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Currency Mismatch: New Database and Indicators for Latin America and the Caribbean

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Currency Mismatch: New Database and Indicators for Latin America and the Caribbean

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ABSTRACT

I construct a database on currency mismatch in the private banking sector that offers several advantages over existing data sources. The data are broken down by currency and, therefore, are better suited for calculating currency mismatches than the data based on the residence principle that are used in the literature. The data are comparable at the highest possible level across countries because the collection process is based on accounting manuals. The database is suitable for policy analysis and cross-country comparative studies since the data are collected quarterly, cover a wide range of economies and yield straight-forward measures of the success in implementing prudential policies. Employing the two indicators that I constructed, I show that the degree of currency mismatch differs across exchange rate regimes and is lower in countries that follow de-dollarization policies. I also demonstrate that the banking sector took short foreign currency positions in Latin America and the Caribbean for the first time in two decades beginning in the late 2000s.

JELCodes: *F30.*

Keywords: *currenyc mismatch, partial dollarization, financial stability.*

1. INTRODUCTION

The recent financial crisis has triggered the interest of policy-makers in understanding the causes and consequences of financial risks. However, insufficient data collection currently impedes to properly measure currency mismatches that drive foreign currency risk in Latin America and the Caribbean. Therefore, I have conducted a survey across the Center for Latin American Monetary Studies' (CEMLA) members and constructed a unique database to assess foreign currency risk. I explain the principal features of the database and employ unique data to construct two currency mismatch indicators for the banking sector in Latin America and the Caribbean.

The contemporary economic history of Latin America and the Caribbean is characterized by periods of high inflation and currency crises. Hyperinflation occurred in Chile, Bolivia, Brazil, Argentina and Peru in the 1970s and 1980s, and large devaluations of the local currency occurred in Mexico and Argentina in the 1990s and 2000s. These crises reduced the purchasing power of and confidence in the local currency, leading to a process of partial dollarization: That is, the public began to use foreign currency for transactions and substituted a large share of their domestic currency-denominated assets and liabilities with US dollar-denominated wealth.[1,2] Partial dollarization has several consequences, and more importantly, is frequently associated with currency mismatches (Álvarez-Plata and García-Herrero, 2007).

Currency mismatches may cause financial losses in the presence of variations in the exchange rate and subsequently extend to healthy sectors of the economy. Expressed in the jargon of the 2008 financial crisis, the balance-sheet effect caused by currency mismatches and variations in the exchange rate trigger systemic risk. Consistent with this idea, a strand of literature argues that currency mismatches are relevant in explaining financial crises in emerging economies and the economic costs associated with these crises – Cavallo et al. (2005), Allen et al. (2002), Eichegreen et al. (2007).[3] Hence, filling data gaps in order to properly measure currency mismatches is of the first order of magnitude for economies exhibiting a high level of partial dollarization. The economies in Latin America and the Caribbean are among such economies.

In this paper, I collect data on foreign currency assets and liabilities from the private banking sector. I employ these data to construct a regional database that offers several advantages in conducting cross-country comparative studies and evaluating the effectiveness of various policies aimed at reducing currency mismatches: The data are comparable across countries at the highest possible level because the collection process is based on the accounting manuals for financial institutions from CEMLA's members. The data were collected on quarterly basis; they refer to the banking sector; they are broken down by maturity and residence and they are grouped into five economic categories, some of which can

[1] Although hyperinflation episodes and currency crises have not been nearly as frequent as they were formerly, dollarization has remained high in many Latin American countries (García-Escribano and Sosa, 2011).

[2] The banking sectors of many countries in Latin America and the Caribbean are among the most dollarized banking sector in the world (Álvarez-Plata and Alicia García-Herrero, 2007).

[3] Cavallo et al. (2005) argue that currency mismatches cause overshooting the exchange rate and larger output contractions. Taking a sectoral perspective, Allen et al. (2002) claim that currency mismatches were high in the banking sector during the East Asian financial crisis and substantial in the non-financial corporate sector in Argentina, Brazil, and Uruguay. Eichegreen et al. (2007) show that they are associated with greater output and capital flow volatility and a lower credit rating.

subsequently be used as outcome variables in empirical studies.[4, 5] Importantly, the data are broken down by currency, and therefore, provide useful information for building currency mismatch indicators that address issues associated with existing measures of currency mismatch.

Two issues have hindered the construction of appropriate currency mismatch indicators. Conceptually, currency mismatch has been mistaken for other concepts related to financial risk, promoting the inappropriate use of *original sin* indicators (Eichengreen, Hausmann and Panizza, 2007) and several measures of external vulnerability (e.g., the ratio of broad money to international reserves) as proxies for currency mismatch. Empirically, the unavailability of data broken down by currency has led the literature to either consider a single side of the balance sheet or to employ data based on the *residence principle* –i.e., data broken by the residence of the asset or liability holder. The use of country level data has also precluded the consideration of internal mismatches and the identification of the specific economic sector facing the foreign currency risk. The data that I collect circumvent these issues because they are disaggregated at the sectoral level; they refer to both sides of the balance sheet, and they are broken down by currency of denomination. Along these lines, I construct proxies for currency mismatch by employing data based on the residence principle and demonstrate that these proxies cannot substitute for indicators derived from CEMLA's database.

I employ CEMLA's database to construct two currency mismatch indicators, each of which should be used for different purposes. The first indicator measures the average degree of currency mismatch, regardless of the type of foreign currency risk involved. The second indicator distinguishes between the risk of foreign currency appreciation and the risk of foreign currency depreciation. These two indicators are then used to address various topics from the literature with the objective of opening lines for further research and promoting the use of CEMLA's database in the central banks. I show that greater flexibility in the exchange-rate regime is associated with smaller currency mismatches when the flexibility is low, but it is also associated with greater mismatches when the flexibility is high. These results are independent of the exchange-rate regime classification employed and are partially consistent with two strands of the literature that argue opposing conclusions about the links between regimes and mismatches.[6,7] The data reveal that the banking sector of several economies took a short foreign currency position in the late 2000s, thereby causing a change in the currency mismatch trends. I link my work with Lane and Shambaugh's seminal paper (2010) by relating this change to variations in the exchange rate trends. I find that trends in currency mismatches are highly correlated with the leads and lags of measures of changes in exchange-rate trends for most economies. Finally, I provide evidence that suggests that CEMLA's database broadens the scope for policy analysis. I show that long foreign currency positions have decreased in economies that have decreased the limit on this position and/or increased the limit on the short position. Although this

[4] The majority of the policies related to foreign currency positions over the last two decades in the region have applied to the banking sector.

[5] Several policies aimed at reducing currency mismatches, such as the limits to foreign currency positions set by the Banco de la Republica (Colombia) and the Banco Central de Chile in 1999 are maturity based. Capital controls represent one example of residence-based policies.

[6] Burnside, Eichenbaum and Rebelo (2001), Mishkin (1996), Obstfeld (1998) and Goldstein and Turner (2004) claim that that greater flexibility is associated with lower mismatches. Arteta (2005), Eichengreen and Hausmannn (1999) and McKinnon (2001) argue the opposite.

[7] The results are the same irrespective of whether I employ Reinhart and Roggof's coarse classification or the regime declared by central banks in the CEMLA Survey.

result is only indicative, this work represents the first attempt to evaluate the effectiveness of policies aimed at reducing currency mismatches in Latin America and the Caribbean.

This paper relates to the strand of literature that has attempted to construct appropriate measures of currency mismatches at the aggregate level (Eichengreen, Hausmann and Panizza, 2007, and Goldstein and Turner, 2004) and measures that have been or could be used as proxies for currency mismatches (Mulder, 1999, and Lane and Shambaugh, 2010). My work is also closely related to a stream of research claiming that country-level data should be complemented with sectoral information for assessing currency mismatches. Allen et al. (2002) argue that sectoral linkages are relevant because currency risk in one sector can cascade into other healthy sectors of the economy. Ranciere et al. (2010) construct a currency mismatch indicator for the banking sector controlling for bank lending to unhedged borrowers and highlight the lack of data availability for emerging economies other than Eastern Europe. Similarly, Reinhart, Rogoff and Savastano (2003) argue that reliable data to measure intersectoral linkages are missing. My paper fills the data gaps on foreign currency assets and liabilities in the private banking sector that have hindered the progress in this literature.

The paper is structured as follows: Section 2 reviews existing currency mismatch indicators, highlighting their flaws and suggesting a measure that addresses the problems associated with existing measures. Section 3 explains the main features of the data collection process and summarizes the information contained in the new database, while Section 4 deals with the advantages of and flaws in the data. Finally, I construct two currency mismatch indicators and utilize these measures to address several topics in the literature in Section 5.

2. EXISTING CURRENCY MISMATCH INDICATORS AND THE RELEVANCE OF DATA BROKEN DOWN BY CURRENCY

The 1994 currency crisis in Mexico and the 1997 financial crisis in East Asia triggered a large body of research aimed at constructing appropriate currency mismatch indicators. Although significant progress has been made, two issues have hindered this progress. Conceptually, currency mismatch has been mistaken for external vulnerability and *original sin*, which is defined below. Empirically, data unavailability has hindered the progress: Information on relevant assets and liabilities is either not available or has not been collected for most emerging economies.[8]

Currency mismatch has been mistaken for *original sin*, a concept coined by Eichengreen and Hausmann in 1999, which is defined as a country's inability to borrow abroad in its own currency. The conceptual error arises because most countries are unable to borrow in their domestic currency abroad, whereas investment projects generate revenues denominated in this currency; as a result, original sin is a potential source of currency mismatches. However, currency mismatch may originate from causes other than original sin; furthermore, original sin may *not* lead to currency mismatch.[9] Due to the conceptual mistake,

[8] Ranciere, Tornell and Vamvakidis (2010) claim that the recent crisis has fostered a data collection effort in Eastern Europe that is unparalleled in other emerging-market regions.

[9] Inappropriate prudential regulation or weak risk management practices by commercial banks may generate currency mismatches. Furthermore, original sin does not lead to currency mismatches when they are associated with larger reserve buildups (Eichengreen, Hausmann and Panizza, 2007).

the three indicators proposed by Eichengreen, Hausmann and Panizza (2007) have been inappropriately employed as proxies for currency mismatch. These indicators do not represent good proxies because they only consider the liability side of the balance sheet: The greater the proportion of foreign currency-denominated securities, the greater original sin is.[10] The original sin measures indicate a large currency mismatch, even though a country's foreign currency assets are as great as its foreign currency liabilities.[11]

A solution to the problem associated with the original sin indicators is to employ measures that consider both sides of the balance sheet, such as the external vulnerability indicators. These indicators employ readily available data and have proved to be powerful for predicting financial crisis. However, a country's inability to discharge obligations may be the result of reasons other than currency risk (Mulder, 1999); currency mismatches are one among other potential sources of external vulnerability. As a result, the data employed to measure external vulnerability should be based on the residence principle because this concept focuses on a country's financial relations with the rest of the world.

On the other hand, currency mismatch focuses on all of the foreign currency relations associated with a country; therefore, measuring a currency mismatch should employ data broken down by currency, regardless of residence. External vulnerability indicators, such as the net international investment position, the ratio of foreign assets to foreign liabilities, the rate of short-term external debt or broad money to international reserves, and the fraction of national debt to net exports have been used as proxies for currency mismatch. Such indicators consider both sides of the balance sheet, but neither of these sides, or only one of them, is foreign currency denominated. Employed as a proxy, a ratio of foreign assets to foreign liabilities that is close to 1 indicates no currency mismatch, despite the fact that the currency denomination of the assets and liabilities differs.

The indicator developed by Lane and Shambaugh provides an alternative proxy for currency mismatch because it investigates the currency composition of foreign assets and liabilities (Lane and Shambaugh, 2010). Their goal is to study the valuation channel that refers to the impact of exchange rate variations on the international balance sheet; valuation channel and currency mismatch are then closely interrelated. In order to construct their measure, they estimate the currency composition of each class of asset and liability from the international balance sheet and combine this information with data on foreign assets and liabilities for 145 countries from the External Wealth of Nations dataset (Lane and Milessi-Ferreti, 2007). This process yields a measure of aggregate foreign currency exposure which offers an advantage over the external vulnerability indicators.[12] However, Lane and Shambaugh's indicator overlooks the foreign currency relationships that occur within a country, and, therefore, is not a good proxy for currency mismatch in economies with a high level of partial dollarization, such as those in Latin America and the Caribbean.[13]

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[10] Analogously, the original sin indicators decrease with the country' proportion of securities issued in its domestic currency.

[11] Furthermore, ignoring the asset side of the balance sheet eliminates much of the time-series variation in currency mismatch, as noted by Goldstein and Turner (2004).

[12] They also construct a financial weight of exposure to each of the most relevant currencies for every country. This innovation represents one of their greatest contributions.

[13] As noted by Allen (2002), it is often equally important to look inside an economy because foreign currency debt among residents may also create internal currency mismatches.

A common feature of the original sin, external vulnerability and Lane and Shambaugh's indicators is that they are *aggregate* indicators because they measure the risk facing a country. Another common characteristic is that they overlook the foreign currency relations that occur within an economy, thereby ignoring internal currency mismatches. It is important to note that ignoring internal mismatches is not the result of their being aggregate indicators, but rather the result of their being based solely on country-level data. Internal currency mismatches do not show up in country-level data because the assets and liabilities of residents cancel each other out. Importantly, not every aggregate indicator employs only country-level data; i.e., Goldstein and Turner (2004)'s aggregate measure of currency mismatch employs data on domestic assets and liabilities –disaggregated at a higher level–, and therefore, at least partially captures internal currency mismatches.

