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Advanced-Country Policies and Emerging-Market Currencies

The Impact of U.S. Tapering on India's Rupee

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Abstract

The global financial crisis and its aftermath have triggered extraordinary policy responses in advanced countries. The impacts of these policy responses—from asset price bubbles to currency depreciations—have often been felt in the developing world. As tapering talk evolves into actual withdrawal of quantitative easing in the United States, and as the Euro Zone launches its own quantitative easing program, there are good reasons to be concerned about the financial stability of emerging economies. India's experience with U.S. tapering offers insights into what to expect. This paper estimates the contribution of external and domestic factors to short-term fluctuations in the value of the Indian rupee between 2004 and 2014, using a rich dynamic model that controls for a large number of exchange rate determinants. The paper finds that a global surprise factor, more than domestic vulnerabilities, was the main driver of the large rupee depreciation in summer 2013. With the surprise factor gone, further normalization of U.S. monetary policy is unlikely to have significant effects on the rupee exchange rate.

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Advanced-Country Policies and Emerging-Market Currencies: The Impact of U.S. Tapering on India's Rupee

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1. Introduction

The global financial crisis and its aftermath have triggered extraordinary policy responses in advanced countries, with the impacts often being felt in the developing world. Quantitative easing in the United States is often identified as one of the drivers of asset price bubbles in several emerging economies. Conversely, a number of emerging market currencies came under stress following the U.S. Federal Reserve Chairman's Congressional testimony on May 22, 2013, which raised speculation of an early "tapering" of the asset purchasing program. The impact of this "tapering talk" was felt most dramatically in India, where the rupee lost 25 percent of its value in barely three months, from end-May to end-August 2013.

As tapering talk evolves into actual withdrawal of quantitative easing policies in the United States, and as the Euro Zone launches its own quantitative easing program, there are good reasons to be concerned about the financial stability of emerging economies. One commonly held view is that actual tapering in the United States will lead to further depreciation of emerging market currencies (IMF, 2014). It has also been argued that countries that have more open capital accounts are more at risk of suffering large currency depreciations. Thus, Eichengreen and Gupta (2014) find that large foreign investor positions, sizeable current account deficits, and real appreciation during the period preceding the "tapering talk" are the strongest factors explaining the extent of currency depreciation across developing countries.

India's experience with U.S. tapering may be useful to determine what to expect going forward, and to identify the risks faced by emerging markets as advanced countries either adopt or wind down extraordinary policy measures. In 2013, with its slowing economic growth, high inflation, and large fiscal and current account deficits, India was often singled out as an example of macroeconomic vulnerabilities leading to large movements in the currency. In August 2013, *The Economist* proposed that "India, Asia's third-biggest economy, is more vulnerable than most" while *The Financial Times* judged that "India remains the biggest concern for most investors with the pessimism there driven by questions about the government's economic management" (*The Economist*, 2013; Kazmin et al., 2013).

Just a few months later, however, assessments turned much more sanguine. India's exports rebounded, imports contracted, the current account deficit shrank, and capital inflows resumed. In December, *The Financial Times* commented that "[f]ears over the impact of the taper have been allayed in particular through moves by Reserve Bank of India head Raghuram Rajan" and that, although "India and other emerging markets have plenty of problems … the taper is unlikely to be chief among them" (Crabtree, 2013; Mackintosh, 2013). But is the recent optimism more justified than the initial pessimism? And what was the relative contribution of global forces and India's own macroeconomic situation to the rapid depreciation and subsequent stabilization of the rupee?

We attempt to answer these questions by building and estimating a model of the nominal INR/USD exchange rate between 2004 and 2014. The model includes a large set of control variables and is designed to capture both long-run trends and short-term deviations from them. Specifically, we estimate an equilibrium relationship between the nominal exchange rate, prices at home and abroad, and relative productivities. We then link short-term fluctuations around this relationship to changes in the variables most often mentioned in the debate about the consequences of tapering on emerging markets. Those variables include the trade balance, portfolio inflows, assets prices at home and abroad and central bank assets. Importantly, they also include an indicator of the tightness of monetary policy in the United States

– the yield of 10-year Treasury bonds – as well as a measure of U.S. policy announcements – the "tapering talk".

