The exchange rate dimension of inflation targeting: target levels and currency volatility

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Abstract

The surprising volatility of floating exchange rates have puzzled macroeconomists and challenged policy makers since the seventies. This is no less true in South Arica where the Rand's volatility is a longstanding policy and business challenge. The literature on currency volatility distinguishes real, nominal and institutional factors in various econometric models. This paper extends the literature on nominal and institutional factors associated with currency volatility. Rose's (2007) description of inflation as Bretton Woods "in reverse" is the departure point and is read with Berganza and Broto's (2012) recent demonstration in a time series study that inflation targeting emerging market economies have experience higher exchange rate volatility. Meanwhile Bleany and Tian (2011) have shown the cross-sectional connection between the level of inflation and exchange rate volatility. We build on Bleany and Tian's (2011) cross sectional approach to investigate the association between the level at which inflation targeting countries target inflation and exchange rate volatility over the long-run. To this end we use a large cross-section of developed and emerging countries covering the roughly twenty years of the inflation targeting era.

Key words: Currency volatility; Commodity currencies; inflation
JEL codes: F31, F41, F37

Introduction

Andrew Rose (2007) characterised of inflation targeting monetary policy regimes as "Bretton Woods in reverse", by which he meant inflation targeting created a unplanned but stable, durable and open international monetary system for those countries that have adopted it. These countries have opened their capital accounts and have allowed their currencies to float while they focused monetary policy on domestic goals. In his assessment these countries enjoyed not just the domestic benefits of greater macroeconomic stability but also suffered fewer external disruptions via their balances of payments and have experiences lower currency volatility compared with non-inflation targeting regimes.

While much of this benign characterization rings true for a South African observer, Rose's (2007) claim about lower exchange rate volatility will be surprising to a Rand observer. The volatility of the South African Rand has been an important public and policy concern for many years, and no less so since the adoption of formal inflation targeting in 2000. Former President Thabo Mbeki placed it at the top of list of growth constraints for South African identified in his Accelerated and Shared Growth Initiative for South Africa (ASGISA) in 2006.

Berganza and Broto's (2012) recent revision of Rose's claim about currency volatility for inflation targeting regimes cast new light on possible reasons for the Rand's volatility. they showed, in a time series study, that inflation targeting emerging market economies such as South Africa have experienced higher exchange rate volatility. In the cross-sectional literature on currency volatility Bleaney and Tian (2011) have meanwhile connected the level of inflation with currency volatility.

We build on Bleaney and Tian's (2011) cross-sectional approach to investigate the association between the level at which inflation targeting countries target inflation and exchange rate volatility over the long-run. To this end we use a large cross-section of

developed and emerging countries covering the twenty plus years of the inflation targeting era. We shows preliminary results that connect the level at which an inflation targeting regime targets inflation is positively associated with the observed volatility of the relevant currency. This results uses an institutional fact, the target level under an inflation targeting system to draw together the separate results of Rose (2007), Berganza and Broto (2012) and Bleaney and Tian (2011).

2. Literature

From an econometric perspective the literature on currency volatility can be divided into (i) time series and (ii) cross country studies. The time series literature is enormous, often using the latest developments in time series econometrics to model exchange rate volatility. Balg and Metcalf (2010), for example, used the new bounds co-integration test to model the contribution of the money supply in currency volatility. In Bauwens and Franciso (2010) the innovation is methodological as they show the applicability of general-to-specific modeling for an exchange rate volatility model aimed at forecasting. Meanwhile Morana (2009) used a new fractionally integrated vector-autoregressive model to model the connection between macroeconomic fundamental and exchange rate volatility.

