**Tapering Talk: The Impact of Expectations of Reduced Federal Reserve Security
Purchases on Emerging Markets**

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Abstract

In May 2013, Federal Reserve officials first began to talk of the possibility of tapering
their security purchases. This tapering talk had a sharp negative impact on emerging markets.
Different countries, however, were affected very differently. We use data for exchange rates,
foreign reserves and equity prices between April and August 2013 to analyze who was hit and
why. We find that emerging markets that allowed the real exchange rate to appreciate and the
current account deficit to widen during the prior period of quantitative easing saw the sharpest
impact. Better fundamentals (the budget deficit, the public debt, the level of reserves, the rate of
economic growth) did not provide insulation. A more important determinant of the differential
impact was the size of the country's financial market: countries with larger markets experienced
more pressure on the exchange rate, foreign reserves and equity prices. We interpret this as
investors being able to better rebalance their portfolios when the target country has a relatively
large and liquid financial market.

1. Introduction

In May 2013, officials of the Federal Reserve System first began to talk of the possibility of the U.S. central bank tapering its securities purchases (of it gradually reducing them from the prevailing $85 billion monthly rate to something lower, presumably as a prelude to phasing them out entirely). A milestone to which many observers point is May 22, 2013 when Chairman Bernanke raised the possibility of tapering in his testimony to the Congress. This "tapering talk" had a sharp negative impact on economic and financial conditions in emerging markets.

Three aspects of that impact are noteworthy. First, not only was the impact sharp but, in the view of many commentators, it was surprisingly large. The most alarmed (some would say alarmist) commentators raised the possibility that some emerging countries might be heading towards a full blown crisis like those in Mexico in 1994 and Asia in 1998. Second, the impact was not felt uniformly; different countries were affected rather differently. And, third, there were complaints from policy makers in the developing world about the Fed's turn to tapering that were seemingly hard to square with earlier criticisms of quantitative easing by the U.S. central bank as a form of "currency war."

This paper is a first attempt to shed light on these issues. We use data for a cross section of emerging markets to analyze who was hit by the Fed's tapering talk and why. We focus on the change in exchange rates, foreign reserves and equity prices between April 2013, just prior to talk of tapering, and August 2013, by which time the response was largely complete. (In September, new data on the condition of the U.S. economy led Federal Reserve officials to make statements that moderated prior expectations of tapering). We relate the reaction of these variables to several classes of potential determinants: (a) observable macroeconomic fundamentals like the budget deficit, public debt, foreign reserves and GDP growth rate in the prior period; (b) the size and openness of a country's financial markets; and (c) the extent to which capital-flow-sensitive indicators like the real exchange rate and current account balance had been allowed to move in the prior period when quantitative easing was underway, there had been no expectations of tapering, and policy makers in emerging markets had complained of currency wars.

On the basis of this analysis, our answers to the questions in the first paragraph are as follows. First, there is little evidence that countries with stronger macroeconomic fundamentals (smaller budget deficits, lower debts, more reserves and stronger growth rates in the immediately prior period) were rewarded with smaller falls in exchange rates, foreign reserves and stock prices starting in May. What mattered more was the size of their financial markets; investors seeking to rebalance their portfolios concentrated on emerging markets with relatively large and liquid financial systems; these were the markets where they could most easily sell without incurring losses and where there was the most scope for portfolio rebalancing. The obvious contrast is with so-called frontier markets with smaller and less liquid financial systems. This is a reminder that success at growing the financial sector can be a mixed blessing. Among other things, it can accentuate the impact on an economy of financial shocks emanating from outside.

In addition, we find that the largest impact of tapering was felt by countries that allowed exchange rates to run up most dramatically in the earlier period of expectations of continued ease on the part of the Federal Reserve, when large amounts of capital were flowing into emerging markets. Similarly, we find the largest impact in countries that allowed the current account

deficit to widen most dramatically in the earlier period when it was easily financed. Countries that used policy and in some cases, perhaps, enjoyed good luck that allowed them to limit the rise in the real exchange rate and the growth of the current account deficit in the boom period suffered the smallest reversals. This provides some intuition for how it was that the same countries could complain about quantitative easing while it was underway – QE had large, disconcerting impacts on local markets – and then also complain about tapering talk , since, their asset prices having been allowed to run up sharply and their current accounts having been allowed to widen relatively dramatically in the earlier period, talk of tapering now had a relatively large negative impact on local markets.

We interpret these real exchange rate and current account measures as picking up the impact, positive, negative or neutral, of macroprudential policy broadly defined. Recall that we control for the stance of fiscal policy (since fiscal tightening can also limit the appreciation of asset prices in a period when capital is flowing in). In addition, we control for the intensity of capital controls in the prior period; these, similarly, do not appear to have exerted a consistently significant impact on the effects of tapering. Nor does their inclusion alter the estimated effect of the change in the real exchange rate. Evidently, neither capital controls, nor fiscal tightening, nor even a combination of the two, sufficed to damp down the effects of financial inflows. Instead, a broader array of macroprudential policies – limits on the rate of growth of bank lending, loan-to-value regulation for the mortgage market, and similar measures – which moderate the upward pressure on the exchange rate and the widening of the current account deficit may have made a difference, and may therefore be called for in the future.

2. **Data**

In what follows we consider the impact of tapering on exchange rates, foreign reserves and stock prices, but we also calculate composite indices of overall financial market pressure. These indices are constructed as a weighted average of changes in exchange rates, reserves and stock market yields. They are constructed in a manner analogous to the exchange market pressure index of Eichengreen, Rose and Wyplosz (1995), which is a weighted average of changes in exchange rates, reserves, and policy interest rates, where the weights were inverse of the standard deviation of each series. We first create this index using data for exchange rate and reserve losses, and then add the negative of the change in stock yields (denoting the two versions Index 1 and Index 2, respectively).[2] For weights, we calculate the standard deviations for each series using monthly data from January 2010 to August 2013. The weights are then the inverse of the standard deviations.

Most of the data definitions and sources will be familiar. We calculate changes in the real exchange rate using data for the nominal exchange rate with respect to the US dollar and the consumer price index for the subject country and the United States. Alternatively, we use data for real effective exchange rates from the *Global Economic Monitor* database of the World Bank and the *International Financial Statistics* of the International Monetary Fund, although the latter covers far fewer countries. It turns out that exchange rate data constructed using different sources are highly correlated and in practice make little difference for our results. We therefore report

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[2] We also did the same including percentage changes in sovereign bonds yields and credit default swaps spreads, but these are available for far fewer countries (not all the countries in the sample having well-functioning government bond markets).

the results using the data for bilateral real exchange rate in the regressions reported here. We calculate percent change in real exchange rate between 2009 and 2012 in two ways. We take the percent cumulative change over the period from 2009 to 2012 and, as an alternative, the average of annual percent changes for 2012, 2011 and 2012. Since the two methods produce very similar series, we report only those for the latter.