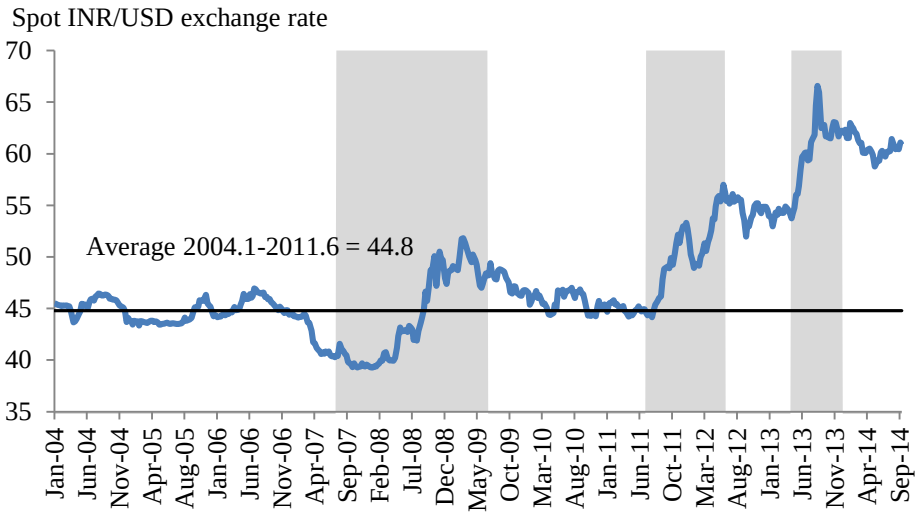
One of the main results is the differential impact of actual monetary tightness and tapering talk. We find that changes in T-bond yields do not help explain fluctuations in the INR/USD exchange rate when the entire decade is considered. But they do have a highly significant explanatory power during the tapering talk period. This suggests that an external surprise factor, rather than domestic vulnerabilities *per se*, was at the heart of what some have referred to as the "rupee crisis." Moreover, our estimates show that this surprise factor had largely disappeared by the time the Federal Reserve began to wind down the quantitative easing program, with the implication that further reductions in asset purchases are unlikely to have a significant impact on the rupee.

The remainder of the paper is organized as follows. Section 2 discusses the evolution of the INR/USD exchange rate in the recent past, particularly before, during, and immediately following the "tapering talk" period. Section 3 develops the error correction model, which identifies the major factors affecting the nominal exchange rate behavior, while section 4 presents the empirical results and impulse responses. Section 5 offers concluding remarks.

2. Exchange rate dynamics

Over the past decade, the Indian rupee has come under significant pressure just three times: during the global financial crisis in 2008-09, with the Eurozone crisis in 2011-12, and after the Fed tapering talk in May 2013 (Figure 1). Outside these three episodes of global turmoil, the nominal exchange rate has remained rather stable. It even recovered to its long-term equilibrium value following the global financial crisis depreciation episode – although it was not quite able to do so in the aftermath of the last two episodes.

Figure 1: Three depreciation episodes over one decade

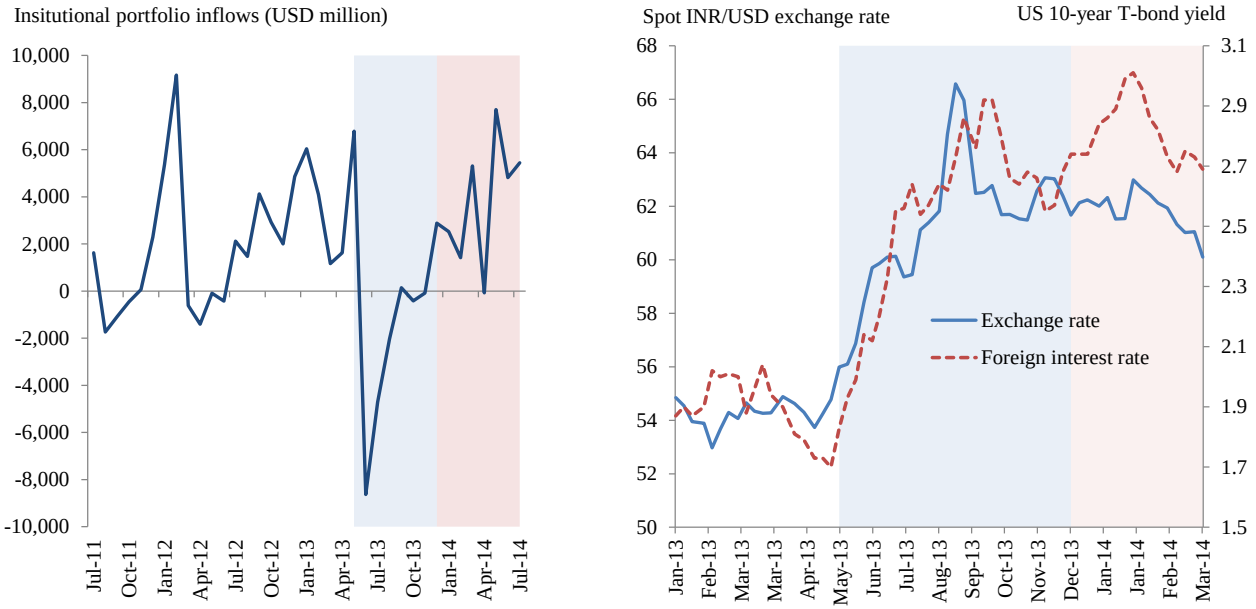


Source: Authors' calculations using CEIC data.

In the last depreciation episode, the Indian rupee rose sharply from 53 INR/USD to a record 68 INR/USD in the summer of 2013, before recovering to around 60 INR/USD in calendar 2014. The depreciation was preceded by a period of strong short-term capital inflows. Since the beginning of the second quantitative easing program in 2011, India received around US$52 billion in portfolio investment, of which over US$15 billion exited the country during the tapering talk period (Figure 2, left panel). The repatriation of funds from India and other emerging markets into safer high-income debt (mostly U.S.) simultaneously pushed up U.S. Treasury yields and put pressure on the INR/USD exchange rate such that the two series moved in unison during the tapering talk (Figure 2, right panel).