In the cross-sectional literature we are particularly interested in Bleany and Tian (2011), Bleany and Francisco (2010) who include inflation amongst the macroeconomic fundamentals to explain he cross-sectional distribution in exchange rate volatility. There is no intention to add anything to the time-series literature here as we are focused on the cross-sectional question. We are interested in those macroeconomic fundamentals that are associated with currency volatility over the long-run on a cross country basis, and specifically, we are interested in discovering the possible role for an institutional fact, the level of an inflation targeting regime, as a fundamental factor associated with currency volatility. This is an alternative to the project that uses labels such as "commodity currency" for the South African Rand and others, with the intention of explaining the

presumed volatility of these currencies by reference to the volatility of the commodity prices that feature prominently in the export baskets of their economies (for example, Arezki et al. 2012).

Many variables have been proposed as fundamental factors underlying exchange rate volatility, including real factors such as productivity growth and business cycle shocks, nominal factors such as the money supply and its variability, inflation and inflation variability and institutional factors such as the exchange rate regime and the monetary policy regime.

3. Data

The cross sectional dataset was constructed from the IMF and World Bank data bases using data from the first quarter of 1990 until the final quarter of 2010. The quarterly frequency of the data is for the purposes of calculating cross-sectional variables, such as exchange rate volatility over a particular period, that have time series dimensions. The data sets contains 39 developed and emerging market countries and shown in tables 1 and 2. These tables also show the starting date for the inflation-targeting regime in those countries that have adopted this monetary policy regime since 1990.

Table 1 Developed countries included

Country	*Inflation target inception*	*Country*	*Inflation target inception*
Australia	1993	New Zealand	1989
Canada	1991	Norway	2001
Eurozone		South Korea	1998
Denmark		Sweden	1995
Iceland	2001	Switzerland	2000
Israel	1997	UK	1992
Japan		USA	

Table 2 Emerging market countries included

Country	*Inflation target inception*	*Country*	*Inflation target inception*
Armenia	2006	Indonesia	2005
Brazil	1999	Malaysia	
Chile	1999	Mexico	2001
China		Morocco	2002
Colombia	1999	Philippines	2002
Czech Rep.	1997	Poland	1998
Egypt		Romania	2005
Estonia		Russia	
Ghana	2007	Serbia	2009
Guatemala	2005	South Africa	2000
Hungary	2001	Thailand	2000
India		Turkey	2006

Exchange rate volatility was calculated as the standard deviation of the quarter-on-quarter differences in the natural log of the particular national currency's exchange rate[1] with the IMF's special daring right (sdr). Exchange rate volatility was calculated over two sample periods, 1990 to 2010 and 2000 until 2010, with the second sample including more countries as inflation targeters. Figures 1 and 2 show the cross-sectional distribution of exchange rate volatility for these two samples.

[1] The exchange rate was expressed in the form national currency per SDR.

