From Tapering to Tightening:
The Impact of the Fed's Exit on India

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India Policy Forum, 2014[1]

This version July 9, 2014

The "tapering talk" starting on May 22, 2013, when the Fed Chairman Ben Bernanke first spoke of the possibility of the Fed tapering its security purchases, had a sharp negative impact on financial conditions in emerging markets. India was among those hardest hit. The rupee depreciated by 18 percent at one point, causing concerns that the country was heading toward a financial crisis. In this paper we ask why did the tapering talk have such a large impact on India? How effective were the policy measures undertaken to contain the impact? And what could be the elements of its medium term policy framework to prepare better for the normalization of monetary policy in advanced economies?

We show that the macroeconomic conditions had deteriorated in the three prior years, rendering India vulnerable to capital outflows, while narrowing the available policy space to respond to an external shock. In addition, the fact that India had a large and liquid financial market by emerging market standards made it an obvious place for investors to rebalance away from. The authorities adopted several measures in response to the volatility. Our results show that these measures were of limited help in stabilizing the financial markets. The implication being that there are no comfortable choices once a country is in the midst of a crisis. Better is to have in place a medium-term policy framework that limits vulnerabilities, avoiding the crisis in the first place while maximizing policy space. Some elements of this framework include rebuilding foreign exchange reserves, using those reserves to prevent excessive exchange rate volatility, exploring additional bilateral swap lines, and simply preparing the banks and the corporates to handle greater exchange rate volatility. A sound fiscal balance, sustainable current account deficit, and environment conducive for investment constitute the other integral parts of this framework.

I.   Introduction

On May 22, 2013, Chairman Ben Bernanke first spoke of the possibility of the Fed tapering its security purchases. This "tapering talk" had a sharp negative impact on financial conditions in emerging markets.[2] India was among those hardest hit. Between May 22, 2013 and the end of August, 2013 its exchange rate depreciated from Rs. 56 to Rs. 66 to the dollar (i.e. by 18 per cent), bond spreads increased and stock markets reacted negatively. The reaction was sufficiently pronounced for the press to warn that India might be heading toward a full blown financial crisis, the kind that requires an emerging market to seek IMF assistance.[3]

Ultimately, no such dire consequences occurred. By end September, 2013 the exchange rate had rebounded to Rs. 61, regaining about half the ground previously lost, capital inflows resumed, and the equity market recovered. The situation stabilized partly because of specific policy measures announced by the Indian government and the central bank, and partly because the Federal Open Market Committee ruled out imminent tapering.

In this paper we ask three questions about the impact of this event. Why did the Fed's "tapering talk" have such a large impact on India's financial markets? How effective were the policy measures undertaken to contain it? And how can India prepare itself better for the tightening of global liquidity conditions in the future and, more broadly, best react to global liquidity cycles?

In Eichengreen and Gupta (2014) we analyzed the impact of the Fed's tapering talk on exchange rates, foreign reserves and equity prices in emerging markets between April 2013 and August 2013.[4] We found that emerging markets that had allowed the real exchange rate to appreciate and the current account deficit to widen during the period of quantitative easing saw the sharpest impact. An important determinant of the differential impact was the size of local financial markets: countries with larger markets experienced more pressure on the exchange rate, foreign reserves, and equity prices. We interpret this as showing that investors are better able to rebalance their portfolios when the target country has a relatively large and liquid financial market. The implication is that emerging markets like India with sizeable financial markets may be especially exposed.

This paper elaborates the Indian case. We show that macroeconomic conditions had deteriorated noticeably in the three prior years, rendering India vulnerable to capital outflows and exchange rate depreciation, while narrowing the available policy space. The deterioration in macroeconomic fundamentals was intertwined with the sizable amounts of capital that India imported during the period of zero interest rates and quantitative easing. These capital flows, in an

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[2] The period of tapering talk is generally referred to as that between May 22, 2013 and September 18, 2013.

[3] See e.g. "India in crisis mode as rupee hits another record low", http://money.cnn.com/2013/08/28/investing/india-rupee/; "India's Financial Crisis, Through the Keyhole", http://www.economist.com/blogs/banyan/2013/08/india-s-financial-crisis.

[4] Subsequently the Federal Reserve has tapered its purchases of securities five times, in December 2013, and in January, March, April and June this year, bringing it down from $85 bn a month to $35 bn a month.

environment of declining investment, financed a larger fiscal deficit and gold imports, resulting in a widening current account deficit and overvalued real exchange rate. Rebalancing by global investors when the Fed began to talk of tapering highlighted these vulnerabilities. And the fact that India had a large and liquid financial market by emerging market standards made it an obvious place for investors to rebalance away from.

The authorities adopted several measures in response to the volatility, intervening in the foreign exchange market, hiking interest rates, raising the import duty on gold, encouraging capital flows from nonresident Indians, easing demand pressure in foreign exchange markets by opening a separate swap window for oil importing companies, and opening a swap line with the Bank of Japan. The Reserve Bank also sought to restrict capital outflows from residents and Indian companies. Using an event study methodology we empirically estimate the impact of these measures on the exchange rate and financial markets. Our results show that these measures were of some, albeit limited help in stabilizing the financial markets. In particular, the Reserve Bank's efforts to restrict capital outflows from residents and Indian companies had decidedly mixed effects.

Finally, we discuss the elements of a broader policy framework for managing the risks and rewards of global liquidity cycles, including holding a larger stock of foreign reserves and using it to moderate fluctuations in exchange rates; signing bilateral swap lines with a larger set of countries as a supplement to keeping a larger reserve cushion; preparing corporates and banks to handle exchange rate volatility better; adopting a clear communication strategy; avoiding measures that could damage confidence, such as attempting to restrict outflows; making more active use of macro-prudential measures, such as countercyclical adjustments in bank capital adequacy requirements; and managing capital inflows to encourage the dominance of relatively stable longer-term flows while discouraging short-term flows.[5] A sound fiscal balance, sustainable current account deficit, and environment conducive for investment need to be the other integral parts of this framework.

The rest of the paper is organized as follows. In section II we document the effect of the tapering talk on India. In section III we relate the impact to various macroeconomic and financial factors. In Section IV we discuss the policy measures announced by the Reserve Bank and Government of India to limit the impact on the exchange rate and financial markets. In Section V we discuss the medium term policy issues to better manage the impact of global liquidity cycles. The last section then concludes.

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[5] See Zhang and Zoli (2014) and the literature cited therein for a recent contribution on the use of macro prudential policies, in particular loan to value ratio, debt to income ratio, required reserves ratio, countercyclical provisioning and countercyclical capital requirements in Asian economies. See Cordella et al (2014) on the use of reserve requirements as a countercyclical macroprudential tool in developing countries.

II. The Effect of Tapering Talk on India

Table 1 offers an overview of market conditions in the summer of 2013 in Brazil, Indonesia, India, Turkey and South Africa, five cases (sometimes referred to as the "Fragile Five") on which much commentary focused. Exchange rates depreciated and reserves declined in all five countries, and equity prices fell in all countries except South Africa. While the largest exchange rate depreciation was in Brazil, Turkey had the largest decline in stock prices, and the reserve loss was the largest in Indonesia. Within this group India had the second largest exchange rate depreciation and the second largest decline in reserves.

Table 1: Effect of the "Tapering Talk" was large on "Fragile Five" Countries (April-August, 2013)

	Exchange Rate Depreciation	% change in Stock Prices	% Change in Reserves
Brazil	17.01	-5.28	-3.07
Indonesia	8.33	-14.21	-13.30
India	15.70	-3.32*	-5.89
Turkey	9.21	-15.38	-4.56
South Africa	10.60	6.81	-5.05

Note: Calculated using data from the Global Economic Monitor database of the World Bank, * decline in stock prices in India is about 10 percent if calculated using daily data between May 22 and August 31.

In Table 2 we calculate the standard deviation of percentage changes in exchange rates, stock market prices and reserves in India as a measure of volatility, using daily data for exchange rate and equity prices and weekly data for reserves. Comparing these standard deviations between May 22nd and the end of August with that in prior months, it is clear that the volatility in financial markets was much larger during summer 2013, the period of the tapering talk.

Table 2: Unprecedented Volatility was seen in the Financial Markets in India during the "Tapering Talk" (Standard Deviation calculated for percent changes in the series)

	s.d. of % change in daily exchange rate	s.d. of % change in daily stock prices	s.d. of % change in weekly stock of foreign reserves
Tapering Talk: May 23, 2013-August 31, 2013	4.95	3.62	1.82
Previous three Months (Feb 21, 2013-May 22, 2013)	0.9	2.81	0.73
Previous one year (May 21, 2012-May 22, 2013)	1.71	6.92	1.05

Note: Calculated using daily data on nominal exchange rate and stock market index from Bloomberg; and weekly data on foreign reserves from the RBI.
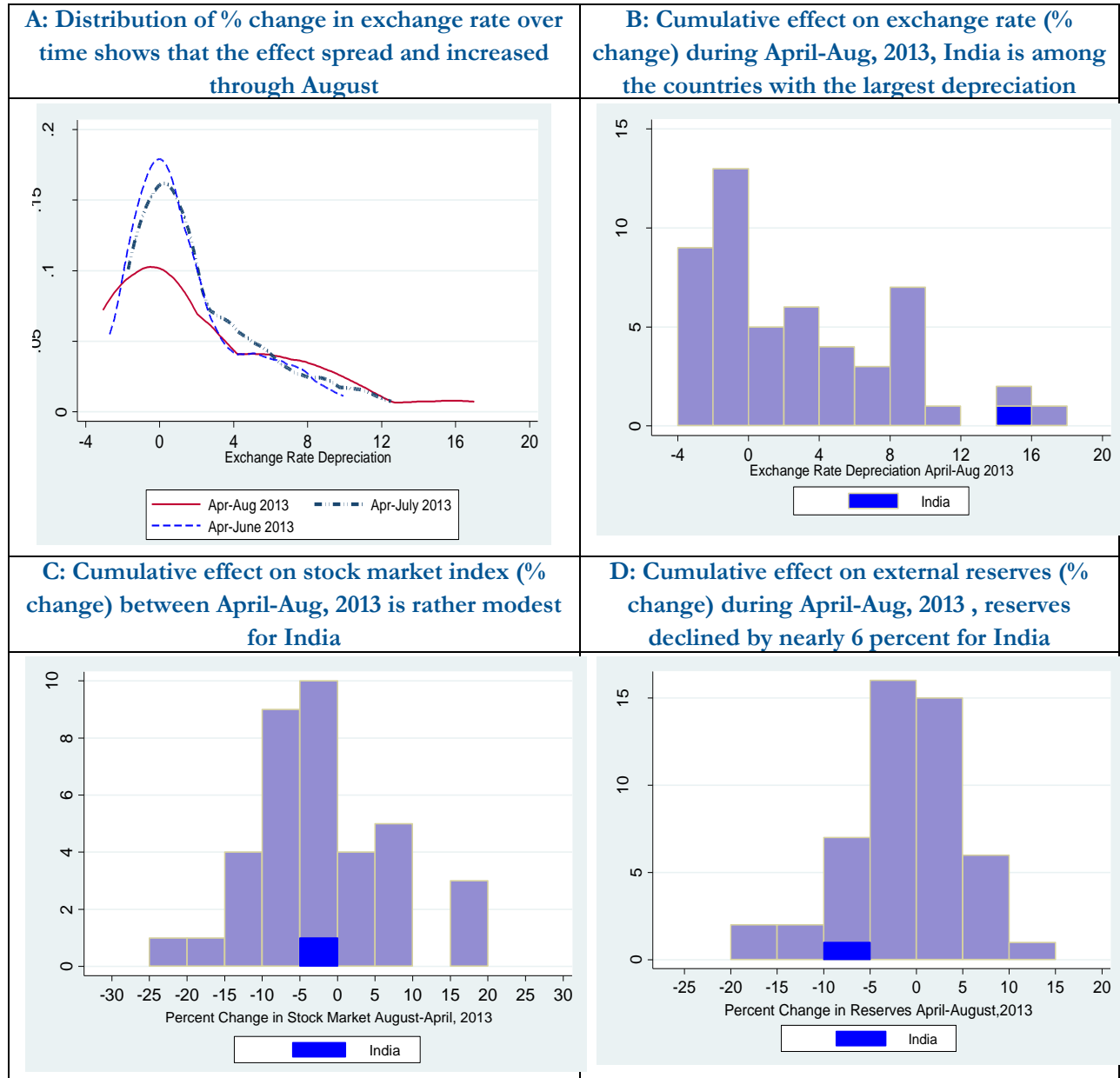
We also benchmark India against a larger set of emerging markets. For this we start with the universe of emerging countries but drop the countries which do not have a national exchange rate, as well as countries that use US dollar as their currency (such as Ecuador, El Salvador and Panama or the Eurozone countries). For the resulting 53 countries, we 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. We show the distribution of exchange rate changes over the months through August in Panel A of Figure 1, and observe that the extent of depreciation increased over the period. The exchange rate depreciated in 36 of the 53 countries between end of April and end of June.[6] Despite some subsequent recovery, exchange rates for 30 of the 53 countries remained below April levels at the end of August. The average rate of depreciation in these 30 countries was over 6 percent, and exchange rates for about half the countries depreciated by more than 5½ percent.

Panel B of Figure 1 provides details on the distribution of exchange rate changes between the end of April and end of August. The largest changes were in Brazil, India, South Africa, Turkey and Uruguay. These countries experienced depreciations of at least 9 percent, with the largest depreciation in Brazil being 17 percent. Data for stock markets are available for fewer countries, but 25 of the 38 countries for which we have the data experienced some decline in their stock markets. The decline between April and August in these 25 countries averaged 6.9 percent, with a median decline being 6.2 percent (Panel C, Figure 1). For six emerging markets (Chile, Indonesia, Kazakhstan, Peru, Serbia, and Turkey), the decline was more than 10 percent. In comparison India had a relatively modest stock market decline (at month-end values). Reserves declined for 29 of 51 countries between April and August, with the largest declines in the Dominican Republic, Hungary, Indonesia, Sri Lanka, and Ukraine.[7]

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[6] We extracted the data on exchange rate, reserves and stock markets from the Global Economic Monitoring database of the World Bank, on October 29, 2013.

[7] We dropped countries where events other than tapering clearly dominated the markets. For example Pakistan, where there was a large increase in stock prices due to developments unrelated to tapering. Pakistan had 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). We also dropped Egypt where foreign reserves rose by 33 percent between the end of April and the end of July due to aid from other countries.

Figure 1: Effect on Exchange Rate, Stock market, Reserves Changes in Emerging Markets during the Tapering Talk

A: Distribution of % change in exchange rate over time shows that the effect spread and increased through August	**B: Cumulative effect on exchange rate (% change) during April-Aug, 2013, India is among the countries with the largest depreciation**
C: Cumulative effect on stock market index (% change) between April-Aug, 2013 is rather modest for India	**D: Cumulative effect on external reserves (% change) during April-Aug, 2013 , reserves declined by nearly 6 percent for India**

Source: We extracted the data on exchange rate, reserves and stock markets from the Global Economic Monitoring database of the World Bank, on October 29, 2013. Calculations are based on end of month values. See Eichengreen and Gupta (2014) for details.

III: Why Was India Impacted so Severely?

