

# On the Link Between Currency Substitution and Financial Deepening in the Developing World \*

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## Abstract

One of the main reasons for dollarization is erosion of money's function as a store of value as the Currency Substitution View <sup>1</sup>suggests. It has not been uncommon for countries with high inflation rates to also have high dollarization ratios. Dollarization gives savers a shelter from domestic inflation. It enables them to retain the value of their savings. If dollar deposits serve as an inflationary hedge against inflation, then they should also restrict the adverse effects of inflation. Following this logic, dollarization is expected to have a positive effect on financial development. This paper investigates this issue. We seek to find an answer to the following question: Does dollarization of bank deposits have an effect on the development of financial intermediation in developing economies? Our empirical analysis which covers over 20 countries with heavily dollarized economies support our predictions that dollarization has a positive significant impact on the monetary depth of an economy. This finding reaffirms the findings of limited previous research on the issue.

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# 1 Introduction

One of the main reasons for dollarization is erosion of money's function as a store of value as the Currency Substitution view suggests. It has not been uncommon for countries with high inflation rates to also have high dollarization ratios. Dollarization gives savers a shelter from domestic inflation. It enables them to retain the value of their savings.

In an inflationary environment it is usually expected that banks will lend less and allocate capital less effectively, while the stock markets will be smaller and have less liquidity. In fact it has been shown that inflation has an adverse effect on financial deepening. Boyd, Levine, and Smith (2001) have shown that monetary depth<sup>2</sup> decreases by half a percentage point for every percentage point rise in the medium-term inflation rate. If dollar deposits serve as an inflationary hedge against inflation, then they should also restrict the adverse effects of inflation. Following this logic, dollarization is expected to have a positive effect on financial development. The goal of this paper is to investigate this issue. We seek to find an answer to the following question: Does dollarization of bank deposits have an effect on the development of financial intermediation in developing economies?

The plan of the paper is as follows: In the following section we provide an overview of the literature surrounding financial deepening and dollarization. In section 3 we define a theoretical model on inflation and monitoring costs which lays the foundation of our analysis into dollarization and financial depth and in section 4 we empirically test our model. We believe this paper will be an important contribution to the existing literature on dollarization and its effect on the financial development of dollarized economies.

## 2 The Literature

Even though there have been studies done on the effects of full dollarization on real economic variables such as growth and employment<sup>3</sup> there has been limited literature on the effects of partial dollarization on the development of financial systems. De Nicolo, Honohan, and Ize (2005) are the first to empirically assess the effect of dollarization of bank deposits on the financial deepening of a country. They also point out the lack of a theoretical framework or empirical literature on this issue. Their findings suggest that especially for higher inflation economies, dollarization strengthens the financial system through the moderating effect of dollarization on the adverse effects of inflation on monetary depth. Other empirical evidence on the issue relates to the negative experiences of forced conversion of dollar deposits into local currency in Mexico and Bolivia in 1982

and in Peru in 1985. Savastano (1996) showed a contraction of domestic intermediation in these countries following the conversions. As these examples showed, if banning deposit dollarization leads to a reduction in financial intermediation and a shallowness of the financial system, the opposite policy of allowing dollar deposits should have a positive impact and enable a deeper credit market.

Most analysis of financial deepening relies heavily on institutional, regulatory and macroeconomic variables. Even De Nicolo, Honohan, and Ize (2005) who are the first in literature to point to the importance of dollarization in the development of financial systems, use a set of regulatory and institutional regressors such as a political stability or government effectiveness index when setting up their empirical methodology<sup>4</sup>. The use of such cultural, institutional or legal structure regressors is also very common in other studies of financial deepening<sup>5</sup>. Other more recent studies including Dehesa, Druck, and Plekhanov (2007), Galindo and Micco (2005) and Djankov, McLiesh, and Shleifer (2005) have used a new World Bank dataset of creditor rights and a consumer information index and showed in cross country studies that financial deepening and development can be explained to a great extent by the protection of creditors.

