Exchange Rate Interventions and Insurance: Is "Fear of Floating" a Cause for Concern?

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Abstract

"Fear of floating" is one of the central empirical characteristics of exchange rate regimes in emerging markets. However, while some view it as the optimal discretionary monetary policy, for example when foreign exchange markets suffer excess volatility from noise trading, others suggest that "fear of floating" arises out of an inefficient lack of commitment to floating, contributing to private sector under-insurance against sudden stops. In this paper we develop a model of the optimal exchange rate regime when both issues are present. We compare three regimes: a state-contingent regime with commitment, which allows exchange rate flexibility during sudden stops but interventions during normal times; a discretionary regime in which choices are made *ex-post;* and a non-contingent regime with commitment in which the exchange rate is uniformly flexible. Since it is only "fear of floating" during crises which is costly, we reexamine the data on exchange rate regimes for evidence that exchange rate flexibility is state-contingent. We find few examples of state contingent policies supporting the claim that "fear of floating" is an inefficient discretionary policy for many emerging markets. However, we also find counterexamples which shed light on exchange rate policy choices. Recent committed floaters exhibit little state contingency because of a uniformly *high* degree of flexibility, suggesting that it takes time to establish a credible commitment to floating. More established floaters with credibility do exhibit state-contingent regimes. Together the evidence suggests that escaping the "fear of floating" trap may be more difficult if it entails short-term costs while credibility is acquired, but that the benefits to floating can be substantial.

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1. Introduction

"Fear of floating" has recently come to be seen as one of the central *de facto* characteristics of exchange rate regimes in emerging markets since it was first identified by Calvo and Reinhart (2002). However the interpretation of this phenomenon is still open to question. Is it the case that the optimal monetary regime for emerging markets with open capital markets entails limited exchange rate flexibility? In the formulation of Shambaugh (2004), is the famous open economy trilemma really a dilemma for emerging markets, a choice between open capital markets or monetary freedom with no separate choice of exchange rate policy? Or is the trilemma alive and well? Does the pervasive "fear of floating" indicate instead that many emerging markets are inadvisably choosing to limit exchange rate flexibility when a genuine floating regime would offer better insurance against the frequent sudden stops which plague these economies?

Although the literature on this topic could be classified along many dimensions we choose to focus here on the extent to which "fear of floating" should be considered the optimal policy for emerging markets. Most of the theoretical explanations of "fear of floating" are built around an argument that the particular shocks faced by emerging markets lead them optimally to choose exchange rate stability, even if they have the option to allow exchange rate flexibility. Calvo and Reinhart (2002) assume that emerging markets are subject to frequent risk premium shocks which combined with a high pass through from the exchange rate to prices lead an inflation targeting government to limit exchange rate movements. Jeanne and Rose (2002) show how less flexible exchange rate regimes are optimal when noise traders in inefficient markets cause non-fundamental shocks to be reflected in the exchange rate. Contrasting this approach, Caballero and Krishnamurthy (2004) have argued that although limited exchange rate flexibility is often the optimal discretionary policy ex-post, it distorts the incentives of the private sector to insure itself ex-ante against sudden stops. "Fear of floating" is not optimal, but a lack of commitment prevents the government implementing the optimal policy which would allow the exchange rate to float during external crises.

The purpose of this paper is to explore the tension between these approaches and its implications for exchange rate policy in emerging markets. We attempt to shed light on the question of whether "fear of floating" is simply the optimal policy choice in a difficult environment or a suboptimal equilibrium with too

little exchange rate flexibility. We take the view that these explanations are not mutually exclusive, allowing "fear of floating" to have different aspects under different circumstances. It is possible in principle that the Central Bank stabilize the economy against the capital market shocks highlighted by Calvo and Reinhart (2002) or Jeanne and Rose (2002) without compromising the commitment to float when faced with a sudden stop of capital inflows as described by Caballero and Krishnamurthy (2004). While floating exchange rates can have important incentive effects it is not necessary that the exchange rate freely float under all circumstances for these effects to obtain. Thus to understand the implications of "fear of floating" it is necessary to allow for the possibility that countries can enjoy the insurance benefits of floating, despite making exchange rate interventions under some circumstances.

We develop a simple model that captures these policy tradeoffs and derive implications for the choice of exchange rate flexibility. The optimal policy with commitment is indeed state-contingent along the lines described above, stabilizing the exchange rate when there are shocks but no crisis, and allowing the exchange rate to float if a (potential) crisis occurs. However we also consider two other policy regimes. We contrast the discretionary policy, which is carried out ex-post with no commitment. As in Caballero and Krishnamurthy (2004) such a policy will exhibit inefficient "fear of floating" during crises and forgo the insurance benefits of the floating exchange rate, but it brings the benefits of exchange rate stability during normal times. Finally we also consider the non-contingent policy with commitment. Although we do not formally model the dynamics of the regime, we have in mind that commitment to floating takes time to establish. As a result the only feasible floating exchange rate might initially require flexibility under all circumstances. If this is the case it might be even more difficult to escape the "fear of floating" trap, since it requires incurring short-term costs, allowing the exchange rate to float even when intervention would be beneficial until the private sector is convinced of the commitment to floating.

The paper proceeds to reexamine the evidence on "fear of floating" from this perspective to see whether the unconditional indices of exchange rate flexibility used in the literature mask higher state-contingent flexibility during potential crises. If so, although describing an unconditional property of exchange rate regimes, "fear of floating" would not necessarily be any cause for concern, and in particular need not imply any under-insurance to crises. We find that for most countries there is little difference between the degree of

exchange rate flexibility during potential crises and other times. This lends support to the view that most emerging markets are operating under a discretionary exchange regime and that under-insurance is likely to be a problem. However, there is a group of emerging markets that does not exhibit state contingency because their exchange rates are uniformly flexible, including Chile and Indonesia. These countries cannot be described as exhibiting "fear of floating". We interpret these countries as non-contingent regimes committed to floating and conjecture that gaining credibility for the commitment to floating requires initially forgoing exchange rate intervention even when this might be beneficial. Finally a few countries, in particular South Africa and Mexico do exhibit state-contingent exchange rate flexibility. Interestingly these regimes are among the most mature floating exchange regimes in our emerging market sample and we conjecture that such maturity is precisely what enables these countries to intervene under some circumstances without compromising their commitment to floating.

The outline of the paper is as follows. Section 2 describes the theoretical framework we use to approach the data. Section 3 describes the data and methodology and provides an outline of the empirical facts. Section 4 provides a more formal analysis of the time series measures of exchange rate flexibility. Section 5 concludes.

2. Fear of Floating: Theoretical Discussion

2.1 Existing Literature

As stated above, various models have been proposed in the literature to explain "fear of floating". Calvo and Reinhart (2002) suggest that "fear of floating" can be explained by a monetary policy dilemma trading off seignorage benefits of inflation against cost of deviating from an inflation target in an environment with risk premium shocks and a high pass through of the exchange rate into the national price level. In their model fear of floating is increasing in the size of the risk premium shocks and the extent to which inflation targeting is valued over seignorage. Other authors, such as Aghion et al (2003) emphasize the balance sheet channel. Typically it is taken as given that there are substantial dollar liabilities which risk bankruptcies in the event of

a devaluation. However, Céspedes et al (2000) present a model in which balance sheet effects do not overturn the standard Mundell-Fleming analysis that floating rates are better in the presence of external real shocks. Lahiri and Vegh (2001) rationalize "fear of floating" as the optimal policy in an environment with an output cost of nominal exchange rate fluctuations, an output cost of higher interest rates to defend the currency, and a fixed cost of intervention. The fixed cost generates a non-linearity in which "fear of floating" only arises for large shocks. Finally Jeanne and Rose (2002) suggest that non-fundamental shocks related to noise traders provide a further reason for the central bank to intervene in the foreign exchange market, as in the presence of imperfect arbitrage these shocks are transferred into the price level. Despite deriving "fear of floating from different imperfections, for our purpose the important feature these models have in common is that "fear of floating" emerges as a characteristic of the *optimal, discretionary policy*.

A different view is offered by Caballero and Krishnamurthy (2004). Fear of floating arises in their model out of a time-consistency problem. Although it is optimal to tighten monetary policy *ex-post*, taking as given that the country is suffering an international liquidity crisis, such a policy increases the extent to which firms fail to conserve international liquidity *ex-ante*. The central monetary policy issue for a country facing such sudden stops is to make sure that the private sector takes enough precaution to insure itself. A floating exchange rate is the optimal policy from an *ex-ante* perspective as it raises the return to holding international liquidity and helps to ameliorate the under-insurance of the private sector. The difficulty in implementing this policy is that once a crisis occurs, the floating exchange rate is no longer optimal and so the time-consistent equilibrium entails "fear of floating" even though this is not optimal. In developing our theoretical model, the central insight we take from this analysis is the existence of *a commitment problem* with respect to floating.