Macroeconomic imbalances were evident in India at the outset of the Fed's tapering talk. The budget deficit was large, inflation was high, economic growth had slowed (although it was still considered high when compared with other emerging markets), public debt was high, the current

account deficit was large and increasing, and the real exchange rate had appreciated in prior years (Figure 2). Although the level of foreign reserves was still deemed comfortable by the IMF, the effective coverage they provided had declined since 2008. The policy interest rate was high in nominal terms, having been increased by the RBI from 3.25 percent in December 2009 to 8.50 percent in December 2012. The substantial budget deficit and high policy rates implied little room for maneuver in fiscal and monetary policy.[8]
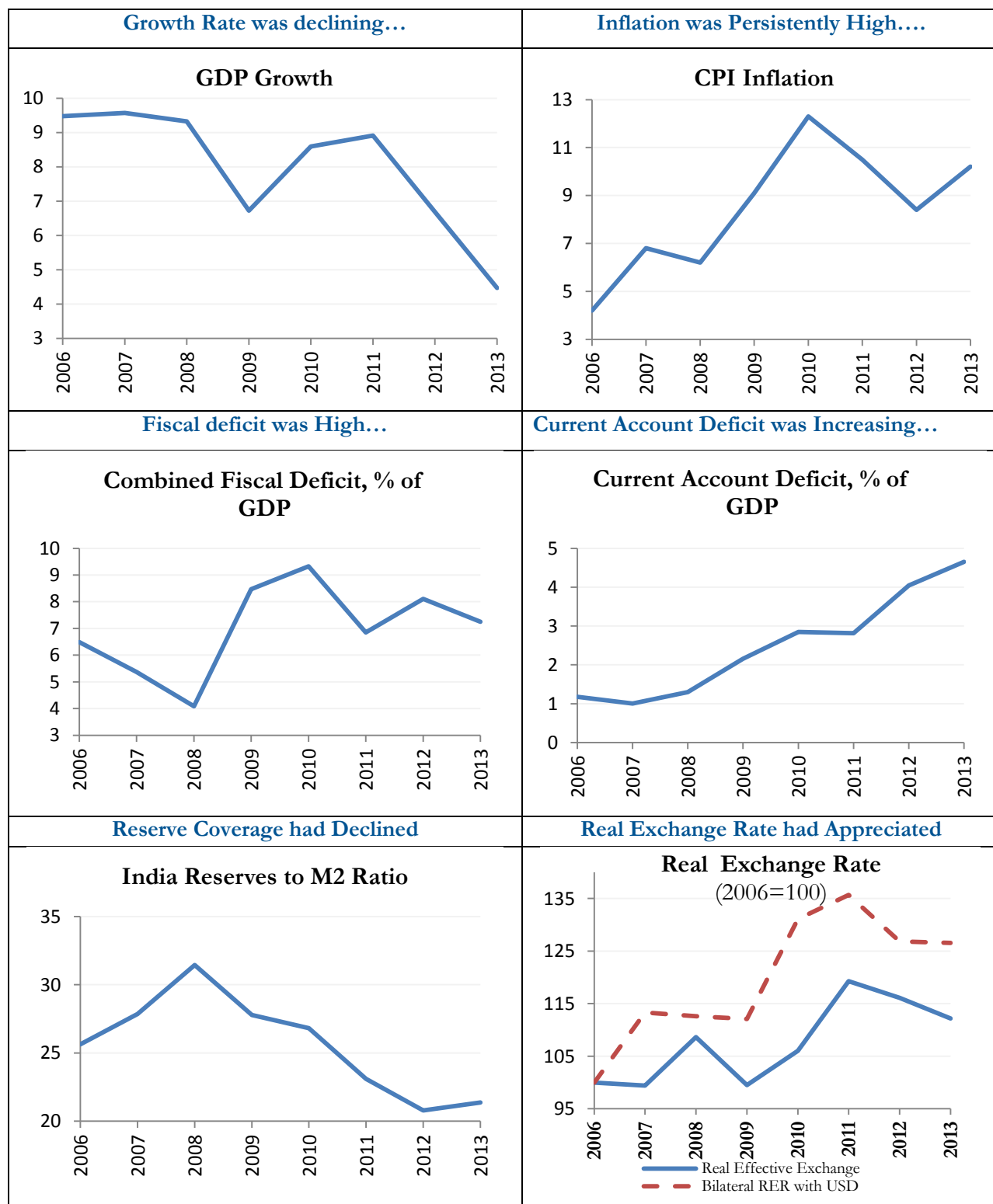
The specific factors contributing to high fiscal or current account deficit also indicated increased economic and financial vulnerabilities. The increase in budget deficit in the past years could be attributed to an increase in current expenditure, in particular expenditure on subsidies, rather than in public investment. The global financial crisis provided the rationale for a fiscal stimulus in 2009, although the stimulus helped contain the impact of the crisis, it proved difficult to reverse subsequently. Loose monetary policy in advanced countries meanwhile made those deficits easy to finance, further relieving the pressure to compress them when the crisis passed. Ideally, capital inflows in an emerging market like India should help finance investment and generate returns that in turn pave the way to eventually repay them. In India, instead, much of this capital was deployed in financing the fiscal deficit and current account deficit.

The increase in the current account deficit, for its part, was due partly to an increase in gold imports (reflecting a dearth of attractive domestic outlets for personal savings in a high inflation environment, where real returns on many domestic financial investments had turned negative) – see Figure 3. Gold imports clearly did less for productivity than, say, imports of capital goods. The country exhibited the typical symptoms of an emerging market undergoing an unsustainable cycle of capital inflows, driven by external market conditions, accompanied by high fiscal deficit and low private savings, and resulting in real exchange rate appreciation and widening current account deficit.[9]

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[8] In a paper presented at last year's India Policy Forum, Mohan and Kapur (2014) cautioned that these macroeconomic imbalances indicated heightened vulnerabilities to a financial crisis in summer 2013.
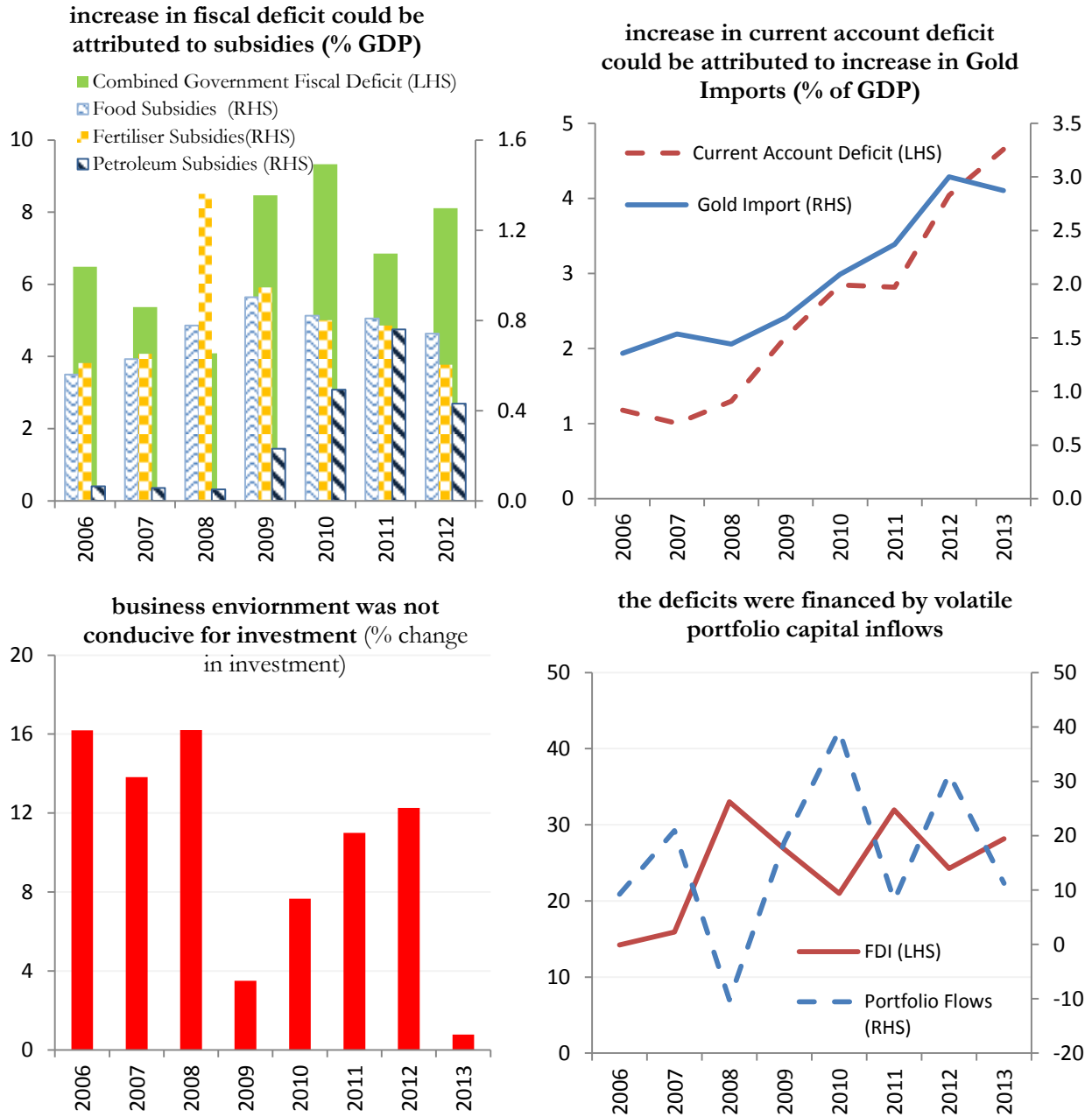
[9] None of this is unfamiliar, indeed similar cycles of capital inflows, triggered by easier global liquidity have been seen in emerging markets repeatedly, invoking Reinhart and Reinhart (2008) to caution that "capital inflow bonanzas are associated with a higher likelihood of economic crises (debt defaults, banking, inflation and currency crashes)."

Figure 2: Macroeconomic Imbalances were Evident in the Indian Economy prior to the period of "Tapering Talk"

Growth Rate was declining…	Inflation was Persistently High….

GDP Growth

CPI Inflation

Fiscal deficit was High…	Current Account Deficit was Increasing…

Combined Fiscal Deficit, % of GDP

Current Account Deficit, % of GDP

Reserve Coverage had Declined	Real Exchange Rate had Appreciated

India Reserves to M2 Ratio

Real Exchange Rate (2006=100)

Real Effective Exchange
Bilateral RER with USD

Sources: GDP, CSO; CPI Inflation, Citi Research; Gross Fiscal Deficit, Current Account Deficit, Reserve Bank of India; Reserves to M2 Ratio, IFS; Real Effective Exchange Rate (CPI based, 6 currency), RBI; Bilateral RER calculated using data from IFS. Years refer to fiscal years.

Figure 3: Not just the Level of Fiscal Deficit and Current Account Deficit was High in India, its Quality was Poor as well

increase in fiscal deficit could be attributed to subsidies (% GDP)

increase in current account deficit could be attributed to increase in Gold Imports (% of GDP)

business enviornment was not conducive for investment (% change in investment)

the deficits were financed by volatile portfolio capital inflows

Sources: Gross Fiscal Deficit, FDI, Gold Import, Current Account Deficit, Reserve Bank of India; Subsidies, Ministry of Petroleum and Natural Gas, Govt. of India; Investment, CSO; Portfolio Flows, Bloomberg.

It was not just the trends described above that indicated worsening macroeconomic outlook for India, it in fact fared worse than the median emerging market economy on most of the variables considered here. Comparing key macroeconomic variables for the Indian economy with those in other emerging markets in Table 3, we note that India was among the bottom quartile of emerging markets for the level of debt, budget deficit, inflation and reserves, and below median for other variables.

Table 3: A Comparison of the Macroeconomic Outlook with other Emerging Markets in 2012 shows the Vulnerabilities that were built in the Indian Economy in 2012

Variable	Number of Countries	Mean	Median	Bottom Quartile*	India
Economic growth, 2012	53	3.01	3.27	1.41	4.7
Public debt % of GDP, 2012	52	47.68	44.10	59.60	66.70
Fiscal deficit % of GDP, 2012	53	3.14	3.30	4.80	7.97
Current Account Deficit % of GDP, 2012	53	2.89	3.10	7.47	4.79
Inflation, CPI, 2012	52	4.96	3.80	6.13	10.44
Reserves to M2 ratio, 2012	52	0.38	0.32	0.24	0.21
RER appreciation, % (during 2010-2012)	50	3.00	2.50	4.29	3.54

Note: *values refer to the country at the bottom 25 percentile for economic growth and reserves and the country at the top 25 percentile for all other variables. Sources as in Eichengreen and Gupta (2014).

In the analysis below we show that some of these macroeconomic weaknesses – a weakening current account deficit, real exchange rate appreciation and inflation, in particular – were correlated significantly with the effect of the tapering talk. Drawing on Eichengreen and Gupta (2014) we consider the impact of the tapering talk on exchange rates, as well as on the composite indices of capital market pressure, consisting of weighted average of changes in exchange rates, foreign reserves and stock prices. We calculate our Capital Market Pressure Index I as a weighted average of the percent depreciation of exchange rate and reserves losses between April 2013 and August 2013, where the weights are the inverse of the standard deviations of monthly data from January 2000 to August 2013.

$$MP\ Index\ I = \frac{\%\ Exchange\ Rate\ Depreciation}{\sigma_{exchange\ rate}} + \frac{\%\ Decline\ in\ Reserves}{\sigma_{reserves}}$$

The Capital Market Pressure Index II is calculated as a weighted average of the percent depreciation of exchange rate, reserves losses and decline in stock prices between April 2013 and

August 2013, with the weights again being the inverse of the standard deviations of the monthly data from January 2000 to August 2013.[10]

$$MP\ Index\ II = \frac{\%\ Exchange\ Rate\ Depreciation}{\sigma_{exchange\ rate}} + \frac{\%\ Decline\ in\ Reserves}{\sigma_{reserves}} + \frac{\%\ Decline\ in\ Stock\ Market}{\sigma_{stock}}$$

We regress exchange rate depreciation, Index I, and Index II on macroeconomic conditions, financial market structure and asset market conditions. Specifically, we estimate linear regression equations of the form:

$$Y_i = \alpha_k\ X_{k,i} + \varepsilon_i \qquad\qquad (1)$$

where Y_i is exchange rate depreciation, Index I or Index II for country i between April and August 2013. The explanatory variables, X_k, include the deterioration in the current account deficit, real exchange rate appreciation, the size of the financial market, and foreign reserves. We consider cumulative private capital inflows during 2010-2012, the stock of portfolio liabilities and stock market capitalization in 2012 as alternative measures of the size of financial markets, and also include available measures of the liquidity of the financial markets. For macroeconomic conditions we include GDP growth, budget deficit, inflation, and public debt; and for institutional variables we include the exchange rate regime, capital account openness, and the quality of the business environment.

Since these variables are correlated with each other, we include them parsimoniously in the regressions. From each category (size of markets, macroeconomic or institutional variables) we include only one variable at a time. Results are similar using different proxies, so we report only a representative subset.[11] We take the values of the regressors in 2012 or their averages over the period 2010–2012 (either way, prior to the tapering talk). Since most of these variables are persistent and thus correlated across years, it turns out to be inconsequential whether we use the data for just one year or use period averages.

In Table 4 we report results for specifications including as explanatory variables the size of the local financial market, the stock of reserves, the increase in current account deficit, and the percentage change in real exchange rate over the period 2010-2012. The deterioration in the current account, extent of real exchange rate appreciation, and inflation (results not reported here for

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[10] We construct these 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 are the inverses of the standard deviation of each series. 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 would be able to generate the index declines to 25.

