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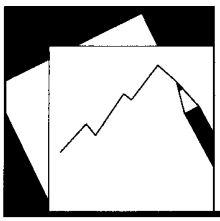

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The Policy Interest-Rate Pass-Through in Central America

Stephanie Medina Cas, Alejandro Carrión-Menéndez, Florencia Frantischek

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Abstract

Several Central American (CADR) central banks with independent monetary policies have adopted policy interest rates as their main instrument to signal their monetary policy stances, often in the context of adopting or transitioning to inflation targeting regimes. This paper finds that the interest-rate transmission mechanism, or the pass-through of the policy rate to market rates, is generally weaker and slower in CADR than in the LA6, the countries selected as benchmarks. A variety of potential factors behind this finding are examined, including the degrees of financial dollarization, exchange rate flexibility, bank concentration, financial sector development, and fiscal dominance. Through panel data analysis, the study suggests that the transmission mechanism can be strengthened by increasing exchange rate flexibility, and, over time, by adopting measures towards reducing financial dollarization, developing the financial sector, and reducing bank concentration.

JEL Classification Numbers: E42, E43, E52

Keywords: Monetary policy, interest-rate transmission, financial sector, exchange rate, Central America, Latin America

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I. INTRODUCTION

The objective of this paper is to assess the effectiveness of the interest-rate transmission mechanism in Central American (CADR) and to provide recommendations to policymakers in order to enhance monetary policy effectiveness in CADR.[1] Several CADR countries with independent monetary policies have adopted policy interest rates as their main instrument to signal their monetary policy stances, often in the context of implementing or moving towards inflation targeting (IT) regimes. Except for Nicaragua, all CADR countries have now explicit policy rates, but their signaling function is undermined by weaknesses in the transmission to bank interest rates (and ultimately to prices and output). Hence, strengthening the pass-through of the policy rate to market interest rates is important for improving the effectiveness of monetary policy in the region and helping the central banks ensure price stability.

The paper shows that the interest-rate transmission is weaker and slower in CADR than in the LA6, the countries chosen as benchmarks, and differs within CADR according to different factors, such as the degree of financial dollarization, exchange rate flexibility, bank concentration, financial sector development, institutional quality, and fiscal dominance.[2] Using panel data analysis on a sample of 40 countries that have a policy rate, the study finds some evidence that reducing dollarization, increasing exchange rate flexibility, and developing further the financial sector can strengthen this channel of transmission of monetary policy.

The paper has four sections. Section II reviews the economic literature on interest-rate transmission. Section III presents estimates of the interest-rate transmission mechanism in Latin America, investigates the speed of transmission, and examines the factors that determine the interest-rate pass-through using panel data analysis. Section IV concludes with a summary of the findings and key policy recommendations for CADR countries.

II. DETERMINANTS OF INTEREST-RATE TRANSMISSION: LITERATURE REVIEW

This section reviews a number of factors that are often seen as key determinants of the interest-rate transmission mechanism in developing countries and emerging markets. It will focus primarily on the first step of monetary transmission, i.e., the pass-through of the policy interest rate to bank lending and deposit rates; the second step, consisting of the impact of bank interest rates on aggregate demand, is beyond the scope of this study. Reviewing the determinants of the interest-rate transmission mechanism helps understand the reasons why it is weaker in some countries and facilitates identifying policies to strengthen it.

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[1] The CADR countries with some degree of monetary policy independence are those that are not fully dollarized. Guatemala has been strengthening its IT framework since its adoption in 2004, while the Dominican Republic and Costa Rica have plans to adopt an IT regime in the next few years. While Honduras has a de facto peg to the U.S. dollar and Nicaragua has a crawling peg, both countries are making efforts to strengthen their monetary frameworks.

[2] The LA6 countries are Brazil, Chile, Colombia, Mexico, Peru, and Uruguay.

High levels of financial dollarization may reduce the impact that changes in the policy rate have on banks‟ interest rates in local currency. The degree to which banks can transmit increases of the policy rate to their local currency rates may be limited due to borrowers‟ ability to switch to foreign-currency instruments.[3] Moreover, in dollarized economies, a large devaluation can have a contractionary impact through its adverse impact on financial balance sheets, thus instilling a fear of floating (Calvo and Reinhart, 2002; Leiderman, Maino, and Parrado, 2006).

Lack of exchange rate flexibility also hampers the effectiveness of the interest-rate transmission mechanism. Allowing the exchange rate to float allows the policy rate of the central bank to be the primary monetary policy tool, sends clearer policy signals to market participants, and boosts monetary policy independence. In addition, exchange rate flexibility highlights to market participants that there are two-way exchange-rate risks, encouraging the development of hedging facilities, and generating incentives to reduce foreign currency mismatches that help reduce dollarization (Freedman and Otker-Robe, 2010).

Bank concentration limits competition and lowers banks‟ reaction to the policy rate and thus can undermine the interest rate transmission mechanism. Indeed, the response of banks‟ rates to changes in the policy rate depends on the adjustment costs incurred by banks. These adjustment costs depend on the elasticity of demand for bank loans, which is influenced by the structure of the financial system (Cotarelli and Korelis, 1994; De Bondt, 2002): relatively inelastic demand is more likely when there is higher bank concentration. Indeed, when banks have substantial market power, policy rate changes (and changes to the banks‟ costs of funds) may impact banking spreads, rather than market rates. For example, banks may try to profit from a reduction in the policy rate by maintaining lending rates fixed, thus increasing lending margins (Mishra, Montiel, and Splimbergo, 2010; and Dabla-Norris, et al, 2007).

The development of the financial system strengthens the interest-rate transmission mechanism as more alternative sources of capital increase the elasticity of demand for bank loans (Cotarelli, et al., 1994). In more developed money and interbank markets, the pass-through from the policy rate to bank deposit and lending rates improves given that the first step in transmission is from the policy rate to the interbank rates (Yang, Davies, Wang, Dunn, and Wu, 2011). Financial shallowness tends to lead to higher excess liquidity in banks, discouraging the development of an active interbank market and reducing the effectiveness of transmission. In addition, more developed domestic capital markets, including a secondary market for government securities and long-term domestic-currency securities, strengthens transmission as it can encourage de-dollarization (Leiderman et al., 2006).

[3] In this regard, de-dollarization of the financial system in Peru and Uruguay has strengthened the interest-rate transmission in these countries (Acosta-Ormaechea and Coble, 2011).

The health of the financial system may also impact the effectiveness of the interest-rate transmission mechanism. Financially weak banks may respond to an injection of central bank liquidity or lower policy interest rates by building up liquidity or increasing margins in order to raise capital positions and increase provisioning rather than extending credit (IMF, 2010). Holding on to bad loans on the balance sheet may crowd out new loans and limit the impact of lower interest rates. In addition, when the banking system and the economy are weak and risk aversion and information costs rise, banks could be reluctant to lend (Archer and Turner, 2006). In this case, credit rationing increases and the demand for loans are more inelastic.

