

**WOULD INTERNATIONAL CURRENCY TAXATION
HELP STABILISE EXCHANGE RATES
AND AVOID CURRENCY CRISES IN DEVELOPING COUNTRIES?**

Graham Bird* and Ramkishen S. Rajan**

February 2000

Word count: 5285 (Text)

* Surrey Centre for International Economic Studies, University of Surrey, UK. E-mail:
g.bird@surrey.ac.uk

* School of Economics, University of Adelaide, Australia and the Institute of Southeast Asian Studies,
Singapore. E-mail: ramkishen.rajana@adelaide.edu.au

Comments by two referees of this journal are appreciated. The usual disclaimer applies.

**WOULD INTERNATIONAL CURRENCY TAXATION
HELP STABILISE EXCHANGE RATES
AND AVOID CURRENCY CRISES IN DEVELOPING COUNTRIES?**

Completely flexible exchange rates may be “excessively” volatile, with the implied currency misalignments leading to real inefficiencies in resource allocation and detrimental effects on economic growth. This paper analyses whether international currency taxation would be effective in calming exchange rate volatility and avoiding currency crises within the context of a simple model of exchange rate determination. It is found that the effects of a tax on foreign exchange volatility depend on the nature of speculation and whether the focus is on capital inflows or outflows.

Key words: foreign exchange, IMF, capital flows, Tobin tax, volatility

JEL Classification: F30, F31, F34

I. BACKGROUND AND INTRODUCTION

Developing countries are caught in something of a dilemma in terms of exchange rate policy. Where macroeconomic policies are inconsistent with an exchange rate peg, and domestic prices and costs are sticky, real exchange rates will become misaligned, and currencies will be vulnerable to speculative attack. However, eradicating misalignments by devaluation can itself create problems. Not only are there political constraints as devaluation is seen as a badge of failure, but also devaluation can spark off an inflationary impulse as well as cause additional speculation that pushes the currency into free fall. It may then prove difficult to engineer a “soft landing”¹.

Prior to the East Asian crisis, pegged exchange rates effectively eliminated any concern on the part of foreign creditors about currency fluctuations relative to the US dollar and, combined with implicit or explicit sovereign guarantees against institutional bankruptcies, this encouraged external overborrowing/overlending on unhedged bases. Real exchange rates appreciated and the balance of payments on current account weakened. When creditors became unwilling to rollover short term loans, a crisis erupted and currencies plummeted in value, causing the local value of dollar-denominated liabilities to rise sharply.

Does this mean that small open economies need greater exchange rate flexibility? Can flexible exchange rates insulate them from external disturbances? Can currency crises be avoided by adopting flexible exchange rates?

Table 1 provides data on exchange rate arrangements for developing and transition

economies as reported by the IMF. Admittedly, officially announced regimes do not always correspond to actual exchange rate policies, with Thailand, and a number of other East Asian economies, being cases in point². Nevertheless, the data indicate a clear trend towards greater exchange rate flexibility. Specifically, while less than 15 per cent of these countries maintained “flexible” arrangements in 1973 and 1978, this figure had risen to 60 per cent by 1998.

Insert Table 1

Paradoxically, the disillusionment with fixed exchange rate regimes in developing economies has been matched by an equal disenchantment with the use of flexible exchange rates in developed economies. A concern here is that flexible exchange rates may give rise to “excessive” variability, with the fluctuations in the bilateral yen/US\$ rate over the past two decades being a stark example. Free floating is sometimes thought to be particularly unsuitable to developing countries, where thin markets imply that a few transactions can lead to extreme exchange rate fluctuations [Min and McDonald, 1999 and World Bank, 1999]. Table 2 presents some evidence on this. Certainly flexible exchange rates often appear to exhibit greater volatility in high frequency data than would be warranted by the underlying fundamentals. Granted that spot exchange rate experience sharp swings due to destabilising speculation, does this necessarily mean that something needs to be done? Or, more to the point, why might such “excessive” volatility be of concern?

Insert Table 2

While the empirical literature is lagging, recent studies that provide some evidence of

a negative impact of exchange rate volatility/uncertainty on investment include Huizinga [1994] and Corbo and Cox [1995]³. To the extent that investment has a significant positive effect on economic growth, declining investment will have an enduring adverse effect on the quantity of real resources. Even in the absence of a negative effect on the level of investment, excessive exchange rate variability will tend to have an adverse influence over the composition of investment since decisions will be based on disequilibrium prices.

It has often been argued that firms and other agents involved in international transactions can undertake hedging operations to shield themselves against exchange rate movements. However, apart from the costs involved with such operations, Adler [1994] and Friberg [1996] have noted that perfect hedges may be very difficult to create technically (given acute revenue-cost uncertainties). Indeed, even if they could be created, they would entail non-negligible transactions costs, thus diverting scarce resources from “real” economic activity. This is especially true in the case of developing economies, in which rudimentary capital markets necessitate the use of cross-hedging techniques (rather than direct hedging), which invariably are costly. According to a 1992 survey of non-financial Fortune 500 corporations, while 85 per cent of the respondents hedged, only 22 per cent hedged *fully*, with this figure dropping to 16 per cent when a “view” of the direction of the foreign exchange (forex) market was developed. Not surprisingly, most of the respondents which did not hedge were smaller firms [Felix and Sau, 1996 and Felix, 1996].

Frankel and Wei [1998] have undertaken a cross-sectional study of bilateral trade.

They find that bilateral exchange rate variability seems to have had a statistically and economically significant negative effect on trade between 1960 and 1985, though the impact - both economic and statistical - has been negligible between 1985 and 1990⁴. Wei [1999] provides new empirical evidence suggesting that exchange rate volatility has had a detrimental effect on trade between pairs of countries to a much larger extent than suggested by previous studies. A recent survey of the literature on the impact of exchange rate volatility on trade flows by McKenzie [1999: 100] concluded that the recent empirical studies seem to have “greater success in deriving a statistically significant relationship between volatility and trade.”

