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SAND IN THE WHEELS OF INTERNATIONAL FINANCE: REVISITING THE DEBATE IN LIGHT OF THE EAST ASIAN MAYHEM

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Noteworthy Quotes on International Capital Flows and Restraints

(D)espite the evidence of the inherent risks of free capital flows, the Wall Street-Treasury complex is currently proceeding on the self-serving assumption that the ideal world is indeed one of free capital flows, with the IMF and its bailouts at the apex in a role that guarantees its survival and enhances its status. But the weight of evidence and the force of logic point in the opposite direction, towards restraints on capital flows. It is time to shift the burden of proof from those who oppose to those who favor liberated capital.

Jagdish Bhagwati (1998)

If we start with the defeatist attitude that it is too difficult to change the awkward system in which we are enmeshed, then no progress will be made. We must reject such defeatism at this exploratory stage and merely inquire whether particular proposals for improving the operations of the international payments system to promote global growth will be effective without creating more difficulties than those inherent in the current system. The health of the world economic system will not permit us to muddle through.

Paul Davidson (1997)

The greatest concern I have about canonizing capital-account convertibility is that it will leave economic policy in the typical 'emerging market' hostage to the whims and fancies of two dozen or so thirty-something analysts in London, Frankfurt, and New York. A finance minister whose top priority is to keep foreign investors happy will be one who pays less attention to developmental goals. We have to have blind faith in the efficiency and rationality of international capital markets to believe that these two sets of priorities will regularly coincide.

Dani Rodrik (1998)

I know of plenty of evidence that financial liberalization is followed by financial crash, but know of practically no evidence that suggests that capital-account liberalization is followed by higher rates of economic growth…In the absence of evidence of this sort, canonizing capital mobility risks being perceived as a mercantilist effort to drum up business for the financial elite of the US and Europe.

Dani Rodrik (1999)

(E)ven with the best economic management, small open economies remain vulnerable. They are like small rowboats on a wild and open sea. Although we may not be able to predict it, the chances of eventually being broadsided by a large wave are significant no matter how well the boat is steered. Though to be sure, bad steering probably increases the chances of a disaster, and a leaky boat makes it inevitable, even on a relatively calm day.

Joseph Stiglitz (1998)

CONTENTS

Abstract

The turmoil that has characterised the global financial markets since the 1990s, and particularly the crisis in East Asia, has generated a great deal of support for proposals to add some frictions to the wheels of international finance, as part of overall reforms to the global financial architecture. With this in view, this paper explores the economic effects of and rationale for imposing levies on capital flows in general, and a Tobin tax in particular. It is argued that the primary aim of such a levy ought to be to act as a measure to prevent for a crisis from building up (i.e. a domestic boom fuelled by short-term capital inflows), rather than as a means of countering or providing breathing space for necessary adjustments once a crisis erupts (or threatens to do so). The Tobin tax needs to be fairly universal in its coverage, failing which there would be a migration of foreign exchange flows to tax havens. Admittedly, the political will to arrive at an international agreement on such a levy is far from assured. However, to the extent that developing economies are most impacted by the vagaries of the financial markets, each may find it in its best interest to unilaterally examine the efficacy of imposing Chilean-type measures of restraining capital flows, as appropriate and aggressive steps are taken to enhance the soundness and transparency of the banking and financial systems.

1. Background and Motivation

The 1990s have seen an accelerated progress towards the liberalisation and integration of global financial markets, a process that began in earnest in the 1980s. Developing countries have enjoyed a surge in capital inflows, with institutional investors (i.e. pension funds, mutual funds, hedge funds and the like) contributing to long-term private inflows reaching an all time high of US$299 billion (bn) in 1997, almost seven times higher than the figure in 1990 (Table 1). Following the dramatic reversal of capital flows from East Asia and emerging economies in general in 1997-98, net private flows to developing economies fell to approximately US$227 bn in 1998, slightly higher than the 1995 level of just over US$200 bn[1]

Table 1
Net Long-Term Resource Flows to Developing Countries (US$ billion), 1990-98[a]

	1990	1991	1992	1993	1994	1995	1996	1997	1998[b]
Official Flows	56.9	62.6	54.0	53.3	45.5	53.4	32.2	39.1	47.9
Private Flows	43.9	60.5	98.3	167.0	178.1	201.5	275.9	299.0	227.1
Debt	15.7	18.6	38.1	49.0	54.4	60.0	100.3	105.3	58.0
Commercial Banks	3.2	4.8	16.3	3.3	13.9	32.4	43.7	60.1	25.1
Bonds	1.2	10.8	11.1	37.0	36.7	26.6	53.5	42.6	30.2
Others	11.4	3.0	10.7	8.6	3.7	1.0	3.0	2.6	2.7
Portfolio Equity	3.7	7.6	14.1	51.0	35.2	36.1	49.2	30.2	14.1
FDI	24.5	34.4	46.1	67.0	88.5	105.4	126.4	163.4	155.0
Net Long-Term Flows	100.8	123.1	152.3	220.2	223.6	254.9	308.1	338.1	275.0