The framework that we outline below combines elements from both approaches to exchange rate flexibility and we assume that "fear of floating" can have a different aspect under different circumstances. In particular we assume that a country can face two sorts of external shocks. Non-fundamental shocks during normal times when "fear of floating" can be beneficial, and sudden stops during which "fear of floating" is not the optimal response taking into account the effects on the incentives of the private sector to insure itself. We will examine the choice of exchange rate flexibility under three different assumptions about the government.

The *discretionary regime* is the optimal policy assuming the government cannot commit to floating during sudden stops and so the policy is determined *ex-post*. Such a policy will be optimal during normal times, but will contribute to under-insurance during sudden stops. The *state-contingent regime* assumes that the government can commit to floating during sudden stops but that the private sector can observe whether or not such an event has occurred. In this case the government is also free to intervene, if it finds this optimal under some circumstances, without compromising its commitment to float during crises. Finally we consider the *non-contingent regime* in which the government can commit to its exchange rate regime, but the private sector does not observe whether or not a sudden stop has occurred. As a result the government must choose the same exchange rate flexibility at all times, since intervention during normal times can compromise the commitment to floating during crises.

The restriction on feasible policies in the non-contingent regime might appear *ad hoc* as it is not derived endogenously within the model but simply imposed as an assumption. In defense we consider this regime for several reasons. First we think of it as a useful approximation to the feasible floating policy for a country that needs to build credibility for its commitment to floating. A similar situation has been modeled formally in the context of building a reputation for inflation credibility by Barro (1986). In that model the private sector is uncertain about the preferences of the policymaker and the policymaker takes into account the fact that the private sector learns about these preferences through his actions. The equilibrium exhibits periods in which policymakers that are tough on inflation drive inflation to a very low level to demonstrate this fact until a reputation is established. We conjecture that a policy of non-contingent floating can operate in a similar manner when a reputation for floating during crises has not been established. Second, it allows us to discuss the possibility that the "fear of floating" trap might be deeper than that identified by Caballero and Krishnamurthy (2004) if it is actually necessary to incur costs in the short run by forgoing beneficial interventions. Finally this policy regime appears to describe the behavior of some countries in our empirical investigation so we were compelled to consider it as a theoretical possibility.

2.2 A Model

The model will draw heavily on the framework of Caballero and Krishnamurthy (2004), postulating an over-investment problem (which is a manifestation of under-insurance with respect to sudden stops) in the private sector, which nevertheless responds to the incentives provided by the exchange rate regime. To highlight the issues on which we focus, and analyze the insurance motives for exchange rate flexibility together with legitimate motives for exchange rate stability we present the model in reduced form without explicitly considering the micro-foundations of the mechanisms through which exchange rate policy acts.

Consider a three period economy. At time 0 firms makes investment decisions. At time 1 a crisis may or may not occur which requires firms to make some reinvestment to maintain the productivity of their asset. At time 2 the economy consumes its output, which depends on both the investment at time 0 and the reinvestment at time 1. If a crisis occurs in period 1 the government faces *ex-post* incentives to tighten monetary policy as in the literature in which fear of floating is optimal. If no crisis occurs the exchange rate is still subject to non-fundamental shocks to which in inefficient financial markets the government has an incentive to respond.

The insurance aspect of monetary policy is that from the point of view of time 0 the investment decisions of firms depend on expectations of the exchange rate during the crisis. Investment (and reinvestment) requires international collateral and the exchange rate determines the price at which international collateral can be traded in the domestic market. There is a pecuniary externality that leads to an undervaluing (relative to the price which maximizes time 2 output) of international collateral, and hence firms over-invest at time 0 and conserve too little international collateral for the possible crisis at time 1. Monetary policy affects the exchange rate and hence has the power to correct this mis-pricing, but to do so the government has to commit to allow the exchange rate to depreciate during the crisis. This raises the return to holding international liquidity, lowers the return to investing and moves the investment decisions of firms closer to the output maximizing level. The time inconsistency problem arises since once the crisis occurs the investment decision is predetermined and the exchange rate depreciation just raises inflation which is costly to the government, so *ex-post* the government prefers to limit exchange rate flexibility.

The objective function of the government is given by $W(Y,\pi)$ where π is the inflation rate which prevails in period 1, Y is the output of the economy in period 2, $W_Y > 0$ and $W_\pi \leq 0$. The output that is produced in period 2 depends on whether or not there was a crisis. The states of the world in which no crisis occurs and a crisis occurs will be denoted *B* and *G* with probabilities of these states of nature are *p* and *1-p* respectively. If no crisis has occurred the economy produces $Y^G(K)$ and if a crisis occurs $Y^B(K)$ where K is the investment level of the private sector in period 0. During the crisis there is a production shock which requires further investment, and although the productivity of the capital stock is restored the country ends up investing more to produce each unit of output, so $Y^G(K) > Y^B(K)$.

The inflation rate depends on the monetary policy of the government via the exchange rate. We formalize monetary policy as a choice over the flexibility of the exchange rate, F which in general can differ across the *G*-state and *B*-state, F^G and F^B. If the exchange rate is flexible during the crisis the exchange rate depreciates and inflation increases. If the government chooses an inflexible exchange rate then depreciation and inflation is limited. Likewise if no crisis occurs we assume that non-fundamental shocks to sentiment cause exchange rate volatility which would be passed into inflation if a flexible exchange rate is adopted. We define the exchange rate e as the domestic price of one of international liquidity (dollars) so that larger values represent depreciations.

$$e = e(F); e_F > 0 \text{ and } \pi = \pi(e); \pi_e > 0$$

The investment decision, $K(e^B)$, depends on the (rationally expected) exchange rate which prevails in period 1, e^B, but only in the event that the crisis occurs. If the crisis does not occur then firms do not require any further foreign capital and so the exchange rate does not affect the objective function of the firm. Monetary policy affects the investment decision of firms, and under the assumptions of Caballero and Krishnamurthy (2004) firms over-invest (relative to the maximizing time 2 output) unless the exchange rate

is allowed to depreciate during crises. If the exchange rate is flexible in the crisis investment decreases towards the output maximizing level and Y^G and Y^B both increase.

$$K = K(e); K_e < 0,\ Y_K^G(K) \leq 0, \text{ and } Y_K^B(K) < 0$$

In reduced form we can write $Y^G(F^B)$ and $Y^B(F^B)$ where F^B is exchange rate flexibility in the *B*-state with

$$Y_F^G > 0 \text{ and } Y_F^B > 0$$

Finally we can write the problem of the government as:

$$\max_{F^G, F^B} EW(Y, \pi) = (1-p)W(Y^G, \pi^G) + pW(Y^B, \pi^B)$$

.

We will characterize the solution to this problem under the following three assumptions: the time-consistent discretionary policy, the optimal non-contingent policy with commitment and the optimal state-contingent policy with commitment.

The Discretionary Policy

The time consistent policy is chosen in period 1 taking investment decisions and the occurrence, or not, of the crisis as given. The fact that policy is chosen *ex-post* implies that the government has the option of carrying out a state-contingent policy. We denote the exchange rate flexibility chosen in each state as F_1^B and F_1^G where the index denotes the fact that the policy is chosen *ex-post* in period 1.

If the crisis occurs then the government solves

$$\max_{F} W(Y^B, \pi^B)$$

Once the crisis has occurred monetary policy has no effect on aggregate output, which is predetermined by the aggregate capital stock and the remaining international liquidity, so $Y_F^B = 0$ and the first order condition which determines the optimal F_1^B is

$$MC_{XP}^B = pW_\pi(Y^B, \pi^B(F_1^B))\pi_F^B(F_1^B)$$

$$MB_{XP}^B = 0$$

The government tightens monetary policy until either $W_\pi(Y^B, \pi^B) = 0$ in which case there are no further benefits to lower inflation, or $\pi_F^B = 0$ in which case inflation cannot be lowered any further.

