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To dollarize or de-dollarize: consequences for monetary policy

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Discussion Papers

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Patricia Alvarez-Plata • Alicia Garcia-Herrero

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Berlin, December 2008

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**To Dollarize or De-dollarize:
Consequences for Monetary Policy**

**Patricia Alvarez-Plata and
Alicia Garcia-Herrero**

December, 2008

Paper Prepared for the Asian Development Bank

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1. Introduction:

In the last decade, several emerging economies experienced severe financial crises. This led to the acknowledgement of a need to revise exchange rate and monetary theory, taking into account more specifically the conditions under which these countries operate. Topics such as dollarization, and balance sheet effects, have become central to the formulation and conduct of monetary policy and exchange rate regimes. This is specially relevant for the countries included in this book, as residents in ASEAN economies in transition save and borrow in large part in US-dollar and, in some cases also use hard currencies as means of payments.

The aim of this paper is to review the experience of various dual-currency economies and analyze the main challenges faced by policymakers in formulating and conducting monetary policy. To that end, it distinguishes between countries with growing dollarization and those which have managed to revert such trend. In addition to the Asian countries of interest we look at a number of Latin American countries, Israel and Russia. All of this countries have experienced – and in some cases still do – a high degree of dollarization. Though there are several other countries within Central and Eastern Europe where a hard currency, i.e. the euro, is frequently used for financing and saving purposes, an important difference of this region and the ASEAN countries in transition, is that the latter are nowhere close to adopting the dollar as an official currency or to enter a monetary union. Israel is chosen as a case study, because it is one of the few countries in the world that were highly dollarized, and could successfully de-dollarize. Also Russia, has been trying to de-dollarize in the last couple of years. However, as we will discuss below they did not manage to lower the deposit dollarization ratio on a sustained basis.

Two issues of special relevance for monetary policy are analyzed in detail: First, whether there is a higher exchange rate pass-through in (partially) dollarized economies. Second, how dollarization influences the design and implementation of monetary policy. In case of a monetary aggregate anchor, for example, an important issue is whether the appropriate concept of money in a dollarized economy should include foreign currency-denominated assets.

The paper is structured as follows. Section 2 offers several definitions of dollarization. Section 3 shows dollarization trends in selected Latin American and Asian countries. Section 4 discusses the complexity and effectiveness of monetary policy in dollarized economies. To this end, the pass-through of nominal exchange rates on prices are analyzed, the monetary aggregates that should be used as intermediate targets are discussed, and the alternative of inflation targeting in dollarized economies is explored. Section 5 reviews some successful cases of de-dollarization with special attention to the conduct of monetary policy. Section 6 summarizes the policy implications for transition economies in ASEAN.

2. What is dollarization?

Dollarization can be defined as the holding by residents of a significant share of their assets, in the form of foreign currency-denominated assets.¹ Usually, it is differentiated between official (or de jure), and unofficial (or de facto) dollarization. The former refers to the case in which foreign currency is given (typically exclusive) legal tender status. This implies that the foreign currency is used for purposes a currency may have, including as a unit of account for public contracts. De facto dollarization represents the situation of a foreign currency being used alongside the domestic currency as means of exchange (for transaction purposes, i.e., as currency substitution) or as means of saving in hard currency (i.e., as asset substitution).² A distinction is also made between domestic dollarization, in which financial contracts between domestic residents are made, and external dollarization which covers financial contracts between residents and non residents.

Standard models of currency substitution explain the ratio between local and foreign currency nominal balances as a function of the nominal interest rates in each currency. Assuming that the uncovered interest parity holds, and that inflation is ultimately reflected in the nominal exchange rate, expected inflation should foster currency substitution (see Levy Yeyati 2006). Asset substitution depends on risk and return considerations about domestic and foreign assets but also on the regulatory framework, which may foster one or the other type of investment.

¹ See for example Baliño et al. (1999).

² See for example Levy Yeyati (2006).

The driving force for currency and asset substitution has generally been economic instability and high inflation. In many emerging economies experiencing hyperinflation, dollarization became very widespread, as the public sought insulation from the cost of holding domestic-currency assets.³ An interesting fact is that inflation has been tamed but dollarization has continued to increase in many countries. Only a few have managed to de-dollarize and generally only partially.

The so-called hysteresis in the dollarization process is probably easier to explain for asset substitution than for currency substitution. This is because foreign currency denominated assets would still provide insurance against the probability of a return to inflation and devaluation. In the same vein, the increase of foreign currency denominated assets in the 1990s resulted from the return of capital held by the residents abroad and re-monetization thanks to the permission to hold foreign-currency deposits in the domestic banking system.⁴ Remittances may also induce asset dollarization in as far as they are kept in foreign currency. This is, for example, the case of our countries of interest, Cambodia, Lao and Vietnam.⁵

For many years, the literature on the use of foreign currency as a store of value, looked only at asset substitution, that is a situation in which domestic residents hold foreign currency financial assets, rather than foreign currency financial liabilities. However, after the crisis of 1998 in Southeast Asia and the Argentinean crisis in 2001/2002, the concept of liability dollarization gained momentum. In fact private and public sectors in emerging economies often borrow in foreign currency, which might increase the economies' vulnerability to external shocks. In Indonesia for example the private sector was highly exposed to short-term foreign-currency denominated debt, which exceeded the country's stock of international reserves. As this loans were mainly used to make investments in the nontradables sector, the large exchange rate devaluations during the crisis led to the explosion in the domestic currency value of the dollar debt– the so-called balance sheet effects – and thus to severe balance-of-payment problems.⁶

³ Baliño et al. (1999).

⁴ Berg and Borensztein (2000).

⁵ See Watanabe (2006).

⁶ Berganza, Chang and Garcia-Herrero (2004) analyze the nature of balance sheet effects stemming from foreign-currency denominated liabilities.

The term of “financial dollarization”, that was created in recent years therefore refers to both, the holding of foreign currency denominated assets and liabilities denominated in foreign currency.

3. Trends in Dollarization – Some stylized facts:

As the policy debate in the last couple of years has focused on financial dollarization, we also concentrate on this aspect of dollarization. However, as we could not obtain data on foreign currency-denominated loans, we only look at foreign currency-denominated deposits at domestic banks. Anyway, in countries, where the number of bank deposits in foreign currency is large, bank loans are also expected to be heavily dollarized, as the standard regulation requires banks to match the currency denomination of their assets and liabilities in order to avoid currency mismatches.⁷

Asset substitution can be measured in different ways, including (i) foreign currency-denominated deposits, as a share of total domestic bank deposits, or as a share of broad money, and (ii) the ratio of residents’ foreign currency deposits to the sum of residents’ domestic currency deposits and domestic currency in circulation.⁸ As there was only reliable data for the first ratio this will be the focus of our country comparison.⁹

Table 1 shows the ratio of foreign currency denominated deposits to total bank deposits for a selected group of countries in Asia and Latina America, Israel and Russia. The country sample is divided into three groups from low to very high dollarization.¹⁰ Countries are, therefore, ranked by the average of their dollarization ratio for the time span available, namely 1995-2004. The most dollarized countries appear to be Cambodia and Bolivia whose foreign currency deposits constitute around 90% of total bank deposits. Instead low dollarization countries - such as Thailand, Malaysia or Korea, but also Chile and China - hold less than 10 % of deposits in foreign-currency.

⁷ See also Rennhack and Nozaki (2006) , and IDB, chapter IV (2005).

⁸ It should be noted that offshore dollar deposits are not included in this measure, even if held by residents. As long as those dollar deposits are not intermediated domestically, it should not bias our measure but this is not always the case, particularly in some emerging economies. See also IDB (2003).

⁹ The data on foreign currency denominated bank deposits are mainly taken from Levy Yeyati (2005).

¹⁰ In order to divide the country sample in lowly and highly dollarized countries, we follow Reinhart et al. (2003) and use their ranges to group the countries according to their degree of dollarization.

