features of the economy. Some of these features are systematically different for countries at different stages of development. This paper has shown that, for a large sample of countries, the development of the financial system may strengthen the transmission of monetary policy for some key rates of the economy (funding rates) while it does not necessarily have an impact on the transmission to other key prices (lending rates). Certainly, heterogeneity in the transmission of monetary policy is not an unusual result (see, for example, Steiner and Galindo (2022)). As indicated earlier, the asymmetrical effect of financial development on the transmission on different rates is symptomatic of certain features of financial markets and financial institutions in their path toward development: lending sources different from traditional banks tend to appear earlier than alternative sources of funding for banks. Therefore, as a financial system develops it is more likely that monetary policy strengthens its effect on the price of short term funding for banks without any additional power on borrowing costs for firms and households.

Future research may explore the larger degree of data granularity that can be had at the national level. More specifically, the results of this paper could be supplemented by studies at the jurisdiction level, where it should be possible to construct more refined measures of financial development at a higher frequency. These would allow assessments of the impact of exogenous variations of financial development on the transmission of domestic monetary policies. At the individual country level there is also a wider variety of estimates of monetary policy shocks.

All this may point to a potential role for monetary authorities in fostering and promoting the development of financial system with the aim of enhancing the transmission of monetary policy decisions. In recent decades this has been the case, for example, for financial stability. Since the North Atlantic financial crisis of 2008 (and for some emerging economies since the financial crisis of the late nineties), central banks have been increasingly concerned about the preservation of financial stability, as it has become clear that it is a necessary condition for the correct functioning and transmission of monetary policy decisions. Although the remit of central banks rarely includes financial development ad one their main objectives, there is a role they could play in promoting it within the general context of the public debate on issues of economic policy.

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Appendix A Descriptive Statistics - Macroeconomic Data