[11] Results hold if we calculate the dependent variables for April-July, 2013.

specifications in which we included inflation, but are available on request) during the years of abundant global liquidity were associated with larger exchange rate depreciations and with larger increases in the composite indices in the summer of 2013. This helps us understand how the same countries that complained about the impact of quantitative easing in the earlier period could also complain about talk of tapering in the summer of 2013. The countries most affected by (or least able to limit) the earlier impact on their real exchange rates were the same ones to subsequently experience large and uncomfortable real exchange rate reversals, in other words. In terms of these results, some effect on India during the tapering talk can be accounted for by the increase in current account deficit, real exchange rate appreciation and inflation prior to the tapering talk.

Table 4: Regression Results for Factors Associated With Exchange Rate Depreciation and Capital Market Pressure Indices during April-August 2013
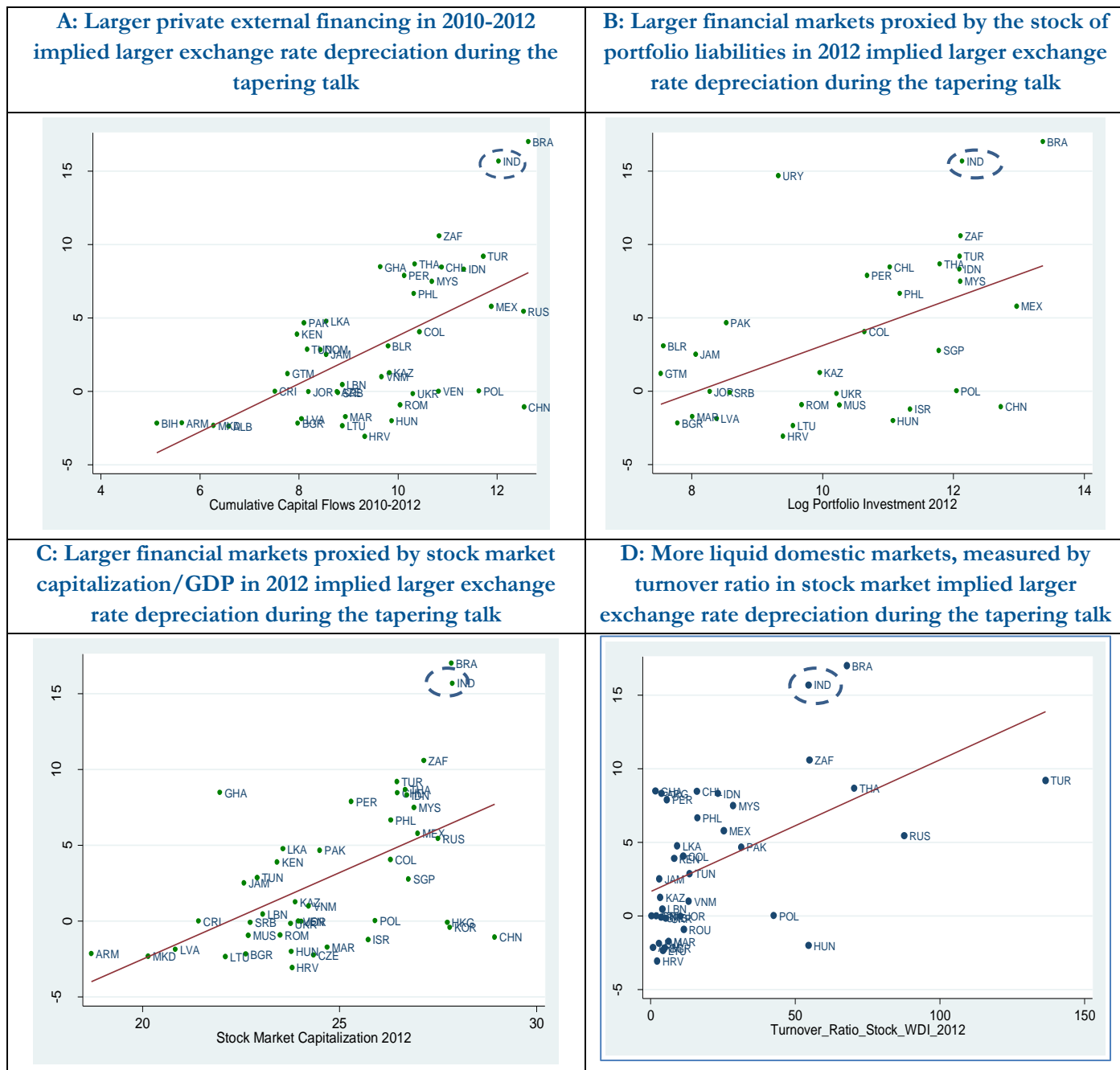
Dependent Variable	% change in nominal exchange rate	Index I: (exchange rate, reserve)	Index II: (exchange rate, reserve, stock prices)	% change in nominal exchange rate	Index I: (exchange rate, reserve)	Index II: (exchange rate, reserve, stock prices)
	(1)	(2)	(3)	(4)	(5)	(6)
Increase in Current Account Deficit in 2010–12, over 2007–09	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, 2010–2012				-0.37***	-0.35***	-0.54***
				[2.82]	[3.21]	[3.66]
Size of Financial Markets (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 Ratio, 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 real exchange rate (RER) is depreciation; we take average annual percent change in RER during 2010, 2011 and 2012. Current account deficit is current deficit as percent of GDP; we take average annual increase in current account deficit during 2010–12 over 2007–09. 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. Index I is constructed as a weighted average of exchange rate depreciation and reserve loss; and Index II as the weighted average of exchange rate depreciation, reserve loss and decline in the index for stock prices. The weights are the inverses of the standard deviations for respective series calculated using monthly data from January 2000 to August 2013.

An important result that comes from this empirical exercise is that the countries with larger financial markets (or larger capital flows) experienced greater exchange rate depreciation and reserve losses. An interpretation being that it was easier for investors to rebalance their portfolios by withdrawing from a few large markets than by selling assets in many small markets. It suggests that having a large

financial market that is attractive to foreign investors may be a mixed blessing. The alternate measures of the size of the market are strongly correlated and give similar results (see Figure 4).[12]

Figure 4: Size and Liquidity of the Financial Markets and the Effect on the Exchange Rate

A: Larger private external financing in 2010-2012 implied larger exchange rate depreciation during the tapering talk

B: Larger financial markets proxied by the stock of portfolio liabilities in 2012 implied larger exchange rate depreciation during the tapering talk

C: Larger financial markets proxied by stock market capitalization/GDP in 2012 implied larger exchange rate depreciation during the tapering talk

D: More liquid domestic markets, measured by turnover ratio in stock market implied larger exchange rate depreciation during the tapering talk

Source: Eichengreen and Gupta (2014)

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[12] We calculated standardized coefficients to compare quantitatively the coefficients of various regressors. These show that the coefficient of the size of financial markets is the largest followed by the coefficients of real exchange rate and current account deficit.

Insofar as the size and liquidity of the financial markets and the extent of capital flows in prior years were important, India ranks high among emerging markets, as shown in Figure 4 above, as well as in Table 5 below. On most metrics of the size of the financial markets, whether measured in absolute terms or as % of GDP, India is not just among the top quartile, but indeed among the top few emerging markets. The remaining macroeconomic variables in which India did not fare too well, reserves, economic growth, public debt, fiscal deficit, as well as the institutional variables, were not found to be significant correlates of the effect of the tapering talk at standard confidence levels. While beyond the scope of this paper to establish it formally, some of these variables are likely to have limited the policy space to deal with the turmoil associated with the tapering talk.

Table 5: Size of the Financial Market and Cumulative Capital Inflows were Large in India compared to other Emerging Markets ($ billion or % of GDP)

	Number of Countries	Mean	Median	Top Quartile	India
Capital Inflows in 2010-2012, GFSR, bn $*	43	65.6	21	57	218
Stock Market Capitalization in 2012, bn $, WDI	47	302	32.9	383	1260
Stock of Portfolio Liabilities, 2012, IFS, bn $	36	92	30.4	151	186
Stock Market Capitalization, % of GDP in 2012, WDI	47	52	36.3	61.8	68.6
Stock of Portfolio Liabilities % of GDP, 2012, IFS	29	22.4	21.7	33.2	10

Note: Data on capital inflows, consisting of private inflows of bonds, equity, and loans is from the IMF's Global Financial Stability Report. Data on stock market capitalization is from the World Development Indicators; and the data on portfolio liability is from the International Financial Statistics.

IV: The Policy Response

To analyze the policy response to stabilize the exchange rate and financial markets during the tapering talk, we assembled a comprehensive matrix of policies announced between May 22 and end-September, 2013. Countries typically adopted a combination of policies. While most allowed their exchange rates to depreciate, they also increased interest rates and intervened in the foreign exchange market to limit the volatility of the exchange rate and prevent overshooting. The RBI too intervened in the foreign exchange market to limit the volatility and depreciation of the exchange rate, spending some $13 billion of reserves between end-May and end-September. Intervention was especially large from June 17 to July 7, when weekly declines in reserves were of the order of $3 billion. It increased its overnight lending rate, the marginal standing facility rate, by 200 basis points to 10.25 percent on July 15, and tightened liquidity through open market operations and by requiring the banks to adhere to reserve requirements more strictly.

In addition, the Government of India and the RBI announced several other measures (detailed in Appendix A). Gold imports being partly responsible for a large current account deficit, the government raised the import duty on gold on June 5, August 13, and September 18, increasing it from 6 percent prior to the tapering talk to 15 percent by September 18. The RBI also imposed controversial new measures on August 14 to restrict capital outflows from residents. These included reducing the limit on amounts residents could invest abroad or repatriate for various reasons, including for purchasing property abroad. India being an oil importing country, demand for foreign exchange from companies that import oil can add a significant amount to the overall demand for foreign exchange and thus affect the level and volatility of exchange rate. The RBI opened a separate swap window for three public sector oil marketing companies on August 28, 2013 to exclude their demand from the foreign exchange market and reduce the exchange rate volatility.[13]

There were then few additional policy announcements in the second half of August, when exchange rate depreciated most rapidly. This was a period of transition at the RBI, as the governor Dr. Subbarao was to retire on September 4, 2013. The government announced on August 6, 2013 that Dr. Raghu Ram Rajan would take charge as the new governor on September 4, but in the interim Rajan joined the RBI as an Officer on Special Duty. Little policy communication or guidance was provided by the RBI during this interregnum, when the exchange rate depreciated by nearly 10 percent.

On September 4, 2013, upon formally joining the RBI, the new governor issued a statement and held a press conference expressing confidence in the economy and highlighting the RBI's comfortable foreign reserves position. In addition, he announced new measures to attract capital through deposits targeted at the nonresident Indians (which turned out to be successful, keeping with the past experience in attracting these deposits, more on which below), and relaxed partially the restrictions on outward investment that had been introduced previously. The exchange rate and the markets subsequently stabilized. Another measure that possibly helped boost the availability of foreign exchange reserves and calm the markets around this time was the extension of an existing swap line with Japan, which was increased from $15 billion to $50 billion. This swap line was negotiated between the Government of India and the Government of Japan and signed by their respective central banks.

We analyze the impact of these policy announcements on financial markets, using "event-study" regressions. As is customary in such regressions we compare the values of the exchange rate and financial market variables in a short window after the policy announcement (we report results for a 5 day post announcement window, but also considered shorter windows of 2 or 3 days which yielded similar results), with those prior to the announcement. For the control window we consider

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[13] None of these policy measures were novel though in the Indian context, having been implemented at different instances in the past, e.g. import duties on gold were prevalent until the early 1990s; deposits from the Indian diaspora were attracted in a similar fashion twice in the past, in 1998 and in 2000; a separate swap window was made available to the oil importing companies in 2008 to reduce the volatility in the foreign exchange market after the collapse of the Lehman brothers.

two options, first, the entire tapering period from May 22 until the day of the policy announcement, and second, a shorter control period of 1 week prior to the announcement. Below we report results from the specifications in which we use this shorter control window of a week. The regression specification is given in Equation 2 below where Y is the log exchange rate, log stock market index, portfolio debt flows, or portfolio equity flows, the latter two measured in millions of US dollars. For some policy announcements we also look at the impact on the turnover in foreign exchange market.

$$Y_t = \text{constant} + \mu \text{ Bond Yield in the US}_t + \alpha \text{ Tapering Talk Dummy}_t +$$
$$\beta \text{ Dummy for a week prior to Policy Announcement}_t$$
$$+ \gamma \text{ Dummy for Policy Announcement}_t + \varepsilon_t \qquad (2)$$

The regressors include US bond yields, to account for global liquidity conditions, and dummies for the tapering period (from May 23, 2013-until a week before the policy announcement was made), for the week prior to the policy announcement, and for the week since the policy announcement. We estimate these regressions using the data from January 1, 2013 up to the date the policy dummy takes a value 1, dropping subsequent observations.[14]

(i)   Increase in the Interest Rate (July 15)

Using the framework discussed above to assess the impact of increase in interest rates that the RBI announced on July 15, we construct the tapering dummy to take a value one from May 23 to July 7, the dummy for the week prior to the announcement takes a value 1 from July 8-July 14, and the dummy for increase in interest rate takes a value 1 for 5 consecutive days from July 15, when the financial markets were open.

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[14] We acknowledge the limitations in being able to establish causality using these regressions due to the difficulty in establishing the counterfactual and in controlling for all the relevant factors that may affect the financial markets.

## Table 6: Increase in the Marginal Standing Facility Rate

	(1) Log Exchange Rate	(2) Log Stock Market Index	(4) Portfolio Debt, $mn	(5) Portfolio Equity, $mn
US Bond Yield	0.06***	-0.00	-183.96*	9.27
	[7.55]	[0.25]	[1.74]	[0.08]
Dummy for tapering May 22-July 7 (α)	0.04***	-0.01	-233.09***	-189.89***
	[9.46]	[0.56]	[4.32]	[3.20]
Dummy for a week prior to July 15, i.e. from July 8-July 14 (β)	0.05***	0.00	-4.91	-376.24***
	[5.99]	[0.15]	[0.05]	[3.19]
Dummy for a week from July 15 (dummy=1 for 5 working days from July 15) (γ)	0.05***	0.02	-21.38	-167.71
	[6.28]	[1.34]	[0.21]	[1.52]
Constant	3.87***	8.69***	399.78**	137.50
	[240.80]	[264.27]	[2.00]	[0.63]
Observations	135	138	133	133
R-squared	0.886	0.033	0.404	0.249
Adj. R-squared	0.882	0.00366	0.386	0.226

Note: Data used in the regressions runs from January 1, 2013-July 22, 2013. *, **, *** indicates that the coefficient is significantly different from zero at 10, 5 and 1 percent level of significance, t statistics are in parentheses.

Results in Table 6 show that the rate of currency depreciation, the equity prices and debt flows did not change significantly in the days after the increase in the interest rate, though equity flows seem to have stabilized a bit. Comparing the increase in interest rates in the other fragile 5 countries in Figure 5, we can see that, except for South Africa, other countries increased interest rates as well. Brazil started raising rates in May itself and continued doing so through January, 2014. The rate increase between May and September totaled 150 basis points. Indonesia first raised rates in July but continued to increase them through November, the increase during May-September totaling 100 basis points. India was different from other countries in that it increased the interest rate by a larger amount all in one go.[15]

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[15] One question of interest is whether a large one time increase is more effective, perhaps for signaling reasons, than several small increases spaced out over months.