Table 1: Degrees of Dollarization
Foreign Currency Deposits to Total Deposits (in percent)

	1990	1995	1998	1999	2000	2001	2002	2003	2004	Average 95-04
High Dollarization Degree										
Cambodia	..	92	93	92	93	95	94	95	96	94
Bolivia	82	78	92	93	92	92	92	93	87	90
Uruguay	86	79	79	81	82	85	88	89	88	84
Ecuador	13	19	37	54	100	100	100	100	100	76
Lao PDR	18	57	76	90	85	83	71	31	33	66
Peru	46	65	64	66	68	66	73	70	68	68
Argentina	47	57	58	62	65	74	1	2	4	40
Moderate Dollarization Degree										
Vietnam	..	35	37	39	40	42	39	30	30	37
Russia	..	29	44	41	37	34	35	27	28	34
Philippines	21	25	33	32	32	31	30	31	32	31
Indonesia	..	20	22	19	21	20	17	16	15	19
Israel	28	19	21	19	19	19	..	..	15	19
Low Dollarization Degree										
Chile	19	5	6	9	9	11	11	12	10	9
China	..	..	8	8	9	8	7	6	5	7
Korea	1	1	5	3	3	4	..	..	..	3
Malaysia	..	..	2	3	3	4	3	3	3	3
Thailand	0.1	0.3	1	1	1	1	..	..	..	1

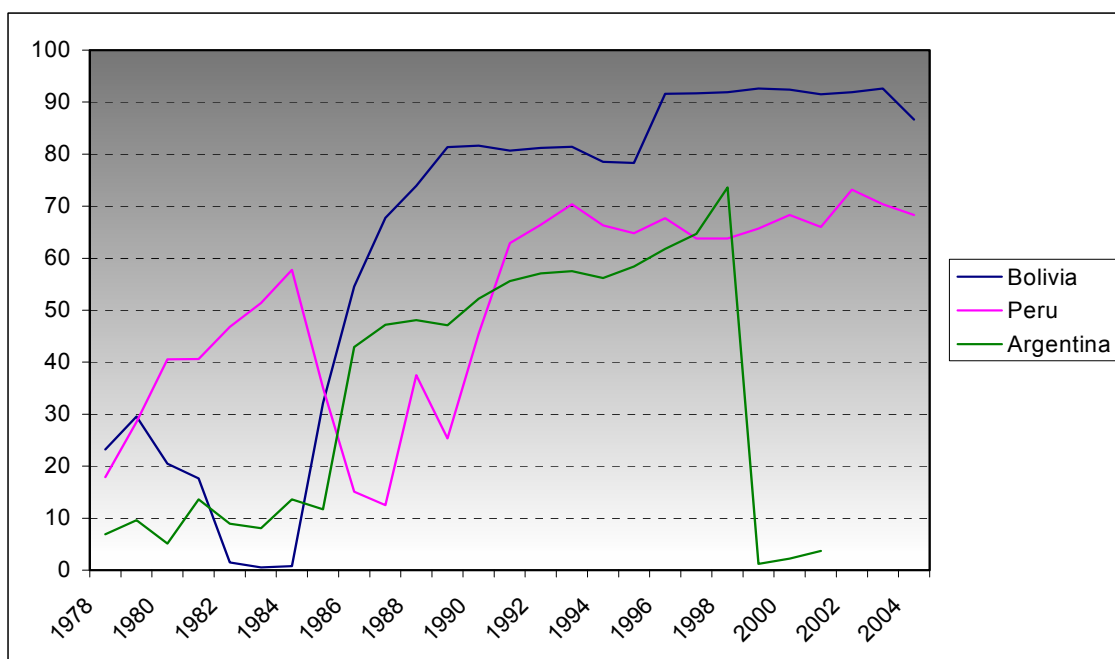
Data from Levy Yeyati 2006 and own calculations

Countries can also be classified into those which have increased their share of dollar deposits, as opposed to those which have reduced or maintain it relatively constant. Among the countries that have managed to de-dollarize, at least to some extent, two distinctive groups can be found. Those which have done it unilaterally, by legal means, and those which have only allowed for market forces to reduce the share of dollar deposits.

Within the first group, the most obvious example is Argentina, which obliged its residents –without previous notice - to transform foreign currency deposits into pesos, in the wake of the 2001 crisis. Also Bolivia and Peru tried to de-dollarize by introducing serious

limitations on the availability of foreign currency deposits, but after some years had to allow for dollar deposits again due to increasing capital flight. Both countries have, since then, remained highly dollarized. Whether Argentina in fact will be successful in maintain the currently low dollarization without suffering from disintermediation still remains to be seen.

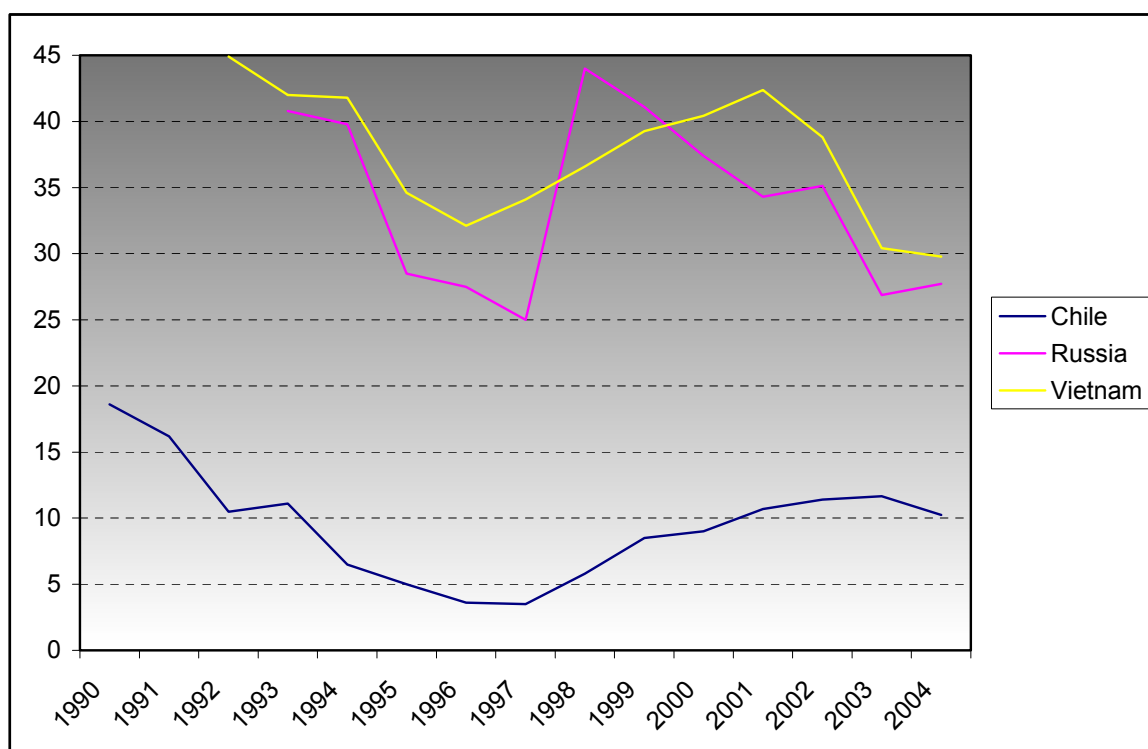
Figure 1 De-Dollarization through administrative measures: Argentina, Bolivia, and Peru



Foreign currency deposits as a percentage of total deposits
Data from Levy Yeyati 2006 and own calculations

In Vietnam, Russia and Chile the ratio of foreign currency deposits to total deposits declined by more than 15 percentage points during the early 1990s. The trend, however, was reverted for a few years and, only recently, has the ratio of dollar deposits started to fall again, particularly in Russia and Vietnam

