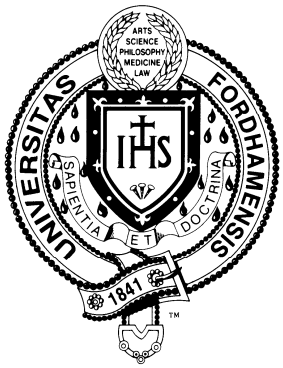

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Evaluating the Effects of Deposit Dollarization in Bank Profitability

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Evaluating the Effects of Deposit Dollarization in Bank Profitability *

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Abstract

Dollar-denominated deposits constitute a large proportion of deposits in many developing economies. This may result in currency mismatches on banks' balance sheets as is suggested by recent literature. In general, having dollar-denominated deposits and loans could increase financial fragility, create balance sheet problems and affect bank profitability. In particular, this currency mismatch does not only increase banks' currency risk when the proportion of dollar-denominated loans with respect to local-denominated loans increases but also it increases their clients' default risk if depreciation occurs. This paper investigates the profitability of 36 dollarized banking systems. Our results suggest that after controlling for some macroeconomic and institutional variables, dollarization, as currency mismatch hypothesis suggests, depresses bank performance and lowers bank profitability.

JEL Classification codes: F31, G21, 024

Keywords: Dollarization, bank performance, bank profitability

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1 Introduction

Banks serve as intermediaries accepting commercial and individual deposits (savings) and transferring them in the form of loans to investments. Access to money from a centralized organization (the banks) increases efficiency and reduces transaction costs. Moreover, having a well developed banking system allows for competition that impacts the interest rates and has an undoubtedly positive effect on investment activities that generate growth in the economy. Current literature have stressed the importance of the banking systems in contributing to economic development. In particular, it has been shown that banks' performance and profitability contribute to the countries' development (Levine (1997)).

Banks' performance is determined by the adequate management of the relationship between risk and profitability. The type of risks that we are interested in this paper are those related to the dollarization of the banking system and our aim is to explore the way in which this variable influences banks' profitability.

As mentioned before, banks' profitability is a basic condition not only for banking systems' development and sustainability but also for economic growth. However, the understanding of the drivers of banks' profitability in dollarized economies has not been covered in detail in the literature. In particular, the evaluation of banks' performance in developing economies with high dollar-denominated deposits should recognize the effect of these deposits on their overall performance. In this paper we aim to contribute to the literature by incorporating the effect of deposit dollarization into the existing models on bank performance evaluation using a relatively large sample of developing economies.

The main goal in this paper is to study the way in which financial dollarization, also known as asset substitution,[1] affects banks' profitability in terms of their earnings before taxes. We analyze the impact of dollar-denominated deposits in the banking system on the profitability of commercial banks. We measure dollarization by the ratio of foreign currency deposits in the system to the overall money supply in the economy, i.e., we use the level of foreign currency deposits in a country's banking system to the M2 money base($\frac{FCD_{it}}{M2_{it}}$).[2]

In order to isolate the effect of deposit dollarization on banks' profitability, we use several macroeconomic (changes in GDP and inflation), financial (the interest rate spread, the ratio of loan-loss-provisions to loans and the ratio of equity to total assets -proxies for credit and capital risk) and institutional variables (government efficiency, political stability, regulatory quality, rule of law, voice and quality).

Using data from 36 countries we show that, as expected, interest rate spreads have a positive and significant effect on banks' profitability. However, the magnitude of their

effect is smaller than that of other explanatory variables. Also as expected, the changes in GDP have a positive impact in banks' profitability. Moreover, having strong institutions appear to have a significative, positive and stronger effect on banks' profitability than the macroeconomic variables mentioned before. The two risk-related variables are significative and exert a negative influence in the profitability.

We find that after controlling for the effect of the macroeconomic, financial and institutional variables, dollarization of deposits exert a statistical significant impact on banks profitability with a one-period lag. Under different econometric specifications we find that this significant relationship is negative, meaning that dollarization of the banking system has a pervasive effect on banks' profitability.

There are two possible explanations for this last result: First, Bank managers in dollarized economies observe previous period's dollarization ratios in determining current period holdings of cash and other assets, i.e. liquidity management. As expected, bankers prefer to hold liquid positions during periods of uncertainty decreasing lending and reducing in this way their banks' profitability. These uncertainty periods are usually characterized by increasing levels of dollarization. Second, there is a transference of exchange rate risk into default risk in dollarized banking systems as Currency Mismatch literature suggests.[3] As banks increase lending in foreign currency to compensate for increases in foreign currency deposits, they increase credit or default risk. As more borrowers default, bank managers increase provisioning for loan losses which enters into balance sheets with a time lag.

