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# The Effect of Inflation Targeting Policies on Dollarization:

## A Cross-Country Analysis

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## I NTRODUCTION

Dollarization, a situation in which individuals and firms in a country choose to use a foreign currency as a substitute for some of the monetary services provided by the domestic currency, is a common issue plaguing many developing countries. While the foreign currency most commonly chosen is the U.S. dollar, *dollarization* is a generic term used to characterize any currency that effectively serves as a replacement for domestic currency. Usually, dollarization is differentiated between official, or *de jure*, dollarization and unofficial, or *de facto*, dollarization. *De jure* dollarization typically refers to a situation in which foreign currency is given legal tender status; it is measured in the literature by the fraction of total deposits held in foreign currency (FCD). *De facto* dollarization refers to the practice of using foreign currency along with domestic currency as means of exchange. This measure also includes the amount of foreign currency in circulation. Measuring unofficial dollarization is a challenge due to the unavailability of reliable data on foreign currency in circulation.

Dollarization could possibly lead to both currency substitution as well as asset substitution. Standard models of currency substitution attribute the ratio of domestic and foreign currency circulating in a country to the difference in their nominal interest rates. If uncovered interest parity condition<sup>1</sup> holds, and assuming that inflation is reflected in the interest rates, expected inflation would foster currency substitution. Asset substitution, on the other hand, depends not only on the risks and returns associated with both domestic and foreign assets, but also on the prevailing regulatory framework of the domestic economy.

Monetary policy in the presence of dollarization becomes especially challenging. The greater the extent and variability of dollarization, the weaker the Central Bank's knowledge and control over domestic money supply. Dollarization also reduces the ability of the government to earn seigniorage<sup>2</sup> from its own currency.

However, one of the common driving factors behind both asset and currency substitution is high inflation. As a result, in many emerging economies experiencing hyperinflation, dollarization emerged as a popular method of insuring against the inflationary shocks to holding domestic assets. A common response from policymakers has been to adopt inflation targeting (IT) as a monetary policy to anchor inflationary expectations. This paper aims to investigate the experiences of some dollarized economies after adopting IT regimes and to compare them to other economies with similar levels of dollarization that did not adopt IT. Then this paper discusses how IT policies work in a dollarized economy, followed by a review of the existing literature on this topic. This paper then presents the dataset used and the measure of dollarization employed in this study, and finally discusses the estimation strategy results and conclusions.

## **Inflation Targeting and Dollarization**

In theory, inflation targeting is a fairly straightforward policy. The central bank explicitly declares an official quantitative target (or target ranges) for the inflation rate over one or more time horizons. The central bank then forecasts the future path of inflation and adjusts monetary policy by the difference. It is important to note here that IT is a mixture of a "rule" and "discretion" with substantial variation across the implementing countries. There cannot be a one-size-fits-all version of the policy, as each country adopts a different version of the policy based on the prevailing institutional arrangements.

As long as IT seems like a credible regime that delivers low and stable inflation, it strengthens the domestic currency as a store of value. It dampens the agents' tendency to hold wealth in a foreign currency by anchoring down inflationary expectations, thereby reducing the risk of holding wealth in domestic currency.

However, it has been observed that de-dollarization (i.e. reduced or discontinued usage of foreign currency) does not occur, at least not fully, when disinflation is achieved. Instead economic agents continue to use foreign currency in their financial systems and in transactions. This is commonly known as the *hysteresis* effect which usually occurs for two reasons. If economic agents can choose among several currencies for transactions, they will prefer the one that is already widely used in the economy. Therefore if the dollar had already reached sufficiently high level of usage during inflation, it will tend to persist after inflation. This is the network effect. The other reason is fear of depreciation of the domestic currency. The less risky currency dollar persists simply because it is more likely to maintain its value.

This process of hysteresis is more likely to occur in asset substitution than currency substitution. This is because foreign currency denominated assets

would still provide insurance against the probability of a return to inflation and devaluation. Remittances can also induce asset substitution as long as they are maintained in foreign currency. This paper investigates whether or not de-dollarization occurs after adopting IT and to what extent the hysteresis effect persists. It will focus on estimating the coefficient on the IT variable in our empirical model with the initial hypothesis that it is negative.