The measure proposed by Goldstein and Turner (2004) comprises three terms, one of which is the foreign currency share of total debt. This term and the aggregate indicator increase when they consider that domestic bank loans and domestic bonds are not exclusively denominated in the domestic currency. Furthermore, the two countries with the highest foreign currency share of debt are Argentina and Peru, two Latin American economies characterized by a high level of partial dollarization over the period. Still, data unavailability forces Goldstein and Turner to incorporate information based only on a subset of foreign currency domestic assets and liabilities, and therefore to account only partially for internal mismatches. For instance, their indicator does not use data on the foreign currency deposits of residents which, as they mention, is limited. In summary, their research illustrates the relevance of combining country-level data with information disaggregated at a higher level and the importance of filling data gaps on this issue for Latin America and the Caribbean.

Any empirical analysis of currency mismatch should also complement country-level data with more disaggregated information in order to identify which sector of the economy bears the most foreign currency risk. The original sin, the external vulnerability and Lane and Shambaugh's indicators fail to distinguish whether a currency mismatch belongs to the government, the banks, the households or the corporate sector.[14]

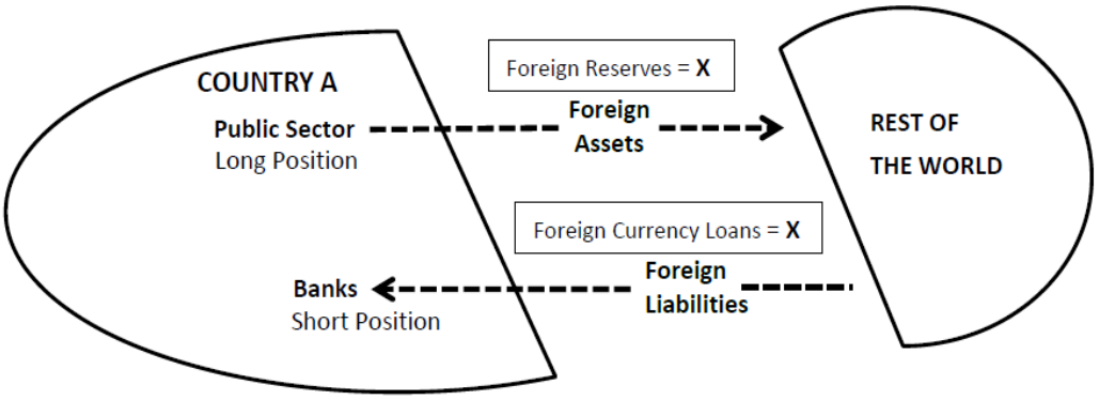
The discussion in the preceding paragraphs allows me to draw the following conclusions:

- A good currency mismatch indicator considers both sides of the balance sheet.
- Such an indicator considers the currency composition of assets and liabilities.
- The indicator examines a country's relationships *vis a vis* the rest of the world.
- Data collected at the country level is not sufficient because it ignores:

[14] Several authors have emphasized the importance of complementing country-level data with sectoral information. Ranciere et al. (2010) and Goldstein and Turner (2004) show that the ratio of foreign currency debt to exports is insufficient for measuring risk because the debt holders may not produce the export goods. Allen et al. (2002) argue that sectoral linkages are relevant because currency risk in one sector can cascade into other healthy sectors of the economy. Following Allen et al. (2002), Reinhart, Rogoff and Savastano (2003) propose a figure that incorporates all of the sectoral linkages and highlight the lack of reliable data on various foreign currency assets and liabilities depicted in the Figure. Recent literature has tried to build currency mismatch indicators at the sectoral level to complement the traditional currency mismatch indicators. Pratt (2007) and Ranciere et al. (2010) build indicators for the banking. Although the former's database and CEMLA's data are related, her frequency data differ from mine, and her sample covers different sets of countries and years.

- Internal mismatches by not considering foreign currency domestic assets and liabilities.
- Sectoral information that is required for identifying which sector of the economy bears the foreign currency risk.

Figure 1
Foreign Reserves to Foreign Currency Debt as a Proxy for Currency Mismatch

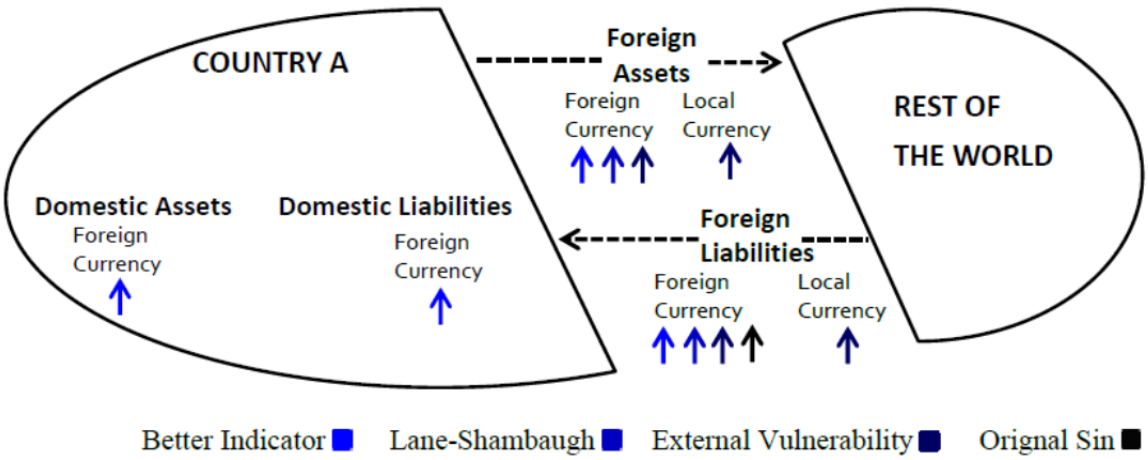


Notes: Although reserves and loans cancel each other out, the public and the banking sectors have an open foreign currency position. Therefore, Country A faces currency risk.

The items listed in the previous paragraph can be conceptualized either as a guide for conducting a foreign currency risk analysis or as the properties that existing currency mismatch indicators fail to consider. As mentioned, research in the existing literature has been constrained by the lack of data. Overcoming the problems associated with existing indicators requires access to data on four relevant components of the balance sheet: Foreign currency foreign assets and liabilities and foreign currency domestic assets and liabilities.

I collect data on the four relevant components of the balance sheet that address the sectoral level, specifically data on the private banking sector in Latin America and the Caribbean for three reasons. First, the data are collected for the banking sector in every country and can be gathered by CEMLA at a relatively low cost. Second, although there have recently been policies that deal with foreign currency positions in the corporate sector, historically most of these policies have dealt with the banking sector. Thus, the data gathered in this database are the most appropriate for conducting policy analysis, as I do in a companion paper (Tobal, 2014). Third, the banking sector has an important role in determining the stability of the financial system in most economies in Latin America and the Caribbean.

Figure 2
Data Requirements For a Better Currency Mismatch Indicator



Notes: Lane and Shambaugh's indicator employs data on two relevant elements of the balance sheet, the external vulnerability indicators employ data on foreign assets and liabilities, and the original sin indicators employ only information on foreign currency foreign liabilities.

3. COLLECTING DATA AND MAKING IT COMPARABLE

A. Data Collection: CEMLA Survey

In this section, I describe the collection process that allowed me to gather data on foreign currency assets and liabilities in the private banking sector. The data were collected in a survey conducted across CEMLA's central banks members and are used to construct two indicators that have the properties illustrated in Figure 2.

The survey aimed at making the data comparable across countries and creating a regional database accessible to CEMLA's members. This goal was achieved since the collection process was designed to ensure the highest possible level of comparability across countries, and the information collected is currently being uploaded on a website with restricted access.[15, 16] The survey also aimed at gaining a better understanding of the financial risks associated with variations in the exchange rate and the policy responses implemented by the economies in the region.[17] Considering these two goals, the questions of the survey were divided into the following five sections.

Section 1 dealt with policies aimed at regulating or giving incentives to banks to change their foreign currency position: limits over banks' capital and reserve or capital requirements associated with this position are examples of the prudential instruments considered in this section. Section 4 studied the same instruments applied to specific lines of the balance sheet, foreign currency credit and foreign

[15] I explain the features of the data collection process more thoroughly in the next subsection.
[16] The security key for accessing the database will be distributed to the heads of the research departments from the central banks at the XVIII Meeting of the Central Bank Researchers Network of the Americas that will be held in Mexico City, México, on November 11-13, 2013.
[17] I study the effect of limits to foreign currency positions on currency mismatch and the exchange rate in a companion paper (Tobal, 2014, forthcoming).

currency deposits. Section 2 covered regulatory policies based on the residence principle, such as taxes, reserve requirements and limits to external assets and liabilities or capital flows. Finally, Section 3 discussed interventions in the FX market, which are thought to substitute for or to complement the regulatory policies mentioned above. Each of these sections focused on three dimensions of the policies: they tracked all of the changes in implementing prudential instruments from the beginning to the end of the sample period (June 1992-June 2012), implementation characteristics (e.g., "limits established over banks' capital") and implementation goals.[18] Finally, Section 5 gathared data on foreign currency assets and liabilities.

The survey was sent to the heads of the research and financial stability departments, who distributed each section to the personnel who were best qualified to answer the questions.[19] The first stage of the data collection process was considered to be finished when the majority of the central banks returned the survey. The second stage comprised a series of contacts made by email or by phone and personal interactions that I maintained with officials from several central banks during the various events organized by CEMLA. This second stage enabled me to complement the information provided in the first delivery of the survey.

Members readily acceded to my requests for information: 19 central banks provided either full or almost complete information so that the data collection process was considered to be either *finished* or *almost finished* for these members; five central banks are continuing to work jointly with CEMLA to enhance the information provided in their first response; two central banks are continuing to work on their own, two central banks decided not to participate in the project due to human capital constraints, and the remaining central bank has not yet responded to our requests.[20]

B. Making Data Comparable

The collection process was designed to ensure the highest possible level of comparability across countries. Specifically, two requirements were fulfilled: The data provided by each central bank referred to a similar set of financial agents as well as to a similar set of assets and liabilities.

Defining the set of financial agents upon which the data would be requested encountered several challenges. For instance, each central bank aggregated the data that it received from the individual institutions of their country into different sets, reflecting significant heterogeneity across financial systems. Thus, the set had to be sufficiently small so that central banks did not include information on

[18] In addition, the central bank officials were asked to indicate the specific institution that was responsible for making the policy decision and implementing the policy.

[19] The heads of the research departments from the central banks had already been informed about the existence of the survey at the XVII Meeting of the Central Bank Researchers Network of the Americas that was held in Montevideo, Uruguay, on November 21-23, 2012.

[20] Data on foreign currency assets and liabilities is not collected in El Salvador. The Central Bank of Venezuela has delivered these data, but at the moment this paper is being written, it had not been analyzed.

financial institutions that did not exist in other countries. On the other hand, the set had to be sufficiently large so that the agents included in the set were representative of the financial system. Given these considerations, I employed the two stages of the collection process to define the optimal set: At the first stage, I requested data on the *banking sector* and defined the optimal set by discussing with the central banks.[21] This set of interest was defined as *commercial banks*, since the majority of members were able to provide data on foreign currency assets and liabilities for these agents. The remaining central banks provided data for at least a "similar but slightly more aggregated" set, in which over 95% of the assets and liabilities belonged to commercial banks (see Table 4 for a case-by-case description). Interestingly, commercial banks represent a substantial proportion of the financial system in most countries, making the set of interest highly representative (see Table 2 for a case-by-case description).

Central banks were also requested to provide data on a similar set of foreign currency assets and liabilities. Thus, I classified these assets and liabilities into categories with the goal of guiding CEMLA's members about the process of data delivery. The optimal categorization was defined in the two stages of the collection process: I proposed a categorization based on the guidelines for international investment positions data from the IMF's *Manual of Balance of Payments 5* (BPM 5) in the first stage, and employed the contacts by email or by phone to redefine this categorization. Following the BPM 5 guidelines would allow me to compare the international balance sheet with CEMLA's database, and, ultimately, to show that the data broken down by currency were the most appropriate for calculating currency mismatches.[22] The feedback received in the second stage led to redefining the original categories (depicted in Table 1).

The redefinition of the categories implied two changes to Table 1 and a clarification. I ignored the subcategories labeled *equity* and *debt instruments* and created a single category labeled *Investment*, because the majority of the accounting manuals did not provide data on these two subcategories separately. I also assigned exclusive categories to foreign currency deposits and foreign currency loans in order to highlight the relevance of tallying these data.[23] Finally, I clarified the fact that the *financial derivatives* data had to be delivered separately from the remaining information: That is, because these data were added to total assets and liabilities and I knew only the aggregate value, I could not compare this total with countries having a derivatives off-balance sheet. Table 2 depicts the classification of assets and liabilities that arises from the redefinition of the categories. The left-hand side blocks labeled *foreign currency assets* and *foreign currency liabilities* indicate the five categories: investment, loans, money and deposits, other assets and financial derivatives.

