European Bank
for Reconstruction and Development

Addressing private sector currency mismatches in emerging Europe

Jeromin Zettelmeyer, Piroska M. Nagy, and Stephen Jeffrey

Summary

This paper provides a survey of the theoretical and empirical literature on the dollarisation of corporate and household liabilities; presents evidence on the causes of FX lending specifically in transition economies; and proposes a set of criteria to help decide on the right policy response based on country characteristics. These criteria particularly affect the extent to which regulation should be part of the policy response. Regulation to contain FX mismatches is useful in relatively advanced countries in which small market size and/or proximity to the euro make it difficult to fully develop local currency capital markets. In contrast, regulatory responses could be counterproductive in less advanced countries with high macroeconomic volatility. In these countries, the route to de-dollarisation first and foremost requires the strengthening of macroeconomic institutions.

INTRODUCTION

The 2008–09 financial crisis has highlighted the problems associated with currency mismatches on the balance sheets of emerging market borrowers, particularly in emerging Europe. Currency mismatches aggravated the crises in countries with large currency depreciations, such as Ukraine, and complicated the crisis response and induced highly contractionary macroeconomic policies in countries that defended their pegs, such as Latvia.

As a result, the question of how these economies can better manage their foreign exchange (FX) risk—or even "de-dollarise"— is again receiving much attention in the ongoing policy debate.[1] It also has begun to translate into tougher regulation. For example, in December 2009, Hungary adopted new regulations that require higher household debt servicing capacity and lower loan-to-value ratios for consumer and mortgage borrowing denominated in foreign exchange. Ukraine banned foreign exchange lending to households outright in late 2008 and set stringent provisioning requirements for FX lending to enterprises in June 2009. In Kazakhstan the authorities limit FX exposures through a variety of prudential measures (for example, higher provisioning for new FX loans to unhedged borrowers), and outright prohibition of lending in FX to unhedged borrowers is also under discussion. Poland, one of the first countries in the region to regulate FX lending ("Recommendation S"; see Box 1), has recently strengthened regulation further in the context of a general tightening of lending standards ("Recommendation T," passed in February 2010). The European Commission has also contemplated introducing European Union (EU)–wide higher regulatory requirements on unhedged FX borrowers via macro prudential and capital requirements, although these are unlikely to be introduced any time soon.

Proposals to tackle the FX lending problem mainly through regulation rest on an implicit assumption that foreign currency lending in the transition region was driven by forces similar to those underlying the precise capital inflow and credit boom more generally, namely, a subordination of fear (of the consequences of currency devaluation) to greed (borrowers' desire for much cheaper borrowing terms and lenders' desire to push out loans). But is this true? Our analysis provides some evidence that foreign financing was indeed a contributing factor to the FX lending boom and concludes that regulation does have a role to play in addressing the FX mismatch problem. However, even a cursory look at the data dispels the idea that financial dollarisation in emerging Europe is mainly a boom phenomenon and hence that it may have a simple cure based on national regulation. FX lending has been a long-standing fixture in the transition region.[2] And while it increased sharply in some countries during the pre-crisis boom years—most notably, in Hungary—it declined in other countries, including Russia and Kazakhstan, which was also the target of very rapid capital inflows (chart 1).

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1. Following the literature, we use the term "financial dollarisation," "loan dollarisation" and "liability dollarisation" to denote the use of foreign currency in the financial system, and especially in bank lending to households, regardless of whether the currency used is the US dollar, the euro, or other currencies. A better term for most of the countries covered in this chapter would be "financial euroisation." Regarding another terminology issue, this chapter uses the terms "emerging Europe" and "transition countries" interchangeably; some of the analysis even includes central Asian transition countries.
2. See, for example, Sahay and Végh (1996).

Chart 1. Foreign currency lending as a share of total lending, 2004 and 2008 [a]
Per cent of total lending, end of year
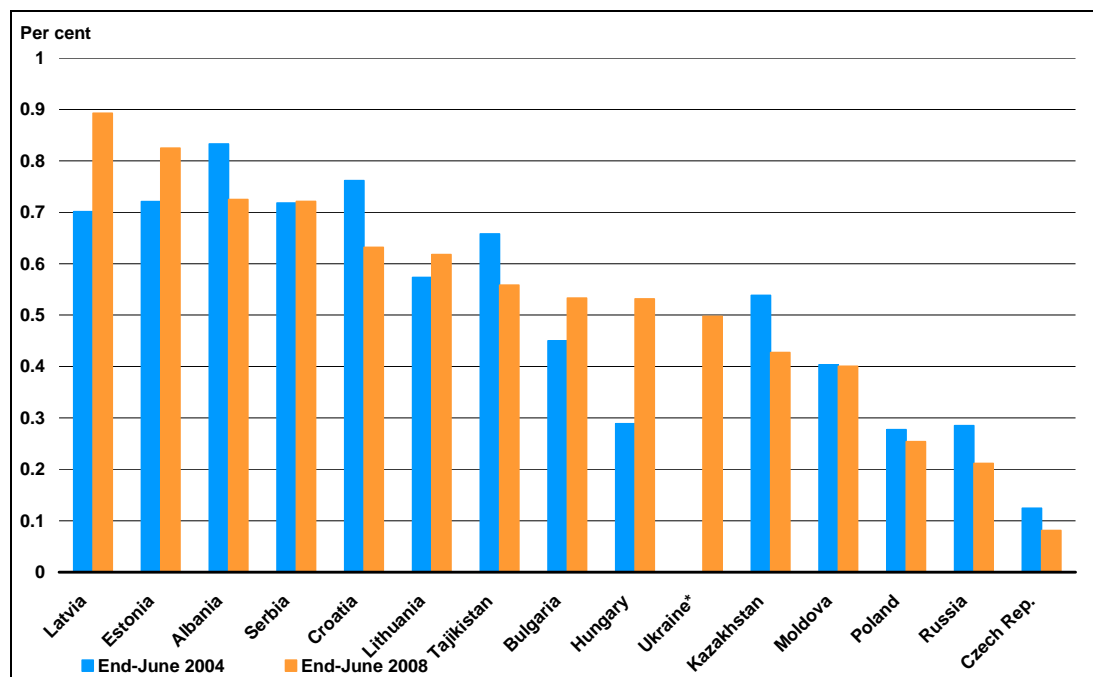
Source: CEIC database (www.ceicdata.com).
  a. No comparable data available for Ukraine for 2004. In the cases of Croatia and Serbia, the values include estimated share of exchange rate-indexed local currency lending (assumed to be 74 per cent in 2004 and 61 per cent in 2008 in Croatia, and 57 per cent in 2004 and 70 per cent in 2008 in Serbia).

To put the search for policy solutions on a sounder footing, one needs a better understanding of what has driven FX lending in the first place in emerging Europe, and why some emerging market regions have managed to de-dollarise whereas in many other transition countries this has thus far proven elusive. This paper begins with a survey of the economic literature on financial dollarisation, which has grown considerably in size and quality in recent years and by now includes several papers on eastern Europe. It next presents some evidence on the question of whether factors related to the capital inflow boom—and the European model of financial integration more generally—have contributed to loan dollarisation in transition economies. Lastly, it analyses the policy implications of this evidence and the de-dollarisation experiences elsewhere (particularly in Latin America).

The main finding of this paper is that financial dollarisation in emerging Europe has a range of causes, from weak institutions and lack of monetary policy credibility (particularly in less advanced transition countries) to implicit guarantees associated with expectations of euro adoption, foreign funding of banking systems, and lack of local currency market infrastructure. Because these causes do not apply to all countries in the region with equal force, the right policy response will depend on country circumstances. For the purposes of making broad recommendations, three groups of countries are distinguished, based on the state of macroeconomic frameworks and institutions, and on the presence of commitments to maintain hard pegs ahead of euro membership. Depending on these characteristics, the policy response needs to focus primarily on improving macroeconomic institutions and policy

credibility or on regulation or on a combination of both, together with measures to develop the legal and institutional infrastructure underlying local currency money and bond markets.

This leaves two main tasks. The first is to correctly diagnose countries. In particular, in countries that lack credible macroeconomic frameworks and institutions, attempts to develop local currency markets are unlikely to succeed, and regulatory solutions may well be counterproductive, as denominating financial contracts in FX could be an optimal response (individually and socially) to an environment of high macroeconomic, institutional, and political risk. The second task is to develop a regulatory approach to FX lending that is both effective—in particular, avoiding problems of cross-border regulatory arbitrage, which can easily arise in financially integrated Europe—and avoids large costs to financial development and access to credit. The chapter has something to say on both of these questions, but much more remains to be done.

1. THEORY: A NON-TECHNICAL SURVEY

A proximate answer to the question of why so much developing country lending is in FX, which has been emphasised by market practitioners and academics alike, points to incomplete markets—in particular, to a lack of markets for local currency debt at longer maturities.[3] However, this answer is not fully satisfactory, for two reasons. First, it begs the question of why these markets have not developed (or why they have developed in some countries but not in others of similar size and per capita income). Second, while the lack of local currency debt markets may explain why firms are pushed to borrow in foreign currency, it does not explain why a firm would not want a long-term local currency loan even when it could obtain one—a situation that an emerging market lender such as the European Bank for Reconstruction and Development (EBRD) often encounters when it attempts to lend in local currency.

Hence to fully address the puzzle of why borrowing in FX is the prevalent form of financing in many emerging market countries, one needs to explain why many borrowers seem to prefer FX loans even when they have a choice. The superficial answer is that the real interest rate of FX-denominated loans compared with local currency-denominated loans is usually much lower. But higher local interest rates compared with foreign interest rates in emerging market countries reflect exchange rate risk. Therefore, it is necessary to understand why borrowers might prefer the cheaper FX loan *even though* it comes bundled with higher currency risk.

As a matter of logic, the answer could fall in two categories. One possibility is that FX risk is mispriced in the sense that the differential between local and FX borrowing rates exceeds the expected rate of devaluation. Alternatively, it could be that the risk is, in fact, fairly priced. In this case, the answer needs to focus on the puzzle of why borrowers nonetheless prefer to pay the lower borrowing rate and take the FX risk.

From the perspective of mainstream economics, there is a problem with the first line of argument: it involves assuming that uncovered interest parity is not only violated (as an empirical matter, it often is) but is systematically violated in one direction. This would seem to be an invitation for arbitrage. If FX rates are systematically low relative to FX risk, then there should be so much FX borrowing that the imbalance disappears. For this reason, it is worth asking first how far one can get in explaining bias toward FX borrowing without assuming systematic under pricing of FX risk (we return to the under pricing idea at the end of this section).

This is actually the approach that most of the literature has taken. For the sake of determining the policy implications, the answers can be grouped in three categories: explanations that imply that (unhedged) FX borrowing is both individually and socially suboptimal, is individually optimal but may be socially suboptimal, and is optimal both individually and socially.

In the first instance, borrowers could prefer the cheaper FX loan because they ignore, underestimate, or excessively discount the FX risk that is involved. Strictly speaking, this means that borrowers behave irrationally—an unpopular assumption in economics,

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3. Eichengreen and Hausmann (1999); Eichengreen, Hausmann, and Panizza (2003).

particularly when it involves many individuals that act independently and when the allegedly irrational phenomenon persists over time. However, there are systematic deviations from rationality that have been well documented in the recent literature on behavioural economics, and these could help explain the phenomenon at hand.[4] Consumers often tend to resolve trade-offs between current and future consumption in a way that front-loads consumption compared with what they would want to do if they could commit to a particular intertemporal path. This type of behaviour could arguably explain why consumers (or small enterprises) favour a form of lending that allows higher consumption today, albeit at a cost (or risk) in the future. Consumers may realise the risks involved but nonetheless choose to borrow in foreign currency today with the intention of hedging or switching to local currency funding soon in the future. But because the future always becomes present, that moment never arrives.