Notes: a) Net long-term resource flows are defined as net liability transactions of original maturity greater than one year. Developing countries are defined as low- and middle-income countries with 1995 per capita incomes of less than $765 (low) and $9835 (middle). Although South Korea is a high-income country, it is included in the developing country aggregate as it is a borrower from the World Bank
b) Preliminary
Source: World Bank (1999)

[1] The most variable component of capital flows and the key factor in the East Asian crisis, is that of the 'short-term' variety. However, the above World Bank data on capital flows only captures 'long-term' flows (defined in Note a in Table 1). Consequently, the magnitude of capital outflows from emerging economies in 1997-98 is grossly under-emphasised. See Bird and Rajan (1999a) for details.

Financial globalisation has however not been an unmitigated blessing, as this period has simultaneously witnessed several episodes of severe financial turbulence in global currency markets[2]. Indeed, since 1992, crises in global financial markets have been the norm rather than the exception. Specifically, in 1992-93, Europe was faced with the very real possibility of a collapse of the European Exchange Rate Mechanism (ERM), which, in fact, began outside the ERM area (in Sweden and Finland). The Italian lira and British pound were withdrawn from the ERM, three other currencies (viz. the Spanish peseta, Irish pound and Danish krona) were devalued, and there was a substantial widening of the bands within which the currencies could fluctuate. In 1994-95, there was the Mexican currency and financial crisis, which saw the steep devaluation of the peso, pushing Mexico to the brink of default[3]. There were also some spillover effects to Argentina and Brazil (the so-called 'Tequila effect'). And, since July 1997, the world has been experiencing the effects of the East Asian crises, which started somewhat innocuously with a run on the Thai baht, but spread swiftly to a number of other regional currencies, most notably the Indonesian rupiah, Malaysian ringgit, Philippine peso and Korean won (the so-called 'Tom-Yam effect'). August 1998 brought about the devaluation of the Russian ruble with negative repercussions on the Turkish currency and those of several other emerging economies. And, most recently, in

[2] We admittedly use the term 'financial globalisation' rather loosely. According to the IMF (1998), globalisation of finance is a complex process involving the following four key elements:

a) an increase in the technical capabilities for engaging in precision finance, i.e. for unbundling, repackaging, pricing, and redistributing financial risks;
b) the integration of national markets, investors bases, and borrowers into a global financial market place;
c) the blurring of distinction between financial institutions, the activities and markets they engage in; and
d) the emergence of the global bank and the international financial conglomerate.

[3] See Rajan (1998a) who makes a distinction between the Korean debacle on the one hand, and the problems faced by the Southeast Asian economies of Indonesia, Malaysia and Thailand on the other. There admittedly also exist significant differences in the circumstances faced by each of the Southeast Asian economies.

January 1999, the Brazilian real was devalued, losing over 40 percent of its value relative to the US$ within two months.

1.1 Significance of the East Asian Crisis

The East Asian crisis is particularly significant for five reasons.

First, Mexico recovered from the crisis in a matter of just a year (so-called 'V-shaped recovery). In sharp contrast, more than one and a half years after their eruption, there were very real concerns that the East Asian crisis might erupt into a full-fledged, systemic, global crisis, particularly as the currency and financial markets in Russia, Brazil and other Latin American economies were under significant duress in late 1998 and early 1999. As the five crisis-hit East Asian economies (viz. Indonesia, Korea, Malaysia, Thailand and less so, the Philippines) saw an aggregate (net) capital reversal (outflow) of almost US$130 bn between 1996 and 1998 (Table 2), the socio-political repercussions that the crisis has had on the regional economies – on Indonesia in particular - have been immense (Gupta, et al., 1998).

Table 2
Net Capital Flows to Indonesia, Korea, Malaysia, Thailand and the Philippines (US$ billions), 1995-99

Type of Capital Flow	1995	1996	1997	1998[e]	1999[f]
Current Account Balance	-40.6	-54.8	-26.1	69.2	44.6
External Financing	83.0	99.0	28.3	-4.2	7.8
Private Flows	80.4	102.3	0.2	-27.6	0.3
Equity Investment	15.3	18.6	4.4	13.7	18.5
Direct	4.2	4.7	5.9	9.5	12.5
Portfolio	11.0	13.9	-1.5	4.3	6.0
Private Creditors	65.1	83.7	-4.2	-41.3	-18.2
Commercial Banks	53.2	62.7	-21.2	-36.1	-16.0
Nonbanks	12.0	21.0	17.1	-5.3	-2.3
Official Flows	2.6	-35.3	28.1	23.4	7.6
Resident Lending/Others[a]	-28.3	-27.3	-33.7	-22.9	-21.0
Reserves (exc. Gold)[a,b]	-14.1	-16.9	31.5	-42.1	-31.4

Notes: a) - denotes increase
b) Including resident net lending, monetary gold and errors and omissions
e) Estimates;
f) Forecast
Source: IIF (1999)

Second, these economies (save the Philippines) showed relative resilience following the Mexican crisis, with a number of observers crediting this to the advantages of open goods and capital markets and conservative macroeconomic policies being pursued in the East Asian economies. According to one World Bank economist:

> Several East Asian economies...have established a track record that inspires confidence and...should be able to attract private flows on a sustained basis...Others (emerging markets) have yet to establish strong fundamentals and so remain vulnerable to sudden changes in investor confidence (Bhattacharya, 1997).