The remaining of the paper is organized as follows. Section 2 presents a brief literature review on previous studies about dollarization and banks' profitability; Section 3 describes the methodology and the data used in this paper. Section 4 presents the results and, Section 5 concludes and presents future venues of research.

2 Literature Review

Banks operating in economies where part of their deposits are denominated in dollars face particular challenges: they face what is known in the literature as currency mismatch risk. Proponents of this hypothesis[4] argue that the existence of foreign currency denominated or indexed deposit accounts in a developing country's banking system can put stress on the balance sheets of commercial banks during devaluations or sudden depreciations of the exchange rate. In fact, mismatches on banks' balance sheets have been mentioned as possible causes of systemic bank failures for some of the recent banking crisis (i.e. East Asian financial crisis).

Banks, looking for ways to hedge against this risk can opt to hedge their currency

exposure by using many types of financial derivatives such as foreign currency swaps[5] or, they can decide to make loans also in foreign currency (where permitted).[6] However, by lending in foreign currency to hedge against their liability positions in foreign currency deposits, banks tend to eliminate one risk at the expense of a potentially more dangerous one: their clients' default risk. In an environment where borrowers' abilities to repay are not necessarily indexed to foreign currency values (i.e. salaries earned in local currency) default risk could be substantial and could hurt bank profits or in extreme cases cause them to fail.

Given these scenarios, the ratio of bank loans to foreign currency deposits should play an important role in explaining the vulnerability of banks to these two types of risks (currency and default risks). Banks with low dollar-denominated loan-to-deposit ratios will be more exposed to currency risk in the sense that devaluations or sudden depreciations could create a deficit between what is collected from the local-denominated loans and what is required to buy back the dollars needed to cover their dollar-denominated deposits. Banks with high dollar-denominated loan-deposit ratios will be more exposed to default risk in the sense that following devaluations or sudden depreciations of the local currency they could face an increasing number of defaults due to the inability of their clients to pay back their dollar-denominated loans when their income is based on local currency (they will need more local currency to buy the dollars needed to pay their loans).

In almost all studies that focus on bank profitability we see a common set of bank specific variables used in explaining bank performance such as operating costs, net interest income, equity, capital, overhead expenses, permissible banking activities and the spread which is the difference between the interest paid on deposits and interest charged on loans.[7] In addition to bank specific variables, some country-specific macroeconomic variables such as average lending rates, per capita incomes or economic growth are also used in estimating bank profiability.[8] Berger (1995) is among the first in literature to empirically analyze individual bank performance in the case of the US. He used annual data between 1983 and 1989 for every insured US Commercial Bank and estimated the Capital to Asset Ratio(CAR) and the Return on Equity (ROE) as a function of lagged values of the CAR and ROE as well as on a number of control variables to closely examine the capital-earnings relationship in banking. His findings indicated a positive relationship between the two variables and a positive causation running in both directions. This means that banks retain some of their marginal earnings in the form of equity increases.

Barth, Nolle, and Rice (1997) analyzed the determinants of bank performance with a sample of over 140 banks in 15 European Union countries, Canada, Japan, Switzerland and the United States, using data from 1993. Their exploratory analysis illustrates a

way in which empirical examinations of bank performance might be enriched by taking into account differences in permissible banking activities across countries. Demirguc-Kunt and Huizinga (1999) use bank-level data for 80 countries and estimate bank profitability by using a variety of bank-specific, macroeconomic and regulatory determinants. Their paper provides a good premier for estimations on bank profitability in terms of choice of explanatory variables in analysis. In a more recent study, Athanasoglou, Brissimis, and Delis (2008) examine the determinants of profitability in the Greek banking system between 1985 and 2001 using bank, industry and macroeconomic regressors. Their paper is worth mentioning since they use the GMM estimation for their analysis, to control for possible endogeneity problems.

Up to this point however, the reader can note that the literature related to the topic of this paper, can be distinguished into two (almost) separate venues of research: papers that do research on issues related to banks' profitability from a institutional point of view and research related to the study of dollarization and its impact on the economy in general. There are only a few papers that combine the two areas and almost none of these studies focus on dollarization as a factor affecting bank profitability.