If the crisis does not occur then the government solves

$$\max_{F} W(Y^G, \pi^G)$$

The same reasoning implies that the optimal F_1^G satisfies

$$MC_{XP}^G = (1-p)W_\pi(Y^G, \pi^G(F_1^G))\pi_F^G(F_1^G)$$

$$MB_{XP}^G = 0$$

Although these policies are both determined *ex-post* it is not necessary that $F_1^G = F_1^B$ since $Y^G \neq Y^B$. Given the best responses $F_1^G(Y^G)$ and $F_1^B(Y^B)$ equilibrium is determined by solving for $Y^G(F_1^B)$ and $Y^B(F_1^B)$, where it should be noted that only the expectations of the degree of flexibility in the *B*-state affect the time 0 investment decisions.

The time consistent policy, although optimal in period 1 when the crisis occurs, taking the time 0 decisions as given, is not optimal once the effect of expectations of time 1 policy on those decisions are taken into account. The optimal policy takes into account both the ex-post effects of devaluation on inflation, and the ex-ante effects on the investment decision of the private sector. The problem of the government is the same as above, but now the optimal policy can affect Y^B and Y^G.

The Non-Contingent Policy

Under this assumption the government must commit to the same degree of exchange rate flexibility whether or not the crisis occurs. We denote the optimal policy by F_0 where the index denotes the fact that the policy is chosen (with commitment) at time 0.

$$MC_{NC} = (1-p)W_{\pi}(Y^{G}(F_0), \pi^{G}(F_0))\pi_F^{G}(F_0) + pW_{\pi}(Y^{B}(F_0), \pi^{B}(F_0))\pi_F^{B}(F_0)$$

$$MB_{NC} = (1-p)W_{Y}(Y^{G}(F_0), \pi^{G}(F_0))Y_F^{G}(F_0) + pW_{Y}(Y^{B}(F_0), \pi^{B}(F_0))Y_F^{B}(F_0)$$

The State-Contingent Policy

Under this assumption the degree of flexibility is unconstrained across states of nature and the government can choose separately F_0^{G} and F_0^{B} where again the index denotes that the policy is chosen (with commitment) at time 0.

The first order conditions for this problem are:

$$MB_C^{B} = (1-p)W_{Y}(Y^{G}(F_1^{B}), \pi^{G}(F_1^{B}))Y_F^{G}(F_1^{B}) + pW_{Y}(Y^{B}(F_1^{B}), \pi^{B}(F_1^{B}))Y_F^{B}(F_1^{B})$$

$$MC_C^{B} = pW_{\pi}(Y^{B}(F_1^{B}), \pi^{B}(F_1^{B}))\pi_F^{B}(F_1^{B})$$

$$MB_C^{G} = 0$$

$$MC_C^{G} = (1-p)W_{\pi}(Y^{G}(F_1^{B}), \pi^{G}(F_1^{G}))\pi_F^{G}(F_1^{G})$$

2.3 Comparing the policy regimes

The section above solved the model under several different assumptions about the policy options of the government. It remains to rank these choices. We can establish the following proposition

i) The State-Contingent Policy dominates both the Non-Contingent Policy and the Discretionary Policy

ii) The ranking of the Non-Contingent and Discretionary Policies is ambiguous. For small values of p the Discretionary Policy dominates and for large values of p the Non-Contingent Policy dominates.

Figure 1 below illustrates the intuition. The Contingent Policy sets a separate and fully optimal exchange rate policy for each state of nature, taking into account the ex-ante insurance properties of exchange rate flexibility, and as such must *a fortiori* dominate any other policy option. As can be seen in the diagram the marginal benefit of exchange rate flexibility in the G-state is zero and the optimal policy is to stabilize the exchange rate, while in the B-state the optimal policy entails a tradeoff between the ex-ante insurance benefits and the ex-post inflation costs. Compared to this policy both the other policies entail costly distortions. The Non-Contingent policy, although taking into account the ex-ante effects of flexibility has to set a single policy across all states of nature. As a consequence in the *B*-state there is insufficient flexibility and in the *G*-state there is too much. The discretionary policy exhibits "fear of floating" in both states of the world forgoing all insurance benefits, as these are not taken into account and setting a low level of exchange rate flexibility.

In choosing between the Non-Contingent and Discretionary Policies it is necessary to compare the distortions produced by each. These are illustrated in the shaded area of Figure 1. This figure also allows us to informally compare the circumstances under which one policy dominates the other. Intuitively the Non-Contingent Policy will dominate when the insurance benefits are more important and the Discretionary Policy when the ability to smooth exchange rate volatility in the *G*-state is more important. As $p \rightarrow 1$ the cost of losing exchange rate interventions in the *G*-state tends to zero. As a consequence the two policies can be ranked by their insurance effects alone and so the Non-Contingent policy dominates. Conversely as $p \rightarrow 0$ the

insurance cost of "fear of floating" tends to zero and the policies are ranked solely on their ability to smooth non-fundamental disturbances in the *G*-state. In this case the Discretionary Policy dominates.

Contingent, Non-contingent and Discretionary Exchange Rate Flexibility

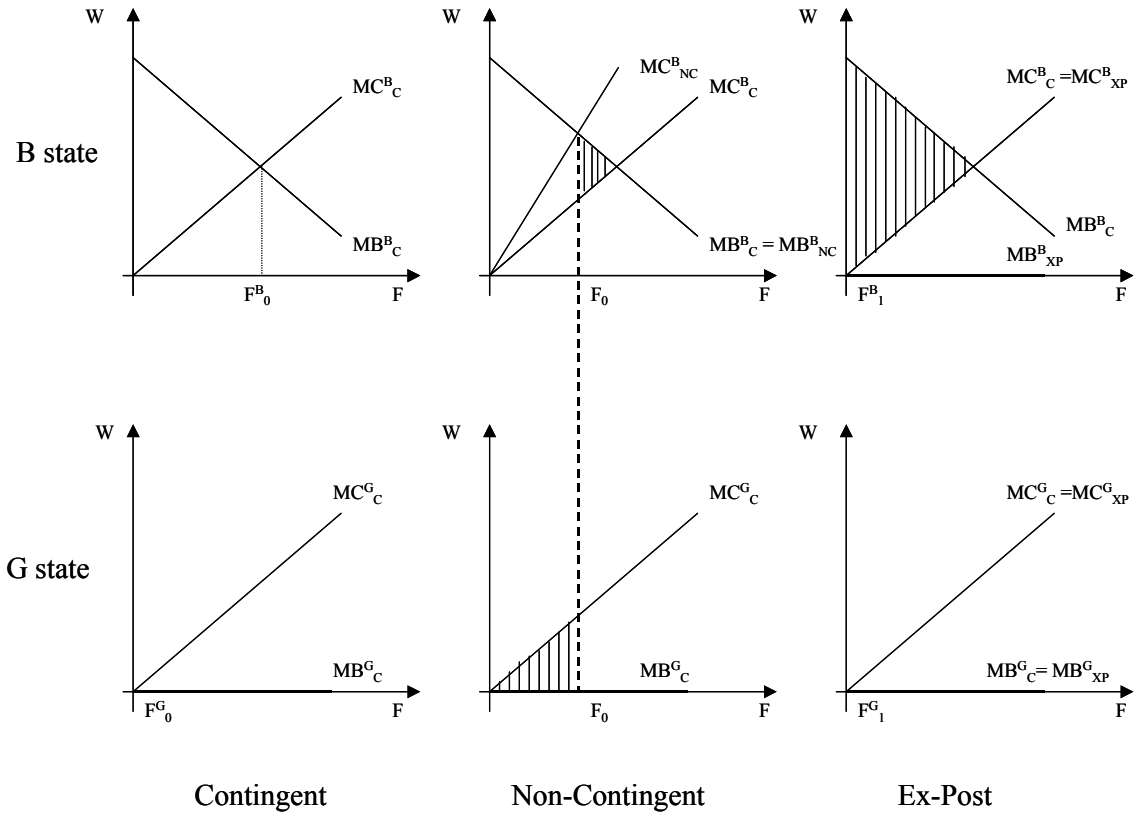

Figure 1

This result is illustrated in Figure 2, which demonstrates the possibility that "fear of floating" might be more difficult to escape from than the literature has so far acknowledged. In particular it is possible that, non-contingent floating is dominated by the discretionary outcome. Thus although it would be beneficial to use a contingent-floating exchange rate for insurance purposes it is not necessarily beneficial if a non-contingent regime is the only option. If the government needs to build a reputation for its commitment to floating this by following a non-contingent policy, this policy can actually be costly in the short run as it requires the government to forgo interventions that might actually be useful when there is no risk of a sudden stop.