Financial market size is measured by total external private financing—i.e. inflows of equity, bonds and loans (these are data for 2010-2012 from the *Global Financial Stability Report* of the IMF, transformed into logs). Alternatively, we measure financial market size as the portfolio liability stock from Lane and Milesi Ferretti (2012), as stock market capitalization, and as aggregate GDP; reassuringly, use of these alternatives had little material impact on the results, since most of the alternative measures are fairly highly correlated. (See the Appendix.) Similarly, there are several common measures of reserve adequacy: reserves in months of imports, reserves as proportion of M2, reserves as a share of GDP, reserves relative to total external debt, reserves relative to short term debt. Below we report results for the ratio of reserves to M2. Results using other measures are similar.

Table 1: Effect on BRICS and Turkey, April-July, 2013

	% Exchange Rate Depreciation	% Change in Stock Indices	% Change in Reserves	Change in Bond Yields	Change in CDS	Pressure Index I	Pressure Index II
Brazil	12.52	-8.92	-1.69	55.78	64.06	3.46	5.00
Russia	4.63	0.42	-3.32	24.95	35.95	2.74	2.69
India	9.98	4.04	-4.77	n.a.	n.a.	7.15	6.57
Indonesia	3.58	-10.01	-13.61	64.75	64.06	5.06	6.47
China	-0.85	-6.49	0.38	23.54	51.78	-2.71	-1.80
South Africa	8.96	3.07	-5.42	57.68	48.17	3.98	3.26
Turkey	7.61	-12.16	-8.20	40.85	66.97	3.26	4.63

Table 1 offers an overview of the behavior of these measures of market conditions in the summer of 2013, displaying their values for the BRICS countries and Turkey, well known cases on which much commentary focused. We see that with the exception of China their exchange rates all depreciated (China of course being known for its policy of seeking to stabilize its currency against the dollar). Similarly, reserves fell in five of six cases (again, excluding China). But equity prices fell in just 3 of 6 cases, in a first hint of the heterogeneity we detect and analyze below. Our composite indices show a negative impact of tapering on financial

conditions overall in the five other countries but not China (where, however, it should be noted that the stock market did decline). [3]

3. Overview

We now proceed to analyzing the entire class of emerging markets. We start with the same set of countries as in Ghosh et al (2013), to which we add Ghana, Hong Kong, Kenya, Ireland, Singapore, and Tanzania. This gives us the universe of countries included in the various definitions of emerging markets. We drop Eurozone countries (Estonia, Greece, Ireland, Italy, Portugal, Slovakia, and Spain), since they have no meaningful national exchange rate, as well as countries that use US dollar as their currency (Ecuador, El Salvador, and Panama). This gives us 55 countries (some of which we end up having to drop for reasons of data availability).

Some emerging markets started experiencing effects immediately with the Fed Chairman's testimony on May 22, and those effects persisted through much of the summer. We therefore calculate cumulative changes in the variables of interest between the end of April and, alternatively, the end of June, the end of July, and the end of August.

Table 2 shows that 36 countries, of 53 for which we have monthly data, experienced some exchange rate depreciation between the end of April and end of June.[4] Even as some of these exchange rates recovered by end August, exchange rates for almost 60 per cent of the countries remained below the levels of end April. The average rate of depreciation was over 6 percent, and exchange rates for half of the countries had depreciated by more than 5½ percent.

Panel A of Figure 1 provides additional detail on the distribution of exchange rate changes across countries between the end of April and end of July. The largest changes were in Brazil, India, Paraguay, South Africa, and Uruguay. Note that three of the BRICS countries are included in this list. All of these countries experienced exchange rate depreciations of 9 percent or greater during this period, with Brazil having the largest depreciation at 12.5 percent.

While foreign reserves declined as well between the ends of April and July, as shown in Panel B, in some countries the pace of decline accelerated very considerably in August. Of the 28 countries for which reserves declined between April and July, 2013, the countries with the largest declines were the Dominican Republic, Indonesia, Pakistan, Sri Lanka, and Ukraine.[5]

Stock markets declined on average as well. We have data for fewer countries for stock market indices (the indices are in local currency nominal terms). 25 of the 38 countries for which we have the data experienced some decline in their stock markets. The cumulative decline between August and April averaged at 6.9 percent, and the median decline was 6.2 percent, as shown in Panel C of Table 2. Panel C of Figure 1 shows the distribution of the effect on stock

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[3] In addition, bond spreads widened and credit default swap spreads widened in all five cases (excluding India) for which they are available. Note the preceding footnote.

[4] We extracted the data from Global Economic Monitoring database of the World Bank, on October 29, 2013. Data form other sources, including Bloomberg was extracted in the same week.

[5] Egypt's foreign reserves rose by 33 percent between the end of April and the end of July. Since this clearly reflected domestic political shocks, we drop it from the sample when proceeding to regression analysis.