Changes in Policy Interest Rate, bps
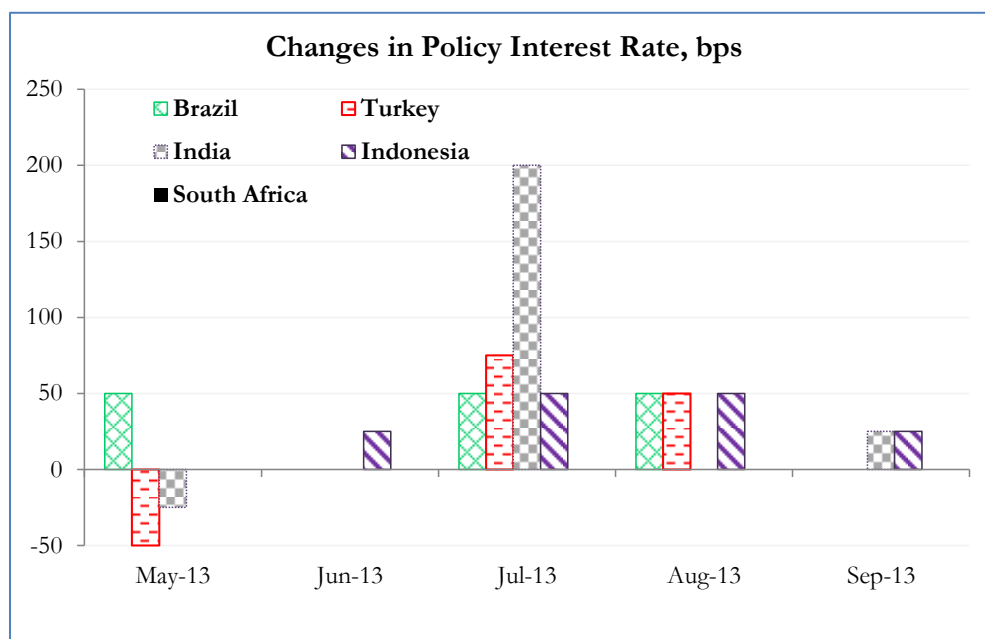
Source: Haver.

(ii) Restricting Outflows from Residents and Corporates (August 14)

On August 14, 2013, the RBI announced restrictions on capital outflows from Indian corporates and individuals. It lowered the limit on Overseas Direct Investment under the automatic route (i.e. the outflows which do not require prior approval of the RBI) from 400 per cent to 100 per cent of the net worth of the Indian firm, reduced the limit on remittances by resident individuals (which were permitted under the so called Liberalized Remittances Scheme) from $200,000 to $75,000, and discontinued remittances for acquisition of immovable property outside India. Table 7 looks at outward remittances by residents subject to these restrictions. The amounts remitted were small, of the order of $100 million a month. There was no surge in remittances during the period of the tapering talk. Outflows were just $92 million in June and $110 million in July, 2013. Quantitatively it seems there was not much to be gained from these restrictions, while the negative impact on markets sentiment was potentially large.[16]

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[16]Even as the amount remitted for the purchase of immovable property had increased in July, 2013 to about 20 million from an average of about 10 million a month in the previous months, it was a rather small amount to justify the restriction.

Table 7: Amount of Outward Remittances under the Liberalized Remittances Scheme for Resident Individuals (in million $) was rather modest

	Avg. of 2012	Avg Jan-April 2013	May 2013	June 2013	July 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013
Total	95.2	129.3	115.3	92.1	109.9	75.8	72.2	67.6	59.4	75.2
Deposits abroad	1.9	3.6	2.2	1.3	2.9	3.2	1.3	1.3	1.2	1.9
Purchase of Property	5	10.3	7.2	8.6	20.6	3	3.8	1.3	0.3	0.5
Investment in equity/debt	19.5	29.4	13.3	12.5	16.2	14.9	9.8	10.2	2.9	11.2
Gift	20.2	30.3	28.8	22.5	24.8	17.3	15.9	17.8	9.8	19.7
Donations	0.4	0.2	0.2	0.1	0.3	0.2	0.1	0.3	–	0.2
Travel	3.7	3.8	4.3	1.1	1	0.7	1	1	0.2	0.8
Maintenance of relatives	17.6	23.8	23.3	9.3	13.8	8.8	9.4	9.5	34.5	9.4
Medical Treatment	0.4	0.4	0.6	0.2	0.4	0.1	0.4	0.2	0.2	0.3
Studies Abroad	10.1	11.4	16.9	7.1	15.5	16.5	14.5	11.9	5.1	18.1
Others	16.5	16.5	18.5	29.4	14.5	11.1	16.2	13.9	5.2	13

Source: Reserve Bank of India.

Regressions in Table 8 confirm the negative impact. In the regressions the dummy for the tapering period prior to the restrictions on outflows takes a value 1 from May 22-August 6, the dummy for the week prior to policy takes a value 1 from August 7-August 13 while the dummy for the policy announcements takes a value 1 for five consecutive days from August 14. Results indicate that in the 5 days from the time when this announcement was made, exchange rate depreciation and the decline in stock market index accelerated, and equity flows declined as well. Commentary in international financial press reflected the fears that these controls evoked (*Economist*, August 16, 2013, "…. India's authorities have planted a seed of doubt: might India "do a Malaysia" if things get a lot worse? Malaysia famously stopped foreign investors from taking their money out of the country during a crisis in 1998…"; and *Financial Times*, August 15, 2013 "… the measure smacks more of desperation than of sound policy").

	(1) Log Exchange Rate	(2) Log Stock Market Index	(3) Log Forex Market Turnover	(4) Portfolio Debt, $mn	(5) Portfolio Equity, $mn
US Bond Yield	0.08***	-0.00	-0.21**	84.99	-22.13
	[11.10]	[0.14]	[2.40]	[0.95]	[0.24]
Dummy for tapering May 22-August 6 (α)	0.04***	-0.00	0.01	-269.33***	-181.64***
	[9.26]	[0.33]	[0.26]	[4.89]	[3.28]
Dummy for a week prior to August 14, i.e. from August 7-August 13 (β)	0.06***	-0.05***	-0.06	-331.38***	-129.77
	[7.51]	[3.13]	[0.57]	[3.21]	[1.25]
Dummy for a week from August 14 (dummy=1 for 5 working days from August 14) (γ)	0.07***	-0.07***	0.03	-86.70	-228.04*
	[7.98]	[3.93]	[0.31]	[0.75]	[1.97]
Constant	3.85***	8.68***	11.29***	-105.41	196.49
	[293.81]	[323.85]	[69.52]	[0.62]	[1.15]
Observations	156	159	155	154	154
R-squared	0.93	0.25	0.15	0.31	0.25
Adj. R-squared	0.93	0.23	0.12	0.29	0.23

Note: Data used in the regressions runs from January 1, 2013-August 21, 2013. *, **, *** indicates that the coefficient is significantly different from zero at 10, 5 and 1 percent level of significance, t statistics are in parentheses.

(iii)   Import Duty on Gold (June 5, August 13, and September 18)

Rising gold imports being partly responsible for deteriorating current account balance, the GOI raised the import duty on gold on June 5 (from 6 to 8%), August 13 (from 8 to 10 %), and September 18 (from 10 to 15%). These duties were not effective in (and perhaps not even intended to), stabilizing the financial markets in a short window after they were announced. The results in Table 9 for the first duty increase on June 5 show that the exchange rate depreciation increased in the five day window following the imposition of the duty, compared to the week before or to the tapering period prior to that, the stock market declined and the portfolio flows were smaller as well.

The increase in import duties were thus ineffective at best presumably because rather than dealing with the causes of financial weakness, it only addressed the symptoms. Insofar as higher import duties on gold were equivalent to tighter restraints on capital outflows, they appear to have an analogous (unfavorable) impact on financial markets. However, since the apparent objective was to reduce the import of gold and compress the current account deficit, this measure succeeded (see Figure 6 below), and thereby possibly helped stabilize the exchange rate and financial markets over a

slightly longer time frame (than say over a shorter daily or weekly horizon that we have included in the empirical analysis).

Table 9: Increase in the Import Duty on Gold (on June 5) and the Effects on Exchange Rate and Financial Markets

	(1) Log Exchange Rate	(2) Log Stock Market Index	(3) Portfolio Debt, $mn	(4) Portfolio Equity, $mn
US Bond Yield	-0.01	0.08***	-265.42*	337.23**
	[0.70]	[3.40]	[1.72]	[2.11]
Dummy for tapering May 22-May 28(α)	0.03***	0.01	-154.11*	-145.16
	[5.41]	[0.76]	[1.77]	[1.60]
Dummy for a week prior to June 5, i.e. from May 29-June 4 (β)	0.04***	0.00	-231.18***	-143.40
	[8.58]	[0.06]	[2.76]	[1.65]
Dummy for a week from June 5 (dummy=1 for 5 working days from June 5) (γ)	0.06***	-0.02*	-335.04***	-245.87***
	[11.99]	[1.76]	[3.93]	[2.77]
Constant	4.01***	8.53***	552.79*	-478.55
	[243.27]	[186.14]	[1.91]	[1.59]
Observations	107	110	106	106
R-squared	0.727	0.146	0.332	0.088
Adj. R-squared	0.717	0.113	0.305	0.0516

Note: Data used in the regressions runs from January 1, 2013-June 10, 2013. *, **, *** indicates that the coefficient is significantly different from zero at 10, 5 and 1 percent level of significance, t statistics are in parentheses.

That said, there are limits to the extent these duties can help in curbing imports. If the difference between the domestic and international price of gold becomes too large, it can provide just the incentive to smuggle gold. As was the case in India until the early 1990s, when import duties on gold, as well as an artificially appreciated exchange rate, made smuggling lucrative and contributed to a thriving parallel market for foreign exchange, where proceeds from smuggled gold could be converted in to rupee at a premium. As a part of the reforms initiated in the early 1990s import duties on gold were abolished and the exchange rate was first devalued and eventually floated, bringing an end to smuggling as well as the parallel market for exchange rate. Assuming that there is no wish to revert to those earlier days when smuggling was rampant, these duties should be relied upon only as a temporary measure.

Figure 6: Duties on Gold Imports helped restrain the import of Gold
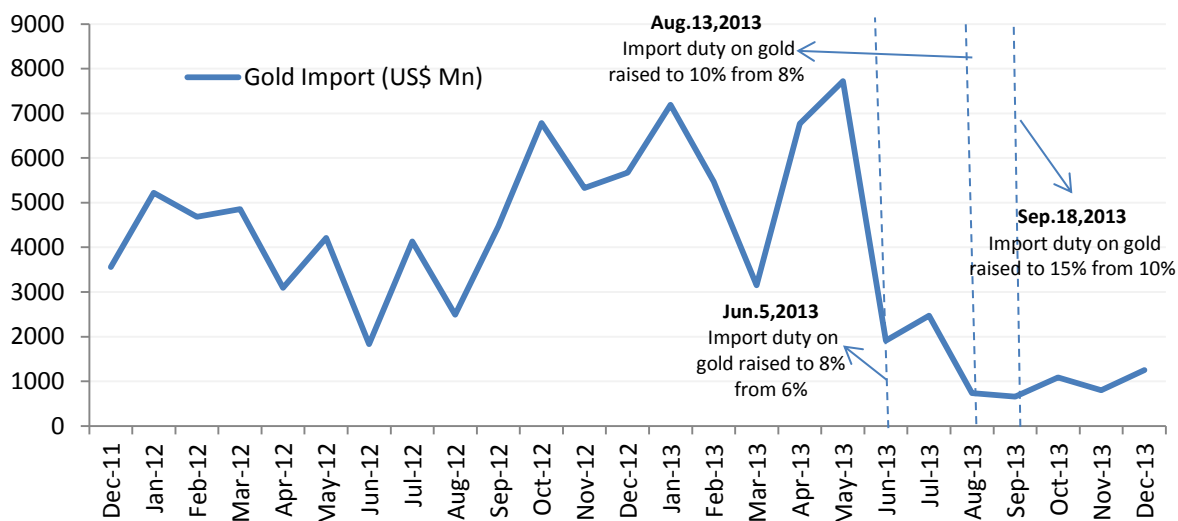
Source: Reserve Bank of India

(iv) Swap Window for Public Oil Importing Companies (August 28)

The largest item in India's import basket is oil, adding up to more than $10 billion a month to the import bill. The demand for foreign exchange from oil importing companies can presumably add a significant amount to the total demand for foreign exchange and thus affect the level and volatility of exchange rate (as per some estimates the demand for foreign exchange from these companies is about $400 million a day). With this logic in mind the RBI opened a separate swap window for three public sector oil companies on August 28, 2013 so as to remove their demand from the foreign exchange market.

It is not obvious though whether, with a daily turnover of about $50 billion in the onshore foreign exchange market, and presumably an equally large offshore market, the amount made available through the special swap window translated into a significant reduction in the demand for foreign exchange. While some commentators reacted positively to this announcement, we do not see a favorable impact on turnover in the onshore foreign exchange market, the exchange rate or equity markets in the week following, Table 10. If anything, the exchange rate depreciation accelerated in the week after this policy was announced as compared to the week before or the rest of the tapering talk period prior to that.

Table 10: Separate Swap Window for Oil Importing Companies and the Impact on Financial Markets

	(1) Log Exchange Rate	(2) Log Stock Market Index	(3) Log Forex Market Turnover	(4) Portfolio Debt, $mn	(5) Portfolio Equity, $mn
US Bond Yield	0.09***	-0.03**	-0.22***	113.02	-23.32
	[13.15]	[2.35]	[2.87]	[1.38]	[0.29]
Dummy for tapering May 22-August 20 (α)	0.04***	0.01	0.02	-281.76***	-179.39***
	[8.00]	[0.69]	[0.36]	[5.20]	[3.40]
Dummy for a week prior to August 28, i.e. from August 21-August 27 (β)	0.09***	-0.06***	0.13	-177.07	-288.62**
	[9.70]	[3.25]	[1.20]	[1.53]	[2.56]
Dummy for a week from August 28 (dummy=1 for 5 working days from August 28) (γ)	0.13***	-0.06***	0.15	-228.67**	-171.92
	[14.27]	[3.11]	[1.47]	[2.11]	[1.62]
Constant	3.83***	8.74***	11.33***	-158.07	198.73
	[298.29]	[342.55]	[76.54]	[1.02]	[1.32]
Observations	165	168	164	162	162
R-squared	0.944	0.357	0.135	0.281	0.271
Adj. R-squared	0.943	0.341	0.113	0.263	0.252

Note: Data used in the regressions runs from January 1, 2013-July 22, 2013. *, **, *** indicates that the coefficient is significantly different from zero at 10, 5 and 1 percent level of significance, t statistics are in parentheses.

(v) Communication and Guidance

As noted earlier, there was very little additional guidance from the government or the central bank in August, even as the exchange rate appeared to go into freefall, depreciating by nearly 10 percent from August 15-September 4. On September 4, 2013, the new governor, Dr. Rajan, issued a statement expressing confidence in the economy and its reserves position. He held a press conference and announced new measures to attract capital through deposits targeted at the Indian diaspora, and relaxed some of the restrictions on outward investment which had been tightened earlier.