By the time the Federal Reserve actually began reducing purchases of U.S. government securities on December 18, 2013, however, international investors appeared to have largely "priced in" the expected impacts of tighter U.S. monetary policy on the India risk premium. Financial flows stabilized and portfolio investment returned, reducing the year-to-date outflows to 0.3 percent of GDP at the end of calendar 2013 from 0.8 percent of GDP at the end of the third quarter. The tight relationship between T-bond yields and the INR/USD exchange rates also appears to have weakened somewhat once actual tapering began (Figure 2, areas highlighted in pink).

Figure 2: Financial sector volatility after the tapering talk



Source: Authors' calculations using CEIC data.

3. Model and data

We rely on basic theory to capture long-run bilateral exchange rate dynamics through movements in relative prices and differences in productivity between the two countries. We begin with a definition of the real exchange rate (E) as a function of the spot rate (S, defined as the home currency price of a unit of foreign exchange) and domestic and foreign prices (P and P^*) such that:

$$E_t = S_t \frac{P_t^*}{P_t} \tag{1}$$

Changes in the real exchange rate over time can be attributed to differences in productivity in the home country (Y) and abroad (Y^*):[1]

$$E_t = F(Y_t, Y_t^*) \tag{2}$$

The real exchange rate decreases (appreciates) with productivity at home (${F'}_Y < 0$) and increases (depreciates) with productivity abroad (${F'}_{Y^*} > 0$). Setting (1) equal to (2), transforming into logs, and taking a first-order approximation to the function F yields:

$$s_t = p_t - p_t^* + F(\bar{Y}, \overline{Y^*}) + \frac{F'_{\bar{Y}}}{F(\bar{Y}, \overline{Y^*})} Y_t + \frac{F'_{\overline{Y^*}}}{F(\bar{Y}, \overline{Y^*})} Y_t^* \tag{3}$$

where lowercase variables indicate natural logarithms (*Ln*). This equation means that the nominal exchange rate depreciates when domestic inflation exceeds foreign inflation and when productivity abroad grows faster than at home.

We can estimate equation (3) as follows:

$$s_t = \alpha + \beta_p p_t + \beta_{p^*} p_t^* + \beta_y y_t + \beta_{y^*} y_t^* + \varepsilon_t = \alpha + \beta x_t + \varepsilon_t \tag{4}$$

To the extent that the variables in this equation are non-stationary, equation (4) can be viewed as a long-run cointegrating vector between the spot rate and relative prices and productivity differences.

Short-term movements around this long-run relationship can be accounted for by first differences in the explanatory variables x, an error correction term, and an additional set of regressors z which are likely to result in only short-term innovations in the value of the spot rate:

$$\Delta s_t = \varphi + \gamma \Delta x_t + \delta(s_{t-1} - \alpha - \beta x_{t-1}) + \theta \Delta z_t + \xi_t \tag{5}$$

The policy discussion about the underlying reasons for the rupee depreciation episode of 2013 suggest that the short-run determinants z of the spot rate include:

- The current account balance (m);
- The volume of capital inflows (k);
- Asset prices at home (a) and abroad (a^*);
- The assets of the central bank at home (b) and abroad (b^*);
- The interest rate abroad (r^*): and
- Major policy announcements such as "tapering talk" (T).

[1] See, for example, Balassa (1964) and Samuelson (1964, 1994).

The model captured by equations (4) and (5) can be estimated sequentially using ordinary least squares (OLS) or generalized least squares, as part of an error correction model (ECM).[2] It can also be estimated jointly in a VAR setting following Johansen's (1988, 1991) methodology. In what follows, we present the sequential ECM-type estimates, although the main results do not change if we instead follow Johansen's approach.

To estimate the model, we use monthly data, which are the highest frequency for which the *x* variables are available.[3] Prices in India are measured by the Wholesale Price Index (WPI) because national Consumer Price Index series were not available prior to 2011. An additional justification for this choice is the RBI reliance on the WPI as the headline measure of inflation and an implicit target for monetary policy during the entire time period under analysis. For consistency, we use the closest equivalent of the WPI in the United States, which is the producer price index (PPI). The Indices of Industrial Production (IIP) of the two countries are used as approximations to their productivity levels in the short term (Table 1).

Table 1: Indicators used in the empirical analysis

Variable	Indicator
Exchange rate (e)	Ln of spot INR/USD rate
Domestic prices (p)	Ln of India WPI
Foreign prices (p^*)	Ln of US PPI
Domestic productivity (y)	Ln of India IIP
Foreign productivity (y^*)	Ln of US IIP
Current account deficit (m)	Ln of trade deficit
Capital inflows (k)	Ln of institutional portfolio inflows
Domestic asset prices (a)	Ln of India SENSEX
Foreign asset prices (a^*)	Ln of US S&P500
Domestic central bank assets (b)	Ln of RBI balance sheet
Foreign central bank assets (b^*)	Ln of US Fed balance sheet
Foreign interest rate (r^*)	US 10-year T-bond yield
Tapering talk (T)	May–Dec 2013 = 1 or Jun – Oct 2013 = 1

All variables are measured on a monthly basis.