## Review of the Literature

Different countries' experiences with dollarization have been studied extensively in the literature. Ize and Levy-Yeyati (2003) approach financial dollarization as a portfolio choice problem and demonstrate that within the minimum variance portfolio allocation benchmark, financial dollarization displays high persistence whenever the expected volatility of the inflation rate remains high with respect to real exchange rate.

Feige (2003) employs a constructed dataset on the amount of foreign currency in circulation (FCC) in the form of U.S. dollars, in various countries around the world, which overcomes the fundamental empirical problem of "un-observability" to an extent. He focuses on *de facto* dollarization in Croatia and compares the new empirical estimates of the extent of dollarization to the ones published by the International Monetary Fund (IMF).

Zoryan (2005) also attempts to create an estimate of the amount of foreign currency in circulation (FCC) in the case of Armenia by surveying households, and uses this to create a currency substitution index.

Honanhan (2007) concentrates on short-run variations particularly the response of dollarization to exchange rate regimes. His econometric model suggests that policymakers' fears of floating may be exaggerated and that exchange rates on average do not result in extrapolative destabilizing denomination of the currency of deposits. Following this, my model controls for exchange-rate regimes.

Mwase and Kumah (2015) investigate the extent of dollarization in low-income countries and their trends during the recent global financial crisis. They conclude that beyond the variation, the level of inflation and size of depreciation also matter for dollarization.

Most of the literature, even those studies conducting cross-country analysis, focus on a particular group of countries, mostly the Latin American economies. In this paper, I investigate a wider cross-section of countries by including dollarized East-Asian economies. Also, most of the existing literature concentrates on the Latin American currency crisis of the 1990s and its aftermath. In this paper, I take the literature forward by considering a more recent time period from 2001 to 2015, which allows me to look at the effects of the recent global financial recession.

## Data and Descriptive Statistics

The dataset considered in this paper consists of a balanced annual panel of fourteen dollarized economies. Eight of these economies have implemented inflation targeting monetary policies, while the other six have not. They are

further classified based on whether they were highly dollarized, moderately dollarized, or low-dollarized. A tabulated description is provided below. The time period considered is from 2001 to 2015.

**Table 1:** Countries chosen for this study.

	High-Dollarized	Moderate-Dollarized	Low-Dollarized
Implemented IT	<i>Thailand, Philippines, Indonesia</i>	<i>Russia, Brazil</i>	<i>Chile, Armenia, Peru</i>
Did not Implement IT	<i>Malaysia, Cambodia</i>	<i>Argentina, Uruguay, Croatia</i>	<i>China</i>

Only deposit dollarization is considered in this paper because estimates of unofficial dollarization are not available for all countries, and the ones available are not comparable. This is not likely to bias the results as the literature has found official and unofficial dollarization to be highly correlated and similarly responsive to inflation.

The measure for official dollarization is constructed using data from International Financial Statistics following the common Dollarization Index (DI) used by IMF.

$$DI = \text{Foreign Currency Deposit} / \text{Broad Money} (1)$$

Since countries report Foreign Currency Deposits and Broad Money<sup>3</sup> in national currency terms, they are converted into dollars using the prevailing exchange rate to make this measure comparable across countries. The economies were further classified as High-Dollarized (HD), Moderate-Dollarized (MD), and Low-Dollarized (LD).

Further details illustrating the trends in dollarization and descriptive statistics about the dollarization index are available in Appendix A. Also included is per capita GDP to proxy for the size of the economies. Assuming perfect asset substitutability, we include the interest rate on domestic deposits for each country. The initial hypothesis is that this interest rate will be negatively related to dollarization.

Following Honahan (2007), I include the exchange rate measured by domestic currency price of foreign currency. Finally, the categorical variables for IT and prevailing exchange rate regimes are constructed from the Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

## Estimation Strategy and Results

The methodology employed is a fixed effects within panel regression technique with country-specific fixed effects. A statistical test conducted to test for time fixed effects failed to reject the null hypothesis. Also includ-

ing the lagged term for DI in the regression, makes it so highly statistically significant that it absorbs the predictive power of all other variables in the model, making them insignificant. Since the focus of this paper is to isolate the effect of adopting an IT regime, we exclude the lagged DI term from our estimation.