markets across countries, between the end of April and end of July. The effect on stock markets is much more heterogeneous than on exchange rates. Fully 40 percent of the countries either did not experience a decline in the stock market or saw some appreciation. For seven emerging markets (Chile, the Czech Republic, Indonesia, Kazakhstan, Peru, Serbia, and Turkey), however, the decline was more than 10 percent. The stock market index for Peru declined by over 24 percent, a value that was 10 percentage points greater than the country with the second greatest decline, Serbia.[6]
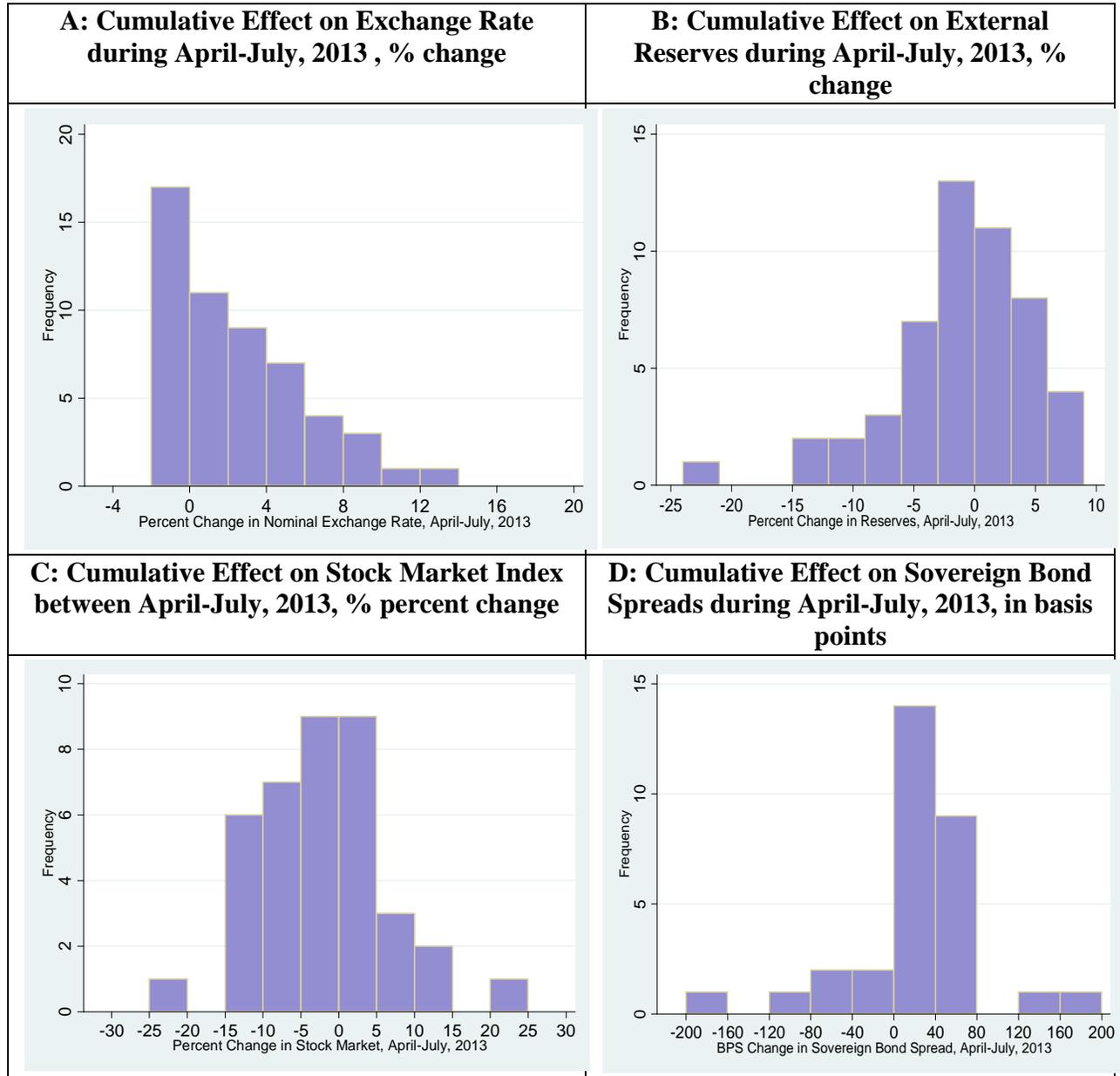
Table 2: Cumulative Percentage Changes in Capital Market Conditions

A. Exchange Rates

	April-June	April-July	April-August
(average for countries which experienced a decline)			
Mean Depreciation	3.14	4.26	6.21
Median Depreciation	1.90	3.84	5.62
Fraction of Countries with Depreciated Exchange Rates	36/53	35/53	30/53

B. Cumulative Percent changes in Foreign Reserves

	April-June	April-July	April-August
(average for countries which experienced a decline in reserves)			
Mean Decline	-2.98	-5.15	-6.21
Median Decline	-2.12	-3.18	-4.55
Fraction of countries which experienced a decline in reserves	36/52	29/51	29/51

C: Cumulative Percentage Change in Stock Market Index

	April-June	April-July	April-August
(average for countries which experienced a decline)			
Mean Decline	-6.21	-7.56	-6.94
Median Decline	-5.42	-6.37	-6.21
Fraction of Countries with Correction in Stock Market	25/38	23/38	25/38

D: Cumulative Increase in Sovereign Bond Spreads

	April-June	April-July	April-August
(average for countries which experienced an increase, in basis points)			
Mean increase	54.31	48.52	61.39
Median increase	44.95	37.57	58.00
Fraction of countries with increase in bond spreads	24/31	23/31	23/31

Note: in the table above and throughout in the paper, an increase in nominal exchange rate is a deprecation.

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[6] The country with the big increase in stock prices was Pakistan where, clearly, developments were driven by other events. Pakistan agreed to a $5.3 billion loan from the IMF on July 5, boosting reserves and leading to rallies in stocks, bonds and the rupee (Bloomberg, July 5, 2013).

Figure 1: Effect on Exchange Rate, Reserves, Stock prices, Bond Spreads during April-July, 2013

A: Cumulative Effect on Exchange Rate during April-July, 2013 , % change	B: Cumulative Effect on External Reserves during April-July, 2013, % change
C: Cumulative Effect on Stock Market Index between April-July, 2013, % percent change	**D: Cumulative Effect on Sovereign Bond Spreads during April-July, 2013, in basis points**

Data on sovereign bond spreads are available for fewer countries, but almost three-quarters of countries for which there are data, experienced an increase in spreads, the mean effect being about 50 basis points (Panel D of Figure 1). The countries with the largest increase in

bond spreads were Ghana, Indonesia, Morocco, Ukraine, and Venezuela, with the latter two countries experiencing increases in spreads of over 150 basis points.[7]

Table 3 shows the bivariate correlations and corresponding p values of significance. Perhaps surprisingly, the effects are not highly correlated, with a few notable exceptions. Again, the message appears to be that different emerging markets were affected in rather different ways.

Table 3: Correlation Coefficients across Cumulative Changes in Variables in April-August, 2013

	Exchange Depreciation	Decline in Reserves, %	Decline in Stock Prices %
Exchange Depreciation	1		
Decline in Reserves, %	0.20	1	
	(0.17)		
Decline in Stock Prices %	0.05	0.23	1
	(0.75)	(0.17)	
Increase in Bond Spreads	0.05	-0.24	0.57***
	(0.78)	(0.20)	(0.00)

Note: values in the table are bivariate correlation coefficients, and the values in parentheses are the p values for the null hypotheses that these are equal to zero.