The feedback received at the second stage of the collection process also led me to use the accounting manuals for CEMLA's members' financial institutions more intensively. For this purpose, I

[21] The data collection process has yet not proceeded through the second stage in México and the Eastern Caribbean countries at the moment this paper is being written.
[22] The next section will illustrate the comparison between the IMF BOP and CEMLA's database.
[23] These data can be used to measure the degree of partial dollarization in each economy.

contacted the Banco de la República, Colombia, which helped me to link each account from its accounting manual to the one of the five categories that I had proposed. The link created by the Banco de la República, Colombia, was then used as a benchmark: The foreign currency accounts from the accounting manual of each Spanish-speaking country were linked to a foreign currency account from Colombia's manual.[24] This exercise created an account-category allocation for each country that was sent to central bank officials.[25] With respect to the non-Spanish-speaking countries, I employed Monaco's accounting manual as a benchmark because its structure is similar to that proposed by the Banco de la República, Colombia. In the second stage, central banks received not only the account-category allocation that I created, but they also received the original allocation provided by the Banco Central de la República, Colombia. Central banks had the freedom to use my account-category allocation or to create their own, employing Colombia's allocation as a benchmark. Therefore, the allocation employed to deliver the data resulted from the choice of experienced officials at each central bank, which, in turn, precluded that misinterpretations of the accounting manuals make the data non-comparable.

Table 1
Classification of Assets and Liabilities at the First Stage

BANKING SECTOR	
Foreing Currency Assets	**Foreing Currency Liabilities**
TOTAL	**TOTAL**
Portfolio Investment	**Portfolio Liabilites**
Equity	Equity
Debt instruments	Debt instruments
Short-term	Short-term
Long-Term	Long-Term
Other Investment	**Other Investment**
Trade Credits	Trade Credits
Loans	Loans
Short-Term	Short-term
Short-Term to Residents	Short-Term to Residents
Long-Term	Long-Term
Short-Term to Residents	Short-Term to Residents
Money and Deposit	Money and Deposit
Short-term	Short-term
Long-Term	Long-Term
Other Liabilities	Other Liabilities
Derivatives	**Derivatives**

[24] I am deeply grateful to Mrs. Luisa Silva Escobar (Banco de la República, Colombia) for her invaluable assistance in creating this link.
[25] The Appendix Section displays the allocation created for each central bank .

Table 2
Final Classification of Assets and Liabilities

Foreing Currency Assets			Foreing Currency Liabilities		
Categories	**Concepts Involved**	**Broken Down by:**	**Categories**	**Concepts Involved**	**Broken Down by:**
Investment	Marketable Securities, Investments Available for Sale, Repurchase and Transfer rights	Short Term	Investment	Investment Securities in Circulation, Bonds Mandatorily Convertible into Shares	Maturity
		Residence			
	Non Marketable Investments, Investments and Transfer Rights Held to Maturity	Long Term			Residence
		Residence			
Loans	Loans and Financial leases	Maturity	Loans	Bank Loans and other Financial Obligations	Maturity
		Residence			Residence
Money and Deposit	Availabilities	Maturity	Money and Deposit	Deposits and Payables	Maturity
		Residence			Residence
Other Assets	Property and Equipment, Fixed Asset Expenditure, Other Assets,.....	-	Other Liabilities	Property and Equipment, Other liabilities,.....	-
Derivatives	Currency Swaps, Forwards	-	Derivatives	Currency Swaps, Forwards	-

C. The Data Collected

Eighteen central banks members delivered data on foreign currency assets and liabilities. Table 3 abstracts from the data delivered by the Banco Central de Venezuela (which is currently being inputted) and lists the names of the remaining 17 countries, the available spam of time and the most detailed breakdown of the data.[26] All countries delivered quarterly data beginning in 2000 or earlier, with the exception of Brazil, Peru and Nicaragua, whose samples commence in 2001 for the former countries and in 2008 for the latter economy.[27] More than half of the sample delivered data broken down by maturity, but only three central banks delivered data broken down by residence. For instance, the data delivered on money and deposits can be divided into short- and long-term in Aruba, Argentina, Colombia, Guatemala and Uruguay on the assets side and into the same subcategories in Aruba, Costa Rica, Nicaragua y Uruguay on the liability side.

[26] The most detailed breakdown refers to the highest disaggregation level found among the five categories.
[27] The Banco Central de Nicaragua recently delivered data commencing in 2000, which is currently being entered into our database.

Table 3
Summary of the Collected Data

Data Broken Down By:	Countries
Residence and Maturity	**PER** [2001Q1-2012Q4], **ARU** [1999Q1-2012Q4]
Residence	**ECCU** [1992-2013Q1]
Maturity	**ARG** [1999Q4 2012Q3] **DOM** [2000Q2-2012Q4] **BOL** [2000Q1-2012Q4] **GUA** [2001Q2-2012Q2] **COL** [2000Q1-2012Q3] **NIC** [2008Q1-2012Q3] **CRC** [1999Q4 -2012Q3] **URU** [1999Q4 - 2012Q4]
Neither Residence Nor Maturity	**BRA** [2001Q1-2012Q4] **MEX** [2000Q4 - 2012Q3] **CHI** [1992Q1-2012[Q4] **PAR** [1995Q1-2012Q3] **HON** [1998Q1-2012Q4] **VEN** [1999Q3 - 2012Q3] **JAM** [2000Q1-2012Q4]

Table 4 depicts the proportion that commercial banks represent in the data delivered by each central bank in the second column. Only the information delivered by Argentina, Jamaica and Paraguay cannot be separated into data on commercial banks and data from other financial institutions. Commercial banks represent over 95% of the data in the former two countries and 75% in Jamaica, whose sample also includes data on two additional types of deposit-taking institutions: Building societies and FIA Licensees. The third column of the table illustrates the proportion that the agents (upon which the data were delivered) represent over the entire financial system. This percentage is over 80% for most economies.

Table 4
Representativeness of Commercial Banks and Delivered Set

Countries	*Proportion of commercial banks in delivered set (%)*	*Proportion of delivered set in financial system*	*Countries*	*Proportion of commercial banks in delivered set (%)*	*Proportion of delivered set in financial system*
Argentina	99	99	Guatemala	100	87
Aruba	100	68	Honduras	100	95
Bolivia	100	80	Jamaica	75	44
Brazil	N.A.	85	Nicaragua	100	99
Colombia	100	91	Paraguay	96	80
Costa Rica	100	90	Peru	100	84
Chile	100	50	ECCU	100	N.A.
Dominican Republic	N.A.	N.A.	Uruguay	100	95

Source: CEMLA Survey.

4. ADVANTAGES OF AND FLAWS IN THE DATA

A. Advantages of the Data

The data gathered for the CEMLA Survey offer several advantages for carrying out cross-country comparative studies and running policy analysis. They represent a useful tool for conducting comparative research because the collection process has been designed to ensure the highest possible level of comparability across countries. The frequency of the data collection is quarterly, the subject is the banking sector, making the database appropriate for evaluating the effectiveness of various policies aimed at reducing currency mismatches in Latin America and the Caribbean over the last two decades.[28] The data can also be used to study residency-based policies, such as capital controls, because the database is broken down by residence (whenever possible), as well as maturity-based measures, such as the limits on liquid foreign currency positions established by the Banco Central de Chile and the Banco de la República (Colombia) in 1999 because it is broken down by maturity. The five categories defined in Table 2 are economically based so that policy analysis and cross country comparative studies can be carried out at the category level. For instance, the Banco Central de Bolivia, the Banco Central de la Reserva del Perú and the Banco Central del Uruguay will be able to evaluate the effectiveness of their de-dollarization policies in comparative terms. Furthermore, one of the main advantages of CEMLA's data is the fact that assets and liabilities are broken down by currency.

Employing data broken down by currency is highly relevant for assessing currency mismatch in economies with a high level of partial dollarization. The unavailability of this breakdown previously compelled researchers to employ data based on the residence principle as a proxy for currency mismatch. In the remainder of this subsection, I provide evidence suggesting that the residence principle is not an appropriate proxy for the currency breakdown in Latin America and the Caribbean. For this purpose, I construct two measures: CEMLA's currency mismatch is defined as the ratio of foreign currency assets to foreign currency liabilities, and its *most similar indicator* is defined as a proxy built with alternative data sources based on the residence principle.[29] This exercise also reveals that CEMLA's database represents an improvement over alternative data sources that can be accessed by central banks at a relatively low cost.

I assess the degree of substitutability between CEMLA's database and two alternative data sources: The Bank for International Settlements (BIS) Locational Banking Statics and the Banking Survey from the IMF's International Financial Statistics.[30] The former provide aggregated international claims and liabilities for all

[28] As mentioned above, most regulation aimed at regulating foreign currency positions in the region applied to the banking sector.

[29] The following section provides a thorough explanation of the properties of this indicator.

[30] The set of financial agents considered to be *banks* via these statistics may not be the same as the set of agents considered to be *banks* in the CEMLA Survey; however, the differences between the sets are not expected to be relevant, based on the fact that commercial banks represent a significant proportion of the financial system in most economies in Latin America and the Caribbean, as explained in the previous section.

banks resident in the reporting countries. The data are broken down by counterparty so that I can retrieve the information for the Latin American and the Caribbean economies *vis-á-vis* the reporting countries.[31] The *most similar indicator* is then calculated as the ratio of international claims to international liabilities.

Table 5 shows that the correlation between CEMLA's indicator and its most similar indicator constructed with BIS data is generally low, suggesting that data that follow the locational principle are not a good substitute for data broken down by currency. The correlation coefficient is above 0.7 (so there is not much information loss by substituting one series with another) only for Jamaica and Guatemala. Interestingly, the correlation coefficient is below 0.7 for Bolivia, Costa Rica, Honduras, Nicaragua, Paraguay, Peru and Uruguay, which are the economies in the region with the highest level of partial dollarization.[32]

Table 5
CEMLA's and BIS' Most Similar Indicators Correlation

Below 0.7		***Above 0.7***	
Country	*Corr. Coeff.*	*Country*	*Corr. Coeff.*
Argentina	0.19	Aruba	N.A.
Bolivia	–0.56	Guatemala	0.74
Brazil	0.05	Jamaica	0.88
Chile	0.66		
Colombia	0.33		
Costa Rica	0.25		
Dominican Rep.	–0.42		
Honduras	0.54		
Mexico	0.19		
Nicaragua	0.30		
Paraguay	–0.06		
Peru	0.58		
Uruguay	0.24		

Sources: CEMLA Survey, BIS Locational Statistics and author's calculations.

Table 6 depicts the correlation coefficients between CEMLA and its most similar indicator constructed as the ratio of foreign assets to foreign liabilities with data retrieved from the Banking Survey of the IMF's International Financial Statistics. The correlation coefficient is above 0.7 only for Brazil and Jamaica and below 0.7 for the economies with the highest levels of partial dollarization in the region. This evidence reveals that CEMLA's data cannot be substituted with data from the IFS based on the residence principle.

[31] Most economies in Latin America and the Caribbean are not reporting countries.

[32] Galindo and Leiderman (2005), Leiderman, Maino and Parrado (2006), Cayazzo, García Pascual, Gutiérrez and Heysen (2006), Rennhack and Nozaki (2006), Sánchez (2006), Bailey (2007), Rincón Reveiz (2008), and Bacha, Holland and Gonçalves (2009) provide evidence for the degree of partial dollarization in these economies.

Finally, I show that CEMLA's data are also irreplaceable at the category level by comparing the behavior of net foreign currency loans to that of net foreign loans in Costa Rica. In order to assess net foreign loans, I use quarterly data on international investment positions broken down by economic agent from the IMF's balance of payment statistics (BPM6) over the period 2005Q1-2012Q2.[33] Figure 3 depicts "Net foreign loans" in brown and "Net foreign currency loans" in blue. Note that banks in Costa Rica have an increasing short credit position *vis á vis* non-residents –the brown curve lies below the 0-line over the entire period– and an increasing long foreign currency credit position –the blue curve lies above the 0-line. This evidence suggests that banks have been borrowing abroad in foreign currency to lend in the domestic market. More importantly, replacing CEMLA's with the IMF data would have driven us to the wrong conclusion: Since the latter data indicate a short foreign currency position for banks, we might have been tempted to reject a limit on foreign currency credit. This policy advice would have been inappropriate and, more important, would have driven our attention to the wrong sector of the economy: The existence of short foreign currency positions seems to be relevant for borrowers, but it is not an issue for banks.

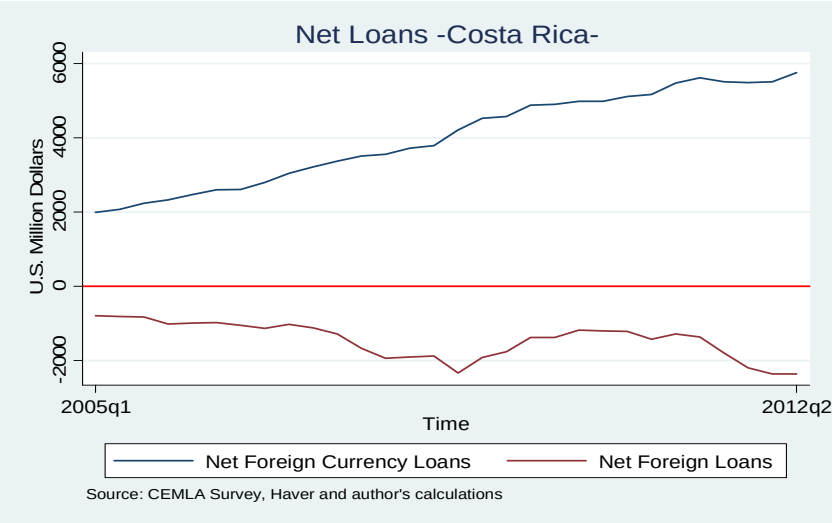
Table 6
CEMLA's and IMF's Most Similar Indicators Correlation

Below 0.7		*Above 0.7*	
Country	*Corr. Coeff.*	*Country*	*Corr. Coeff.*
Argentina	–0.45	Brazil	0.83
Aruba	0.49	Jamaica	0.74
Bolivia	0.10		
Chile	0.43		
Colombia	0.17		
Costa Rica	–0.17		
Dominican Rep.	0.10		
Guatemala	–0.25		
Honduras	–0.03		
Mexico	–0.55		
Nicaragua	–0.58		
Paraguay	0.17		
Peru	0.68		
Uruguay	0.43		

Sources: CEMLA Survey, Haver and author's calculations.