Table 6: Macroeconomic Data by Country

	Policy rate				*GDP*				*CPI*				*Neer*			
	Mean	Min	Max	DE	Mean	Min	Max	DE	Mean	Min	Max	DE	Mean	Min	Max	DE
Australia	3.9	1.0	7.3	1.8	2.9	1.6	4.4	0.7	2.6	1.0	6.1	1.1	-0.5	-28.7	28.9	12.9
Austria	1.5	0.0	4.8	1.5	1.5	-5.2	3.8	1.8	1.9	0.0	3.7	0.8	-0.6	-22.2	24.8	9.9
Belgium	1.5	0.0	4.8	1.5	1.6	-4.1	4.3	1.5	1.9	-1.2	5.6	1.2	-0.6	-22.2	24.8	9.9
Brazil	12.6	2.0	26.5	5.1	2.3	-4.8	7.6	2.8	6.2	2.1	16.9	2.7	5.1	-29.4	51.8	19.0
Bulgaria	1.0	0.0	5.8	1.7	2.6	-3.4	7.2	2.8	3.4	-2.4	15.0	3.9	0.8	-17.2	24.8	9.1
Chile	3.6	0.5	8.3	1.7	3.6	-6.5	7.6	2.5	3.2	-3.0	9.3	2.0	2.0	-21.7	28.2	10.9
China, P.R.: Hong Kong	2.5	0.5	8.0	2.2	3.3	-6.3	8.7	3.3	1.7	-3.8	6.5	2.5	0.0	-1.2	1.0	0.4
Colombia	5.6	2.8	10.0	1.9	3.8	-1.9	7.1	1.8	4.6	1.8	8.2	1.8	2.5	-29.6	43.1	14.0
Costa Rica	5.2	0.8	10.0	2.4	3.8	-2.2	8.8	2.3	4.7	-1.0	15.5	3.9	1.0	-14.5	13.0	5.2
Cyprus	1.5	0.0	4.8	1.5	2.6	-6.6	6.5	3.5	1.5	-2.7	5.5	2.0	-0.6	-22.2	24.8	9.9
Czech Rep.	1.7	0.1	5.3	1.5	2.8	-4.5	7.0	2.7	2.2	-0.4	7.4	1.6	-2.1	-33.8	25.1	12.0
Denmark	1.5	0.0	4.8	1.6	1.3	-5.1	3.9	1.9	1.6	0.1	4.2	0.9	-0.6	-22.1	24.9	9.9
Estonia, Rep. of	1.5	0.0	4.8	1.5	3.8	-15.4	10.8	5.3	3.2	-2.0	11.4	2.8	-0.6	-22.2	24.8	9.9
Finland	1.5	0.0	4.8	1.5	1.5	-8.1	5.8	2.7	1.4	-1.0	4.6	1.2	-0.6	-22.2	24.8	9.9
France	1.5	0.0	4.8	1.5	1.2	-6.7	4.3	1.7	1.4	-0.4	3.3	0.8	-0.6	-22.2	24.8	9.9
Germany	1.5	0.0	4.8	1.5	1.2	-5.6	5.0	2.1	1.4	-0.2	3.1	0.7	-0.6	-22.2	24.8	9.9
Greece	1.5	0.0	4.8	1.5	0.0	-11.3	6.0	4.6	1.8	-2.4	5.5	2.1	-0.6	-22.2	24.8	9.9
Iceland	6.9	1.0	18.0	3.9	2.9	-7.7	8.8	3.8	4.4	1.1	17.1	3.4	1.8	-26.3	66.8	17.3
Indonesia	6.8	4.0	12.8	1.9	5.3	-0.4	6.5	1.1	5.7	1.2	16.9	3.2	2.8	-23.9	23.2	9.3
Ireland	1.5	0.0	4.8	1.5	5.0	-6.9	25.4	5.4	1.7	-6.1	6.6	2.5	-0.6	-22.2	24.8	9.9
Israel	2.8	0.1	9.1	2.7	3.7	-2.2	9.0	2.2	1.5	-2.5	6.7	2.0	-0.8	-23.7	16.4	7.9
Italy	1.5	0.0	4.8	1.5	0.2	-7.4	4.1	2.2	1.6	-0.5	4.0	1.1	-0.6	-22.2	24.8	9.9
Japan	0.1	-0.1	0.5	0.2	0.2	-6.2	4.1	2.3	0.1	-2.2	2.1	0.8	-2.5	-22.8	21.3	8.3
Korea, Rep. of	2.9	0.5	5.3	1.3	4.0	-0.9	11.1	2.0	2.4	-0.1	5.5	1.3	0.2	-20.1	33.4	9.6
Latvia	1.5	0.0	4.8	1.5	3.7	-14.3	13.3	6.0	3.6	-3.8	17.7	4.0	-0.6	-22.2	24.8	9.9
Lithuania	1.5	0.0	4.8	1.5	4.1	-14.7	11.1	4.8	2.4	-1.7	12.1	2.8	-0.6	-22.2	24.8	9.9
Luxembourg	1.5	0.0	4.8	1.5	2.8	-4.8	8.1	2.4	1.9	-0.1	4.3	1.0	-0.6	-22.2	24.8	9.9
Malta	1.4	0.0	4.3	1.3	4.2	-1.1	10.9	2.8	1.9	-0.4	5.1	1.3	-1.2	-22.2	24.8	9.9
Mexico	6.0	3.0	9.8	1.9	1.9	-7.6	5.1	2.4	4.2	2.3	6.6	1.0	4.6	-14.0	29.3	9.6
Netherlands, The	1.5	0.0	4.8	1.5	1.4	-3.7	4.7	1.8	1.8	0.0	4.4	1.0	-0.6	-22.2	24.8	9.9
New Zealand	4.0	0.3	8.3	2.3	3.0	-1.6	5.4	1.6	2.1	0.1	5.3	1.1	-1.2	-24.1	34.5	13.0
Norway	2.6	0.0	9.0	2.4	1.6	-1.3	4.1	1.2	2.0	-1.4	4.7	1.1	0.8	-25.8	30.1	11.9
Poland, Rep. of	4.5	0.1	19.0	3.9	3.7	-0.9	7.0	1.7	2.4	-1.2	10.6	2.1	-0.3	-27.8	46.2	13.0
Portugal	1.5	0.0	4.8	1.5	0.7	-6.1	3.8	2.2	1.8	-1.5	4.8	1.5	-0.6	-22.2	24.8	9.9
Romania	5.0	1.5	10.3	2.8	3.5	-5.3	10.2	3.7	3.9	-2.6	8.9	3.0	2.3	-19.7	30.2	10.8
Serbia, Rep. of	8.4	1.3	18.0	4.0	3.2	-2.7	9.5	2.9	7.0	0.5	16.6	5.0	2.5	-19.1	31.7	12.8
Singapore	1.2	0.2	3.4	0.9	5.2	-3.2	14.5	3.7	1.6	-0.9	7.5	2.1	-1.2	-13.1	11.3	5.0
Slovak Rep.	1.5	0.0	4.8	1.5	3.6	-5.5	10.8	3.2	3.2	-0.8	9.5	2.7	-0.6	-22.2	24.8	9.9
Slovenia, Rep. of	1.5	0.0	4.8	1.5	2.3	-7.6	7.4	3.2	2.8	-0.9	9.3	2.6	-0.6	-22.2	24.8	9.9
Spain	1.5	0.0	4.8	1.5	1.6	-8.2	5.2	2.7	2.0	-1.1	4.9	1.6	-0.6	-22.2	24.8	9.9
Sweden	1.6	-0.5	4.5	1.3	2.2	-5.2	6.2	2.4	1.1	-1.4	4.3	1.2	-0.5	-20.5	32.4	12.3
Switzerland	1.0	-0.3	4.0	1.2	2.0	-2.5	4.3	1.5	0.5	-1.4	3.0	0.9	-2.6	-25.9	15.0	8.5
Thailand	2.3	0.5	5.0	1.1	3.5	-4.9	8.6	2.7	2.0	-2.8	7.5	2.2	-1.6	-13.0	12.0	5.9
Turkey	8.3	1.5	22.5	5.3	4.4	-6.8	11.1	4.3	9.7	4.3	22.4	3.7	14.2	-9.6	52.3	12.6
United Kingdom	2.7	0.3	6.0	2.2	1.8	-4.6	4.1	1.7	2.0	0.3	4.5	0.9	0.8	-14.9	32.7	9.8

Source: IMF - Central Banks; Authors' calculations.