In the second case, foreign currency borrowing could be excessive from a social perspective but fully rational from an individual perspective as a result of distortions such as borrower moral hazard or externalities.

- *Moral hazard* on the part of the borrower became popular as an explanation for loan dollarisation after the Asian crisis, in which implicit guarantees to borrowers and investors were widely believed to have played a role.[5] In this scenario, the borrower understands the higher risks of FX borrowing but reckons that he or she will not be forced to repay in full in the event of a depreciation-related insolvency. This could be because of limited liability or because of the existence (or expectation) of state support in the event of a devaluation.[6]
- *Externalities* could be a cause of excessive FX borrowing if the foreign currency exposures of individuals aggravate the depth of a crisis, and this effect is not taken into account when individuals choose their level and denomination of borrowing (as each individual has a negligible impact). In effect, this creates a collective action problem that gives rise to excessive FX borrowing.[7] If borrowers (or lenders) made the decision collectively, they would internalise the risks of FX borrowing and choose a lower level, but since decisions are decentralised, this is not the case.

In the third situation, borrowing in foreign currency (or alternatively, via inflation-indexed debt) could be optimal—even from a purely risk-minimising perspective—in an environment of high and variable inflation.[8] There is a widely held presumption that it is safer for unhedged borrowers whose revenue streams are in local currency to also borrow in local currency. However, this presumption may be incorrect because it ignores the fact that the borrower commits to a *nominal* repayment in the future, while the prices of the goods that make up the firm's income stream (or the wages of a household) could change as a result of inflation or relative price shocks. Hence borrowing in local currency does not eliminate the mismatch problem: it replaces a currency mismatch with a mismatch between real and nominal units.

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4. For a recent popular survey, see Ariely (2008), particularly chapter 6.
5. McKinnon and Pill (1999); Corsetti, Pesenti, and Roubini (1999).
6. For the case of limited liability, see Brown, Ongena, and Yeşin (2009). On the role of perceived or actual state support, see Dooley (2000); Burnside, Eichenbaum, and Rebelo (2001); Schneider and Tornell (2004); Rancière, Tornell, and Vamvakidis (2010).
7. Korinek (2009).
8. See Parrado and Ize (2002); Jeanne (2003). This approach is close in motivation and philosophy to the portfolio approach to *deposit* dollarisation, which concludes that the optimal currency composition of the portfolio of a domestic saver will depend on the trade-off between inflation and real exchange rate volatility (Ize and Levy Yeyati 2003).

In a stable inflation environment, this mismatch does not matter. With volatile inflation, however, committing to a nominal repayment amount in local currency over the period of several years may be as risky as, or indeed riskier than, committing to the equivalent (at the time of borrowing) foreign currency amount. If inflation turns out to be lower than expected, it could leave the borrower saddled with unsustainable high debt (particularly if lower-than-expected inflation accompanies an adverse real shock, as will often be the case). The safest form of financing in this instance would normally be inflation-indexed debt, but that in turn may not be feasible if low monetary credibility reflects broader institutional deficiencies, which raise doubts about the timeliness and accuracy of inflation measurement, and concerns that measurements may be manipulated.[9] As a result, the safest strategy available may be to borrow in foreign currency.

Although the economic literature emphasises inflation volatility as the principal cause of risk involved with writing financial contracts in local currency, the underlying idea is more general. From a borrower's perspective, the choice of FX versus local currency denomination involves trading off currency and real interest rate risk. One reason why real interest rates could be volatile is inflation risk. But another reason (when local currency loans involve floating interest rates that move in response to expected inflation) could be volatile interest rates in response to liquidity squeezes, unpredictable policy moves, or political instability.

The link between low policy or institutional credibility and FX borrowing emphasised in this literature represents a broader theme that runs through both corporate finance and modern international finance: "dangerous" forms of finance, such as FX borrowing or short-term borrowing, could reflect a deep policy or institutional deficiency, such as weak contract enforcement or an inability to commit to investor-friendly polices. In such circumstances, dangerous finance can be welfare improving, for two reasons.

First, dangerous financial contracts tend to be simple and hard to renegotiate. They do not involve a lot of risk-sharing; it is this very fact that makes them potentially dangerous (think of simple debt as opposed to equity, or FX debt rather than debt indexed to the consumer price index). By the same token, however, they can "work" even in underdeveloped and weak institutional settings, and are much less exposed to tampering by governments. For example, unlike equity, simple debt does not require well-developed accounting standards or corporate governance in order to exist. By the same token, FX debt can thrive even in an environment in which poor economic institutions prevent the development of other debt forms.[10]

Second, dangerous finance can ameliorate some of the underlying problems (in particular, government moral hazard and its counterpart, lack of institutional commitment) by acting as a disciplining device. Dangerous debt structures such as short-term or foreign currency debt not only protect investors from the consequences of misbehaviour by the borrowing country government, but they also raise the stakes for those countries precisely *because* they potentially give rise to deep crises and hence reward behaviour that prevents such crises.[11] However, an inefficiency arises from the fact that the same crises could be triggered by bad luck rather than bad policies. Nonetheless, the net *ex ante* welfare effect of dangerous debt is generally positive in these circumstances: "Dangerous forms of debt are also 'policy

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9. Rajan and Tokatlidis (2005).
10. Rajan and Tokatlidis (2005).
11. Jeanne (2000, 2009); Tirole (2003).

resistant'; they make the government more accountable, ultimately to the benefit of the country."[12]

The three explanations summarised above have vastly different implications for public policy. If FX bias is caused by borrowers who are either ill-informed or have a tendency to procrastinate, then the problem could be solved either through education, or by offering low-risk instruments that are costly to refinance and hence commit borrowers to prudent behaviour (many real-life loans have that feature, which makes procrastination a somewhat unconvincing explanation of FX bias). If FX bias results from externalities or simply irrational behaviour, the answer lies in regulation (for example, imposing an unremunerated reserve requirement on FX bank assets, which would make FX borrowing just expensive enough to align its individual cost with its social costs). Lastly, if the cause of FX bias is a lack of credible macroeconomic policies or institutions, then the only way to counter the bias is to address these institutional weaknesses directly. Thus, in this situation, making FX borrowing more expensive or prohibiting FX borrowing by unhedged borrowers will not help: rather than encouraging more local currency borrowing, it will simply lead to less overall borrowing, and it may aggravate some of the underlying institutional problems by eliminating a disciplining device.

As mentioned at the beginning of this section, all the theories we have reviewed so far "work" under the assumption that FX risk is fairly priced. Recently, however, an alternative approach has gained popularity, one that argues that banks under price FX loans relative to local currency loans in order to match the currency structure of their assets with that of their liabilities.[13] Of course, this idea works only if bank liabilities are also biased toward FX. There could be two reasons for this:

- *FX deposits*. If this is the case, the "puzzle" is merely pushed back one step, as an FX bias in deposits would itself require explanation. This leads to a literature on deposit dollarisation that argues largely along similar lines as the theories discussed above (essentially, invoking optimal portfolio choice of depositors in light of high consumer price index volatility compared with real exchange rate volatility; lack of macroeconomic credibility, and moral hazard or similar distortions).
- *Foreign currency funding from abroad.* This could take the form of subsidiary borrowing from a foreign parent (in essence drawing on parent bank deposits) or wholesale borrowing of domestic banks. In this view, financial openness, and particularly foreign bank entry (if foreign subsidiaries have cheaper access to foreign funding than domestic banks), could be a driving force behind the FX bias in borrowing. Note that as long as no other distortions are assumed, this could be efficient. However, in combination with some of the other distortions described— limited rationality, moral hazard, externalities, and lack of government commitment— this channel will reinforce whatever welfare outcomes result from the initial distortion.

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12. Tirole (2003).
13. Basso, Calvo-Gonzales, and Jurgilas (2007); Luca and Petrova (2008).

2. EMPIRICAL LITERATURE

There is a recent, but by now quite substantial, empirical literature on the determinants of financial dollarisation. A number of papers analyse the Latin American experience during the 1990s and the beginning of this decade.[14] Others study the correlates of liability and sometimes deposit dollarisation in a broad international cross-section of countries.[15] Lastly, there is a small recent literature specifically on financial dollarisation in transition economies.[16] Most of these papers use aggregate data (typically, with the share of foreign currency bank credit in total domestic bank loans to the private non-financial sector as the main variable of interest) but a growing number are based on firm data.[17]

For the most part, these papers are not set up to discriminate between the main views on financial dollarisation that we summarised in the previous section. This said, a few facts emerge from these papers that shed light on some of the theories. We summarise them briefly as follows.

First, there is consistent support for the view that macroeconomic policy credibility, and perhaps institutional quality more broadly, is a determinant of both loan and deposit dollarisation. Inflation volatility tends to be associated with higher levels of FX borrowing. Proxies for institutional quality matter either in addition to or as alternative proxies for instability. In the regressions of De Nicoló, Honohan, and Ize (2003), inflation history loses significance once proxies for the quality of broad political institutions and governance indicators are included. Rajan and Tokatlidis (2005) show that dollarisation is robustly related to the sensitivity with which the inflation tax reacts to growth shocks: dollarisation thrives in environments in which economic fluctuations lead to macro instability. In Guscina (2008), political instability is related to higher shares of FX debt. Brown, Ongena, and Yeşin (2009), using data from the 2005 EBRD-World Bank Business Environment and Enterprise Performance Survey (BEEPS), find a strong effect of firm security payments on their propensity to borrow in FX.

Second, the interest rate differential is a reliable predictor of loan dollarisation, particularly in the cross-section.[18] This effect is found both for Latin America and particularly for transition economies.[19]

Third, there is evidence that floating exchange rates reduce dollarisation. This appears to be true both for floating exchange rate *regimes* and measures of exchange rate volatility.[20] The strongest evidence in this regard comes from Latin America, but Brown, Ongena, and Yeşin (2009) also find this effect in their study of firm borrowing based on the BEEPS.

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14. Martinez and Werner (2002); Barajas and Morales (2003); Gelos (2003); Rossi (2004); Cowan, Hansen, and Herrera (2005); Kamil (2008).

15. De Nicoló, Honohan, and Ize (2003); Rajan and Tokatlidis (2005); Jeanne (2003); Levy Yeyati (2005); Guscina (2008).

16. Luca and Petrova (2008); Basso, Calvo-Gonzalez, and Jurgilas (2007); Brown, Ongena, and Yeşin (2009); Rosenberg and Tirpák (2008).

17. Martinez and Werner (2002); Allayannis, Brown, and Klapper (2003); Rossi (2004); Cowan, Hansen, and Herrera (2005); Kamil (2008); Brown, Ongena, and Yeşin (2009).

18. Though Rosenberg and Tirpák (2008) also show some evidence for longitudinal effects.

19. For effects in Latin American economies, see Barajas and Morales (2003); for those in transition economies, see Brown, Ongena, and Yeşin (2009); Basso, Calvo-Gonzalez, and Jurgilas (2007); and Rosenberg and Tirpák (2008).