The fundamental equation for estimation is:

$$DI_{it} = a + \alpha_{it} + \beta_1 GDP_{it} + \beta_2 r_{it} + \beta_3 Infrate + \beta_4 Exrate_{it} + \beta_5 IT_{it} + U_{it} \quad (2)$$

Where DI is the aforementioned dollarization index, *GDP* refers to the per capita Gross Domestic Product, *r* refers to the interest on demand deposits, *Infrate* refers to the domestic inflation rate, *Exrate* refers to the exchange rate of the domestic currency, and *IT* is a binary variable indicating whether the particular country adopted inflation targeting that year. Subscript ‘*it*’ refers to the observation for a particular country for a specific year. Further details regarding the measurement of the variables and the data are provided in Appendix C.

We start our analysis with the specification given by Equation (2) and subsequently build on it. A table of coefficients with their t-ratios from each specification is provided in Appendix D.

On estimating Equation (2), we find the following results. While most of the coefficients carry their expected sign, the variable of interest *IT* carries the opposite sign and is also statistically insignificant. This could be due to the effect of hysteresis described earlier. To investigate this further, the *IT* dummy is interacted with other variables in the model. We start by interacting the *IT* dummy with the dummy for countries that have a free floating exchange rate regime.

$$DI_{it} = a + \alpha_{it} + \beta_1 GDP_{it} + \beta_2 r_{it} + \beta_3 Infrate + \beta_4 Exrate_{it} + \beta_5 IT_{it} + \beta_6 IT * Freeit + uit \quad (3)$$

The coefficient on *IT* still maintains a positive sign but is now statistically significant, whereas the coefficient on the interaction term is negative and statistically significant. This indicates that for economies with *IT* regimes, the ones with free floating exchange rate regimes have managed to de-dollarize compared to those with managed float or fixed exchange rates.

To investigate this further, we interact the *IT* dummy with the dummy for Moderate Dollarization (*MD*) and High Dollarization (*HD*), with Low-Dollarization (*LD*) being the reference category.

$$DI_{it} = a + \alpha_{it} + \beta_1 GDP_{it} + \beta_2 r_{it} + \beta_3 Infrate + \beta_4 Exrate_{it} + \beta_5 IT_{it} + \beta_6 IT * Freeit + \beta_7 IT * HD_{it} + \beta_8 IT * MD_{it} + uit \quad (4)$$

We find that the interaction terms for both moderately dollarized as well as highly dollarized economies carry a positive sign and are statistically significant, indicating a high degree of hysteresis. However, moderately dollarized economies seem to have a higher degree of hysteresis compared to highly -dollarized economies

We further interact the IT dummy with a regional dummy for East Asian economies and Latin American economies, with Central European countries being the reference category.

$$Dlit = a + \alpha it + \beta_1 GDPit + \beta_2 rit + \beta_3 Inflrate + \beta_4 Exrateit + \beta_5 ITit + \beta_6 IT*Freeit + \beta_9 IT*Asiait + \beta_{10} IT*LAit + uit \quad (5)$$

Both these interaction terms carry a negative sign and are statistically significant indicating de-dollarization. However, the Latin American economies tend to de-dollarize more than the East-Asian economies.

## Conclusion

In conclusion, there is evidence of persistent hysteresis in the economies in the time -period considered in this study. The adoption of inflation targeting policies has the desired de-dollarization effect in economies with a free floating exchange rate system compared to the economies with fixed exchange rate systems. Both highly-dollarized and moderately dollarized economies suffer from hysteresis compared to low dollarized economies. However, moderately dollarized economies have a higher degree of persistent hysteresis than highly-dollarized economies. In addition, inflation targeting has had the desired de-dollarization effect in East Asian and Latin-American economies compared to Central European economies in the time period considered in the study. Future work will attempt to investigate the effect of not just adopting inflation targeting regimes, but also the specific targets chosen.

An obstacle still remains in measuring and studying unofficial dollarization in any economy. Previous work that has attempted to measure unofficial dollarization has taken place through the use of survey that are specific to each country. These measures are not comparable and thus cannot be used in any cross-country analysis. In order for monetary policy to be effective, a thorough knowledge of the amount of foreign currency circulating in the economy is necessary. A comparable measure of unofficial dollarization can be used to explain the differential effects of adopting inflating targeting policies of various groups of economies that this study found.



### Work Cited

<sup>1</sup> The uncovered interest rate parity (UIP) condition states that the difference in the interest rate between two countries is equal to the expected change in exchange rates between the two countries.