Third, the International Monetary Fund (IMF) had raised some early concerns about the sustainability of Thailand's macroeconomic policies, its over-exposed and fragile financial system and inflated property market (IMF, 1997a,b). However, it is fair to say that the general belief was that the East Asian economies were considered relatively impervious to the vicissitudes of the global financial markets in comparison with Latin American economies. This was due, at least in part, to the dominance of foreign direct investment (FDI) in total capital inflows into the fast-growing East Asian economies compared to Latin America. Thus, the following conclusion by Calvo, et al.(1995, p.361) was the prevailing orthodoxy:

> (A) marked difference between Asia and Latin America is in the composition of capital inflows. Whereas in the Asian countries 40 percent of the increase in capital inflows came in the way of foreign direct investment, for Latin American countries direct investment accounted for only 20 percent of the increase in inflows. This difference may help explain why concerns over 'hot money' and a sudden reversal are more prevalent among Latin American policy circles than among their Asian counterparts[4].

Fourth, following the Mexican-Tequila crisis and earlier crises in the 1970s and 1980s (those of the Southern Cone economies in Latin America being the best-documented)[5], there was a belief that financial market participants had learned their lessons and would be more vigilant in ensuring that such crises were not repeated. For instance, the IMF (1996) concluded:

[4] This conclusion is however not strictly accurate. In particular, data for the early 1990s show that the share of FDI in gross capital inflows was little different between the two regions. However, while most of the FDI in Latin America was in the form of debt-to-equity swaps and privatisation, that in East Asia involved the establishment of new enterprises and acquisitions. The East Asian-type FDI was more likely to add to new capital formation, much of which was export-oriented (Reisen, 1996). Bird and Rajan (1999a) and World Bank (1999, Chapter 3) document the relative stability/durability of FDI in comparison to other private capital flows over time.

[5] See for instance, Ffrench-Davis and Griffith Jones, eds. (1995) and Calvo, et al. (1995).

> Developments in the currency markets in late 1995 to early 1996 represent...a return to a more stable environment...After the initial overreaction to the Mexican crisis, investors began to discriminate more carefully between regions and then between countries within regions...Although continued volatility in emerging market asset prices and capital flows cannot be ruled out, the risk of contagion from a disturbance in one of the major recipient countries is now thought to be lower than in 1995...Market participants...appear to be heeding the lessons from their earlier mistakes and excesses.

To the extent that the recent attack on the Thai baht seems to have followed a largely similar 'boom-bust' pattern (as outlined in Bird and Rajan, 1999a), this suggests the existence of significant myopia on the part of market participants. In other words, on the surface at least, little learning appears to have occurred.

Fifth, the current crisis in East Asia took place against the backdrop of a generally favourable international economic environment in terms of high world output and trade growth, low international interest rates and declining spreads on international borrowing (World Bank, 1998, p.30).

In light of the above, it is not surprising that the East Asian financial crisis is reported to have "disturbed investor psychology much more deeply than the European currency crisis..or the Mexican crisis" (Rude, 1998, p.20). This, and a heightened awareness of and sensitivity to the existence of 'problems' in the international monetary system by policy-makers and prominent academics, have worked in tandem to generate much support for examining how the current global financial architecture may be restructured - if not completely overhauled - so as to reduce, if not prevent future financial crises[6]. One element of the reforms that has received much attention, involves

[6] Similar calls were made following the Tequila crisis, but with far less conviction and with far fewer supporters, particularly for restraining capital flows.

'sprinkling sand in the wheels of international finance' through the imposition of a tax on currency transactions, so as to moderate cross-border capital flows and foreign exchange (forex) instability[7]. While Rajan (1998b) has attempted to clarify thinking on the notion of restraints on international capital flows by classifying and categorising the various concepts involved, the primary focus of this paper is on exploring the economic rationale and effects of imposing such restraints.

2. Scope and Organisation of Paper

Three important caveats are in order before proceeding any further:

First, while the principal motivation for the discussion is the East Asian economic crisis, the arguments and resulting policy conclusions are more generally applicable. Importantly, the focus is on capital restraints as a possible means of establishing a more durable and crisis-proof system over the medium and longer-terms, as opposed to their role as a panacea for the ongoing crises, as has been the focus of Krugman (1998b) and much of the popular discussion on the subject[8].