Strengthening central bank independence boosts the interest-rate transmission as it gives autonomy to the central bank to undertake monetary policy actions and enhances its signaling function to market participants. In developing countries, *de jure* and *de facto* independence are important in raising the effectiveness of the central bank (Cukierman, Webb, and Neyapti, 1992). Independence includes the freedom to set the policy rate without government interference (i.e. instrument independence). Improving independence encompasses increasing the autonomy of the central bank board, limiting or banning central bank lending to the government, increasing the financial autonomy of the central bank, and enhancing its accountability through better communication of policies and goals.[4]

Similarly, eliminating fiscal dominance enhances transmission as it does not subordinate monetary policy to the objectives of fiscal policy and strengthens central bank independence (IMF, 2010). Direct central bank lending to the government undermines the balance sheet of the central bank and constrains the ability of the central bank to clearly signal changes in the monetary policy stance by raising interest rates and performing open market operations (Laurens, 2005). High fiscal deficits can also raise interest rates by increasing the risk premium, thus interfering with the pass-through of the policy rate to market interest rates.

Weak regulations and institutional environment can also weigh on the interest-rate transmission as they cause problems of asymmetric information and contract enforcement which raise the cost of financial intermediation (Mishra, et al., 2010). This reduces the elasticity of the demand for loans and makes bank rates less sensitive to changes in the policy rate and can result in lower lending by banks. A better institutional and regulatory environment can also help to develop capital markets, thus strengthening the interest-rate transmission mechanism. These institutional weaknesses, which tend to be more prevalent in developing countries and emerging markets than in advanced countries, cover government effectiveness, regulatory quality, the rule of law, and control of corruption.[4]

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[4] These areas are used in the computation of a central bank autonomy index (the CWN index, Cukierman et al, 1992).

[4] These factors can be proxied using the World Bank governance indicators (Kauffmann, Kraay, and Mastruzzi, 2009).

III. INTEREST-RATE TRANSMISSION IN CADR

A. Correlations of the Policy Rate with Market Rates

This section presents initial estimates of the interest-rate pass-through in CADR and the LA6. The LA6 were included as benchmarks for Central America given their relatively more developed monetary frameworks, including having well established IT regimes in place and, to varying degrees, flexible exchange rate arrangements (Table 1).[5] Within CADR, only Guatemala has an IT regime, but the signaling function of its policy rate is relatively weak. For more details on the monetary policy frameworks in CADR, see Medina Cas, Carrión-Menéndez, and Frantischek (2011).

Correlation analysis between the policy rates and banks‟ borrowing and lending rates provide a first take on the strength and speed of the interest-rate transmission mechanism. It suggests that the pass-through is generally weaker in CADR than in LA6 countries, and its strength varies by country (Table 2).[6,7] With the exception of Peru (and Uruguay in the case of the pass-through of the policy rate to deposit rates), LA6 countries have higher long-term correlation coefficients than CADR. Within CADR, Costa Rica has the highest correlation, while Nicaragua, with its exchange rate anchor, has the lowest correlation. Changes in policy rates explain a smaller proportion of the variance in lending and deposit rates in CADR countries than in the LA6. Lending rates tend to have a higher correlation with the policy rate than deposit rates in most Latin American countries.[8]

The main factors that appear to be influencing the transmission mechanism of monetary policy in CADR are in line with those discussed in the previous section **(**Figure 1). In particular, the transmission mechanism seems to be positively correlated to the degree of exchange rate flexibility, financial intermediation (measured by the amount of bank credit to the private sector in percent of GDP), and the institutional environment (measured by the World Bank‟s governance indicator on regulatory quality);[9] and negatively correlated

[5] According to the IMF de facto classification system, non-floating arrangements are divided into stabilized arrangements (that can be considered as peg-like) and crawl-like. Floating arrangements cover exchange rates that are largely market determined and are divided into two subcategories: i) free floating if intervention occurs only exceptionally to address market disorders, and ii) floating when intervention occurs to moderate excessive fluctuations in the exchange rate but without targeting a specific exchange-rate level. Any arrangement that is not classified as floating or non-floating is classified as other managed arrangement, the residual category. See Habermeier, Kokenyne, Veyrune, and Anderson (2009) for more details.

[6] Section III. B presents a more detailed discussion of how the strength of the pass-through varies by country.

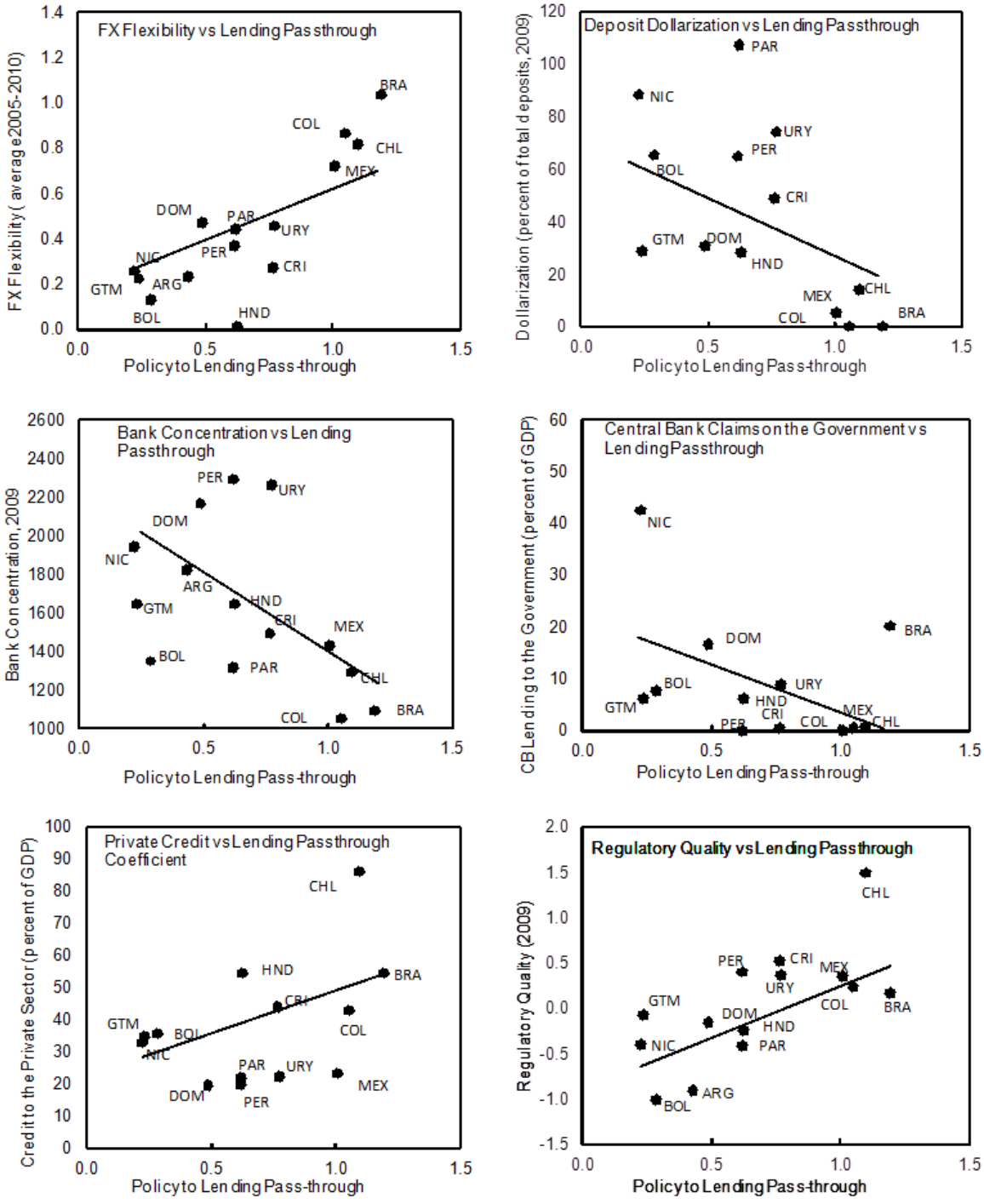
[7] The correlations were made using monthly data (see Appendix I for details) and follows the methodology of Mishra, et al., 2010. Dummies were used in the equations to control for the impact the global financial crisis had on interest rates in the second-half of 2008.