Within the *z* variables, we use the trade deficit as a measure of the current account balance, as data on the latter are only available quarterly. Capital inflows are captured through net foreign institutional investments in the Indian stock market. The SENSEX stock market index and the S&P500 index provide measures of

[2] See Engle and Granger (1987).

[3] The data range from January 2004 to July 2014. All variables are in natural logs. All series have been downloaded from the CEIC database, with the underlying data coming from the Reserve Bank of India (RBI), US Federal Reserve, and other official government agencies.

asset prices in India and the United States, respectively. In their case, as well as for the other *z* variables, monthly observations are constructed as averages over higher-frequency data (stock indices, central bank balance sheets, and Treasury yields). Information on central bank balance sheets is from the RBI and the U.S. Federal Reserve Board, respectively. Finally, the interest rate abroad is measured through the yield on the 10-year U.S. Treasury bond.

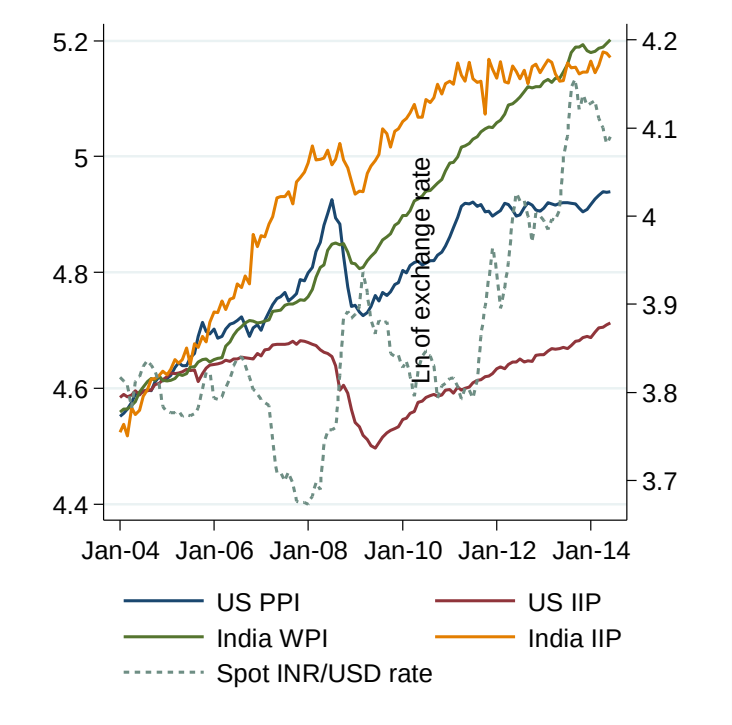
A particularly important variable is the tapering talk indicator, for which we use two options. The first one is based on actual dates of policy announcements and actions. It marks the period as beginning in May, when the original tapering announcement was made, and ending in December, when the Federal Reserve began drawing down its asset purchases. The definition of the tapering talk period in the second option is data-driven. We run all possible combinations of the beginning month (May – August) and end month (June – December) and select the period based on the best fit of the model. This approach suggests the June – October period for tapering talk.

4. Estimation results

4.1 Stationarity and cointegration

The underlying assumption for estimating equation (4) as part of an ECM is that all series are I(1) and there exists a cointegrating vector such that ε_t is stationary or I(0). None of the series in the long-run model exhibits an obvious tendency towards mean reversion (Figure 3).

Figure 3: The exchange rate and its long-run determinants



Source: Authors' calculations using CEIC data

Empirical analysis confirms that all five are non-stationary in levels but stationary in first differences (Table 2).[4] The next step is therefore to confirm the presence of a (unique) set of parameters that combines the exchange rate, price, and productivity series in such a way that the residual term is stationary.

Table 2: Unit root tests for the variables in the long-run model

	Levels	**First differences**
Exchange rate (s)	0.788	0.000
Domestic prices (p)	0.642	0.000
Foreign prices (p^*)	0.589	0.000
Domestic productivity (y)	0.692	0.000
Foreign productivity (y^*)	0.989	0.000

Figures in the table are p-values for ADF unit root tests.

In addition to estimating equation (4) by testing the residual term ε_t for the presence of a unit root, we can also formally test for the presence of cointegrating vector(s) using the Johansen methodology. This approach – as well as the regression based DF-GLS unit root test and the KPSS unit root test – relies on the selection of an appropriate lag length. We therefore construct a VAR with the variables in equation (4) and test for the optimum lag length using a series of information criteria. The Hannan and Quinn (HQIC), Schwarz (SBIC), and FPE (final prediction error) criteria suggest lag lengths of two to three months, while the Akaike Information Criterion (AIC) proposes a longer lag order, of six months. In what follows, we set the lag length at two, although the results do not change if we use lag length of three.