Appendix B Descriptive Statistics - Aggregated Macroeconomic Information

Table 7: Aggregated Macroeconomic Information

	N	Media	Q1	Median	Q3	Min	Max	SD
Policy rate *(%)*	3380	2.9	0.5	2.0	4.0	-0.5	26.5	3.2
GDP *Real Annual Growth (%)*	3380	2.7	1.2	2.7	4.4	-15.4	25.4	3.2
CPI *Annual Growth (%)*	3380	2.6	1.0	2.2	3.6	-6.1	22.4	2.7
Exchange rate *Annual Growth (%)*	3380	0.2	-6.2	0.0	6.3	-33.8	66.8	10.8

Appendix C Taylor Rule Regressions by Country

Table 8: Taylor rule regressions (1)

	Dependent variable:					
	Policy rate (Delta)					
	Singapore	Austria	Belgium	Brazil	Chile	China, P.R.: Hong Kong
	(1)	(2)	(3)	(4)	(5)	(6)
GDP_gap_L1	7.19	1.55	2.97	20.29	22.16	9.99
	(5.88)	(5.49)	(6.32)	(26.84)	(18.09)	(10.87)
GDP_gap_L2	−9.99*	−2.97	−4.66	−40.13	−25.01	−14.01
	(5.91)	(5.57)	(6.49)	(26.66)	(17.86)	(10.93)
CPI_gap_L1	1.25	−1.88	−3.89	−10.47	12.43	−7.19
	(9.36)	(7.22)	(7.23)	(21.16)	(15.75)	(6.98)
CPI_gap_L2	4.48	−16.14**	−5.48	−32.09	−33.06*	−6.43
	(9.61)	(7.49)	(7.33)	(23.74)	(16.87)	(6.87)
Exchange_rate_L1	0.01	−0.01*	−0.01**	0.01	−0.01	−0.10
	(0.01)	(0.004)	(0.004)	(0.01)	(0.01)	(0.20)
Exchange_rate_L2	−0.004	0.01**	0.01**	−0.01	0.003	0.09
	(0.01)	(0.004)	(0.004)	(0.01)	(0.01)	(0.22)
Policy_rate_L1	−0.20	0.25**	0.29***	0.28**	−0.10	0.08
	(0.12)	(0.10)	(0.10)	(0.13)	(0.14)	(0.12)
Policy_rate_L2	0.13	−0.28***	−0.33***	−0.28**	−0.05	−0.13
	(0.13)	(0.10)	(0.10)	(0.13)	(0.14)	(0.12)
Constant	0.07	0.01	0.02	−0.12	0.52*	0.07
	(0.09)	(0.04)	(0.04)	(0.43)	(0.29)	(0.09)
Observations	79	81	81	81	81	81
R^2	0.11	0.39	0.36	0.39	0.35	0.29
Residual Std. Error	0.38 (df = 70)	0.24 (df = 72)	0.25 (df = 72)	1.19 (df = 72)	0.78 (df = 72)	0.49 (df = 72)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 9: Taylor rule regressions (2)

	Dependent variable:					
	Policy rate (Delta)					
	Colombia	Cyprus	Czech Rep.	Denmark	Estonia, Rep. of	Finland
	(7)	(8)	(9)	(10)	(11)	(12)
GDP_gap_L1	25.52**	−0.01	−5.66	12.02*	2.96	−3.32
	(11.14)	(4.61)	(5.63)	(6.18)	(2.84)	(5.02)
GDP_gap_L2	−38.06***	−0.74	4.94	−14.15**	−2.21	2.60
	(11.75)	(4.79)	(5.61)	(6.07)	(2.86)	(5.13)
CPI_gap_L1	−2.25	0.02	−3.52	−3.52	−5.03	−3.29
	(8.40)	(2.76)	(4.02)	(5.99)	(3.58)	(7.66)
CPI_gap_L2	−14.85*	−3.26	−8.02*	−7.57	−3.56	−15.17*
	(8.69)	(2.87)	(4.18)	(6.13)	(3.86)	(8.39)
Exchange_rate_L1	0.001	−0.01**	0.003	−0.01**	−0.01**	−0.01**
	(0.01)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
Exchange_rate_L2	0.01	0.01**	−0.003	0.01	0.01**	0.01*
	(0.01)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)
Policy_rate_L1	0.38***	0.35***	0.39***	0.36***	0.12	0.13
	(0.10)	(0.10)	(0.12)	(0.10)	(0.11)	(0.11)
Policy_rate_L2	−0.42***	−0.39***	−0.42***	−0.39***	−0.15	−0.17
	(0.10)	(0.10)	(0.11)	(0.10)	(0.11)	(0.11)
Constant	0.15	0.02	0.01	0.02	0.003	0.004
	(0.22)	(0.04)	(0.04)	(0.03)	(0.04)	(0.04)
Observations	78	81	81	81	81	81
R^2	0.57	0.32	0.43	0.50	0.45	0.45
Residual Std. Error	0.49 (df = 69)	0.26 (df = 72)	0.24 (df = 72)	0.21 (df = 72)	0.23 (df = 72)	0.23 (df = 72)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 10: Taylor rule regressions (3)