[8] Appendix II plots the policy and lending rates in LA6 and CADR.

[9] Regulatory quality measures the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

Figure 1. Pass-through in Latin America 1/

Interest-rate transmission is positively correlated with exchange rate volatility, financial development, and regulatory quality; and negatively correlated with financial dollarization, bank concentration, and fiscal dominance.



1/ Trend line estimated from a linear regression.
Source: See Appendix I

with the degree of financial dollarization, bank concentration,[10] and fiscal dominance (measured by central bank claims on the government in percent of GDP).

Table 1. Monetary and Exchange Rate Frameworks in CADR and LA6[1]

CADR	Monetary Policy Framework	De Facto Exchange Rate Arrangement
Costa Rica	Transitioning to inflation targeting within an exchange rate band to the U.S. dollar.	Other managed arrangement.
Dominican Republic	Transitioning to inflation targeting. No explicitly stated nominal anchor, but the central bank monitors various indicators including the exchange rate.	Stabilized arrangement (or peg-like).
Guatemala	Inflation targeting, with some areas being strengthened.	Floating.
Honduras	Exchange rate anchor to the U.S. dollar.	Stabilized arrangement (or peg-like).
Nicaragua	Exchange rate anchor to the U.S. dollar.	Crawling peg.
LA6		
Brazil	Inflation targeting.	Floating.
Chile	Inflation targeting.	Free floating.
Colombia	Inflation targeting.	Floating.
Mexico	Inflation targeting.	Floating.
Peru	Inflation targeting.	Floating.
Uruguay	Inflation targeting.	Floating.

Source: IMF staff.
[1] As of end-April, 2010.

In general, the speed of transmission of the policy rate to lending rates appears to be faster in the LA6 than CADR though it does vary by country. Figure 2 presents estimates of the cumulative correlation.[11] Within the LA6, the speed of transmission appears to be the fastest in Peru, with full transmission at about four months (though, as earlier indicated, it has the lowest long-term correlation coefficient, i.e., the weakest interest-rate transmission mechanism); most of the other countries achieve full transmission within six and eight months. Within CADR, Costa Rica has the fastest speed of transmission of the policy rate to lending rates (about six months), while the Dominican Republic, Guatemala, and Honduras have the slowest (within eight months and a year).

[10] Bank concentration is measured using the Hirshman-Hirfindahl index that measures industry concentration by summing the squared market shares of all the firms in the industry. A higher value corresponds to higher concentration and less competition.

[11] Appendix III explains how the cumulative pass-through is calculated. An estimate of the cumulative pass-through of Nicaragua (excluded from Figure 2) is presented in Appendix III.

Table 2.

Short and long-term correlations between policy rate and bank lending/deposit rates
(correlation coefficients, average 2004-2010 unless noted otherwise)

	Contemporaneous	Short Term	**Long-term**	R-Squared
	For Lending Rates 1/			
Central America (mean) 2/	0.07	0.14	**0.49**	0.31
Latin America 2/	0.13	0.23	**0.62**	0.34
LA6 (mean)	0.63	0.47	**1.07**	0.54
Brazil	0.71	0.58	**1.19**	0.54
Chile	0.63	0.22	**1.09**	0.60
Colombia	0.24	0.54	**1.05**	0.51
Mexico	0.80	-0.28	**1.01**	0.67
Uruguay	0.10	0.25	**0.77**	0.28
Costa Rica	0.05	0.46	**0.76**	0.27
Paraguay	0.08	0.04	**0.62**	0.23
Honduras	0.07	0.26	**0.63**	0.38
Peru	0.16	0.40	**0.62**	0.30
Dominican Republic	-0.07	-0.09	**0.49**	0.37
Argentina	0.30	0.30	**0.43**	0.53
Bolivia	0.16	0.22	**0.28**	0.27
Guatemala	0.11	-0.12	**0.24**	0.31
Nicaragua	0.09	0.14	**0.22**	0.27
	For Deposit Rates 1/			
Central America (mean) 2/	0.02	0.06	**0.37**	0.31
Latin America /2	0.26	0.22	**0.58**	0.56
LA6 (mean)	0.50	0.25	**0.72**	0.62
Chile	1.39	-0.08	**1.00**	0.77
Colombia	0.32	0.49	**0.88**	0.68
Brazil	0.65	0.63	**0.83**	0.48
Mexico	0.27	0.20	**0.71**	0.79
Paraguay	-0.13	0.44	**0.70**	0.78
Costa Rica	0.03	0.32	**0.66**	0.27
Argentina	0.13	0.43	**0.54**	0.84
Honduras	0.02	0.08	**0.47**	0.62
Peru	0.16	0.10	**0.46**	0.72
Uruguay	0.23	0.14	**0.46**	0.28
Bolivia	0.38	0.25	**0.41**	0.35
Nicaragua	0.23	0.05	**0.37**	0.25
Guatemala	0.01	0.01	**0.34**	0.76
Dominican Republic	0.02	0.06	**0.27**	0.31

1/ Long term effects are calculated as $\frac{\pi_i + \theta_i + \mu_i + \rho_i}{1 - (\alpha_i + \beta_i + \delta_i)}$ from the equation:

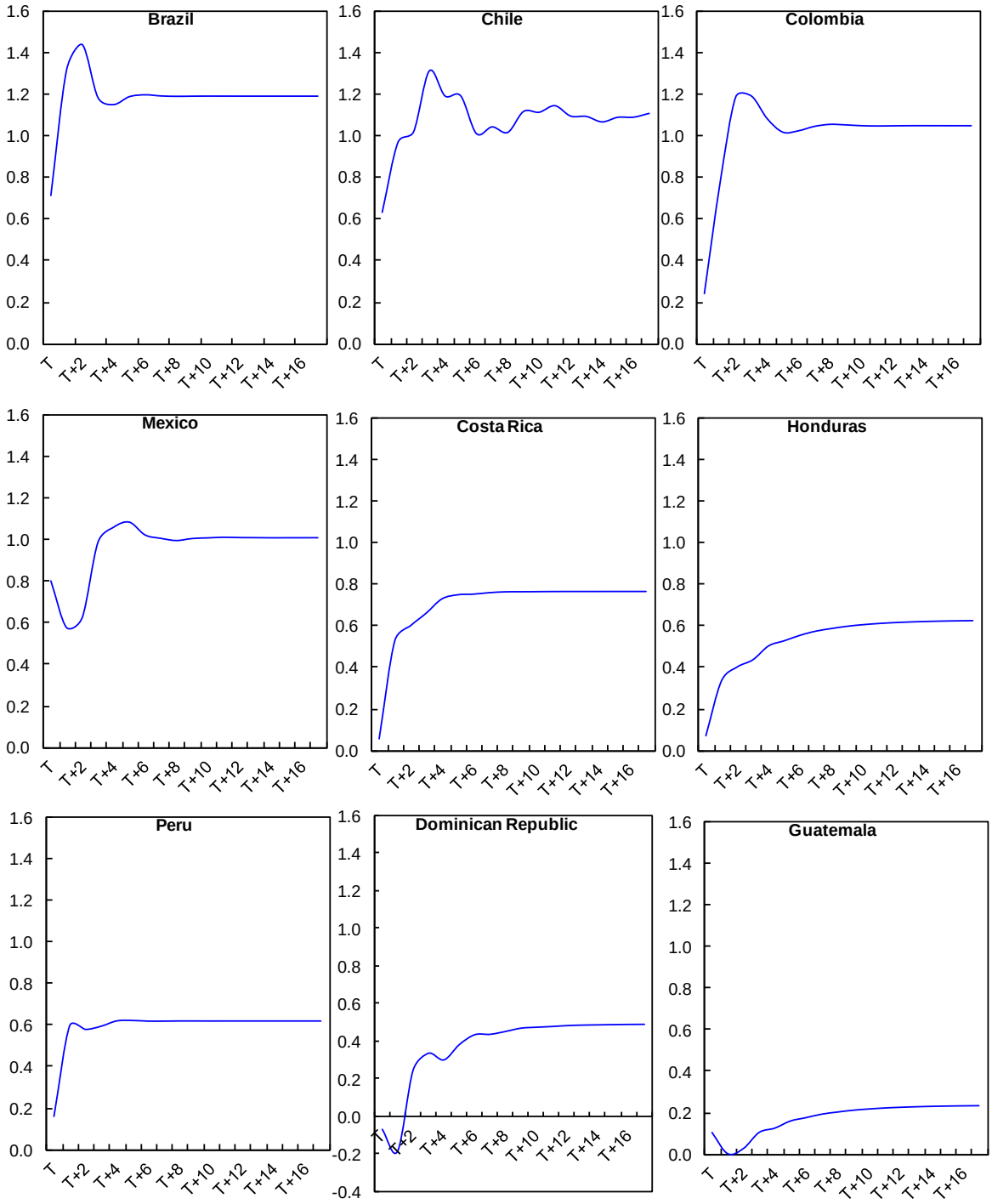
$$y_t = \alpha y_{it-1} + \beta y_{it-2} + \delta y_{it-3} + \theta x_{it} + \mu x_{it-1} + \pi x_{it-2} + \rho x_{it-3}$$

Where y is the change in the retail rate (either lending or deposit) and x is the change in policy rate. Θ and u capture the cotemporaneous and short term effects respectively.

2/ Excludes countries that use the US Dollar as currency.

Source: See Appendix I

Figure 2. CADR + LA6: Policy to Lending Pass-through Cummulative Response Over Time[1]



Source: Authors' calculations. See Appendix III.
[1] T equals the first month.

B. Interest-Rate Transmission: Empirical Evidence

This section measures the pass-through from policy rates to banks‟ lending rates through a panel estimation, incorporating the effects of dollarization, exchange rate flexibility, the size of the banking sector, and banking concentration.[12] The methodology follows in part Mishra, Montiel, and Splimbergo (2010), but restricts the sample to 40 countries that publish a policy rate using annual data from 2004–10. The panel regressions use: (i) the ratio of foreign currency deposits to total deposits in the banking system to measure financial dollarization; (ii) an index from 0 to 10 based on the standard deviation of the daily exchange rate within a one month period as a proxy of exchange rate flexibility, (iii) the ratio of bank deposits to GDP to measure the size of the banking sector, and (iv) a dummy for bank concentration (equal to one if the index is higher than the median and zero otherwise) to test whether a monopolistic banking sector hinders the pass-through.[13] These variables are interacted with the policy rate in order to evaluate the way in which they condition the pass-through in the following equation.[14]

$$y_{it} = \alpha_0 + \beta_1 y_{it-1} + \beta_2 x_{it} + \mu z'_{it} + \theta x_{it} z'_{it} + \delta' + \epsilon_{it}$$

It is assumed that the impact of the policy rate (x_{it}) on the lending rate (y_{it}), or the interest rate pass-through, is affected by the level of deposit dollarization, exchange rate flexibility, deposits to GDP, and concentration of the banking sector (z'_{it}) as they interact with the policy rate ($x_{it} z'_{it}$). The interest rate pass-through is represented by the coefficient β_2 and δ' denotes time dummies for every period. Following the previous subsections, the coefficients corresponding to the interactions of the policy rate with the size of the banking sector and exchange rate flexibility are expected to have a positive sign, while the interaction of the policy rate with deposit dollarization and banking sector concentration should have a negative sign. Since the independent variables are not strictly exogenous due to correlation with the error term (ϵ_{it}), OLS and least-squares dummy variables (fixed effects) models give biased results. A solution to this problem is given by the System-GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998). This estimator is derived from the estimation of a system of two simultaneous equations, one in levels and the other in orthogonal deviations.[15] For this panel, monthly data was collapsed into yearly averages in order to implement System-GMM (for large „n‟, small „t‟). We ran several tests and confirmed that there is no presence of unit root, thus the variables in the panel are in levels.