While we cannot separate out the effect on the markets of each of these announcements, we assess the combined effect of these announcements, by estimating regressions with the policy announcement dummy taking a value 1 for five days after September 4. Table 11 shows that the exchange rate and stock market improved following these announcements. Our results thus favor

communicating with the market participants to limit the volatility in the exchange rate or financial markets in such times of external or domestic shocks.

Table 11: Policy Announcements, Statement and Press Conference on September 4, 2013

	(1)	(2)	(3)	(4)
			Portfolio	Portfolio
	Log Exchange	Log Stock	Debt,	Equity,
	Rate	Market Index	$ mn	$ mn
US Bond Yield	0.11***	-0.05***	144.73*	-50.25
	[14.42]	[4.00]	[1.86]	[0.66]
Dummy for tapering May 22-August 27 (α)	0.03***	0.01	-293.92***	-170.32***
	[5.67]	[1.53]	[5.50]	[3.27]
Dummy for a week prior to Sep 4, i.e. from Aug 28-Sep 3 (β)	0.11***	-0.04*	-257.59**	-147.36
	[10.97]	[1.94]	[2.43]	[1.43]
Dummy for a week from Sep 4 (dummy=1 for 5 working days from Sep 4) (γ)	0.07***	0.02	-193.87*	75.12
	[6.20]	[1.25]	[1.70]	[0.68]
Constant	3.79***	8.78***	-217.64	249.32*
	[269.90]	[345.87]	[1.48]	[1.74]
Number of observations	170	173	167	167
Adjusted R-squared	0.93	0.26	0.253	0.248

Note: Data used in the regressions runs from January 1, 2013-Sep 11, 2013. *, **, *** indicates that the coefficient is significantly different from zero at 10, 5 and 1 percent level of significance, t statistics are in parentheses.

V: The Medium-Term Policy Framework

Once you are in a crisis of confidence, there are no easy choices. Better is to put in place a medium-term policy framework that limits vulnerabilities, avoiding that crisis in the first place while maximizing policy space for responding to shocks. While maintaining a sound fiscal balance, sustainable current account deficit, and environment conducive to investment are obvious important elements of this framework, the other elements would include managing capital flows so as to encourage relatively stable longer-term flows while discouraging short-term flows, avoiding excessive appreciation of exchange rate through interventions using reserves and macroprudential policy, holding a larger stock of reserves and where feasible signing swap lines with other central banks, and preparing the banks and the corporates to handle greater exchange rate volatility. We discuss some of these in greater detail below.

(i)   Level of Foreign Reserves in India

The average reserve holdings of emerging markets have increased sharply in the last four decades, from about 5 percent of GDP in the 1980s to 25 percent in 2010s (see Ghosh, Ostry and

Tsangarides, 2012). Emerging markets hold reserves for a variety of reasons, mercantilist reasons, as insurance against shocks to the current and capital accounts, as an indicator of external solvency, or to stabilize the exchange rate. Ghosh et al (2012) show that the reasons for holding reserves differ across countries and over time. While in the 1980s and 1990s countries held reserves to defend the level of exchange rate or to insure against shocks to the current account, insuring against shocks to capital account has become a more important motivation in the last two decades.

But what level of reserves is optimal? There are several available metrics to prescribe the optimal level of reserves. There is the well-known Greenspan-Guidotti rule, that requires that an emerging market should hold reserves equivalent to a year of short term liabilities; rules based on import requirements, which consider reserves equivalent to about 3-6 months of imports to be adequate; yet another metric defines the level of reserves in terms of the broad money supply and considers reserves equivalent to 20 percent of M2 to be adequate to insure against the shocks to the capital account. The IMF considers any single metric to be inadequate and instead combines the aforementioned in a risk weighted composite index to assess the reserve adequacy of its member countries.[17]

India's reserve level has been considered adequate on most of these metrics.[18] Even so, examining the level of reserves since 2000, one can observe two distinct eras (Figure 7). The first lasted from 2000 till 2008, when reserves were accumulated actively, taking them from $40 billion in 2000 to $305 billion in mid-2008. Reserves then declined to $245 billion in end 2008, due to withdrawals of capital after the collapse of Lehman Brothers. Reserves were rebuilt in the second period to $300 billion by 2011, at which level they then remained broadly stable. There were subsequently no apparent attempts to increase the stock of reserves at the pace seen in the earlier years.

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[17] The cost of holding reserves occurs because reserves are typically invested in liquid treasury bills of the countries which issue hard currencies and generate returns lower than the domestic assets. Levy Yeyati (2008) however suggests that the cost of reserves estimated as the difference between these interest rates is exaggerated, since larger reserves lower the cost of issuing sovereign debt.

[18] India's reserve level has been considered adequate on most of these metrics, including in the IMF's assessment of the Indian economy. The IMF is currently revising its reserves metrics and is likely to revise upwards the desirable level of reserves for oil importing countries such as India who need to hold a larger reserve buffer to meet the oil import bill, the demand for which is inelastic and often volatile due to the volatility of the oil prices.
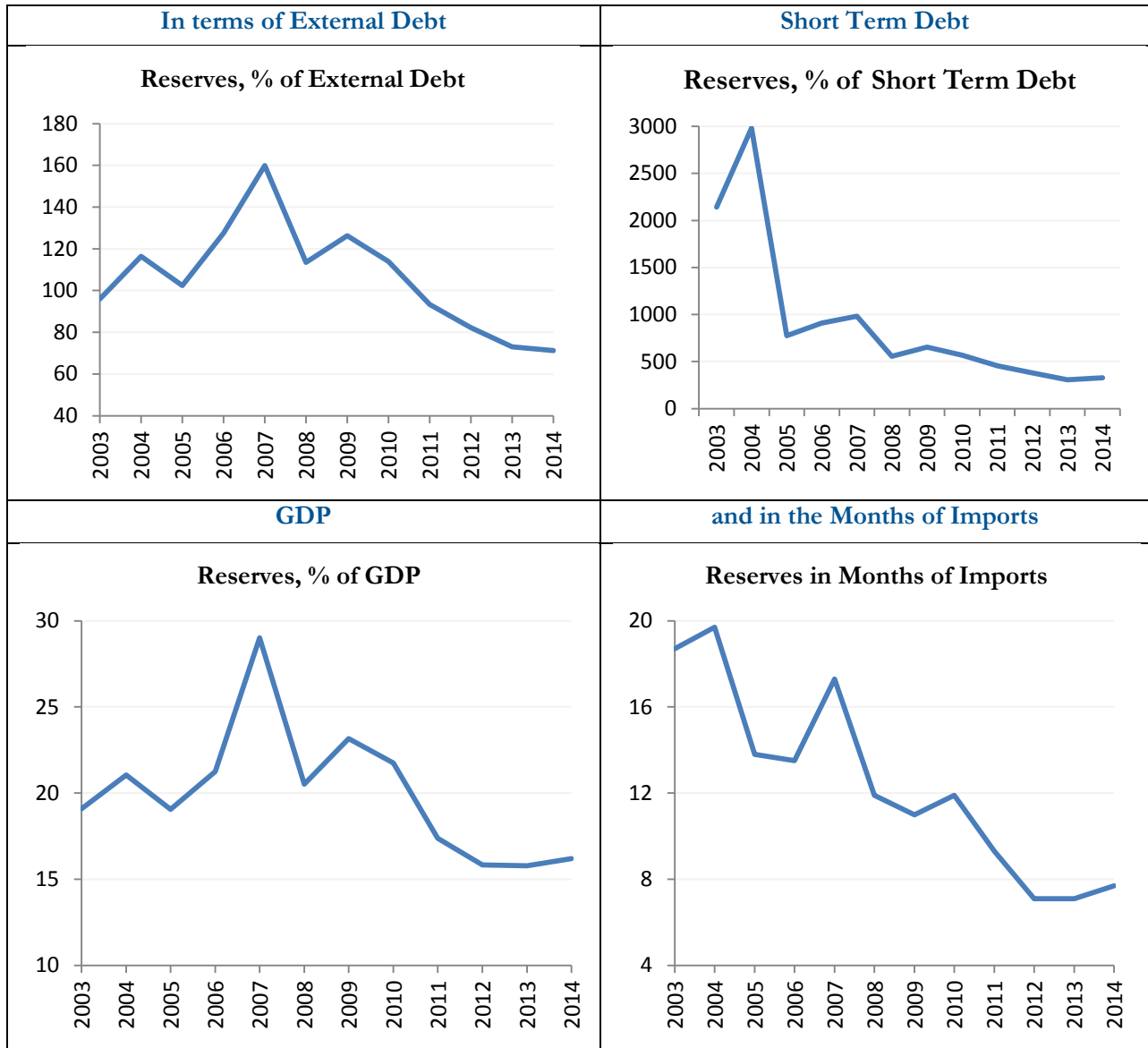
Figure: 7 The Stock of External Reserves in India has Remained Stable since 2009 ($ billion)
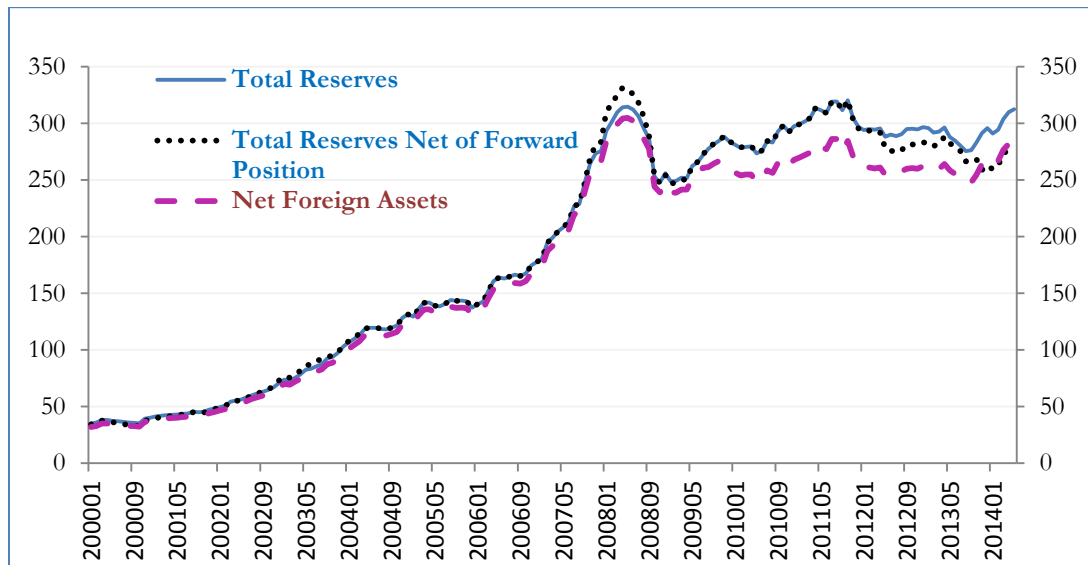
Note: Total reserves include net foreign assets, SDR, and gold. Source: Reserve Bank of India.

As a result, with the growth of the economy and of external liabilities, the effective reserve coverage declined in India (Figure 8 below), implying heightened vulnerability to current account or capital account shocks and narrower room to intervene in the foreign exchange market.

Figure 8: Effective Coverage provided by Foreign Reserves has Declined

In terms of External Debt	Short Term Debt

Reserves, % of External Debt

Reserves, % of Short Term Debt

GDP	and in the Months of Imports

Reserves, % of GDP

Reserves in Months of Imports

Source: Citi Bank Research. Total External Debt includes: long-term debt (multilateral, bilateral, IMF, trade credit, ECB, NRI&FC above 1 year maturity and Rupee debt) and short-term debt (NRI&FC deposits up to 1year maturity, bills and other instruments and other trade related debts).

One corollary of this passive reserve management is that the volatility of exchange rate has increased since 2008. Regardless of how volatility is calculated (as percent change in exchange rate, as absolute percent changes in exchange rate or as the standard deviation of daily percent changes), the picture is similar, as is evident from Figure 9, panels A and B. This increased volatility is not

confined just to the earlier period of the global financial crisis or to the period of the tapering talk but extends through the entire period since 2008. [19]

Figure 9: Volatility in Exchange Rates and changes in Reserves Since 2000
A: Nominal Exchange Rate has become more volatile since 2009 (larger spread is seen in % change in exchange rate)
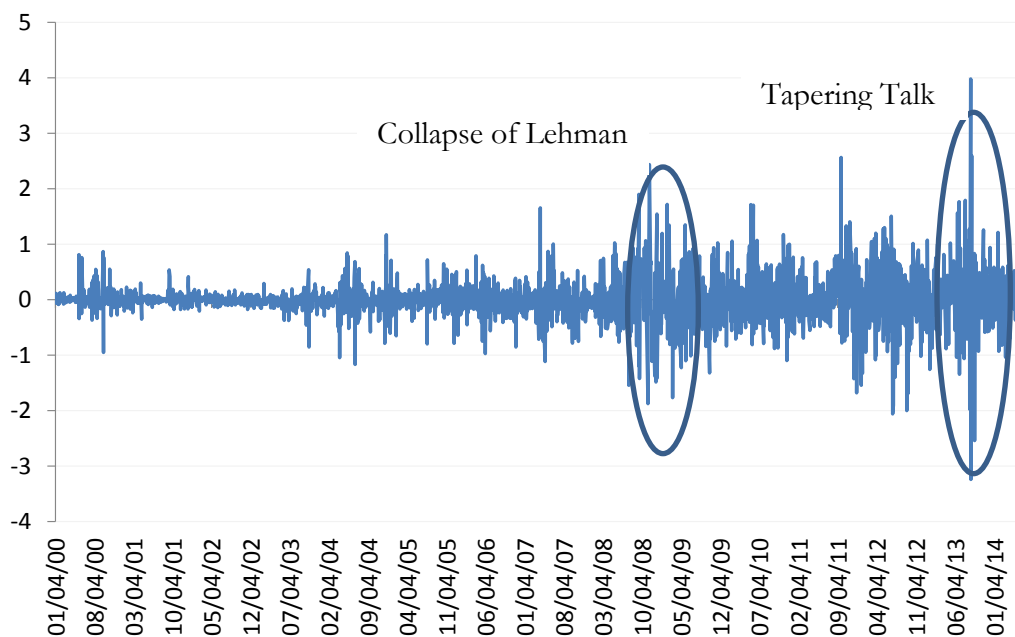

Note: calculated using data from Bloomberg.

The question we ask next is whether this volatility could be attributed to less proactive use of reserves?[20] We calculate monthly percentage changes in reserves since 2000, and observe that the changes in reserves have been smaller since 2008, see Panel C, Figure 9. This hints at more passive reserve management as a factor in increased volatility of the exchange rate.

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[19] One might argue that the increased volatility of exchange rate is a global phenomenon, and afflicted all emerging markets post 2008. We calculate similar measures of volatility for all fragile 5 countries, but besides India no other country experienced a similar increase in volatility.

[20] See Basu (2009) and Basu and Varoudakis (2013) on using reserves optimally to intervene in the foreign exchange market.