Second, the issue under consideration is not (or ought not to be) one of *whether* the capital account should to be liberalised. To be sure, the benefits of an appropriately timed and sequenced decontrol of the capital account have been extensively discussed

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[7] Other issues discussed under the umbrella of a 'new global financial architecture', include reform of the IMF and World Bank, possible creation of a lender of last resort facility (or redefining the IMF's role as such), establishing international bankruptcy procedures, formalising a mechanism for burden-sharing between private debtors and creditors, and the like. A systematic discussion of some of these issues is provided by Calmoris (1998b). Also see the recent reports on the international financial architecture by the G-22 (1998).

[8] Krugman's (1998b) exchange control proposal for afflicted countries in East Asia broadly entails the imposition of temporary exchange controls on capital *outflows*. The rationale for such controls is to divorce the domestic financial market from the international one, hence allowing for the pursuit of expansionary monetary policy to reflate the economy (no longer being constrained by the 'impossible trilogy'), without fear of capital flight (given higher returns to be obtained abroad) and weakening exchange rates. On September 1, 1998, Malaysia announced a package of wide-ranging and selective exchange and capital restraints on capital outflows. See Rajan (1998b) for a discussion of the Krugman proposal and the Malaysian controls.

by Mathieson and Rojas-Suarez (1993), Reisen (1994) and others, and ought to be taken as primitives[9]. To recap, there are broadly five efficiency gains:

a) static resource allocation benefits through international specialisation in the production of financial services;

b) static financial gains through 'appropriate' portfolio diversification internationally;

c) dynamic (or 'X-efficiency') gains through introduction of competition in the financial sector;

d) gains from intertemporal trade through access to global financial markets; and

e) absence of rent-seeking and other costs of capital restraints.

This said, an open capital account need not necessarily preclude the imposition of 'moderate' levies (made explicit in Section 6) on international capital flows. The aim is to try and reduce short-term 'speculative' flows and slow the reaction speed of international forex markets, with minimal distortion to the stock of 'productive' capital over the medium and longer-terms. Indeed, any attempts to curb instability in international financial markets can only help reassure countries considering when (and if) to undertake capital account convertibility (most notably, India and China), hence paradoxically increasing the extent of global capital flows.

Third, Rajan (1998a) and others have detailed the weaknesses that have been made apparent by the East Asian crisis and the necessary remedial steps to be taken thereof. Among the most important and urgent of these, is the need to revoke distortions that may have led to moral hazard problems that gave rise to 'excessive' risk-taking. The three most important distortions in the case of the East Asian economies in particular, have been an inappropriate sequencing of financial sector and capital account liberalisation, without putting in place the necessary prudential regulations; the maintenance of a fixed nominal exchange rate despite a significantly altered

[9] However Rodrik (1998, 1999) has cautioned against the ready acceptance of this assumption in light of adequate (any?) supporting empirical evidence.

macroeconomic environment; and the explicit or implicit government guarantees against possible bankruptcy of financial institutions. McKinnon and Pill (1996, 1998) have formalised how such government guarantees give rise to the so-termed 'over-borrowing' syndrome. In other words, it leads to too much external debt accumulation (especially short-term liabilities) on an unhedged basis, which makes an economy particularly vulnerable to sudden shifts in investor confidence and the resulting boom-bust cycles.

While McKinnon and Pill (1996, 1998), Eichengreen (1996) and others take this as rationale for the possible imposition of capital restraints (at least on external borrowing), such a policy is however only 'second best' (i.e. sub-optimal option)[10]. The 'first best' policy is to directly attack the problem head on. In the case of East Asia, these first best policies include (but are by no means limited to) the adoption of best practices with regard to prudential supervision and other regulations relating to banks in particular (given that the bulk of credit in developing economies is intermediated through them) and other financial institutions, allowing for greater exchange rate flexibility, revoking explicit or implicit government guarantees relating to private sector financial transactions, and improving overall corporate governance structures of bank and nonbank corporations. In other words, restraints on capital flows cannot be seen as a 'substitute' for the important banking, financial and corporate sector reforms that need to take place to make the East Asian economies internationally competitive once again. (They can, however, play a complementary role to such restructuring as discussed in Section 4).

However, the important questions for the purposes at hand are, even after all these and the other necessary reforms are undertaken, whether:

[10] The theory of second best, loosely interpreted, states that in the presence of an existing distortion or market failure, a judicious introduction of another distortion *may be* welfare-enhancing.

a) there exist other market failures which may warrant correction through the introduction of restraints on capital flows[11]; and

b) if such intervention is feasible, i.e. is the remedy worse than the 'sickness'?

The remainder of the paper is organised as follows. Sections 3 and 4 respectively summarise the cases against and for levies on global capital flows in general. Section 5 discusses the need for a flexible exchange rate system in open global markets and the reasons for 'excessive' exchange rate volatility. The penultimate section provides a detailed discussion regarding the feasibility of imposing a tax on global currency transactions (specifically, a Tobin tax) on international capital flows. The final section concludes. Three appendices follow. Appendix 1 provides a broad overview of global trends, patterns and structure of forex flows. Appendices 2 and 3 develop simple models of exchange rate variability and the effects of a Tobin tax respectively.