[33] I obtain net foreign currency loans by subtracting the foreign currency loans borrowed by banks from the foreign currency loans lent by banks. CEMLA's database provides me the data for constructing this variable.

Figure 3
International Investment Position and CEMLA's data



B. FLAWS IN THE DATA

There exists substantial heterogeneity in the way the accounting manuals for financial institutions from CEMLA's members treat financial derivatives. As mentioned in the previous section, derivatives are off-balance sheet in most economies, and almost no country differentiates between derivatives employed for hedging foreign currency risk and the remaining derivatives. Consequently, only four CEMLA's members have provided information on financial derivatives and the information for only one of these countries (Colombia) refers exclusively to derivatives dealing with foreign currency risk. This represents a major flaw in the CEMLA's database, since instruments such as cross currency swaps, forwards or options markets could be used to hedge foreign currency positions. On the other hand, it should be said that this flaw is common to all the data sources and currency mismatch indicators mentioned in this paper. Furthermore, the degree of development in the market of derivatives is not high in most economies in Latin and America and the Caribbean. In order to find a proxy for the degree of development in the derivatives market, I calculate the ratio of the sum of derivatives assets and liabilities to the sum of total assets and liabilities, independent of currency denomination.

Table 7 displays this proxy for three of the four countries that provided information on derivatives.[34] Chile and Nicaragua have provided monthly data for January 2010-July 2013 and for January 2008-June 2006, respectively. The ratio equals 3.7% and 0.07% for these economies, indicating that the financial derivatives market is not that well developed in these economies. On the other hand, the value of the ratio is higher in Colombia, which has provided quarterly data from 2000 to 2012. Although this analysis is informative, it is definitely not conclusive: despite the fact that financial derivatives represent a small

[34] Data on total assets and liabilities were not available for Peru.

percentage of total assets and liabilities, the majority of these derivatives could be employed for hedging foreign currency positions. Indeed, anecdotal evidence suggests that this is the case in the Peruvian economy.[35] Information on financial derivatives may be relevant in assessing currency mismatch and should be taken into consideration as central banks acquire more data on the matter.

An additional flaw with respect to the information gathered in Section 5 of CEMLA's Survey is the fact that the data are not broken down by foreign currency. This feature will preclude researchers from assessing the risk associated with a specific currency, as Lane and Shambaurg (2010) do in their seminal paper. CEMLA has not been able to collect the data that could have facilitated the assessment of this risk because the information received by most central banks from individual institutions has already been aggregated at the *foreign versus dometic currency* level. Distinguishing among foreign currencies does not seem to be a major issue since the US dollar has traditionally been the currency denomination for foreign currency assets and liabilities in most economies in Latin America and the Caribbean. However, the recent appearance of the euro may cause this flaw in the data to become more relevant in the near future.

Table 7
Development of the Financial Derivatives Market

Country	*Period*	*Ratio*
Chile	2010M1-2013M7	3.70%
Colombia	2000Q1-2012Q3	12.17%
Nicaragua	2008M1-2013M6	0.07%

Sources: National authorities and author's calculations.

Finally, CEMLA's data only refer to the banking sector. As mentioned in Section 2, sectoral level data are necessary to assess foreign currency risk, but are not sufficient for drawing a complete picture of currency mismatch in an economy. Along these lines, the data should neither be construed as predicting a financial crisis that does not originate in the banking sector nor should they be used to construct aggregate currency mismatch indicators, such as Goldstein and Turner's measure. Future research will employ data on other sectors of the economy along with CEMLA's information to replicate existing aggregate indicators.[36]

5. MISMATCH INDICATORS, POLICY AND VARIATION IN THE EXCHANGE RATE

A. TWO CURRENCY MISMATCH INDICATORS

I propose two indicators that capture different dimensions of currency mismatch in the banking sector and construct these indicators employing the data gathered in CEMLA's database. The first indicator measures the average degree of currency mismatch in the banking sector of an economy. For a given country i and a period that comprises T quarters, the indicator is written as follows

[35] I am grateful to Jorge Muñoz (Banco Central de la Reserva del Perú) for making this point.
[36] I am deeply grateful to Philip Turner for providing me with updated data on the variables they used in constructing their indicator.

$$(1) \qquad CMABS_{iT} = \frac{\sum_0^T \left| \frac{FX\ Assets_{it}}{FX\ Liabilities_{it}} - 1 \right|}{T},\ t \in [0,1..t..T],$$

where the first quarter of the period has been normalized to 0, $CMABS_{iT}$ is the first currency mismatch indicator that I propose for country i in a period of T quarters; $|.|$ denotes absolute value; $FX\ Assets_{it}$ represents the amount of foreign currency assets held by the banking sector in country i at quarter t, and $FX\ Liabilities_{it}$ denotes the corresponding amount of foreign currency liabilities. Since it is the absolute value of the ratio of FX assets to FX liabilities minus 1 that is considered, the indicator is silent on whether this ratio is greater or smaller than 1, and, therefore, on whether country i faces the risk of foreign currency appreciation or the risk of foreign currency depreciation. The consideration of absolute values, on the other hand, ensures that short and long foreign currency positions do not cancel each other out, thereby yielding a complete measure of currency mismatch over a given period.

Table 8 displays the value of the currency mismatch indicator for 17 economies in Latin America and the Caribbean. The length of the period considered (T) depends on data availability, Chile being the country with the highest number of quarters (84) and Nicaragua being the economy with the lowest number of quarters taken into consideration (15). The median of the $CMABS_{iT}$ distribution equals 0.1107 –the value for Mexico– and is lower than the average sample (0.0163). Along the same lines, the number of countries with a below-average indicator is 11 and higher than the number of countries with an above-average value: 6. Two additional features stand out in Table 3. First, the three countries with the lowest currency mismatches are Bolivia, Uruguay and Paraguay, which are among the economies with the highest level of partial dollarization in the sample. In the next subsection, I suggest that the policies implemented by these economies, the majority of which aimed at decreasing the degree of partial dollarization, reduced the currency mismatch in their banking sectors.[37] Second, Chile is the economy with the greatest currency mismatch with an indicator value that is 2.46 standard deviations over the mean. The large average value of the indicator in Chile originates from the accumulation of currency mismatches over the period 1992Q1 - 1999Q3, in which the pegged float regime led to several reductions in the price of the Chilean peso. I link currency mismatches and exchange rate variation in the last subsection and cover the Chilean case in the Appendix.

The averages listed in Table 8 were taken over long periods of time and may, therefore, hide relevant information on currency mismatches. Currency mismatches are high in economies having a highly volatile indicator, independent of the average value taken over a long period of time. In order to better assess foreign currency risk, I provide information on the standard deviation of the currency mismatch indicator in Table 9.

[37] The goals of these policies are better referred to as promoting *Bolivianización* for the case of Bolivia.

Table 8
Currency Mismatch (CM) in Absolute Value

Country	*Abbr.*	*Position*	$CMABS_{iT}$ *
Bolivia	BOL	1	0.0415
Uruguay	URU	2	0.0524
Paraguay	PAR	3	0.0672
Peru	PER	4	0.0673
Dominican Rep.	DOM	5	0.0701
Nicaragua	NIC	6	0.0765
Honduras	HON	7	0.0773
Costa Rica	CRC	8	0.1082
Mexico	MEX	9	0.1107
Guatemala	GUA	10	0.1362
Brazil	BRA	11	0.1497
Argentina	ARG	12	0.2187
Eastern Caribbean	ECCU	13	0.2591
Aruba	ARU	14	0.2814
Colombia	COL	15	0.2824
Jamaica	JAM	16	0.3270
Chile	CHI	17	0.4600

Source: CEMLA Survey and author's calculations.
* Average over available period of time.

Table 9
CM Mean and Standard Deviation

Percentile	*Countries*	$CMABS_{iT}$ *	*Std. Dev.* $CMABS_{it}$ **
0-33	BOL, URU, PAR, PER, DOM	0.0599	0.0407
33-66	NIC, HON, CRC, MEX, GUA, BRA, ARG	0.1115	0.0473
66-100	ECUU, ARU, COL, JAM, CHI	0.3142	0.2169

Sources: CEMLA Survey and author's calculations.
* Average of the mean over countries considered in the corresponding group.
** Average of the standard deviation over countries considered in the corresponding group.

In Table 9, I group the countries considered in Table 8 into three categories based on their mean indicator value: That is, countries with a mean that lies between the 0 and 33 percentile form the first group, those with a mean that lies between the 33 and 66 percentiles are in the second group and the remaining countries constitute the third group. The third column shows the average of the mean

indicator for the countries considered in each group, and the fourth column displays the average of the standard deviation for the same countries. Note that the average standard deviation increases monotonically with the average mean, with the increase being stronger for high levels of the average mean. Table 9 suggests that the countries at the bottom of Table 3 have been exposed to higher levels of foreign currency risk because their average currency mismatch has been higher, but also because these economies have had the greatest levels of currency mismatch. Figure A1 in the Appendix supports this evidence by depicting the averages and the standard deviations of the indicator at the country level.

The second indicator that I propose is based on the measure of currency mismatch that I introduced in Section 4. This measure is informative as to whether an economy has faced the risk of foreign currency appreciation or the risk of foreign currency depreciation, and is written as follows for a given country I over a period that comprises T quarters:

$$CM_{iT} = \frac{\sum_0^T CM_{it}}{T},\ t \in [0,1..t..T], \tag{2}$$

where $CM_{it} = \frac{FX\ Assets_{it}}{FX\ Liabilities_{it}}$.

The indicator is a simple average of the ratio of FX assets to FX liabilities over time. It takes values in the interval $(0,\infty)$; a value greater (smaller) than 1 indicates the risk of foreign currency depreciation (appreciation).

Note that the value of the CM_{iT} indicator for most countries is lower than the absolute value of $1-CMABS_{iT}$: in these countries, there have been short and long foreign currency positions that partially cancel each other out. Because CM_{iT} takes lower values than the absolute value of $1-CMABS_{iT}$, its mean (1.1329) is closer to its median (1.1082) and its distribution is more symmetric.[38] All changes in relative positions are explained by two facts: Three pairs of countries have switched their positions with each other, and Brazil goes from being number 11 to the first position. Paraguay, Aruba and Jamaica *lose* a position at the expense of Peru, Colombia and Chile, respectively, because the latter countries have taken a higher proportion of short foreign positions. The last subsection shows that the appearance of short foreign currency positions in these economies is a phenomenon of the late 2000's and delves deeper into its causes. With respect to Brazil, it is the only economy with an average short foreign currency position, having faced the risk of foreign currency appreciation in most quarters. The low value of its CM_{iT} is primarily due to its economic behavior in the early 2000's, when the central bank established reserve requirements to regulate foreign currency positions in the two parallel FX markets. Interactions with

[38] By the same token, the numbers of countries with an indicator below and above average are more even –10 and 7, respectively

official from the Central Bank of Brazil support this statement, which I study more closely in the Appendix.[39]

I take a more dynamic approach to CM_{iT} in Table 5, where I provide information on the rates of change. These rates are given by the log difference between the average currency mismatch of the first four available quarters and the average of the last four available quarters. Figure 4 ranks countries in a descending order, based on the average of the first four available quarters and depicts the rates of change. The three countries with the highest average at the beginning of the period present the greatest rates of decrease, whereas the country with the lowest average (Brazil) presents the greatest rate of increase. This fact, along with the behavior of Paraguay, Guatemala, Costa Rica, Nicaragua and Honduras, leads to a convergence in the foreign currency position of the economies in Latin American and the Caribbean over time. Specifically, the standard deviation of the averages for the first four available quarters is 1.42 greater than the standard deviation of the averages for the last four available quarters. This result is robust to redefining the rates of change as the log difference between the average of the first two available quarters and the last two available quarters. Interestingly, Bolivia, Uruguay and Peru, which are located on the right-hand side of Figure 4, do not contribute to the convergence of currency mismatch. This finding is consistent with the fact that the policies taken by these economies with the goal of de-dollarizing their economies reduced the currency mismatch.