Evaluation of bank performance in developing economies with high dollar-denominated deposits should recognize the effect of these deposits on their overall performance. Banks' profitability is a basic condition not only for banking systems' development and sustainability but also for economic growth. Dollarization aspect is of particular interest in that regard since exchange rate fluctuations or the relative foreign currency exposure of banks should have an impact on banks' performance. For example, De Nicolo, Honohan, and Ize (2005) have shown that dollarization has a negative effect on solvency risk for banks in countries with de facto dollarization and, Cespedes, Chang, and Velasco (2000) has drawn attention to the dollarization of liabilities as a cause of the recent financial crises. There have also been some studies that analyze banks' asset quality and profitability under official (full or de jure) dollarization where it has been shown that full dollarization improves asset quality.[9] The only other paper in recent literature that aims to evaluate bank profitability as a factor of dollarization is done by Ozsoz (2009) but only covers nine transition economies. To the best of our knowledge there have not been a more comprehensive panel analysis of bank performance in the presence of dollar deposits.

3 Methodology and Data

The methodology presented in this paper is purely empirical.[10] We expect to provide light on certain important relationships that could help us to better understand the effect of

dollar deposits on banks' performance.

Banks' profitability is usually measured in literature as the ratio of banks' net profits to its total assets. However and due to the fact that in this paper our research is based on 36 banking systems from around the world, where tax rates differ from country to country, we use banks' earnings-before-taxes for cross country comparisons. Therefore, we use the ratio of earnings-before-taxes to total assets (to control for banks' size).[11]

Our empirical model constructs on the works of Berger (1995), Demirguc-Kunt and Huizinga (1999) Quispe-Agnoli and Whistler (2006) and Athanasoglou, Brissimis, and Delis (2008). We have also benefited greatly from De Nicolo, Honohan, and Ize (2005) in determining our main estimation model. Our estimation includes a new variable that had not been used in bank profitability estimation before, namely the Aggregate Governance Indicator Dataset developed by Kaufmann, Kraay, and Mastruzzi (2009). We also include bank specific information at the aggregate level. Following the work of Athanasoglou, Brissimis, and Delis (2008), we use (equity/ta) and (loan-loss-provisions/loans) as proxies for capital and credit risk, respectively. Our estimation takes the following reduced form:

$$\frac{EBT_{i,t}}{TA_{it}} = \alpha_i + \beta_1 INST_{i,t} + \beta_2 FORDEP_{i,t-1} + \sum_{i=3}^{4} \beta_i MACRO + \sum_{j=5}^{7} \beta_j MICRO + \varepsilon_{i,t} \quad (3.1)$$

We define bank profitability (EBT_{it}) for banks in country i at time t and measure it by the earnings-before-taxes of commercial and savings banks that accept dollar deposits. TA_{it} represents the aggregate level of total assets of commercial and savings banks in the banking system in country i at time t. We use as our dependent variable the ratio of earnings-before-taxes to assets rather than just the earnings-before-taxes itself since both of these variables are in terms of local currency and, we need to control for the size of the banking system of each individual country. The coefficient α is a country-fixed effect term that captures time-invariant influences specific to country i, $INST_{it}$ is an equally-weighted average of the six institutional quality variables developed by Kaufmann, Kraay, and Mastruzzi (2009): Government Efficiency, Political Stability, Regulatory Quality, Rule of Law, Voice, and Corruption.[12] $FORDEP_{it-1}$ is our dollarization variable measured by the ratio of foreign exchange deposits in the banking system of country i at time t-1 to the M2 money supply in the same country during the same time frame.[13]

Note that we use lagged dollarization rates as opposed to contemporaneous rates in our analysis.[14] The rationale for this can be explained by the following:

- by construct, asset management decisions taken by bank managers regarding ex-

tension of foreign currency loans in an effort to hedge against currency mismatch risk should not be expected to have effects on bank's balance sheets in the same accounting period. There is a time-lag of at least one period before currency mismatch risk shows up on bank's balance sheets in the form of increased credit risk as foreign-currency denominated loans start defaulting.

- bank managers plan for current period usually by reflecting on previous periods' data. Therefore, accounting for changes in deposit dollarization ratios should have at least a one-year time lag as bank managers manage their asset and liquidity positions.

We use as MACRO variables $GROW_{it}$ and $INFLATION_{it}$ that represent economic growth, calculated as the percent change in GDP from previous year and, inflation, respectively. We use as MICRO or bank specific variables (equity/ta) and (loan-loss-provisions/loans) as proxies for capital and credit risk and $SPREAD_{it}$ that represents the difference between the interest rate banks' ask to their clients and the one they pay for the deposits. Finally, ε_{it} is the disturbance term with a zero mean and constant variance.