Finally, we consider the composite indices described above, first constructing the index as just the changes in exchange rates and reserves and then constructing another index combining these two variables with the percentage stock market decline.[8]
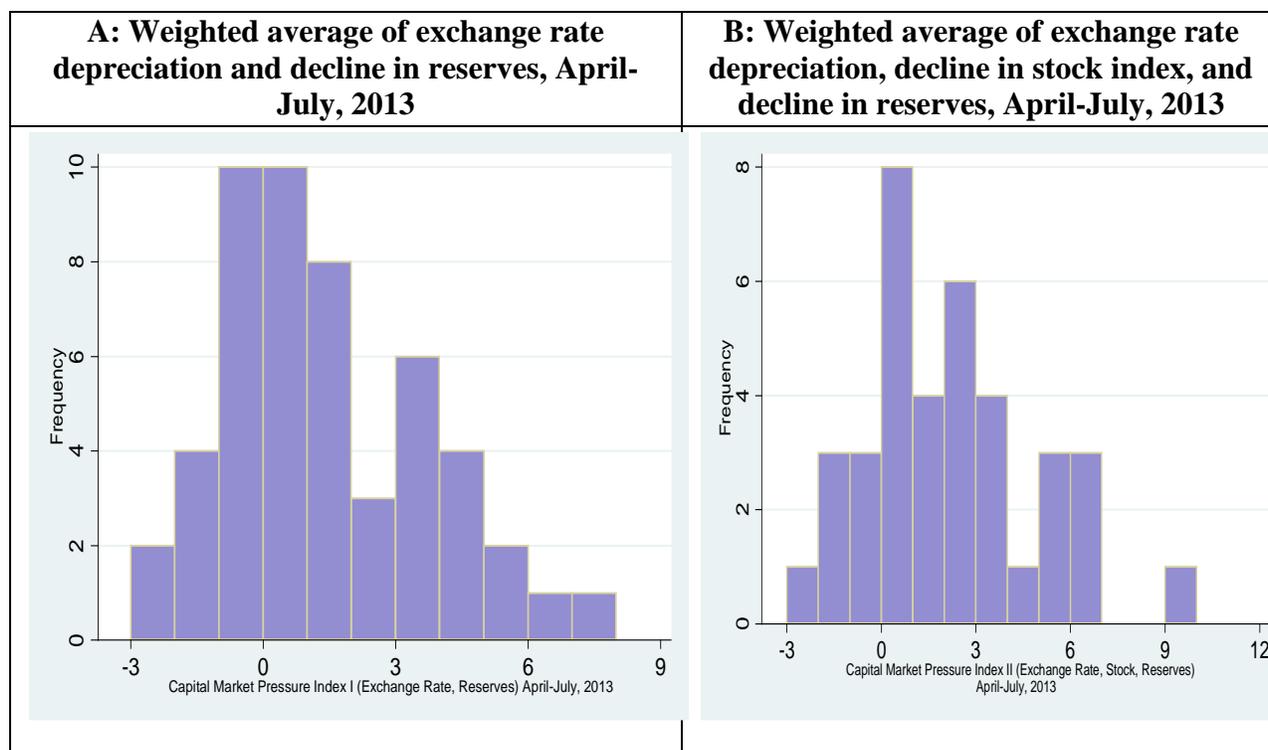
As the left hand panel of Figure 2 shows, the majority of countries (35 of 51) for which data are available experienced pressure on the exchange rate and/or reserves. The countries experiencing the largest impact were India, Indonesia, Malaysia, Peru, and Thailand. Peru and India were the outlier, with values of 6.3 and 7.1, respectively. Panel B shows that the effect was stronger when we take into account stock index declines as well, and that intensity increased progressively from June through August. Again the majority of countries (30 of 37) for which data are available experienced pressure on exchange rate, stock market, and/or reserves. The

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[7] The two countries for which spreads fell are Pakistan (198 basis points – on its case see above) and Argentina (82 basis points). Data on credit default swaps (CDS) are available for only half as many countries as the ones for which we have the data for exchange rates. For what it is worth, CDS spreads increased for almost all the countries for which the data are available during this period. The cumulative average increase was more than 50 basis points during between the end of April and end of July. Eight countries experienced an increase of more than 40 basis points in CDS and three countries experienced an increase of more than 200 basis points. These three countries were Argentina, Ukraine, and Venezuela. These countries were perhaps affected due to other unrelated ongoing political and economic

[8] The number of countries for which we are able to construct these indices declines from 51 for the first to 37 for the second. If we also include increases in bond yields in the index the number of countries for which we are able to generate an index declines to 25.

countries experiencing the largest impact were Chile, India, Indonesia, Peru, and Thailand.[9]   See Table 4 for further details.

Figure 2: Distribution of Changes in Market Pressure Index

A: Weighted average of exchange rate depreciation and decline in reserves, April-July, 2013	B: Weighted average of exchange rate depreciation, decline in stock index, and decline in reserves, April-July, 2013

Table 4: Market Pressure Indices

	April-June	April-July	April-August
Market Pressure Index I			
(Index of weighted changes in exchange rate and reserves)			
Mean	1.07	1.37	1.61
Median	0.67	0.91	1.15
Number of Countries	35/51	35/51	35/51
With positive values of Index I			
Market Pressure Index II			
(Index of weighted changes in exchange rate, reserves and stock prices)			
Mean	1.77	2.20	2.50
Median	1.49	1.88	2.19
Number of Countries	30/37	30/37	30/37
With positive values of Index II			

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[9] The country with the highest index value (9.72) was Peru: 6.16 points comes from the exchange rate component, while 3.56 points comes from the stock component.

4. Regression Analysis

We now regress (i) exchange rate depreciation, (ii) the composite index based on exchange rate depreciation and reserves losses, and (iii) the composite index based on exchange rate depreciation, reserve losses and the decline in stock prices on measures of macroeconomic conditions and policy, financial market structure, and asset market conditions. Specifically, we estimate linear regression models of the form:

$$Y_i = \alpha_k X_{k,i} + \varepsilon_i \tag{1}$$

where Y_i, the dependent variable, is, alternatively, exchange rate depreciation, the index of exchange rate depreciation and reserve loss (Index 1) or the index of exchange rate depreciation, reserve loss on falls in stock prices (Index 2) for country i between the end of April and end of August 2013. Note that the number of countries varies, since observations for stock markets are available for fewer countries than observations for exchange rates and foreign reserves.