The Fear of Floating Trap

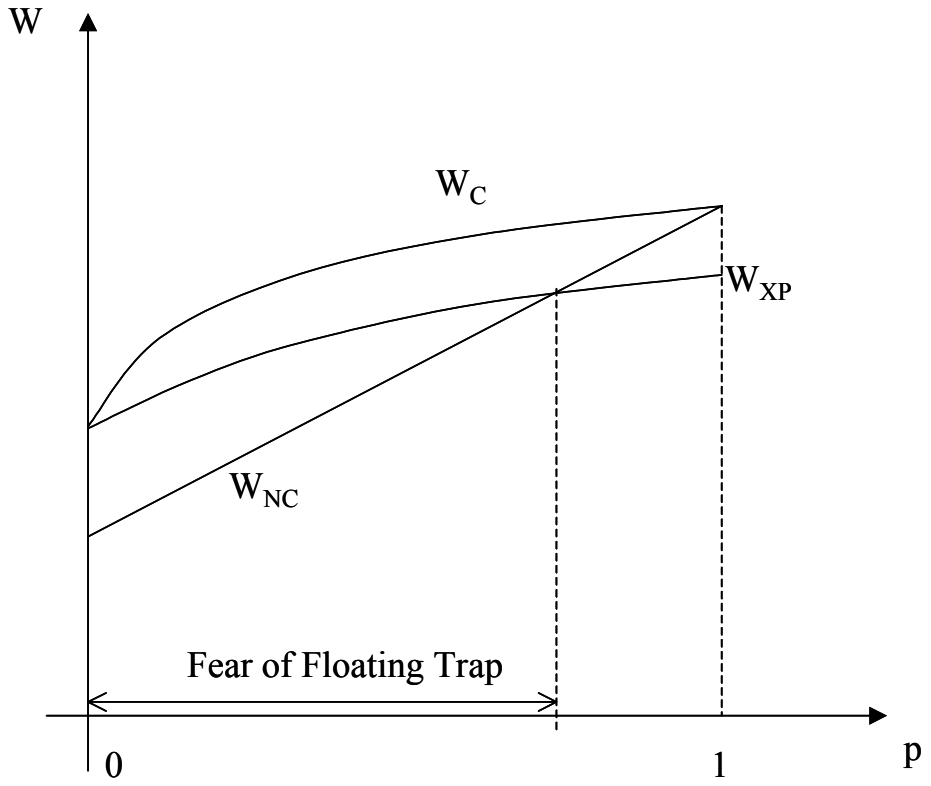

Figure 2

In the next section we turn to examine the data on exchange rate flexibility through the model developed above. We look for evidence of state-contingent flexibility which would mitigate the welfare implications of the "fear of floating" that the literature has previously discussed. At the same time we examine the outliers relative to the "fear of floating" category, countries which although not operating state-contingent regimes are distinguished by their uniformly *high* level of flexibility.

3. "Fear of Floating", Non-Contingent Floating and State-Contingent Flexibility

3.1 Methodology

The methodological approach that we adopt to characterizing exchange rate flexibility follows Calvo and Reinhart (2002). However, unlike their paper which sought to characterize differences in unconditional

exchange rate flexibility across countries, in comparison with the benchmark floaters of Australia and the members of the G-3 our purpose is to extend this analysis to investigate whether exchange rate flexibility of emerging market floaters varies over states of nature.[1] We do not dispute that "fear of floating" characterizes the unconditional exchange rate regime across emerging markets, but we seek to determine whether this unconditional measure conceals flexibility with respect to shocks that are important from an insurance perspective.

The literature on the *de facto* classification of exchange rate regimes has burgeoned recently. Extending the analysis of Calvo and Reinhart (2002), Reinhart and Rogoff (2004) have developed a *de facto* classification of exchange rate regimes which shows substantial numbers of deviations from the declared *de jure* regimes. The fear of floating manifests itself in the misclassification of regimes that *de jure* float, but *de facto* are less flexible. At the same time, Levy-Yeyati and Sturzenegger (2004) developed a similar index, albeit based on a different classification methodology with the same finding of extensive misclassification. An alternative classification scheme is constructed in Stambaugh (2004). We follow the approach of Calvo and Reinhart (2002) for two reasons. First, the methodologies in the other papers cited above are more suited to the broad classification question of distinguishing between fixed and flexible arrangements but our investigation is focused on the differences within the group of flexible regimes. Second, we want our results to be comparable with those reported in Calvo and Reinhart's paper which started the "fear of floating" debate.[2]

To measure flexibility we compare movements in exchange rates with movements in monetary policy instruments that affect the exchange rate. Examining the exchange rate in isolation is not informative about exchange rate policy as it does not take into account the shocks that monetary policy had to face. If the exchange rate is stable we do not know whether it was due to policy choices despite shocks or to a lack of shocks. To deal with this problem we define a flexible exchange rate as an exchange rate that is volatile

[1] Of course, Germany has a fixed exchange rate as a member of the Euro and previously limited flexibility in the Exchange Rate Mechanism, but Calvo and Reinhart's point was that the currencies of the G-3 floated freely against each other.

[2] Furthermore the question of the correct classification methodology is far from settled. Different methodologies appear to be suitable for different purposes and as Frankel (2003) notes the correlation among different *de facto* measures is actually quite low so we choose that which is most suitable for the questions we wish to address. For example the correlation between the Reinhart-Rogoff (2004) classification and the Levy-Yeyati-Sturzenegger is 0.41 which is not much larger than the 0.33 correlation of the Reinhart-Rogoff (2004) with the much maligned *de jure* classification.

relative to the instruments that could stabilize it. The implicit idea is that the policy maker faces a choice about where to allocate a given external shock. It can be allowed to affect the exchange rate if policy is inactive, or the exchange rate can be insulated if policy is active. Exchange rate flexibility is about the relative volatilities of the exchange rate and instruments and not about the absolute volatility of either in isolation.

We follow Calvo and Reinhart (2002) in using changes in reserves and interest rates as measures of the monetary policy instruments available to the authorities, and hence as measures of the degree of intervention. However, using these variables is not without its problems and we will review here some of the issues.[3] We risk errors of omission and commission in using changes in reserves or interest rates as measures of intervention and furthermore these potential biases might be more or less relevant depending on whether the question is to determine the within-country state contingency of exchange rate flexibility or compare exchange rate regimes across countries. Nevertheless, despite the many qualifications or issues of interpretation we use these measures as they are the best data that we have available and have been used by the authors of previous studies with which we would like to be able to compare our results.

Reserves can change for reasons unrelated to intervention, in particular accrual of interest and management of foreign currency debt. However, as will become clearer below, since we focus on large movements in reserves it is unlikely that we will misclassify an accounting change of reserves as an intervention due to the magnitude of the changes on which we focus, thus we are unlikely to be biased towards measuring too much intervention. On the other hand there can be "hidden" movements of reserves for example related to credit lines or derivative transactions which are not reported on the balance sheet. It is possible that we miss some of these interventions, and as such we misclassify regimes as not intervening when in fact they are. This would not be a problem were it our intention to establish "fear of floating" as it would bias our results towards finding flexibility and make the hypothesis harder to establish. However, since a major goal is to investigate the circumstances in which the exchange rate regime becomes more flexible we will need to pay attention to whether our findings can be explained by a change in the method of intervention towards "hidden" transactions. This can be a problem both within a country in establishing state-contingency if the

[3] Calvo and Reinhart (2002) also discuss some of the same issues.

change in the means of intervention is correlated with the shocks we use to measure state-contingency and across countries if countries with apparently flexible regimes are more likely to use "hidden" transactions.

Regarding interest rates as measures of foreign exchange intervention we also face several issues. The first is the extent to which the interest rate is genuinely an instrument of exchange rate management. Calvo and Reinhart (2002) present much anecdotal evidence that interest rates in emerging markets are active instruments of exchange rate management, but Shambaugh (2004) presents more systematic evidence that interest rate policy is not uniform across emerging markets and countries with more flexible exchange rates have more autonomy in setting their interest rates. If interest rates are not just tools of exchange rate management we risk misclassifying episodes as interventions when they are not. With regard to the within-country results this would present a problem only to the extent that the shocks that we use to measure external crises had a direct effect on the domestic economy, separate from the exchange rate channel, and interest rate policy responded directly to these effects. This does not seem a very plausible assumption. With regard to cross-country comparisons the issues are more serious since the empirical measures of interest rates that are available across countries are far from uniform, and policy interest rates which are the most natural counterpart to the theoretical analysis are not always available. In addition to the possibility that the extent to which interest rate policy is directed towards exchange rate management varies across countries it is possible that we introduce biases related to systematic differences in the interest rate series we use across countries. If the extent of misclassification varies systematically with exchange rate flexibility, for example if more flexible exchange rates give more monetary policy autonomy so that the interest rate can be directed to domestic macroeconomic objectives, then there would be a bias towards finding "fear of floating". This issue is actually relevant for the results in Calvo and Reinhart (2002) although they do not discuss it, but it makes it more difficult for us to establish circumstances in which exchange rates are flexible.