Figure 2: Market-driven De-Dollarization: Chile, Russia, and Vietnam



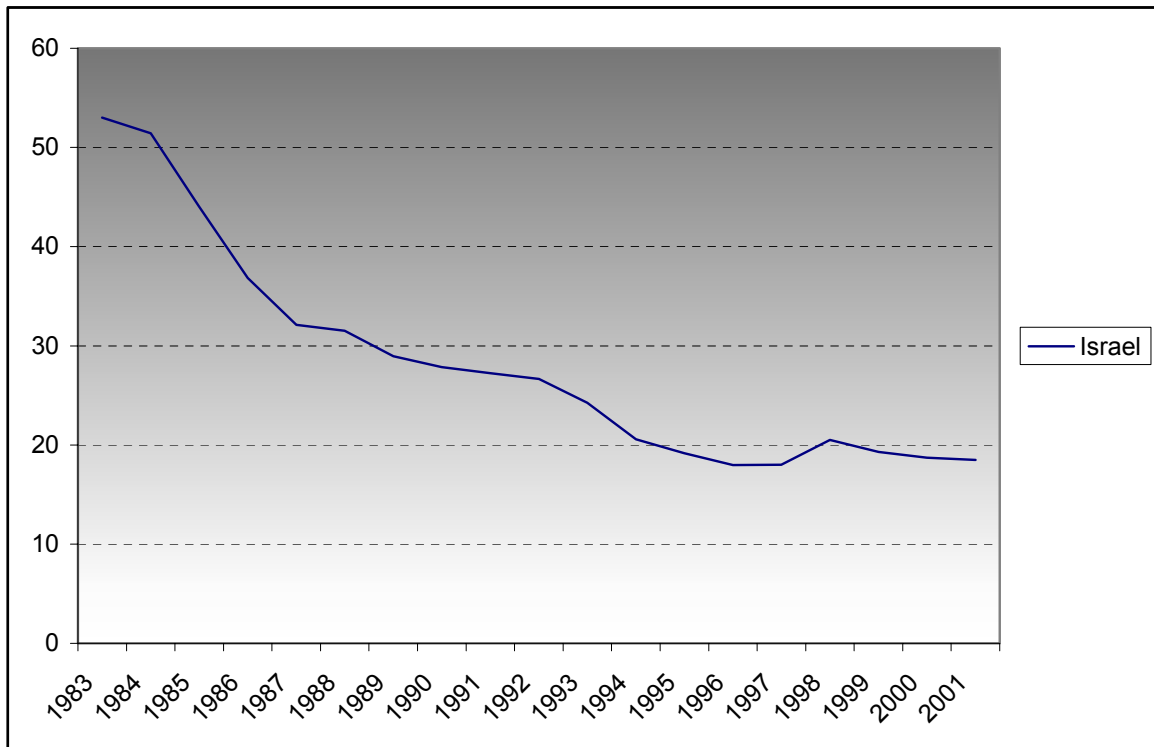
Foreign currency deposits as a percentage of total deposits

Data from Levy Yeyati 2006 and own calculations

Israel is the only country in our sample, where the decline in the share of foreign currency deposits has been large and relatively permanent since the trend started back in the 1980s (Figure 3). Whereas dollar deposits in Israel amounted to over 50% of total deposits in the early 1980s, deposit dollarization reached only 15% in 2004.

Ecuador, in turn, exhibits increasing dollarization in the years before adopting the US-dollar as legal tender in 2000 (Figure 4). In contrast to most of the other economies that record a very high dollarization degree, Ecuador was not very dollarized in the first half of the 1990s.

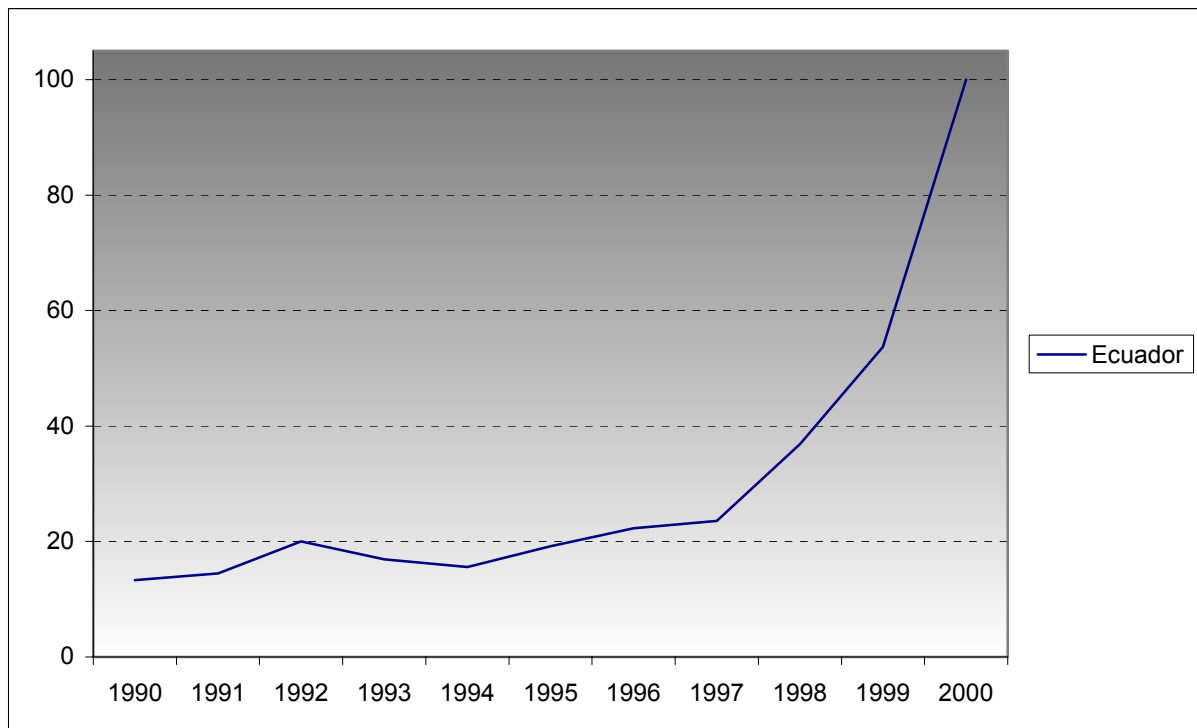
Figure 3: Successful Dollarization: Israel



Foreign currency deposits as a percentage of total deposits

Data from Levy Yeyati 2006 and own calculations

Figure 4: Increasing Dollarization: Ecuador



Foreign currency deposits as a percentage of total deposits

Data from Levy Yeyati 2006 and own calculations

4. Dollarization and Monetary Policy

The parallel circulation of a foreign currency, either as means of payment or as store of value, is bound to affect the conduct of monetary policy and, ultimately, the inflation outcome. The theoretical literature does not offer a clear answer as to how dollarization may affect monetary policy. The base case in point is probably the model by Cowan and Do (2003) where dollarized liabilities can, on the one hand, help correct a devaluation bias, by creating a disciplining effect on the Central Bank but also put the economy in a dollarization trap when information is imperfect. In fact, a benevolent Central Bank that lacks credibility may face high levels of dollarization, making a stabilization monetary policy hard to implement and credibility very costly to build. As a matter of fact, emerging countries are generally subject to imperfect information so that the model is tilted towards dollarization being a burden for monetary policy. However, given the differences across countries, it seems useful to analyze the issue empirically.

In this section, we first assess how dollarization may affect inflation, and in particular the pass-through from the exchange rate to prices. Second, we review how it may influence the effectiveness of monetary policy, particularly as concerns the stability of money demand. Finally, we draw some policy conclusions for the conduct of monetary policy.