In order to account for possible persistence in banks' profitability, we slightly modify Equation (3.1) and include a lag of our endogenous variable.[15] To estimate the model, we first compute it without the dynamic component using a fixed effect model. For the modified version of Equation (3.1) we use the dynamic Generalize Method of Moments (GMM) following the strategy of Arellano and Bond (1991).

3.1 Data

One of the reasons why there has not been extensive research done on the effects of dollarization on bank performance is the issue of data gathering. There is not a readily available dataset that includes the level of foreign exchange deposits in the commercial and savings banks of dollarized economies. Most dollarized economies also have developing banking systems, which makes it harder to collect individual or system wide data since the statistics bureaus or central banks have not developed their data gathering and archiving functions. After significant effort we were able to obtain data on the banking systems of 36 dollarized economies as well as on the level of foreign exchange deposits. Data on inflation and economic growth was obtained through IMF's IFS database. Table (1) presents some descriptive statistics of the data we use and a list of the countries included in our analysis along with their data availability is presented in Table 3 in the Appendix.

Our original banking data is available at the bank level and comes from the balance sheets and income statements found in the BANKSCOPE Database compiled by Bureau

van Dijk Electronic Publishing (BvDEP). Our dataset contains an unbalanced panel of 5249 balance sheets and income statements for sixteen (1991-2006) years with an average of 146 balance sheets/income statements for each country and 328 balance sheets/income statements per year. We have the most extensive data available for the year 2004 with 517 balance sheets/income statements and the least data available for 1991 with only 36 balance sheets/income statements. For Mexico, Poland and Slovak Republic the same data come from OECD's Bank Profitability Dataset. Our banking dataset includes the total before-tax-incomes of all commercial and savings banks in each country, as well as the their total assets. Table 4 in the Appendix provides a detailed list of our banking data including number of balance sheets used for each country and year.

We aggregate these individual banks' data at the country level. The data on foreign exchange deposits in each country is annualized and comes from each country's Central Bank database or is obtained from calculated ratios in prior work in the field.[16] For the ratio of foreign exchange deposits in the banking system, the amount of foreign exchange deposits is converted into local currency and its ratio to M2 money supply is calculated by using line 35 (Quasi-money) of the IMF's IFS database. National definitions of M2 money supply are not taken into consideration in order to provide a uniform measure of the M2. We exclude fully dollarized economies in our sample such as Ecuador and El Salvador.

4 Estimation Results

In this section we present the way in which we analyze the data using Equation (3.1). First of all we checked for the stationarity of the data using a unit root test for unbalanced panels (Fisher test). The results show that the null of non-stationarity is rejected at 5% for all the variables. Secondly, for the static model as presented in Equation (3.1), we use the Hausmann test to test the validity of the Fixed Effects model. The $\chi^2(8) = 142.29$ and the $p = 0.00$ showed that the differences in the coefficient estimates using Random Effects and Fixed Effects is systemic. Thus, supporting the use of the Fixed Effects model.

Table 1: Descriptive Statistics For Variables used in tables 2

	INCOME/TA	SPREAD	INST	FORDEP	INFLATION	GROWTH	LLP/LOANS	EQUITY/TA
Mean	0.014	11.593	-0.122	0.322	27.997	4.808	0.031	0.113
Median	0.014	7.940	-0.248	0.284	6.991	4.752	0.019	0.097
Std.Dev.	0.018	17.603	0.672	0.181	211.631	5.613	0.047	0.094
Skewness	-1.378	6.558	0.365	0.444	18.102	3.613	4.453	4.234
Kurtosis	14.561	65.934	2.596	2.177	348.198	43.279	31.070	29.167

Descriptive statistics for estimations on bank profitability. Inflation rate, growth and spread are in percentages.

As noted by Arellano and Bond (1991), if we try to use the same technique for the dynamic model, i.e. if we include a lag of the endogenous variable as an explanatory variable, the results of the Fixed Effect model will be biased and inconsistent. Thus, for this specification of the model we use the GMM model following the technique proposed by Arellano and Bond (1991). As suggested by these authors we use all possible lags of our dependent variable plus lagged values of all regressors as instruments. In this way we obtain parameter estimates that are consistent and efficient. Moreover, we have 34 countries that we use in our dynamic panel GMM model, that increases our confidence about consistency and efficiency of our estimates. As in Athanasoglou, Brissimis, and Delis (2008) we verified that capital is better modeled as an endogenous variable and that credit risk is better modeled as a predetermined regressor. We used the Sargan test of over-identifying restrictions that showed that this hypothesis is rejected for capital and not rejected for credit risk. This result implies that we do not use the lags of capital as instruments. For this GMM specification we also tested for time effects and found none.