20. See Kamil (2008) regarding floating exchange rate regimes.

Fourth, financial development (typically proxied by credit-to-GDP or M2-to-GDP ratios) tends to be *positively* related to loan dollarisation within developing country samples.[21] This runs counter to the view that lack of financial development is intrinsic to the dollarisation phenomenon.[22]

Fifth, virtually all studies that use transition economy data agree that foreign funding of bank credit is a contributing factor to dollarisation (the literature on Latin America does not emphasise this mechanism). There is disagreement, however, on whether foreign banks are the culprit or not. In the firm-level regressions of Brown, Ongena, and Yeşin (2009), foreign bank presence appears to contribute to dollarisation, although the effect is not always robust. Basso, Calvo-Gonzalez, and Jurgilas (2007) show that the share of foreign liabilities of the banking system is a very strong predictor of loan dollarisation, and they interpret this effect as reflecting the presence of foreign bank subsidiaries. However, Rosenberg and Tirpák (2008) show that once the loan-to-deposit ratio is controlled for (their measure of foreign funding); the share of foreign banks in the assets of the banking system no longer predicts dollarisation. In other words, what appears to matter is foreign funding, not foreign banks per se.

Sixth, regulation appears to have some effects, but the literature does not contain a clear message on its overall importance. Many papers ignore regulation altogether. The two main exceptions are Luca and Petrova (2008) and Rosenberg and Tirpák (2008). Both papers focus on transition economies:

- Luca and Petrova look at measures of liberalisation of foreign currency lending and deposits, and at a measure of bank hedging opportunities (forward market liberalisation). Only the latter seems to have an effect: a deep forward foreign exchange market lowers the level of loan dollarisation for a given level of deposit dollarisation. (The interpretation is that banks need not lend in dollars to stay matched but can instead cover their exposure in the forward market.)
- Rosenberg and Tirpák define an "FX restriction index" based on measures that authorities could take to limit FX liabilities: requiring banks to monitor FX asset risk, requiring banks to disclose FX risk to borrowers, imposing eligibility criteria on FX customers, requiring banks to provision or hold higher reserves as a function of indirect FX exposures, and introducing a ceiling on FX exposures. The FX restriction index has a statistically significant impact on loan dollarisation in their model, but the effect is economically modest (a fully restrictive regime, on average, lowers FX dollarisation by about 2 percentage points). Furthermore, the size of the effect is cut in half if loan dollarisation is redefined to include cross-border lending. One interpretation is that with open capital accounts, FX restrictions on banks are not very effective because they can divert borrowing to non-resident sources.

Lastly, the literature confirms a robust relationship between firm-level "natural hedges"—the share of exports in firm revenue, and foreign ownership—and loan dollarisation. Virtually every paper confirms that exporters tend to borrow more in FX than nonexporters. This said, unhedged borrowers are also significantly indebted in foreign currency. By how much? With the exception of Kamil (2008), the literature is silent on this point, reflecting data limitations.

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21. Barajas and Morales (2003); Basso, Calvo-Gonzalez, and Jurgilas (2007).
22. Caballero and Krishnamurthy (2003).

3. RE-EXAMINING THE EVIDENCE FOR THE TRANSITION REGION

In spite of its richness, the literature discussed in the previous section leaves a number of questions open. To ascertain the policy implications for the transition region, it is necessary to understand the role of foreign financing or foreign banks *over and above* that of the more standard causes of financial dollarisation that have been identified in the literature. It also would be useful to determine the robustness of the results across methodologies and time periods for the region. Lastly, it would be helpful to use at least one methodology that allows for clearer causal interpretation than is the case in most papers using macroeconomic data. Some of the "determinants" of loan dollarisation identified in this literature qualify as deep causes of dollarisation (for example, weak institutions). For the most part, however, they represent macroeconomic and financial outcomes that are co-determined with dollarisation (for example, interest rate differentials or loan-deposit ratios). Hence regressions that attempt to uncover the effects of macroeconomic variables on economy-wide measures of dollarisation are hard to interpret.

The remainder of this section takes a stab at these problems by extending the analysis of two papers in the literature, those of Brown, Ongena, and Yeşin (2009) and Rosenberg and Tirpák (2008).[23] The approach is to examine the statistical relationship between FX lending and a broad set of explanatory variables—capturing inflation history, institutional quality, exchange rate regimes, and the effects of foreign financing and foreign bank ownership, plus additional controls—using two different concepts to measure FX lending, and three data sets:

- Firm-level data based on the third (2005) BEEPS, which contains a question about the currency denomination of the last loan taken out by the firms participating in the survey.[24] The answer to this question—whether the loan was in domestic or foreign currency—is represented using a dummy variable, which is regressed on a set of firm variables and country variables, including several measures of financial integration.
- A quarterly macroeconomic dataset with the same country-level variables and the same sample period (2002–05). The dependent variable in this analysis is the FX share in banking system liabilities for each country.
- An annual macroeconomic dataset with similar variables but comprising a longer period (2000–08).

Table 1 highlights the main results.[25] For each of the three data sets used, it shows the results of three statistical models. All models comprise a number of potential country-level determinants of FX liabilities, including inflation volatility, a proxy for institutional quality (the EBRD governance and enterprise reform index), a dummy variable that takes the value of 1 if the country had a hard peg and 0 otherwise, the asset share of foreign banks, and an

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23. We are very grateful to the authors of these papers for allowing us to use their data for this purpose.
24. Data are available online at EBRD, "Business Environment and Enterprise Performance Survey" (www.ebrd.com/country/sector/econo/surveys/beeps.htm).
25. For the full set of regression coefficients, see the tables in appendix B.

additional variable capturing financial integration.[26] There are also a number of additional country-level control variables for which the results are not shown, as well as firm-level controls in the first group of regressions based on BEEPS data (see table notes and appendix tables). The difference between the models used for each data set is in the financial integration variable, namely: gross financial integration, cross-border bank lending (using data from the Bank for International Settlements), and the loan-to-deposit ratio of the banking system. The latter two are used as alternative measures of foreign financing.

The table shows that the governance indicator is a significant and robust determinant of the FX lending share, confirming the finding of earlier studies that FX lending is more prevalent in countries with weak institutions. The economic magnitude is large, with a 1-point improvement on the EBRD transition indicator scale (which runs from 1 to 4.3) associated with a reduction in the probability of FX borrowing by 22–33 percentage points (firm-level regressions), and a reduction in the share of FX lending of 12–22 percentage points (country-level regressions). Inflation volatility also matters in two of the three data sets, but its effects are less robust (controlling for the governance indicator). Also, the association between hard pegs and FX borrowing seems to be strong, particularly in the macroeconomic data.

Regarding the role of foreign financing and foreign banks, there is some disagreement between the firm-level and the macroeconomic regressions. In the firm-level regression, the presence of foreign banks appears to make FX borrowing more likely. The effect is statistically significant in two of the four specifications shown. Additional regressions (using a broader set of financial inflow and integration controls for example) reveal a statistically significant impact in 10 of 14 specifications. In contrast, the other financial integration measures do not seem to have this effect.

In the macroeconomic regressions, only bank lending inflows—but not specifically foreign banks—appear to be associated with FX borrowing. According to these regressions, what mattered is foreign financing of bank lending in transition countries, regardless of whether this took the form of parent bank lending to a subsidiary, direct cross-border lending, or syndicated lending.

In summary, there is some evidence that foreign financing or the presence of foreign banks or both played a role—on top of determinants such as inflation history, quality of institutions, and the exchange rate regime—in encouraging FX lending in transition economies. However, the results are not conclusive on whether foreign banks contributed to the FX lending bias beyond their role as a conduit for foreign financing. Furthermore, they imply that if there was such an effect, it was economically small, with a 10 per cent increase in the share of foreign bank assets increasing the probability of FX-denominated lending and the share of FX lending by at most 3 percentage points. (See the second column of firm-level regressions in table 1)

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26. Note that in all cases, the variables shown in table 1 are measures of FX lending, not of net FX exposure (although the firm-level regressions contain some explanatory variables that control for exposure differences for given information about FX lending, such as an exporter dummy). This follows the approach used in most of the literature (exceptions include Goldstein and Turner [2004] and Kamil [2008], reflecting lack of information about the FX composition of assets and revenue streams of FX borrowers. Very recently, Rancière, Tornell, and Vamvakidis (2010) have attempted to construct net exposure measures for transition economies by combining FX asset and liability data from banking statistics with firm-level data from the BEEPS.

Table 1. Determinants of FX lending in transition economies
Regression coefficients

	Financial integration (FI) measure[b]								
	Firm regression, 2002–05[c]			Quarterly dataset, 2002–05[d]			Annual dataset, 2000–08[e]		
Variable	GFI	BIS	L/D	GFI	BIS	L/D	GFI	BIS	L/D
Inflation volatility	0.035	0.026	0.012	5.986	5.499	11.040	-1.823	-4.648	-1.510
	(0.010)	(0.049)	(0.418)	(0.308)	(0.363)	(0.009)	(0.204)	(0.072)	(0.270)
Governance[f]	-0.321	-0.228	-0.209	-15.800	-13.780	-17.070	-20.070	-17.070	-22.120
	(0.000)	(0.001)	(0.004)	(0.010)	(0.030)	(0.010)	(0.006)	(0.020)	(0.001)
Hard peg[g]	0.013	0.001	0.075	32.220	33.300	23.350	23.020	24.040	19.500
	(0.786)	(0.972)	(0.280)	(0.001)	(0.002)	(0.000)	(0.021)	(0.018)	(0.057)
FI measure	0.060	0.000	-0.185	4.625	0.068	12.940	2.564	0.016	3.048
	(0.360)	(0.540)	(0.057)	(0.628)	(0.047)	(0.390)	(0.821)	(0.088)	(0.842)
Foreign banks	0.003	0.001	0.001	0.122	0.067	0.131	-0.049	0.024	-0.095
	(0.000)	(0.001)	(0.166)	(0.243)	(0.473)	(0.321)	(0.775)	(0.888)	(0.587)
Observations	1,574	1,452	1,541	223	212	196	74	74	59
Number of countries	21	19	19	21	20	20	15	15	15

Sources: Brown, Ongena, and Yeşin (2009); Claessens, Kose, and Terrones (2008); Lane and Milesi-Ferretti (2006); Abiad, Leigh, and Mody (2009); EBRD, BIS; IMF IFS; BEEPS III; Basso, Calvo-Gonzalez, and Jurgilas (2007); and data from the EBRD, Bank for International Settlements (BIS), International Monetary Fund International Financial Statistics, and BEEPS III.

    a. p-values are shown in parentheses. The table shows results from three statistical models using three datasets. For each dataset, the models differ only in terms of the financial integration measure used. The table shows only five variables of interest; additional controls are listed in the notes below.

    b. GFI: level of gross financial integration (external assets + external liabilities in percent of GDP); BIS: cross-border bank lending, year-on-year change in percent; L/D: loan-to-deposit ratio.

    c. Firm-level quarterly data, 2002q1–2005q2, probate estimation, marginal effects reported. The dependent variable is a dummy for whether the last loan of the firm was in a foreign currency. Following Brown, Ongena, and Yeşin (2009), additional controls used include inflation, depreciation and depreciation volatility, firm-level controls (exporter dummy, sales to multinationals, international accounting, dummy for firm size, age of firm), loan characteristics (duration, collateral) and banking sector and institutional controls interest rate differential), FX deposits, CIS dummy, dummy for forward FX exchange market, capital controls, and foreign exchange).

    d. Panel estimation, 2002q1–2005q2. The dependent variable is the share of FX loans to total loans, in percent. Estimated using generalised method of moments (GMM), using past values as instruments. Additional controls include inflation, depreciation, depreciation volatility, interest differential, and FX deposits.

    e. Panel estimation, 2000–08. The dependent variable is the share of FX loans to total loans, in percent. Estimated using GMM, using past values as instruments. Additional controls include inflation, depreciation, depreciation volatility, and interest differential.

    f. EBRD governance and enterprise restructuring indicator (defined from 1 to 4.3).

    g. Dummy variable taking the value 1 for Bosnia-Herzegovina, Bulgaria, Estonia, Latvia, and Lithuania, and 0 otherwise.