Figure 1 *Currency volatility since 1990*

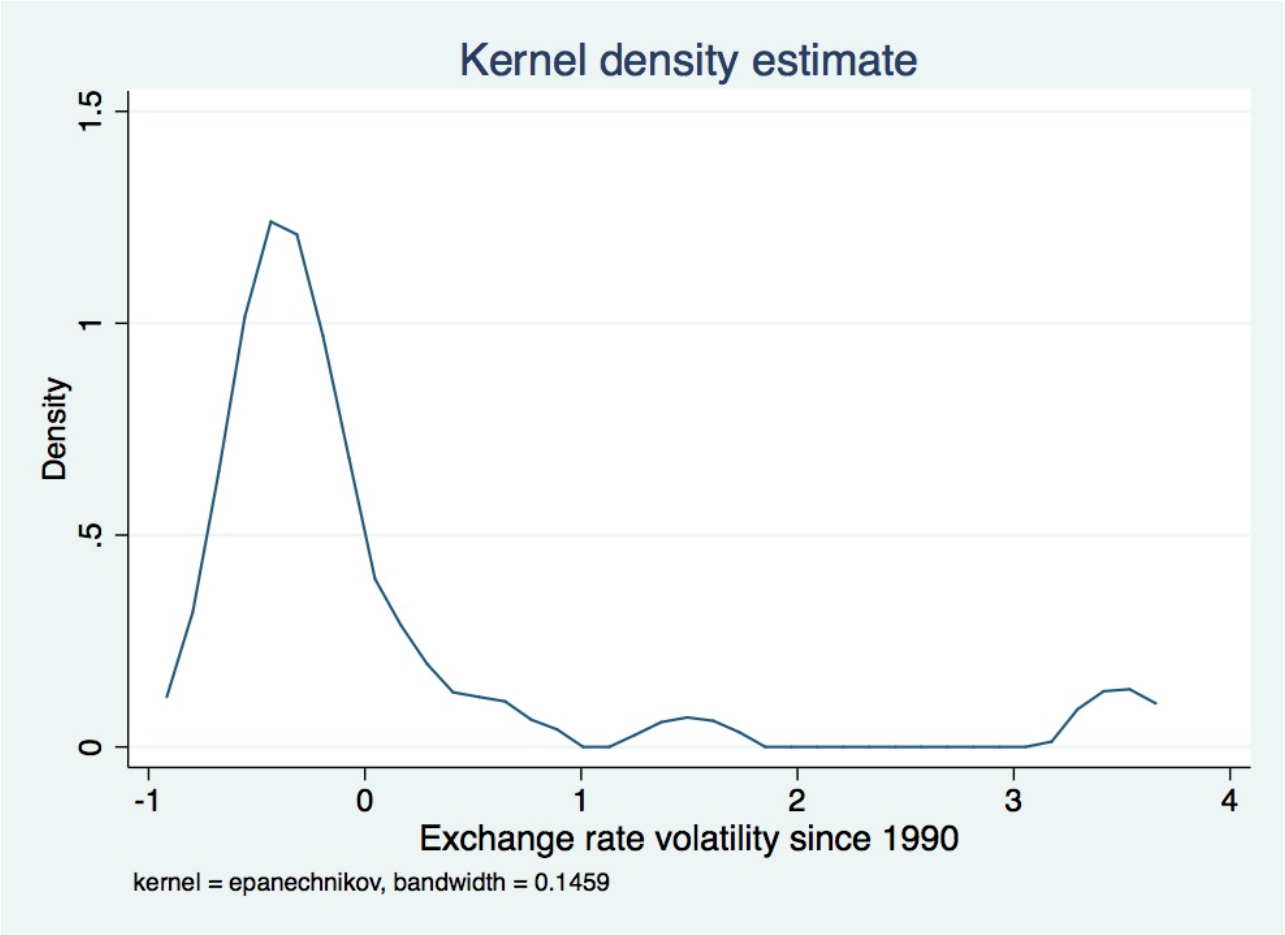


Figure 2 *Currency