B: Volatility in Exchange Rates (monthly standard deviation) has Increased
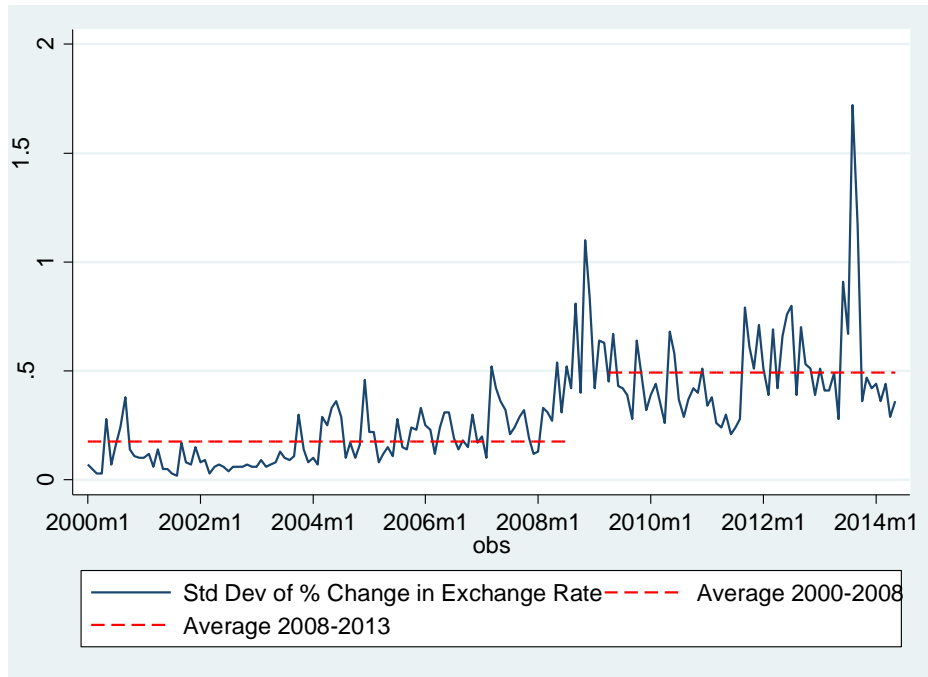
Note: Averages are calculated for January 2000-September 2008 and April 2009-Decemebr 2013. These averages are significantly different from each other at 1 percent level of significance.

C: While the Percent Changes in Reserves (monthly percent changes) have become smaller
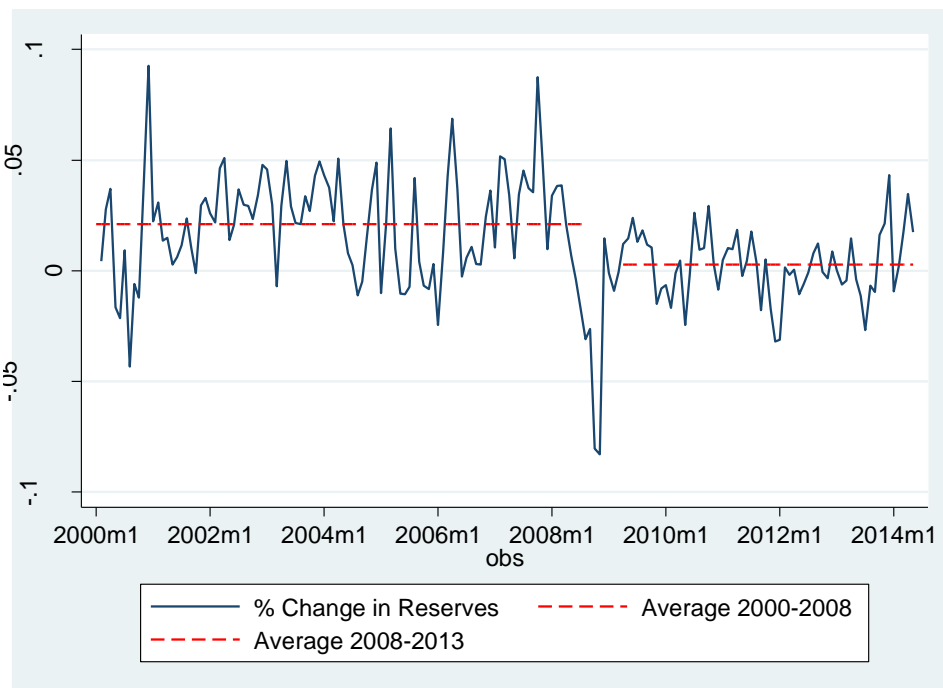
Note: Note: Averages are calculated for January 2000-September 2008 and April 2009-Decemebr 2013. These averages are significantly different from each other at 1 percent level of significance.

Why should one worry about the volatility in exchange rate? There is empirical evidence to support the idea that "excessive" exchange rate volatility can distort investment decisions and affect long-term growth, especially in countries with low levels of financial development (see Serven (2003) and Aghion et al. (2009), respectively). In the Indian case in a period when the climate was not conductive to investment, exchange rate volatility is unlikely to have helped.

But is intervention successful? Or as some have put it differently, does "leaning against the wind" succeed? Adler and Tovar (2011) show that the interventions using reserves slow the pace of appreciation of exchange rate, especially at lower levels of capital account openness. But the intervention using reserves might be less successful in warding off the pressure on the exchange rate to depreciate.

What about the cost of intervention? The cost of holding reserves occurs because reserves are typically invested in liquid treasury bills of the countries which issue hard currencies and generate returns lower than the domestic assets. Even as there have been numerous concerns about the high cost of intervention, the available estimates suggest these costs are much lower than previously believed. Flood et al (2002) point out that in order to calculate the cost of holding reserves one needs to take in to account not just the interest rate differential but also the valuation gains from holding reserves. They suggest that once the capital gains on foreign currency reserves arising from exchange rate changes are taken into account, the opportunity cost of holding reserves could be rather small.[21]

In a recent regional report of the World Bank the costs of central bank intervention in foreign exchange markets have been estimated systematically for several emerging markets. Based on these estimates the report concludes that the cost of intervention is small across countries and indeed negative for some of the countries. The report also points out that these estimates do not take into account the fact that larger reserves lower the cost of issuing sovereign debt or even private debt, thus the actual costs are likely to be smaller than the ones based solely on the interest rate differential and the valuation effects, see Levy Yeyati (2008). They also suggest that if the costs of holding reserves are of concern to the central banks they may want to consider holding a proportion of their reserves in higher yielding assets, as some central banks indeed have started doing. Finally, since the central banks hold reserves for many different reasons, the cost attributed to any one objective, such as to smooth the exchange rate movements would be only a small fraction of the total costs estimated.

Use of Reserves during the Tapering Talk Period by India

The use of reserves by India during the tapering talk period was comparable to that in the other fragile 5 countries. The decline in reserves totaled some $13 billion between the end of May and end

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[21] Or as Friedman suggested, if you purchase dollars when the exchange rate is overvalued and sell them when it is undervalued, valuation changes may offset and even outweigh any interest rate differential.

of September, i.e. about 5 percent of the initial stock. Intervention was relatively larger from June 17 to July 7, when reserves fell by $3 billion a week. Comparing the extent of intervention in the Fragile 5 countries, we see that India and Indonesia intervened the most, and that their intervention was concentrated in June and July.

**Figure 10: Comparing Changes in Reserves in Fragile 5 during the Tapering Talk**
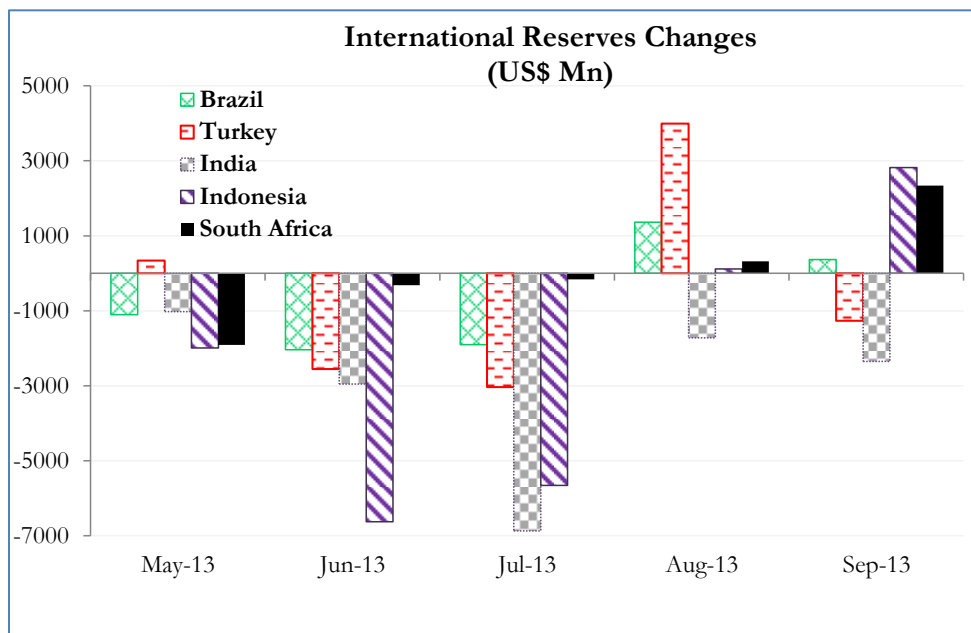
Source: Bloomberg.

Due to the lack of a counterfactual it is difficult to know whether these interventions were effective in moderating exchange rate depreciation, if anything since the pressure to intervene was larger when there was larger depreciation of the currency. This is likely to yield a positive correlation between decline in reserves and exchange rate depreciation. In Figure 11 we plot the weekly change in reserves and the percentage change in the nominal exchange rate which confirm the challenge in assessing the effectiveness of the use of reserves. As predicted we establish a positive correlation in Panel A (significant at 1 percent level), i.e. a large decline in reserves was associated with greater exchange rate depreciation. In Panel B we correlate percentage changes in the exchange rate and reserves, where the latter is lagged by a week. Here the correlation between the lagged values of decline in reserves and exchange rate depreciation is indistinguishable from zero.[22]

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[22] We plot similar data for Turkey and Brazil in Appendix B, two other countries for which we have the weekly data on reserves, and observe a similar relationship between the decline in reserves and exchange rate depreciation.

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Figure 10: Weekly decline in Reserves (billion $) and percent change in Nominal Exchange Rate in India during May 23-End September, 2013

A: Contemporaneous Correlation

Exchange Dep=0.28+0.59***Reserve Decline
(3.05)
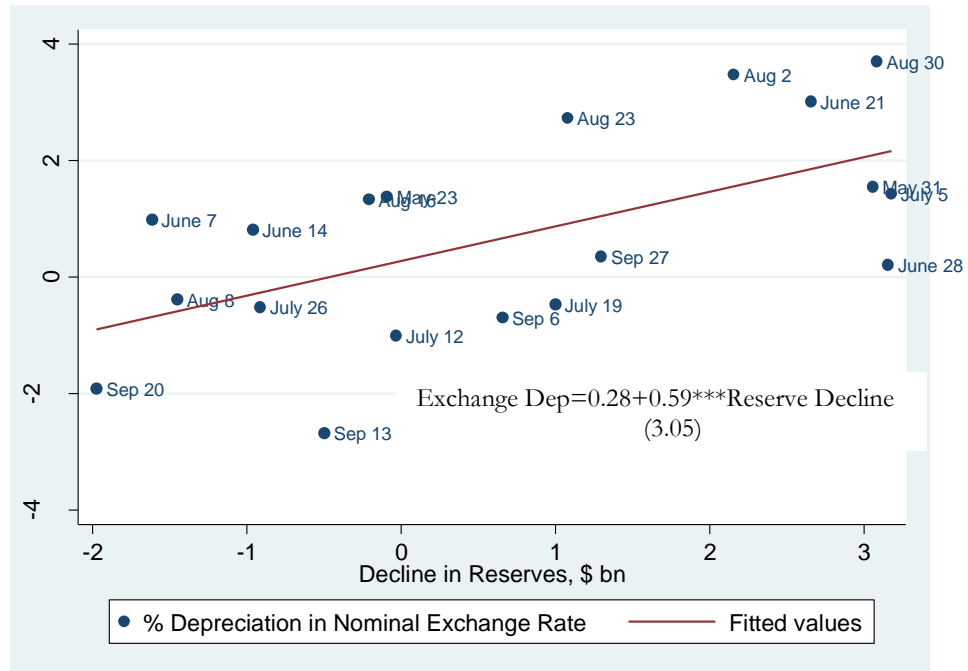
B: Reserve Declines lagged by a Week

Exchange Dep=0.83-0.26 Reserve Decline, lag
(1.06)
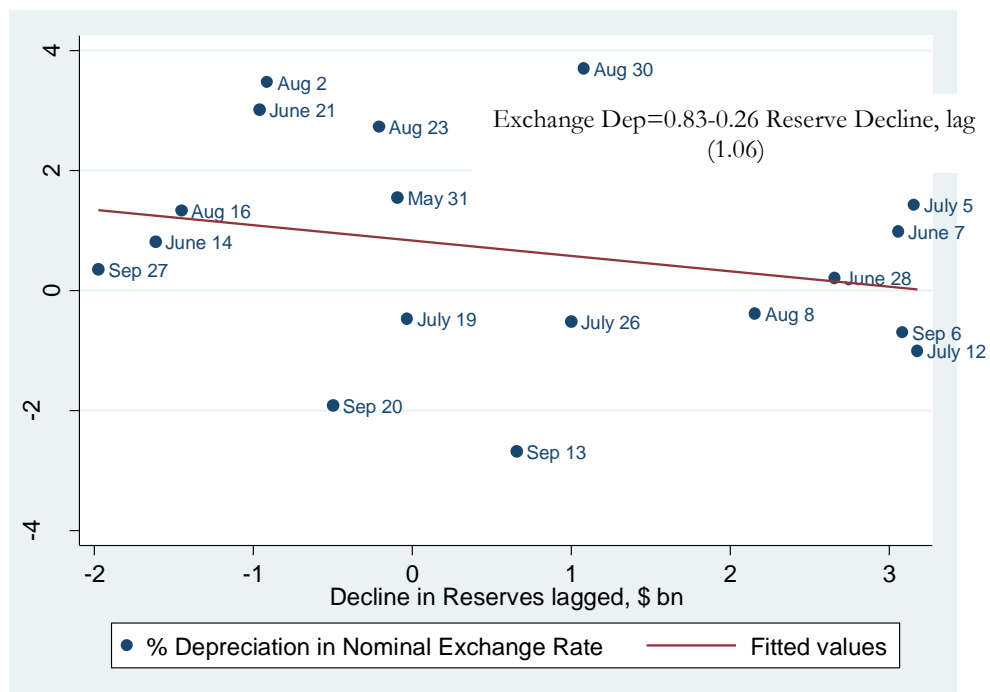
(ii)   Swap lines as a Substitute for Reserves? But Swap Line with Whom?

Since there are costs as well as benefits of holding reserves, and there are no consensus on what the optimal level of reserves should be, a recent discussion that has gained some currency (as it were) is whether bilateral swap lines with other central banks, regional swap lines such as under the Chiang Mai initiative or the proposed BRICS bank, or multilateral lines such as liquidity arrangements with the IMF could constitute attractive alternatives.

Along these lines Eichengreen (2014) argues that, given the reluctance of the Congress to authorize increased funding for the IMF, the Fed should contemplate extending swap lines to a larger number of emerging economies. Kapur and Mohan (2014) suggest that since monetary policies of the advanced economies have important spillovers for emerging markets, they ought to be offered swap facilities to limit this impact. Sheng (2014) too emphasizes the need for the emerging markets to rely on swap lines, but he points out that the swap lines with the US Fed are available only selectively, and the emerging markets in general are not welcome to join these arrangements. Hence he suggests that the emerging markets should consider a diverse set of arrangements, including signing the swap arrangements lines with China, who has emerged as a large regional as well as global player in offering swap lines; and pursuing regional arrangements such as the Chiang Mai Initiative or a BRICS bank.