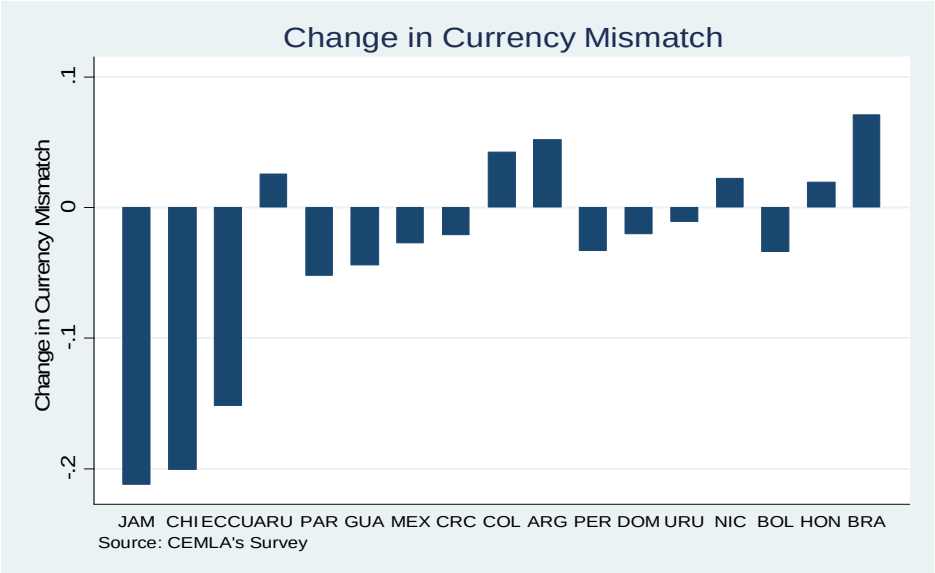
[39] I am deeply grateful to Mr. Emanuel Freire Di Stefano Bezerra for his comments in this regard during the Round Table on FX market intervention organized by BIS and CEMLA.

Table 10
CM Mean and Standard Deviation

Country	*Position*	CM_{iT}
BRA	1	0.8523
BOL	2	1.0337
URU	3	1.0443
PER	4	1.0519
PAR	5	1.0671
DOM	6	1.0690
NIC	7	1.0764
HON	8	1.0773
CRC	9	1.1082
MEX	10	1.1107
GUA	11	1.1362
ARG	12	1.2187
ECCU	13	1.2233
COL	14	1.2805
ARU	15	1.2814
CHI	16	1.3012
JAM	17	1.3270

Sources: CEMLA Survey and author's calculations.
* Average over available period of time.

Figure 4
Convergence in Foreign Currency Positions



B. SCOPE FOR POLICY ANALYSIS

One of the goals of the CEMLA's data collection was to generate information for running policy analysis. In this section, I provide basic evidence suggesting that the new database broadens the scope for further policy analysis. In a companion paper (Tobal 2014, forthcoming), I carry out policy analysis employing more rigorous econometric methods.

I concentrate on a particular prudential instrument, namely, the limits on foreign currency positions that were studied in Section 1 of the CEMLA Survey. When modifying these prudential instruments, authorities often target either short or long foreign currency positions. There have been only a few cases in Latin America and the Caribbean in which a change in the limits on open positions (i.e., an open position is defined as the difference between foreign currency assets and liabilities, independent of whether this difference results in a short or a long foreign currency position). The limit on the variation in the *global position* that was established in Costa Rica in 2004 and the simultaneous increase in the limits to short and long foreign currency positions in Honduras in 2006 are the only two examples of such policies in the 2000s.[40] Since few policies have targeted open positions, in this section I do not consider the absolute value indicator, which is silent on whether currency mismatches are generated by short or long foreign currency positions.

I focus on the measure of currency mismatch that differentiates between the risk of foreign currency appreciation and the risk foreign currency depreciation. Following the discussion in the previous subsection, I consider changes in currency mismatches. I group the countries into three categories based on their observed change in the indicator (i.e., the first group comprises economies whose change in the indicator lies between the 0 and 33). All of the countries included in the first group saw their currency mismatch indicator decrease, and all of the countries included in the third group saw their mismatch increase. I also classify policies based on the theoretical impact on their currency mismatch indicator: Increases in the limit to long foreign currency positions and decreases in the limit to short positions are classified as having a decreasing effect on currency mismatch and are labeled DEC; decreases in the limit to short positions and increases in the limit to long positions are classified as having an increasing effect and are labeled INC in Table 6. Note that the number of policies labaled DEC is the highest for the group of countries whose change in currency mismatch lies within the 0-33 percentile, and the number of policies labeled as INC is the highest for the countries comprising the third group. Furthermore, the former countries implemented more DEC than INC policies and the latter economies undertook more INC than DEC measures.

[40] These policies were more frequent in the 1990's, when Mexico, Bolivia, Brazil and Paraguay undertook these measures.

Table 11
CM Mean and Standard Deviation

Percentile	*Countries*	*Policies DEC (number)*	*Policies INC (number)*
0-33	BOL, CHI, CRC, ECCU, GUA, DOM, MEX, PAR, PER, URU	8	2
33-66	HON, NIC, ARU	1	2
66-100	ARG, BRA, COL	0	7

Sources: CEMLA Survey and author's calculations.

Table 11 suggests that the information collected by CEMLA expands the scope for further policy analysis.

C. Currency Mismatch and Exchange Rate Variation

In this subsection, I discuss an existing debate in the literature regarding the relationship between currency mismatch and the degree of flexibility of an exchange rate regime. I also employ the indicator that distinguishes between the risk of appreciation and the risk of depreciation to complete an accounting exercise to approximate capital losses. Finally, I study the correlations between currency mismatch trends and the exchange rate.

Economists have long debated whether more flexible exchange rate regimes cause higher or lower currency mismatches. Two main strands of research argue in opposing directions about the links between regimes and mismatches. A large strand of papers (Burnside, Eichenbaum and Rebelo 2001, Mishkin 1996, Obstfeld 1998 and Goldstein and Turner, 2004) argues that fixed exchange rates generate greater mismatches: the commitment of the central bank to defending the peg makes agents believe themselves to be immune to variations in the exchange rate, thereby reducing their incentives to hedge their foreign currency liabilities. On the other hand, the other stream of papers claims that greater flexibility encourages currency mismatches. For example, Arteta (2005) contends that greater flexibility makes foreign currency deposits more attractive to households but does not necessarily increase the attractiveness of foreign currency credit to banks. Thus, greater flexibility encourages currency mismatches in the financial intermediation carried out by the banking sector. Along the same lines, Eichengreen and Hausmann (1999) and McKinnon (2001) claim that greater flexibility increases the cost of hedging, and, therefore, reduces the incentives to hedge foreign currency liabilities.

I employ the data collected in the CEMLA Survey in addition to the currency mismatch indicators introduced in the previous section to approach the ongoing debate on the links between exchange rate regimes and currency mismatches. Specifically, I study the relationship between mismatch, the volatility of the exchange rate and exchange rate regimes. I obtain information on the exchange rate regime in each country and quarter from Section 3 of the CEMLA Survey. Central banks provided a set of different

alternatives for their regime that can be grouped into three categories: *fixed exchange rate*, *pegged float* and *Floating*, which are labeled as *1, 2* and *3*, respectively. I created a fourth category labeled *foreign exchange controls* to capture the elimination of free access to foreign exchange by non-residents in Argentina in the fourth quarter of 2011, the prohibition of purchasing foreign currency without prior approval in the Eastern Caribbean Countries prior to the first quarter of 1996, and the existence of two regulated FX markets in Brazil prior to the third quarter of 2005. Table A1 displays the results of following this criterion to classify exchange rate regimes in the Appendix. Furthermore, I retrieved daily-frequency data on exchange rates from Bloomberg and calculated the coefficients of variation in the exchange rete for each country and quarter. [41, 42, 43]

Table 6 groups all quarters in which a country had the same regime and displays the average coeffcient of variation and the mean of the $CMABS_{iT}$ indicator for each group. Figure 5 sumarizes this information without taking the category labeled *foreign exchange controls* and the period when the pegged float took place in Chile into consideration –for the sake of clarity in the graph. Note that in this figure the coefficients of variation in the exchange rates are as predicted by theory: Most countries labeled *1*, thus having a non-flexible exchange rate regime, are located on the left-hand side of the graphs, most countries labeled *2* are located in the middle region, and most economies with greater flexibility and labeled *3* lie in the zone of high coefficients of variation. The figure does not reveal a clear relationship between the coefficient of variation in the exchange rate and the currency mismatch, primarily because this relationship is not clear within each group of exchange rate regimes. However, the figure depicts a pattern across regimes: the mean of the $CMABS_{iT}$ indicator decreases as we move from *fixed* to *pegged float*, but it increases as we move from the latter category to *floating*. This pattern is depicted in Figure 5 by the three red squares located in a *V-shaped* position, which show the average of the mean indicator and the average of the coefficient of variation by type of exchange rate regime. These statistics are depicted in Table A3 in the Appendix. Although this result should be interpreted cautiously because my analysis does not establish causal relationships, the evidence is consistent with the fact that greater flexibility reduces currency mismatches for low and middle degrees of flexibility; however, it increases mismatches if the regime is already suffciently flexible.

In order to verify the *V-shaped* result, I perform two robustness checks. It may be argued that the *V-shaped* result is driven by countries with few observations. Thus, I assign the same weight to all observations associated with the same regime, independent of the country to which they belong and take the average of $CMABS_{iT}$ over these observations. As shown in Table A2 of the Appendix, the qualitative implications of

[41] The coefficient of variation is defined as the standard deviation of the exchange rate divided by its mean.
[42] The Bloomberg data present some variation in the daily-exchange rates of countries with fixed exchange rate systems.
[43] The exchange rate taken is given by the amount of domestic currency per US dollar.

the *V-shaped* result remain unchanged. Second, I repeat the same exercise by employing Reinhart and Rogoff's coarse classification of exchange rate regimes.[44] Their classification has six groups of regimes, which are labeled as follows: *1* refers to *peg*; *2* refers to *crawling peg/band, band narrower or equal to +/- 2%*; *3* denotes *Crawling band, managed floating*; *4* is *freely floating*, and *5* and *6* denote *freely falling* and *dual parllel markets*, respectively. I dropped the latter two groups as I did with category *4* –FX controls– from CEMLA's classification, and ignore *freely floating*, for which there is no observation among the economies in Latin America and the Caribbean within the time frame considered. Thus, I am left with the first three groups, which are not exactly comparable with categories *1, 2* and 3 in my classification; however, they have one feature in common: They establish an ordinal scale in which a larger number denotes greater flexibility of the exchange rate regime. Table 8 shows the result from averaging $CMABS_{iT}$ and the standard deviation over all obsevations classified as belonging to the same regime.

Table 12 illustrates a V-shaped result in which the least and the most flexible exchange rate regimes have the greatets levels of currency mismatch. This evidence is consistent with the two strands of research mentioned at the beginning of the section, but it conditions the consistency to the flexibility level of the exchange rate regime.

Having linked the absolute value indicator with data on exchange rate volatility, let me now turn to the currency mismatch indicator that differentiates between the risk of foreign currency appreciation and the risk of foreign currency depreciation. I take advantage of CEMLA's information about foreign currency assets and liabilities to approach the capital losses generated by fluctuactions in the exchange rate. This exercise also allows me to gain a better understanding of exactly when and which foreign currency positions have changed from long to short, thereby following the discussion presented in the first subsection.

[44] The monthly classification can be found at <http://www.carmenreinhart.com/data/browse-by-topic/>. I transformed the monthly classification into a quarterly classification by using the exchange rate regime that was in place during a higher number of months in each quarter. Only a few quarters have more than one regime in the same quarter, and there is no quarter with more than two regimes.

Figure 5
Currency Mismatch Divergence across Regimes

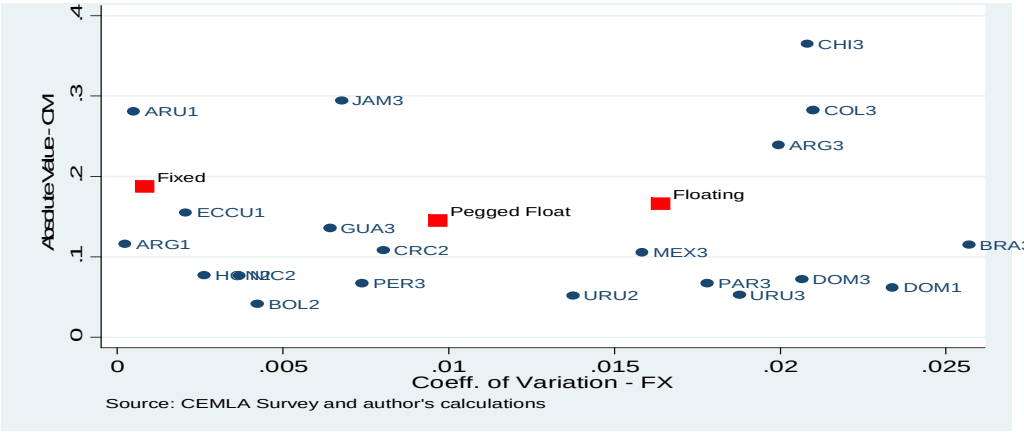


Table 12
CM Employing Reinhart & Rogoff's Regimes

Group	*Average*	*Coeff. of Variation -FX*
Peg	0.2003	0.0028
Narrow crawling peg and band	0.1569	0.0074
Managed floating, crawling band	0.2168	0.0197

Sources: CEMLA Survey, Reinhart and Rogoff's classification, and author's calculations.