4a Monetary policy and inflation

As already mentioned in the introduction, dollarization typically has been a reaction to economic instability and high inflation. That has also been the case in most of the highly dollarized economies from our sample. In Argentina, Bolivia, Uruguay or Vietnam for example inflation reached over 300 percent in the late 1980s. In Cambodia inflation exceeded 100 percent in the beginning of the 1990s. However, the fact that over the last decade inflation has decreased dramatically (as shown in Table 2), does not seem to have led to significantly lower dollarization.¹¹

All together, the relationship between inflation and dollarization is far from clear. Though the average inflation rate in highly dollarized economies is consistently larger than in less

¹¹ Reinhart et al. (2003). The latter analyze the relationship between the degree of dollarization and the duration of disinflation, and come to the conclusion that dollarization had no considerable effects on the duration of the disinflation. Moreover, the successful disinflation generally was not accompanied by declines in the degree of dollarization.

dollarized economies (see Table 2), it is difficult to argue that dollarization has been an impediment in stabilizing inflation, as the latter has been decreasing in most dollarized countries and has reached one digit levels in the most recent period.

Table 2: Inflation (in percent)

	1990	1995	1998	1999	2000	2001	2002	2003	2004
High Dollarization Degree									
Cambodia	..	1	15	4	-1	-1	3	1	4
Bolivia	17	10	8	2	5	2	1	3	4
Uruguay	113	42	11	6	5	4	14	19	9
Ecuador	48	23	36	52	96	38	12	8	3
Lao PDR	36	20	91	128	25	8	11	15	10
Peru	7485	11	7	3	4	2	0	2	4
Argentina	2314	3	1	-1	-1	-1	26	13	4
<i>Average</i>	<i>1669</i>	<i>16</i>	<i>24</i>	<i>28</i>	<i>19</i>	<i>7</i>	<i>10</i>	<i>9</i>	<i>6</i>
Moderate Dollarization Degree									
Vietnam	67	6	7	4	-2	0	4	3	8
Russia		197	28	86	21	21	16	14	11
Philippines	14	8	10	7	4	6	3	3	6
Indonesia	8	9	58	21	4	12	12	7	6
Israel	17	10	5	5	1	1	6	1	0
<i>Average</i>	<i>26</i>	<i>46</i>	<i>22</i>	<i>24</i>	<i>6</i>	<i>8</i>	<i>8</i>	<i>6</i>	<i>6</i>
Low Dollarization Degree									
Chile	26	8	5	3	4	4	2	3	1
China	3	17	-1	-1	0	1	-1	1	4
Korea	9	4	8	1	2	4	3	4	4
Malaysia	3	3	5	3	2	1	2	1	1
Thailand	6	6	8	0	2	2	1	2	3
<i>Average</i>	<i>9.3</i>	<i>7.8</i>	<i>5.0</i>	<i>1.2</i>	<i>1.9</i>	<i>2.3</i>	<i>1.4</i>	<i>2.1</i>	<i>2.6</i>

Data from IMF, IFS.

The question that one might have, given the above trends, is whether dollarization has actually contributed to decreasing inflation. To help disentangle the issue – and within the

limits of a descriptive paper such as this one - we examine the relationship between inflation and dollarization using a simple Granger causality test.¹² Unfortunately we could run the tests only for Bolivia and Cambodia, as these were the only countries for which monthly currency-denominated deposits are readably available. However, Zamaróczy and Sa (2003) do conduct a similar Granger causality test for Cambodia, Lao P.D.R. and Vietnam.¹³ Our result, as well as theirs, are shown in Table 3, indicating that dollarization does not Granger cause inflation, or rather disinflation in light of the most recent trends. The statistics shown in the table below are the conventional F-statistics of this type of tests.

Table 3: Granger Causality Test

Country	Inflation Granger causes dollarization 1/	Dollarization Granger causes inflation 1/
Bolivia	no (1.118)	no (0.349)
Cambodia	no (2.401)	no (2.485)
Cambodia [§]	no 0.374)	no (1.102)
Lao P.D.R. [§]	yes(2.506*)	no (0.42)
Vietnam [§]	no(0.509)	no (0.802)

1/ The null hypothesis tests whether a variable X does not Granger cause variable Y. The a star (*) close to the value in brackets stand for the rejection of such hypothesis at the 5 percent level.

[§]Results according to Zamaróczy and Sa (2003).

Another important issue in the debate about monetary policy and inflation in dollarized economies is whether the pass-through from exchange rates to prices increases under pervasive dollarization. This is important because it would constrain monetary policy. The reason behind such *a priori* is that non-tradable goods are priced in foreign currency so that exchange rate variations in a dollarized economy might pass through to domestic inflation for a broader set of goods than in a non-dollarized economy.

¹² One should be aware that inflation is a multifaceted concept, which can hardly be determined by a single variable, at least in the short run. Still, the exercise seems useful as a tool to analyze the driving forces between the two variables.

¹³ They approximated dollarization as the ratio of foreign currency deposits to broad money, whereas we used the foreign currency deposit to total deposit ratio.

We now move to analyzing whether dollarization affects the degree and speed of transmission of nominal exchange rate movements into domestic inflation. We estimate a 4-variable VAR model, country by country, in which we include the nominal exchange rate, the CPI, the money supply, and the output gap.¹⁴ All variables, except for the output gap, are transformed into log differences.¹⁵ To elect the lag order of the respective VAR model several order selection criteria are evaluated.¹⁶ The output gap is constructed by applying the Hodrick-Prescott (HP) filter to real GDP. The definition of money supply used is M1. We use the nominal exchange rate vis-à-vis the US dollar, as no data on the nominal effective exchange rate was available for several of the countries in our sample. In any case, as the US is one of the most important trade partners for many of those countries and several others peg to the US dollar, we expect this bilateral exchange rate to be a good proxy for the nominal effective exchange rate. The countries in our sample are the same as shown in Tables 1 and 2, namely a group of highly, moderately and weakly dollarized emerging economies.¹⁷

Figures 5 to 7 show the estimated impulse responses (over 24 months) of the CPI to a one standard deviation shock in the exchange rate in each country. More precisely, the vertical axes show the percentage changes of domestic prices in response to the exchange rate shock; the horizontal axes report the time horizon in which the shock may impact the price variable. The point estimate of such impact is shown by the full line within each graph. The dotted lines, in turn, represent the plus/minus two standard error bands for such point estimate.¹⁸

The response graphs of the most dollarized countries (Figure 5) show that the price increase is positive and statistically significant in all of these countries (even though

¹⁴ Our VAR model is based on the usual Cholesky decomposition. Variables are ordered in the following way: Output gap is ordered first, base money second, nominal exchange rate third and the price variable fourth. For a similar approach, see Ito and Sato (2006).

¹⁵ Prior to this, all series have been found to be I (1) and not to be cointegrated so as to be able to proceed with the VAR estimation.

¹⁶ Based on different specification tests, we decide to trust the AIC criterion. The VARs are estimated with the following lag lengths: Argentina (4), Bolivia (1), Cambodia (3), Chile (4), China (5), Ecuador (4), Indonesia (5), Israel (4), Korea (4), Lao PDR (5), Malaysia (4), Peru (5), Philippines (4), Russia (2), Thailand (5), Uruguay (4), Vietnam (5).

¹⁷ For most of them we used quarterly data from 1986Q4 to 2006 Q3. Only for Cambodia, Lao P.D.R. and Vietnam the sample was somewhat shorter and comprised data between 1993Q1 and 2006Q3.

¹⁸ The analytic standard errors are used to generate the error bands.

magnitude differs among them). Argentina, Peru and Lao PDR. exhibit the largest response to an exchange rate shock, whereas the CPI response to the exchange rate depreciation in Cambodia, Bolivia and Uruguay is somewhat smaller. In all of these countries the price increase is very persistent. Looking at the countries with a moderate degree of dollarization (Figure 6) it becomes evident, that the price responses in these countries is not very persistent, as the effect of an exchange rate depreciation becomes statistically insignificant after a few periods in most countries or is not significant at all. Israel is the only exception within this group of countries. All together, the magnitude of price increase in countries with a moderate degree of dollarization is (on average) far smaller than in highly dollarized countries.