A general conclusion seems to be that developing countries in particular may experience non-negligible real costs as a consequence of excessive exchange rate variability. Flexible exchange rates may therefore also be associated with currency misalignment. Can this “excessive” instability be reduced?

This paper aims to make a contribution to answering this question by examining the effect of international currency taxation on exchange rate instability by developing a simple model of exchange rate determination. It therefore attempts to move forward the debate about exchange rate policy in developing countries. The paper is organised as follows. Section II provides direct evidence of “destabilising speculation” by reviewing recent surveys of forex market participants. These survey findings provide the motivation for Frankel's asset model of exchange rate volatility [Frankel, 1996], which we develop and extend in Section III. Within the context of this Frankel-type model, Section IV is devoted

to a theoretical analysis of the effects of a tax on international currency transactions. To anticipate the conclusion of these sections, it is found that the effects of a tax on forex volatility depend on the nature of speculation and whether the focus is on capital *inflows* or *outflows*. The final section offers some concluding remarks which place our analysis in the context of current discussion of exchange rate policy in developing countries.

II. WHAT DO SURVEYS OF FOREX MARKET PARTICIPANTS REVEAL?

There remains significant controversy among economists over the exact definition and significance of “excessive volatility” of exchange rates. Arguably, the most direct and persuasive evidence of this is provided by surveys of forex market participants. The main conclusions of recent surveys may be summarised as follows.

First, surveys by Frankel and Froot [1990a,b] using Money Market Services (MMS) International and the Economist Financial Report data bases have found there to be two broad groups of participants: the “chartists”, who consciously use analytical techniques (“momentum” models); and the “fundamentalists”, who make use of conventional macroeconomic exchange rate theories. The behaviour of the forex market is dependent on the interaction between and relative magnitudes of these two groups. This finding is consistent with the Kaldorian description of the forex market [Kaldor, 1960] and with Keynes’ (General theory) description of financial markets more generally. In particular, Kaldor suggested that financial market participants can be divided into two broad groups, viz. the “speculators”, who are “trend-chasers” (i.e., buying when the market is rising and selling when it is falling), and - for want of a better term - the “fundamentalists”, who focus

on the trend of “non-speculative elements” or market fundamentals. Intuitively, the greater the proportion of speculators to fundamentalists, the more destabilising is unfettered forex market trading in the short to medium term.

Frankel and Froot found that for every one per cent appreciation in the US\$, the median respondent expected a further 0.13 per cent appreciation over a one-week horizon, with this pattern continuing over the next few weeks (but at lower rates). But, over three, six and twelve month periods, the US\$ was expected to depreciate below the original (pre-appreciation) value.

Second, a questionnaire study of the London forex market reported by Allen and Taylor [1989] and Taylor and Allen [1990] led them to a broadly similar conclusion. The Frankel-Froot surveys revealed the use of technical analysis to have become more prevalent in the 1990s, with chartists dominating the market in the short term. The Allen-Taylor study revealed that about 90 per cent of respondents placed some weight on technical analysis. While less than ten per cent felt that pure fundamentals determined exchange rates over a three month period, this figure rose to over 30 per cent for periods over a year. Significantly, most did not view “pure chartism” to have played any significant role in even high-frequency exchange rate determination. Rather, the general view was that exchange rates were determined by the interaction between chartism and fundamentalism at all times, with the weight shifting towards the latter over longer horizons.

Third, using survey data of Japanese financial institutions relating to yen/US\$ bilateral exchange rates, Ito [1990] found evidence of market heterogeneity along Kaldorian lines.

He further found that participants have “bandwagon” expectations in the short run but “stabilising” ones over the long run (specifically, most participants expected a yen appreciation in the short run, but depreciation over the long run).

Fourth, a survey of senior forex traders in the main Asian money centres, (viz. Japan, Singapore and Hong Kong) conducted by Cheung and Wong [1997], suggested that only about five per cent of respondents believed that intraday exchange rate fluctuations reflected changes in fundamentals. This proportion rose to 80 per cent in the case of long run exchange rate movements, (i.e., longer than six months). About 80 per cent of respondents also viewed “bandwagon effects”, “over-reaction to news”, and “speculative forces”, as dominating intraday exchange rate movements. Exchange rate movements over the medium term, (i.e., periods less than 6 months), were generally thought to be driven by a mechanical trading rule (40 per cent) or economic fundamentals (30 per cent). Of particular interest is the fact that traders viewed long run exchange rates as being the least predictable, despite being of the view that they were driven by fundamentals.

Fifth, a survey of UK based forex dealers undertaken by Cheung et al. [2000], confirmed the existence of market heterogeneity⁵. Only three per cent of respondents believed that intraday movements in exchange rates reflected changes in underlying fundamentals, this figure rising to 87 per cent for the long run (longer than six months). Asked specifically about the PPP concept, while less than five per cent of respondents believed it to be a useful gauge of intraday exchange rate variations, 44 per cent opined that it was important in the long run.

In addition to these surveys, a study based on US Treasury forex data by Wei and Kim [1997] found that large market players are likely to have contributed to market volatility, suggesting that they trade on “noise” rather than on information. This is consistent with Nealy [1997], who has noted that such trading rules are most profitable for banks and large financial institutions. This is significant, because larger players would be expected to have better information. Nealy further finds that the profitability of such trading rules diminishes rapidly with time, turning negative over horizons of over a year.

De Long et al [1990] and Shleifer and Summers [1990] have emphasised that such market characteristics and heterogeneity are common to all financial markets. They refer to the “speculators” as “trend chasers”, “positive feedback investors” or “noise traders”. They define “arbitrageurs” as those making use of all available information in forming expectations.

In light of the above studies, Flood and Taylor [1996: 286] conclude that:

the finding that a high proportion of foreign exchange market participants deliberately use analytical techniques that ignore macro fundamentals (i.e., “technical” or “chartist” analysis), especially over shorter horizons ... underscores the importance of allowing for the interaction of diverse forces in the short run determination of exchange rates.