Besides cultural and institutional variables, macroeconomic stability, especially a low inflation rate is closely linked with strengthening of financial systems. As Moore (1986) and Boyd, Levine, and Smith (2001) have shown, high inflation has a negative impact on financial deepening. Macroeconomic uncertainty and financial instability which are usually commonplace in economies that suffer from high inflation rates, also contribute to the shallowness of financial systems as they can raise monitoring costs for banks, and limit financing of investment projects not just risky ones.

Dollarization provides a safe haven for investors in unstable economies marred by high inflation rates; it does not only serve as a hedging instrument but can also provide an incentive for savings which are very much needed in developing financial systems. As Feige (2003) has pointed out, by offering an alternative investment mechanism, it also helps stop capital flight from these economies. Intuitively, dollarization through these effects should help improve the monetary depth of such economies by keeping local savings in the home country and within the financial system. Yet, our understanding of the role of foreign currency deposits in the depth of the financial system is limited. In this paper we try to provide some answers to this question, provide a theoretical framework based on previous literature regarding the role of dollarization and empirically test our framework by using cross country data.

### 3 The Model

#### 3.1 Inflation and Monitoring Costs

Inflation has been known to have a negative impact on the depth of a financial system. As Moore (1986) asserts this is because it erodes the value of assets while it raises the level of uncertainty about investment projects. Inflation also affects credit rationing in a financial market as was noted by Jappelli and Pagano (2002) and Hung (2003). It is no coincidence that countries with high inflation rates also happen to have small banking sectors, undeveloped equity markets and shorter maturity credit<sup>6</sup>. As noted by Boyd and Champ (2003) high inflation reduces lending after a threshold inflation level is reached and thus leads to credit rationing in an economy. Credit rationing in turn may lower the level of economic growth in an economy.

Credit rationing in high inflation environments implies more scrutiny in banks' screening of their credit applications. Our estimations on loan-loss provisioning and inflation show that as the inflation rate increases so do the ratio of banks' loan-loss provisions to their total assets<sup>7</sup>. This is understandably due to an effort on the banks' part to lower their non-performing loan ratios in the future as inflation will increase the default rate on the loans. In inflationary environments, banks also experience a surge in the amount of their foreign currency-indexed liabilities, as domestic agents in these countries start holding their savings in the foreign currency to avoid the erosion of the value of their assets. This might further increase banks' scrutiny of their loan applications since the ratio of their liabilities shifts from a less stable domestic currency to a stronger foreign one while the value of their assets, mainly existing loans, securities or physical capital are still denominated in local currency.

Table 1: Descriptive Statistics for Variables used in Estimations in Table 2

	$\Delta$ OVERHEAD	$\Delta$ REER	$\Delta$ FOREX	$\Delta$ INFLATION
<i>No.ofcountries</i>	11	11	11	11
<i>Mean</i>	0.5	-0.07	0.82	0.28
<i>Median</i>	0.22	-0.04	0.22	-0.07
<i>Std.Dev.</i>	0.89	0.24	4.6	1.3
<i>Skewness</i>	2.55	0.41	9.3	3.4
<i>Kurtosis</i>	10.55	7.07	89.1	17.01

Descriptive statistics for the variables used in estimations in table 2. The number of observations is 93.

Table 2: Determinants of Monitoring Costs

<i>Dependent Variable:</i> <i>Percent change in OVERHEAD</i>			
<i>TimePeriod</i>	<i>Allsample</i> 1994 – 2006	<i>HighInflation</i> 1995 – 1999	<i>LowInflation</i> 2001 – 2006
<i>Constant</i>	0.44*** (0.09)	-0.89*** (0.24)	0.18 (0.16)
<i>Percent change in Vol. of REER</i>	0.34 (0.34)	0.65 (0.81)	-0.14 (0.70)
<i>Percent Change in FOREX Dep</i>	0.01 (0.18)	0.002 (0.02)	0.49 (0.60)
<i>Percent change in INFLATION</i>	0.29*** (0.06)	0.46*** (0.11)	0.03 (0.1)
<i>Adj.R<sup>2</sup></i>	0.18	0.53	-0.04
<i>No.ofcountries</i>	11	6	9
<i>No.ofobservations</i>	93	18	40

\* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent

Although it is hard to find a direct reporting of a bank's monitoring costs, bank income statements include non-interest and personnel expenses which could be thought of as good proxies for their monitoring costs of loans. As banks increase their efforts to monitor loan applications, they will hire more personnel or increase their credit monitoring expenses (part of non-interest expenses on a bank's income statement). A cross-country empirical look at the interaction of this variable with percentage change in the inflation rate, relative price stability (measured by the percentage change in the volatility of the real exchange rate) and percentage change in foreign exchange deposits in the banking system reveal that inflation plays an active and significant role in the determination of banks' overall monitoring costs (Table 2.) A closer look at sub-samples of low and high inflation economies illustrates that the effect of inflation increases under high inflation while it becomes insignificant in explaining changes in banks' overhead costs in low inflation environments. These empirical results form the basis for our analysis of the effect of dollarization on the financial development of a country.

### 3.2 A Theoretical Framework on Financial Deepening and Dollarization

In setting up our theoretical framework on financial Deepening, we follow the work of Dehesa, Druck, and Plekhanov (2007) which is based on a standard banking loan with

monitoring costs that follows Williamson (1987).

We consider a dollarized country economy where commercial banks that accept foreign currency deposits are faced with two alternatives: giving (risky) loans to local businesses or/and making (risk-free) investments in foreign currency in offshore markets. This yields us a portfolio, the return of which,  $\rho$ , has to be maximized:

$$\rho = \sum_{i=1}^n \frac{r_i}{100} \rho_i + \left(1 - \sum_{i=1}^n \frac{r_i}{100}\right) r_f \quad (3.1)$$

where each risky loan made to the local businesses has the value  $r_i$  and the bank's risk-free investment abroad returns  $r_f$ . The return  $\rho_i$  on investment of entrepreneur  $i$  is randomly distributed with density  $f(p)$ . We also assume a uniform distribution on the interval  $(\mu b; \mu + b)$  for the return on  $\rho_i$  where the parameter  $\mu$  ( $\mu > 1$ ) is the expected return at the end of the period, and the parameter  $b$  ( $b > 0$ ) reflects the uncertainty surrounding the outcome of the project.

Banks incur monitoring and repossession costs in this economy as they make out loans. The cost of finding out the true value of the project  $i$  to a bank is  $\frac{\gamma_i}{c}$ . The parameter  $\gamma_i$  is a random variable uniformly distributed on the interval  $(0; 2(\mu b))$  and is project-specific. We can interpret this variable as the cost of verifying the quality of the borrowers' assets (monitoring costs) and repossessing the entrepreneur's property in case of bankruptcy. The parameter  $c$  is the level of creditor rights and efficiency of judiciary in a given country that ranges between 0 and 1, so that higher values correspond to stronger creditor rights in an economy. When  $c$  gets close to zero, the repossession costs become infinitely high, while with  $c = 1$  these costs are the lowest.

We can also model a commercial bank's expected return  $\rho$  on its loans  $r_i$  as follows<sup>8</sup>:

$$\rho_i = r_i \left(1 - \int_{\mu-b}^{r_i} f(p) dp\right) + \int_{\mu-b}^{r_i} p f(p) dp - \frac{\gamma_i}{c} \int_{\mu-b}^{r_i} f(p) dp. \quad (3.2)$$

where the first item is the expected return in the case of the orderly debt repayment (total amount due times the probability that the realized value of the project exceeds this amount) and the second item is the expected value of the repossessed property in the case of bankruptcy (if the realized value of the project is insufficient to recover the debt obligation). The third item is monitoring and repossession costs times the probability of

bankruptcy) So, our maximization problem becomes:

$$100\rho = \sum_{i=1}^n r_i \left( r_i \left( 1 - \int_{\mu-b}^{r_i} f(p) dp \right) + \int_{\mu-b}^{r_i} p f(p) dp - \frac{\gamma_i}{c} \int_{\mu-b}^{r_i} f(p) dp \right) + \left( 100 - \sum_{i=1}^n r_i \right) r_f \quad \xrightarrow{r_i} \quad \max \quad (3.3)$$