For the static model we use a step-type regression analysis and developed 6 models. Models (7) and (8) present the results of using the dynamic GMM panel specification. Table (2) presents the results of all these models.

In model (1) we include the interest rate spread as the only regressor of bank profitability and observe that even though the effect is significant its magnitude is very small. This result holds for all model specifications. In models (2) through (8) we add the institutional quality index (INST). As expected the sign is positive and its value is not only significant but also large in magnitude. This result is also consistent for all specifications. These results tell us that institutions' quality (that encompasses Government Efficiency, Political Stability, Regulatory Quality, Rule of Law, Voice, and Corruption) is fundamental for banks' profitability.

Starting on model (3) we include our lagged dollarization variable (FORDEP) which we find significant and negative in our estimations. This finding confirms our initial thinking regarding currency mismatch risk and its effect on bank profitability. Banks' current profitability depends on dollarization ratios experienced during the previous period since losses and earnings from loans and deposits are usually carried onto their financial sheets with a one-year lag. [17] As we can see in Table (2), dollarization has a negative and significant effect on banks' profitability under all scenarios (including the GMM ones presented in models (7) and (8)). This effect is robust to the inclusion of other control variables like inflation, GDP growth and to the two bank specific variables that we use (capital and credit risk). This result implies that dollarization (lagged one period) has a negative effect in banks' profitability.[18]

The one-period lagged profitability ratio in estimations (7) and (8) is not significative in our estimations, therefore results are not reported.[19]

The effect if inflation appears to be positive, significant but very small for all specifications. This results goes in hand with the findings of Athanasoglou, Brissimis, and Delis (2008). Growth effect on profitability is positive, significant and small. We include the credit risk variable (LLP/Loans) in models (6) and (8). The negative sign of this variable implies that as credit risk increases (credit quality deteriorates) banks profitability decrease due to higher loan loss provisioning with respect to total loans. Of course, banks' profitability should also be affected by actual defaults. Finally, we include the capital variable (equity/total assets) in models (6) and (8). The sign is not the expected one but it is not significantly different from zero under the GMM specification.

In Table (2) we can also observe that increasing the number of variables reduces our number of observations. This is due to the nature of our data where not all variables are present for all 36 (34) countries that we analyze in the static (dynamic) models. However, even though the number of observations drop from 417 for Model (1) to 191 in model (8), the sample size is large enough to be confident that our parameter estimates are unbiased and efficient.

Finally, for Models (7) and (8) we present the Arellano-Bond test for the average autocovariance in the residuals of order 1 and 2. The null hypothesis is that there is no autocorrelation of a given order. In our case, we can see that there is no autocorrelation of the errors neither of order 1 or 2. This gives us additional support for consistency of our results.

5 Conclusion

Financial institutions in dollarized economies accept foreign currency deposits and usually make loans in foreign currencies in an attempt to protect themselves from the exchange rate risk they are exposed to. This practice however does not provide a hedge against exchange rate fluctuations; it only substitutes loan default risk in place of exchange rate risk leaving banks still vulnerable to fluctuations in the value of foreign currency. Moving from this assumption, we have set out to study the performance of commercial banks in 36 dollarized economies to see what effect the existence of dollar deposits within the banking system has on the performance of banks.

We used the level of foreign currency deposits in a country's banking system to the M2 money base($\frac{FCD_{it}}{M2_{it}}$) as our dollarization measure and we estimated bank performance

using bank profits before taxes as the dependent variable. In our modeling we have followed previous research on bank performance estimation and used not only bank and industry specific variables such as credit quality measured by ratio of bank's loan loss provisions to overall loans and bank capital ratio (measured simply as equity to total assets) but also country specific macro variables including inflation, economic growth, average intermediation spread and a measure of institutional quality to which we have added dollarization. We have used not only a fixed effects model but also a dynamic GMM model to see the robustness and consistency of our results.