Referring to the same issue, Frankel and Rose [1995: 1713-4] noted that:

(this) area of research is quite small. However, it is potentially important, since it is part of the market microstructure work that is concerned with some of the most central issues of international finance, such as excess volatility and exchange rate determination. We hope for further developments.

Frankel [1996] has himself recently attempted to specify a model which presents a realistic structure for the forex market, and which takes into account the heterogeneity of

and interaction between the two groups of agents⁶. The next section reviews and extends this model. The importance of doing this is underscored by Obstfeld [1995: 189], who claims that:

(l)acking a complete understanding of exchange rate determination, it is not possible to form a reliable picture of how a Tobin tax would work in practice.

III. MODELING THE EXCHANGE RATE⁷

The Frankel model

Given the predominance of the US\$ in forex transactions, we concentrate on a bilateral exchange rate and assume that the other currency is the Thai baht (b). The demand for US\$ and bahts are, of course, derived from the demand for US and Thai assets respectively. Since the model is monetary in nature, we assume that the assets are financial (as opposed to real).

All variables are in log form.

$$s = m - d + u, \tag{1}$$

where: s is the spot exchange rate (baht per US\$); m is the supply of domestic (Thai) assets relative to US assets; d = relative demand for domestic (Thai) assets; and u is a stochastic term.

$$d = wd_i + (1 - w)d_s,$$

(2)

where: w is the fraction of long term participants or “fundamentalists”; $(1 - w)$ is the fraction of short term participants (“speculators”) or “chartists”; d_f is the relative domestic asset demand by the fundamentalists; and d_c is the relative asset demand by the chartists. As detailed above, the chartists expect the exchange rate to diverge from equilibrium (hence creating a “bubble”), while the fundamentalists expect a convergence. Thus, the fundamentalists’ behaviour is assumed to be stabilising or regressive, in that if the spot rate is higher than the equilibrium rate, a depreciation is expected and vice versa (i.e., exchange rate reversion). On the other hand, the “chartists”, who make use of analytical techniques or trading rules (“momentum models”) to forecast exchange rates, tend to have a destabilising effect on the asset value (relative to its “fundamental” value).

Accordingly, following Frankel [1996] we may rewrite the relative demand for domestic assets (d) as follows:

$$d = [wf_iq(s - \underline{s}) - (1 - w)f_c v(s - \underline{s})], \quad (3)$$

where: f_i and f_c denote the demand elasticities of the fundamentalists and chartists for foreign assets with respect to their corresponding expectations; q and v are the rates of expected convergence (by the fundamentalists) and divergence (by the chartists) of the spot rate from the long run “equilibrium level”, which is denoted by \underline{s} .

In order to fully specify the model, Frankel assumes \underline{s} to be a constant. Accordingly, solving for the spot rate, he obtains:

$$s = \alpha \{ m - (1 - w)f_i q \underline{s} + wf_s v \underline{s} + u \}, \quad (4)$$

where: $\alpha = 1 / \{ 1 - (1 - w)f_i q + wf_s v \}$.

From equation (4), the variance (Var) of the spot rate is:

$$\text{Var} (s) = \alpha^2 \text{Var} (m + u). \quad (5)$$

From equation (5), we note that $\partial[\text{Var} (s)]/\partial w < 0$, i.e., the greater the proportion of long term investors or fundamentalists in the market, the less variable is the exchange rate. Further, $\partial[\text{Var} (s)]/\partial(f_i q) < 0$ and $\partial[\text{Var} (s)]/\partial(f_s v) > 0$, i.e., the more sensitive or responsive the speculators are to the expected divergence between the spot and equilibrium exchange rate relative to the fundamentalists, the more variable will be the spot exchange rate.

In the short term, we would expect chartists/speculators to dominate the market both in terms of their share of market participants (low w) and in terms of the intensity of their actions (high $f_s v$). However, in the longer term, and once the exchange rate is beyond a certain level, the general perception is one of gross under/over-valuation, with the result that more market participants start paying closer attention to macro fundamentals. This is similar

to any other “rational price bubble” which feeds on itself in the short run as it is fueled by uni-directional expectations (i.e., either trend bearishness or bullishness), but is eventually pulled backed by the anchor of economic fundamentals (i.e., slow mean reversion)⁸. It follows therefore that the exchange rate will be very variable in the short term (relative to underlying fundamentals). However, this variability will fall over time in the absence of random shocks (the term u in this model) as fundamentals anchor the long term exchange rate⁹.

Extending the model to incorporate PPP

While the above Frankel model is intuitively appealing, its failure to endogenise \underline{s} based on a fundamental macro model of exchange rates, limits the generalisability of the results. It is also inconsistent with the survey and other empirical results reported earlier (Section II) which clearly find that the macro exchange rate models do hold over the longer term¹⁰.

There is no general agreement as to what constitutes the equilibrium exchange rate in the academic literature. However, there is a broad consensus regarding the long run validity of purchasing power parity (PPP). Consensus estimates put the rate of convergence to PPP at about 15 per cent annually, a half-life of about 5 years [Flood and Taylor, 1996, Rogoff, 1994]. In similar vein, Flood and Taylor [1996] show that the explanatory power of PPP rises sharply over a five-year average time horizon. Further, the standard monetary models of exchange rates all assume that PPP holds (either all the time or eventually). Even among practitioners, as noted, 44 per cent believed PPP to be a relevant predictor of the

long run or “equilibrium” exchange rate [Cheung et al., 2000].

Accordingly, a first attempt to extend the basic Frankel model would be to assume that the equilibrium exchange rate (s) is determined by PPP rather than being exogenous.