The uniform distribution assumption we made earlier on the interval  $(\mu b; \mu + b)$  for the return on  $\rho_i$  where the parameter  $\mu (\mu > 1)$  is the expected return at the end of the period, and because  $b > 0$  enables us to rewrite 3.3 as:

$$\rho_i = \frac{1}{2b} \left( -\frac{r_i^2}{2} + r_i \left( \mu + b - \frac{\gamma_i}{c} \right) + \frac{\gamma_i}{c} (\mu - b) - \frac{(\mu - b)^2}{2} \right),$$

and thus:

$$\frac{\partial \rho}{\partial r_i} = \frac{1}{2b} \left( -\frac{r_i^2}{2} + r_i \left( \mu + b - \frac{\gamma_i}{c} \right) + \frac{\gamma_i}{c} (\mu - b) - \frac{(\mu - b)^2}{2} \right) + \frac{r_i}{2b} \left( -r_i + \mu + b - \frac{\gamma_i}{c} \right) - r_f \stackrel{!}{=} 0,$$

This leaves us with the following 2nd-degree equation:

$$3r_i^2 - 4r_i \left( \mu + b - \frac{\gamma_i}{c} \right) - 2\frac{\gamma_i}{c} (\mu - b) + (\mu - b)^2 + 2r_f = 0. \quad (3.4)$$

From here we can derive the optimal monitoring and repossession costs  $\gamma_i/c$ , which is:

$$\gamma_i^* = \frac{c}{2} \cdot \frac{3r_i^2 - 4r_i(\mu + b) + (\mu - b)^2 + 2r_f}{2r_i + \mu - b}. \quad (3.5)$$

The bank will grant loans to all the entrepreneurs characterized by lower repossession costs ( $\gamma_i < \gamma_i^*$ ) and will reject all applications when ( $\gamma_i > \gamma_i^*$ )

Assuming that the distribution of monitoring and repossession costs ( $\gamma_i$ ) is independent of the distribution of returns on investment ( $\rho$ ), the share of approved applications  $D$  can be expressed as:

$$D = E[\gamma_i^*] = \frac{\gamma_i^*}{2(\mu - i)}, \quad (3.6)$$

We can broadly interpret the share of approved applications  $D$  as the depth of credit market. In regards to  $D$  we make the following propositions:  $\frac{\partial D}{\partial b} < 0$ , which implies that credit markets are deeper when the projects on average are less risky, and  $\frac{\partial D}{\partial c} > 0$ , which implies strong creditor rights also improve the depth of financial markets and  $\frac{\partial^2 D}{\partial b \partial c} < 0$ , which implies the marginal effectiveness of creditor rights protection is declining in the overall level of risk.

If we plug equation into , we get:

$$D = \frac{c}{4(\mu - i)} \cdot \frac{3r_i^2 - 4r_i(\mu + b) + (\mu - b)^2 + 2r_f}{2r_i + \mu - b},$$

which, as long as  $D \geq 0$ , seems to have all desired properties. In the next section, we empirically test the above theoretical predictions.

## 4 Empirical Estimation

### 4.1 Methodology

Common measurements used in literature (such as in World Bank (1998), King and Levine (1993)) for financial deepening include broad measures of money stock (M2 or M3 mostly) to the level of nominal GDP. Yet other measures of money stock such as M1 to GDP or bank deposit liabilities plus currency to GDP have also been used. Another proxy for measuring the level of financial development is the development of credit markets. This proxy was used in recent literature by Dehesa, Druck, and Plekhanov (2007) and can be measured by taking the ratio of domestic credit to the nominal GDP. In this paper we follow recent literature and employ the ratio of domestic credit to the nominal GDP as the main indicator of financial deepening.