Johansen (1995) describes three methods for determining the number of cointegrating equations in a vector error correction model: trace statistic, maximum eigenvalue statistic, and minimization of an information criterion. The first two methods (as well as the HQIC estimator) suggest the presence of two cointegrating vectors, while the SBIC criterion hints at no cointegration.[5] The presence of two cointegrating vectors (at most two under the trace statistic test) could be perceived as problematic since a second cointegrating vector implies a zero restriction on one of the VAR coefficients. However, as shown in the next section, coefficient estimates on U.S. industrial production are not significantly different from zero – and once this series is removed from the VAR, all tests point strongly to the presence of a unique cointegrating vector.

4.2 Long-run equilibrium

Equation (4) can be estimated under different assumptions of the structure of the error term. The first column in Table 3 shows the OLS estimates while the second column shows estimates with Newey-West robust standard errors. The third column contains the Prais-Winsten estimates, which are robust to first-

[4] Table 2 presents the results of the augmented Dickey-Fuller test, with the null hypothesis being that series has a unit root. However, the conclusion also holds – at the 5 percent significance level or better – when we run the DF-GLS test. And it holds when we run the KPSS test with the null hypothesis that the series is trend-stationary, with a reasonable number of lags (up to 12 for the exchange rate, Indian WPI, and Indian IIP, 4 lags for US PPI and 9 lags for the US IIP).

[5] With just one lag, which is the lag length suggested by SBIC, there is at most one cointegrating vector.

order serial correlation.[6] The last column in Table 3 shows ARMAX estimates with AR(1) and AR(2) disturbance terms.[7]

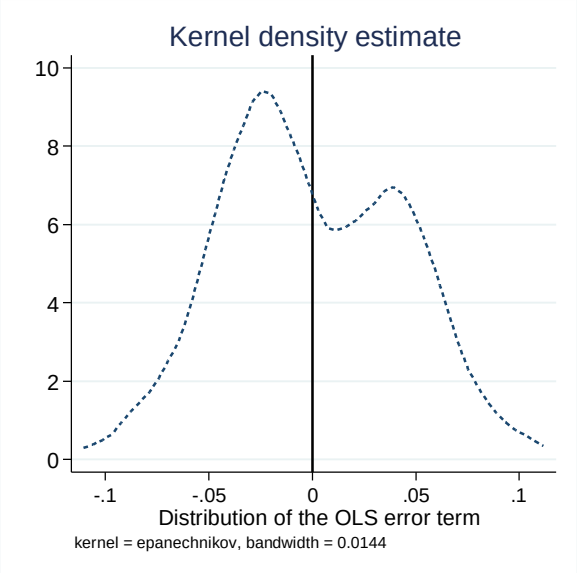
Table 3: Long-run exchange rate dynamics

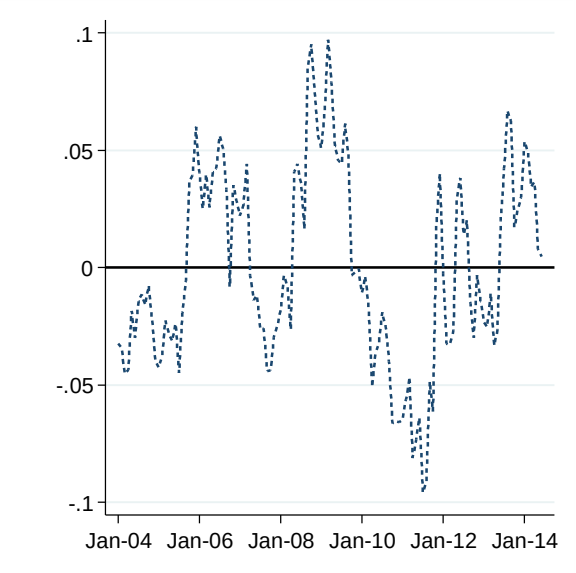
	OLS	Newey-West	Prais-Winsten	ARMAX (1-2 lags)
Dependent variable: exchange rate (s_t)				
Domestic prices (p_t)	1.34***	1.34***	0.88***	0.78***
Foreign prices (p_t^*)	-0.72***	-0.72***	-0.58***	-0.44***
Domestic productivity (y_t)	-0.53***	-0.53***	-0.12	-0.13*
Foreign productivity (y_t^*)	-0.01	-0.01	-0.14	-0.10
Observations	126	126	126	126
Adjusted R^2	0.87		0.96	

*** p<0.01, ** p<0.05, * p<0.1.

The error terms from the OLS/Newey-West estimates, although serially correlated, are centered around zero and appear to revert to zero mean following a shock (Figure 4). This can be seen as evidence of a long-run cointegrating relationship explaining the INR/USD exchange rate

Figure 4: Error terms are centered around zero and revert to the mean





[6] Durbin-Watson d = 0.28, Breusch-Godfrey X^2 = 93.63 [p=0.00].

[7] Estimates in Table 3 are robust to including higher-order AR disturbances, but parameter estimates on orders higher than AR(2) were never statistically significant.