While the model is developed formally in the Appendix, for our purposes, it suffices to highlight the main conclusions derived:

- a) The benefit of a flexible exchange rate for any country is the ability to undertake independent macroeconomic policy (and thus experience differing inflation rates), though the drawback is its greater bilateral exchange rate variability.
- b) The greater the proportion of “long term investors” or “fundamentalists” in the market, the less variable the exchange rate. – This is the original Frankel result.
- c) Where chartists dominate the market, we would expect that the exchange rate will be very variable in the short term, with this variability falling over time, in the absence of random shocks. In other words, “fundamental things apply as time goes by” [Flood and Taylor, 1996: 283].
- d) The model also explains the growing variability of exchange rates over time. The more variable is the exchange rate, the less certain are participants about the fundamentals driving the market, with the result that the proportion of speculators rises (w falls). In other words, there may be a vicious cycle or self fulfilling prophecy, in which speculation and variability feed on each other in the short term [De Long *et al*, 1990 and Shleifer and Summers, 1990]¹¹.
- e) The importance of a cost-based levy in reducing exchange rate volatility also

becomes apparent. An aim of international currency taxation is to reduce the volatility of spot exchange rates by lessening the speculative element in the market [Tobin, 1996]. Specifically, such a tax could help reduce $\text{Var}(s)$ by raising w (the proportion of long-term market participants) or lowering f_s (speculative expectations).

IV. INTERNATIONAL CURRENCY TAXATION

Having provided the analytical background for international currency taxation, this section discusses a specific form of such a levy, the Tobin tax (TT). The tax is so named, because it was originally proposed by James Tobin [Tobin, 1978, 1996]. The TT is essentially a permanent, uniform, ad-valorem transaction tax on international forex flows. Since the tax can be amortised over a longer-period, the burden of the TT is claimed to be inversely proportional to the length of the transaction. On other words, the shorter the holding period, the heavier the burden of tax. For instance, a TT of 0.25 per cent implies that a round trip undertaken twice daily carries an annualised rate of 365 per cent [i.e., $0.25 * 2$ per roundtrip transaction which occurs twice a day for 365 days in the year]. In contrast, a round trip made twice a year, carries a rate of one per cent [i.e., $0.25 * 2$ per day for 2 days in a year]. Accordingly, and considering that 80 per cent of forex turnover in 1995 involved round trips of a week or less (BIS, 1998), it would seem that the TT ought to help reduce exchange rate volatility and concomitantly curtail the intensity of “boom-bust” cycles.

While the currency crises of the 1990s have provided the impetus for a proliferation

of articles TT (see [\[Bird and Rajan, 1999a\]](#) and references cited therein), most of the discussion has been rather informal. In what follows, we provide a simple formalisation of the potential effects of a TT.

We consider the simplest case of only two countries. Let:

i_h = home country nominal interest rate;

i_f = foreign country nominal interest rate;

s = spot exchange rate (domestic currency per unit of foreign currency);

s^e = expected exchange rate;

y = duration of investment measured as the number of years;

t = currency tax per transaction, (the Tobin tax)

We assume that both the principal and interest earnings are subject to the tax (paid in domestic currency). The TT may be modelled as a tax on interest earnings on foreign income. To connect it with the discussion in the previous section, note that the most volatile component of capital flows is “other investments”, which mostly includes inter-bank loans and other similar short term capital flows [\[Bird and Rajan, 1999a\]](#), driven by interest rate differentials and “herd behaviour”. Thus, a reduction in this “destabilising” component of capital flows may be broadly interpreted as either raising w , lowering f_s or both, consequently reducing the volatility of spot exchange rates.

By arbitrage, the after-tax returns should be equalised between both countries. Thus,

$$[(1 - t)/(1 + t)](1 + y i_f) (s^e/s) = (1 + y i_h) \quad (6)$$

The left-hand side of equation (6) is the after-tax returns on investing in the foreign country. Note that the tax on foreign interest income earned will be penalised twice, once when entering and once when leaving the country. The right-hand side is simply the return from investing at home. Solving for the foreign rate of return gives:

$$i_f = (1/y)[(s/s^e)(1+t)/(1-t) - 1] + i_h[(1+t)/(1-t)](s/s^e). \quad (7)$$

Dropping the second term on the right hand side in equation (7), without loss of much generality, and assuming $s = s^e$, we have:

$$i_f = (1/y)[2t/(1-t)]. \quad (8)$$

This equation implies that, *ceteris paribus*, the longer the investment-duration, the lower the “required” foreign rate of return (i.e., $\partial i_f / \partial y < 0$). In other words, the burden of the TT is inversely related to the duration of the foreign investment. For instance, assume $t = 0.1$ (10 basis points) for an investment lasting one year, the required return on investment needed to attract foreign capital is about two per cent a year, while it is a massive 115 per cent for an investment with a one week horizon. However, this result (which is akin to that derived by [\[Frankel, 1996\]](#)) is based on a special case of $s^e = s$ (as implicitly assumed by Frankel), and is not generalisable.

Using equation (7) and taking the first derivative of i_f with respect to y , yields:

$$(\partial i_f / \partial y) = -(1/y^2)[(1 + t)/(1 - t)(s/s^e) - 1]. \quad (9)$$

The more general case is shown by equation (9). For as long as the condition in equation (10) below is satisfied, the result that $(\partial i_f / \partial y) < 0$, goes through:

$$(s^e/s) < (1 + t)/(1 - t). \quad (10)$$

For $t = 0.1$, this implies that (s^e/s) should be less than 1.2. If the home country is faced with a currency crisis, the downward pressure on the home currency implies that $(s^e/s) > 1$. It is not uncommon to expect a currency under attack to depreciate by over 20 per cent and the condition shown by equation (10) is therefore violated. Conversely, during periods of rapid inflow, when the home currency is appreciating significantly, i.e., when $(s^e/s) < 1$, equation (10) is always satisfied, thus ensuring that short term capital inflows face relatively higher tax burdens than do long term flows.