4. POLICY

Based on the theory and evidence presented in the previous section, we now sketch the outlines of a strategy for addressing the currency mismatch problem in the transition region. Before doing so, it is worth reviewing a success story in de-dollarisation: Latin America.

How did Latin America de-dollarise?

Financial dollarisation and currency substitution has been endemic to Latin America for many decades. Given the region's history of crises and macroeconomic volatility, this is not surprising. Most major Latin American countries experienced hyperinflation in the 1970s or 1980s (Colombia is the main exception). In some cases—including Argentina and Brazil—this lasted into the 1990s.

By the middle of the decade, however, in the wake of "Washington consensus" reform efforts and following the conclusion of Brady deals with most major countries and the resolution of the painful but brief Tequila crisis, virtually all of Latin America had stabilised to moderate or even low levels of inflation. A gradual decline in dollarisation was widely expected to follow. But surprisingly, this did not happen. On the contrary, while currency substitution (use of FX in current transactions) declined in some countries, deposit and loan dollarisation continued to increase. It was this astonishing fact that put financial dollarisation on the map and focused the minds of policy-makers and academics alike. The literature described in the previous section has its origins in this experience.

Almost immediately after the phenomenon had been understood, however, it began to recede. After peaking in the mid- to late 1990s, the FX share in total firm debt fell sharply in Latin American countries, albeit from different starting levels (see Chart 2). Progress was even more dramatic when export revenues are taken into account, with exports as a percentage of short-term dollar liabilities rising from 10-20 per cent to over 100 per cent in Colombia and Mexico by 2005, from about 50 per cent to over 100 per cent in Chile, and from less than 5 per cent to about 50 per cent in Peru. In Brazil the rise was more modest, with export coverage of dollar liabilities going from 25 to 45 per cent, but this likely underestimates the extent of hedging because it ignores hedges purchased on Brazil's highly developed derivatives markets.

What happened? Roughly, Latin America's de-dollarisation process seems to have been driven by five related events and policy initiatives.[27]

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27. The following account is based on Borensztein and others (2004), Kamil (2008), and various International Monetary Fund reports.

Chart 2. Dollarisation of liabilities of the corporate sector in Latin America, 1992–2007[a]

Per cent, annual average across firms (controlling for changes in sample composition)
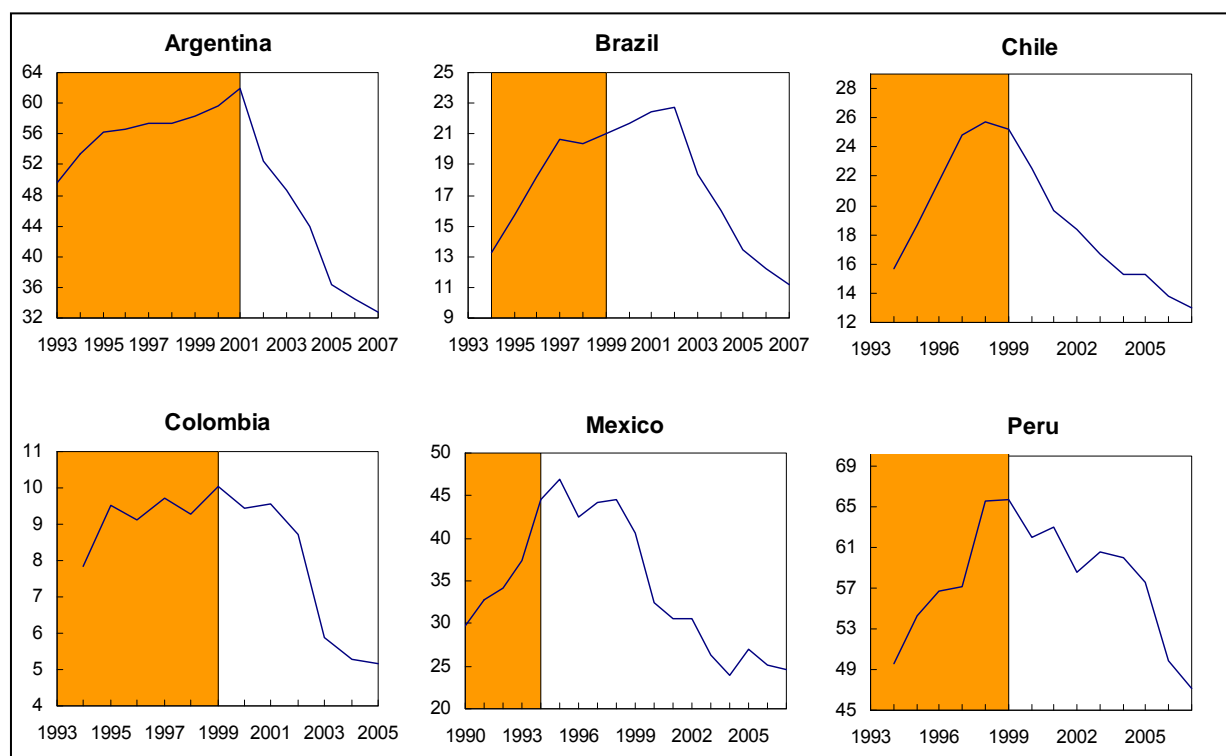
Source: Kamil (2008).
   a. Shaded area represents period with fixed or pegged exchange rate regime; white area period of managed or independent floating.

First, most Latin American countries experienced economic downturns and crises in the second half of the 1990s. The first of these was the homegrown 1995 Mexican crisis, but most crises took place in the last years of the decade, triggered by a "sudden stop" in emerging market finance after the 1998 Russian default and devaluation. The crises ranged from relatively orderly recessions (Chile, 1999) to currency collapses, political upheaval, and sovereign default (Ecuador, 1998–2000; Argentina, 2001–02). Loan dollarisation played a critical role in virtually all of these cases. In the cases of Argentina and Ecuador, sovereign debt dollarisation was a contributing cause in sovereign defaults (once the devaluations occurred, public sector debt became unsustainable), and dollarisation in the private sector created or magnified systemic banking crises in Argentina, Ecuador, and Uruguay (2002–03). But loan dollarisation played an important role even in Chile, whose 1999 recession was in part a result of an interest rate defence of the currency in 1998. Among the major countries, only Brazil managed to escape a recession during this period, and it did so because it spent its international reserves in the final months of 1998 on removing private sector currency mismatches—much in the same way in which Russia did so 10 years later—just ahead of its January 1999 currency crisis.

Second, following these crises, the affected countries switched to flexible exchange rate regimes (except Ecuador, which adopted the US dollar as legal tender). Unlike in Asia in the 1990s and in some transition economies today, these regimes for the most part floated *de*

facto and not just *de jure*. There is convincing evidence that this move encouraged de-dollarisation of corporate liabilities.[28]

Third, with the exception of Argentina, the switch to a floating exchange rate regime typically accompanied a move (albeit gradual) towards fully fledged inflation-targeting regimes and, in some cases, fiscal rules and other structural-fiscal reforms. In other words, the monetary and macroeconomic regimes changed not just in a way that made exchange rate volatility more visible but also in a way that stabilised inflation expectations and more generally made the recurrence of macroeconomically induced crises much less likely.

Fourth, a few years into the new regimes, most countries began to de-dollarise their *public* debts by issuing longer-term nominal peso bonds at gradually longer maturities in domestic markets. Mexico led the way, issuing three-year and five-year bonds in 2000, followed by seven-year and 10-year bonds in 2002, a 20-year bond in 2003, and a 30-year bond in 2006. Most other large Latin American countries followed suit, with Chile, Colombia, and Peru all issuing long-term, non-indexed domestic currency bonds by the middle of this decade (Argentina did so as part of its 2005 debt exchange). In several of these countries, pension reform (the creation of a private pension pillar) is believed to have contributed to demand for long-term domestic currency bonds. The icing on the cake came during 2005–07, when several of these countries took advantage of favourable global liquidity conditions to issue long-term bonds in local currency in *international* markets, while at the same time buying back or prepaying FX-denominated international bonds, such as Brazilian or Mexican Brady bonds.

The fifth process factor associated with Latin American de-dollarisation is the development of derivatives markets, particularly in Brazil.[29] In the middle of the decade, derivatives trading surged in the larger economies in the region, with Brazil, Mexico, Colombia, and Chile registering a combined daily trading volume of close to US$ 110 billion (notional) in 2006, of which US$ 46 billion was attributable to Brazil. Brazil and Mexico developed exchange-based derivatives markets, while over-the-counter derivatives' trading was dominant in the other countries. Interest rate derivatives (swaps, options, and forward rate agreements) represented about 70 per cent of total trading activity; with most of the remainder taken up by currency derivatives (FX forwards and swaps).

In contrast, there does not appear to be any direct evidence that regulation of domestic FX exposures (either directly or through regulation of the banking system) has contributed to the Latin American de-dollarisation process, except in the household sector. For example, Colombia and Brazil prohibit households from holding FX deposits with resident banks.

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28. See Martinez and Werner (2002) for Mexico, and Kamil (2008) for a broader group of countries.
29. Luca and Petrova (2008).

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5. ELEMENTS OF A STRATEGY FOR EMERGING EUROPE

As in Latin America in the 1990s, financial dollarisation in emerging Europe has remained stubbornly high in this decade despite relatively stable macroeconomic environments since the beginning of the decade (if not earlier). However, there are several factors that distinguish the recent dollarisation experience in transition economies from that in Latin America, in particular, the role of foreign financing of banking systems and expectations of euro adoption. Taken together, the economic literature, the Latin American experience, and these special factors point to four policy areas that are likely to play a role—to greatly varying degrees across countries—in reducing and better managing the currency mismatch problem.

Reforming macroeconomic regimes and institutions

At one level, the persistence of dollarisation in the EBRD region is not surprising. As we have shown, dollarisation in Latin American countries did not begin to fall until countries had established credible macroeconomic policy frameworks based on floating exchange rates and inflation targeting. Very few transition countries have such regimes, namely, the Czech Republic (since 1998), Poland (since 1999), Albania (since 2001), Romania (since 2005), Hungary (since 2007), and Serbia (since 2009).[30] Tellingly, the two countries with the oldest and most established of these regimes, the Czech Republic and Poland, also have the lowest rates of dollarisation or euroisation in the region.

In emerging Europe, reforming macroeconomic frameworks and improving credibility could mean several things, depending in part on whether countries have the option to freely float their currencies or are constrained by international commitments such as participation in the European Exchange Rate Mechanism (ERM2). To the extent that there is no such commitment, countries that are serious about de-dollarising can improve their policy and institutional credibility by building formal inflation-targeting regimes and demonstrating their success over time. Countries with weak fiscal records may also require fiscal-structural reforms to make inflation targets credible over the longer term, in addition to central bank independence. Fortunately, following the 1998-2000 crises and defaults in three transition countries (Russia, Ukraine, and Moldova), many transition countries built a track record of sound public finances, although maintaining this track record will be a challenge in light of the fiscal burdens arising from the most recent crisis.