In the empirical part of the study we follow strategy used by Dehesa, Druck, and Plekhanov (2007) in determining the effect of dollarization to the development of the financial sector. The empirical specification to be estimated can be written as:

$$CREDIT_{it} = \alpha + \beta CRI_{it} + \theta CII_{it} + \delta INF_{it} + \phi ERV_{it} + \lambda GDPCAP_{it} + \rho DOLL_{it} + \varepsilon_{it} \quad (4.1)$$

where  $CREDIT_{it}$ <sup>9</sup> represents the ratio of domestic credit extended by the banking system to the private sector to nominal GDP in country  $i$  in year  $t$ ;  $CRI_{it}$  is the creditor rights index as reported by the World Bank in Doing Business Report for year  $t$  in country  $i$  which ranges from 0 (low protection) to 10 (high protection) and shows the relative easiness of seizing of collateral by creditor if the debt obligation is not fulfilled;  $CII$  is the credit information index that reflects the availability of credit information to the creditors in the country. It takes on a value between 0 (poor information) to 6 (broad information).  $INFLATION$  is change in CPI from previous year;  $ERV$  is the volatility of the real effective exchange rate (REER);  $GDPCAP$  is the logarithm of per capita GDP;  $DOLL$  is the ratio of the dollar deposits in country  $i$  in year  $t$  to the M1 or M2 money base and  $\varepsilon$  is

the error term.

Our study focuses on crosscountry differences and covers the years for which the CRI and CII index are available. The OLS estimator is used.

## 4.2 Data

The panel dataset used in the empirical estimation covers three years (2004-2006) and 20 countries (for a full list of countries used in the estimation see Table 3 and Table 4 for data definitions and the sources for the variables used in the estimations. Both tables can be found in the appendix). Our analysis covers a short time period due to the fact that data the creditor rights index and the credit information index compiled by the World Bank was only available starting 2004. Table 4 in the appendix lists the definition and sources of each variable.

Table 3: Countries used in the sample for estimations reported in table 6

Country	Years of Available Data	Credit-GDP (Mean)	Dollarization (Mean)
Armenia	2005	0.08	.62
Bolivia	2004-2005	.50	.55
Bulgaria	2004-2006	.40	.34
Costa Rica	2004-2005	.42	.43
Croatia	2004-2006	.73	.53
Czech Republic	2004-2006	.45	.08
Hungary	2004-2006	.62	.28
Iran	2004	.36	na
Macedonia	2004	.22	.45
Malaysia	2004-2005	1.31	.25
Moldova	2004-2005	.32	.47
Nicaragua	2004	.84	.62
Poland	2004-2005	.32	.47
Romania	2004-2006	.21	.37
Slovak Rep.	2004-2006	.47	.12
South Africa	2004-2005	.75	.03
Pakistan	2004-2005	.42	.05
Philippines	2004-2005	.49	.28
Tunisia	2004-2005	.67	na

The credit-to-GDP ratios are calculated using the domestic credit and nominal GDP figures reported by the IMF in its IFS database. The World Bank creditor rights index is available starting from 2004 and the credit information index from 2005. Both indices

are published in the World Bank's Doing Business Reports.

Volatility of the real effective exchange rate is calculated using the coefficient of variation of monthly averages of the REER reported by the IMF in its IFS database during the proceeding four years. The ERV for year 2005 for instance is calculated using the monthly data between 2002-2005.