The model suggests that if a TT is applied at a punitive rate (about 10 basis points) during a crisis period (i.e., period of “sharp” expected currency depreciation), it will in fact have the perverse effect of being more burdensome on longer term capital flows. Conversely, during periods of rapid inflow, when the home currency is expected to appreciate, short term capital inflows face relatively higher tax burdens than do long term

flows¹². This conclusion stands in sharp contrast to Tobin [1996: xi], who has noted that:

the essential property of the transactions tax - the beauty part is that this simple, one-parameter tax would automatically penalise short-horizon round trips, while negligibly affecting the incentives for commodity trade and long term capital investments.

Davidson [1997] has argued that, insofar as agents engaged in international trade in goods and services, foreign direct investment (FDI) and other “productive” cross-border activities hedge their financial transactions, while those engaged in portfolio flows that are short term in nature (“speculators”) do not, it is possible for the TT to be relatively more burdensome on the former. This conclusion is reached by assuming that each hedging operation requires four or more financial transactions (each of which will be taxed). In contrast, speculative transactions involve only two cross-border flows (i.e., a single round trip). The above model shows how a similar conclusion may be obtained without the need for the hedging assumption, as long as there is downward pressure on the domestic currency. Davidson goes on to conclude that something far more “potent” than the TT is needed for the purposes at hand (i.e., a “boulder” rather than just “sand”). However, our interpretation of the model sketched above, emphasises that the currency tax should be aimed at “crisis prevention” rather than “crisis management”. To the extent that during a boom, there will be an anticipated upward pressure on the domestic currency, the burden of the TT will in fact vary inversely with the maturity of the capital inflow. This result suggests that a TT may have to be applied counter-cyclically, i.e., tightened during a boom, and loosened during a bust. This contrasts with the general argument for a tightening or imposition of temporary controls during a crisis¹³, but is consistent with the Chilean

experience with interest free deposit requirements [Bird and Rajan, 1999a,b; also see Reinhart and Reinhart, 1999].

One of the arguments made against currency restraints is that, through the law of large numbers, inasmuch as such levies successfully reduce the volume of trading, they may in some circumstances increase volatility [Davidson, 1998 and Willett and Wihlborg, 1990]. It is not possible to determine the effects of such levies on overall capital inflows *a priori*. This is so, as while on the one hand, the direct effect of restraints ought to reduce the level of capital inflows (direct effect), to the extent that they are successful in enhancing the “durability” of the economy (by reducing the highly volatile component of capital flows), on the other, (indirect effect), they may actually intensify inflows. The *net* effect of such levies on the volume of net capital inflows is therefore an empirical question¹⁴.

But would a Tobin tax have avoided the East Asian crisis? Surely faced with large prospective devaluations a small tax on currency transactions will be insignificant. While this is an important point, it paradoxically enhances the argument for a TT as presented here. To be specific, we have argued that the aim of a TT ought to be to prevent a crisis from occurring by mitigating surges in capital inflows during boom periods. The fact that a TT is relatively ineffective during a crisis period, and that “bad fundamentals” are still often the initiating cause of such crises, implies that a TT levied at a “moderate rate” will not be able to defend a regime that is inherently unsustainable. In other words, the discipline of the market will remain in operation despite the TT.

If the intended purpose of a Tobin tax is to reduce systemic capital volatility and

exchange rate instability, it needs to be imposed multilaterally. Unilateral use will merely lead to the migration of forex transactions. However, our focus is on the use of international currency taxation as a policy instrument for mitigating excessive exchange rate instability in the case of a developing country moving from a pegged to a flexible exchange rate regime. Its objective is to avoid sharp exchange rate appreciation that may for a time maintain its own internal dynamic in forex markets dominated by short term speculation but which will eventually lead to the so-called Dutch disease-type problems (or the capital inflows problem) and will be followed by a reversal and a sharp depreciation probably in the context of a currency crisis.

V. CONCLUDING REMARKS

Currency crises involving developing countries have called into question the wisdom of them adopting pegged exchange rates. Experience has shifted the weight of evidence against the nominal anchor counter-inflationary case for pegging [Bird, 1998], and has strengthened the appeal of greater exchange rate flexibility. The recent literature on exchange rate policy in developing countries has focused on the “exit problem” of how to move from a pegged to a flexible exchange rate regime [Eichengreen, 1999].

However, it is easy to overlook that flexible rates bring with them their own problems. Perhaps the principal one is that of excessive variability. This may be potentially severe in the case of developing countries because their forex markets are thin. Adopting flexible exchange rates does not guarantee against currency crisis. Can currency taxation help

mitigate the worst excesses of currency variability? As with most things, the important message that emerges from the theoretical analysis presented in this paper is that “it depends”. Specifically, within the context of the Frankel model of exchange rate determination, the effect of a tax on forex volatility depends on the nature of speculation and whether the focus is on capital inflows or outflows. Currency taxation needs to be seen as a way of helping to *prevent* currency crises rather than *manage* them once they have happened.

Political economy factors that probably rule out the global adoption of a Tobin tax to stabilise volatile capital markets systemically, are less of a problem when it comes to the unilateral use of currency taxation by individual developing countries. Although, in essence, at odds with the move toward greater capital account liberalisation, currency taxation is technically not inconsistent with capital account convertibility. In any event, there appears to be growing recognition that developing countries may need to phase capital account liberalisation over a number of years allowing themselves time to strengthen their financial institutions and regulatory and supervisory frameworks. Currency taxation may therefore be a useful and constructive interim measure.