Countries that participate in the ERM2 or have the strong intention to adopt the euro in the near term ought to focus on the credibility of eurozone entry over the targeted time frame.[31] In light of high crisis-related deficits, this will require a fiscal adjustment programme to meet the Maastricht debt and deficit criteria. The European Central Bank (ECB) could support a country's path to the eurozone through currency swap arrangements against local currencies, provided that fiscal consolidation and supportive monetary policy remain on track. These arrangements would be similar to swap arrangements between the ECB and EU central banks outside the eurozone, such as those of Denmark and Sweden, during the global financial crisis, except that they would be used in cases of speculative currency attacks and not financial crisis conditions, as long as good macroeconomic policies remain in place.

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30. Hungary began inflation targeting in 2001 but maintained an additional exchange rate target until late 2007.
31. On European Union (EU) membership, all new EU member states have agreed to eventually adopt the euro—without, however, committing to a timetable.

Developing local currency capital markets

The economic literature does not focus on underdeveloped local currency money and bond markets as a cause of dollarisation (rather, it is interpreted as a consequence of the same factors that also drive financial dollarisation as commonly defined, that is, dollarisation of bank loans and deposits). However, in practice, de-dollarisation experiences often have been accompanied by the development of such markets. This link is not necessarily causal: for example, the government's ability to issue long-term bonds in local currency may simply be a barometer of its macroeconomic credibility, which directly affects financial dollarisation.

That said, there is a plausible causal link from the development of local currency bond markets (typically, beginning with government bonds) to financial de-dollarisation, as follows. Moving from back to front in the causal chain, the existence of a corporate bond market could help de-dollarise bank loans and deposits by providing local currency funding opportunities to banks in an environment in which deposits are mostly dollarised. This could broaden the local currency investment opportunities of banks, enabling them to offer local currency loans at more attractive terms. Corporate bond markets will in turn require legal and market infrastructure—that is, supportive laws, regulations, and institutions. One institution that is sometimes cited as a necessary precursor is a liquid (short maturity) money market, since it may be critical in the development of a primary dealer network.[32]

Developing a corporate bond market may also require the development of a public bond market in order to overcome the "first mover" or coordination problems that are often associated with financial innovation.[33] Once a yield curve based on government bonds of various tenors has been established, corporate bonds can be priced "off" that curve, enabling potential investors to disentangle interest rate risk and corporate default risk (relative to the government). The same benchmark role can potentially be played by a large (relative to potential market entrants) and highly rated private sector borrower, or by investing international financial institutions, such as the EBRD or IFC. To serve their purpose, benchmark bonds must be liquid, which may not be easy in markets without a developed institutional investor base. Domestic currency benchmark bonds that meet these requirements exist only in a few transition countries, namely Poland, Hungary, and Russia.

Lastly, a successful corporate bond market requires a "demand side" of local institutional investors who are interested in purchasing medium- and long-term financial assets in local currency. Private institutions that might play a key role in this regard are pension funds and insurances. Both of them need to invest a flow of local currency receipts (contributions or premiums) to service future local currency obligations. Hence regulatory frameworks and, more generally, market conditions that help the development of non-bank financial institutions could play a critical role in building local currency capital markets.

Derivatives markets that allow borrowers to hedge against currency and interest rate risk can also help manage currency mismatches. The most obvious channel through which this can occur is by allowing FX borrowers to hedge at affordable prices. Somewhat less obviously—since one might think that the presence of affordable currency hedges may encourage firms to borrow more in FX—derivatives markets appear to contribute to the de-dollarisation of corporate liabilities.[34] There could be two possible explanations. For a given deposit

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32. Schinasi and Smith (1998).
33. See, for example, Allen and Gale (1994).
34. Luca and Petrova (2008).

dollarisation, FX markets can help *banks* hedge foreign currency risk and hence allow them to play the role of a buffer between deposit and loan dollarisation. In addition, by allowing firms to hedge against (local currency) interest rate risk, derivatives markets may eliminate an important factor that pushes firms toward FX borrowing.

Aside from creating market institutions through their own bond issuance, should governments provide fiscal or regulatory incentives for creating local currency markets? Tax benefits in the form of preferential treatment for long-term local currency savings and lending instruments can potentially play a role in building a local currency yield curve. But more important may be the *removal* of fiscal or regulatory obstacles. For example, in Kazakhstan pension funds are obligated to hold at least 30 per cent of their portfolio in long-term government bonds, many of which earn interest rates below inflation. Reducing this requirement or issuing inflation-indexed government bonds would help build a corporate bond market.

Regulatory measures

Regulation can ameliorate financial dollarisation if the latter is not primarily a reflection of lack of macroeconomic credibility but instead is caused by distortions, such as moral hazard or a crisis externality, or by irrational or short-sighted behaviour by corporate or household borrowers.

Regulation does not seem to have played a critical role in Latin America's de-dollarisation process. However, emerging Europe may be different in this respect, for two reasons. First, there is some direct evidence that cross-country differences in regulation help explain cross-country differences in loan dollarisation in the new member states of the European Union.[35] Second, and more important, expectations of euro adoption and reliance on foreign funding of bank loans—the main factors that seem to distinguish dollarisation in emerging Europe from dollarisation in Latin America and elsewhere—imply that regulation could be a potentially important remedy in many European countries. Basic macroeconomic credibility and inflation problems are less likely to play a role in countries that are in the European Union (or EU candidates) and have started their convergence with the eurozone. In addition, the convergence process may reinforce some of the underlying causes of dollarisation-euroisation that are best addressed by regulation, particularly a false sense that the exchange rate will remain stable throughout the convergence process (this may have played a role in Hungary, see Kiraly, 2009), and that government commitments to stabilise the exchange rate give rise to implicit guarantees. Lastly, if foreign funding of the banking system generates under-pricing of FX loans, as some papers have suggested, this may also generate a rationale for regulation.

The appropriate form of regulation will depend on the nature of the problem, that is, the distortion that biases borrowers in favour of FX lending:

- If the problem is that borrowers are misinformed, then the right response is to force disclosure of FX risk. In light of large depreciations in some countries, this source of FX borrowing preference must have become less relevant as a result of the recent financial crisis.

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35. Rosenberg and Tirpák (2008).

- If the underlying problem is that FX interest rates are too low because borrowers and lenders do not internalise the social risk of FX borrowing in the event of a crisis, then the underlying distortion can be corrected through regulatory measures that change the relative price of FX and local currency lending. This could take the form of an unremunerated reserve requirement for FX lending by banks, higher capital requirements for FX loans, or more demanding provisioning requirements for FX loans (or, conversely, depending on the demand conditions, lower capital or provisioning requirements for local currency lending).[36] These measures will not only have the effect of protecting banks' balance sheets from the higher credit risk that they assume by lending to unhedged borrowers but also will result in relatively higher FX interest rates, hence levelling the playing field between local currency and FX loans.

- Lastly, if the problem is either implicit guarantees or myopia on the part of the borrower, who focuses only on the interest rate differential, then even these more heavy-handed regulatory measures might not work unless they make the interest rate differential disappear altogether (which may, in turn, be undesirable because it *over* promotes local currency loans to borrowers that are not myopic or do not assume guarantees). In this case, the answer may be to place limits on the open FX position of *borrowers* or make some classes of borrowers ineligible for FX loans altogether.

Of the three approaches, the one described last is the least applied and the most difficult to implement. However, to the extent that one believes that myopia or implicit guarantees are really what is driving demand for FX borrowing by, for example, households or small and medium enterprises, it would be well worth exploring. At the practical level, the main difficulty is that although many countries have elaborate institutions for monitoring and supervising the balance sheet risks of the banking sector, there are no equivalent institutions for supervising similar risks in the vastly more populous and fragmented corporate and household sectors. As such, instruments that try to limit the FX exposures of these sectors tend to be blunt—for example, prohibiting household borrowing in foreign currency altogether.

One way to make balance sheet regulations for corporations and households more focused without a need to create new agencies might be to impose on banks some of the burden of supervising borrower balance sheet structures. In effect, this supervision is already part of the natural due diligence process that well-run banks apply to borrowers. For example, when households apply for a mortgage loan, they typically need to disclose not only their income but also their assets and liabilities. It may not be too difficult to require banks to take account of currency risks in the balance sheet of a potential borrower in the same way. A bank would need to establish the currency exposure of a corporate borrower and would only be allowed to lend in foreign currency if that exposure remains below a certain limit. On the household side, a similar principle could be applied, or alternatively, lower loan-to-value ratios could be applied for FX borrowers, which would ensure that the borrower retains positive equity even after a devaluation of a certain size. This principle underlies Poland's "Recommendation S," which was introduced in 2006 and is credited with curbing unhedged FX lending during the peak of the boom (see box 1 and Chart 3). It is also embodied in a regulation that was recently introduced in Hungary.

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36. See Korinek (2009) for more on unremunerated reserve requirements for FX lending.

Box 1. Poland's "Recommendation S"[37]

Recommendation S on Good Practices Regarding Mortgage-Secured Credit Exposures, introduced by the Polish Commission for Banking Supervision in June 2006, comprises two essential elements to discourage FX lending. First, it recommends requiring higher creditworthiness when customers apply for a residential loan in a foreign currency than when they apply for a zloty loan of the same value. Second, and related to this point, it sets a high standard for disclosing FX-related risks. The bank is advised to first present a zloty loan offer. When a customer still wishes to take out a foreign currency loan, the bank is asked to inform the customer about the currency risk and show a simulation of the value of loan instalments assuming zloty depreciation (of 20 per cent and the difference between the highest and lowest zloty exchange rate in the past 12 months) and an increase of the interest rate to the level of a similar zloty-denominated loan.

Recommendation S has been credited with a rise in the share of local currency loans in new lending for the second half of 2006, although it did not affect the overall growth rate of mortgage debt. In 2007 the narrowing interest rate differential between Poland and Switzerland also may have dampened the demand for Swiss franc loans. The renewed demand for FX mortgage loans in 2008 may be attributable to the gradual easing of income criteria for FX loans and the appreciation of the zloty until the third quarter (see Chart 3).

Chart 3. Net new credit to households, Poland, 2008–10
Millions of zloty
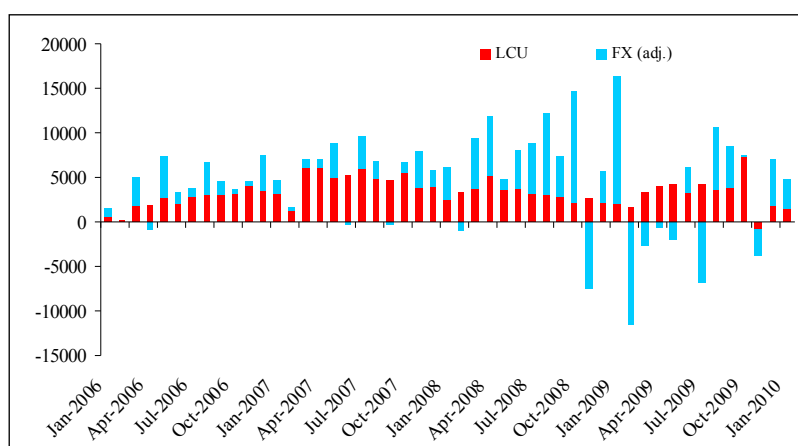
Source: CEIC database and authors' calculations

While Recommendation S may not have had a lasting impact on curbing FX borrowing, it may have been successful in raising the credit quality of FX loans. Data confirm that Polish FX mortgage borrowers tend to be well-educated first-time borrowers with strong employment prospects. As of the end of September 2009, the ratio of non-performing FX mortgage loans remained low, at 0.9 per cent, versus 2.4 per cent for zloty-denominated mortgages.