The right hand side variables are denoted by X_k. Explanatory variables in equation (1) include GDP growth, the budget deficit, inflation, and the change in foreign reserves as measures of the economic fundamentals; the deterioration in current account deficit and real exchange rate appreciation as measures of local market impacts and loss in competitiveness; cumulative private capital inflows, the stock of portfolio liabilities, stock market capitalization and aggregate GDP as alternative measures of the size of the market; the exchange rate regime, public debt, capital account openness, the quality of the business environment (institutional quality) as structural variables. Where results are similar using different proxies, we report only a representative subset.[10] We take the values of these variables in 2012 or their averages over the period 2010-2012 (either way, prior to the advent of tapering talk). Since most of these variables are persistent and thus highly correlated across years, it turns out to be inconsequential whether we use the data for just one year or the period averages.

Since many of the explanatory variables are also correlated with one other, we include them parsimoniously in the regressions. From each category of variables we generally include only one variable at a time, while conducting robustness checks to make sure that the results are comparable when alternative measures are included in the regressions.

Table 5 reports our first set of regressions. There we estimate specifications with the size of the financial market in emerging markets; the stock of reserves, increase in current account deficit, and percent change in real exchange rate. The results indicate that the deterioration in the current account and extent of real exchange rate appreciation in the 2010-2012 period are associated with larger depreciation of exchange rate (and of the composite indices) in the summer of 2013. This helps us understand how the same countries that complained about the cross-border impact of quantitative easing in the earlier period could also complain about talk of tapering in the summer of 2013. The same countries most affected by (least able to limit) the earlier impact on their real exchange rates were the same ones to experience large and sometimes uncomfortable real exchange rate reversals subsequently.

In addition, countries with larger financial markets, measured here by the magnitude of external financing, experienced larger exchange rate depreciation and reserve losses. As

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[10] Additional results are available from the authors on request.

mentioned above, this may indicate that it was easier to rebalance portfolios by withdrawing from a few larger markets than to rebalance portfolios by selling assets in smaller markets. It suggests that having a large financial market that is attractive to foreign investors may be somewhat of a mixed blessing under these circumstances.[11] Note, as mentioned above, that we consider several different measures of the size of the market, the portfolio liability stock from Lane and Milesi Ferretti, stock market capitalization, aggregate GDP etc.   A. These are correlated with each other and give similar results in the regressions. These results imply that the larger markets are more prone to the effects of liquidity retrenchment.

In contrast, the stock of reserves held in the previous period does not appear to be associated with the effect on exchange rate or on the composite indices of exchange rate and reserves.

Table 5: Factors Associated With Exchange Rate Depreciation and Composite Financial Market Pressure, April-August 2013

Dependent Variable	Nominal Exchange rate	Index I: Exchange rate, Reserves	Index II: Exchange rate, Reserves, Stock Prices	Nominal Exchange rate	Index I: Exchange rate, Reserves	Index II: Exchange rate, Reserves, Stock Prices
	(1)	(2)	(3)	(4)	(5)	(6)
Increase in Current Account Deficit in 2010-12	0.25**	0.17*	0.33***	0.21**	0.07	0.23**
	[2.58]	[1.77]	[3.27]	[2.18]	[0.74]	[2.45]
Avg. annual % Change in RER, 2009-2012				-0.37***	-0.35***	-0.54***
				[2.82]	[3.21]	[3.66]
Size (Private External Financing, 2010-12, Log)	1.42***	0.71**	0.58	1.20***	0.55**	0.23
	[3.85]	[2.65]	[1.19]	[3.16]	[2.15]	[0.41]
Reserves/M2, 2012	-2.53	1.52	4.32	-1.15	1.45	4.88
	[0.73]	[0.46]	[1.03]	[0.40]	[0.51]	[1.43]
Observations	45	43	32	43	41	30
R-squared	0.43	0.24	0.29	0.49	0.36	0.43
Adj. R-squared	0.39	0.19	0.21	0.44	0.29	0.34

Note: An increase in RER is depreciation; CAD is current deficit as percent of GDP. Robust t statistics are in parentheses. *** indicates the coefficients are significant at 1 percent level, ** indicates significance at 5 percent, and * significance at 10 percent level.

In Table 6 we include the additional explanatory variables, focusing first on the extent of exchange rate depreciation as the dependent variable. We consider economic growth; the fiscal deficit; public debt relative to GDP; and inflation as indicators of aggregate economic policy and

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[11] Note that this variable is constructed here as the log of the value of financial flow, not financial flows scaled by GDP.

performance.[12] We also include exchange rate regime (using the de facto exchange regime classification of the IMF); and an index for controls on capital account (using the data from AREAER, IMF, we also calculate changes between 2009 and 2012).[13] For the business environment or institutional quality, we include "Doing Business" ranking of the countries and the Kauffman governance indicator, reporting results from the latter in the table below.

Table 6: Factors Associated with Exchange Rate Depreciation, April-August 2013 (including other macro variables)

Dependent Variable: Percent change in Nominal exchange rate between April-August, 2013								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Increase in Current Account Deficit 2010-12	0.20**	0.21**	0.20*	0.19*	0.20**	0.16	0.13	0.22**
	[2.19]	[2.05]	[1.98]	[1.95]	[2.07]	[1.55]	[1.13]	[2.31]
Avg. annual % Change in RER, 2009-2012	-0.35**	-.39***	-.42**	-.49***	-.38***	-.38***	-.29**	-.37***
	[2.30]	[2.84]	[2.66]	[3.37]	[2.79]	[2.96]	[2.27]	[2.76]
Size (External Financing, 2010-12, Log)	1.2***	1.3***	1.2***	1.1**	1.2***	1.1***	.96**	1.2***
	[3.07]	[3.28]	[3.13]	[2.71]	[3.08]	[3.20]	[2.31]	[3.10]
Reserves/M2, 2012	-1.17	-0.36	0.10	-0.64	-0.58	-1.92	-3.61	-1.22
	[0.41]	[0.13]	[0.03]	[0.23]	[0.21]	[0.60]	[1.20]	[0.42]
Real GDP 2012, percent change	0.08							
	[0.30]							
General Public Debt 2012		0.02						
		[0.82]						
Fiscal Deficit 2012, % of GDP			0.13					
			[0.67]					
Inflation 2012				0.10**				
				[2.10]				
Capital Control Index 2012					0.01			
					[0.49]			
Increase in Capital controls 2009-12						0.19*		
						[1.82]		
Exchange Rate Regime 2012							.61***	
							[2.72]	
World Governance Indicator, 2012								0.22
								[0.22]
Observations	43	42	43	43	43	43	42	43
R-squared	0.49	0.51	0.50	0.52	0.49	0.54	.58	0.49
Adj. R-squared	0.43	0.44	0.43	0.46	0.43	0.48	.52	0.43

Robust t statistics are in parentheses. *** indicates the coefficients are significant at 1 percent level, ** indicates significance at 5 percent, and * significance at 10 percent level.