Reassuringly, the parameter estimates are consistent across all estimation approaches and, with the exception of U.S. industrial production, conform to theoretical expectations. Indeed, higher inflation at home leads to exchange rate depreciation while higher inflation abroad, *ceteris paribus*, implies appreciation. Similarly, faster output growth at home results in exchange rate appreciation. Only the impact of faster output growth abroad is not statistically different from zero.[8]

4.3 Short-run dynamics

The long-run relationship can be used to estimate the richer model in equation (5). The explanatory variables include the first differences of all the variables in the long-run model, plus the error correction term, plus the first differences of a broad set of variables expected to influence the short-term dynamics of the exchange rate around the long-run equilibrium relationship in equation (4). The error correction term in this specification is the lagged error term from the OLS/Newey-West estimates in Table 3.

Table 4: Short-run exchange rate dynamics

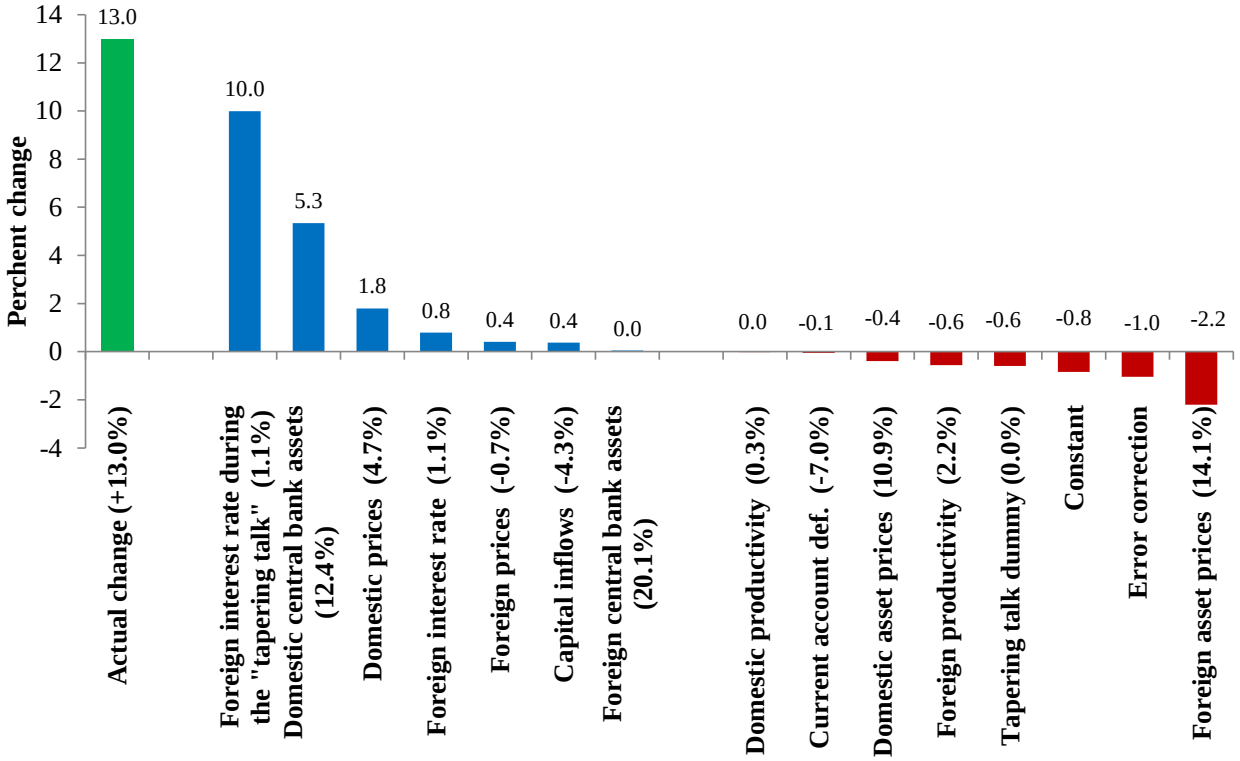
	(1)	(2)	(3)
Dependent variable: exchange rate (Δs_t)			
Domestic prices (Δp_t)	0.41*	0.38*	0.25
Foreign prices (Δp_t^*)	-0.61***	-0.55***	-0.52***
Domestic productivity (Δy_t)	-0.05	-0.05	-0.06
Foreign productivity (Δy_t^*)	-0.26	-0.25	-0.25
Error correction term	-0.07**	-0.06**	-0.07**
Current account deficit (Δm_t)	0.01**	0.01**	0.01***
Capital inflows (Δk_t)	-0.10***	-0.09***	-0.09***
Domestic asset prices (Δa_t)	-0.04	-0.04	-0.04
Foreign asset prices (Δa_t^*)	-0.15***	-0.16***	-0.15***
Domestic central bank assets (Δb_t)	0.46***	0.43***	0.43***
Foreign central bank assets (Δb_t^*)	0.00	0.00	0.01
Foreign interest rate (Δr_t^*)	0.01**	0.01	0.01
Tapering talk (T_t: May – Dec 2013 = 1)		-0.00	
Tapering talk (T_t: Jun – Oct 2013 = 1)			0.00
Interactive term ($T_t \times \Delta r_t^*$)		0.09***	0.09***
Observations	124	124	124
Adjusted R^2	0.60	0.64	0.64

[8] This result underpins the finding of more than one cointegrating vector in the Johansen test in the previous section.