Rajan (2014) proposes internationalizing oversight of such swaps. He suggests that since a multilateral institution such as the IMF possesses the expertise to operate such lines, is free of political obligations, unlike the sovereign governments does not need to explain to the domestic stakeholders the credit risks that such arrangements might entail, and has the capacity to bear such risks if they arise swap arrangements should be channeled through it. Rajan also suggests that the IMF could act as a facilitator, helping countries identify the counterparts who would be amenable to signing the bilateral or regional swap arrangements, and if needed, could mediate negotiation of these swap lines. He also proposes modifications to the IMF's existing liquidity line so as to reduce the stigma of accessing this facility and ensure wider use by its member countries.

The countries with which India might be able to sign swap lines would be its large trading partners or the sources of foreign investment, in other words the countries with a stake in the stability of the Indian currency and economy. Such swap lines would be considered credible if signed with countries that do not belong to the same asset class as India for global investors, and thus are not affected in a similar manner by the global financial conditions or the monetary policy in the advanced economies. Based on these considerations some countries that India could explore bilateral swap lines with include the US, UK, Japan, South Korea, and the countries from which India imports its oil. While it is difficult to anticipate what could be the total amount under such swap lines to provide the required additional buffer to India in addition to its existing $300 plus billion of reserves, but perhaps something of the order of $100 billion of unconditional line would be adequate.

Let's consider some of these bilateral or regional possibilities for India. Is a swap line with the US a viable option for India? In October, 2008 the Federal Reserve Board agreed for the first time to offer liquidity swap lines to four large emerging markets, Mexico, Brazil, Singapore and South Korea. These lines were for $30 billion for each of the four countries (similar in amount to the lines offered to Canada, Sweden, and Australia). The transcripts of FOMC meetings on October 23-24, 2008 are quite illuminating on the considerations on which these swap lines were offered to these emerging markets. The lines were offered not simply because these countries faced a liquidity risk but because they were considered of systemic importance given their financial linkages with the US economy.[23] The Fed officials worried that if these countries faced liquidity problem, these could spill over to the US financial institutions, given the large presence of the US financial institutions in these countries.

The FOMC committee while endorsing the macroeconomic policies of these four countries in general was also emphatic that since they all held substantial reserves, a large part of it in the US treasury, swap lines to them carried little credit risk. Even then in essence the swap lines arrangements with the emerging markets were less generous than the ones offered to the developed countries, and more safeguards were put in place than for similar arrangements with advanced economies. The emerging markets could draw funds from the proposed lines only with prior authorization of the Fed, and the drawings each time were to be limited to $5 billion. The central banks in these countries were to publicly announce each time they drew on their lines and to provide details of the allocation of the dollar liquidity so obtained. Even as the Fed converted the dollar swap lines put in place during the global financial crisis with the Bank of Canada, Bank of England, European Central Bank, Bank of Japan, and Swiss National Bank into more permanent arrangements in October 2013, the swap lines to emerging markets were treated as temporary facilities for six months, and were to last only until April 30, 2009.[24]

There was extensive discussion among the committee members on whether other emerging markets would be considered for similar swap arrangements if they approached the Fed. There was also awareness and some discussion on whether by selecting a small group of countries for these swap arrangements it was exposing the countries which were not offered similar arrangements to possible negative market reaction. But the committee concurred that any other emerging country with a similar request was not to be offered the swap arrangement and was instead to be directed to

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[23] Some of these contentions are confirmed by Aizenman et al (2010) in their empirical work conducted prior to when these minutes were published. They find out that the swap lines were offered selectively by the Fed to the countries with which the US had substantial trade and financial linkages. The few emerging markets it offered the lines to were the ones to which the US banks had exposure; hence the US inherently had a stake in their financial stability. Apparently India does not enjoy this advantage with the US.

[24] The amounts of swap lines with developed economies were larger, adding upto $333 billion, compared to $120 billion offered to the emerging market economies. Sheng compares the arrangements signed between the Fed and these emerging markets with the swap offers that the PBOC signed with about a score of central banks of developing countries most of whom export commodities to China. These added up to over US$426 billion, implying that the China offered a more viable alternative to developing countries than the Fed.

utilize a new IMF facility, which was to be announced in conjunction with the Fed's swap line the following day. Prasad (2014) and Steil (2014) note that the Fed rebuffed requests from Chile, the Dominican Republic, Indonesia and Peru in 2008 for swap lines, and subsequently in 2012 it spurned a request from India. This leads us to conclude that most emerging markets, including India, are unlikely to be able to avail swap agreements from the US to handle the spillovers from the monetary policy in advanced economies and thus need to seek alternatives.

Could India enlarge its existing swap line with Japan? For India, the only existing swap line is with Japan. This was originally signed for $15 billion in December, 2011 but was increased to $50 billion on September 6, 2013.[25] Around the time Japan extended its swap line with India it also signed similar swap lines with Indonesia and the Philippines, and in addition was committed to swap lines to other countries in ASEAN as a part of the Chiang Mai Initiative. Given the extent of the Japanese existing bilateral and regional commitments, there may be limits to how much further the existing India-Japan swap line can be expanded.

Do regional lines within the BRICS or liquidity lines with the IMF provide viable options? In our opinion none of these are likely to provide credible alternative swap arrangements to India in near term. A BRICS bank is unlikely to be operational anytime soon, and even when it does the initial amount being considered to set up the bank and to be made available for borrowing to its member countries is unlikely to be sufficient to tide over the liquidity needs of any of its large member countries. In addition, several of its founder member countries belong to the same asset class from the perspective of the international investors, possibly requiring them to need the liquidity around the same time, rendering its resources inadequate. Finally, the rather poor take-off of the Chiang Mai initiative does not provide much confidence in the proposed BRICS bank initiative either.[26]

The last option we consider for India is a contingency line with the IMF. As is well known, these contingency lines of credit have been used very sparingly by the IMF member countries, so much so that besides Mexico, Poland and Colombia no other member country has signed up for these lines. Observers believe this is presumably because approaching the IMF is considered to be carrying a stigma and potentially a negative signal to the market participants. A similar sentiment was recorded in the minutes of the Fed's meeting held on October 28-29, 2008, where it was noted, "…..these top-tier EMEs that we are recommending for swap lines are very reluctant to return to

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[25] Our understanding is that under this agreement after the first $15 bn that the Bank of Japan would provide to India without strings, the rest $35 bn would be conditional of an IMF program.

[26] As Sheng explains the Chiang Mai Initiative came into offing in May 2000 as a network of bilateral swap arrangements among the ASEAN countries plus China, Japan and South Korea. In May 2012, its amount was doubled to US$240 billion, and it replaced the existing bilateral swap agreements with a single agreement, the Chiang Mai Initiative-Multilateralization. The swap lines have never been activated, and there is no evidence whether they provide insulation to the signatories of the swap lines from the spillovers of monetary policies in advanced economies or from the volatility emanating from international capital flows.

the IMF. Given the strength of their policies, they no longer view themselves as clients.."; and subsequently "I do think going to the IMF will attach a fair amount of stigma [to the country]. So I am worried that the spillover benefits to other countries will be negative, not positive, because of that stigma."

Thus it is not obvious whether India would be comfortable accessing the credit lines from the IMF, just like its comparators which the Fed officials are refereeing to above. It is not then surprising that the emerging markets did not find many credible swap arrangements during the tapering talk. The only swap arrangements that most emerging markets could access during the tapering talk were with larger, more developed Asian economies such as China, Japan and South Korea, rather than with the US, EU or other advanced economies, or with the IMF, see Figure 13.[27]

Figure 13: Recent Currency Swap Lines

Currency Swap Lines
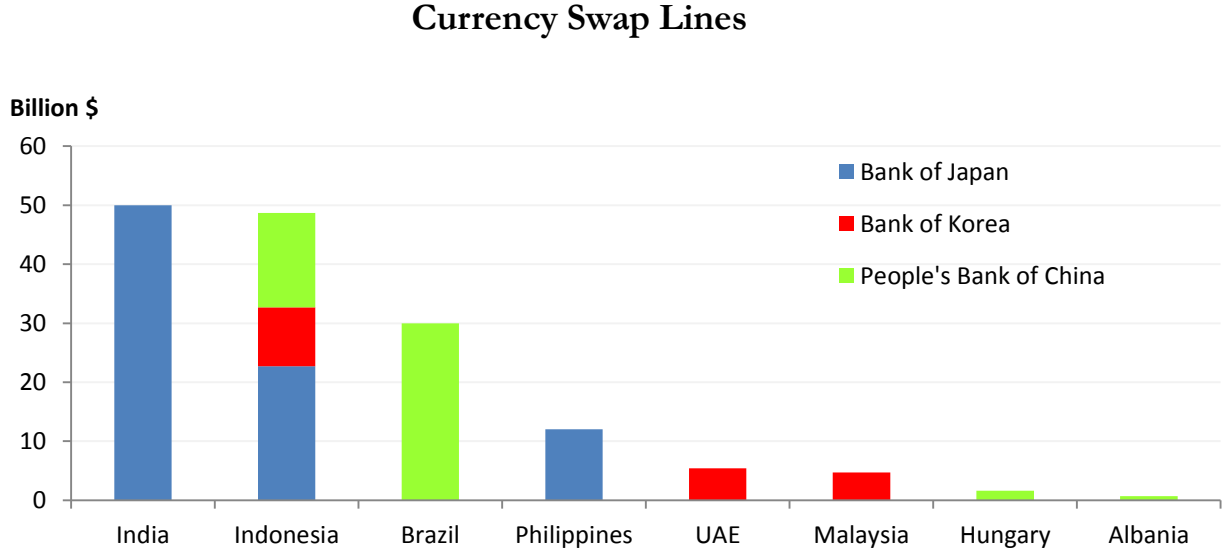
Note: Sep.6, 2013: India and Japan signed $50bn currency swap agreement. Source: RBI.
Oct.7, 2013: Indonesia and China signed $16bn currency swap agreement. Source: Bloomberg.
Oct.12, 2013: Indonesia and South Korea signed $10bn currency swap agreement .Source: WSJ.
Dec.14, 2013: Indonesia and Japan signed $22.7bn currency swap agreement .Source: Bank of Indonesia
Mar.26, 2013: Brazil and China signed $30bn currency swap agreement .Source: BBC
Dec.16, 2013: Philippines and Japan signed $12bn currency swap agreement .Sources: WSJ.
Oct.13, 2013: UAE and South Korea signed $5.4bn currency swap agreement.Sources:globaltimes.com
Oct.20, 2013: Malaysia and South Korea signed $4.7 currency swap agreement.Sources:Koreaherald.com
Sep.9, 2013: Hungary and China sign $1.62bn currency swap line.Sources:centralbanking.com
Sep.13, 2013: Albania and China sign $0.33bn currency swap line. Sources: Reuters
Apr.2, 2014: Albania and China sign $0.34bn currency swap line. Sources: Reuters

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[27] Bank of China signed these swap lines with many other countries, while we have only presented a small selective list of these.

Some bilateral currency swap lines excluded from figures such as China-UK ($32.6bn), China-ECB ($57.2bn), and South Korea-Australia ($7.4bn).

To conclude, currently there do not seem to be many leads for India to extend the swap lines for larger amounts or to sign new lines with advanced economies. While India could continue exploring these further with advanced economies as well as with oil exporters but it seems, just like the rest of the emerging world, it would continue to be on its own in handling the spillovers of the advanced economies monetary policy. Consequently, the need for reserve accumulation is not obviated for India for the time being. We summarize this discussion by citing IMF (2013) for a similar view: "Reserves remain a critical liquidity buffer for most countries. They are generally associated with lower crisis risks *(crisis prevention)* as well as space for authorities to respond to shocks *(crisis mitigation)*. While other instruments, such as official credit lines and bilateral swap lines, are also external buffers, for most countries they principally act as a complement to their official reserves."[28]

(iii) Managing Capital Flows

The contemporary literature cautions that the capital flows into emerging market economies are volatile. In an IMF working paper, Bluedorn et al (2013)caution that private capital flows are typically volatile for all countries, across all points in time, and for all types of capital flows, i.e. the bank flows, portfolio debt, or portfolio equity flows. The authors recommend using macroeconomic and macroprudential measures to buttress economic and financial resilience to such volatility.

Continuing with a similar concern, in its *Global Financial Stability Report,* published in April 2014, the IMF acknowledges that "the reduction in U.S. monetary accommodation could have important spillovers for advanced and emerging market economies alike as portfolios adjust and risks are repriced." It suggests that the increased participation of foreign investors in domestic bond markets exposes emerging economies to volatility and pressure on capital flows. Even as financial markets have deepened and become more globalized, new asset classes have developed, and the role of bond funds—especially local currency bond funds, open-end funds with easy redemption options, and funds investing only opportunistically in emerging markets—has increased. These global portfolio investors and bond flows are quite sensitive to global financial conditions. One recommendation of the IMF, of particular relevance to India, is to monitor and limit the size of foreign investors in local bond markets, even as the attempts are made to increase the local investors' participation.

Keeping with the cross country observations some flows to India are considered more stable than the others. Thus while the FDI flows and external commercial borrowing have been relatively

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[28] The IMF however cautions, rightly so, that the reserves alone cannot substitute for sound fundamentals and a good policy framework.

stable, as has been the experience in other emerging markets, portfolio flows, debt flows especially, have been more unpredictable, see Table 12.[29]

Table 12: Different Kinds of Net Inflows in Capital Account (in billion $)

	Monthly Avg. 2012	Monthly Avg. Jan-April 2013	May, 2013	Jun-2013	Jul-2013	Aug-2013	Sep-2013	Oct-2013	Nov-2013	Dec-2013
FDI	2.02	2.46	1.99	1.8	2.17	1.92	4.64	1.83	2.24	1.71
External commercial borrowings (Corporate)	2.52	3.01	2.49	1.95	3.71	2.31	3.35	1.93	2.18	4.56
Portfolio equity	2.03	2.78	3.77	-1.76	-0.99	-0.95	1.99	2.93	1.13	2.53
Portfolio debt	0.57	0.78	0.52	-5.37	-2.11	-1.38	-1.26	-2.10	-0.78	0.86
NRI deposits	1.39	1.05	1.64	2.51	1.17	1.56	5.42	5.28	15.14	1.02

Source: RBI, Haver/Bloomberg)

India's experience with attracting deposits from non-resident Indians (NRI deposits) is revealing. Gordon and Gupta (2004) analyzed trends in nonresident Indian (NRI) deposits and their determinants. They found that NRI deposits respond positively to the differential between the interest rates on NRI deposits and what could be obtained in advanced economies.[30] Interestingly, the impact of interest rate differential outweighs that of other factors, making it feasible to attract sizable amounts through bonds targeted at the nonresident population. A precedent was in 1998, when to augment its reserves (following the imposition of international sanctions in the aftermath of nuclear tests), a Resurgent India Bond was issued. Targeted at the NRI community, it paid an

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[29] One potential source of vulnerability with the ECB is the exchange rate risk that the corporates assume, exposing them to negative balance sheet effects if the exchange rate depreciates. Thus for such borrowings hedging of foreign exchange risk is important, especially for the firms which do not derive their earnings from exports.