volatility since 2000*

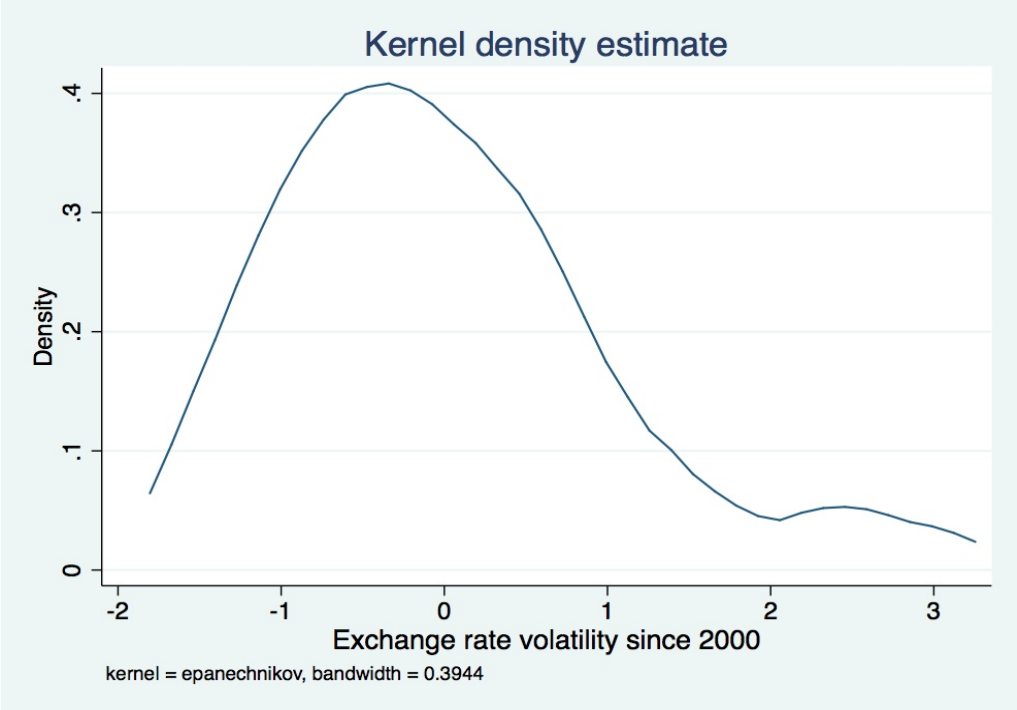
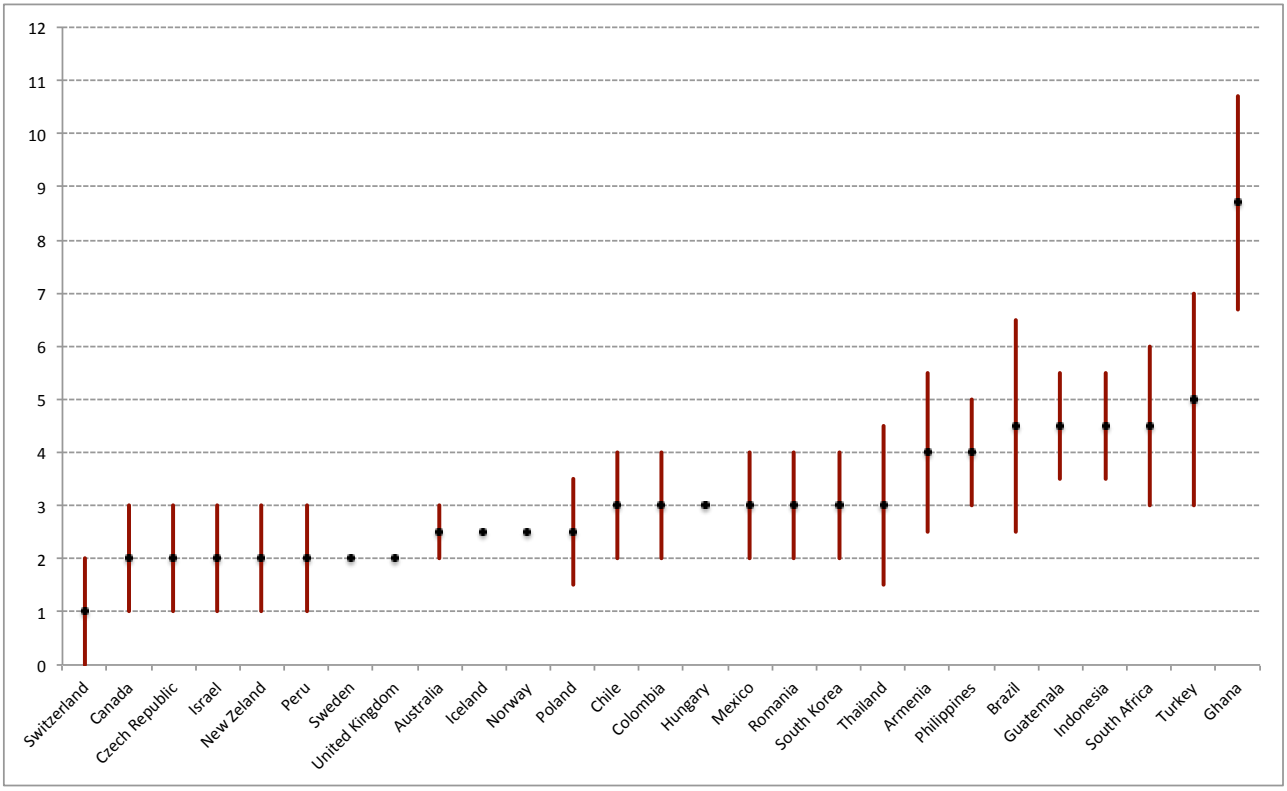