3. The Case Against Capital Restraints

Opponents of introducing frictions to the free-wheeling global capital market have argued that currency crises are merely a manifestation by the international financial markets of, and a rational response to, profligate demand management policies being pursued by the country in question, rather than being a symptom of the problem. This view argues that currency crises are largely a reflection of inconsistent and unsustainable macroeconomic policy stances, which are characterised by burgeoning fiscal deficits that are monetised, and (without a parallel increase in the excess of private savings over domestic investment) worsening current account imbalances, overvaluation of the real exchange rate and eventual loss of international reserves. In the absence of access to other sources of international credit and rigid fiscal imbalances, there is no alternative but to abandon the currency peg once reserve

[11] Broadly, market failures are said to exist when the free market mechanism does not lead to (Pareto) optimal consequences.

holdings fall below some critical level (i.e. so-termed 'switch time'). Models of this vintage - which posit policy-inconsistency as the primary reason for currency attacks – have drawn motivation from the 'conventional' balance of payments crises (due to profligate fiscal and monetary policies pursued) in Latin America in the 1970s and 1980s. These models are commonly referred to in the literature as the 'first-generation' or the 'Federal-Reserve' view and have been formalised early on in seminal works by Krugman (1979) and extended upon by Flood and Garber (1984a) and others since[12].

Apart from this 'markets know best' argument for unfettered capital flows, there exist a number of specific criticisms of financial market intervention per se.

First, critics argue that even if there were market failures that might justify consideration of restraints on capital flows as a first best policy (as discussed in the next section), they may be far less costly than the distortions and inefficiencies that would be created by artificially limiting free capital mobility by interfering with 'regular' productive and welfare-improving trade and financial activities and longer-term investment.

Second, capital controls may allow the authorities to relax policy discipline that is imposed by open financial markets[13].

Third, as discussed by Mathieson and Rojas-Suarez (1993), the very effectiveness of capital controls in the medium-to-longer runs is open to question. Controls are commonly avoided through leads and lags in the settlement of international commercial transactions, over-invoicing of exports, under-invoicing of imports, transfer

[12] For those who find the above rather informal and loose discussion of the technical literature on currency crises unsatisfactory, see Rajan (1999a) for a detailed review of the formal literature, including recent important extensions to the Krugman model.

[13] Even abstracting from the self-fulfilling equilibra to be discussed in Section 4.2, an open capital account has acted like a double-edged sword in terms of its implications for fiscal discipline. On the one hand, access to the capital market could lead to temporary funding of extraneous government expenditures, leading to a soft budget constraint for a time. However, perceptions of profligacy will eventually lead to capital flight and the consequent need for 'belt-tightening' measures.

pricing by multinationals, etc. It could also give rise to a parallel (black) market and growth of new financial instruments that attempt to evade the existing regulations[14].

4. The Case For Capital Restraints

The motivation for the imposition of capital controls may be broadly classified into five categories. These are:

a) retention of domestic savings;

b) maintenance of the domestic tax base;

c) preservation of monetary autonomy while pursuing a managed float;

d) need for appropriate sequencing of economic liberalisation; and

e) limiting volatile short-term capital flows (hence curtailing forex variability and deterring/reducing the frequency and ferocity of speculative attacks).

Mathieson and Rojas-Suarez (1993) and others have provided convincing arguments for the invalidity of the rationale (a) through (c) for restraints on capital flows. Rationale (d) regarding the optimal sequencing of economic reforms requires a little elaboration. Conventional wisdom has it that financial *reforms* (as opposed to mere *liberalisation*) need to precede capital account liberalisation (see Rajan, 1994 and references cited within). Insofar as some of the East Asian economies (Indonesia and Thailand particularly) reversed the order of economic reforms (i.e. capital account first),

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[14] The Economist magazine, which is the unabashed ideological bastion of *laissez faire* economics, has succinctly summed up the arguments of critics as follows:

> (F)inancial markets can be erratic in the way they judge economies...Even in such cases it is hard to think of a better alternative to letting the speculators place their bets. They may be fallible, but there are reasons to expect governments to make even bigger mistakes...More to the point, any attempts to clamp down on speculators could make matters worse..(Capital controls) would be hard to enforce, and would increase the cost of capital by discouraging good capital flows (e.g. to finance trade)...And..it would muffle the signals and allow governments to delay urgent policy shifts for even longer...Politicians and pundits may say they know better. But to trust them, instead of the market, would truly be a reckless gamble. (February 3, 1996, pp.67).

an important question is whether this 'mis-step' could be reversed by ongoing financial sector reforms.