**Figure 5: Impulse responses of inflation to exchange rate changes
Countries with a very high degree of dollarization**

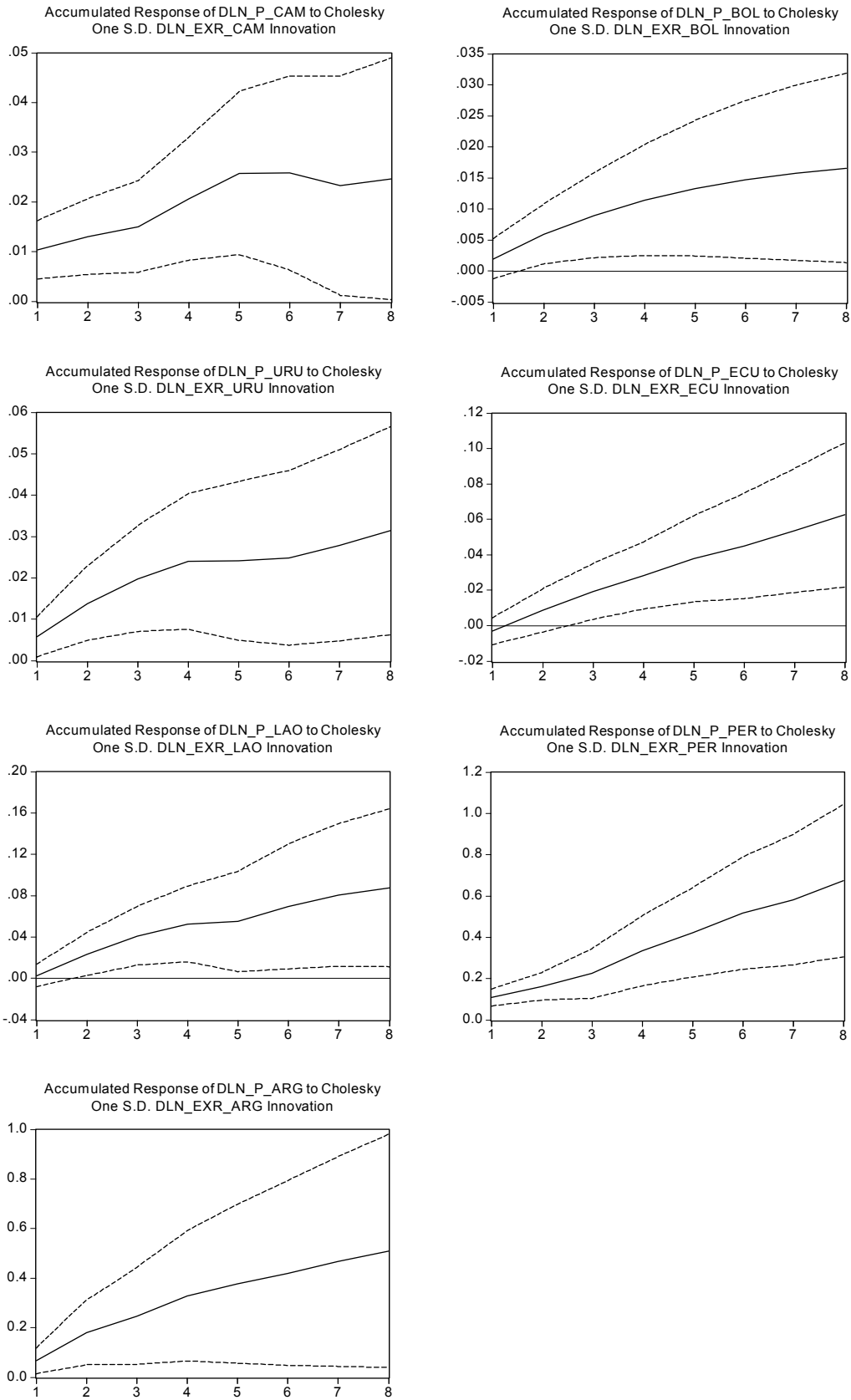
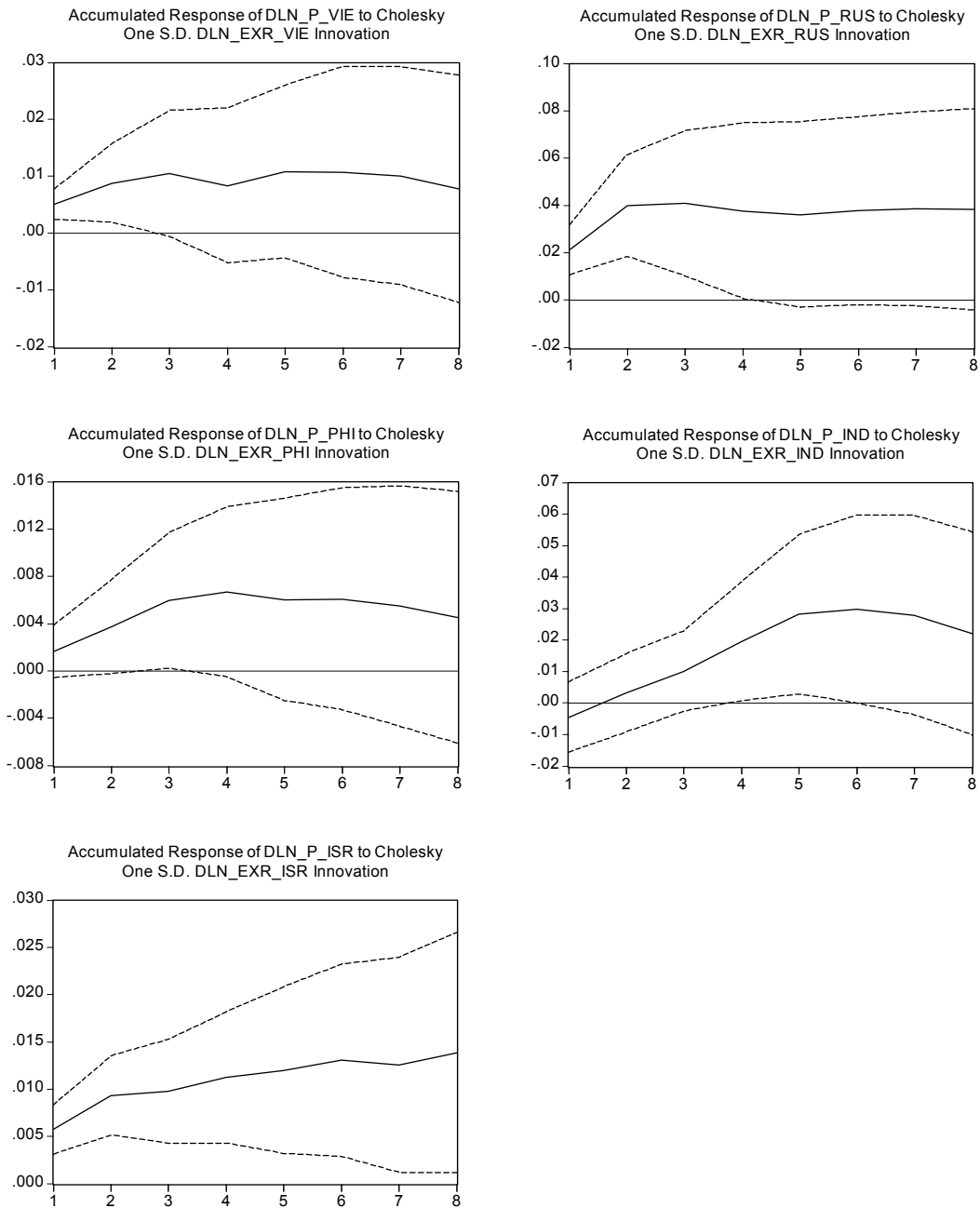