Table 3 presents the results of our model: a pooled OLS (column 1), a least-squares dummy variables with fixed effects (LSDV, column 2), and a System GMM (column 3), following

[12] Appendix IV has details on the sample of countries, data, and sources.

[13] Other variables included in Section III. A were tested (e.g., central bank claims on the government, exchange-rate regime classifications, and World Bank governance variables). However, the results were not significant and goodness of fit tests suggested that these variables should be excluded. Regarding the index on central bank independence, a long time series do not exist.

[14] The constitutive terms (or explanatory variables) of the interactions have been centered by subtracting the mean from each data point in order to facilitate the interpretation of their coefficients.

[15] Because of gaps in our data, orthogonal deviations instead of differences were used, thus maximizing the sample size (Roodman, 2006).

Roodman (2006). Given the upward and downward bias of the OLS and LSDV estimates respectively, the lagged dependant variable should lie in between these two. Columns 1 to 3 present the model with no interactions, and show the relationship of the explanatory variables with the lending rate, while columns 4 to 6 include the interactions. In column 3, the Hansen test of 0.112 indicates that the instrument set of 24 variables can be considered valid and that there are no issues with over-identification. Similarly, in column 6, the Hansen test value of 0.149 suggests an instrument set of 40 instruments is appropriate. In order to build this set, all the variables after the second lag were used, which is the standard treatment for endogenous variables when there is autocorrelation in the first lag, or AR(1). The main results of the estimations are:

Table 3. Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)
			System GMM Twostep			System GMM Twostep
VARIABLES	OLS	LSDV	Windmeijer SE correction	OLS	LSDV	Windmeijer SE correction
Dependent variable: Lending rate (percent)						
Lagged lending rate (percent)	0.869***	0.378***	0.428***	0.848***	0.343***	0.618***
	(0.0158)	(0.0510)	(0.146)	(0.0172)	(0.0533)	(0.0672)
Policy rate (percent)	**0.191*** **	**0.499*** **	**0.657*** **	**0.277*** **	**0.526*** **	**0.551*** **
	(0.0408)	(0.114)	(0.147)	(0.0613)	(0.0818)	(0.114)
FX deposits (percent of total deposits)	-0.00102	0.00721	0.126*	-0.00121	0.0221	-0.00711
	(0.00536)	(0.0376)	(0.0685)	(0.00534)	(0.0338)	(0.0361)
FX flexibility (index)	-0.0546	0.0232	0.0226	-0.0601	0.00728	-0.118
	(0.0464)	(0.0980)	(0.192)	(0.0456)	(0.0925)	(0.118)
Deposits (percent of GDP)	-0.000504	-0.0101	-0.00618	0.00164	-0.00159	-0.000935
	(0.00207)	(0.0118)	(0.00911)	(0.00284)	(0.0146)	(0.00489)
Bank concentration (dummy)	-0.382	-0.553*	-1.598	-0.359	-0.306	-0.209
	(0.272)	(0.313)	(1.156)	(0.267)	(0.306)	(0.511)
Policy rate interacting with:						
FX deposits (percent of total deposits)				-0.000523	-0.00341	-0.00722*
				(0.00145)	(0.00293)	(0.00359)
FX flexibility (index)				0.0419***	0.0673***	0.0657*
				(0.0141)	(0.0203)	(0.0355)
Deposits (percent of GDP)				0.00148*	0.00129*	0.00197*
				(0.000769)	(0.000656)	(0.00101)
Bank concentration (dummy)				-0.136*	-0.0355	-0.107
				(0.0706)	(0.0747)	(0.100)
Observations	235	235	235	235	235	235
R-squared	0.952	0.542		0.955	0.611	
Adjusted R-squared	0.949	0.519		0.952	0.585	
Number of countries		40	40		40	40
No. of instruments			24			40
Hansen test p-value			0.112			0.149
A-B AR(1) test			-1.839			-2.797
A-B AR(1) test p-value			0.0659			0.00516
A-B AR(2) test			-1.470			-1.709
A-B AR(2) test p-value			0.141			0.199
F-test p value (joint significance of financial variables)						0.0336**

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
All estimations include time dummies.

- The pass-through in the first year is about 0.55 (a one percentage change in the policy rate is associated with a 0.55 percentage point increase in the lending rate) in the GMM estimation with interactions (column 6).

- The interactions of the financial variables with the policy rate have the correct sign, and foreign currency deposits, exchange rate flexibility, and bank deposits as a percent of GDP are significant, although only at the 10 percent level. This is likely due to the fact

that the financial variables are correlated. An F-test on the interactions of the four financial variables shows that they are jointly significant at the five percent level, highlighting that tackling dollarization, improving exchange rate flexibility, developing the financial sector, and lowering bank concentration are all important for increasing the interest-rate pass-through.

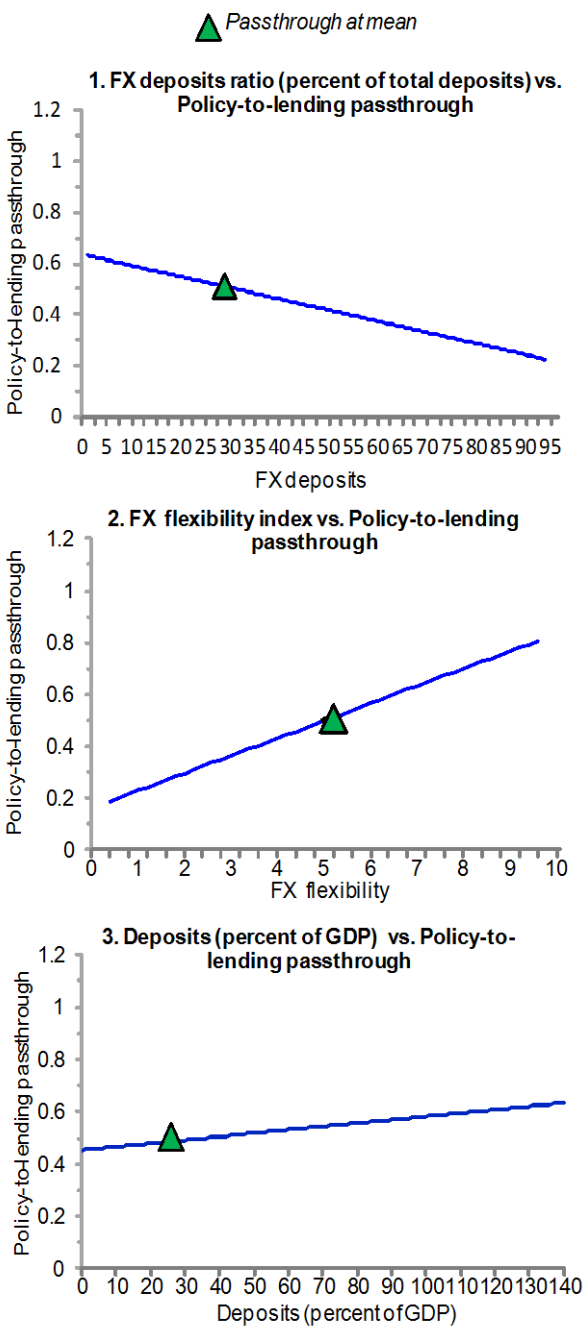
- The interaction with the policy rate suggests that higher dollarization tends to lower the pass-through. The relevant coefficient is negative and is statistically significant in the GMM estimation (column 6). In particular, an increase in the ratio of deposits in foreign currency by one standard deviation, from 29 to 53 percent, would reduce the pass-through by about 0.1 (Figure 3).