[30] NRI deposit flows to India gained momentum in the 1980s after the RBI introduced NRI deposit schemes to tap flows from the Indian diaspora abroad. It made deposits fully repatriable; offered attractive interest rates; and assumed the exchange rate risk on foreign currency-denominated accounts. However, these schemes proved to be vulnerable during the 1991 balance of payments crisis, when the outflows of deposits compounded the pressure on the external accounts. Subsequently the composition of deposits was shifted toward rupee denominated accounts; the repatriable component was reduced; and the exchange risk on foreign currency deposits was shifted to the banks. In the subsequent one decade NRI deposit inflows continued to be substantial, although their relative importance in the external accounts had declined with remittances and services exports gaining pace. The authorities responded to a robust external position by linking the interest rates offered on foreign currency deposits more closely to the Libor rate, essentially lowering the interest rates on these deposits; by giving the banks flexibility to set interest rates on rupee deposits; and by making all new deposits fully repatriable. These measures resulted in the interest rates on NRI deposits declining sharply, and moderating these inflows.

interest rate of 7¾ percent on U.S. dollar deposits and raised $ 4.2 billion within days. A second scheme, the Indian Millennium Deposit, was offered in 2000, and was able to raise $5.5 billion at an interest rate of 8½ percent.

A similar phenomenon was in play during the tapering talk episode. Just as in the past, by providing incentives to the banks (by offering a swap facility to pass their currency risk to the RBI), the RBI managed to attract a large amount of deposits though banks in to the country. Fresh deposits were of the order of $30 billion between September and December 2013. Floating bonds or deposits to Indian diaspora as a crisis mitigation strategy could be deployed in future as well.

While India is considered to have managed its capital account prudently thus far, the fact remains that it is among the largest emerging markets in the size of its financial markets. A large size exposes it to capital account shocks, which needs to be counter balanced by a larger reserve stock. Since reserves accumulated to buffer shocks to the capital account have costs as well as limits suggests that Indian policy makers should intervene also on other margins to limit the volatility of the capital account. Active capital flow management is the obvious option.

VI. Conclusion

Starting in May 2013, expectations that the Federal Reserve would begin reducing the pace of its securities purchases had a sharp negative impact on conditions in emerging markets. India was among those hardest hit. Between May 22, 2013 and the end of August 2013, the rupee depreciated by 18 per cent, while stock prices, bond prices and foreign reserves all declined. That reaction was sufficiently pronounced for the press to warn that India might be heading toward a financial crisis, the kind that requires an emerging market to resort to the IMF.

Why India? As we show in this paper, macroeconomic conditions had deteriorated noticeably in three prior years, rendering the economy vulnerable to capital outflows and exchange rate depreciation and narrowing policy space. The deterioration in fundamentals was intertwined with the sizable amounts of capital that India imported during the period of zero interest rates and quantitative easing in the U.S. and other advanced economies. These capital flows, in an environment of declining investment, financed fiscal deficits and gold imports, resulting in a widening current account deficit and overvalued currency. Rebalancing by global investors when the Fed began to talk of tapering highlighted these vulnerabilities.

An additional important factor was the size and liquidity of India's financial markets. Countries with larger markets felt more pressure on the exchange rate, foreign reserves, and equity prices. Investors are better able to rebalance their portfolios when the target country has a relatively large and liquid financial market. On most metrics, India is among the top quartile of emerging economies in terms of the size of financial markets. Hence it was especially exposed to rebalancing by global investors.

The authorities adopted several measures in response, intervening in the foreign exchange market, hiking interest rates, raising the import duty on gold, introducing measures to encourage capital flows from the Indian diaspora, easing demand pressure in foreign exchange markets by opening a separate swap window for oil importing companies, and opening a swap line with the Bank of Japan. The Reserve Bank also sought to restrict capital outflows from residents and Indian companies.

Using an event study methodology we empirically estimated the impact of these various measures on the exchange rate and financial markets. Our results show that these measures were of some, albeit limited help in stabilizing financial markets. The implication is that there are no comfortable choices once you are in the midst of a crisis. Better is to have in place a medium-term policy framework that limits vulnerabilities, avoiding the crisis in the first place while maximizing policy space. Elements of this framework include rebuilding foreign exchange reserves, using those reserves to prevent excessive exchange rate volatility, exploring additional bilateral swap lines, and simply preparing the banks and the corporates to handle greater exchange rate volatility.

To be sure, there are costs of holding reserves and limits to signing bilateral swap lines. In addition, even countries with a large stock of reserves may feel comfortable using only a small portion of that stock to intervene in the market – something that may tip the cost-benefit calculus away from an approach based on reserve stockpiling.

This observation points, in turn, to the importance of other elements of the macroeconomic framework. A sound fiscal balance, sustainable current account deficit, and environment conducive for investment need to be integral parts of this framework. Emerging markets should manage capital inflows so as to encourage relatively stable longer-term flows while discouraging short-term flows. They should use capital-flow-management tools to avoid excessive appreciation of real exchange rate and loss of competitiveness. This may be done through active use of macro-prudential measures such as countercyclical adjustments in bank capital adequacy requirements. Evidence shows that capital flows to emerging markets are procyclical, hence capital-flow-management measures should be countercyclical, tightening in good times and loosening in bad times. Other things equal, this should make them relatively easy to implement. India's experience suggests abstaining from the introduction of new constraints on capital outflows in the midst of a crisis, something that can aggravate the loss of confidence.

Finally, those who implement the medium-term framework and adopt emergency crisis-management measures, alike, need to adopt a clear communication strategy so as to interact smoothly and transparently with market participants.

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Appendix A: Policy Announcements, Exchange Rate Depreciation and Reserve Changes during the Tapering Talk in India

| The week starting on	Weekly % change in exchange rate	Weekly change in reserves, $ mn	Date	Policy announcement
20-May	1.38	94		
27-May	1.55	-3057		
3-Jun	0.99	1617	June 5	Government raised the duty on import of gold to 8% from 6%.
10-Jun	0.81	963		
17-Jun	3.02	-2656		
27-Jun	0.21	-3155		
1-Jul	1.43	-3175		
8-Jul	-1.01	33		
15-Jul	-0.47	-999	July 15	RBI Raised its marginal standing facility rate by 200 basis points to 10.25 % to "restore stability to the foreign exchange market"; used OMO to suck liquidity; required banks to maintain a minimum daily CRR balance of 99 % of average fortnightly requirement.
22-Jul	-0.52	914	July 22	1/5 th of Gold imports to be made available to exporters
			July 23	Revised Cap LAF 0.5 % of individual bank's NDTL; daily average CRR increased from 70 to 99% of requirement
29-Jul	3.48	-2155		
5-Aug	-0.38	1453		stricter maintenance of CRR; curtailed access to LAF by banks; OMO of Rs. 22,000 each week
12-Aug	1.33	212	August 13	Indian government hiked the import duty on gold to 10 %
			August 14	Limit on Overseas Direct Investment (ODI) under automatic route reduced from 400 % of the net worth of the Indian party to 100 %. Reduced the limit on remittances made by resident individuals under the liberalized Remittances Scheme (LRS) from $ 200,000 to $ 75,000; abolished the use of LRS for acquisition of immovable property outside India.
19-Aug	2.73	-1078		
26-Aug	3.71	-3081	August 28	RBI decided to open a forex swap window to meet the daily dollar requirements of three public sector oil marketing companies, to remain until further notice

4-Sep	-0.7	-656	September 4	Limit on overseas direct investments, through External Commercial Borrowings, reinstated to 400 % of net worth.
				Swap window to the banks to swap the fresh FCNR (B) dollar funds, mobilized for a minimum tenor of three years; at a fixed rate of 3.5 % per annum. The overseas borrowing limit of 50 % of the unimpaired Tier I capital raised to 100 %; the borrowings mobilized under this provision could be swapped with RBI at the option of the bank at a concessional rate of 100 basis points below the ongoing swap rate prevailing in the market; the schemes to remain open up till Nov. 30, 2013.
				New Governor issues a statement outlining priorities and reiterating trust in the health of the economy; laid out the blueprint of further financial sector reforms.
9-Sep	-2.68	500		
16-Sep	-1.92	1975	September 18	increased the import duty on gold jewelry to 15 %
23-Sep	0.35	-1296	September 20	RBI increased the policy rate by 25 bps to 7.5 %
			October 7	RBI lowered the MSF rate by 50 bps to 9.0 per cent and announced additional liquidity measures in the form of term repos of 7-day and 14-day tenor for the amount equivalent to 0.25 per cent of banking system NDTL through variable rate auctions every Friday beginning October 11, 2013.
			October 29	RBI lifted its policy repo rate by 25 bps to 7.75 %
			November 11	RBI receives US$ 17.5 billion under Forex Swap Window
			November 20	RBI receives US$ 22.7 billion under Forex Swap Window

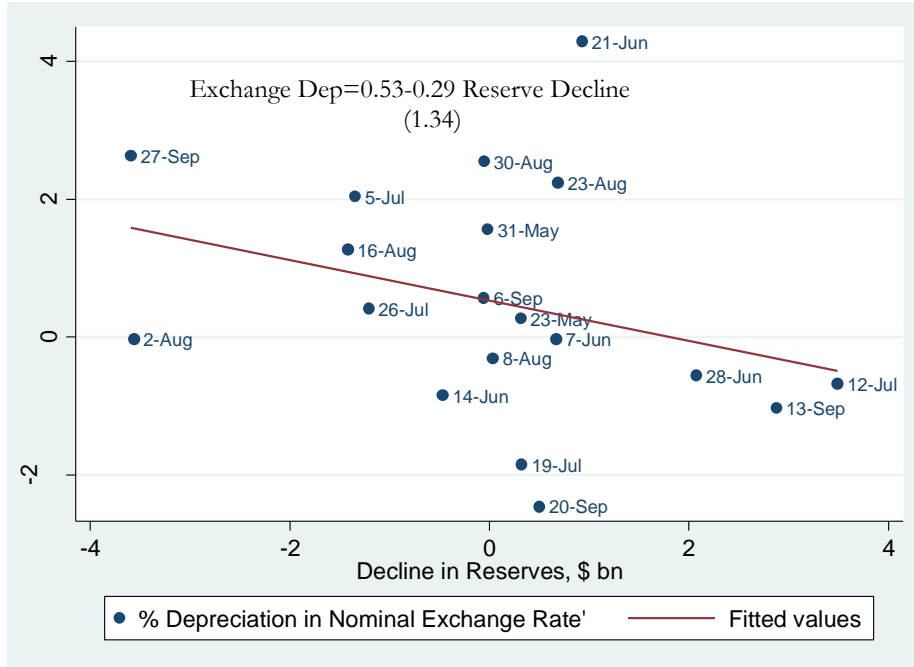# Appendix B: Reserve Changes and Exchange Rate Depreciation during Tapering Talk in Brazil and Turkey

Brazil: Contemporaneous Correlation between Reserves Decline and Exchange Rate Depreciation in Weekly Data is not significant
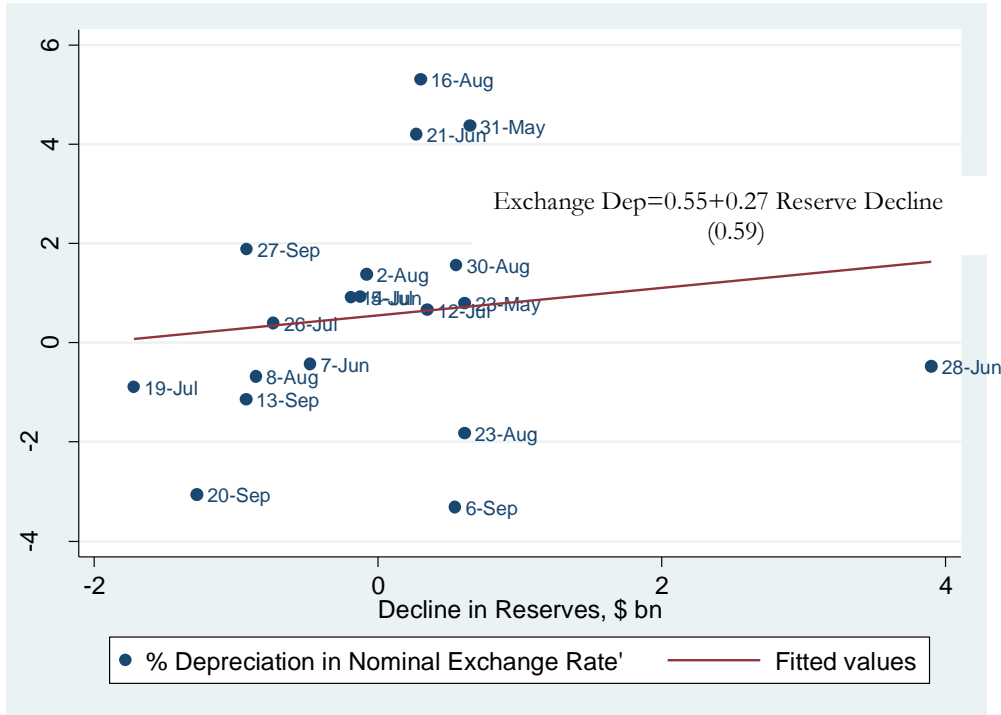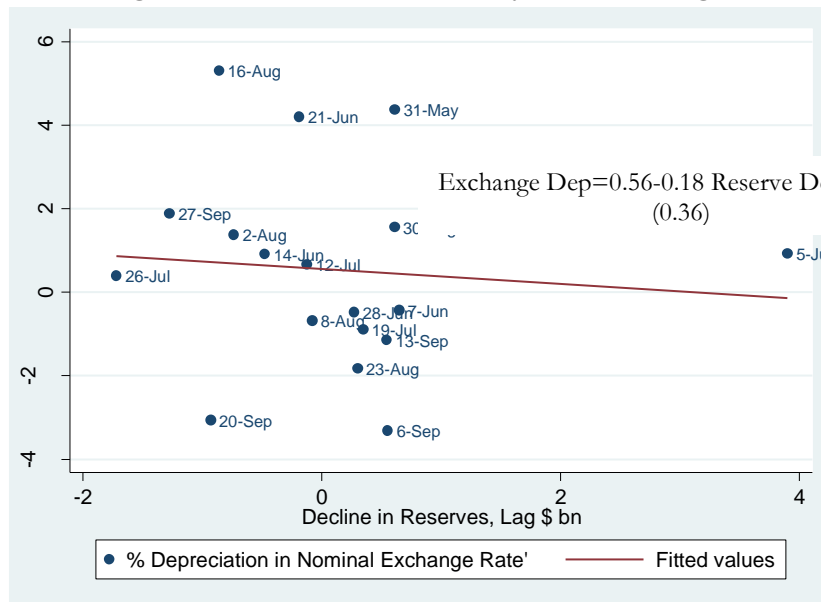
Brazil: Contemporaneous Correlation between lagged Reserves Decline and Exchange Rate Depreciation in Weekly Data is not significant

Turkey: Contemporaneous Correlation between Reserves Decline and Exchange Rate Depreciation in Weekly Data is not significant

Exchange Dep=0.53-0.29 Reserve Decline
(1.34)

x-axis: Decline in Reserves, $ bn

Legend: % Depreciation in Nominal Exchange Rate'   Fitted values

Turkey: Contemporaneous Correlation between Lagged Reserves Decline and Exchange Rate Depreciation in Weekly Data is not significant

Exchange Dep=0.59-0.26 Reserve Decline
(1.01)

x-axis: Decline in Reserves, Lag, $ bn

Legend: % Depreciation in Nominal Exchange Rate'   Fitted values