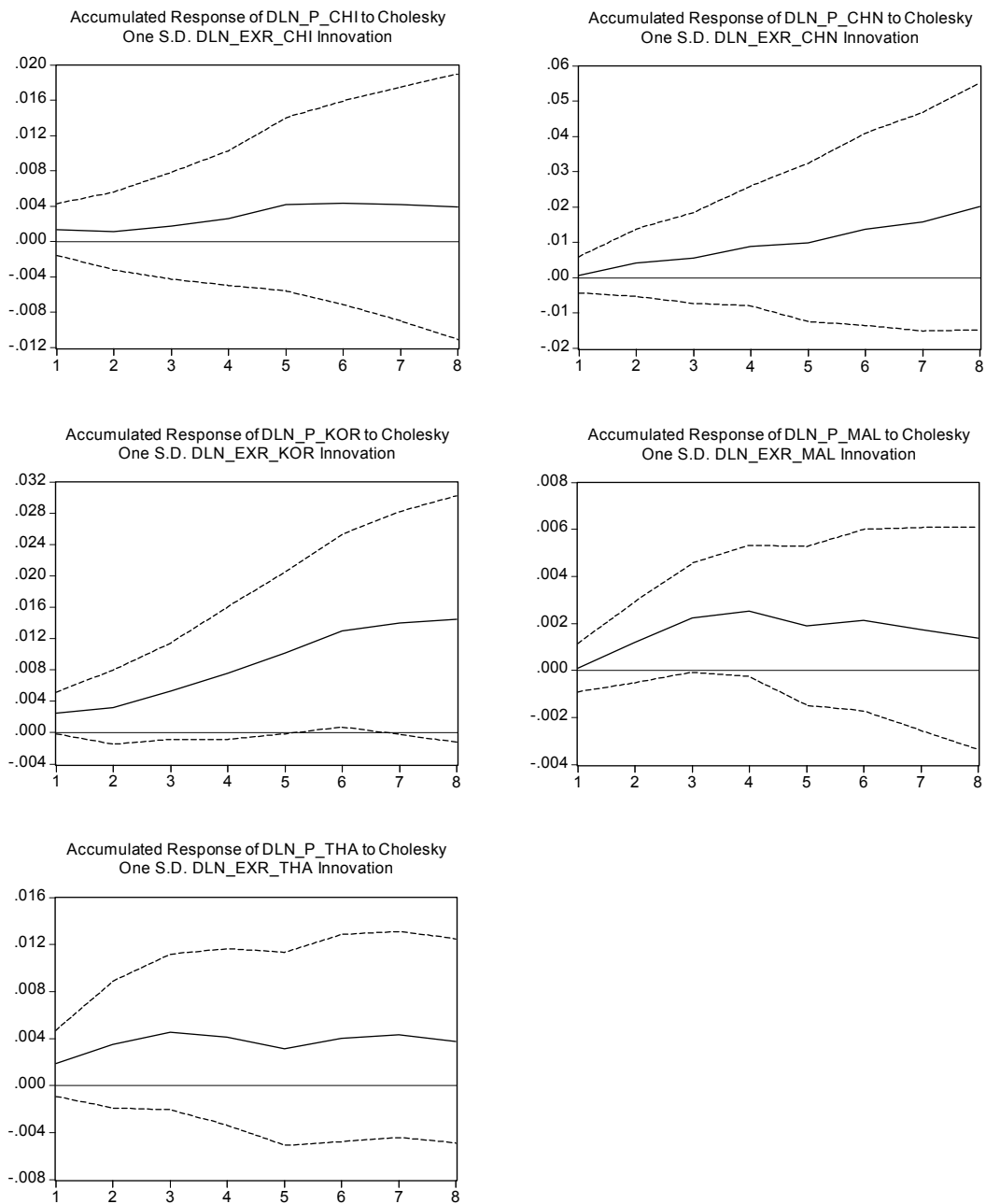
Figure 6: Impulse responses of inflation to exchange rate variations
Countries with moderate degree of dollarization



In the case of the countries with low dollarization (Figure 7), the pass-through stemming from a shock in the exchange rate is insignificant for all countries, with the exception of Korea. Thus, overall the impact of exchange rate changes on inflation does seem to be affected by the degree of dollarization. To make sure that this result is not driven by the degree of openness, for which we do not control in our VAR models, we look at the countries' *trade to GDP* ratio. Most of the more open economies belong to the group of

countries with low dollarization degree, whereas most of the countries belonging to the group of high dollarization (with exception of Cambodia and Lao PDR) are relatively closed economies. Thus, the results of our impulse response analysis seem not to be driven by the degree of openness of an economy. It is rather the degree of dollarization which plays an important role.

Figure 7: Impulse responses of inflation to exchange rate variations
Countries with a low degree of dollarization



Our results are consistent with those of Reinhart et al (2003). They also show that highly dollarized countries tend to experience a larger pass-through and the opposite is true for countries with limited dollarization. The observation that the exchange rate pass-through in highly dollarized countries is significantly larger and generally more persistent has important policy implications. This is all the more so if one considers that the volatility of the exchange rate will tend to be greater in dollarized countries – as long as the exchange rate regime allows - as the exchange rate is more sensitive to changes in the domestic money supply or other variables that influence the money market. This idea will be expanded further later. All in all, policy makers in dollarized countries will tend to “fear” exchange rate movements more than those in less dollarized countries.¹⁹

4b Monetary policy effectiveness

A common view among economists is that dollarization makes monetary policy more complicated and less effective. In large part this view can be attributed to theoretical results from the early literature on currency substitution. The latter showed that dollarization might increase the volatility of money demand due to the reduced costs of switching from domestic to foreign currency holdings in order to avoid the effects of inflation. A side effect of this is that currency substitution should also increase the exchange rate volatility (if the exchange rate regime allows). Calvo and Vegh (1992, 1996) for example show that there is a strong positive correlation between currency substitution and exchange rate volatility. A higher exchange rate volatility results also from the fact that currency substitution makes the exchange rate more responsive to expected changes in domestic money supply and other factors that affect the money market²⁰

While this concern came originally from the assumption that the demand for foreign currency reflects essentially a search for a second means of payment, a similar argument could be made regarding the dollarization as an asset substitution phenomenon: As the flight to readily available foreign currency assets becomes less costly, the demand for a store of value in a dollarized economy can be expected to be more responsive to a

¹⁹ See Calvo and Reinhart (2002), and Reinhart et al. (2003) for a more general discussion of the “fear of floating”.

²⁰Thus, cu.

monetary expansion or to a change in the exchange rate.²¹ Hence, the inflation response of monetary shocks should be stronger in dollarized economies. Levy Yeyati (2004, 2006) does, in fact, find that the elasticity of the inflation rate to a monetary expansion increases significantly as dollarization deepens. He emphasizes, however, that there can still be some scope for monetary policy. In fact, a more intense price response to monetary shocks, implicates that a reduction in the rate of money growth would have a stronger stabilizing outcome.

Another strand of the literature emphasizes the weaker monetary transmission in dollarized economies. This comes from the fact that the foreign currency component of broad money cannot be directly influenced by the monetary authorities. Thus, money supply is not set by domestic monetary authorities but, rather, by the behavior of agents holding foreign and domestic-currency denominated assets. This should obviously complicate the authorities' ability to control inflation.

Turning to the control of monetary aggregates, monetary authorities are obviously not able to influence domestic money supply directly but they might be in a position to manage the monetary base and the reserve requirement rate of banks. Unfortunately financial intermediation in partially dollarized economies is often limited, and conducted in large part in foreign currency. This makes it very difficult for domestic central banks even to control very narrow definitions of money such as the monetary base or reserve money. Zamaróczy and Sa (2003) report that this has been the case of Cambodia.

4c How to conduct monetary policy

A key issue that has to be resolved when talking about monetary policy is which intermediate targets of monetary policy to choose. Traditionally, intermediate targeting has implicated a pre-announced exchange rate rule or a target on a monetary aggregate. Under the exchange rate rule, monetary policy is very restricted. The monetary authorities stand by to intervene in the foreign exchange market in order to maintain the exchange rate at its pre-announced level or range; the exchange rate serves as a the nominal anchor.