- Exchange rate flexibility has a significantly positive impact on the interest-rate pass-through. The results indicate that an increase in the index of exchange flexibility by one standard deviation (from 5.4 to 8.1) would increase the pass-through from about 0.50 to about 0.65. The relevant coefficient of the interaction of the policy rate and exchange rate flexibility is positive and statistically significant in columns 4 and 5, though the significance decreases in column 6.

- The size of the banking sector has a positive correlation with the pass-through. Were the ratio of deposits to GDP to increase by one standard deviation (from 35.1 to 61.2 percent), the pass-through would increase from 0.5 to 0.6. The relevant coefficient of the interaction of the policy rate and bank deposits to GDP is positive and statistically significant in equations 4 to 6.

- Although the coefficient on the interaction between bank concentration and the policy rate does show the expected negative sign, indicating concentration tends to lower the pass-through, it is only statistically

Figure 3. Marginal Effects of Explanatory Variables on the Policy Rate Pass-through 1/



1/ These marginal effects are computed as the derivatives of dy/dx calculated from predictions at fixed values of each of the above mentioned covariates and averaging the rest. Following the equation in page 13, they can be expressed as:

$$\frac{\partial y}{\partial x} = \beta_2 + \theta z'$$

Source: Author's estimates.

significant in equation 4; this could be due to limitations in the way the concentration index is calculated.[16] It may also reflect the fact that concentrated markets can be competitive if barriers to new entrants are low.[18]

Table 4 presents estimates of the interest rate pass-through calculated at the mean values of the explanatory variables for the LA6 and CADR, derived from the system GMM (column 6 in Table 3). The overall results display similarities to the long-term correlations between the policy and lending rates in Table 1. On average, the LA6 have a higher interest-rate pass-through than CADR countries; and within the LA6, Brazil and Chile have the highest pass-through, while the dollarized economies of Peru and Uruguay have the lowest. Regarding CADR countries, the pass-through is relatively similar in the Dominican Republic, Costa Rica, and Guatemala. The pass-through estimates for CADR are also in line with independent estimates by Swiston (2011). The pass-through range for CADR is narrower than in Table 1, at around 0.5–0.7. However, the panel analysis excludes Nicaragua, as it does not have a policy rate.

Table 4: Summary Means and Predicted Pass-Through: 2004-2010

	FX ratio	FX flexibility	Deposits	Pass-through 1/
Chile	1.71	7.68	57.43	1.15
Brazil	0.00	7.30	53.81	1.14
Colombia	0.00	6.99	15.65	1.04
Mexico	12.13	6.93	14.20	0.95
LA6	**21.81**	**6.52**	**38.77**	**0.94**
Uruguay	82.01	6.10	37.34	0.70
Peru	35.01	4.13	54.22	0.67
Dom.Rep	39.27	5.51	43.80	0.65
Costa Rica	49.95	4.36	41.82	0.61
Guatemala	32.20	3.80	30.22	0.57
CADR	**38.08**	**3.59**	**39.67**	**0.57**
Honduras	30.89	0.68	42.83	0.46

1/ These marginal effects are computed as the derivatives of dy/dx calculated from predictions at fixed values of each of the above mentioned covariates and averaging the rest. Following the equation in page 12, they can be expressed as:

$$\frac{\partial y}{\partial x} = \beta_2 + \theta z'$$

Source: Authors' estimates.

These pass-through results for the individual CADR countries are also in line with the literature and are more intuitive than those implied by the long-term correlations in Table 1. In particular, the higher pass-through coefficients in the Dominican Republic, Costa Rica and Guatemala are consistent with relatively more advanced monetary policy frameworks. Indeed, Guatemala has already adopted IT, and Dominican Republic and Costa Rica have taken steps towards adopting this monetary framework and have deeper capital markets relative to other CADR countries. Still, the results suggest that the effectiveness of the IT framework in Guatemala is weakened by limited exchange rate flexibility and shallow capital markets (including underdeveloped secondary government securities and interbank markets). In Costa Rica, the Dominican Republic, and Honduras the results suggest that the interest-rate transmission mechanism could be strengthened by allowing greater exchange rate flexibility and reducing dollarization.

[16] This index only accounts for the assets of the three largest banks as a share of all commercial banks.

[18] See Cotarelli and Kourelis (1994) for further discussion of this argument.

IV. CONCLUSION

This paper has examined the key factors that influence the strength of the interest-rate transmission mechanism, with particular emphasis in CADR countries. The results suggest that the pass-through of the policy rate to market rates is generally weaker and slower in CADR than in LA6 countries, with the main factors hindering the transmission mechanism in line with the literature. In particular, a correlation analysis suggests that the transmission mechanism could be strengthened by allowing greater exchange rate flexibility, reducing financial dollarization, lowering bank concentration, deepening financial markets, tackling fiscal dominance, and enhancing the regulatory and institutional environment.

The importance of some of these factors was assessed through panel data analysis. The pass-through of the policy rate to lending was estimated at about 0.55 in the sample of countries. The panel results suggest that the pass-through of the policy rate to lending rates has a negative and statistically significant relationship with dollarization, and a positive and statistically significant relationship with exchange rate flexibility and financial system development. While bank concentration was also found to have a negative relationship with the interest-rate transmission mechanism, its statistical significance was not confirmed. However, an F test suggested that that these four financial variables are jointly significant at the five percent level, providing support to the notion that reforms in all four areas can improve the interest-rate transmission mechanism.

A careful prioritization of the steps needed to bring CADR monetary frameworks to best international practices is essential to relax the existing constraints to an effective monetary policy. In the near term, the three main priorities are to increase exchange rate flexibility, preserve the absence of fiscal dominance, and ensure central bank instrument independence (Medina Cas, Carrión-Menéndez, Frantischek, 2011). Other conditions to enhance the monetary policy frameworks can be developed, and in some instances their fulfillment can be accelerated, once the above three steps are taken. These conditions include strengthening the political independence of central banks and tackling their balance sheet weaknesses, developing further the capacity of central banks for forecasting inflation, and continuing to improve the transparency and accountability of central banks. In addition, although not an immediate priority in the process of strengthening the monetary policy framework, it will be important to continue enhancing financial supervision and regulation and implementing structural reforms to develop and promote diversification of financial markets.