I divide the countries from the sample into three groups based on whether they have changed the nature of their foreign currency position (from long to short or the other way around). Table 13 shows outcomes for economies with no change in the nature of the position. All of these economies have taken a long position over the entire period, and therefore, had capital losses as the foreign currency depreciated (domestic currency appreciated). The third column illustrates the number of periods in which capital losses occurred with the percentage that this number represents over the whole period in parentheses, and the fourth column lists the maximum foreign currency depreciation. The three largest economies (Argentina, Guatemala and Mexico) are those with the highest number and percentage of periods in which the domestic currency appreciated, and, therefore, represent the countries that experienced capital losses over more periods. These three economies, along with Costa Rica, are those in which the domestic currency appreciated the most. Nicaragua and Honduras are the countries with the lowest number and percentage of domestic currency appreciations and the lowest maximum appreciation.

Table 13
No Change in Nature of Foreign Currency Position

Country	*CM>1*	***Foreign Currency Depreciation ****	
		Periods	*Maximum*
ARG	1999Q4-2012Q3	**13**(33%)	**11.6 %**
ARU	1999Q1-2012Q3	**.**	**.**
CRC	1999Q4-2012Q3	**13**(25%)	**4.6 %**
GUA	2001Q2-2012Q2	**23**(51%)	**2.5 %**
HON	1998Q1-2012Q3	**5**(8%)	**2.2 %**
JAM	2000Q1-2012Q3	**8**(15%)	**2.6 %**
MEX	2000Q4-2012Q3	**28**(58%)	**7.6 %**
NIC	2008Q1-2012Q3	**0**(0%)	**.**

Source: CEMLA Survey and author's calculations.
* Quarters with a fixed exchange rate FX controls are excluded.

Table 14 shows the same results for countries with a change in the foreign currency position that lasted less than a year. Colombia, Dominican Republic, Paraguay, and Uruguay had a long foreign currency position in most quarters, whereas Brazil had a long position, as noted in the first subsection. With the exception of Uruguay, which switched positions after the Uruguayan financial crisis of 2002, all of the countries changed the nature of their foreign currency position in the second half of the 2000s. Uruguay, Colombia and Paraguay had capital losses generated by appreciations in the domestic currency in a similar percentage of periods as Mexico, Guatemala and Argentina in at least one interval of time. Interestingly, the highest appreciation is observed in the second half of the 2000s for all of these economies. The Dominican Republic was the economy with the highest appreciation, which occurred as the peso returned to its pre-crisis value in 2004. In Brazil the period with the greatest capital loss was the third quarter of 2008, when the financial crisis triggered by the collapse of Lehman Brothers caused a 31.5% depreciation in the real.

Economies that switched the nature of their foreign currency position for longer than a year are depicted in Table 15. Note again, that most countries switched from a long to a short position in the second half of the 2000s. Peru is the economy with the highest proportion of periods with capital losses and the highest number of switches followed by Chile and the Eastern Caribbean countries. Tables 14 and 15 confirm that Peru, Colombia and Chile switched positions more frequently than Paraguay, Aruba and Jamaica, respectively, as mentioned in our discussion of Table 5 in the first subsection. Regarding the variation in the exchange rates, the highest appreciation and depreciation are observed for Chile during the pegged float regime and the period beginning in 2007, respectively.

Table 14
Changes in the Nature of Position Less Than a Year

Country	*CM>1*	***Foreign Currency Depreciation****		*CM<1*	***Foreign Currency Appreciation****	
		Periods	*Maximum*		*Periods*	*Maximum*
BRA	2006Q2	1(100%)	0.7%	2001Q1-2006Q2	0(0%)	.
				2006Q3-2012Q3	9(36%)	31.5%
COL	2000Q1-2006Q4	18(64%)	5.5%	2007Q1	0(0%)	.
	2007Q2-2012Q3	11(50%)	10.1%			
DOM	2000Q4-2011Q1	6(19%)	33.2 %	2011Q2	1 (100%)	0.2%
	2011Q3	0 (0%)	.	2011Q4	2 (100%)	13.4%
	2012Q1-2012Q3	0 (0%)	.			
PAR	1995Q1-2009Q3	21(36%)	12.4%	2009Q4-2010Q1	1(50%)	1.1%
	2010Q2-2010Q4	1(33%)	6.3%	2001Q1	0(0%)	.
	2011Q2-2012Q3	3(50%)	2.1%			
URU	1999Q4-2002Q2	0(0%)	1%	2002Q3-2003Q2	3(75%)	5.2%
	2003Q3-2012Q3	22(59%)	11.1%			

Sources: CEMLA Survey and author's calculations.
* Quarters with a fixed exchange rate FX controls are excluded.

Several conclusions can be drawn from Tables 14 and 15. The phenomenon of short foreign currency positions primarily began in the second half of the 2000s. This suggests that there had been a change in the currency mismatch trend; the causes of this change have yet to be studied. Furthermore, several economies switched from a long to a short foreign currency position in 2007 and in 2009, when the economies in the region received strong capital inflows. Putting these facts together and considering the fact that currency mismatch increased in Chile as the price of the peso fell during the pegged float regime, raises the question of how much of the change in currency mismatch is correlated with the change in exchange rates. I approach this issue by calculating the correlation between the currency mismatch trend and the rate of change in the trend of the exchange rate. This approach is related to Lane and Shambaugh's work (2010), who found that depreciations during bad times are associated with a longer position in foreign currencies. However, three relevant features should be considered. Lane and Shambaugh account for external foreign currency positions, but ignore the internal mismatches that I consider, as noted above. Whereas I investigate the correlation between foreign currency positions and rates of change in the exchange rate, they investigate how the covariance between the exchange rate and domestic output affects these positions. Third, they propose a theoretical frameowrk and aim at establishing causal relationships in their empirical work. Although establishing a causal relationship is beyond the scope of this paper, the evidece presented herein opens a line for further research.

Table 15
Changes in the Nature of Position Longer Than a Year

Country	*CM>1*	***Foreign Currency Depreciation****		*CM<1*	***Foreign Currency Appreciation****	
		Periods	*Maximum*		*Periods*	*Maximum*
BOL	2000Q1-2010Q3	15(35%)	3.4%	2010Q4-2012Q3	1(12%)	0 %
CHI	1992Q1-2003Q1	14(31%)	7.0%	2003Q2-2003Q4	0(0%)	.
	2004Q1-2007Q3	9 (60%)	5.9%	2007Q4-2012Q3	9(45%)	21.6%
ECCU	1992Q1-1996Q2	.	.	1996Q3-1998Q3	.	.
	1998Q4-2009Q2			2009Q3-2012Q1		
PER	2000Q1-2007Q1	18(72%)	2.7%	2007Q2	0(0%)	.
	2007Q3	1(100%)	4.8%	2007Q4-2008Q1	1(33%)	3.0%
	2008Q3-2009Q2	2(50%)	5.1%	2009Q3-2011Q1	2(14%)	0.2%
	2011Q2-2011Q4	3(100%)	1.5%	2012Q1	0(0%)	.
	2011Q2-2012Q3	2(100%)	1.8%			

Sources: CEMLA Survey and author's calculations.
* Quarters with a fixed exchange rate FX controls are excluded.

Table 16 depicts the correlation coefficient between the trend of the currency mismatch indicator and the rate of change in the trend of the exchange rate; countries are shown in a descending order based on the strength of the correlations. I obtained the trends for the series by employing the Hodrick-Prescott filter and display the correlations for first two lags and leads as well as for the current value of the exchange rate measure. The variation in currency mismatch has a correlation higher than 85% on average with the variation of a single variable (the trend of the exchange rate) for Costa Rica, Chile, Paraguay, Perú and Jamaica. Note that correlations are positive for all of these economies, indicating that appreciations in the foreign currency are associated with longer foreign currency positions. This tendency is also observed for Bolivia, Honduras and Dominican Republic, which present positive and moderate-high correlations over the entire period. On the other hand, the coefficients for Guatemala, Colombia and Mexico are low and, interestingly, their sign varies across the lags and leads. The change of sign demonstrates that the rate of change in the trend of the exchange rate is impersistent, which partially explains the low correlation coefficients. Brazil and Nicaragua present negative coefficients, but the change in currency mismatch can still be explained by a measure of variation in the exchange rate. Table 11 reveals the correlation between the trend of currency mismatch and the trend of the exchange rate for these countries. For both economies, the correlation coeffcients are positive and high, indicating that the appreciations in the foreign currency are also associated with longer foreign currency positions in these economies. This pattern is not observed for Uruguay, where the trend of the currency mismatch indicator presents a negative correlation with the measure of variation in the exchange rate.

TABLE 16
Correlations between CM and FX Rate–trends

Country	*FXR(t–2)**	*FXR(t–1)*	*FXR(t)*	*FXR(t+1)*	*FXR(t+2)*
CRC	0.984	0.989	0.994	0.997	0.999
CHI	0.888	0.891	0.892	0.888	0.880
PAR	0.888	0.898	0.907	0.913	0.916
PER	0.819	0.812	0.806	0.802	0.798
JAM	0.802	0.831	0.855	0.875	0.891
BOL	0.605	0.568	0.532	0.497	0.462
HON	0.546	0.569	0.588	0.603	0.613
DOM	0.487	0.452	0.420	0.390	0.361
GUA	0.239	0.165	0.083	–0.007	–0.102
ARG	0.119	0.040	–0.042	–0.130	–0.229
COL	0.049	0.006	–0.038	–0.082	–0.127
MEX	–0.031	–0.029	–0.019	–0.008	0.005
URU	–0.779	–0.763	–0.740	–0.712	–0.680
BRA	–0.982	–0.969	–0.951	–0.931	–0.908
NIC	–0.999	–0.999	–0.999	–0.999	–0.999

Sources: CEMLA Survey and author's calculations.
*FX(t-2) represents the rate of change in the trend of the exchange rate at t-2.

Overall, Tables 15 and 16 suggest that the changes in currency mismatch are correlated with different measures of variation in the exchange rate. As mentioned above, proving a theoretical explanation and establishing casuality remain subjects for further research, which can now be accomplished using CEMLA's database.

Table 17
Correlations between CM and FX (Trends)

Country	*FX(t-2) **	*FX(t-1)*	*FX(t)*	*FX(t+1)*	*FX(t+2)*
BRA	0.745	0.726	0.706	0.685	0.662
NIC	0.996	0.996	0.996	0.996	0.996

Source: CEMLA Survey and author's calculations.
* FX(t-2) represents the trend of the exchange rate at *t*-2.

6. CONCLUSIONS

Currency mismatch is associated with foreign currency risk, and, therefore, is a potential source of systemic risk and financial instability. With a history of high levels of partial dollarization, the economies in Latin America and the Caribbean are particularly vulnerable to currency mismatches. Thus, properly measuring these mismatches is highly relevant for the economies in the region and an important

tool in the decision-making process when financial stability is a major concern. In this paper, I have filled data gaps by collecting information on foreign currency assets and liabilities from the Latin American and Caribbean banking sectors.. The data that I have collected exhibit several properties that make them appropiate for running policy analysis and accomplishing cross-country comparative studies.

I have linked the data to several topics from the literature with the goal of promoting the use of CEMLA's database among researchers from the central bank members. Further research could employ rigorous econometric methods to establish casual relationships between policies aimed at reducing currency mismatches and the indicators that I have proposed. The basic policy analysis that I conducted in Section 5 suggests that there is a significant need for this type of research. Further research could also investigate the causes of currency mismatch and the role of variations in the exchange rate more deeply, thereby continuing the strand of literature initated by Lane and Shambaugh (2010). An interesting question is how powerful the data are in predicting a financial crisis. In order to answer this question, CEMLA's database on the banking sector should be combined with information from other economic sectors. Along these lines, I plan to rebuild the aggregate currency mismatch indicator proposed by Goldstein and Turner (2004) using CEMLA's data.

The database constructed by CEMLA provides useful information for assessing currency mismatches, but it also provides an interesting exercise showing that there exist potential gains from achieving research coordination. There are several areas of study that would benefit from filling other data gaps. Hopefully, further research coordination will fill these gaps and promote knowledge sharing in Latin America and the Carribean.

7. APPENDIX

A. APPENDIX TO SECTION III

This Appendix displays the account category allocation that was sent to the official from each central bank. I display one table per country. Below each table, I display notes that clarify the content of accounts that could be thought of as *breaking comparability*. Note that the categories labeled "Loans" and "Money & deposits" are the most homogeneous across countries with respect to the concepts involved. On the other hand, the category "Other assets (liabilities)" is the most heterogeneous, because it is thought to capture residual foreign currency assets (liabilities) that should not be incorporated into the remaining categories.

Argentina

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Títulos públicos y privados en moneda extranjera	125000, 126000	Investment	Bonos corporativos	
Loans	Préstamos en moneda extranjera, créditos diversos en moneda extranjera	135000, 136000, 175000, 176000	Loans	Líneas de crédito con el exterior	
Money and Deposit	Disponibilidades en moneda extranjera	115000, 116000	Money and Deposit	Depósitos en moneda extranjera	315000, 316000
Other assets	Saldos deudores en moneda extranjera	235000	Other liabilities	Saldos acreedores en Moneda Extranjera	355000
	Participaciones en otras sociedades en moneda extranjera	165000		Obligaciones diversas	335000, 336000
	Otros créditos por intermediación financiera en moneda extranjera	145000, 146000		Otras obligaciones por intermediación financiera en moneda extranjera	325000, 326000
	Créditos por arrendamientos financieros en moneda extranjera	155000		Obligaciones subordinadas	365000, 366000
	.....	.....		...	....
Derivatives	-	-	Derivatives	-	-

Notes: Argentina's accounting manual only establishes minimum guidelines for reporting data.
Neither corporate bonds nor "Foreign lines of credit" appear in the accountign manual but commercial banks deliver these data. Corporate bonds and subordinated debt, which corresponds to the category "Other assets"" are aggregated in the data delivered and thus in the database.