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[12] Data on CPI inflation is from the IMF's *World Economic Outlook*. We also calculate change in inflation rate in 2010-2012 over 2007-2009. But it is not significant in the regressions. For growth we also consider values in 2013 Q1, or growth forecast for 2013.

[13] On the construction of this capital controls measure, see the appendix below.

The estimates do not provide much support for the notion that the standard measures of economic policy and performance were strongly associated with the extent of tapering. GDP growth, the budget deficit, public debt, level of reserves, and the governance indicator do not exert a significant impact on the exchange. In contrast, financial market size, the increase in current account deficit and the extent of real exchange rate appreciation are still associated with the subsequent exchange rate impact, as before.

Table 7: Factors Associated with Index of Exchange Rate Depreciation and Reserve Loss

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable: Composite index of Percent change in Nominal exchange rate and reserve loss between April-August, 2013								
Increase in Current Account Deficit 2010-12	0.06	0.07	0.05	0.05	0.03	0.06	0.02	0.05
	[0.65]	[0.69]	[0.52]	[0.50]	[0.34]	[0.56]	[0.22]	[0.43]
Avg. annual % Change in RER, 2009-2012	-.34***	-.37***	-.45***	-.46***	-.39***	-.36***	-.35***	-.36***
	[2.98]	[3.22]	[3.01]	[3.57]	[3.34]	[3.19]	[3.03]	[3.39]
Size (External Financing, 2010-12, Log)	0.56**	0.61**	0.58**	0.47*	0.42*	0.54*	0.36	0.57**
	[2.08]	[2.43]	[2.30]	[1.77]	[1.96]	[1.99]	[1.09]	[2.20]
Reserves/M2, 2012	1.41	2.27	3.96	1.74	2.74	1.28	0.71	1.53
	[0.49]	[0.81]	[1.47]	[0.66]	[1.01]	[0.43]	[0.25]	[0.55]
Real GDP 2012, percent change	0.05							
	[0.28]							
General Public Debt 2012		0.02						
		[1.14]						
Fiscal Deficit 2012, % of GDP			0.24*					
			[1.69]					
Inflation 2012				0.08*				
				[1.88]				
Capital Control Index 2012					0.03			
					[1.53]			
Increase in Capital controls 2009-12						0.03		
						[0.51]		
Exchange Rate Regime 2012							0.38*	
							[1.93]	
World Governance Indicator, 2012								-0.62
								[0.80]
Observations	41	40	41	41	41	41	40	41
R-squared	0.358	0.394	0.405	0.396	0.394	0.360	0.419	0.366
Adj. R-squared	0.266	0.305	0.320	0.310	0.307	0.269	0.334	0.275

Robust t statistics are in parentheses. *** indicates the coefficients are significant at 1 percent level, ** indicates significance at 5 percent, and * significance at 10 percent level.

Table 8: Factors Associated with Index of Exchange Rate Depreciation, Reserve Loss and Decline in Stock Prices

Dependent Variable: Composite index of Percent change in Nominal exchange rate, reserve loss and decline in Stock Prices between April-August, 2013								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Increase in Current Account Deficit 2010-12	0.25**	0.21*	0.22*	0.25**	0.19	0.22**	0.18	0.24**
	[2.50]	[2.05]	[1.73]	[2.23]	[1.71]	[2.23]	[1.63]	[2.49]
Avg. annual % Change in RER, 2009-2012	-0.58**	-0.55***	-0.56***	-0.48***	-0.57***	-0.56***	-0.47***	-0.57***
	[2.76]	[3.54]	[3.21]	[3.11]	[3.65]	[3.34]	[2.83]	[3.30]
Size (External Financing, 2010-12, Log)	0.19	0.32	0.28	0.33	0.19	0.16	-0.01	0.19
	[0.31]	[0.56]	[0.45]	[0.61]	[0.37]	[0.25]	[0.02]	[0.30]
Reserves/M2, 2012	5.08	5.05	5.36	5.78*	6.28*	4.79	3.16	4.91
	[1.41]	[1.46]	[1.56]	[1.71]	[1.87]	[1.37]	[0.86]	[1.41]
Real GDP 2012, percent change	-0.09							
	[0.31]							
General Public Debt 2012		0.00						
		[0.10]						
Fiscal Deficit 2012, % of GDP			0.07					
			[0.26]					
Inflation 2012				0.33				
				[1.43]				
Capital Control Index 2012					0.03			
					[0.97]			
Increase in Capital controls 2009-12						0.05		
						[0.48]		
Exchange Rate Regime 2012							0.45	
							[1.63]	
World Governance Indicator, 2012								0.43
								[0.39]
Observations	30	29	30	30	30	30	30	30
R-squared	0.433	0.442	0.432	0.476	0.452	0.435	0.488	0.432
Adj. R-squared	0.314	0.321	0.313	0.367	0.337	0.317	0.381	0.314

Robust t statistics are in parentheses. *** indicates the coefficients are significant at 1 percent level, ** indicates significance at 5 percent, and * significance at 10 percent level.

Three additional results are worth mentioning. The one "macroeconomic fundamental" that shows up as significant in Table 6 is the inflation rate in the prior period. Inflation is, of course, one mechanism through which a country can experience real appreciation. So this coefficient may be picking up the same financial-market effects that we identified before.[14]

That the indicator for the exchange rate regime enters negatively and significantly here is not surprising. It simply tells us that countries that pegged their currencies suffered less depreciation in the summer of 2013. More interesting will be whether they also saw less (or more) movement in their reserves and equity prices.

Finally, there is some sign that countries tightening their capital controls in the prior period experienced more currency depreciation when talk turned to tapering. It may be that these were the countries with the great perceived vulnerability (where policy makers responded by tightening controls – the change in controls was partly endogenous, in other words) and that perceived vulnerability translated into actual vulnerability. But, if so, there is no sign that controls had a moderating effect starting in May.[15] Table 7 reinforces the conclusion that controls alone were ineffectual as a macroprudential device. There, where the dependent variable is weighted average of the change in the exchange rate and change in reserves, the capital control measures lose their significance. The same is true of Table 8, where the dependent variable is a weighted average of exchange rate changes, reserve changes, and equity price changes.