Under all econometric specifications, the results of our estimations suggests deposit dollarization has a negative impact on banks' profitability with a time lag. While current period dollarization ratios do not seem to have any significant effect on banks' overall performance in an economy, previous period dollarization ratios have a robust and significant effect on bank profitability. This result is in line with our initial thinking about the transference of exchange rate risk into default risk in these banking systems. As banks in dollarized banking systems increase lending in foreign currency to compensate for increases in the level of foreign currency deposits, they might increase their credit risk. As more borrowers default on their foreign currency denominated or indexed loans, bank managers increase their provisioning for loan losses which are entered into banks' balance sheets with a time lag, which explains why previous period dollarization is a better indicator of bank profitability than current ratios. Moreover, this result also goes in hand with the idea that bankers prefer to hold liquid positions during periods of uncertainty decreasing lending and reducing in this way their banks' profitability. In highly dollarized banking systems, these uncertainty periods are usually characterized by increasing levels of dollarization

There are important implications of our results both in terms of policy and in terms of future research. Firstly, our results show that the dollarization is not yet fully understood. Although some studies have shown dollarization enhances savings in an economy through a mediating effect on inflation and thus contributes to financial deepening of these economies, our results prove that for dollarized banking systems the danger of currency mismatch is still valid and real. Benefits of dollarization may not necessarily outweigh the costs. Our results also suggest current policy positions on removing restrictions on foreign currency holding or lending in developing economies may be counter-productive for the development of the country's banking system despite the current common thinking among policy makers.

Table 2: Cross Sectional Determinants of Bank Profitability - All Countries

Dependent Variable: $INCOME_{it}/TA_{it}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Method	*OLS*	*OLS*	*OLS*	*OLS*	*OLS*	*OLS*	*GMM*	*GMM*
TimePeriod	$1990-2006$	$1996-2006$	$1996-2006$	$1996-2006$	$1996-2006$	$1996-2006$	$1997-2006$	$1997-2006$
C	0.014^{***}	0.015^{***}	0.025^{***}	0.023^{***}	0.015^{***}	0.018^{***}		
	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)	(0.004)		
$SPREAD$	0.000^{*}	0.000^{*}	0.000^{*}	0.000^{***}	0.000^{***}	0.000^{***}	0.000	0.000^{***}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$INST$		0.011^{*}	0.026^{***}	0.025^{***}	0.033^{***}	0.036^{***}	0.064^{**}	0.072^{***}
		(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.032)	(0.029)
$FORDEP$			-0.031^{***}	-0.027^{***}	-0.016^{*}	$-0.012**$	-0.025^{**}	-0.017^{**}
			(0.002)	(0.009)	(0.010)	(0.010)	(0.012)	(0.009)
$INFLATION$				-0.000^{***}	0.001^{***}	0.000^{***}	0.000^{***}	0.000^{***}
				(0.0003)	(0.000)	(0.000)	(0.000)	(0.000)
$GROWTH$					0.000^{***}	0.000^{***}	0.000	0.000^{***}
					(0.000)	(0.000)	(0.000)	(0.000)
$LLP/LOANS$						-0.083^{***}		-0.113^{**}
						(0.027)		(0.058)
$EQUITY/TA$						-0.022^{**}		-0.004
						(0.012)		(0.024)
$Adj.R^2$	0.22	0.21	0.40	0.44	0.50	0.54		
$Numberofcountries$	36	36	36	36	36	36	34	34
$Numberofobservations$	417	351	289	289	272	250	210	191
$S.EofRegression$							0.013	0.012
Wald-test							$\chi^2(7) = 1768.02$	$\chi^2(9) = 8907.52$
Sargan-test							$\chi^2(210) = 36768.696$	$\chi^2(191) = 29455.60$
AR(1)							$z = -0.043$	$z = -0.107$
							p=0.529	p=0.136
AR(2)							$z = -0.075$	$z = -0.041$
							p=0.445	p=0.278

Source:Bankscope,IMF-IFS, Kaufmann, Kraay, and Mastruzzi (2009) and author's calculations. SPREAD: Interest income - interest expense, INST: Institutional Quality Index, FORDEP: Foreign currency deposits in the banking system in year t-1 to M2 in year t-1. GROWTH: Growth of real GDP per capita .In estimastions (7) and (8) cross sections are fixed (first differences), thus intercept does not appear. Results for the lagged of the dependent variable($INCOME(-1)/TA(-1)$) are not reported in estimations (7) and (8) since they are not significant. * significant at 10 percent; ** significant at 5 percent; *** significant at 1 percent.