As in Calvo and Reinhart (2002) we first adopt a relatively atheoretical approach to exploring the data. To measure exchange rate volatility we compute the probability that the monthly percentage change in the nominal exchange rate is within a given band. To measure instrument volatility we examine the movement of foreign exchange reserves and interest rates. We will denote the absolute value of the percent change and the absolute value of the change in variable x by $\hat{x}$ and $|x|$, respectively and x^c a critical threshold. We are

interested in the probability that the variables $\hat{x}$ or $|x|$ are less than x^c. We follow Calvo and Reinhart (2002) in considering percent changes for nominal exchange rates and international reserves (setting x^c equal to 2.5%), and absolute changes for nominal and real interest rates (setting x^c equal to 400 basis points). We use bands as measures of volatility as they are less dependent on outliers than variances and also are less likely to miss-identify changes in instruments as interventions because they focus in big policy changes, although we carry out a more formal analysis that uses variances in the next section.

To examine whether flexibility varies when the country faces a potential sudden stop, we use a measure of high yield spreads (defined as the difference between Moody's Seasoned AAA and BAA Corporate Bond Yields) to capture a source of exogenous financial pressure. Shocks are measured as the difference between the logarithm of the actual series and its trend as measured with the Hodrick-Prescott filter. In particular, we define a period of external pressure as an episode when either the shock is one standard deviation above its average, or the change in the actual series is one standard deviation above its average. These two dimensions imply that we are defining potential crises as periods when the level or the change in high yield spreads were particularly high. As a consequence, the periods entering within this definition are 1990.10-1991.04, 1998.10-1999.03, 2001.01, 2001.12-2002.12, and 2003.06.

It is important to emphasize that this variable is intended as an exogenous source of *potential* financial pressure. Since we are interested in the preventive properties of exchange rate regimes it would not be correct to look at actual crises.[4] Our goal is to examine exchange rate choices during episodes in which countries had a choice about whether to pursue a tight monetary policy or let the exchange rate depreciate. For this reason we will pay careful attention when interpreting the results to whether we have excluded all false positives related to actual crises, when even fixed exchange rates can pass through periods of turbulence. Furthermore, although we will pay more careful attention to this issue in discussing the results it is worth emphasizing that such "false positives" concerning exchange rate flexibility are more likely to occur in situations of low levels of reserves and financial crises that we already partially excluding with the sample selection (see below).

3.2 Data

We use monthly data taken from the *International Financial Statistics* for all our analysis. The nominal exchange rate is the monthly end-of-period bilateral dollar exchange rate (Source: IFS line ae). Reserves are measured using gross foreign exchange reserves minus gold (Source: IFS line 1L.d). Regarding nominal interest rates we follow Calvo and Reinhart (2002) in trying to use policy interest rates whenever possible. As these vary by country, we use interbank rates (for Argentina, Australia, Brazil, India, Indonesia, Malaysia, Mexico, Pakistan, Singapore, South Africa, and Thailand. Source: IFS line 60B), deposit rates (for Chile. Source: IFS line 60L), discount rates (for Colombia and Peru. Source: IFS line 60) and T-bill rates (For Israel and Philippines. Source: IFS line 60C).

The sample was chosen to include emerging economies that are sufficiently developed so as to have access to capital flows, so that they face the open economy policy dilemmas described above. In particular we only incorporate countries that are included in Morgan Stanley Capital International (MSCI) index.[5] In contrast to Calvo and Reinhart (2002) we consider only the period starting in 1990 because only during this phase did voluntary capital flows to these economies become substantial. We exclude the transition economies because they experienced shocks and reforms of a very different nature during the 1990s and we limit our analyses to exchange rate regimes with some *de jure* exchange rate flexibility so that we include only regimes classified as managed floating or independent floating as reported to the IMF. Finally we exclude regimes with severe macroeconomic instability since the macroeconomic issues are very different for economies with high levels of inflation,[6] and for each episode we exclude the three months before and after any explicit change of exchange rate regime to avoid contaminating the results with transition effects.

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[4] For example, Calvo et al. (2004) analyze *actual* sudden stops.

[5] The EMBI which is the probably better known index for emerging markets has frequently changed the sample definitions, so we focused on the MSCI to define the sample used here.

[6] Reinhart and Rogoff (2004) assign these regimes to a separate category of "freely falling" in their *de facto* analysis arguing that floating exchange rates are qualitatively different under very high inflation.

3.3 The Stylized Facts

We first use the measure of exchange rate flexibility described above to discuss the unconditional "fear of floating" result that has been described in the literature. We compute the relative frequencies of large exchange rate movements and large policy changes and plot them in Figure 3 below. In particular we plot on the horizontal axis the sample probability that the nominal exchange rate remains within the band, which is measure of exchange rate stability, and on the vertical axis the sample probability that the instruments remain within the band as a measure of instrument volatility. The volatility of policy instruments is a weighted average of the volatility of the nominal interest rate and the volatility of reserves, using as weights the variance of the volatility of each instrument.

To interpret the diagram, it is useful to consider the slope of the line connecting each point to the origin as a measure of exchange rate flexibility. The steeper the slope the more volatile the exchange rate relative to the policy instruments. Movements along a ray towards the origin represent more volatility in *both* the exchange rate and instruments, without changing the *relative* volatility of either, and hence can be interpreted as a measure of the shocks with which exchange policy had to contend during the sample period. The diagram also includes Australia, which was used by Calvo and Reinhart (2002) as a benchmark floating economy.[7]

"Fear of floating" can be clearly observed in this figure although interestingly it is far from uniform as a *de facto* characterization of emerging market floating exchange rates. According to this crude measure of exchange rate flexibility, few emerging markets have exchange rate regimes which are more flexible than Australia. Only Brazil and the newly independent floating regimes of Chile, Indonesia and Thailand appear to have more flexibility. Mexico and South Africa while having a similar policy stance to Australia appear to face more volatile external conditions. At the other extreme Pakistan and India behave very similarly to pegs.

[7] They argue that unlike the G-3, which are not useful comparators for emerging markets due to the fact that their currencies are held as international reserves, Australia has a freely floating policy and is subject to similar external shocks to many emerging markets.