Note also that the exchange rate regime has no separate significant impact on the change in reserves (although it does continue to register significantly in Table 7) and no significant impact on the change in the equity price index.

5. Conclusion

Our exploration of the effects of the Fed's tapering talk in the summer of 2013 yields the following conclusions. First, emerging markets that allowed the largest appreciation of their real exchange rates and the largest increase in their current account deficits in the prior period of quantitative easing saw the sharpest currency depreciation, reserve losses and stock market declines when talk turned to tapering. Second, measures of policy fundamentals and economic performance (the budget deficit, the public debt, the level of reserves, the rate of GDP growth) do not indicate that better fundamentals provided better insulation. An important determinant of that differential impact, in addition to the prior run-up of the real exchange rate and current account deficit, was the size of a country's financial market: countries with larger markets experienced more pressure on the exchange rate, reserves and stock market when talk turned to tapering. We interpret this as investors seeking to rebalance their portfolios being able to do so more easily and conveniently when the target country has a relatively large and liquid market. This suggests that having a large and liquid market can be a mixed blessing when a country is subject to financial shocks coming from beyond its borders.

Finally, there is little evidence that the presence of controls or their tightening in the prior period provided insulation from talk of tapering. More important, we suspect, were

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[14] Note however that the real exchange rate remains significant in the equation where inflation is included, so this cannot be all that is going on.

[15] It also could be that our measure of controls is imperfect – that we are not picking up further changes in their incidence and extent in the first four months of 2013, since we use 2010-12 data.

macroprudential policies broadly defined, where these were used to limit the appreciation of the real exchange rate and widening of the current account deficit in response to foreign capital inflows.

These patterns thus point to what countries are and are not vulnerable to external pressures once tapering again comes around.

References:

Eichengreen, Barry, Andrew Rose and Charles Wyplosz (1995), "Exchange Market Mayhem: The Antecedents and Aftermath of Speculative Attacks," *Economic Policy*.

Ghosh, Atish R., Jun Il Kiml, Mahvash Qureshi Saeed, and Juan Zalduendo (2012), "Surges," IMF Working Paper WP/12/22.

Philip R. Lane and Gian Maria Milesi-Ferretti (2007), "The External Wealth of Nnations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004", *Journal of International Economics* 73, pp.223-250, updated and extended version of dataset.

<center>**Appendix**</center>

A: Size of the Market

We consider several different measures of the size of the market, incidentally these are highly correlated with each other and give similar results in the regressions.

<center>**Table A1: Correlation between Different Measures of Size of the Market**</center>

	Stock Market Capitalization, 2012	Portfolio Liability Stock, 2011	Average inflow of bonds, equity, loans, 2010-2012	GDP, 2012
Number of observations for each variable	47	47	45	51
Capitalization	1			
Portfolio Liability Stock	0.81	1		
Average inflow of bonds, equity, loans	0.90	0.89	1	
GDP	0.90	0.80	0.92	1

Note: Stock Market Capitalization and GDP data is from WDI; Portfolio Liability stock from Lane and Milesi Ferretti; Inflows of bonds, equity and loans, are averages for 2010-2012, from GFSR, IMF. All are in log transformed values.
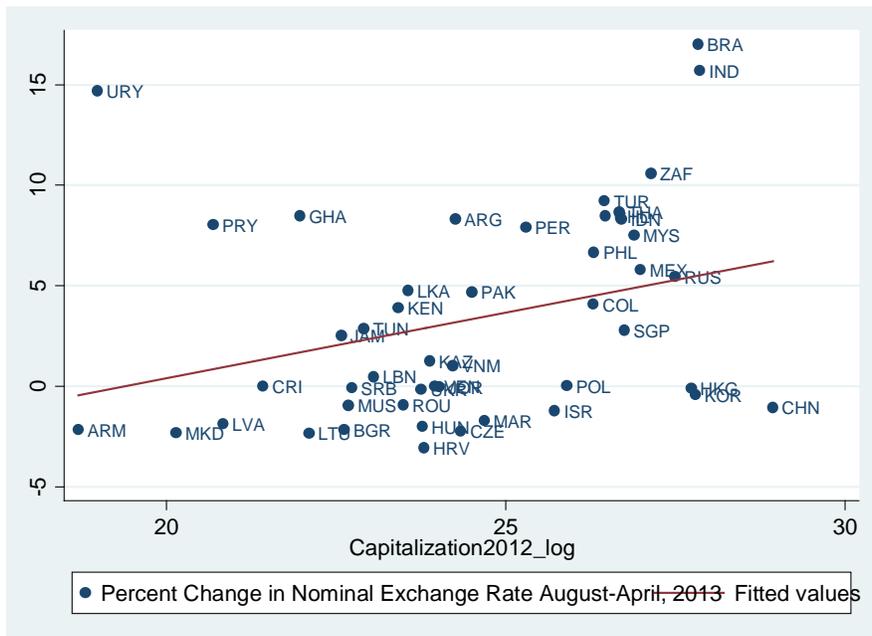
<center>**Figure A1: External Private Inflows (total, 2010-2012, log) and Exchange Rate Depreciation**</center>
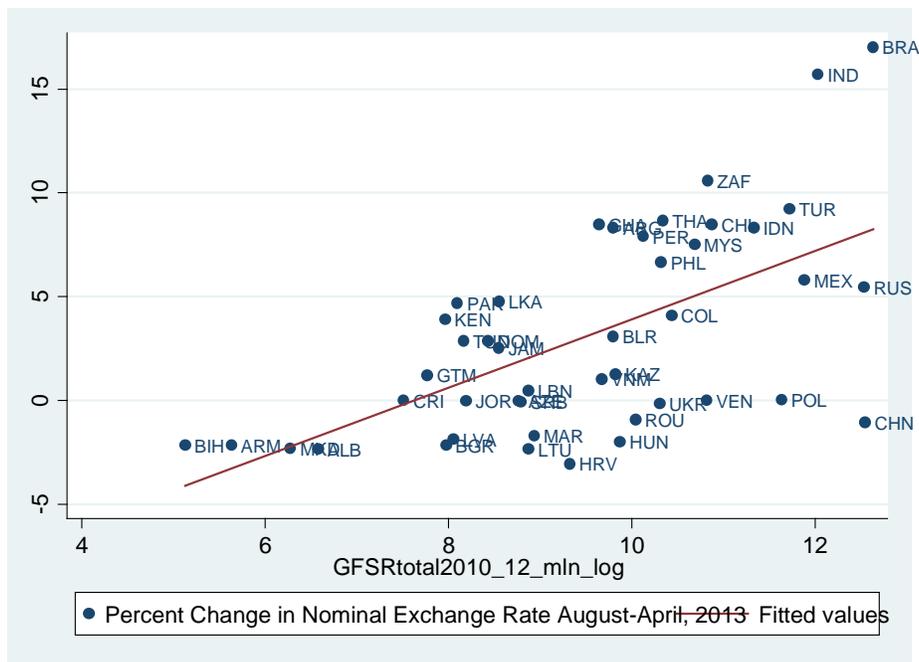
Figure A2: Stock of Portfolio Liabilities and Exchange Rate Depreciation