In February 2010 the Polish regulator passed "Recommendation (T)" to reduce risk in the banking sector, including measures to restrict access to loans for customers with lower incomes (with debt payments exceeding 50 per cent of monthly income), to improve the use of the credit register and to provide more information to borrowers on risks, especially for foreign currency loans. In addition, it updated its recommendation on banks' FX risk management and FX risk operations.

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[37] This box was prepared by Anatoli Annenkov. For more information, see Polish Commission for Banking Supervision (2006).

Lastly, it is important to recognise that regulation, particularly in financially integrated Europe, may not be effective unless similar regulatory principles apply across jurisdictions. Consider, for example, a tough regulation in an eastern European host country of an international banking group. If the home country does not impose a similar regulation, the host country regulation can be easily circumvented (except in the presence of capital controls) by borrowing directly from the parent bank rather than the subsidiary (anecdotal evidence suggests that this occurred in some countries before the recent crisis). In addition, host countries may not want to apply tougher regulations than exist in other potential host countries to avoid discouraging capital inflows.

However, there are unlikely to be any EU-wide regulations entailing higher capital or prudential requirements in the foreseeable future, for three reasons. First, there is a recognition that the problem is partly rooted in macroeconomic factors that need to be addressed first. Second, there is a concern that under the prevailing cyclical conditions, a "tax" on FX lending would prolong the credit crunch and slow the recovery in emerging Europe. Third, it is unlikely that the 27 EU members will agree on EU-wide regulatory changes without conducting the usual impact studies accompanying such changes.

However, there are two pragmatic short-run alternatives to EU-wide regulation. First, regulators of internationally active banking groups can affect the operations of these banks. Home country supervisors can lead this effort, in close coordination with host supervisors. The Austrian authorities, for example, have launched a new supervisory initiative restricting Austrian banks' domestic foreign currency lending to unhedged individuals, and are engaged in negotiations with the main Austrian banking groups that aim to apply similar principles to the lending of these banking groups in emerging Europe (both to direct cross-border lending and to subsidiary lending). Second, the main bank groups could agree among themselves to a set of lending standards that in effect embodies and pre-empts the main restrictions that regulators might otherwise impose. A combination of the two, with home countries setting some basic coordinated guidelines and effectively encouraging banks to incorporate them into their lending standards, would be a desirable possibility.

Country insurance

The regulatory measures discussed in the previous subsection are based on acceptance of the fact that financial dollarisation cannot be rooted out but instead must be managed so as to limit the risks that go along with it. One way of doing that is to manage risks at the macro level in addition to the micro level. This means offsetting an aggregate FX mismatch in the private sector by a long FX position (ideally, on a contingent basis) in the public sector. In the event of a "sudden stop" or other event triggering pressure on the currency, this public long FX position can then be mobilised in a way that softens the blow to the private sector. This is how Brazil (1998) and Russia (2008) managed pressures on their currencies in light of private sector open FX positions. In effect, international reserves were spent to allow the private sector to close its FX position either ahead of devaluation (in Brazil) or accompanying a very gradual devaluation (in Russia).

The problem with this approach is that it is potentially expensive for the public sector, particularly if the "country insurance" consists of hoarding large amounts of international reserves. Even worse, if the delivery of FX (or FX risk hedges) from the public to the private sector involves a subsidy, then the country insurance mechanism could become a source of moral hazard and hence help create the very problem that it is meant to mitigate. That said,

these problems are not insurmountable: for example, FX support will not create a distortion if it takes the form of (fairly priced) lending rather than a transfer. Furthermore, country insurance could be cheaper if it involves international risk sharing, either through a public institution, such as the International Monetary Fund (IMF), or through private contingent credit lines.[38] In general, a country that decides to "live with" some degree of private sector currency mismatch is well advised to have a crisis mitigation framework in place that will allow it to cope with the consequences of pressures on the currency.

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38. See Caballero and Panageas (2005) and Sturzenegger and Zettelmeyer (2007, chapter 12) for a survey.

6. A FRAMEWORK FOR COUNTRY-SPECIFIC DE-DOLLARISATION STRATEGIES

Not all of the elements discussed in the previous subsection are equally suited to all emerging European countries with private sector loan dollarisation. In particular, two sets of constraints or considerations need to be taken into account when defining country-specific strategies to reduce or limit the risk of FX exposures.

The first constraint is EU membership or EU candidate status. As argued in the previous section, if expectations of euro adoption are a driver of euroisation, this makes it more likely that regulation is an appropriate response. Expectations of euro adoption in small countries may also make it more difficult to develop local currency capital markets. Lastly, and most obviously, international commitments and geography may limit the extent to which countries may be able to, or wish to, reform their monetary institutions in the direction of free-floating exchange rates and inflation-targeting policies. In particular, several members of the European Union have undertaken commitments under the ERM2 that limit currency flexibility, or have adopted rigid pegs in anticipation of euro adoption.

Second, attempts to address the causes of dollarisation must take into account the context of a specific country. In particular, it does not make sense to push the development of local currency bond markets in countries that have not reached a minimum level of macroeconomic policy and institutional credibility (if attempted, such efforts would fail). It may make even less sense, in such countries, to try to reduce financial dollarisation through regulatory measures because financial dollarisation may be a constrained-optimal response to a weak institutional environment. In other words, although regulation might be successful in reducing financial dollarisation, this may come at the expense of precluding access to finance by unhedged borrowers and perhaps shutting down some forms of finance (for example, longer-term borrowing) altogether.

Taken together, these constraints suggest three ways of grouping countries. The first category consists of those countries with weak institutions and volatile macroeconomic environments. To address financial dollarisation in this group, the strategic focus should be on building credible macroeconomic policy frameworks and institutions, and allowing more exchange rate flexibility. To support this process, countries can attempt to limit external volatility, for example, through an IMF-supported arrangement or credit line. Attempts to develop local currency markets and limit financial dollarisation through regulatory means can receive less emphasis during this phase.

In the second category are those countries that have built reasonably strong macroeconomic institutions and are either not candidates for the euro or not constrained by the ERM2 or by hard euro pegs. Countries in this group could mobilise all four elements of the strategy described above, to varying degrees. They should continue to build macroeconomic policy credibility in the context of floating exchange rates, develop local currency markets and possibly derivatives markets (except in countries that are so small that they would not meet minimum scale and liquidity requirements), strengthen regulations, and seek country insurance to minimise risks while the de-dollarisation process is ongoing.

The last group consists of EU members that participate in the ERM2 or have committed to hard pegs in anticipation of euro adoption. These countries should focus on regulatory measures to mitigate risks associated with FX mismatches on the road to the euro. Such

countries could also strengthen, in collaboration with the ECB and the European Commission, their policy credibility by committing to a strong convergence programme towards, and then within, the ERM2 framework to meet the Maastricht criteria. The ECB could facilitate these countries' path to the eurozone by providing genuine euro currency swap facilities against local currencies, as long as countries' convergence programmes remain on track.

The question is which countries fall in which categories. This is easy to answer for some countries, but there is a "grey zone" (and judgement) involved with classifying others.

ERM2 participants or countries with hard pegs in anticipation of euro entry include the Baltic countries and Bulgaria. Countries that are outside the European Union and do not currently have candidate status make up the complementary group. This leaves highly euroised EU members or candidates such as Hungary, Romania, and possibly Croatia in a grey zone. For these countries, both choices could be on the table: to build further on past progress in improving institutions and local currency markets with the aim of reducing euroisation, or to accept euroisation and manage its risks, primarily through regulation. Regardless of which "box" these countries fit in, regulation can be expected to play a role, for reasons explained in the last section. At the same time, these countries have room to strengthen both monetary and fiscal policy credibility and to improve local capital market infrastructure. Hence they should not confine themselves to a "regulation only" approach.

It is also difficult, but not impossible, to attempt to classify countries according to *monetary policy credibility*. One approach is to examine the inflation volatility data underlying the regressions shown in table 1. This will identify the set of countries for which inflation volatility is a key driver of dollarisation, according to the regressions; however, this set is, in turn, somewhat sample specific. Another approach to the issue is to ask in which countries, with the benefit of hindsight, lending in local currency would have led to more predictability in the debt burden, over the medium term, than lending in euros or dollars (see box 2 and Table 2). Where this applies, the local currency should have proved itself a better—less risky—unit of account for financial contracts than foreign currency.

Both approaches give roughly consistent answers, suggesting that a macroeconomic credibility problem is probably not the main driving factor behind loan dollarisation in central European and the Baltic countries, whereas it is more likely to be an issue in the Commonwealth of Independent States and the Balkans region. How one delineates the boundary between these groups will depend on whether memories of high inflation in the 1990s are considered to affect monetary policy credibility today, and on whether in assessing credibility, one focuses only on inflation volatility or also considers nominal interest rate volatility driven by liquidity squeezes, erratic macroeconomic policies, and political shocks. The latter approach would expand the group of countries for which policy credibility is deemed to be an issue.

Box 2. Comparing the riskiness of local currencies and euros as currencies of denomination

Suppose a firm, producing one unit of real output t periods in the future, had been given the choice of borrowing long term, either in local currency units or in euro units, both at a fixed interest rate. Viewed from the present, the debt due at time t (expressed in whatever units it was contracted in) is known with certainty. What is not known, however, is the repayment capacity of the firm expressed in the same currency unit that was used to fix the repayment amount. Suppose that uncovered interest parity holds, so that future debt constitutes the same share of *expected* firm revenue regardless of what unit debt and revenue are expressed in. Then the probability that the firm will be able to repay its debt in local currency will be higher than if it is denominated in euros if and only if the volatility of future output in local currency units is lower than that of future output expressed in euros. Thus one way of assessing the relative riskiness of local currency debt versus euro debt is simply to compare the volatility of output expressed in the two units.

Table 2 undertakes this comparison, for three different measures of volatility. First, to assess the risk faced by the borrower from not knowing precisely what the value of his production will be in the units in which the debt has been contracted, one ideally would want to compare the predictability of output, over a t horizon, expressed in the various units (see Borensztein and others 2004, box 1). The group of columns on the left side of the table do so by computing the standard deviations of the forecast error of cumulative GDP growth over a four-year horizon, computed as the difference of four-year-ahead *World Economic Outlook* (WEO) forecasts made for 2005 (in the 2001 WEO), for 2006 (in the 2002 WEO), and so on, and comparing them with the actual GDP values for these years.

Focusing on this measure, the results indicate (not surprisingly) that a number of central European countries (Croatia, Czech Republic, Hungary, Poland, Slovak Republic, and Slovenia) would have been better off denominating debt in local currency units versus euro units. Most other countries (including those with hard pegs, all of which have resisted devaluation so far, and most members of the Commonwealth of Independent States and the South East Europe Program) would have fared better with euro-denominated debt. There are two anomalies: Tajikistan and the United States, which is included as a memorandum item together with a few other advanced countries. This can be attributed to the tiny sample of only five observations underlying each standard deviation.