Fear of Floating – The Unconditional Evidence

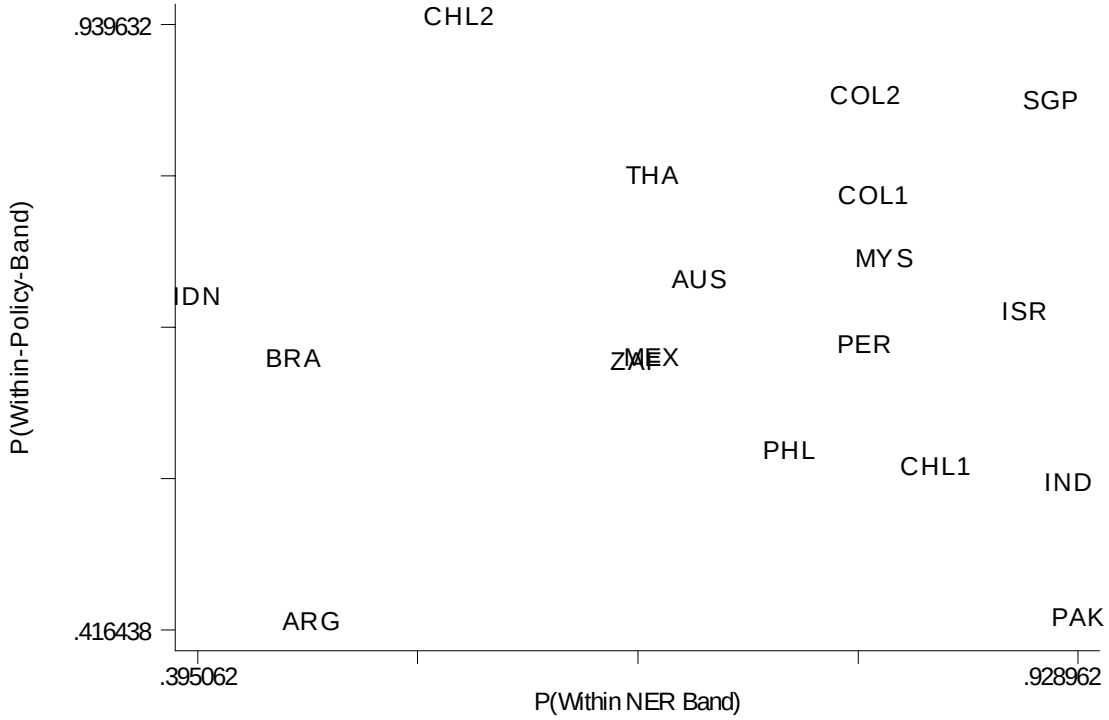


Figure 3

However, as discussed above it is difficult to draw policy implications from this diagram as it is not possible to determine the circumstances which have led to these policy choices. To address this question we need to compare exchange rate flexibility across periods with and without external pressure. Table 1 presents the evidence on the flexibility of the exchange rate and instruments controlling for whether the country is faced by external pressure. The effects are estimated by running a regression of a binary variable taking a value of 1 if the variable is within the band and 0 otherwise and our indicator of periods of external pressure. This procedure is equivalent to comparing the probability that each variable is within the relevant band in periods with and without external pressure. We will use this evidence to address two questions. To what extent are there emerging markets which are not characterized by "fear of floating" and among those which are, is there any evidence of state-contingent flexibility when faced with external pressure?

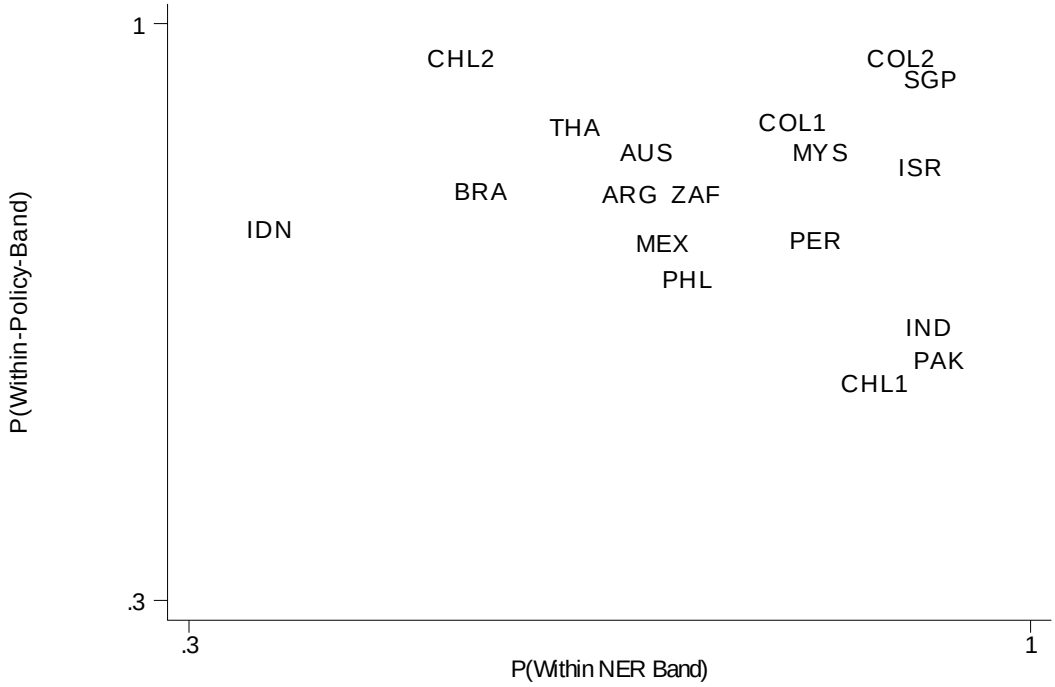
Table 1: Volatility of Exchange Rates, Reserves and Interest Rates

Country	IMF Classification	Start	End	Nominal Exchange Rate		Reserves		Interest Rates	
				Basis case	HYS shock	Basis case	HYS shock	Basis case	HYS shock
Argentina	Managed Float	200201	200412	0.667	0.300*	0.333	0.200*	1.000	0.200*
Brazil	Ind. Float	199901	200412	0.543	0.267*	0.478	0.400	0.935	1.000*
Chile	Managed Float	198901	199908	0.870	0.692	0.620	0.539	0.520	0.385
Chile	Ind. Float at	199909	200412	0.526	0.667	0.895	0.933	0.973	1.000
Colombia	Managed Float	198901	199909	0.802	0.846	0.663	0.846*	0.970	0.846
Colombia	Ind. Float	199910	200412	0.892	0.667*	0.838	0.733	1.000	1.000
India	Managed Float	198901	200412	0.916	0.769	0.430	0.385	0.713	0.429
Indonesia	Ind. Float	199708	200412	0.368	0.524	0.719	0.667	0.750	0.762
Israel	Managed Float	199112	199912	0.909	0.833	0.432	0.833*	1.000	1.000
Mexico	Ind. Float	199501	200412	0.693	0.667	0.480	0.706*	0.841	0.905
Pakistan	Managed Float	198901	200412	0.924	0.964	0.160	0.179	0.785	0.857
Peru	Ind. Float	199008	200412	0.822	0.741	0.619	0.407	0.778	0.778
Philippines	Ind. Float	198901	200412	0.715	0.857*	0.420	0.464	0.806	0.857
Singapore	Managed Float	198901	200412	0.917	0.893	0.762	0.786	1.000	1.000
S. Africa	Ind. Float	198901	200412	0.722	0.464*	0.347	0.714*	0.993	1.000*
Thailand	Ind. Float	199707	200412	0.621	0.905*	0.724	0.762	0.931	1.000*

Source: Authors' calculations based on *International Financial Statistics*, International Monetary Fund
Notes:
1 – Nominal Exchange Rate Volatility - Probability that the monthly change is within a +/-2.5% band
2 – Reserves - Probability that the monthly change is within a +/-2.5% band
3 – Interest Rates - Probability that the monthly change is within a +/-400 b.p. band
* identifies a situation when the value in the basis case and the HYS shock are significantly different at the 5% level.

Figure 4 presents this data in a diagram, with a combined measure of instrument volatility as used in Figure 1. Again the slope of the line connecting each point to the origin can be interpreted as exchange rate flexibility. The two panels compare exchange rate flexibility under the base case with that when the country faces external pressure. Two findings stand out from this diagram. First, this analysis appears to confirm that Brazil, Chile, Indonesia and Thailand are characterized by more exchange rate flexibility under the normal circumstances of the base case. These countries are not accurately characterized by "fear of floating". Second there appears to be evidence of state-contingent flexibility for some countries. In particular both South Africa and Mexico, while exhibiting similar flexibility to Australia during normal times seem to have a higher degree of flexibility during periods of external pressure. Figure 5 will develop a more transparent representation of this state-contingent flexibility.

Contingent Flexibility – Base Case



Contingent Flexibility – High Yield Spread Shocks

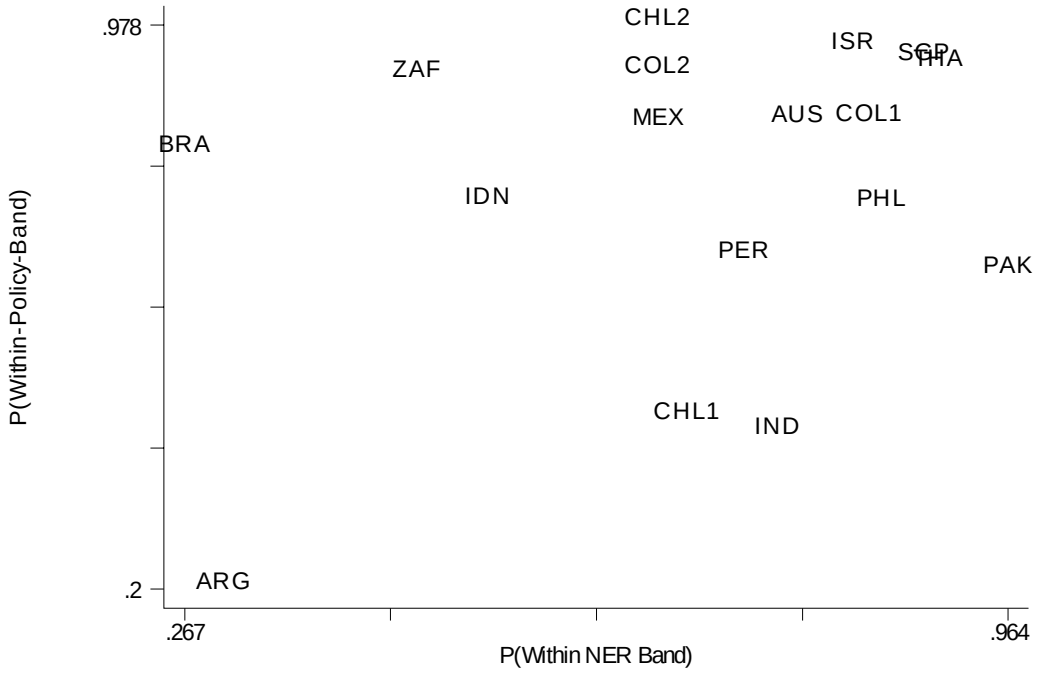


Figure 4

Under the interpretation of the Figures 3 and 4 above the flexibility of the exchange rate changes in periods of external pressure if and only if the slope of line connecting each point to the origin changes. Figure 5 develops a simple way of testing this hypothesis. In particular define the exchange rate flexibility during normal times and under external pressure as F^G and F^B.