	Dependent variable:							
	Policy rate (Delta)							
	France	Germany	Greece	Ireland	Israel	Italy	Korea, Rep. of	Latvia
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
GDP_gap_L1	2.35	3.57	−3.86	2.88	1.01	0.87	−7.50	0.16
	(4.80)	(4.91)	(4.44)	(2.68)	(10.20)	(4.62)	(10.95)	(3.16)
GDP_gap_L2	−3.63	−4.70	2.13	−2.32	−10.27	−2.67	−0.25	−0.15
	(4.97)	(5.18)	(4.29)	(2.71)	(9.80)	(4.71)	(10.95)	(3.28)
CPI_gap_L1	−0.06	−9.89	0.06	−2.55	20.06**	−8.77	−3.48	0.94
	(8.09)	(7.67)	(2.76)	(4.27)	(9.47)	(9.90)	(7.72)	(3.15)
CPI_gap_L2	−10.80	−8.48	−5.90**	−5.83	−34.72***	−2.30	−11.78	−5.68*
	(8.16)	(7.71)	(2.77)	(4.45)	(8.55)	(10.15)	(8.18)	(3.31)
Exchange_rate_L1	−0.01*	−0.01**	−0.01**	−0.01**	0.01	−0.01**	−0.01**	−0.01*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.01)	(0.004)	(0.01)	(0.004)
Exchange_rate_L2	0.01**	0.01**	0.01**	0.01*	0.02	0.01**	−0.004	0.01***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.01)	(0.004)	(0.01)	(0.004)
Policy_rate_L1	0.32***	0.25**	0.37***	0.18	0.17	0.32***	0.01	0.25**
	(0.10)	(0.11)	(0.09)	(0.11)	(0.12)	(0.11)	(0.13)	(0.10)
Policy_rate_L2	−0.36***	−0.28**	−0.40***	−0.21*	−0.22*	−0.35***	−0.03	−0.28***
	(0.10)	(0.11)	(0.09)	(0.11)	(0.11)	(0.11)	(0.13)	(0.10)
Constant	0.02	0.01	0.02	−0.01	0.09	0.02	0.04	0.002
	(0.04)	(0.04)	(0.04)	(0.04)	(0.08)	(0.04)	(0.09)	(0.04)
Observations	81	81	81	81	81	81	81	81
R^2	0.34	0.39	0.34	0.40	0.46	0.35	0.33	0.40
Adjusted R^2	0.26	0.32	0.26	0.34	0.40	0.28	0.26	0.33
Residual Std. Error (df = 72)	0.25	0.24	0.25	0.24	0.49	0.25	0.30	0.24
F Statistic (df = 8; 72)	4.59***	5.75***	4.60***	6.10***	7.72***	4.85***	4.44***	5.90***

Note: *p<0.1; **p<0.05; ***p<0.01

Table 11: Taylor rule regressions (4)

	Dependent variable:				
	Policy rate (Delta)				
	Lithuania	Luxembourg	Malta	Netherlands, The	New Zealand
	(21)	(22)	(23)	(24)	(25)
GDP_gap_L1	−2.91	4.55	−0.56	−2.68	4.60
	(3.15)	(4.36)	(3.89)	(6.51)	(8.54)
GDP_gap_L2	1.75	−8.30*	−1.28	−4.69	−19.30**
	(3.11)	(4.45)	(3.85)	(6.58)	(8.58)
CPI_gap_L1	−0.01	3.08	−3.21	−3.40	−18.66**
	(3.75)	(6.25)	(4.24)	(5.57)	(8.43)
CPI_gap_L2	−6.78*	−14.32**	−2.19	−9.27	−2.56
	(3.86)	(6.32)	(3.99)	(5.74)	(9.45)
Exchange_rate_L1	−0.01**	−0.01**	−0.01**	−0.01**	−0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Exchange_rate_L2	0.01**	0.01**	0.01***	0.01**	0.0005
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Policy_rate_L1	0.22**	0.21**	0.29**	0.18*	0.50***
	(0.10)	(0.10)	(0.11)	(0.11)	(0.10)
Policy_rate_L2	−0.24**	−0.24**	−0.34***	−0.21**	−0.52***
	(0.10)	(0.10)	(0.11)	(0.11)	(0.10)
Constant	0.0002	−0.001	0.04	0.01	0.04
	(0.04)	(0.04)	(0.04)	(0.04)	(0.08)
Observations	81	81	78	81	81
R^2	0.41	0.42	0.32	0.41	0.54
Adjusted R^2	0.35	0.35	0.24	0.35	0.49
Residual Std. Error	0.24 (df = 72)	0.24 (df = 72)	0.26 (df = 69)	0.24 (df = 72)	0.31 (df = 72)
F Statistic	6.27*** (df = 8; 72)	6.48*** (df = 8; 72)	4.05*** (df = 8; 69)	6.28*** (df = 8; 72)	10.75*** (df = 8; 72)
Note:					*p<0.1; **p<0.05; ***p<0.01

Table 12: Taylor rule regressions (5)