To get around the sample size problem, we additionally compute the standard deviation of growth itself (rather than cumulative growth forecasts) over two horizons: 1994-2009, a period comprising almost the entire transition sample except for the early stabilisation and liberalisation years; and 2001–09 (2009 is always included to reflect crisis-related devaluations in the volatility measures). As it turns out, the longer sample is often still dominated by high inflation experiences in the first half of the 1990s. For this reason, local currency units very rarely emerge as the volatility-minimising unit of account. This changes if the sample period is reduced to 2001–09, with local currency denominations emerging as the variance-minimising unit in most countries. The exceptions are Belarus, Tajikistan, and Serbia (and most of the hard peg countries, as mentioned above).

Box 2 (continued)

Table 2. GDP volatility: comparison of standard deviations across currency units

Country	Four-year forecast error (2005–09)[a]		SD minimizing	SD growth (1994–2009)[c]		SD minimizing	SD growth (2001–09)		SD minimizing
	Local	Euro		Local	Euro		Local	Euro	
Transition									
Albania	3.0	17.8	Local	11.9	17.0	Local	3.0	6.4	Local
Armenia	19.1	10.5	Euro	1,169.3	22.2	Euro	6.2	13.9	Local
Azerbaijan	96.0	12.7	Euro	532.5	23.7	Euro	22.3	24.4	Local
Belarus	149.0	13.2	Euro	416.0	85.1	Euro	22.6	12.1	Euro
Bulgaria	13.2	7.0	Euro	217.9	20.8	Euro	5.2	4.5	Euro
Croatia	6.8	14.7	Local	29.2	8.4	Euro	3.5	4.9	Local
Czech Republic	5.7	12.7	Local	5.3	7.5	Local	3.8	8.7	Local
Estonia	19.9	17.3	Euro	12.1	12.3	Local	8.5	8.4	Euro
Georgia	13.9	11.0	Euro	2,085.9	30.2	Euro	5.1	10.5	Local
Hungary	5.6	20.0	Local	8.1	7.0	Euro	4.0	8.1	Local
Kazakhstan	50.1	26.1	Euro	323.4	31.4	Euro	11.4	16.5	Local
Kyrgyz Republic	43.8	16.0	Euro	29.0	18.3	Euro	8.6	8.8	Local
Latvia	34.8	14.4	Euro	11.6	16.7	Local	12.6	12.5	Euro
Lithuania	12.4	7.9	Euro	14.6	14.4	Euro	6.8	6.4	Euro
Macedonia, FYR	19.7	11.6	Euro	35.4	8.8	Euro	5.1	5.2	Local
Moldova	32.1	12.8	Euro	36.5	15.6	Euro	6.7	11.0	Local
Mongolia	50.8	11.7	Euro	20.1	16.0	Euro	11.5	15.7	Local
Poland	15.7	18.2	Local	13.2	9.7	Euro	2.7	11.8	Local
Romania	22.5	14.5	Euro	39.5	11.1	Euro	11.0	11.3	Local
Russia	32.4	23.7	Euro	63.9	24.2	Euro	9.3	16.3	Local
Serbia[b]	...	...	...	28.7	17.9	Euro	27.1	13.2	Euro
Slovak Republic	9.2	13.6	Local	12.2	11.1	Euro	3.7	5.9	Local
Slovenia	1.6	11.5	Local	4.2	3.8	Euro	3.6	3.0	Euro
Tajikistan	19.3	19.4	Local	98.6	25.7	Euro	8.5	7.3	Euro
Turkey	142.0	31.3	Euro	34.8	15.8	Euro	15.4	15.3	Euro
Turkmenistan	133.7	52.8	Euro	338.5	27.2	Euro	16.7	18.5	Local
Ukraine	54.2	40.0	Euro	186.1	18.8	Euro	9.6	18.5	Local
Uzbekistan	28.5	20.3	Euro	289.0	18.2	Euro	10.7	17.3	Local
Memorandum									
Canada	6.6	19.9	Local	2.9	9.4	Local	3.2	7.1	Local
Japan	3.7	6.2	Local	2.0	10.6	Local	2.2	8.0	Local
United Kingdom	5.0	28.1	Local	2.0	9.3	Local	2.5	8.2	Local
United States	5.1	4.3	Euro	2.1	9.1	Local	2.6	7.2	Local

Source: Authors' calculations based on data from the IMF's World Economic Outlook, various years.

a. Standard deviation of percentage differences between four-year-ahead GDP forecasts published in the spring 2001–05 editions of the World Economic Outlook (WEO) and realised (or in the case of 2009, projected) GDPs based on the April 2009 WEO.

b. For data availability reasons, the sample for Serbia starts in 1997.

c. Standard deviation of cumulative five-year-ahead forecast errors based on previous year's projected growth rate (that is, the 2000 rate is used to generate the cumulative forecast for 2005, the 2001 rate is used to generate the forecast for 2006, and so on).

Chart 4 summarises the discussion in this chapter. The *top right cell* shows countries for which tighter regulation and fiscal consolidation are the main options to manage the risks of currency mismatches, both because weak institutions are not the principal underlying problem in these countries, and because existing policy commitments limit the options for institutional reform and for local currency capital market development.

The *bottom left cell* includes countries for which the macroeconomic and institutional credibility is probably the main issue at this point, and regulation and aggressive market development is unlikely to be useful (or could even be counterproductive) until some degree of credibility has been achieved.

Lastly, the *top left cell* includes the remaining countries, which will want to use combinations of all tools to address currency mismatches. Within this heterogeneous group, the emphasis given to particular tools will vary, with more prominence given to regulation in countries with relatively advanced institutional environments and membership in, or proximity to, the European Union. Furthermore, country size may limit the scope for local market development, particularly in some countries in south-eastern Europe.

Note that the *bottom right cell* is empty. In a sense, countries such as Montenegro, which have unilaterally adopted the euro, fit in this area; however, their adoption of the euro precludes the need for a further policy response, at least conditional on that policy choice.

Chart 4. Framework for policy responses to liability dollarisation in transition economies

		In ERM2, or hard peg in anticipation of euro?	
		No	Yes
Macroeconomic and institutional credibility?	OK	Further reform monetary and fiscal institutions and/or build track record Local capital market development Regulation Country insurance *Most emerging European countries*	Regulation Fiscal consolidation and/or fiscal-structural reforms *Baltic countries, Bulgaria*
	Low	Reform monetary and fiscal institutions and build credibility track record Country insurance *Ukraine, most early transition countries, some countries in the Western Balkans*	

CONCLUSION

As in other emerging market regions, liability dollarisation in emerging Europe and in the transition economies further east has multiple causes. First among these is lack of macroeconomic credibility. In some countries, high inflation volatility may have encouraged financial contracts in foreign currency as opposed to local currency. Even in countries with more solid inflation track records, imperfect credibility has meant that FX borrowing has typically been cheaper than local currency borrowing. Whether combined with implicit guarantees associated with hard pegs, or simply the result of disregard for exchange rate risk in light of low exchange rate volatility and expected euro adoption in the medium term, this factor has created incentives for foreign currency borrowing. Abundant foreign financing appears to have aggravated the situation, perhaps because it led to more aggressive pricing of FX loans.

Policy responses to the liability dollarisation problem will be successful only if they are shaped by the correct diagnosis. In countries in which monetary and fiscal institutions are weak and resort to the inflation tax remains a concern, regulatory responses—making FX lending more expensive or banning it outright—could be counterproductive, as they may lead borrowers to take higher risks or undermine lending altogether. In these countries, the reforms must focus on the core of the problem by reforming macroeconomic institutions and strengthening public finances. In the remaining countries, regulation can play a useful role, but it should be embedded in a broader strategy that seeks to further improve macroeconomic credibility and develop local currency markets.

Regulation can be useful through two channels: first, by limiting corporate and household FX exposures and hence the risks associated with currency mismatches, even while much of the financial system remains dollarised; and second, by correcting distortions that may have made FX borrowing too cheap. At the same time, regulation to address the FX liability bias needs to be designed with care. Like any regulation, it comes at the cost of making potentially welfare-improving transactions more expensive or impeding them altogether. This is a particular concern at a time when net credit growth is still weak or negative in many emerging European countries, and many households and firms need to refinance FX debts. When introducing such regulation, policy-makers will need to trade off these risks against the desire to take advantage of post crisis political momentum favouring financial sector reforms.

Lastly, attempts to introduce regulation need to address the cross-border coordination problem. In a financially integrated Europe, where cross-border banking groups own the bulk of financial system assets in many emerging European countries, regulatory discrepancies across countries could lead to regulatory arbitrage: shopping for loans where regulation is the weakest. This can be avoided through EU-wide regulation that is also adopted in the EU neighbourhood. In the absence of such regulation, informal coordination between regulatory authorities can help. One good thing to emerge from the ongoing crisis is that it has created mechanisms for cross-border coordination in the context of crisis management.[39] The success of the post crisis clean-up and reform effort could hinge on whether these mechanisms can be maintained and developed beyond the crisis.

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39. See EBRD, 2009, box 1.4).

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Appendix A: Regression variables and definitions

Variable name	Definition
Forex	loan 1 = last loan of firm was in a foreign currency, 0 = last loan of firm was in local currency.
Duration	Duration of the loan, in months.
Collateralised	1 = yes, 0 = no.
Exporter	1 = firm has export revenues, 0 = otherwise.
Income via bank	Share of firm revenues that are received through bank transfers.
International accounting	1 = firm applies international accounting standards (IAS or USGAAP),0 = otherwise.
Small firm	1 = less than 50 employees, 0 = otherwise.
Age	Age of firm at time of loan disbursement, in years.
Security costs	Expenses for security services over sales.
State firm	1 = at least 50 per cent of ownership in state hands, 0 = otherwise.
Interest differential	Money market rate minus euro repo rate, in the past quarter.
Deprec. volatility	Variance of monthly changes in the real exchange rate versus euro, in percent, during the past four quarters.
Depreciation	Depreciation of local currency versus the euro, nominal, in percent, during the past quarter.
Peg	1 = country has crawling peg, fixed peg, or currency board exchange rate regime, 0 = otherwise.
EU	1 = country is or has completed negotiations to become EU member, 0 = otherwise.
Inflation	Consumer price inflation, in the past quarter.
Inflation volatility	Variance of monthly changes in the consumer price index, in percent, during the past four quarters.
Foreign banks	Assets share of foreign controlled banks in domestic banking system, in percent.
Governance	EBRD index of enterprise reform. Scale: 1 to 4.33.
Forex deposits	Share of deposits in the banking sector denominated in foreign currency, in percent.
CIS	1 = country is member of Commonwealth of Independent States, 0 = otherwise.
Forward FX market	1 = country has developed forward FX market, 0 = otherwise.
Capital controls	1 = country has controls on foreign borrowing by or foreign direct investment in domestic firms, 0 = otherwise.
Open FXposition	Maximum total open FX position of banks over capital, in percent.
GFI[	Gross financial integration, defined as stock of external assets and liabilities, percent of GDP.
fintliab	Total external liabilities, percent of GDP.
fintdebl	External debt liabilities, percent of GDP.
L\D	Loan-to-deposit ratio.
kaopen	Chinn-Ito index of capital account liberalisation.
ca_3	Average current account deficit in the three years previous, percent of GDP.
BIS	FX-adjusted quarterly change in the asset position of commercial banks reporting to the Bank for International Settlements, in percent, from the BIS locational database.
fintdebt_ch	Three-year change in external debt, percent