Table 4: Data Definitions and Sources - Dollarization and Financial Deepening Estimations

<i>Symbol</i>	<i>Definition</i>	<i>Source</i>
$\Delta$ OVERHEAD	Percentage change in overhead expenses(Personnel expenses+Other operating expenses)	BANKSCOPE, OECD Bank Profitability Index
CII	Credit Information Index published by World Bank, ranges between 0 and 6	World Bank Doing Business Reports
CRI	Creditor Rights Index published by World Bank, ranges between 0 and 10	World Bank Doing Business Reports
GDP/CAP	GDP per capita in 1990 US Dollars(converted at Geary Khamis PPPs)	Groningen Growth and Development Centre and the Conference Board, Total Economy Database, January 2007
REER	Real Effective Exchange Rate	IMF IFS
CREDIT/GDP	Ratio of Domestic Private Credit to nominal GDP	IMF-IFS
FOREX/M1	Foreign Exchange Deposits as a ratio of M1	Yeyati(2006), Central Bank Bulletins, IMF-IFS
FOREX/M2	Foreign Exchange Deposits as a ratio of M2	Yeyati(2006), Central Bank Bulletins, IMF-IFS

Inflation is the change in CPI as reported by the IMF in its IFS database; our pool does not contain countries with inflation rates higher than 15 percent for the selected period. Descriptive statistics of the sample can be found in table 5.

Table 5: Descriptive Statistics For Variables used in table 6

	CREDIT/GDP	CII	CRI	INFLATION	ERV	GDPCAP
<i>No.ofcountries</i>	19	19	19	19	19	19
<i>Mean</i>	0.51	3.42	5.15	5.70	0.015	6465.8
<i>Median</i>	0.45	4	5	4.46	0.014	7010.0
<i>Std.Dev.</i>	0.25	1.78	1.71	3.87	0.007	2890
<i>Skewness</i>	1.36	-0.58	0.68	0.83	2.05	0.005
<i>Kurtosis</i>	5.58	2.39	3.03	2.67	7.88	1.69

Descriptive statistics for the financial development and dollarization estimations. Inflation rate is in percentages. GDP per capita is in US Dollars. The number of observations is 40.

In line with the analysis of dollarization in earlier studies, two measures of dollarization have been used in this study: The ratio of foreign exchange deposits in the banking system(FOREX) to the M1 money supply as well as to the M2 broad money supply. The ratios were calculated using the M1 and M2 money supply data as reported by the IMF IFS excluding the national definitions; the amount of foreign exchange deposits in the banking system have been obtained from Central Bank bulletins or for countries or for years for which they were not available from the CB bulletins, a forex deposit database compiled by Levy-Yeyati (2006) have been used.

### 4.3 Estimation Results

Results of our estimations are listed in Table 6 and they support our predictions about the role and the effect of dollarization on a country's financial development. In estimation (1) which covers 19 countries and 40 data points, we see that the only significant explanatory variables for financial deepening are the Creditor Rights Index and Inflation. Our finding reaffirms those of Dehesa, Druck, and Plekhanov (2007). Ceteris paribus, a 1 percentage point increase in inflation leads to a 2 percent decrease in credit to the private sector. The coefficient on the index of creditor rights suggests that a "one-step" improvement in the relevant regulation results in an increase in domestic private credit of 4 percent of GDP. Adding the two different dollarization variables to this estimation in regressions (2) and (3) we see a remarkable increase in the adjusted R square as well as in the coefficient of this variable. In both estimations (2) and (3) dollarization variables have high coefficients

and significance. While the effect of inflation to the financial deepening of the economy does not change with the addition of dollarization, the coefficient on the creditor rights index increases implying this variable becomes more meaningful in explaining financial deepening in dollarized economies. The per capita GDP variable also enters the estimation (3) with a positive and significant sign reaffirming our predictions. Rising incomes in an economy is a sign of increasing development and stability which in turns increases the monetary depth of an economy. At the same time, exchange rate volatility turned out to have a small and highly statistically insignificant coefficient.