	Dependent variable:						
	Policy rate (Delta)						
	Norway	Poland	Portugal	Slovak Rep.	Slovenia	Spain	Turkey
	(26)	(27)	(28)	(29)	(30)	(31)	(32)
GDP_gap_L1	22.37	3.41	0.43	0.82	−0.02	1.86	425.90**
	(17.92)	(13.33)	(4.39)	(4.10)	(3.87)	(4.08)	(197.63)
GDP_gap_L2	−26.30	−13.14	−2.65	−4.42	−3.01	−3.37	−395.03**
	(17.11)	(12.94)	(4.46)	(4.13)	(3.93)	(4.11)	(189.58)
CPI_gap_L1	−1.28	18.79**	1.95	−2.47	−2.49	−1.06	−147.30
	(10.10)	(9.13)	(4.06)	(3.21)	(3.32)	(3.30)	(103.94)
CPI_gap_L2	−16.86	−32.62***	−9.50**	2.15	−8.60**	−7.55**	92.96
	(10.37)	(8.95)	(4.02)	(3.28)	(3.41)	(3.34)	(105.52)
Exchange_rate_L1	−0.01	0.001	−0.01**	−0.01**	−0.01**	−0.01**	0.07
	(0.01)	(0.01)	(0.004)	(0.004)	(0.004)	(0.004)	(0.16)
Exchange_rate_L2	0.01*	0.002	0.01**	0.01**	0.01	0.01**	0.32*
	(0.01)	(0.01)	(0.004)	(0.004)	(0.004)	(0.004)	(0.16)
Policy_rate_L1	0.19*	0.31***	0.30***	0.32***	0.13	0.31***	−0.62***
	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)
Policy_rate_L2	−0.24**	−0.36***	−0.33***	−0.35***	−0.17*	−0.34***	0.28**
	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)
Constant	0.07	0.10	0.02	0.01	0.03	0.02	1.44
	(0.09)	(0.08)	(0.04)	(0.04)	(0.04)	(0.04)	(2.65)
Observations	81	81	81	81	81	81	81
R^2	0.30	0.56	0.37	0.35	0.44	0.36	0.34
Adjusted R^2	0.22	0.51	0.30	0.28	0.38	0.29	0.26
Residual Std. Error (df = 72)	0.50	0.45	0.25	0.25	0.23	0.25	16.53
F Statistic (df = 8; 72)	3.89***	11.32***	5.20***	4.82***	7.21***	5.15***	4.58***
Note:							*p<0.1; **p<0.05; ***p<0.01

Table 13: Taylor rule regressions (6)

	Dependent variable:					
	Policy rate (Delta)					
	Thailand	Australia	Romania	Switzerland	Iceland	Mexico
	(33)	(34)	(35)	(36)	(37)	(38)
GDP_gap_L1	−0.43	−18.85	−7.72	7.62	2.23	16.52
	(4.33)	(20.44)	(13.40)	(10.17)	(15.94)	(14.42)
GDP_gap_L2	2.23	0.97	3.98	−17.19*	−17.92	−17.88
	(3.87)	(21.27)	(13.56)	(10.12)	(15.85)	(14.25)
CPI_gap_L1	8.93**	−10.60	4.42	−15.82**	12.05	−23.11*
	(3.61)	(8.96)	(12.69)	(7.21)	(15.99)	(13.66)
CPI_gap_L2	−24.28***	−26.43***	−9.67	−15.74**	−45.10***	−1.47
	(3.64)	(9.01)	(10.90)	(7.41)	(16.72)	(14.77)
Exchange_rate_L1	0.02**	−0.02***	0.01	0.001	0.03**	−0.03**
	(0.01)	(0.01)	(0.01)	(0.005)	(0.01)	(0.01)
Exchange_rate_L2	−0.01	0.01**	−0.01	−0.001	−0.02**	0.02
	(0.01)	(0.005)	(0.01)	(0.005)	(0.01)	(0.01)
Policy_rate_L1	0.45***	0.03	0.42***	−0.16	−0.12	0.12
	(0.09)	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)
Policy_rate_L2	−0.44***	−0.07	−0.44***	0.14	0.11	−0.21*
	(0.09)	(0.11)	(0.11)	(0.13)	(0.12)	(0.12)
Constant	−0.01	0.10	0.02	−0.05	−0.01	0.53
	(0.08)	(0.10)	(0.14)	(0.05)	(0.26)	(0.34)
Observations	66	77	74	75	73	73
R^2	0.66	0.46	0.27	0.35	0.44	0.26
Adjusted R^2	0.62	0.40	0.18	0.27	0.36	0.17
Residual Std. Error	0.22 (df = 57)	0.32 (df = 68)	0.81 (df = 65)	0.28 (df = 66)	0.89 (df = 64)	0.72 (df = 64)
F Statistic	14.03*** (df = 8; 57)	7.33*** (df = 8; 68)	3.04*** (df = 8; 65)	4.46*** (df = 8; 66)	6.17*** (df = 8; 64)	2.80** (df = 8; 64)

Note: *p<0.1; **p<0.05; ***p<0.01

Table 14: Taylor rule regressions (7)