Table B-1. Firm-level regressions: full results[a]
Regression coefficients

	Foreign financing/integration measure (FI measure)							
Variable	GFI	BIS	L/D	fintliab	fintdebl	ca_3	fintdeb_ch	kaopen
Inflation volatility	0.0353	0.0255	0.0118	0.0355	0.0337	0.0629	0.0337	0.0292
	(0.010)	(0.050)	(0.418)	(0.008)	(0.008)	(0.000)	(0.009)	(0.038)
Governance	-0.321	-0.228	-0.209	-0.317	-0.299	-0.440	-0.300	-0.224
	(0.000)	(0.001)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)
Hard peg	0.013	0.001	0.075	0.015	0.009	0.204	0.007	0.001
	(0.786)	(0.972)	(0.280)	(0.756)	(0.857)	(0.005)	(0.889)	(0.981)
FI measure	0.0601	-0.0003	-0.1850	0.0008	0.0007	-0.0103	0.0006	-0.0061
	(0.360)	(0.540)	(0.057)	(0.331)	(0.487)	(0.202)	(0.490)	(0.821)
Foreign banks	0.060	0.000	-0.185	0.001	0.001	-0.010	0.001	-0.006
	(0.000)	(0.001)	(0.166)	(0.000)	(0.000)	(0.544)	(0.000)	(0.004)
Inflation	-0.001	-0.001	0.000	0.000	0.000	0.004	0.000	-0.002
	(0.933)	(0.915)	(0.969)	(0.968)	(0.980)	(0.544)	(0.992)	(0.793)
Interest differential	-0.001	0.002	0.000	-0.001	-0.001	0.006	-0.001	0.002
	(0.863)	(0.477)	(0.915)	(0.760)	(0.773)	(0.051)	(0.855)	(0.501)
Depreciation	-0.003	-0.001	-0.002	-0.003	-0.003	-0.005	-0.003	-0.001
	(0.175)	(0.620)	(0.223)	(0.145)	(0.119)	(0.0163)	(0.134)	(0.621)
Depreciation volatility	0.005	0.002	0.003	0.005	0.005	0.006	0.005	0.002
	(0.234)	(0.592)	(0.355)	(0.232)	(0.254)	(0.264)	(0.252)	(0.556)
Exporter	0.115	0.127	0.121	0.115	0.114	0.132	0.114	0.128
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Sales to multinationals	0.0349	0.0346	0.0386	0.0347	0.0361	0.0594	0.0359	0.0326
	(0.381)	(0.411)	(0.346)	(0.382)	(0.363)	(0.211)	(0.366)	(0.439)
International accounting	0.0480	0.0590	0.0627	0.0477	0.0476	0.0473	0.0475	0.0573
	(0.270)	(0.244)	(0.176)	(0.272)	(0.273)	(0.390)	(0.275)	(0.253)
Small firm	-0.004	-0.014	-0.001	-0.004	-0.004	-0.022	-0.004	-0.012
	(0.893)	(0.671)	(0.982)	(0.908)	(0.902)	(0.603)	(0.896)	(0.701)
Age	-0.001	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	0.000
	(0.558)	(0.691)	(0.315)	(0.561)	(0.540)	(0.414)	(0.543)	(0.696)
CIS	-0.128	-0.129	-0.0565	-0.136	-0.122	-0.0551	-0.118	-0.140
	(0.098)	(0.084)	(0.450)	(0.087)	(0.102)	(0.478)	(0.112)	(0.058)
Forward FX market	-0.0142	-0.0812	-0.0228	-0.0129	-0.0158	0.0181	-0.0211	-0.0734
	(0.826)	(0.150)	(0.737)	(0.841)	(0.806)	(0.811)	(0.741)	(0.163)
Capital controls	-0.0690	-0.0806	-0.0857	-0.0646	-0.0621	-0.0504	-0.0644	-0.0825
	(0.059)	(0.009)	(0.015)	(0.061)	(0.063)	(0.237)	(0.064)	(0.075)
Open FX position	0.004	0.006	0.004	0.004	0.004	0.010	0.004	0.006
	(0.040)	(0.000)	(0.048)	(0.048)	(0.060)	(0.000)	(0.061)	(0.004)
EU	-0.011	0.000	0.006	-0.015	-0.015	0.010	-0.013	0.001
	(0.842)	(0.998)	(0.914)	(0.785)	(0.790)	(0.836)	(0.820)	(0.981)
Forex deposits	-0.00303	-0.00191	-0.00154	-0.00307	-0.00326	-0.00958	-0.00326	-0.00185
	(0.032)	(0.158)	(0.345)	(0.027)	(0.015)	(0.000)	(0.017)	(0.175)
Collateralized	-0.0169	-0.0102	-0.0178	-0.0171	-0.0161	-0.00614	-0.0165	-0.00927
	(0.752)	(0.862)	(0.738)	(0.750)	(0.767)	(0.929)	(0.762)	(0.874)
Duration	0.00314	0.00307	0.00291	0.00314	0.00314	0.00341	0.00313	0.00310
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of observations	1574	1452	1541	1574	1574	1121	1574	1461
Number of countries	21	19	19	21	21	15	21	20

Source: Authors' calculations based on data from Brown, Ongena, and Yeşin (2009) and Rosenberg and Tirpák (2008).

a. For variable definitions see appendix A. p-values are shown in parentheses. Dependent variable is dummy variable denoting whether firm's last loan was in FX (1) or local currency (0).

Table B-2. Quarterly dataset, 2002–05: full results [a]
Regression coefficients

Variable	Foreign financing/integration measure (FI measure)							
	GFI	BIS	L/D	fintliab	fintdebl	ca_3	fintdebt_ch	kaopen
Inflation volatility	5.986	5.499	11.04	6.101	5.543	11.47	5.687	5.856
	(0.308)	(0.363)	(0.009)	(0.285)	(0.255)	(0.013)	(0.276)	(0.304)
Governance	-15.8	-13.78	-17.07	-15.08	-15.43	-15.13	-14.37	-23.47
	(0.010)	(0.030)	(0.010)	(0.017)	(0.030)	(0.150)	(0.032)	(0.010)
Hard peg	32.22	33.3	23.35	32.12	35.64	39.53	35.64	27.95
	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.006)
FI measure	4.625	0.068	12.94	0.0600	-0.177	-0.019	-0.110	4.834
	(0.628)	(0.047)	(0.390)	(0.630)	(0.171)	(0.979)	(0.351)	(0.216)
Foreign banks	0.122	0.0665	0.131	0.102	0.0958	0.0916	0.0652	0.0944
	(0.243)	(0.473)	(0.321)	(0.374)	(0.314)	(0.473)	(0.484)	(0.406)
Inflation	-1.268	-1.634	-1.243	-1.312	-1.200	-1.508	-1.141	-0.932
	(0.098)	(0.047)	(0.133)	(0.082)	(0.128)	(0.018)	(0.150)	(0.283)
Interest differential	0.785	0.919	0.682	0.747	0.704	1.823	0.646	0.473
	(0.092)	(0.028)	(0.084)	(0.084)	(0.104)	(0.001)	(0.170)	(0.293)
Depreciation	-0.188	0.0255	-0.316	-0.196	-0.113	-0.386	-0.143	0.0275
	(0.502)	(0.922)	(0.246)	(0.490)	(0.659)	(0.281)	(0.573)	(0.918)
Depreciation volatility	0.505	0.580	0.486	0.487	0.625	0.290	0.593	0.257
	(0.389)	(0.326)	(0.437)	(0.394)	(0.231)	(0.702)	(0.285)	(0.644)
Forex deposits	-0.159	-0.211	-0.240*	-0.146	-0.220	-0.576	-0.198	-0.0998
	(0.407)	(0.226)	(0.099)	(0.456)	(0.228)	(0.182)	(0.275)	(0.602)
Capital controls	-14.39	-11.85	-12.95	-13.81	-15.82	-7.529	-14.89	-12.14
	(0.010)	(0.029)	(0.017)	(0.019)	(0.0123)	(0.307)	(0.015)	(0.085)
Number of observations	223	212	196	223	223	164	223	214
Number of countries	21	20	20	21	21	16	21	20

Source: See table B-1.
a. For variable definitions, see appendix A. p-values are shown in parentheses. Dependent variable is percent of
   FX lending in total lending. Estimated using Generalized Method of Moments.

Table B-3. Annual dataset, 2000–08: full results [a]
Regression coefficients

Variable	Foreign financing/integration measure (FI measure)							
	GFI	BIS	L/D	fintliab	fintdebl	ca_3	fintdebt_ch	kaopen
Inflation volatility	-1.823	-4.648	-1.510	-1.822	-1.814	-1.182	-1.757	-3.631
	(0.204)	(0.072)	(0.270)	(0.180)	(0.178)	(0.361)	(0.188)	(0.137)
Governance	-20.07	-17.07	-22.12	-20.64	-20.7	-21.43	-19.73	-21.47
	(0.006)	(0.020)	(0.001)	(0.005)	(0.010)	(0.020)	(0.013)	(0.005)
Hard peg	23.02	24.04	19.57	22.68	24.86	11.98	23.77	18.6
	(0.021)	(0.018)	(0.057)	(0.018)	(0.023)	(0.211)	(0.029)	(0.031)
FI measure	2.564	0.0164	3.048	0.106	-0.123	-1.339	-0.0122	7.137
	(0.821)	(0.088)	(0.842)	(0.487)	(0.525)	(0.424)	(0.937)	(0.000)
Foreign banks	-0.0486	0.0237	-0.0946	-0.0648	-0.0107	0.0620	-0.0430	-0.0771
	(0.775)	(0.888)	(0.587)	(0.714)	(0.951)	(0.722)	(0.832)	(0.642)
Inflation	-0.0123	-0.0645	-0.289	-0.0925	0.0863	0.238	0.0409	-0.0569
	(0.981)	(0.961)	(0.702)	(0.864)	(0.884)	(0.748)	(0.945)	(0.963)
Depreciation volatility	0.255	1.702	0.208	0.271	0.268	-0.00621	0.218	1.425
	(0.703)	(0.156)	(0.739)	(0.677)	(0.676)	(0.992)	(0.729)	(0.209)
Depreciation	0.0553	0.0766	0.134	-0.0287	0.178	0.0188	0.0855	0.00307
	(0.834)	(0.775)	(0.674)	(0.906)	(0.478)	(0.939)	(0.768)	(0.992)
Interest differential	-0.862	-1.059	-0.743	-0.937	-0.707	-1.325	-0.818	-0.606
	(0.158)	(0.0406)	(0.141)	(0.101)	(0.300)	(0.044)	(0.131)	(0.190)
Number of observations	79	74	64	79	79	61	79	74
Number of countries	16	15	16	16	16	13	16	15

Source: See table B-1.

a. p-values in parentheses. Dependent variable is percent of FX lending in total lending. Variable names as shown in appendix A except that inflation now denotes the previous year's consumer price index inflation; depreciation, the percent change of local currency per euro during the previous year; inflation volatility, the standard deviation of monthly inflation over the previous five years; and depreciation volatility, the standard deviation of monthly percent changes in the bilateral real exchange rate against the euro. Estimated using Generalized Method of Moments.