The results, shown in column (1) of Table 4, generally conform to expectations. Faster inflation abroad leads to appreciation in the spot rate, while faster inflation at home results in exchange rate depreciation. Acceleration or deceleration in growth at home or abroad does not appear to have a significant effect on changes in the exchange rate. The error correction term coefficient is negative and statistically significant, which means that the spot rate tends to return to the long-run equilibrium relationship described by equation (4) following short-run shocks.

As for the short-term determinants, the results show that a widening of the trade deficit (which historically has been the main driver of changes in the current account deficit) in the previous period is associated with exchange rate depreciation in the current period. Strong portfolio inflows in the previous period are also associated with exchange rate appreciation in the current period. Somewhat counter-intuitively, better stock market performance in the United States is associated with rupee appreciation while changes in the SENSEX do not appear to have a significant effect on the exchange rate. We do not find a statistically significant link between the spot rate and Fed's balance sheet, but the RBI's balance sheet has a strong positive association with the exchange rate – an increase in RBI assets would normally imply a larger supply of rupees, which could in turn lead to depreciation. Finally, increases in yield on the 10-year U.S. T-bond – which captures global investor sentiment, risk aversion, and portfolio allocation decisions – are positively and significantly associated with exchange rate depreciation.

Figure 5: The drivers of the 2013 rupee depreciation



Note: Estimates are for the period Apr – Dec 2013

The error correction model in column (1) explains 60 percent of the variation in the first difference of the INR/USD spot rate. We can improve the fit by 4-5 percentage points by recognizing that changes in the T-bond yield have only had a significant effect on the changes in the INR/USD exchange rate during the "tapering talk," and are not a significant exchange rate determinant over the entire period. We show this in

columns (2) and (3) of Table 4 by adding the tapering talk variable and interacting it with changes in the T-bond yield.

The results are very similar regardless of how the tapering talk period is defined. Changes in the T-bond yield only explain changes in the rupee exchange rate during the tapering talk period, but not before or after it. In fact, during the tapering talk period, the T-bond yield is the most important determinant of changes in the INR/USD rate even after controlling for all other factors (Figure 5). This suggests, therefore, that global forces, rather than India-specific factors, were largely responsible for the Indian rupee depreciation of 2013. Moreover, the sharp rupee depreciation during the tapering talk could be interpreted as the effect of a surprise factor, since the T-bond yield is not a significant predictor of the exchange rate either before or after the tapering talk period.

4.4 Impulse responses

The impact of actual tapering on the INR/USD exchange rate can be assessed by estimating impulse responses. The analysis of the impact of tapering talk in the previous section suggests an important distinction, namely whether tapering comes as a surprise or is anticipated. In practice, this can be done by estimating the impulse responses to a change in foreign interest rates both at a time of tapering talk (surprise) and outside that period (anticipated).

We estimate impulse responses by combining all the variables in the richer short-term dynamic model into a VAR setting. Because the number of explanatory variables is high, and a VAR needs to be parsimonious, we combine several of them into relative indicators, capturing differences in movements at home and abroad. For instance, we replace the two variables measuring domestic and foreign prices by one variable measuring the change in relative prices. The tapering dummy and the interaction of changes in the T-bond yield with the tapering dummy are treated as exogenous variables, while the first differences of all other variables are endogenous. The VAR specification is as follows:

$$\Delta \boldsymbol{v}_t = \mu_0 + \mu_1 \Delta \boldsymbol{v}_{t-1} + \mu_2 \Delta \boldsymbol{v}_{t-2} + \eta\, T_t + \phi\, T_t \Delta r_t^* + \varphi_t \qquad (6)$$