	Dependent variable:						
	Policy rate (Delta)						
	Serbia, Rep. of	Indonesia	UK	Bulgaria	Sweden	Costa Rica	Japan
	(39)	(40)	(41)	(42)	(43)	(44)	(45)
GDP_gap_L1	32.68	17.29	7.41	1.44	31.11**	−35.75	−0.58
	(35.32)	(20.08)	(17.19)	(9.06)	(13.63)	(23.37)	(1.55)
GDP_gap_L2	−35.22	−17.68	−15.55	−6.83	−21.38	46.60**	0.97
	(34.16)	(20.52)	(17.44)	(9.36)	(13.98)	(23.15)	(1.65)
CPI_gap_L1	43.76**	−8.33	−21.47*	5.40	−7.23	12.23	−4.18
	(18.13)	(6.71)	(12.07)	(4.54)	(12.98)	(16.06)	(2.68)
CPI_gap_L2	−39.32**	−9.01	2.60	−10.42**	−3.97	−39.01**	0.52
	(15.88)	(6.79)	(13.22)	(4.56)	(13.46)	(17.73)	(2.99)
Exchange_rate_L1	−0.01	0.004	−0.02**	−0.01	−0.02***	0.01	−0.001
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)	(0.002)
Exchange_rate_L2	0.001	0.01	0.01	−0.01	0.01	−0.01	0.003
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.002)
Policy_rate_L1	−0.07	0.26**	0.07	0.16	−0.51***	0.12	0.12
	(0.12)	(0.13)	(0.15)	(0.15)	(0.13)	(0.14)	(0.17)
Policy_rate_L2	0.02	−0.27**	−0.09	−0.19	0.37***	−0.14	−0.14
	(0.12)	(0.13)	(0.15)	(0.14)	(0.13)	(0.15)	(0.18)
Constant	0.46	0.01	−0.01	0.03	0.11	−0.06	0.01
	(0.48)	(0.20)	(0.10)	(0.05)	(0.12)	(0.31)	(0.01)
Observations	73	61	65	60	58	56	44
R^2	0.15	0.42	0.37	0.43	0.42	0.29	0.29
Adjusted R^2	0.05	0.33	0.29	0.34	0.33	0.17	0.13
Residual Std. Error	1.58 (df = 64)	0.45 (df = 52)	0.38 (df = 56)	0.33 (df = 51)	0.42 (df = 49)	0.77 (df = 47)	0.06 (df = 35)
F Statistic	1.43 (df = 8; 6)	4.69*** (df = 8; 5)	4.20*** (df = 8; 5)	4.7*** (df = 8; 5)	4.50*** (df = 8; 4)	2.44** (df = 8; 4)	1.82 (df = 8; 3)

Note: *p<0.1; **p<0.05; ***p<0.01

Appendix D Methodology of Financial Development Index

Svirydzenka (2016), constructed 9 indexes employing a 4-stage procedure based on the principal component analysis methodology.

Appendix D.1 Normalization of Variables

Initially, the variables are transformed through a winsorization process using the 5^{th} and 95^{th} percentiles as cut-off levels, with the aim of eliminating outliers. Subsequently, the variables are normalized following a minimum-maximum procedure that allows obtaining comparable I_x indicators between 0 and 1. The differentiation between (9) and (10) is done with the objective that the value of 1 for a country in any variable is associated with a better performance. In particular, (10) is used for the following variables: 1) *accounting value of bank's net interest revenue as a share of its average interest-bearing assets*; 2) *difference between lending rate and deposit rate*; 3) *bank's income that has been generated by noninterest related activities as a percentage of total income* and 4) *operating expenses of a bank as a share of the value of total assets.*

$$I_x = \frac{X - X_{min}}{X_{max} - X_{min}} \tag{9}$$

$$I_x = 1 - \frac{X - X_{min}}{X_{max} - X_{min}} \tag{10}$$

X_{min} = Global minimum in all countries and years

X_{max} = Global maximum in all countries and years.

Appendix D.2 Aggregation into Second-Order Sub-Indices

The initial I_x indicators are aggregated from a weighted linear average (11) or (12). The weights W_x of each indicator within the sub-index are obtained from the square of the loadings of the first principal component of the variables of each subgroup. From this step the first 6 sub-indexes are obtained: FID, FIA, FIE, FMD, FMA, FME.

$$FI_j = \sum_{x=1}^{n} W_x I_x \tag{11}$$

$$FM_j = \sum_{x=1}^{n} W_x I_x \tag{12}$$

Appendix D.3 Aggregation into First-Order Sub-Indices

The second-order subindices are normalized following the same procedure as in Appendix D.1 and aggregated as explained in Appendix D.2. Equation (11) and (12) gives the results of the two first order sub-indices respectively: FI, FM.