²¹ See Levy Yeyati (2006).

Recently more and more countries have started to adopt explicit *inflation targeting* as a strategy for conducting monetary policy. This involves: a) the public announcement of numerical targets for inflation; b) an institutional commitment by the monetary authority to price stability as the primary goal; c) information on the mix of instruments chosen to achieve it; d) increased communication with the public about the monetary policy strategy; and e) the monetary authority's accountability regarding the inflation objectives.²² Decisions on monetary policy are, then, taken based on the deviation of forecasts of future inflation from the announced target. In other words, the inflation forecast basically serves as the intermediate target of monetary policy.

In the following we look at the implications of dollarization for the conduct of monetary policy. There are different issues depending on the monetary policy strategy chosen. In case of a monetary aggregate anchor, an important question is whether foreign-currency assets should be included in the monetary aggregate targeted. If the main criterion to choose the monetary aggregate to target is its influence on the price level through transaction demand for money, currency substitution would justify that foreign currency denominated monetary assets are part of that definition. At the same time, the accumulation of foreign-currency assets for the store of value, rather than means of payment function of money, would not call for including foreign-currency denominated assets in the monetary aggregate that central banks decide to target.²³ Against this background, Baliño et. al (1999) test for currency substitution (versus asset substitution) by checking whether foreign currency assets help monetary aggregates to better forecast inflation developments. Their results vary significantly across countries.

In the same vein, Berg and Borensztein (2000) examine the experience of five dollarized countries, namely, Argentina, Bolivia, Peru, Philippines and Turkey and ask which monetary aggregates appear to have the closest connection to future inflation.²⁴ They find that a broader monetary aggregate that includes foreign currency deposits is superior to one that does not. They also test whether the reason is their function of means of payment, as

²² Mishkin (2000) and IMF *De Facto Classification of Exchange Rate Regimes and Monetary Policy Framework*.

²³ As said before, in the case of asset substitution foreign currency denominated assets are used as store of value but not as a means of payment or unit of account.

²⁴ Berg and Borensztein (2000) run multiple VAR models on prices, and money aggregates. They estimate several VAR models for each of the countries. In some cases the exchange rate is also included.

argued by Baliño et. Al (1999), but find contrary evidence in as far as foreign currency cash in circulation, as such, does not improve the forecasting power of narrow monetary aggregates.²⁵

Unlike the monetary targeting, inflation targeting does not require a stable relationship between money and inflation. However, dollarized economies have a number of disadvantages that may impinge on the conduct of inflation targeting and the achievement of inflation objective. Important disadvantages are the previously reported relatively higher exchange rate pass-through on prices and the vulnerability of the economy to balance sheet effects. The former will reduce the monetary authorities' control of inflation the more so under a floating exchange rate. The latter may make the exchange rate flexibility required by inflation targeting disruptive and costly.

In spite of these concerns, Peru, a highly dollarized economy, has adopted inflation targeting. Leiderman et al. (2006) analyze the challenges faced by Peru compared to non-dollarized inflation targeters and come to the conclusion that high dollarization *per se* does not rule out the use of inflation targeting as an effective policy arrangement. Regarding the “fear of floating” phenomenon faced by highly dollarized economies, the authors argue that “leaning against the wind” interventions on the foreign exchange market are consistent with, and even conducive, to inflation targeting. Moreover, they find that switching to inflation targeting in Peru has resulted in a lower exchange rate pass-through on prices, and a higher pass-through of the policy interest rate on banking rates. It should, however, be noticed that the design and implementation of inflation targeting in Peru differs substantially from a non-dollarized environment Armas and Grippa (2006). The differences in the implementation, have to do with the inflation forecasting system and the monetary authorities' responses for coping with dollarization risks. As stated by the authors, one possible response could be to reduce a country's vulnerability to large exchange rate depreciations by promoting de-dollarization.

Due to the “fear of floating” phenomenon, dollarized economies often tend to choose the exchange rate as their nominal anchor. This however, implicates two major problems.

²⁵ They approximate dollar currency in circulation based on U.S. Customs Service data on shipments of currency across the U.S. border.

First, as foreign exchange market interventions of monetary authorities provide implicit insurance against exchange rate risk, de-dollarization and market development of exchange rate risk hedging instruments is exacerbated, leading eventually to higher financial fragility. Second, in depending on the intensity of foreign exchange market intervention, monetary policy loses influence and the money supply becomes largely endogenous.

5. Some experiences with de-dollarization

This section reviews a number of experiences with de-dollarization and draws lessons for the conduct of monetary policy.

Chile's experience is centered towards the introduction of indexed instruments to attract investors' interest to the detriment of dollar-denominated assets. Most instruments were indexed to the consumer price index (CPI) through the creation of a unit of account the "Unidad de Fomento" (UF) to which indexed instruments were referred to. The success of these instruments can be explained in terms of the credibility of the UF and Chilean's confidence that it would not suffer from a sudden loss of value. In fact, comparing the negative experiences of Argentina, Brazil and Uruguay with indexation can be useful to understand that indexation is not a panacea but requires a number of conditions to be effective. Jimenez (1993) argues that failure to develop markets in these countries in the 1980s and early 1990s was due to the lack of secondary markets for this type of instruments, the weak legal support for the indexation unit and the difficulties in agreeing to a common indexation measure.

Another important factor was the existence of institutional investors and, more specifically pension funds and insurance companies, which –by regulation - had to invest a large share of their portfolio in local instruments. Finally, a clear orientation of monetary policy towards price stability –through the introduction of inflation targeting but also a clearer mandate - helped reduce investors' uncertainty as well as macroeconomic volatility.²⁶

²⁶ For more details, see Herrera and Valdes (2003).

Israel is another successful experience of dollarization. Although there was no direct attempt to de-dollarize the economy, since the early 1990s an active policy was conducted in this direction when deciding on the currency composition of public sector issuance. In fact, a conscious effort was made to deepen the market for local currency denominated government bonds. This has obviously come at a cost, in terms of higher interest payments paid by the public sector particularly in a period of high real interest rates. However, the costs have been reduced year after year as the disinflation program started bearing fruit and inflation finally reached single digits. Apart from “nominalizing” the debt –first through CPI-indexation and later without any indexation -, Israel has also lengthened the maturity of its public debt. This points that there is not necessarily a trade-off between currency of composition and the maturity of public debt. Finally, the central bank has played a very active role in promoting markets in financial derivatives and other instruments to insure against exchange rate risk. As regards monetary policy, the Bank of Israel is probably the first emerging country to have introduced inflation targeting, which has been shown to anchor expectations and, thereby, reduce investors’ uncertainty about local currency assets.²⁷

Among the ASEAN countries in transition, Vietnam is probably the one which has gone furthest in terms of de-dollarization. This has been associated with a successful disinflation strategy. Goujon (2006) analyzes the monetary and exchange rate policies in Vietnam that might have led to the control of its inflation. He comes to the conclusion that two steps taken by the Vietnamese policymakers during the 1990s have been decisive: First, the heavily managed floating exchange regime maintained by the authorities, which allowed for exchange rate stability and reduced uncertainty about the value of investing in domestic currency. Second, the introduction of a restrictive monetary policy based on a target on broad money (M2) which includes foreign currency deposits.

6. Conclusions:

Dual currency circulation and asset substitution are important issues for ASEAN transition economies. The first challenge that policy makers confront is the difficulty in measuring dollarization because of its several dimensions and the lack of reliable data. In this article, we offer a quick overview of the degree of dollarization, not only in ASEAN transition

²⁷ For more details, see Galindo and Leiderman (2005)

economies, but also in other relevant emerging countries. This is the case of several Latin American countries but also Israel and Russia.