Percent Change in Nominal Exchange Rate August-April, 2013   Fitted values
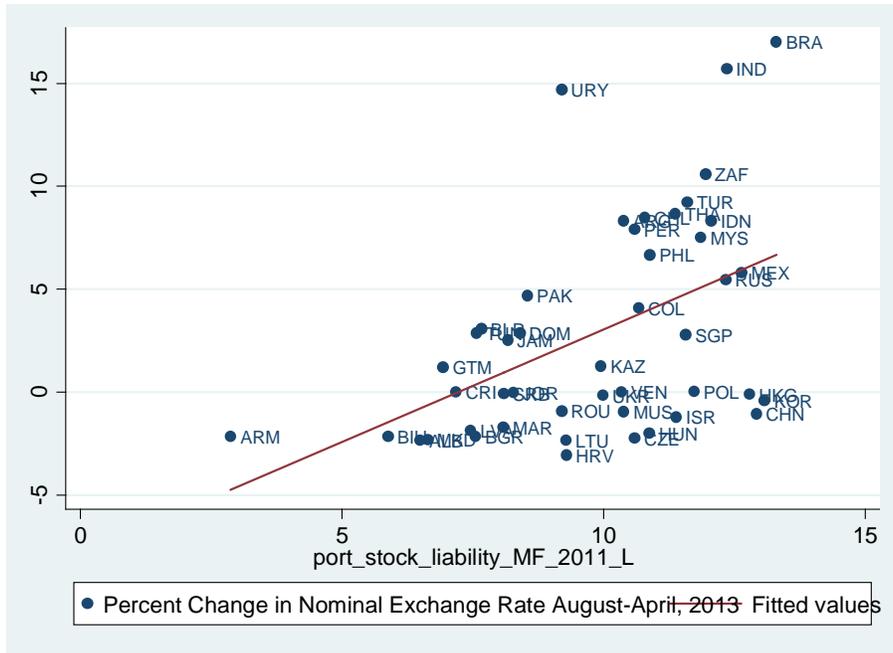
Figure A2: Stock Market Capitalisation and Exchange Rate Depreciation

Percent Change in Nominal Exchange Rate August-April, 2013 Fitted values

B: Capital Controls

Since Chinn-Ito data on capital controls are available only until 2011 we have constructed our variable directly from IMF's AREAER 2013 online publication. It has data until 2012. While Chinn and Ito combined data for the following categories: the presence of multiple exchange rates; restrictions on current account transactions; restrictions on capital account transactions; and requirement of the surrender of export proceeds; we concentrate just on capital account transactions. AREAER has entries under 50 some heads and it tabulates the data under no and yes--yes implying that there are some restrictions on capital flows within the category and no implying that there are no restrictions. We first code them in such as away that if a category has a restriction we gave it a value 1 and if the category has no restriction we gave it a value 0 and scale it to 0-100, we add up all these values to come up with the overall capital account controls measure—a larger value implies more less open capital account and more controls. We correlate it with the values for Chinn Ito for 2011, and the correlation is about 0.83.

We use this measure in a number of different ways: levels in 2012, change in 2009 over 2012, or changes over shorter periods—2010 over 2012 and 2011 over 2012; and percent change in 2009-2012. Figure A4 shows that the exchange rate depreciation is not correlated with the level of capital account openness in 2012. Figure A5 shows that an increase in capital account controls is correlated with a smaller effect on exchange rate.

Figure A4: Level of Capital Controls in 2012 and Exchange Rate Depreciation, May-Aug 2013
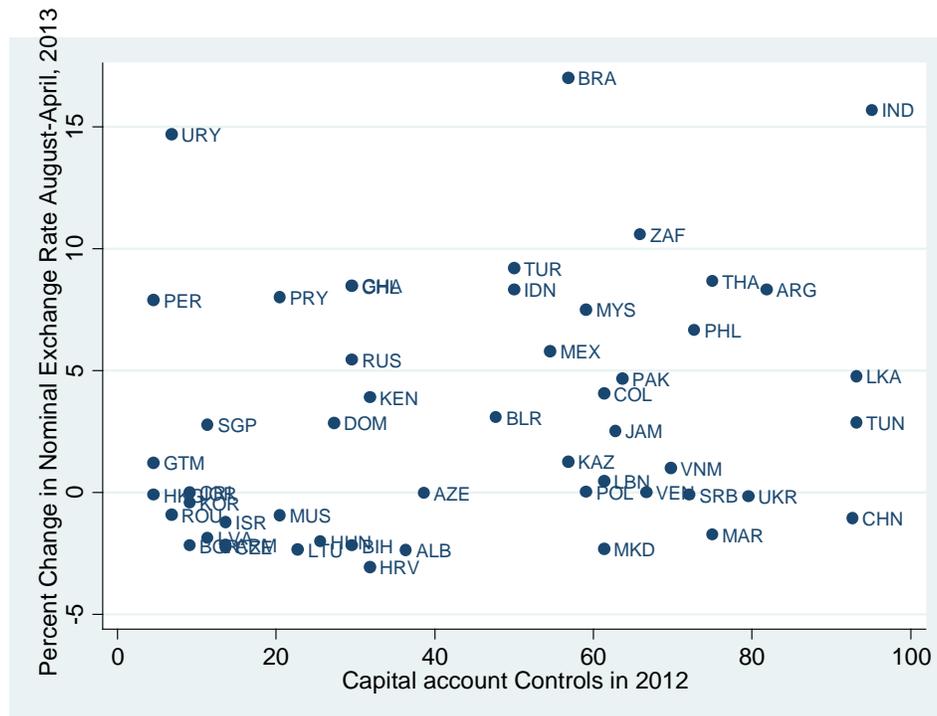
Figure A5: Increase in Capital Controls 2009 to 2012 and Exchange Rate Depreciation May-Aug 2013