Bolivia

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Inversiones temporarias	120	Investment	Valores en circulación	260
	Inversiones permanentes	160			
Loans	Cartera	130	Loans		
Money and Deposit	Disponibilidades	110	Money and Deposit	Obligaciones	210, 220, 230, 280
Other assets	Otras cuentas por cobrar	140	Other liabilities	Otras cuentas por pagar	240
	Bienes realizables	150		Previsiones	250
	Bienes de uso	170			
	Otros activos	180		Obligaciones subordinadas	270
	...	-		...	-
Derivatives			Derivatives		

Notes: "Valores en circulación" on the liabilities side include bonds, cédulas hipotecarias and pagarés bursátiles. No account on the laibilities side refers to loans.

Chile

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Instrumentos para negociación, y de inversión disponibles para la venta	1150, 1350	Investment	Instrumentos de deuda emitidos	2400
	Instrumentos de inversión hasta el vencimiento	1360			
Loans	Adeudado por bancos; colocaciones comerciales, para vivienda, de comsumo	1270, 1302, 1304, 1305	Loans	Obligaciones con bancos, otras obligaciones financieras	2300, 2500
Money and Deposit	Efectivo y depositos en bancos	1100	Money and Deposit	Depósitos y otras obligaciones a la vista, depósitos y otras captaciones a plazo	2100, 2200
Other assets	Operaciones de liquidación en curso	1130	Other liabilities	Operaciones con liquidación en curso	2130
	Contratos de retrocompra y préstamos de valores	1160		Contratos de retrocompra y préstamos de valores	2160
	Provisiones consitutuidas	1309		Impuestos corrientes/diferidos	2600, 2650
	Inversión en sociedades	1400			
	Intangible	1500		Provisiones	2700
	Activo fijo	1600			
	Impuestos corrientes, diferidos	1700, 1750		Otros pasivos	2800
	Otros activos	1800			
	...	-		...	-
Derivatives	Contratos de derivados financieros de negociación, de cobertura contable	1250.1, 1250.2	Derivatives	Contratos de derivados financieros de negociación, de cobertura contbale	2250.1, 2250.2

Notes: "Otras obligaciones financieras" refers to credit borrowed from agents or institutions that are present/resident in Chile.

Colombia

Foreing Currency Assets				Foreing Currency Liabilities		
	Account name	Account number			Account name	Account number
Investment	Inversiones negociables, disponibles para la venta, de cobertura, derechos de recompra, de transferencia (corto plazo)	1302, 1303, 1304, 1306, 1313, 1316, 1317, 1326, 1329, 1331, 1335	13	Investment	Títulos de inversión en circulación	26
	Inversiones permanentes, para mantener hasta el vencimiento, no negociables; derechos de transferencia para mantener hasta el vencimiento (largo plazo)	1308, 1312, 1314, 1318, 1319, 1333			Bonos obligatoriamente convertibles en acciones	29
Loans	Cartera de créditos y operaciones de leasing financiero	14		Loans	Créditos de bancos y otras obligaciones financieras	24
Money and Deposit	Disponible	11		Money and Deposit	Depósitos y exigibilidades	21
Other assets	Posiciones activas en operaciones de mercado monetario y relacionadas	12		Other liabilities	Posiciones pasivas en operaciones de mercado monetario y relacionadas	22
	Cuentas por cobrar	16			Cuentas por pagar	25
	Propiedades y equipo	18			Pasivos estimados y provisiones	28
	Otros activos	19			Otros pasivos	27
	Aceptaciones bancarias en plazo	1505			Aceptaciones bancarias en plazo	2305
	Aceptaciones bancarias después del plazo	1510			Aceptaciones bancarias después de plazo	2310
	...	-			...	-
Derivatives	Derechos de compra, de venta, de monedas, otros derechos	1512, 1515, 1516, 1517, 1565, 1567, 2315, 2316, 2317, 2365, 2367		Derivatives	Obligaciones de compra, de venta, de monedas	2315, 2316, 2317, 2365, 2367, 1512, 1515, 1516, 1517, 1565, 1566, 1567

Notes: This allocation was jointly created with the Banco de la República, Colombia.

Costa Rica

Foreing Currency Assets			Foreing currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Inversiones temporales	120	Investment	Obligaciones convertibles en capital	270
	Inversiones permanentes	160			
Loans	Cartera de créditos	130	Loans	Préstamos con entidades financieras del país, y con entidades financieras del exterior	232.10, 232.11
Money and Deposit	Disponibilidades	110	Money and Deposit	Obligaciones con el público, con el BCCR, con otras entidades	210, 220, 230-232.10 232.11
Other assets	Otras cuentas por cobrar	140	Other liabilities	Cuentas por pagar y provisiones	240-241
	Bienes realizables	150		Obligaciones subordinadas	260
	Bienes de uso	170			
	Otros activos	180		Otros pasivos	250
	Activos para actividades distintas a la intermediación financiera	190		Grupos pasivos por actividades distintos a la intermediación financiera	280
	...	-		...	-
Derivatives	Diferencial de posición en instrumentos financieros derivados	126	Derivatives	Diferencial de posición en instrumentos financieros derivados	241

Notes: "Obligaciones con otras entidades" includes *obligaciones a la vista, obligaciones a plazo* and *obligaciones por aceptaciones*, among other concepts.

Dominican Republic

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Inversiones en valores a negociar, disponibles para la venta	131, 132	Investment	Valores en poder del público	220
	Inversiones en valores mantenidas hasta su vencimiento, inversiones permanentes en acciones	133, 160		Obligaciones convertibles en capital	290
Loans	Cartera de créditos	120	Loans	Financiamientos obtenidos	230
Money and Deposit	Disponibilidades	110	Money and Deposit	Depósitos del público y obligaciones financieras	210, 240
Other assets	Otras inversiones en instrumentos de deuda	134	Other liabilities	Acreedores y provisiones diversos	250
	Valores de disponibilidad restringida	135			
	Fluctuaciones	136		Obligciones subordinadas	280
	Rendimientos por cobrar por inversiones	138		Fondos de administración	270
	Previsión para inversiones en valores y rendimientos por cobrar	139			
	Cuentas a recibir	140		Otros pasivos	260
	Activos fijos	150			
	Otros activos	170		...	-
	...	-			
Derivatives			Derivatives		

Notes: "Otras inversiones en instrumentos de deuda" comprises financial investments that should not be included in other categories of investment due to their unique characteristics. "Obligaciones financieras" comprises financial obligations that should not included in other categories.

Guatemala

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	En títulos-valores para negociación, para la venta, operaciones de reporto, acciones en moneda extranjera	102601, 102602, 102604, 106601	Investment	Obligaciones financieras en moneda extranjera	3036
	En títulos-valores para su vencimiento, certificados de participación	102603, 102605			
Loans	Cartera de créditos en moneda extranjera	1036	Loans	Créditos obtenidos en moneda extranjera	3026
Money and Deposit	Disponibilidades en moneda extranjera	1016	Money and Deposit	Obligaciones depositarias en moneda extranjera	3016
Other assets	Intereses pagados en compra de valores	102609	Other liabilities	Cuentas por pagar en moneda extranjera	3056
	Cuentas por cobrar en en moneda extranjera	1046		Provisiones en moneda extranjera	3066
	Bienes realizables en moneda extranjera	1056			
	Otras inversiones en moneda extranjera	1076		Sucursales, casa matriz y departamentos adscritos en moneda extranjera	3076
	Sucursales, casa matriz y departamentos adscritos en moneda extranjera	1086			
	Inmuebles y muebles en moneda extranjera	1096		Otras obligaciones en moneda extranjera	3086
	Cargos diferidos en moneda extranjera	1106		Créditos diferidos en moneda extranjera	3096
	...	-		...	-
Derivatives			Derivatives		

Notes: "Obligaciones financieras" on the liabilities side refers to bonds, *pagarés financieros, obligaciones financieras a la orden* and *obligaciones financieras con restricciones.*

Honduras

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Inversiones en moneda extranjera	1022	Investment		
Loans	Préstamos, descuentos y negociaciones en moneda extranjera	1032	Loans	Obligaciones bancarias en moneda extranjera	2042
Money and Deposit	Disponibilidades en moneda extranjera	1012	Money and Deposit	Exigibilidades inmediatas en moneda extranjera	2012
				Exigibilidades a térumino en moneda extranjera	2022
Other assets	Otros activos en moneda extranjera	1042	Other assets	Otras exigibilidades en moneda extranjera	2032
	Sucursales, agencias y casa matriz en moneda extranjera	1052			
	Activos eventuales en moneda extranjera	1062		Reservas técnicas en moneda extranjera	2052
	Cargos diferidos en moneda extranjera	1082			
	Bienes de arrendamiento financiero en moneda extranjera	1092		Créditos diferidos en moneda extranjera	2062
	Activos contingentes	401		Pasivos contingentes	402
	...	-		...	-
Derivatives			Derivatives		

Notes: "Activos eventuales en moneda extranjera" refers to real estate and financial assets whose property has been assigned in court.

Mexico

Foreing Currency Assets		Foreing Currency Liabilities	
Foreing Currency Assets. Total		Foreing Currency Liabilities. Total	
Investment	Inversión en valores, deudores por reporto	Investment	
	Inversiones permanentes, activos de larga duración disponibles para la venta		
Loans	Cartera de crédito	Loans	Préstamos interbancarios
Money and Deposit	Disponibilidades	Money and Deposit	Captación tradicional
Other Assets	Derechos de cobro adquiridos	Other Liabilities	Créditos diferidos y cobros anticipados
	Beneficios por recibir en ops. de bursatilización		Obligaciones en operaciones de bursatilización
	Otras cuentas por cobrar		Otras cuentas por pagar
	Bienes adjudicados		Obligaciones subordinadas
	Inmuebles, mobiliario y equipo		Valores asignados por liquidar
	Impuestos diferidos		Impuestos diferidos
	Otros activos		
	...		...
Derivatives	Con fines de negociación, y de cobertura	Derivatives	Con fines de negociación, y de cobertura

Notes: The allocation is based on the balance sheets of banks that appear on the official website of the Comisión Bancaria y de Valores. The data delivered by the Banco de México includes small amounts –different from 0– in the category *investments* on the liabilities side in the first four quarters; we are waiting for Mexico to proceed through the second stage of the data collection process to learn what these small amounts refer to.

Nicaragua

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Inversiones al valor razonable con cambios en resultados, inversiones disponibles para la venta, operaciones de reporto	1201, 1204, 1301, 1302, 1303, 1304, 1305	Investment	Operaciones con valores, obligaciones convertibles en capital	2200-2206-2207, 2903
	Inversiones mantenidas hasta el vencimiento, permanentes en acciones	1207, 1700			
Loans	Cartera de créditos		Loans	Obligaciones con instituciones financieras y otros organismos	2300
Money and Deposit	Disponibilidades	1100	Money and Deposit	Obligaciones inmediatas	2100
Other investment	Cuentas por cobrar	1400	Other liabilities	Otras cuentas por pagar y provisiones	2400
	Bienes de uso	1500		Reservas por obligaciones laborales para el retiro	2500
				Otros pasivos	2600
	Otros activos	1600		Ingresos diferidos	2700
				Operaciones pendientes de imputación	2800
	...	-		Obligaciones subordinadas	2901, 2902
				...	-
Derivatives	Operaciones con instrumentos financieros derivados	1306	Derivatives	Operaciones con instrumento financieros derivados	2206

Notes: Although there is no specific account devoted to the concepts in the category *loans* on the liabilities side, commercial banks report the data to the central bank. Our database offers this information.

Paraguay

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Inversiones temporales	12000	Investment		
	Invesiones permanentes	17000			
Loans	Cred. interm. financ. SF, interm. financ SNF, diversos, vencidos	13000, 14000, 15000, 16000	Loans	Obligaciones por intermediación financiera SNF, SF	2100, 2200
Money and Deposits	Disponibilidades	1100	Money and Deposit		
Other assets	Bienes de uso	18000	Other liabilities	Obligaciones diversas	24000
	Cargos diferidos	19000		Previsiones y provisiones	25000
	...	-		...	-
Derivatives			Derivatives		

Notes: On the liabilities side, both "Obligaciones por intermediación financiera SF" and "Obligaciones por intermediación financiera SNF" include loans borrowed by banks and deposits.

Peru

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Inversiones financieras temporales	1301	Investment		
	Inversiones financieras permanentes	1302			
	Inversiones en instituciones financieras del exterior, en instituciones internacionales, en subsidiarias y sucursales del exterior	1303, 1304, 1305			
Loans	Fondos interbancarios, colocaciones	12, 14	Loans	Adeudos y otras obligaciones financieras, fondos interbancarios	22, 25
Money and Deposit	Disponible	11	Money and Deposit	Obligaciones inmediatas, depósitos de ahorro, depósitos a plazo, depósitos del sistema financiero y organismos internacionales	21, 23, 24, 26
Other assets	Cuentas por cobrar	16	Other liabilities	Cuentas por pagar	27
	Bienes realizables y adjudicados	17		Otros pasivos	28
	Activo fijo	18		Provisiones	29
	Otros activos	19			
	...	-		...	-
Derivatives			Derivatives		

Notes: On the liabilities side, there is no account assigned to the concepts in the category *investments*. Accordingly, the Banco Central de la Reserva del Perú has not delivered data referring to "Investments."