Table 3: List Of Countries In The Sample and Data Availability

Country	*FORDEP*	*INCOME*	*INST*
Albania	94-06	99-06	96-06
Angola	95-00	98-05	96-06
Argentina	81-04	94-05	96-06
Armenia	92-04	96-06	96-06
Belarus	00-06	96-05	96-06
Bolivia	80-04	91-06	96-06
Bulgaria	91-04	91-06	96-06
Cambodia	93-04	96-05	96-06
Costa Rica	87-06	93-05	96-06
Croatia	93-06	91-06	96-06
Czech Republic	93-04	91-06	96-06
Egypt	91-06	99-06	96-06
Estonia	94-06	95-06	96-06
Georgia	94-99	96-06	96-06
Hungary	03-06	94-06	96-06
Jamaica	98-05	92-06	96-06
Macedonia	95-04	92-06	96-06
Mongolia	92-99	99-05	96-06
Moldova	93-06	98-05	96-06
Malaysia	96-04	98-06	96-06
Mexico	91-02	86-03	96-06
Morocco	96-03	91-06	96-06
Nigeria	94-04	92-06	96-06
Nicaragua	95-04	95-05	96-06
Peru	80-04	92-05	96-06
Philippines	82-04	90-06	96-06
Poland	98-05	93-03	96-06
Romania	90-04	94-06	96-06
Russia	93-00	94-06	96-06
Singapore	93-04	91-06	96-06
Slovak Rep.	93-04	97-03	96-06
Slovenia	94-05	93-05	96-06
Ukraine	92-05	96-06	96-06
Venezuela	98-01	94-06	96-06
Vietnam	92-06	92-06	96-06

Table 4: No Of Balance Sheets Compiled Per Country And Year For Income Bank Income Data

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
Albania							1	2	4	4	4	6	8	8	5	5	47
Angola								2	2	2	4	5	7	8	8		38
Argentina	6	9	17	30	34	39	42	70	75	72	77	72	66	66	62	n.a.	737
Armenia						2	4	4	5	5	5	5	5	10	5	5	55
Belarus	n.a.	n.a.	n.a.	1	1	1	4	5	9	10	13	13	15	15	12	n.a.	99
Bolivia	2	2	4	4	4	4	3	3	11	11	11	11	12	12	12	10	116
Bulgaria	1	3	6	10	14	16	19	21	20	24	25	28	30	30	27	14	288
Cambodia						1	1	1	1	2	2	2	3	2	2		17
Costa Rica	1	5	5	5	5	6	7	21	21	21	23	23	21	18	16	n.a.	198
Croatia	na	11	15	17	19	24	28	23	22	27	28	27	27	25	25	13	331
Czech Republic	1	2	4	4	4	4	4	4	3	3	3	3	3	3	3	3	51
Egypt	1	2	4	5	7	7	14	15	30	30	28	26	24	23	2	n.a.	218
Estonia				2	6	9	8	4	4	5	5	6	6	7	6	6	74
Georgia						2	3	6	9	8	8	9	9	9	9	8	80
Hungary	2	5	8	9	13	13	14	15	15	16	14	10	10	15	15	12	186
Jamaica	n.a.	1	1	1	2	3	2	2	3	3	3	7	5	5	5	2	45
Lithuania						5	6	6	5	6	7	7	7	8	8	8	73
Macedonia		2	2	2	6	7	7	7	10	10	11	12	13	15	12	4	120
Mongolia									3	5	6	6	5	6	5	3	39
Moldova							1	3	6	6	7	7	9	13	14		66
Malaysia			1	9	17	16	16	35	36	31	28	29	28	27	27	5	305
Mexico	NOT AVAILABLE - OBTAINED FROM OECD FOR 1991- 2003																n.a
Morocco	3	3	3	3	4	6	7	5	5	6	6	6	6	5	9	9	86
Nigeria	1	3	6	6	13	19	24	24	24	26	29	28	28	28	26	26	311
Nicaragua					5	6	9	12	11	10	10	10	9	7	4		93
Peru	n.a.	5	8	9	11	12	13	14	17	18	15	15	14	14	12	n.a.	177

Philippines	2	2	2	2	2	2	2	3	2					13	14	14	60
Poland	NOT AVAILABLE - OBTAINED FROM OECD FOR 1993- 2003																n.a
Romania				1	3	2	4	13	15	15	14	18	18	21	21	11	156
Russia		1	1	2	3	2	2	3	8	11	11	11	14	19	20	20	128
Singapore	7	7	8	8	9	9	10	8	6	6	5	4	2	8	9	5	109
Slovak Rep	NOT AVAILABLE - OBTAINED FROM OECD FOR 1997- 2003																n.a
Slovenia	n.a.	n.a.	2	4	6	13	13	16	16	16	14	12	14	15	12	2	155
Ukraine	n.a.	n.a.	n.a.	n.a.	n.a.	3	9	11	15	19	21	25	29	30	29	21	212
Venezuela	n.a.	n.a.	n.a.	10	11	12	17	19	29	31	31	29	30	31	27	30	307
Vietnam	2	5	7	9	11	12	13	15	15	16	18	21	21	25	26	16	232
Total	36	74	110	162	217	259	308	396	460	491	502	501	493	517	459	264	5249