$$F^G = P(Pol\_in\_band / no\_shock) / P(NER\_in\_band / no\_shock)$$

$$F^B = P(Pol\_in\_band / shock) / P(NER\_in\_band / shock)$$

The exchange rate regime is more flexible under external pressure if and only if $F^B > F^G$ which can be written, after taking logarithms and rearranging:

$$\begin{aligned} &\Leftrightarrow \ \ln P(Pol\_in\_band / shock) - \ln P(Pol\_in\_band / no\_shock) \\ &> \ln P(NER\_in\_band / shock) - \ln P(NER\_in\_band / no\_shock) \end{aligned}$$

$$\Leftrightarrow \ \Delta(Policies) > \Delta(NER)$$

Thus Figure 5 plots the change (in logs) of the policy response against the change in the nominal exchange rate response. Points above the diagonal represent countries that are more flexible during periods of external pressure while points below the diagonal exhibit the opposite behavior. As is apparent, many countries are located on or around the diagonal suggesting that these countries do not exhibit much state contingency. Some of these countries as Chile present high levels of flexibility in both normal and shocks periods, while other as Pakistan present low levels of flexibility in both situations. However, Argentina, Brazil, the more recent Colombian regime, South Africa, Israel, and Mexico do appear to exhibit some state-contingency. At the other extreme a few countries, such as India, Indonesia, and Thailand lie below the diagonal suggesting that these countries are pursuing more flexible policies during normal times that during periods of external pressure. However, although this is a potentially a further form of fear of floating, Thailand and Indonesia are being compared to a relatively high base level of flexibility so this interpretation is not necessarily appropriate. Finally, Australia is also included in this figure as a falsification exercise. HYS shocks should not have a significant effect on Australia and so we would not expect to observe any difference in flexibility during periods of external pressure. This is exactly what we observe.

Contingent Flexibility – High Yield Spread Shocks

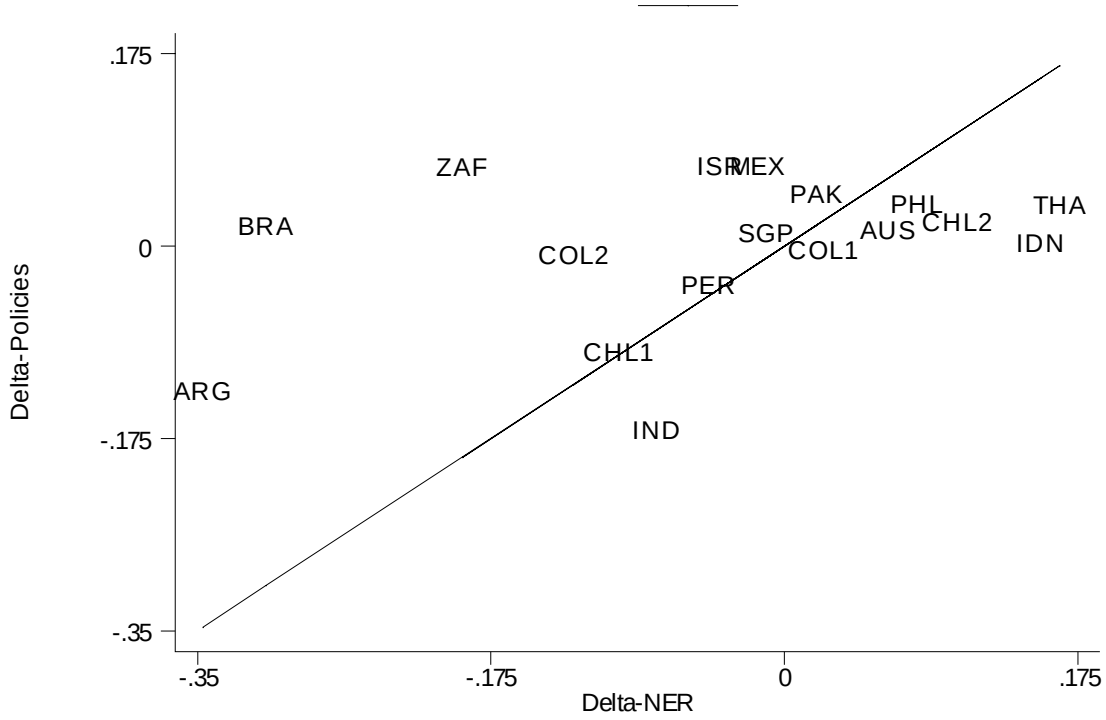


Figure 5

In summary the above figures suggest two basic findings. First, in the unconditional data there are several countries which are exhibiting less "fear of floating" than the Australia benchmark. Second it is possible to identify a few countries that while exhibiting "fear of floating", do on average allow more exchange rate flexibility during periods of external pressure. South Africa in particular stands out in this regard, although contingent flexibility seems to be an aspect of exchange rate behavior for Brazil, Colombia and Mexico as well. The next section will investigate these findings in more detail by carrying out a more formal time series analysis of exchange rate flexibility which will allow us to attribute statistical significance to the findings.

4. Exchange Rate Flexibility Index: Time Series Analysis

To provide further support to the claims developed above we undertook a more formal analysis of exchange rate flexibility. For this purpose we constructed a time series index of flexibility analogous to that presented in Calvo and Reinhart (2002). The exchange rate flexibility index is defined as:

$$F = \frac{\sigma^2_{\hat{E}}}{\sigma^2_{\hat{R}} + \sigma^2_{|i|}},$$

where $\sigma^2_{\hat{E}}$ denotes the variance of the nominal exchange rate, $\sigma^2_{\hat{R}}$ the variance of reserves and $\sigma^2_{|i|}$ the variance of the interest rate.

To implement the measure we construct at each point in time *t* a 13-month rolling window centered on *t* and compute the sample variance of each component variable. In this manner we derive a time series measure of exchange rate flexibility. The interpretation of this indicator is similar to the analysis above. To evaluate the degree of flexibility of an exchange rate regime we incorporate information about flexibility of both the exchange rate and instruments. In more flexible regimes we should observe a high degree of volatility of the exchange rate vis-à-vis instruments, and hence a high value of *F*, while in less flexible regimes the flexibility index should be close to 0. We use a symmetric window incorporating both leads and lags of each variable since we want to evaluate the effect of shock comparing the exchange rate and policies before and after.

For each episode (i.e. regime included in the analysis) we run the following regression:

$$F_t = \alpha + \sum_{m=0}^{M} \beta_m HYS_{t-m} + \sum_{n=0}^{N} \gamma_n F_{t-n} + \varepsilon_t$$

Thus we identify $\frac{\alpha}{1-\sum_{n=0}^{N}\gamma_n}$ as the long-run basis regime effect (i.e. when there is no external pressure from the HYS and after incorporating the dynamics of *F*), $\frac{\sum_{m=0}^{M}\beta_m}{1-\sum_{n=0}^{N}\gamma_n}$ as the long-run difference in the flexibility index between normal and (potential) crises times. In order to choose the optimal lag structure of the model we use the Schwarz information criterion. Table 2 presents a summary of the results of these regressions.