$$FI = \sum_{j=1}^{n} W_j FI_j \tag{13}$$

$$FM = \sum_{j=1}^{n} W_j FM_j \tag{14}$$

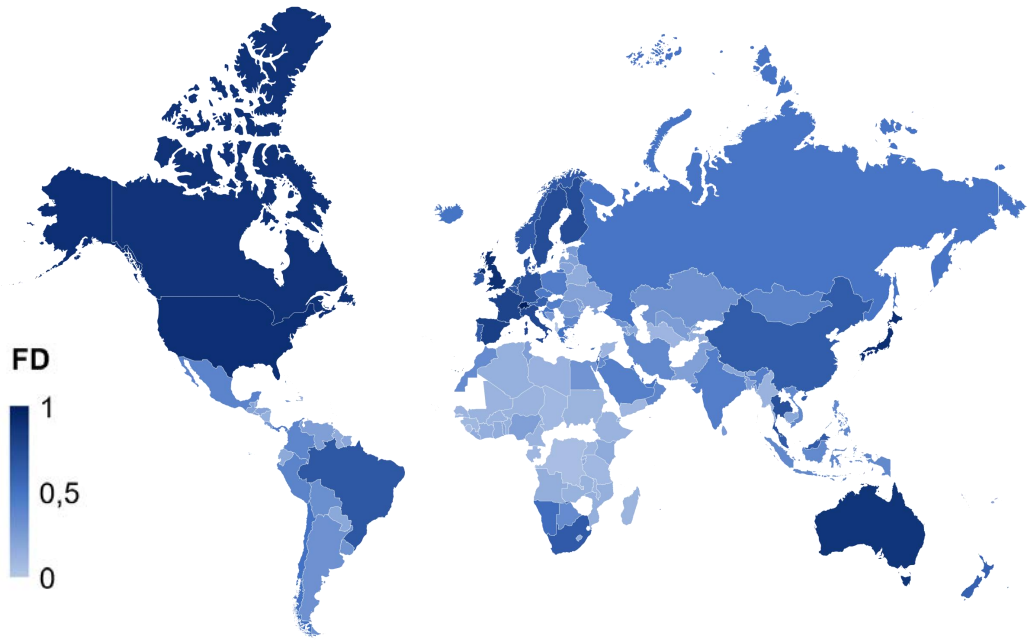
Appendix D.4 Aggregation in the Financial Development Index

The first-order sub-indices are normalized following the same procedure as in Appendix D.1 and aggregated as explained in Appendix D.2. Equation (15) gives the result of the aggregated financial development index FD.

$$FD = W_{FI} FI + W_{FM} FM \tag{15}$$

Appendix E

Figure 8: World Map of Financial Development-2019



Source: Financial Development Index Database - IM; Authors' elaboration.

Appendix F Sample countries in Financial Development Index Database

Table 15: Sample Countries: by Region and Income Classification

Income level/Region	Countries
Developed countries	36
Asia and Pacific	7
Europe	27
Western Hemisphere	2
Emerging countries	81
Africa	10
Asia and Pacific	12
Europe	13
Middle East and Central Asia	21
Western Hemisphere	25
Low-income countries	66
Africa	34
Asia and Pacific	16
Europe	1
Middle East and Central Asia	7
Western Hemisphere	8
All Countries	183

Source: Financial Development Index Database - IMF; Authors' elaboration.

Appendix G Arellano-Bond Linear Dynamic Panel Data Estimation

Table 16: Results on Deposit Rate

	Equation					
Exogenous variables	**(3)**	**(3L)**	**(4)**	**(4L)**	**(5)**	**(5L)**
$\varepsilon_{i,t}$	-1.952***	-0.442	-1.289***	-0.304	-2.691***	-0.415
$FD_{i,t}$	0.957	1.125				
$\varepsilon_{i,t} * FD_{i,t}$	2.197***	0.429				
$FM_{i,t}$			-1.563	-2.780**		
$\varepsilon_{it} * FM_{i,t}$			1.213***	0.267		
$FI_{i,t}$					2.430	4.810**
$\varepsilon_{i,t} * FI_{i,t}$					3.109***	0.289
$i_{i,t}$	0.655***	0.442***	0.649***	0.429***	0.658***	0.444***
$y_{i,t}$	-0.102***	-0.038**	-0.106***	-0.039**	-0.096***	-0.025
$\pi_{i,t}$	0.166*	0.054	0.173*	0.064**	0.158*	0.045
$neer_{i,t}$	0.004	-0.001	0.002	-0.002	0.004	0.001
VIX_t	-0.004	0.011*	-0.005	0.013**	-0.001	0.012*
CPI_t	0.004**	0.006***	0.005***	0.007***	0.004**	0.005***
$DepositRate_{i,t-1}$	0.202***	0.178***	0.197***	0.176***	0.212***	0.183***
$Constant$	-0.621	-0.947	0.688	0.977	-1.655	-3.410**
Observations	550	550	550	550	550	550
F Test p-value	0.000	0.000	0.000	0.000	0.000	0.000

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

*** Statistically significant at the 1% level.

y_{it}: Real GDP growth; π_{it}: Inflation rate; $neer_{it}$: Annual variation of the nominal exchange rate

Source: Authors' calculations.

Table 17: Results on Lending Rate

	Equation					
Exogenous variables	**(3)**	**(3L)**	**(4)**	**(4L)**	**(5)**	**(5L)**
$\varepsilon_{i,t}$	-1.475*	-0.001	-1.057*	-0.160	-2.061*	-0.086
$FD_{i,t}$	-2.978*	-4.847***				
$\varepsilon_{i,t} * FD_{i,t}$	1.332	-0.508				
$FM_{i,t}$			-1.620	-1.983		
$\varepsilon_{it} * FM_{i,t}$			0.701	-0.352		
$FI_{i,t}$					-2.032	-3.280
$\varepsilon_{i,t} * FI_{i,t}$					2.088	-0.598
$i_{i,t}$	0.768***	0.585***	0.765***	0.590***	0.713***	0.597***
$y_{i,t}$	-0.085*	-0.079***	-0.082*	-0.071***	-0.082*	-0.081**
$\pi_{i,t}$	0.025	0.065	0.026	0.067	0.034	0.061
$neer_{i,t}$	0.005	0.007***	0.004	0.009**	0.007*	0.009***
VIX_t	-0.006	-0.010	-0.008	-0.012	-0.007	-0.013
CPI_t	0.005**	0.005	0.005	0.004**	0.005	0.006
$LendingRate_{i,t-1}$	0.447***	0.407***	0.454***	0.418***	0.449***	0.413***
Constant	3.030***	4.362**	2.118*	2.516*	2.655*	3.699**
Observations	550	550	550	550	550	550
F Test p-value	0.000	0.000	0.000	0.000	0.000	0.000

* Statistically significant at the 10% level.