Table 1
Exchange Rate Regimes of Developing Countries, Selected Years, 1973-98
(Number of Countries)

	1973	1976	1982	1987	1998
<u>Pegged to a single currency</u>					
<i>of which:</i>	86	67	56	53	47
US\$	54	46	38	34	20
French Franc	17	13	13	14	15
Pound Sterling	11	3	1	-	-
Others	4	5	4	5	12
<u>Pegged to a basket</u>					
<i>of which:</i>	-	25	34	37	18
SDR	-	11	15	10	4
Others	-	14	19	27	14
<u>Flexible Arrangements</u>					
<i>of which:</i>	11	15	35	42	98
Limited flexibility against a single currency	-	2	10	4	4
Adjusted according to a set of indicators ^a	9	6	4	4	-
Managed floating	-	4	16	22	54
Independent floating	3	3	5	12	40
Total	97	107	125	132	163

Notes: a) classification not available in latest IMF Annual Report, various issues

Source: IMF

Table 2
Forex Market Activity (\$ Billions): East Asia versus Industrialised Economies, 1997-98

Country	GDP ^a	Average Daily Turnover of Forex Activity ^b	Relative Size ^c (%)
<u>East Asia</u>			
Indonesia	214.6	1.5	0.7
Malaysia	97.9	1.1	1.1
South Korea	442.7	3.5	0.8
Thailand	153.9	3.0	2.0
Average	227.3	2.3	1.0
<u>Advanced Economies</u>			
United States	8111.0	350.9	4.3
United Kingdom	1288.4	637.6	49.5
Germany	2102.6	94.3	4.5
Japan	4192.3	148.6	3.5
Switzerland	254.9	81.7	15.5
<u>Memo Item</u>			
Mexico	402.7	8.6	2.1

Notes: a) billions \$, 1997 data

b) billions \$, as of April 1998

c) average daily Turnover-to-GDP ratio

Sources: Min and McDonald [1999]

Table 3
Global Official Reserves, Forex Trading and Trade, 1977-95

Year	Trade ^a (US\$ billion)	Reserves ^b (US\$ billion)	Annual global Forex volume (US\$ billion)	Reserves/ Trade (%)	Trade/ Forex (%)	Reserves/ Forex (days)
1977	1094.7	296.6	18.3	27.1	23.9	16.2
1980	1960.0	468.9	82.5	23.9	9.5	5.7
1983	1752.6	496.6	119.0	28.3	5.9	4.2
1986	2074.5	552.6	270.0	26.6	3.1	2.0
1989	3003.2	826.8	590.0	27.5	2.0	1.4
1992	3780.6	1022.5	820.0	27.0	1.8	1.2
1995	5053.0	1330.0	1260.0	26.3	1.6	1.1

Notes: a) simple average of exports and imports

b) includes gold holdings

Sources: BIS [1998] and IMF [1998]

NOTES

1. Consider the following quote by James Tobin [1998: 8] regarding a pegged exchange rate system:

(A) discrete change in an official parity is...traumatic. It is a loss of face and a blow to pride. It is an administrative decision, that is to say a decision of policy and politics. It necessarily requires responsible officials - finance ministers, chancellors, central bank chairmen - to go back on their solemn word. Moreover, they or their successors have the unenviable task of choosing a new rate in a climate poisoned by distrust, clouded by uncertainties about the fundamentals, and dominated by unpredictable psychology. It is easy to get the choice wrong, prolonging and aggravating the crisis. For all these reasons, there is great temptation to stick with an overvalued parity too long.
2. Specifically, in principle, Thailand and the other regional economies were supposed to have adopted basket peg systems, with the yen and other currencies receiving smaller weights in determining the respective currency values (i.e., multi-currency peg). However, as shown by Frankel and Wei [1994], the US\$ had the overwhelming weight *de facto*.
3. Corbo and Cox [1995] and others also find that macroeconomic uncertainty in general has a deleterious impact on investment. Also see the broad literature survey by Serven [1997].
4. On balance, these earlier time-series studies seem to have found an insignificant effect of exchange rate uncertainty on trade. See the synopsis of the literature by Willett, 1986.
5. However respondents did not distinguish themselves between “speculators” and “fundamentalists”.
6. DeGrauwe et al [1993] develop a model showing how the interaction between chartists and fundamentalists is capable of generating a chaotic behaviour of exchange rates. The complex non-linearities in their model preclude manual solutions, and necessitate computer simulations. Focusing on financial assets in general, De Long et al [1990] develop an overlapping generations model in which noise traders are not chased out of the market by fundamentalists (in contrast to the efficiency market hypothesis).
7. This subsection draws on and extends Bird and Rajan [1999a].
8. In the context of this model, w rises, as does f_q , while f_v will diminish, as participants are less willing to continue extrapolating at the same rate.
9. More to the point, technical analysis does not attempt to capture the peaks and troughs in the market, but rather, the general trend. Thus, when the market gets “too out of line” with the fundamentals and the past trend slows down, this will lead to expectations of a general reversal.
10. These macro models have also been found to work well in the short and medium terms in hyperinflationary environments [Frankel and Rose, 1995].
11. See Frankel and Froot [1990b] for an explicit formulation for these weights as a bayesian (learning) process.
12. As noted by a referee of this journal, the implicit assumption made has been that short term assets are bought on frequent round trips through the forex market. This is consistent with the literature on TT.

13. Indeed, Litan et al. [1998] propose that countries impose an exit tax on foreign capital flows at a peak of one crisis.
14. While the Chile's deposit requirements ('encaje') are obviously different from a TT, it is instructive to note that Chile's experience suggests that the indirect effect may offset, and, if anything, dominate the direct effect, such that capital inflows are either unaffected or even intensified with such levies [Bird and Rajan, 1999a].