If this is valid, there may then be a 'first-best' case for temporary capital restraints as the other reforms are put in place, particularly given that financial sector reforms do take time to implement[15]. As noted by Rodrik (1999, p.4): "Today's developed countries did not get their regulatory and legal institutions overnight. It would be nice if third-world countries could somehow acquire first-world institutions, but the safe bet has to be that this will happen only when they are no longer third-world countries." Thus, for instance, Calmoris (1998b) has estimated that even under the most optimistic scenario, one would be looking at no less than five years to put in place the necessary supervisory procedures and other arrangements to strengthen the banking system. This leaves us with rationale (e), which is the focus of the rest of this paper.

4.1 Curtailing 'Excessive' Exchange Rate Variability

Advocates of restraints on international forex transactions have pointed to the seeming and ever-growing delinking of forex turnover and short-term capital flows from the 'real side' of the economy, viz. production, trade and physical investment (Appendix 1). The forex markets post Bretton Woods (system of fixed exchange rates) have generally been acknowledged to be far more volatile than might be warranted by underlying fundamentals such as price levels or real incomes. Various tests of forex market efficiency such as the uncovered interest parity theory have been found not to

[15] In addition, there are negative externalities or 'contamination effects' of foreign borrowing, which arise due to the existence of a country risk premium that is an increasing function of aggregate external indebtedness. This drives a wedge between marginal private and social (or aggregate) external borrowing costs (Harberger, 1980), and points to the need for some sort of tax on all external borrowings to be in place as part of appropriate financial sector reforms. In similar vein, Fischer (1998a) has noted the need for prudential controls on unhedged forex positions of banks and other nonbank corporations (though, of course, the same result may be achieved to some extent through more market-based means by allowing for greater exchange rate variability and revoking of guarantees as discussed previously). Both these emphasise the point that financial sector *reforms* do not, by any means, imply absolute *laissez faire*.

hold (see for instance, Flood and Taylor, 1996, Frankel, 1996 and Frankel and Rose, 1995). Indeed, macroeconomic-based models of exchange rates have been extremely low even ex-post, with ad-hoc forecasts based on lagged spot rate consistently outperforming macroeconomic models[16]. Accordingly, a reading of the literature on exchange rates led Michael Mussa (1990) – now Economic Counselor and the Director of the IMF's Research Department - to the ensuing, very apt conclusion:

> I have long been sympathetic to the view that the behaviour of asset prices, including exchange rates, is afflicted by some degree of craziness. Many aspects of human behavior impress me as being not entirely sane, and I see no reason why the behavior of asset prices should be a virtually unique exception.

The apparent intensity of currency crises on the one hand and the instability and unpredictability of the forex market in general on the other, are broadly attributed to herd or wolf-pack behaviour, bandwagon expectations, rumours or noise-trading of private market participants who display bouts of exaggerated exuberance and undue pessimism. Explanations for this market failure due to herd mentality or band-wagon expectations of market participants, may be broadly divided into those that are 'rational' and 'non-rational'. The latter assumes that financial market participants behave like lemmings, blindly following one another. Rational views of this herding phenomenon on the other hand argue that there exist incentive structures or informational asymmetries that make herding an optimal behaviour by fully rational agents (Devenow and Welch, 1996).

For instance, consider the incentive structure of fund managers who are 'agents' or 'trustees' of the funds under their control. If a fund manager makes a loss/wrong

[16] As Dornbusch's (1976) classic paper has shown, the monetary approach to exchange rates does allow for the possibility of short-term overshooting of the exchange rate if there exist different adjustment speeds between the assets and goods markets. However, as noted by Frankel (1996), there is in actuality "an overshooting of the overshooting equilibrium."

decision when most other competitors do likewise, it is unlikely that she will be punished by her institution. On the other hand, if the fund manager under-performs relative to her competitors, punishment is very likely. Given these 'principal-agent' considerations, it is not surprising that the decisions of most fund managers are highly correlated, and thus have magnified effects on the particular country or group of countries. These bandwagon effects may also be rationalised by appealing to the international political economy literature, which would argue that the existence of foreign investors may act as a signal to other potential investors about the extent of investment-conduciveness of the country's overall policy regime. This reduces uncertainty and therefore increases ex-ante expected returns[17].

Drawing on the real options approach to physical investment and trade, the presence of irreversibilities or sunk costs in investment implies that any short-term variability and uncertainties could, by delaying productive activities, have significant negative repercussions on the real economy (see for instance, Dixit and Pindyck, 1995 and Rajan and Marwah, 1998 for theoretical discussions of this burgeoning literature). 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)[18]. Corbo and Cox and others also find that

[17] See Rajan (1997) for a model involving FDI. Radelet and Sachs (1998b) have sketched a simple model of collective actions by creditors leading to a liquidity crisis (i.e. a 'creditor grab race' occurs).