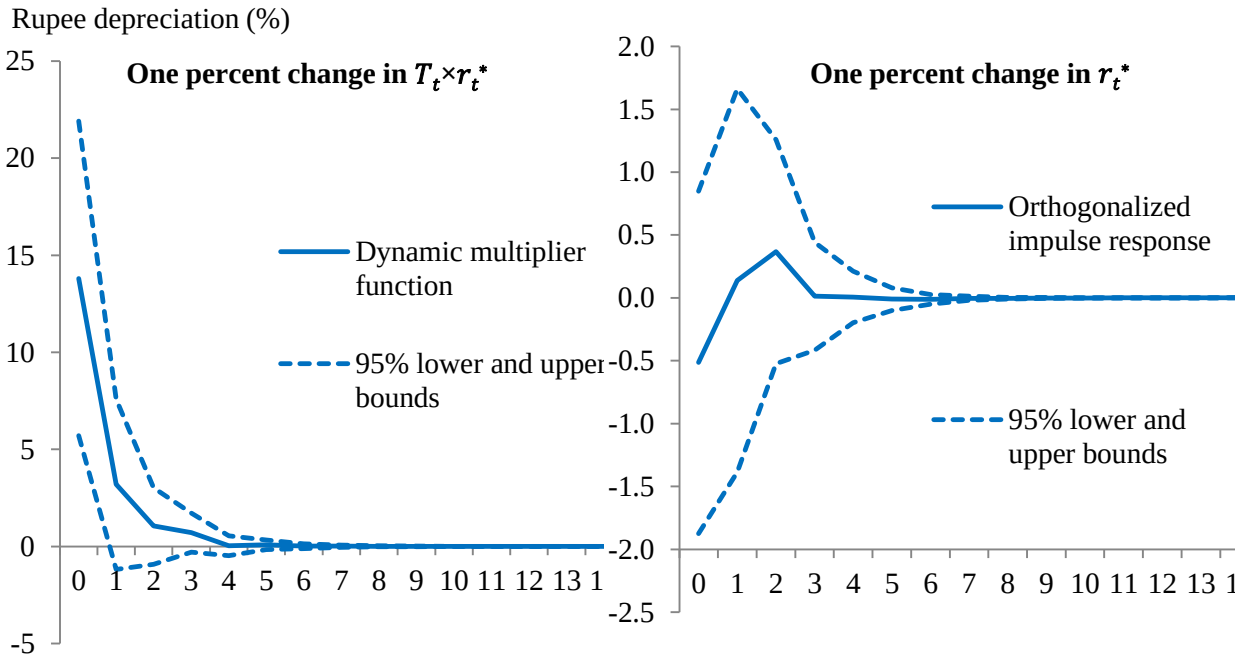
where the vector $\boldsymbol{v}_t$ includes the following variables:

$v_{1t} = y_t - y_t^*$	Productivity differential
$v_{2t} = m_t$	Current account deficit
$v_{3t} = p_t - p_t^*$	Relative prices
$v_{4t} = k_t$	Capital inflows
$v_{5t} = r_t^*$	Foreign interest rate
$v_{6t} = a_t - a_t^*$	Relative asset prices
$v_{7t} = s_t$	Exchange rate

Variables are ranked by their plausible order of sluggishness, with adjustments being slowest for productivity differentials and fastest for the exchange rate. In estimating this VAR model, the ϕ coefficient is restricted to zero in the equation for v_{5t}.

The dynamic multiplier function of changes in the T-bond yield during the "tapering talk" and the impulse response of changes in the T-bond outside the "tapering talk" are shown in Figure 6. The left panel of shows that the effect of a surprise tightening of monetary policy in advanced countries would be large and statistically significant. The right panel shows the "equilibrium" effect of the change in the T-bond yield. The size of the impact is much smaller and it is never significantly different from zero. These results suggest that once the policy announcement has been internalized by the markets (i.e., the tapering talk period is over), further reductions in the Federal Reserve asset purchasing program would not have a sizeable effect on the INR/USD exchange rate.

Figure 6: Depreciation impact of "surprise" and anticipated monetary tightening



5. Concluding remarks

The impact of the tapering talk of 2013 on emerging-market currencies has raised concerns about the consequences of further monetary tightening in the United States. The announcement that quantitative easing would be scaled down pushed up T-bond yields and prompted investors to withdraw funds from countries they saw as most vulnerable to the end of "easy money". And in a way, these expectations became self-fulfilling: investors thought that capital accounts of emerging markets would be adversely affected, and indeed their withdrawal of funds put pressure on the capital accounts in a number of countries, including India.

The adoption of a quantitative easing program by the Euro Zone, and the prospect of it winding down further down the road, can only add to current concerns. It is legitimate to worry about extraordinary policy measures in advanced countries generating financial turbulence in emerging markets, including currency depreciations as asset purchasing programs are scaled down and eventually discontinued. And it is natural to believe that countries with weaker macroeconomic situations will be more severely affected.

However, the experience of India during the tapering talk period suggests that the concerns may be overstated. Two main conclusions emerge from the empirical analysis in this paper. First, while domestic macroeconomic variables had a significant influence on exchange rate dynamics, most of the rupee depreciation of 2013 can be accounted for by the tapering announcement. Even after controlling for all other determinants of exchange rate movements (short- and long-term, domestic and foreign…), changes in the 10 year U.S. T-bond yield turn out to be the most important determinant of exchange rate dynamics during that period. Second, and equally important, the 10-year T-bond yield has a statistically significant effect only during the tapering talk period, while it does not help explain variations in the INR/USD once the surprise effect is gone.

In fact, it can be argued that the tapering talk strengthened India's macroeconomic situation. As a result of capital outflows, much of the "hot money" that entered India during the quantitative easing period exited. And because of the rupee depreciation, exports became more competitive and imports more expensive, reducing the current account deficit. The RBI also responded to the capital outflows by tightening monetary policy, which bounded inflationary expectations. The stronger macroeconomic situation and the early "pricing in" of the tapering impact in U.S. markets meant that yields did not move much when actual tapering began and that there was little additional pressure on the currency. With the global surprise factor gone, this paper's estimates suggest that further changes to the U.S. monetary policy – as proxied by changes in the T-bond yield – are unlikely to have significant effects on the INR/USD exchange rate.

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