REFERENCES

- Adler, M., 1996, 'Exchange Rate Planning for International Trading Firm', in Y. Amihud and R. Levich (eds.), *Exchange Rates and Corporate Performance*, NY: Irwin Professional Publishing.
- Allen, H. and M. Taylor, 1989, 'Chartists, Noise Traders and Fundamentals: A Study of the London Foreign Exchange Market', *Working Paper No.341*, CEPR.
- Bank of International Settlements (BIS), 1996, *Central Bank Survey of Foreign Exchange and Derivatives Market Activity*, May.
- BIS, 1998, *Press Release on Central Bank Survey of Foreign Exchange and Derivatives Market Activity in April 1998: Preliminary Global Data*, October 19.
- Bird, G., 1998, 'Exchange Rate Policy in Developing Countries: What is Left of the Nominal Anchor Approach?' *Third World Quarterly*, Vol.19, pp.255-276.
- Bird, G. and R. Rajan, 1999a, 'Cashing In on, or Coping with International Capital Volatility', mimeo, March.
- Bird, G. and R. Rajan, 1999b, 'Time to Reconsider the Tobin Tax Proposal?', *New Economy*, Vol.6, pp.229-33.
- Cheung, Y., M. Chinn and I. Marsh, 2000, 'How do UK-Based Foreign Exchange Dealers Think their Market Operates?', *Working Paper No.7524*, NBER.
- Cheung, Y. and C. Wong, 1999, 'Foreign Exchange Markets in Hong Kong, Tokyo and Singapore', in T. Bos and T. Featherson (eds.), *Advances in Pacific Basin Financial Markets Vol.V*, forthcoming.
- Corbo, V. and V. Cox, 1995, 'Exchange Rate Volatility, Investment and Growth: Some New Evidence', in W. Gruben, D. Gould and C. Zarazaga (eds.), *Exchange Rates, Capital Flows, and Monetary Policy in a Changing World Economy*, MA: Kluwer Academic Press.
- Davidson, P., 1997, 'Are Grains in the Wheels of International Finance Sufficient to Do the Job When Boulders are Often Required?', *Economic Journal*, Vol.107, pp.671-86.
- Davidson, P., 1998, 'Volatile Financial Markets and the Speculator', paper presented to the Royal Economic Society Annual Conference, Warwick, April.
- De Long, B., A. Shleifer, L. Summers and R. Waldmann, 1989, 'Positive Feedback Investment Strategies and Destabilizing Rational Speculation', *Working Papers No.2880*, NBER.
- DeGrauwe, P., H. Dewachter and M. Embrechts, 1993, *Exchange Rate Theory: Chaotic Models of Foreign Exchange Markets*, Oxford: Blackwell.
- Eichengreen, B., 1999, 'Kicking the Habit: Moving from Pegged Rates to Greater Exchange Rate Flexibility', *Economic Journal*, Vol.109, pp.1-14.

- Felix, D., 1996, 'Financial Globalization Versus Free Trade: The Case for the Tobin Tax', *UNCTAD Review 1996*, pp.63-104.
- Felix, D. and R. Sau, 1996, 'On the Revenue Potential and Phasing In of the Tobin Tax', in M. ul Haq, I. Kaul and I. Grunberg (eds.) (1996). *The Tobin Tax: Coping with Financial Viability*, Oxford: Oxford University Press.
- Flood, R. and A. Rose, 1995, 'Fixing Exchange Rates: A Virtual Quest for Fundamentals', *Journal of Monetary Economics*, Vol.36, pp.3-37.
- Flood, R. and M. Taylor, 1996, 'Exchange Rate Economics: What's Wrong with the Conventional Macro Approach', in J. Frankel, G. Galli and A. Giovannini. (eds.), *The Microstructure of Foreign Exchange Markets*, IL: The University of Chicago Press.
- Frankel, J., 1996, 'How Well do Markets Work: Might a Tobin Tax Help?', in M. ul Haq, I. Kaul and I. Grunberg (eds.), *The Tobin Tax: Coping with Financial Viability*, Oxford: Oxford University Press.
- Frankel, J. and K. Froot, 1990a, 'Chartists, Fundamentalists, and Trading in the Foreign Exchange Market', *American Economic Review*, Vol.90, pp. 80-5.
- Frankel, J. and K. Froot, 1990b, 'Chartists, Fundamentalists, and the Demand for Dollars', in A. Courakis and M. Taylor (eds.), *Private Behaviour and Government Policy in Interdependent Economies*, Oxford: Clarendon Press.
- Frankel, J. and A. Rose, 1995, 'Empirical Research on Nominal Exchange Rates', in G. Grossman and K. Rogoff (eds.), *Handbook of International Economics Vol.III*, The Netherlands: Elsevier Press.
- Frankel, J. and S. Wei, 1994, 'Yen Bloc or Dollar Bloc?: Exchange Rate Policies of the East Asian Economies', in T. Ito and A. Krueger (eds.), *Macroeconomic Linkage: Savings, Exchange Rates, and Capital Flows*, IL: University of Chicago Press.
- Frankel, J. and S. Wei, 1998, 'Regionalization of World Trade', in J. Frankel (ed.), *The Regionalization of the World Economy*, IL: University of Chicago Press.
- Friberg, R., 1996, 'Exchange Rate Uncertainty and the Microeconomic Benefits of EMU', *Working Paper No.127*, The Economic Research Institute, Stockholm School of Economics.
- Froot, K. and R. Thaler, 1990, 'Anomalies: Foreign Exchange', *Journal of Economic Perspectives*, Vol.4, pp.179-92.
- Huizinga, J., 1994, 'Exchange Rate Volatility, Uncertainty, and Investment: An Empirical Investigation', in C. Leiderman and A. Razin (eds.), *Capital Mobility: The Impact on Consumption, Investment and Growth*, Cambridge: Cambridge University Press.
- IMF, 1998, *International Capital Markets Developments, Prospects, and Key Policy Issues*, Washington, DC, September.
- IMF, 1999, 'Chile: Selected Issues', *Staff Country Report No.99/15*, IMF.
- Ito, T., 1990, 'Foreign Exchange Rate Expectations: Micro Survey Data', *American Economic Review*, Vol.80, pp. 434-49.
- Kaldor, N., 1960, 'Speculation and Economic Activity', in *Essays in Economic Stability and Growth*, London: Gerald Duckworth & Co..