Table 6: Determinants of Domestic Private Credit

<i>Dependent Variable:</i> <i>Method</i> <i>TimePeriod</i>	Domestic Private Credit to GDP					
	<i>OLS(1)</i>	<i>OLS(2)</i>	<i>OLS(3)</i>	<i>OLS(4)</i>	<i>OLS(5)</i>	<i>OLS(6)</i>
<i>INFLATION</i>			2004-2006			
	-0.02** (0.011)	-0.02** (0.011)	-0.02** (0.01)	0.03 (0.05)	-1.32 (1.04)	0.04 (0.06)
<i>ERV</i>	-6.23 (5.23)	5.5 (6.95)	1.9 (7.68)	0.12 (5.62)	7.10 (7.13)	4.13 (7.84)
<i>CRI</i>	0.04** (0.02)	0.07** (0.02)	0.05* (0.03)	0.09** (0.05)	0.12** (0.06)	0.12** (0.06)
<i>CII</i>	0.02 (0.01)	0.02 (0.02)	0.04 (0.02)	0.01 (0.02)	0.005 (0.02)	0.01 (0.03)
<i>CRI*INFLATION</i>				-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
<i>GDP CAP, log</i>	-0.05 (0.09)	0.04 (0.1)	0.19* (0.10)	-0.03 (0.09)	0.11 (0.10)	0.06 (0.10)
<i>FOREX/M1</i>		0.17*** (0.06)			0.15*** (0.06)	
<i>FOREX/M2</i>			0.73** (0.40)			0.62* (0.4)
<i>CONSTANT</i>	0.95 (0.80)	-0.94 (0.97)	-0.34 (1.02)	0.5 (0.90)	-1.32 (1.04)	-0.87 (1.11)
<i>Adj.R<sup>2</sup></i>	0.14	0.36	0.21	0.14	0.36	0.23
<i>Number of countries</i>	19	16	16	19	16	16
<i>Number of observations</i>	40	23	23	40	23	23

\* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent

In estimations (4) through (5) we include an interaction variable in our estimation ( $CRI * INFLATION$ ), to see if our dollarization variables become insignificant when we account for the second order effects of inflation. Our estimation results suggest dollarization is a robust variable to this iteration.

Our estimation results support our predictions that dollarization has a positive significant impact on the monetary depth of an economy. This finding reaffirms the findings of limited previous research on the issue (mainly by De Nicolo, Honohan, and Ize (2005)). The field will benefit from further studies on the topic especially regarding the mechanics of such relationship between the two variables.

## Notes

<sup>1</sup>For more on Currency Substitution Theory, see the surveys by (Calvo and Vegh 1997), (Savastano 1996) and by (Giovannini and Turtelboom 1994).

<sup>2</sup>usually defined as ratio of a broad measure of money stock (M2 or M3 mostly) to the level of nominal GDP

<sup>3</sup>Dornbusch (2001), has shown that full dollarization will positively affect growth by resulting in lower interest rates, higher investment and faster growth. Rose (2000) has emphasized the effect of dollarization on economic growth through increased trade due to the use of a common currency.

<sup>4</sup>The set of regressors used by De Nicolo, Honohan, and Ize (2005) come from a governance indicators index compiled by Kaufmann, Kraay, and Mastruzzi (2003) in a World Bank policy paper. This is a dataset of governance indicators that includes calculated indexes of voice and accountability, political stability, government effectiveness, political voice, regulatory quality, rule of law and control of corruption which can be used as a good set of different proxy measures of institutional and regulatory strength in the countries they cover.

<sup>5</sup>Some of the recent studies that point out to the effect of these factors in financial development are Porta, de Silanes, Shleifer, and Vishny (1997) as well as Porta, de Silanes, Shleifer, and Vishny (1998) and Jappelli and Pagano (2002).

<sup>6</sup>In a more recent study Valev and Tasic (2008) show that the level of inflation has a significant effect in determining the credit maturity structure in a country

<sup>7</sup>see for instance Ozsoz (2009)

<sup>8</sup>We borrow this return function from Dehesa, Druck, and Plekhanov (2007)'s equation (1)

<sup>9</sup>Domestic Credit as reported by the banking survey of the IMF IFS Database for year  $t$  in country  $i$

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