Table 2: Exchange rate flexibility index

Country	**IMF Classification**	**Start**	**End**	$\frac{\alpha}{1-\sum_{n=0}^{N}\gamma_n}$	$\frac{\sum_{m=0}^{M}\beta_m}{1-\sum_{n=0}^{N}\gamma_n}$	Dynamic structure (M,N)
Argentina	Managed Floating	200201	200412	0.3747	0.2186	(0,1)
Australia	Independent Floating	198901	200406	0.3023	-0.0616	(1,2)
Brazil	Independent Floating	199901	200412	0.7985†	0.4711*	(1,1)
Chile	Managed Floating	198901	199908	0.2281	-0.0195	(0,1)
Chile	Independent Floating	199909	200412	0.9233†	0.2778	(1,2)
Colombia	Managed Floating	198901	199909	0.4880	0.3797	(0,1)
Colombia	Independent Floating	199910	200412	0.5168	1.2369*	(0,1)
India	Managed Floating	198901	200412	0.1469†	0.0516	(0,1)
Indonesia	Independent Floating	199708	200412	1.4425†	-1.1495	(0,1)
Israel	Managed Floating	199112	199912	0.1044	4.7612	(2,5)
Mexico	Independent Floating	199501	200412	0.2895	0.4450*	(0,1)
Pakistan	Managed Floating	198901	200412	0.0875†	-0.0271	(1,4)
Peru	Independent Floating	199008	200412	0.2855	-0.1455	(1,1)
Philippines	Independent Floating	198901	200412	0.3535	0.2299	(0,1)
Singapore	Managed Floating	198901	200412	0.6357†	0.1291	(0,1)
South Africa	Independent Floating	198901	200412	0.9601	0.2079*	(0,3)
Thailand	Independent Floating	199707	200412	0.5182	-0.2832	(0,1)

Source: Authors' calculations based on *International Financial Statistics*, International Monetary Fund
* indicates a regime when the long-run effect of HYS crises is significantly different from 0 at the 5% level using a Wald test.
† indicates base case significantly different to Australia 5% level using a Wald test.
Covariance matrix computed with Newey-West standard errors.

The results of this analysis mostly confirm the less formal stylized facts presented in section 3, although some important differences will be discussed below. Comparing the signs of the coefficients, the regime

classifications present a similar picture to Figure 3 for both the base effect and the long run effect of external pressure. More importantly this analysis allows us to identify the regimes for which contingent flexibility is statistically significant. Table 2 suggests that only four countries, Brazil, Colombia, South Africa, and Mexico behave in this fashion. The other countries present a constant level of flexibility in different states of nature. The table also allows us to distinguish which countries are operating significantly more flexible, although non-contingent exchange rate regimes. In this category are Chile, Indonesia and Singapore. There is some inconsistency with the earlier results where it appeared that Thailand was also in this category, although this is not confirmed by the statistical analysis. South Africa, although apparently exhibiting a high degree of base-line flexibility is not statistically different to Australia.

It is instructive to interpret these results in the light of the model presented in Section 2. In particular we can divide the sample into three groups along the lines suggested by the theory. In the first category are the countries which exhibit "fear of floating" in all states of nature. These countries are characterized by discretionary exchange rate policies and an apparent inability to commit to floating exchange rates. This group represents the majority of the sample and as such lends support to the claim that the low levels of exchange rate flexibility in these countries might be a cause for concern. At the other extreme is a small group of countries which although not exhibiting state-contingent flexibility nevertheless exhibit a genuinely floating exchange rate with significantly more flexibility than the benchmark, Australia. These countries include Chile, Indonesia and Singapore and we can identify this group as non-contingent floating regimes. It is interesting to note that Chile and Indonesia are more recent entrants to the group of floating exchange rates and this is suggestive of the possibility that a reputation for commitment to floating is something which takes time to acquire, during which time countries do not have the freedom to undertake exchange rate interventions for fear of undermining their credibility to floating.

Finally we find a few examples of state-contingent regimes which the model suggests is the most appropriate exchange rate policy for these emerging markets. As argued above, even the most freely floating exchange rate is subject to non-fundamental shocks which might require intervention. These countries seem to have won the ability to intervene in these cases without compromising their demonstrated commitment to floating during times of external pressure. Interestingly this group includes Mexico and South Africa two of the

countries with the longest standing commitment to floating in the sample lending further weight to the hypothesis that commitment to floating is something that can only be acquired over time, but once acquired policymakers will find themselves with more freedom to manage exchange rate volatility if necessary. Furthermore these two countries have been more or less able to isolate their economies from the periods of extreme external turbulence during the late 1990s. For instance, while allowing big movements in the nominal exchange rate in the late 1990s, neither of them have had sudden stops during the same period (Calvo et al. 2004) and their decline in growth rates have been quite mild in comparison with other countries. In this group we also find Brazil and Colombia. However the identification of these regimes in contingent-flexibility category is less certain. Both switched to more flexible regimes in the aftermath of a sudden stop and although they have avoided suffering additional external crises, it is perhaps too early to tell whether they are floating more out of choice or necessity. Finally it should be noted that the statistical analysis does not identify Argentina as a member of this group despite appearances to the contrary in Figure 5.

5. Conclusions

We have reexamined the "fear of floating" phenomenon from the perspective that policymakers in emerging markets face a set of tradeoffs when determining exchange rate policy. While "fear of floating" during normal times might indeed be the optimal policy for these economies, there are also occasions when sudden stops imply that "fear of floating" is not the optimal policy, even though this is precisely what a discretionary policy maker will choose. We have attempted to categorize the feasible exchange rate regime choices, recognizing that these tradeoffs imply that the optimal policy would be state-contingent floating, although in practice the necessity of acquiring a reputation for a commitment to floating might limit the available policy options to a choice between non-contingent floating, or if commitment is lacking, a discretionary regime.

With this framework in mind we have explored the empirical evidence on exchange rate flexibility in emerging markets. We have covered some of the same ground as Calvo and Reinhart (2002) in their original paper on "fear of floating" although we have found much evidence that the picture is significantly more complicated than this one dimensional characterization. There is indeed a lot of "fear of floating" in

emerging markets as they found, but our analysis of state-contingent flexibility allows us to be a little more certain both in attributing this to an inefficient discretionary equilibrium and in arguing that more commitment to exchange rate flexibility would be beneficial for the insurance of these economies against sudden stops. At the same time we have found a couple of emerging markets, namely Chile and Indonesia, that are not characterized by "fear of floating" at all. These economies, recent converts to floating, appear to be serious about developing a reputation for floating and are forgoing exchange rate intervention to demonstrate this. Other analyses have also highlighted the exchange rate flexibility of these economies. Hernandez and Montiel (2001) identify Indonesia as the only Asian country to move to free floating following the crisis and Frankel (2003) discusses Indonesia as one of the examples which is commonly cited as a successful floating exchange rate, due to its subsequent recovery despite being hit with the worst of the Asian crisis.

Finally we have found that several of the more mature floating exchange rates exhibit precisely the state-contingent flexibility that our theoretical analysis suggests would be optimal in this environment. They appear to be able to intervene under certain circumstances without compromising their commitment to floating during sudden stops, when floating is really important. The clearest example of such a country that emerges from our analysis is South Africa, which is perhaps a more appropriate benchmark for this group of emerging markets than Australia with which they are commonly compared. The particular financial market shocks on which we have focused clearly have an impact on South Africa, while they have no impact on the Australian exchange rate regime, and for which it is probably safe to say they do not represent external shocks at all.

The South African case presents a particularly interesting study for emerging market floating regimes. It is an open middle income country that between the end of the Bretton-Woods system and 1985 experienced seven currency crises (Bordo and Eichengreen (2002)), which is high even by current standards of emerging market volatility. Nevertheless, since 1985 South Africa has a history of floating and its commitment to this regime does not appear to be in doubt.[8] The South African Reserve Bank has explicitly stated that it does not

[8] It is one of the few emerging markets that the Reinhart and Rogoff (2004) classification reports as a freely floating exchange rate. It is classified as such from 1995, prior to which it is classified as a managed float.

target the level of the exchange rate, although it has a policy of interventions aimed to "smooth out large short-term fluctuations in the exchange rate" according to Mboweni (2004). The commitment to floating has clearly been tested on several recent occasions; however during the period starting in 1998 South Africa did not experience a sudden stop despite the turmoil in emerging markets (Calvo et. al 2004). It appears that a floating exchange rate is not only a feasible policy for emerging markets; it is a policy that can be successfully used to insure the economy against external volatility without forgoing the option to occasionally intervene in turbulent markets. For more recent floaters such as Chile, this experience should prove an invaluable guide.

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