Appendix I: Data Information and Sources for Pass-through Estimates and Determinants in Latin America

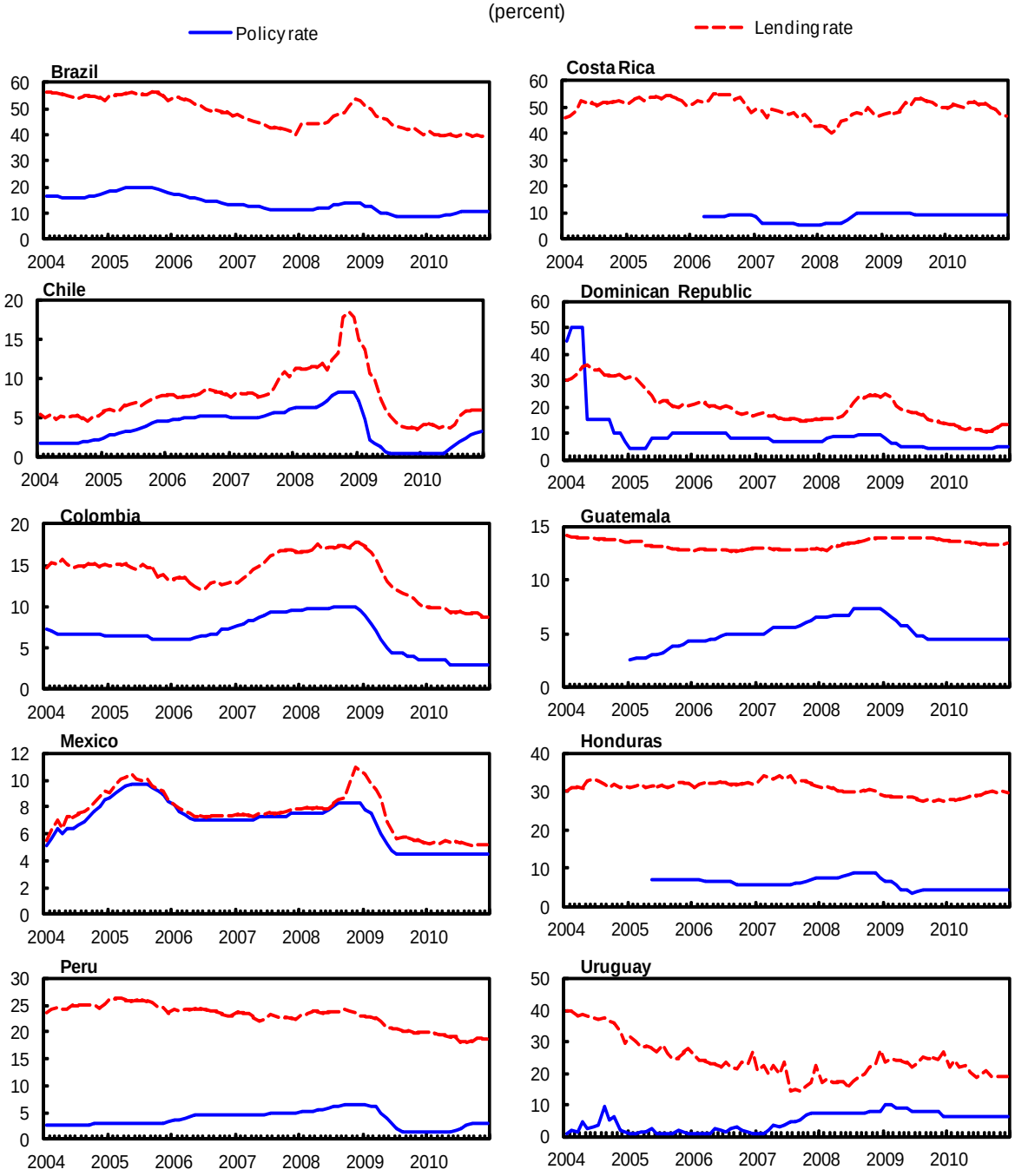
	Rates			Deposits currency						
	Policy	Lending	Notes on policy rate	Local	Foreign	CB Claims on the Central Government	Private Credit	CB Independence & Regulatory Quality	Bank Concentration	FX Flexibility 1/
Argentina	Bloomberg	dXdata	Badlar	Auth.	Auth.	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Bolivia	Auth.	IFS	Tasa Premio, Reporto	Auth.	Auth.	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Brazil	IFS	IFS	Selic overnight	SRF	SRF	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Chile	Auth.	Auth.	Tasa de polîtica monetaria	Auth.	Auth.	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Colombia	Auth.	IFS	Tasa de intervención	Auth.	Auth.	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Costa Rica	Auth.	dXdata	Tasa de polîtica monetaria	SECMCA	SECMCA	IFS	SECMCA	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Dominican Republic	SECMCA	Auth.	Tasa de polîtica monetaria	SECMCA	SECMCA	IFS	SECMCA	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Guatemala	Auth.	Auth.	Tasa de polîtica monetaria	Auth.	Auth.	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Honduras	SECMCA	Auth.	Tasa de polîtica monetaria	SECMCA	SECMCA	IFS	SECMCA	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Mexico	Auth.	IFS	Bank funding rate (pre 2008)	Auth.	Auth.	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Nicaragua	Auth.	Auth.	Operaciones de reporto	SECMCA	SECMCA	IFS	SECMCA	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Paraguay	Auth.	IFS	Tasa de polîtica monetaria	Auth.	Auth.	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Peru	Auth.	dXdata	Tasa de interés de referencia	Auth.	Auth.	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Uruguay	Auth.	dXdata	Call rate	Auth.	Auth.	IFS	Auth.	World Bank	Authorities, Hirshman-Hirfendahl Index	Bloomberg
Frequency:	Monthly	Monthly		Monthly	Monthly	Monthly	Monthly		Yearly	Daily

Sources: Haver Analytics; Standardized Report Form (IMF, data provided by authorities), Bloomberg LLP, dXdata, Secretaría Ejecutiva del Consejo Monetario Centroamericano (SECMCA), World Bank Governance Indicators and country authorities.