Figure 3 shows the various target ranges for the 27 countries in our sample where inflation targeting defines he monetary policy regime. The south African regime lies towards the right-hand of this distribution amongst the countries with the highest mid-point and upper level for the inflation target.

Figure 3 Target bands for the inflation targeting regimes



Various control variables were used in the cross-sectional regressions, they are: medina inflation, a dummy variable to indicate an inflation targeting regime, the exchange rate regime measured with Reinhart and Rogoff's (2004) de fact index , initial real per capita GDP adjusted for Purchasing Power Parity, the median current account balance scaled by GPP.

4. Results

Initial cross-sectional regressions showed clear evidence of a positive correlation between currency volatility, the exchange rate regime and the level of inflation with more flexible

exchange rate regimes and higher median levels of inflation associated with higher currency volatility.

The institutional investigation regarding the impact of an inflation targeting regime was more ambiguous though. For the full sample there did not appear to be a connection, though inflation targeting was associated with higher currency volatility since 2000. We investigated, but rejected, the relevance of (i) CA balance, (ii) proxies for commodity currencies and (iii) asymmetric real GDP shocks.

Given the observed relationship between the level of inflation and currency volatility we considered a sub-division of the inflation targeting regimes. Given the earlier results of Bleaney and Tian (2011) and the positive association between median inflation and currency volatility we found we decided to split the inflation targeting regimes into two groups, with one third classified as high inflation regimes and the other two thirds as low inflation regimes. This asymmetry matches the distribution shown in figure 3. The upper band of the targeting zone (e.g. 6% in South Africa) was used to guide this division. Those regimes with an upper band of 5% or more ended in the high inflation targeting group and we created dummy variables to indicate whether an inflation targeting country was in the lower or higher group.

We also observed considerable heteroskedasticity in the initial LS regressions and decided to estimate robust regressions instead. Table 3 shows the robust regression results for the two samples under consideration.

Table 3 Regression output

	Currency volatility since 1990		*Currency volatility since 2000*	
	Coefficient	P-value	Coefficient	P-value
Median inflation	0.144	0.03	0.5	0.003
Median inflation squared			-0.17	0.101
Currency regime	0.09	0.00	0.144	0.003
GDP p.c.	-0.24	0.001		
High Inflation targeting			0.66	0.82
Low inflation targeting			0.48	0.153
Constant	-1.2	0.000	-1.53	0.000

The results in table 3 suggest that the inflation targeting regime matters for currency volatility even after controlling for the median level of inflation. However, this effect is obscured by the distribution of at least two kinds of inflation targeting regimes associated with the level at which inflation is targeted. The additional association with the inflation targeting regime emerges clearly when the population is split between high and low IT cases, with high inflation targeting currencies associated with considerably more currency volatility.

Figures 4 and 5 show the actual and fitted cross-plots for the two samples. In both cases the model explains a substantial proportion of the variance in the data. However the analysis of residuals shows that there remains systematic information in the data that may distort the estimated equations. Accordingly the interpretation given here remains tentative and provisional.