Table 5: Definitions, notations and the expected effect of the explanatory variables of model 3.1 on Bank Profitability

Variable	Measure	Notation	Expected Effect	
Dependent Variable				
	Bank Profitability	Earnings-before-taxes of commercial and savings banks to the aggregate level of total assets.	$\frac{EBT_{it}}{TA_{it}}$	
Determinants				
Macro Determinants				
	Intermediation Spread	Difference between average lending and borrowing rate in the country	SPREAD	Positive
	Inflation	Change in CPI	INFLATION	Positive
	Economic Growth	Percent change in GDP from previous year	GROWTH	Positive
Micro Determinants				
	Credit Risk	Loan Loss Provisions/Loans	LLP/LOANS	Negative
	Capital	Equity/Total Assets	EQUITY/TA	Positive
Other Determinants				
	Institutional Quality	an equally-weighted average of the six institutional quality variables of Kaufmann, Kraay, and Mastruzzi (2009): Government Efficiency, Political Stability, Regulatory Quality, Rule of Law, Voice, and Corruption.	INST	Positive
	Dollarization	The ratio of foreign exchange deposits in the banking system to the M2 money supply	FORDEP	?

Notes

[1]De Nicolo, Honohan, and Ize (2005) define three generic types of unofficial dollarization depending on the three functions of money: currency substitution (when residents use foreign currency in cash, demand deposits, or reserves at the central bank for transaction purposes); financial dollarization also referred to as asset substitution (consists of residents' holdings of financial assets or liabilities in foreign currency) and, real dollarization (where local prices and wages are indexed to the dollar).

[2]We concentrate our study on partially dollarized economies which excludes from our sample countries like Ecuador and El Salvador. In fully dollarized economies, inflation and interest rates are synchronized with those in the US or in the country that issues the currency.

[3]see Literature Review section for more on Currency Mismatch discussion

[4]See Burnside, Eichenbaum, and Rebelo (2001) and Mishkin (1996)

[5]There are also other options that have increasingly become available for banks in dollarized economies to use their foreign currency holdings. Aside from lending, commercial banks in dollarized economies can invest their foreign currency holdings in overseas equity markets with more stable returns. Yet these options could be costly for banks or may be subject to strict regulations imposed by the capital regulatory boards of these countries. This topic is left for future research.

[6]Neanidis and Savva (2009) find that the correlation between deposit dollarization and loan dollarization could be as high as 71% for transition economies.

[7]More in current times than before, this component is only a part of total banks' profitability.Day after day, different type of fees and commissions constitute a large part of banks' profits.

[8]For more comprehensive literature on bank profitability studies see Barth, Nolle, and Rice (1997), Demirguc-Kunt and Huizinga (1999) and De Nicolo, Honohan, and Ize (2005)

[9]Quispe-Agnoli and Whistler (2006) find that in the case of Ecuador and El Salvador full dollarization has no effect on bank profitability but on liquidity and asset quality

[10]this method was also used in previous studies such as Ozsoz (2009) and Demirguc-

Kunt and Huizinga (1999)

[11]Another measure on bank performance is the ratio of earnings-before-taxes to equity rather than total assets. The problem that we face in this particular case is that in some countries, governments may be involved in financial intermediation or could give particular guarantees to some of its local banks, which could enable banks operate with low equity. This could inflate banks' return on equity and lead to inconsistent results.

[12]See the appendix for a more detailed explanation and calculation of this variable

[13]We also used a second measure for dollarization, namely deposit dollarization which is the ratio of foreign currency deposits to total deposits in the banking system. This variable was used by De Nicolo, Honohan, and Ize (2005). The results were consistent with the results that we present in the paper and are available upon request.

[14]We have also used contemporaneous dollarization as an explanatory variable. Our results show that the coefficient estimates are not statistical significative and the general model fit deteriorates. These results are available upon request.

[15]Even though we find that inclusion or removal of this variable has no effect in our estimations as reported in section 4

[16]Honohan and Shi (2002) and Levy-Yeyati (2006) make part of their dataset on foreign exchange deposits available in their papers and on their website, available at http://profesores.utdt.edu/ ely/papers.html.

[17]Banks earn interest (and other income) from operations carried out in the previous year.

[18]Again, we have also used contemporaneous dollarization as an explanatory variable. Our results show that the coefficient estimates are not statistical significative and the general model fit deteriorates. These results are available upon request.

[19]We also observe that our results do not change quantitatively or qualitatively when we remove this variable from our estimations.

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