** Statistically significant at the 5% level.

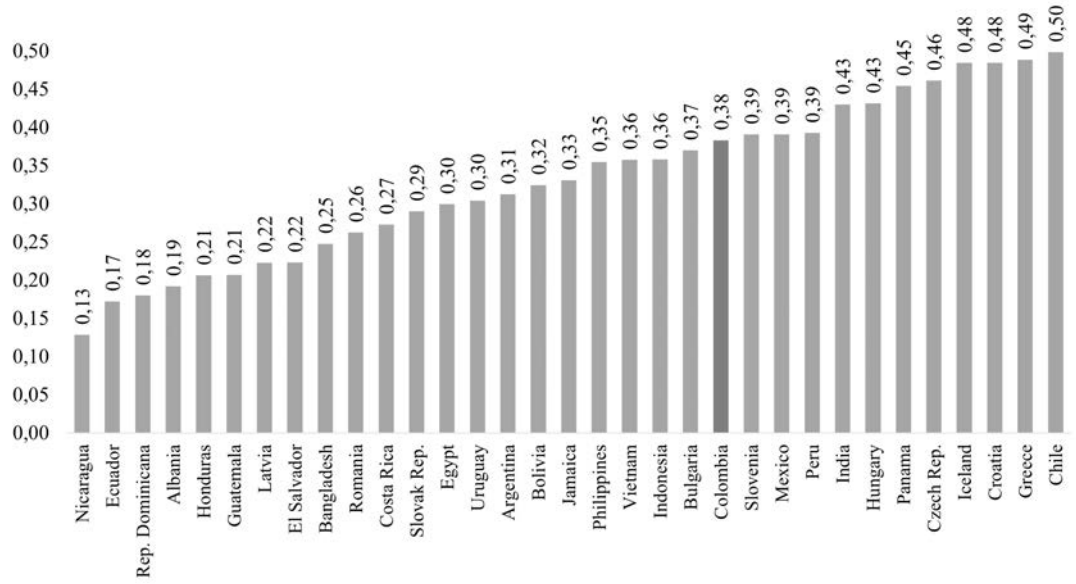
*** Statistically significant at the 1% level.

y_{it}: Real GDP growth; π_{it}: Inflation rate; $neer_{it}$: Annual variation of the nominal exchange rate

Source: Authors' calculations.

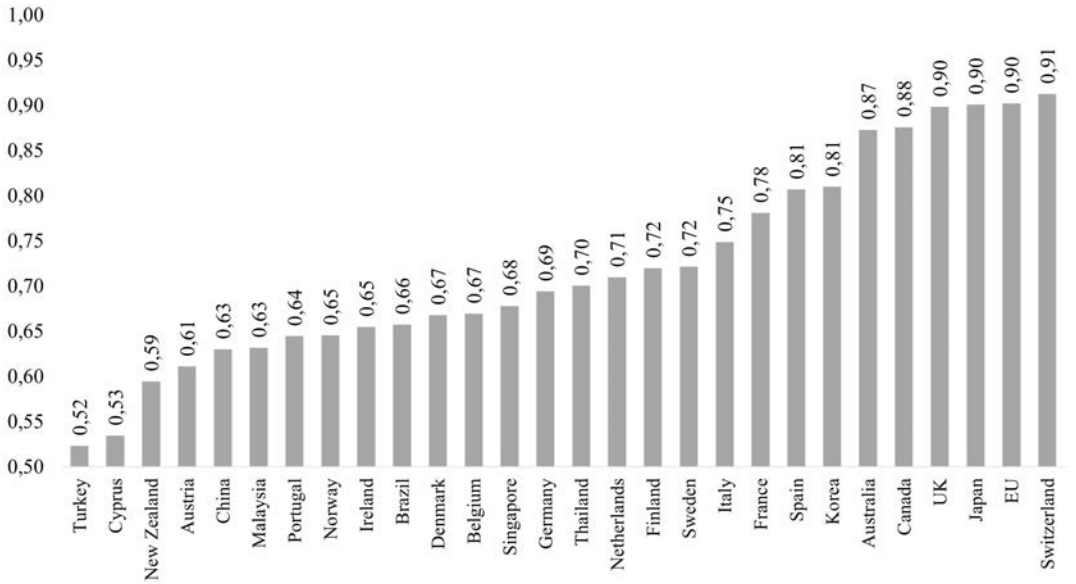
Appendix H Financial Development Index by Country

Figure 9: Countries with FD less than or equal to 0.5



Source:Financial Development Index Database - IM; Authors' elaboration.

Figure 10: Countries with FD greater than 0.5



Source:Financial Development Index Database - IM; Authors' elaboration.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