1/ Calculated as a log of the monthly average weekly standard deviation of the exchange rate

Appendix II. LA6 and CADR: Policy and Lending Rates, 2004-2010

(percent)



Source: See Appendix III

Appendix III: Policy-to-Lending Pass-Through Cummulative Response Over Time

We start with equation (1):

$$y_t = \alpha y_{it-1} + \beta y_{it-2} + \delta y_{it-3} + \theta x_{it} + \mu x_{it-1} + \pi x_{it-2} + \rho x_{it-3}$$

Where y is the difference in the lending rate and x is the difference in the policy rate. Once we obtain these coefficients using a simple OLS regression we get the long-run effect with equation (2):

$$\frac{\pi_i + \theta_i + \mu_i + \rho_i}{1 - (\alpha_i + \beta_i + \delta_i)}$$

In order to calculate the marginal effect (R) in each period (t) we calculate the following:

At t_0 $R_0 = \theta,\ \ \mathrm{x} = 1$
At t_1 $R_1 = \alpha R_0 + \mu$
At t_2 $R_2 = \alpha R_1 + \beta R_0 + \pi$
At t_3 $R_3 = \alpha R_2 + \beta R_1 + \delta R_0 + \rho$
At t_4 $R_4 = \alpha R_3 + \beta R_2 + \delta R_1$
At t_5 $R_5 = \alpha R_4 + \beta R_3 + \delta R_2$

We can express this in the following way after t_4:

$$t_n\ R_n = \alpha R_{n-1} + \beta R_{n-2} + \delta R_{n-3}$$

Once we have the marginal effect for each period (t_0 to t_{18}), we compute the cummulative effect with the sum of the values for R. The final value will equal to the long-term effect obtained in equation (2).

Commulative Response for LA6 and CADR

	BRA	CHI	COL	MEX	PER	URU	CRI	DOM	GTM	HND	NIC
T	0.71	0.63	0.24	0.80	0.16	0.10	0.05	-0.07	0.11	0.07	0.09
T+1	1.32	0.97	0.77	0.58	0.59	0.30	0.53	-0.19	0.01	0.34	0.19
T+2	1.44	1.02	1.19	0.63	0.58	0.68	0.60	0.24	0.03	0.40	0.33
T+3	1.18	1.31	1.19	0.99	0.59	0.92	0.66	0.33	0.11	0.44	0.25
T+4	1.15	1.19	1.09	1.06	0.62	0.76	0.73	0.30	0.13	0.50	0.18
T+5	1.19	1.19	1.02	1.08	0.62	0.78	0.75	0.38	0.16	0.53	0.18
T+6	1.20	1.01	1.03	1.02	0.62	0.75	0.75	0.43	0.18	0.55	0.24
T+7	1.19	1.04	1.05	1.00	0.62	0.78	0.76	0.43	0.19	0.57	0.25
T+8	1.19	1.02	1.06	0.99	0.62	0.76	0.76	0.45	0.20	0.58	0.22
T+9	1.19	1.12	1.06	1.00	0.62	0.77	0.76	0.47	0.21	0.60	0.21
T+10	1.19	1.11	1.05	1.01	0.62	0.77	0.76	0.47	0.22	0.60	0.22
T+11	1.19	1.14	1.05	1.01	0.62	0.77	0.76	0.48	0.22	0.61	0.23
T+12	1.19	1.09	1.05	1.01	0.62	0.77	0.76	0.48	0.23	0.61	0.23
T+13	1.19	1.09	1.05	1.01	0.62	0.77	0.76	0.48	0.23	0.62	0.22
T+14	1.19	1.07	1.05	1.01	0.62	0.77	0.76	0.48	0.23	0.62	0.22
T+15	1.19	1.09	1.05	1.01	0.62	0.77	0.76	0.49	0.23	0.62	0.22
T+16	1.19	1.09	1.05	1.01	0.62	0.77	0.76	0.49	0.23	0.62	0.23
T+17	1.19	1.11	1.05	1.01	0.62	0.77	0.76	0.49	0.23	0.62	0.22
T+18	1.19	1.10	1.05	1.01	0.62	0.77	0.76	0.49	0.23	0.62	0.22

Appendix IV: Pannel Regression Data Sources 1/

	Rates		Deposits currency			
	Policy	Lending	Local	Foreign	Bank Concentration	FX Flexibility 3/
Australia	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Azerbaijan	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Belarus	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Bolivia	Auth.	Auth.	SRF	SRF	Beck and Al-Husaini	Bloomberg
Bosnia & Herzegovina	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Brazil	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Bulgaria	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Canada	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Chile	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Colombia	Haver	Auth.	Auth.	Auth.	Beck and Al-Husaini	Bloomberg
Costa Rica	Auth.	SECMCA	SECMCA	SECMCA	Beck and Al-Husaini	Bloomberg
Croatia	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Czhech Republic	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Denmark	IFS	Haver	SRF	SRF	Beck and Al-Husaini	Bloomberg
Dominican Republic	Haver	IFS	Auth.	Auth.	Beck and Al-Husaini	Bloomberg
Egypt	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Guatemala	SECMCA	Auth.	SECMCA	SECMCA	Beck and Al-Husaini	Bloomberg
Honduras	SECMCA	SECMCA	SECMCA	SECMCA	Beck and Al-Husaini	Bloomberg
Hong Kong	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
India	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Indonesia	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Israel	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Jordan	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Korea	Haver	IFS	dxData 2/	dxData 2/	Beck and Al-Husaini	Bloomberg
Kuwait	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Malaysia	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Mexico	Auth.	IFS	Auth.	Auth.	Beck and Al-Husaini	Bloomberg
New Zealand	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Nigeria	Haver	IFS	Haver	Haver	Beck and Al-Husaini	Bloomberg
Pakistan	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Paraguay	Auth.	Auth.	SRF	SRF	Beck and Al-Husaini	Bloomberg
Peru	Haver	dxData	Auth.	Auth.	Beck and Al-Husaini	Bloomberg
Romania	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Russia	Haver	IFS	dxData 2/	dxData 2/	Beck and Al-Husaini	Bloomberg
Serbia	Haver	Haver	Haver	Haver	Beck and Al-Husaini	Bloomberg
South Africa	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Sweeden	Haver	Haver	SRF	SRF	Beck and Al-Husaini	Bloomberg
Thailand	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
United Kingtom	Haver	Haver	SRF	SRF	Beck and Al-Husaini	Bloomberg
Uruguay	Auth.	Auth.	Auth.	Auth.	Beck and Al-Husaini	Bloomberg
Vietnam	Haver	IFS	SRF	SRF	Beck and Al-Husaini	Bloomberg
Frequency:	Monthly	Monthly	Monthly	Monthly	Yearly	Daily

1/ Sources include: Haver Analytics; Standardized Report Form (IMF, data provided by authorities), Bloomberg LLP, dXdata, Secretaría Ejecutiva del Consejo Monetario Centroamericano (SECMCA), Beck and Al-Husaini (2009) and country authorities.
2/ Quarterly data
3/ Calculated as the monthly average daily standard deviation of exchange rate, standardized as a 0-10 index.

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