<sup>2</sup>Seigniorage is the revenue earned by the a government by issuing currency.

<sup>3</sup>Broad money, as the name suggests, is the broadest definition of the money supply of the economy. It comprises physical money such as coins and bills, as well as demand deposits at commercial banks.

<sup>4</sup>Numbers in the column heading refers to the equation number being estimated. Refer to the main text.

<sup>5</sup>Bolded coefficients are significant at 95% level of confidence.

<sup>6</sup>Numbers in parenthesis refers to t-ratios.

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## Appendix A

### Data

**Table 3:** Descriptive statistics of the Dollarization Index for all the countries in this study

Country	Statistic		
	Minimum	Mean	Maximum
Armenia	0.25	0.37	0.57
Philippines	0.68	0.74	0.81
Uruguay	0.52	0.59	0.76
Russia	0.44	0.52	0.67
Argentina	0.49	0.55	0.77
China	0.01	0.03	0.07
Peru	0.27	0.38	0.58
Thailand	0.77	0.85	0.88
Indonesia	0.67	0.69	0.72
Croatia	0.54	0.71	0.78
Malaysia	0.71	0.74	0.79
Brazil	0.57	0.62	0.74
Chile	0.36	0.44	0.55
Cambodia	0.38	0.62	0.72

## Appendix B

### Alternative Measures of Dollarization

Following the definition of Feige (2000)

$$BM = DCC + DDD + DTD + FCD$$

(where BM = Broad Money, DCC = Domestic Currency in Circulation, DTD = Domestic Time Deposits, FCD = Foreign Currency Deposits)

$$EBM = BM + FCC$$

(where EBM = Effective Broad Money)

In countries with high dollarization, foreign currency serves as a unit of account, store of value and usually as a circulating medium of payment. Due to the lack of data on FCC, most of the literature has been forced to accept FCD as a proxy for dollarization. The measure of official dollarization is:

$$DI = FCD / BM$$

This is usually biased downwards compared to the unofficial dollarization index (UDI), defined by:

$$UDI = (FCD + FCC) / EBM$$

## Appendix C

### Description of Variables

**Table 3:** Description and source of data for each of the variables used in the analysis

Name	Description of Variable	Source of Data
Foreign Currency Deposits	Foreign Currency and time deposits under Deposit Money Banks for countries still reporting under Non-Standardized Reports and other deposits for countries using the Standardized Report Forms	International Financial Statistics,
Broad Money	M <sub>3</sub> or Broad Money from National Definition of Monetary Aggregates	International Financial Statistics
Exchange rate	National Currency Price of Foreign Currency as Annual Average	International Financial Statistics
IT	Categorical Variable=1 for IT regimes, =0 otherwise	AREAER
Exchange rate regime	Categorical variable =1 for Free Floating Regimes, =0 for all others	AREAER
GDP	Per Capita GDP in Current US dollars	World Development Indicators
Inflation rate	Annual percentage change in CPI	World Development Indicators
Interest rate	Interest rate on domestic deposits in percentage per annum	International Financial Statistics

## Appendix D

### Estimation Results

Variable	Coefficients			
	(2) <sup>4</sup>	(3)	(4)	(5)
GDP	-0.021 <sup>5</sup> (-2.05) <sup>2</sup>	-0.021 (-2.72)	-0.021 (-2.72)	-0.021 (-2.72)
Interest Rate	-0.005 (-6.06)	-0.005 (-6.19)	-0.005 (-6.19)	-0.005 (-6.43)
Inflation Rate	0.005 (2.98)	0.005 (3.43)	0.005 (3.49)	0.005 (3.64)
Inflation Targeting (IT)	0.03 (1.44)	0.174 (4.86)	0.174 (4.88)	0.172 (5.67)
IT*Free	–	-0.19 (-4.84)	-0.24 (-5.18)	-0.32 (-6.02)
IT*HD	–	–	0.19 (2.43)	–
IT*MD	–	–	0.26 (3.80)	–
IT*Asia	–	–	–	-0.15 (-3.34)
IT*LA	–	–	–	-0.25 (-6.49)
Constant	0.72 (8.48)	0.78 (9.61)	0.75 (9.64)	0.77 (9.97)
R <sup>2</sup>	0.19	0.28	0.34	0.34
n	210	210	210	210