Uruguay

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Valores para negociación, disponibles para la venta	012000	Investment		
	Valores para inversiones al vencimiento				
Loans	Créditos	013000, 014000, 016000	Loans	Obligaciones por intermediación financiera SF	21000
Money and Deposit	Disponible	011000	Money and Deposit	Obligaciones por intermediación financiera SNF	22000
Other assets	Bienes de uso	018000	Other liabilities	Obligaciones diversas	023000
	Cargos diferidos	019000			
				Provisiones	024P00
	Inversiones	017000		Previsiones	025000
				Interés minoritario	026000
	...	-		...	-
Derivatives			Derivatives		

Notes: Account number 017000 includes assets whose property has been assigned by the court, other assets, investments in foreign branches, and so on.

Venezuela

Foreign Currency Assets			Foreign Currency Liabilities		
	Accoutn name	Account number		Accoutn name	Account number
Investment	Inversión en títulos valores para negociar, disponibles para la venta, en otros títulos valores	121, 122, 126	Investment	Título valores emitidos por la institución	216, 241.05, 242.02, 243.10, 244.04
	Inversiones en títulos valores mantenidas hasta su vencimiento	123			
Loans	Cartera de créditos	130	Loans		
Money and Deposit	Disponibilidades	110	Money and Deposit	Captaciones del público, obligaciones con el BCV, captaciones y obligaciones con el Banco Nacional de Vivienda y Hábitat	210-216, 220, 230
Other assets	Intereses y comisiones por cobrar	140	Other liabilities	Otros financiamientos obtenidos	240-241.05-2424.02-243.10-244.04
	Inversiones en empresas filiales, afiliadas y sucursales	150		Otras obligaciones por intermediación financiera	250-253
	Bienes realizables	160		Intereses y comisiones por pagar	260
	Bienes de uso	170		Acumulaciones y otros pasivos	270
	Otros activos	180-188.14		Obligaciones subordinadas	280
	...	-		Otras obligaciones	290
				...	-
Derivatives	Derechos por operaciones de derivados	188.14	Derivatives	Obligaciones por operaciones con derivados	253

Ecuador

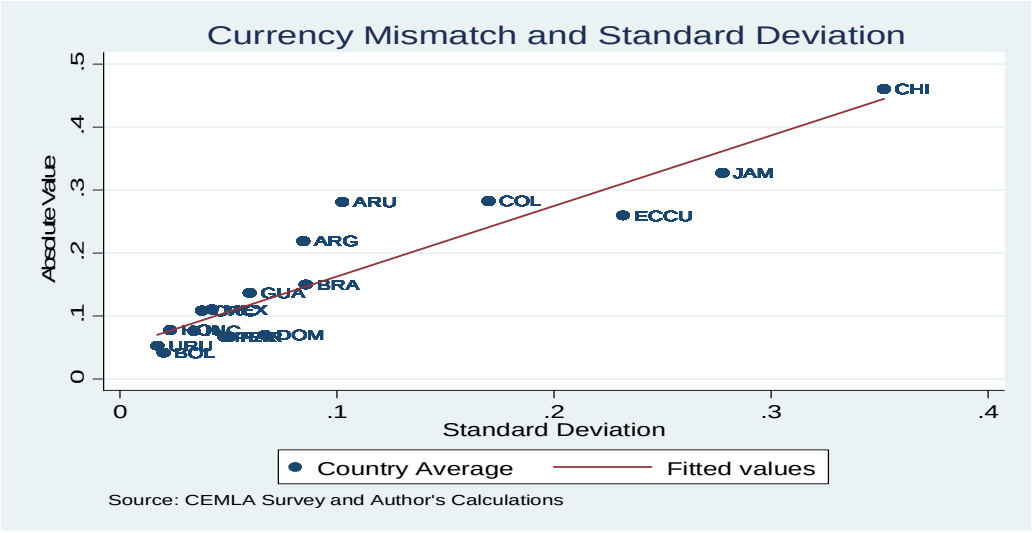
Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Inversiones (corto plazo y largo plazo)	13	Investment	Valores en circulación	27
				Obligaciones inmediatas	23
				Obligaciones convertibles en acciones	28
Loans	Cartera de créditos (corto plazo y largo plazo)	14	Loans		
Money and Deposit	Fondos disponibles	11	Money and Deposit	Obligaciones con el público	21
Other assets	Operaciones interbancarias	12	Other liabilities	Aceptaciones en circulación**	24
	Deudores por aceptaciones	15		Operaciones interbancarias	22
	Cuentas por cobrar	16		Cuentas por pagar	25
	Bienes realizables	17		Obligaciones financieras	26
	Propiedades y equipo	18		Otros pasivos	29
	Otros activos	19			

Non-Spanish-Speaking Countries

Foreing Currency Assets			Foreing Currency Liabilities		
	Account name	Account number		Account name	Account number
Investment	Marketable securities, available for sale investments, hedge investments, repurchase rights, transfer rights (short term)	13	Investment	Investment securities in circulation	26
	Investments held to maturity, non marketable investments, transfer rights to hold to maturity (long term)			Bonds mandatorily convertible into shares	29
Loans	Loans and financial leases	14	Loans	Bank loans and other financial obligations	24
Money and Deposit	Availabilities	11	Money and Deposit	Deposits and payables	21
Other assets	Active positions in money market operations and related	12	Other liabilities	Pasive positions in money market operations and related	22
	Receivable accounts	16		Payable accounts	25
	Property and equipment	18		Estimated liabilities and provisions	28
	Other assets	19		Other liabilities	27
	Term bank acceptances	1505		Term bank acceptances	2305
	After term bank acceptances	1510		After term bank acceptances	2310
	...	-		...	-
Derivatives	Call options, put options, forwards, futures, swaps	15, 23	Derivatives	Call options, put options, forwards, futures, swaps	15, 23

B. Appendix to Section VI

Figure A1



Notes: The countries with higest levels of currency mismatch are also those with the highest volatility of the indicator.

Figure A2

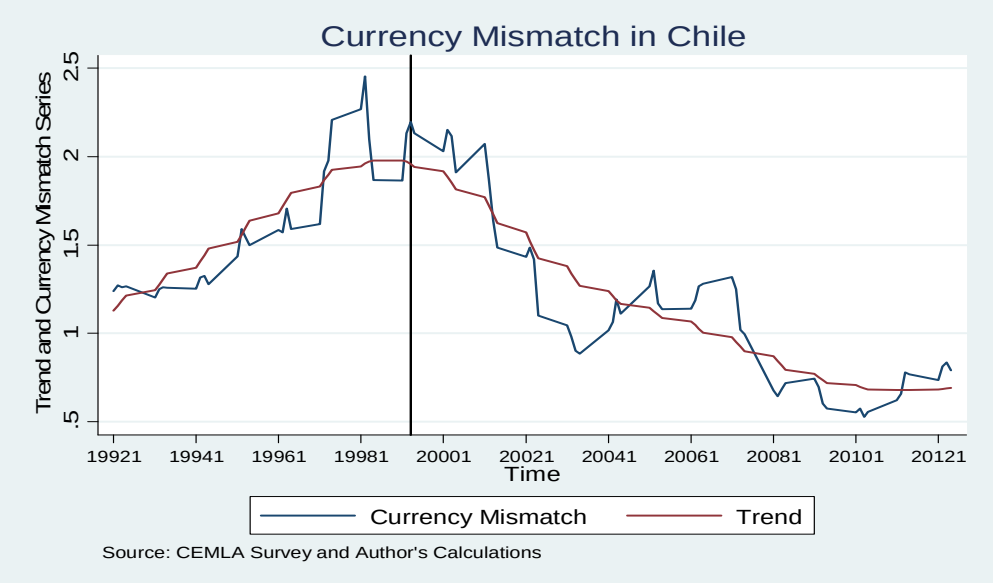


Figure A2 should be thought of as a complement to Table 8, in which Chile's currency mismatch is 2.6 times a standard deviation higher than the average mismatch. Note in the Figure that the abnormally high value of the indicator is due to the levels reached from 1992 to 1999Q3, when the pegged float regime established by the central bank induced a series of reductions in the price of the peso. Note also the change in the trend of currency mismatch as the exchange rate regime was abandoned.

Figure A3

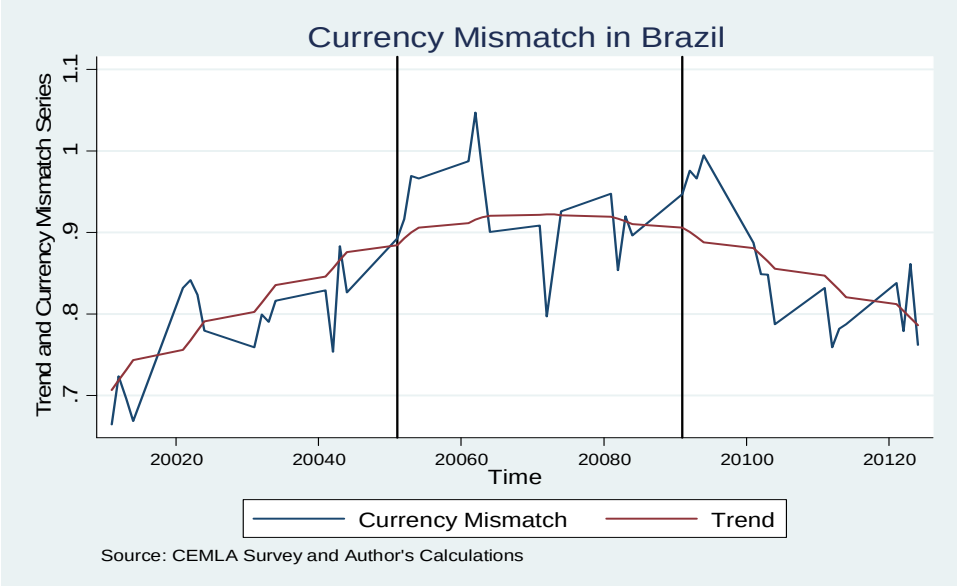


Figure A3 should be thought of as a complement to Table 10, in which currency mismatch reaches low values in Brazil, as well as Table 16, in which the trends of currency mismatch and the exchange are highly correlated for Brazil. Note in the Figure that the trend in currency mismatch reaches the lowest values at the beginning of the sample period, when a dual FX market emerged in Brazil. The two markets were highly regulated, with limits on long

foreign currency positions over which additional reserves were required. The regulation of foreign currency positions and the existence of a dual market gradually eased by 2005, and the currency mismatch correspondingly converged to the level of other Latin American and Caribbean economies. In this regard, note the spike in the first quarter of 2005: the currency mismatch increased as a result of the unification of the MCTF and the MCTL foreign currency mismatch. The increase in the trend of currency mismatch and convergence towards *normal values* continued until the Lehman Brothers episode, when the real appreciates, triggeirng a decrease in the currency mismatch.

Table A1
Exchange Rate Regimes Declared and FX Controls

Country	*Period*	*Regime*	$CMABS_{iT}$	*Coefficient of Variation-FX*
ARG1	1999Q4-2001Q4	1	0.1161	0.000247
ARG3	2001Q1-2011Q3	3	0.2392	0.019944
ARG4	2011Q4-2012Q3	4	0.2503	0.008050
ARU1	1991Q1-2012Q4	1	0.2814	0.000500
BOL2	2001Q1-2012Q4	2	0.0415	0.004227
BRA4	2001Q1-2005Q1	4	0.2130	0.035532
BRA3	2005Q2-2012Q4	3	0.1149	0.025685
CHI2	1992Q1-1999Q3	2	0.6228	0.012270
CHI3	1999Q4-2012Q4	3	0.3648	0.020812
COL3	2000Q1-2012Q3	3	0.2824	0.020990
CRC2	1999Q4-2012Q3	2	0.1082	0.008020
DOM1	2000Q4-2003Q1	1	0.06181	0.0233939
DOM3	2003Q2-2012Q4	3	0.07217	0.0206476
ECCU1	1993Q2-1995Q4	1	0.1550	0.002074
ECCU4	1996Q1-2012Q1	4	0.2787	0.002846
GUA3	2001Q2-2012Q2	3	0.1362	0.006421
HON2	1998Q1-2012Q4	2	0.0773	0.002625
JAM3	2001Q1-2012Q4	3	0.2942	0.006767
MEX3	2000Q4-2012Q3	3	0.1056	0.015843

NIC2	2008Q1-2012Q3	2	0.0765	0.003689
PAR3	1995Q1-2012Q3	3	0.0672	0.017800
PER3	2001Q1-2012Q4	3	0.0673	0.007382
URU2	1999Q4-2002Q2	2	0.0516	0.013746
URU3	2002Q3-2012Q4	3	0.0526	0.018770

Source: CEMLA Survey and author's calculations.

Table 1 displays the exchange rate regimes declared by central banks along with the fourth category referring to FX controls.

Table A2
CM by Regime, CEMLA's Classification

Group	*Average* $CMABS_{iT}$	*Coeff. of* ***var.*** *-FX*
Fixed	0.1841	0.0009
Pegged float	0.1485	0.0097
Floating	0.1633	0.0160

Source: CEMLA Survey and author's calculations.

Table A3
My Classification, by Observation

Group	*Average* $CMABS_{iT}$	*Coeff. of Var. -FX*
Fixed	0.2216	0.0005
Pegged float	0.1499	0.0063
Floating	0.1659	0.027

Source: CEMLA Survey and author's calculations.

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