[18] One may argue that firms and other agents involved in international transactions could undertake hedging operations to shield against these 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 technically create (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 necessitates the utilisation of cross-hedging techniques (rather than direct hedging), which invariably are far costlier. According to a 1992 survey of non-financial Fortune 500 corporations, while 85 percent of the respondents hedged, only 22 percent hedged *fully*, with this figure dropping to 16 percent when a 'view' of the direction of the forex market was developed. Not surprisingly, most of the respondents which did not hedge were smaller firms (averaging US$2 bn in capital) (Felix and Sau, 1996 and Felix, 1996b).

macroeconomic uncertainty in general has a deleterious impact on investment (also see the broad literature survey by Serven, 1997). Apart from the aggregate time-series studies of effects of exchange rate uncertainty on trade[19], 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 1990. In an important paper, Wei (1999) provides new empirical evidence suggesting in fact 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.

4.2 Reducing the Frequency/Intensity of Currency Crashes

Following pioneering work by Flood and Garber (1984b) and Obstfeld (1986) in particular and further stimulated by the ERM collapse and the Mexico-Tequila crisis, there is a class of models which allows for multiple equilibra and show how currency runs may be 'self-fulfilling'. The focus of these models is on the existence of a tradeoff faced by policymakers between the benefits of retaining a pegged exchange rate on the one hand and the costs of doing so on the other.

To be sure, the (perceived) benefits of retaining the fixed exchange rate include:

[19] 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). Theoretically, a major problem with attempting to test this nexus is that *a priori*, the effects of uncertainty on trade and investment is complicated by the relation between the latter two. Specifically, if trade and investment are substitutes (for instance, an agent is deciding whether to service a market through exports or direct investment), in the presence of uncertainty and capital irreversibility, the export option may be chosen (this is formalised in Rajan and Marwah, 1998). Hence, uncertainty of any kind, including exchange rate movements, may stimulate trade while concomitantly diminishing FDI. Accordingly, firm-level studies which distinguish between types of investment (i.e. export versus domestic-market oriented) are essential to empirically determine this investment-trade-exchange rate (or even more generally, macroeconomic) uncertainty nexus.

a) consequent loss of credibility by forsaking commitment to such an exchange rate regime and level (i.e. 'reputational costs');

b) perceived role of a fixed exchange rate as a nominal anchor on the one hand, and fear of inflationary spiral due to currency depreciation on the other;

c) promotion of real economic activity, i.e. trade and investment (as noted in Section 4.1); and

d) contagion effects of a currency devaluation by any one country, which are largely regional in scope[20].

Conversely, apart from the loss of forex reserves and competitiveness due to an overvalued exchange rate, the costs of sticking with a fixed exchange rate regime primarily involve those due to maintaining high real interest rates on a sustained basis to stave off a speculative attack[21]. These involve:

a) the negative impact on the real economy, such as investment, growth, employment, and size of the public debt;

b) the sharp adverse repercussions on the domestic financial system, as banks had lent at fairly low interest rates when the system was flush with liquidity, and they now have to pay depositors this much higher interest rate[22];

[20] Following Masson (1998), we may describe contagion as a situation where a crisis in one country leads to a jump to a 'bad' equilibrium in a 'neighbouring' country.

[21] The costs incurred in hiking interest rates is a non-negligible point, because technically speaking, governments could defend a currency peg (by reducing the monetary base sufficiently) if it were willing to subordinate all other goals to it (Obstfeld and Rogoff, 1995).

[22] This is a particularly significant point, as weaknesses in the domestic banking system can seriously paralyse a government from taking appropriate stances to counter a currency run. Specifically, while a speculative attack requires a (sharp) hike in interest rates, if the banking system is plagued by bad debts, such a policy could, by contracting economic activity and deflating asset prices, substantially exacerbate the situation. Hence a currency crisis could be turned into a financial crisis, with far more adverse repercussions on the domestic real economy. This is especially problematic in developing economies, and was faced by Mexico during the Tequila crisis, as well as by the most-impacted East Asian economies. See Rajan (1999a) for an elaboration and formalisation.

c) all sorts of internal income redistributional effects, for instance, by impacting mortgage rates; and

d) its signaling role to 'mechanistic' traders who make use of dynamic option hedging techniques, and along with the initial speculators, also join the fray (Garber, 1995).

While Krugman (1996, 1998a), Obstfeld (1986, 1996) and Rajan (1999a) provide summaries of the main elements of these second generation models, three major insights from the models are particularly relevant for policy[23].

First, the models are not purely 'self-fulfilling', in the sense of being completely arbitrary. There must exist some weakness in the economic fundamentals of the country for an attack to occur, which makes a sustained rise in interest rates to stave off a speculative attack a non-credible policy[24]. Thus, the problems in the case of Europe seemed to be high unemployment, while those in the case of the East Asian economies that were most affected included acute financial sector weaknesses, along with a sharp slow-down in export growth (particularly in Thailand). On the other hand, if the economy is either very 'good' or very 'bad', it will respectively never or always be attacked. Thus, in the case of East Asia, despite the regional contagion or Tom-Yam effects, it is revealing that the regional economies with the strongest fundamentals, viz. Hong Kong, Singapore and Taiwan were least impacted by the turmoil *directly*.