We, then, review the existing evidence on how dollarization may affect monetary policy. Both the literature and our own empirical results suggest that partial dollarization does not necessarily help reduce inflation. Furthermore, it could actually hamper the conduct of monetary policy in as far as it increases the pass through of the exchange rate to prices and requires larger monetary aggregates (i.e., including foreign currency ones) to be monitored. In addition, partial dollarization can lead to large currency mismatches due to the immediate impact of exchange rate depreciation on foreign-currency denominated liabilities. The 2001 Argentine crisis is probably the best example of how severe the problem can be.

Against this background, it seems interesting to analyze the experience of countries having reduced the degree of dollarization. Their strategies can be classified into two: (i) a hands-on approach based on administrative measures to discourage dollarization; (ii) a more hands-off approach based on good macroeconomic performance and the stability (or appreciation) of the local currency. The paradigmatic case of the first approach is Argentina but there have been other examples such as Mexico, Peru and even Cambodia. In turn, Israel and Chile have been more hands-off. While it is probably too early to evaluate the Argentine experience, Bolivia, Cambodia and Peru did not manage to reduce dollarization through administrative measures. Mexico, in turn, did but only years after the measures. Israel's case, in turn, shows how macroeconomic measures can help reduce dollarization by bringing confidence and more certainty about future developments. On the monetary policy front, the key pillar of Israel's strategy was the introduction of inflation targeting, which seems to have contributed to monetary credibility and, eventually, to price stability.

All in all, dollarization is a complex enough problem to think that simple rules are going to be the solution for every country. On the one hand, one could argue that macroeconomic solutions should be needed in as far as dollarization clearly has macroeconomic causes. On the other hand, the so-called "hysteresis" behind the dollarization process points to government intervention as an important tool.

More generally, economic authorities may want to think in terms of setting up the right incentives for residents to be willing to transact and hold local currency. Both market forces and government intervention should reinforce each other in that regard.

As regards market forces, reducing price uncertainty seems key as it would reduce the need of consumers and firms to insure against inflation surprises. One important measure in this regard includes strengthening the institutional setting of the institutions which promote monetary stability. The European experience shows that a clear focus on price stability and central bank independence are very important improvements on the institutional side.

As for government intervention, prudential regulation should aim at limiting the possibility that agents mispricing risk due to dollarization. More specifically, prudential regulation should discourage financial intermediaries lending in foreign currency to agents who cannot generate revenues in foreign currency but are attracted by a lower cost of financing. While this measure is reasonable in terms of financial stability, it should be noted that it may encourage disintermediation. This is generally the case of any administrative measures which may aim at reducing dollarization.

Between the a hand-offs approach focused on the macroeconomic environment and a hands-on one based on administrative measures, there are additional ways in which economic authorities can discourage dollarization, related to financial market development. The main one is the introduction of local currency denominated instruments, which can still be appealing to domestic investors. Chile and Israel have are two examples of positive experiences with the introduction of indexed instruments (generally CPI-indexed) but Argentina and Uruguay in the late 1970s offer counterexamples with a compulsory de-indexation and a rapid surge in inflation. All in all, indexed instruments should be thought of as a useful –but transitory – tool to offer investment instruments which can compete with foreign currency ones. In the long run, local currency instruments should be developed as well as forward markets to cover exchange rate risk.

Taken together, a policy agenda for dollarization would seem to require a three-pillar approach: (i) ensuring that regulation encourages or, at least, does not penalize intermediation in domestic currency; (ii) the use of local-currency, or at least indexed,

instruments should be promoted; (iii) the institutional set-up of the central bank as well as its monetary policy strategy should be geared towards reducing uncertainty about the value of the local currency. This obviously implies that price stability should be the central bank's main objective and independence should be granted so as to facilitate the achievement of this objective.

Bibliography

- Balino, Tomás, Adam Bennett, and Eduardo Borensztein. 1999. "Monetary Policy in Dollarized Economies." International Monetary Fund.
- Berg, Andrew and Eduardo Borensztein. 2000. "The Choice of Exchange Rate Regime and Monetary Target in Highly Dollarized Economies." *Journal of Applied Economics*, III:2, pp. 285-324.
- Berganza, J.C., R. Chang and A. Garcia-Herrero. 2004 "Balance sheet effects and the country risk premium: an empirical investigation", *Review of World Economics*, vol. 140, No. 4.
- Calvo, Guillermo. 2001. "Capital Markets and the Exchange Rate." *Journal of Money, Credit and Banking*, 33:2, pp. 312-34.
- Calvo, Guillermo, and Carlos Végh. 1992. "Currency Substitution in Developing Countries: An Introduction." *Revista de Análisis Económico*, 7:1, pp. 3-27.
- Calvo, Guillermo, and Carlos Végh. 1996. "From Currency Substitution to Dollarization: Analytical and Policy Issues," in *Money, Exchange Rates and Output*. Guillermo Calvo ed: MIT Press, pp. 153-75.
- Calvo, Guillermo, and Carmen Reinhart. 2000. "Reflections on Dollarization."
- Calvo, Guillermo, and Carmen Reinhart. 2002. "Fear of Floating." *The Quarterly Journal of Economics*:2, pp. 379-408.
- Cowan , Kevin and Quy Toan Do. 2003. Financial Dollarization and Central Bank Credibility, Policy Research Working Paper 3082.
- Enders, Walter. 2003. *Applied Econometric Time Series*: Wiley.
- Goujon, Michael. 2006. "Fighting Inflation in a dollarized economy: The case of Vietnam." *Journal of Comparative Economics*, 34, pp. 564-81.
- Hausmann, Ricardo, Ugo Panizza, and Ernesto Stein. 2001. "Original Sin, Passthrough, and Fear of Floating."
- Galindo, Arturo and Leonardo Leiderman. 2005. "Living with Dollarization and the Route to Dedollarization", Inter-American Development Bank, Working Paper No 526.

Herrera, Luis Oscar and Rodrigo Valdes. 2004. "Dedollarization and Nominalization: The Chilean Experience", Inter-American Development Bank: Economic and Social Studies Series Re1-04-015.

Ito, Takatoshi and Kiyotaka Sato. 2006. "Exchange Rate Changes and Inflation in Post-Crisis Asian Economies: VAR Analysis of the Exchange Rate Pass-Through." NBER Working Paper Series.

Ize, Alain and Eduardo Levy-Yeyati. 1998. "Dollarization of Financial Intermediation: Causes and Policy Implications." *IMF Working Paper*. International Monetary Fund.

Ize, Alain and Eduardo Levy-Yeyati. 2006. "Financial De-Dollarization: Is It For Real?," in *Financial Dollarization: The Policy Agenda*. Adrián Armas, Alain Ize, and Eduardo Levy Yeyati ed: Palgrave MacMillan.

Leiderman, Leonardo, Rodolfo Maino and Eric Parrado. 2006. "Inflation Targeting in Dollarized Economies," in *Financial Dollarization: The Policy Agenda*. Adrián Armas, Alain Ize, and Eduardo Levy Yeyati ed: Palgrave MacMillan.

Levy Yeyati, Eduardo. 2004. "Financial Dollarization: Evaluating the Consequences."

Levy Yeyati, Eduardo. 2006. "Financial Dollarization." *Economic Policy*, pp. 61-118.

Levy Yeyati, Eduardo, and Federic Sturzenegger. 2001. "Dollarization: A Primer."

Levy Yeyati, Eduardo, and Federico Sturzenegger. 2005. "Classifying exchange rate regimes: Deeds vs. Words." *European Economic Review*, 49:3, pp. 1603-35.

Reinhart, Carmen, Kenneth S. Rogoff, and Miguel A. Savastano. 2003. "Addicted to Dollars." NBER.

Rennhack Robert, and Masahiro Nozaki. 2006. "Financial Dollarization in Latin America," in *Financial Dollarization: The Policy Agenda*. Adrián Armas, Alain Ize, and Eduardo Levy Yeyati ed: Palgrave MacMillan.

Zamaróczy, Mario de and Sopenha Sa. 2003. "Economic Policy in a Highly Dollarized Economy: The Case of Cambodia." International Monetary Fund.