- Levich, M., 1989, 'Is the Foreign Exchange Market Efficient?', *Oxford Review of Economic Policy*, Vol.5, pp. 40-59.
- Litan, *et al*, 1998, 'Statement of the Shadow Financial Regulatory Committee on IMF Assistance and International Crises', *Statement No.145*, May 4.
- McKenzie, M., 1999, 'The Impact of Exchange Rate Volatility on International Trade Flows', *Journal of Economic Surveys*, Vol.13, pp.71-103.
- Min, H. and J. McDonald, 1999, 'Does a Thin Foreign-Exchange Market Lead to Destabilizing Capital-Market Speculations in the Asian Crisis Countries?', mimeo, World Bank.
- Nealy, C., 1997, 'Technical Analysis in the Foreign Exchange Market: A Layman's Guide', *Economic Review*, Federal Reserve Bank of St. Louis, September-October, pp.23-38.
- Obstfeld, M., 1995, 'International Currency Experience: New Lessons and Lessons Relearned', *Brookings Paper on Economic Activity*, No.1, pp.119-220.
- Reinhart, C. and V. Reinhart, 1999, 'On the Use of Reserve Requirements to Deal with the Capital Flow Problem', *International Journal of Finance and Economics*, Vol.4, pp.27-54
- Rogoff, K., 1994, 'Perspectives on Capital Flows and Long-Run Real Exchange Rates', *Working Paper No.4952*, NBER.
- Schleifer, A. and L. Summers, 1990, 'The Noise Trader Approach to Finance', *Journal of Economic Perspectives*, Vol.4, pp.19-33.
- Serven, L., 1997, 'Uncertainty, Instability, Irreversible Investment: Theory, Evidence, and Lessons from Africa', *Policy Research Working Paper No.1722*, World Bank.
- Taylor, H. and M. Allen, 1992, 'The Use of Technical Analysis in the Foreign Exchange Markets', *Journal of International Money and Finance*, Vol.11, pp.304-14.
- Tobin, J., 1978, 'Proposal for International Monetary Reform', *Eastern Economic Journal*, Vol.4, pp.153-59.
- Tobin, J., 1996, 'Prologue', in M. ul Haq, I. Kaul and I. Grunberg (eds.), *The Tobin Tax: Coping with Financial Viability*, Oxford: Oxford University Press.
- Tobin, J., 1998, 'Financial Globalization: Can National Currencies Survive?', Keynote Address, Annual World Bank Conference on Development Economics, Washington, DC, April 20-21, 1998. (CHECK!!!)
- Wei, S., 1998, 'Currency Hedging and Goods Trade' *Working Paper No.6742*, NBER.
- Wei, S. and J. Kim, 1997, 'The Big Players in the Foreign Exchange Market: Do They Trade on Information or Noise?', *Working Paper No.6256*, NBER.
- Willett, T., 1986, 'Exchange Rate Volatility, International Trade, and Resource Allocation: Perspective on Recent Research', *Journal of International Money and Finance*, Vol.5, pp.s101-s112.
- Willett, T. and C. Wihlborg, 1990, 'International Capital Flows, the Dollar, and U.S. Financial Policies', in W. Haraf and T. Willett (eds.), *Monetary Policy for a Volatile Global Economy*, Washington, DC: American Enterprise Institute.
- World Bank, 1999, *Global Development Finance 1999*, New York: Oxford University Press.

APPENDIX

This appendix extends the Frankel model developed in Section III to incorporate the PPP assumption. Specifically, assume that the “equilibrium” exchange rate (\underline{s}) is determined by the PPP assumption. Therefore:

$$\underline{s} = p_b - p_u. \quad (A1)$$

where: p_h and p_u refer to home and US (foreign) price levels respectively.

We rewrite equation (4) in the text below as equation (A2):

$$s = \alpha \{ m - (1 - w)f_i q \underline{s} + wf_s v \underline{s} + u \}, \quad (A2)$$

where: $\alpha = 1 / \{ 1 - (1 - w)f_i q + wf_s v \}$. Substituting equation (A1) into equation (A2) gives:

$$s = \alpha \{ m + [wf_i q - (1 - w)f_s v] (p_b - p_u) + u \}. \quad (A3)$$

From equation (A3), the variance (Var) of the spot rate is:

$$\begin{aligned} \text{Var}(s) = (1/A^2)\{ & \text{Var}(m) + [wf_iq - (1-w)f_s v]^2 \text{Var}(p_b) + [wf_iq - (1-w)f_s v]^2 \text{Var}(p_u) + \\ & \text{Var}(u) - 2[wf_iq - (1-w)f_s v] \text{Cov}(m, p_u) + 2[wf_iq - (1-w)f_s v] \text{Cov}(m, p_b) \\ & - 2[wf_iq - (1-w)f_s v] \text{Cov}(p_b, p_u)\}, \end{aligned} \quad (\text{A4})$$

where $\text{Cov}(x, y)$ is the covariance term between x and y . We assume that the disturbance term (u) is uncorrelated with prices and relative asset supply. In other words, $\text{Cov}(u, m) = \text{Cov}(u, p_u) = \text{Cov}(u, p_b) = 0$ and $A > 0$.

Ignoring for the moment the last term in equation (A4), it may be seen that the endogenisation of the equilibrium exchange rate leads to an increase in $\text{Var}(s)$ compared to a situation where \underline{s} is treated as a constant. This would be expected *a priori*. The last term is quite interesting. Basically, if one country (Thailand) pegs its exchange rate to the other (US), price levels (or more generally, inflation rates) in the two countries will be correlated. Thus, in the case of exchange rate pegging, $\text{Cov}(p_b, p_u) > 0$. On the other hand, if the two countries maintain largely independent macroeconomic policies and have flexible exchange rates, $\text{Cov}(p_b, p_u)$ will be close to zero and $\text{Var}(s)$ will correspondingly increase.

While the introduction of PPP complicates the comparative statics, it can be shown that, with the assumption that $A > 0$, the Frankel results (as discussed in Section III) follow. For a given w , the results are stronger the larger ($f_i q$) and the lower ($f_s v$); or conversely, for

a given (f, q) , the lower (f, v) and the larger w .