Figure 4 *Actual and fitted currency volatility since 1990*

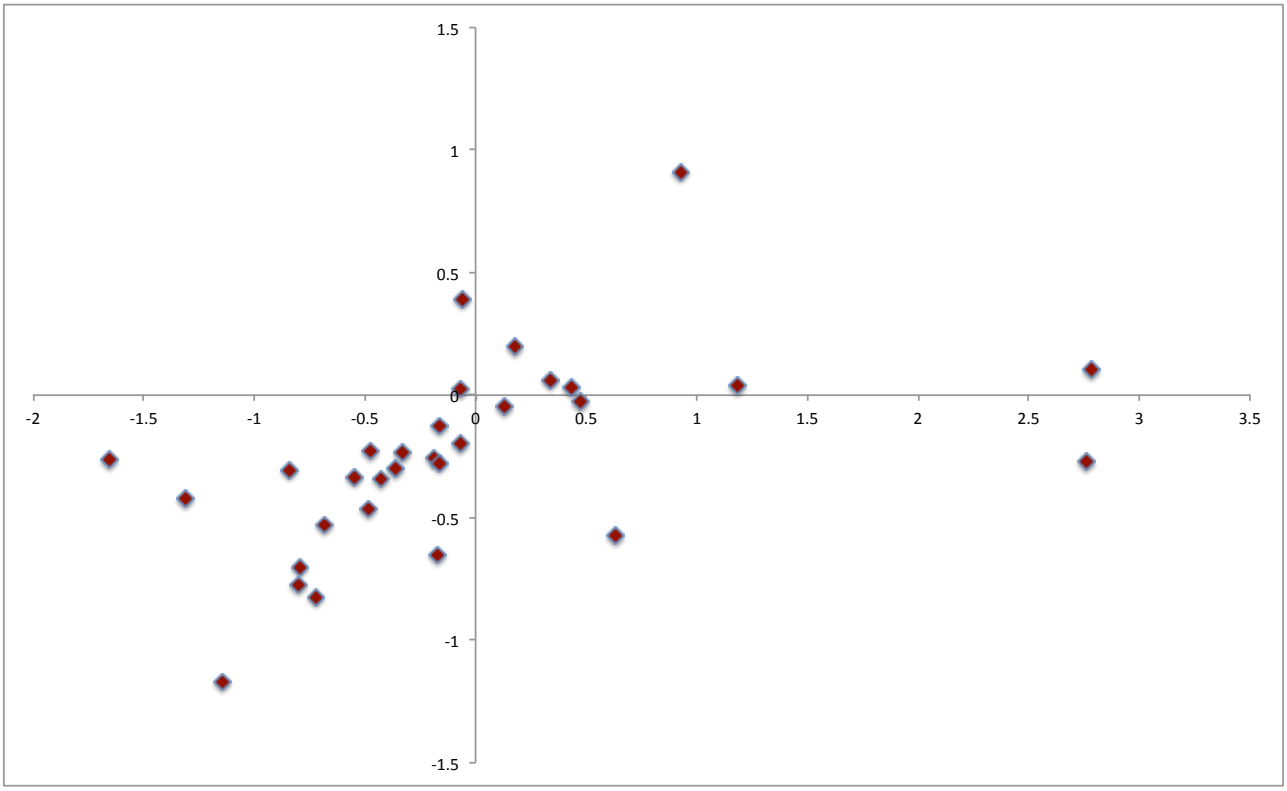
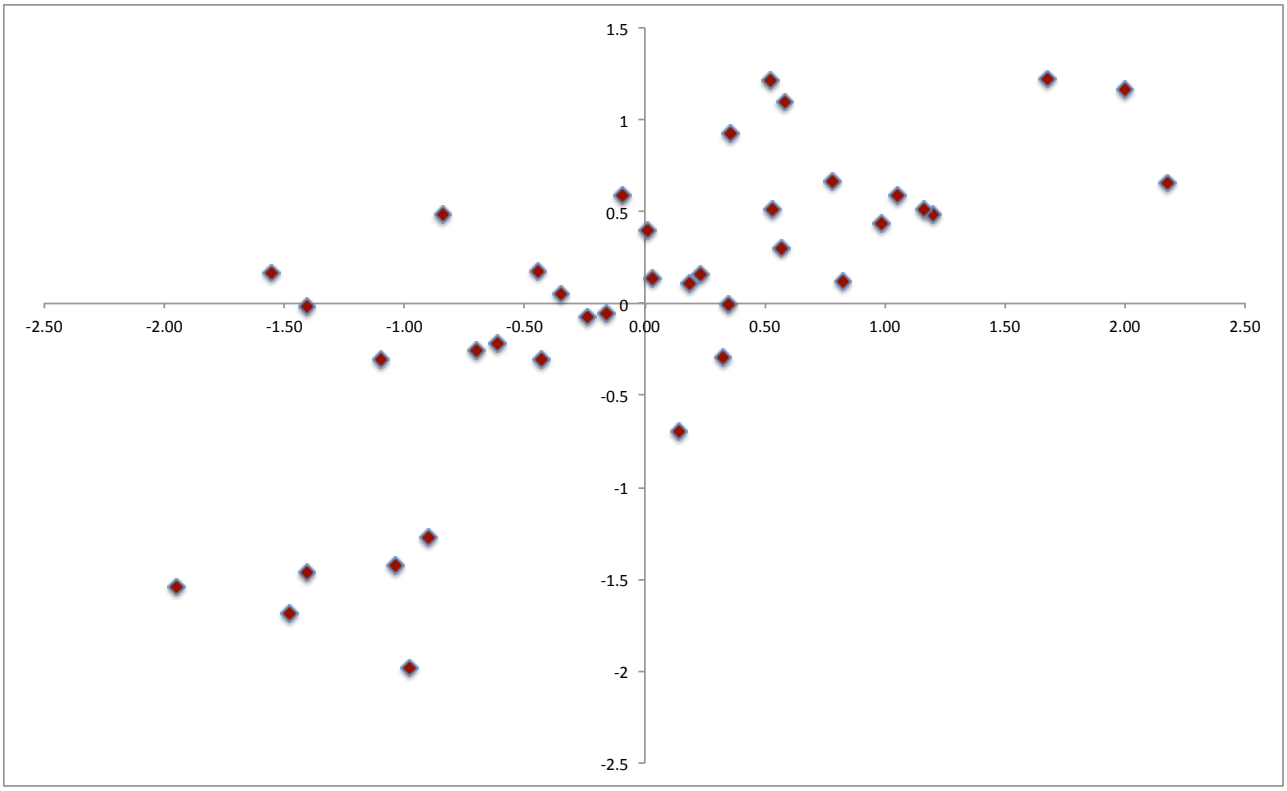


Figure 5 *Actual and fitted currency volatility since 2000*



To show the impact of the inflation targeting regime we considered the case of the South African Rand. Since 2000 the median Rand volatility was 8.1% compared with a sample average of 4.38% with a standard deviation of 1.82%. Over this period the SARB's inflation target was in the high inflation targeting group and medina South African inflation was 5.66% compared with a sample median of 3.07 with a sample standard deviation of 3.28%. If SA had a low IT regime and inflation at the sample median, then the model would have predicted Rand volatility of 3.62% since 2000, less than half the observed volatility.

5. Tentative conclusions

Currencies have been more volatile under de facto flexible exchange rate regimes than the proponents of floating regimes had anticipated. Amongst the many fundamental factors associated with currency volatility the literature has lately included the level of inflation. Since inflation targeting is a monetary policy regime associated with flexible exchange rates, it follows that there should be a link between the level at which is inflation is targeted and exchange rate volatility.

We confirm that this link exists in the post-2000 sample, but also show that higher inflation targeting regimes are associated with more currency volatility. Currency volatility may be an additional cost of targeting high, instead of lower, inflation outcomes

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