Second, within those two extremes - which imply unique equilibrium (i.e. an attack with close to 0 or 1 probabilities) - there is a large intermediate range (gray area). Within this range, there may exist some weaknesses in the economy that are neither

[23] Formally, the policy-maker/monetary authority is modeled as minimising a loss function, which consists of two adaptively separable terms which respectively represent costs of maintaining the fixed exchange rate in the face of market pressures to devalue, and the costs of succumbing to the pressures and allowing a devaluation.

[24] This is not to say that purely self-fulfilling attacks can never occur, though there is not much evidence of this once one abstracts from the regional contagion effect. The point is that the multiple equilibra models do not provide any theoretical/academic justification for drawing such a conclusion.

strong enough to completely preclude a speculative attack on the currency, nor sufficiently weak to make an attack unavoidable. Rather, there are a multiplicity of equilibra, such that an economy remains on what seems otherwise to be a sustainable path ('superior' equilibrium) until some 'trigger' or evidently minor event coalesces market expectations to an 'inferior' one that is realised (as in the case of bank runs). This 'bad' equilibrium then becomes the absorbing state. As noted neatly by Obstfeld (1996, p.395), the "question is not whether the crisis was 'justified' by fundamentals, since everyone agrees the fundamentals play and must play a role, but whether the fundamentals were such as to make the crisis the inevitable and unique outcome."

Calvo (1996) and Calvo and Mendoza (1996) have formalised how the presence of large-scale investment alternatives provide investors fewer incentives to expend resources to learn about individual countries, and conversely make it rational for investors to become highly sensitive to even 'small' uncertainties in any one country. Masson (1998) has shown how it is conceptually possible for contagion to increase the 'grey area' noted above, thus making countries even more vulnerable to a currency crisis. These factors, along with the 'herd mentality' of investors, make dependence on shorter-term foreign capital flows hazardous, with countries becoming acutely susceptible to 'boom-bust' cycles and sudden capital reversals. As such, any (endogenous) policy slippages or exogenous shocks (even minor ones that are transitory) could have potentially grave and uncertain consequences for the economy. In other words, the 'punishment' meted out by the financial markets may be far too severe in relation to the 'crime'.

4.3 The Chilean Model[25]

Buttressing these insights from theory, proponents of implementing capital restrictions also point to the recent Chilean experience. Since 1991, in response to a

sharp inflow of capital (partly attracted by bullish expectations of the economy as it underwent a successful reform programme), Chile has levied permanent and selective capital restraints, predominantly on *inflows* (Table 3). The only restriction on capital *outflows* takes the form of a one year requirement before investment capital may be repatriated. This is meant to discourage the entry of short-term 'speculative capital' (so-called 'hot money').

Table 3
Restrictions on Capital *Inflows* into Chile

Type of Restriction
No restrictions on repatriation of profit of FDI, but initial investment capital must remain in country for one year. Maximum proportion of FDI that may be financed through debt is 50 percent[a].
Issuance of American Deposit Receipts (ADRs) by Chilean companies is regulated. Only companies with risk classifications of BBB (for non-financial companies) and BBB+ (for financial institutions) are permitted to issue ADRs. Minimum account requirement as of November 1995 is US$10 million (mn).
Bonds issued by local companies in global markets must have an average minimum maturity of four years.
All other portfolio flows (including foreign loans, bond issues) above US$10,000 are subject to a non-remunerated 10 percent reserve requirement to be deposited at the central bank for one year interest-free[b]. The reserve requirement is independent of maturity (length of stay) of inflow.
Credit lines for trade financing operations also subject to the 10 percent reserve requirement[b].

Notes: a) Reduced from 70 percent to 50 percent in mid 1996
b) Initially increased from 20 to 30 percent in May 1992. Subsequently reduced to 10 percent as of June 26, 1996 in response to a general slowdown in portfolio capital inflows to all emerging economies.
Source: Rajan (1998b) and IMF (1998)

Restrictions on *inflows* are largely meant to favour equity over debt and medium- and long-term capital inflows over short-term ones. There exist three broad types of such restraints.

[25] This section draws from Rajan (1998b) and IMF (1998).

First, are the implicit taxes (in the form of interest-free reserve requirements to be deposited at the central bank) on all portfolio inflows. The non-remunerated deposit requirements are meant for capital inflows of all maturities for a period of one year, after which the central bank returns the funds. It can be shown that the deposit requirements act as an implicit tax on capital inflows, with the rate varying inversely with maturity (Fane, 1998). Intermittent adjustments are made to the implicit tax rate in response to changing macroeconomic circumstances. In particular, the restraints are counter-cyclical in nature, being tightened during bullish periods when there is an upsurge in capital inflows and relaxed when inflows subside (see note b in Table 3).

Second, all capital coming into Chile must be parked in the country for a minimum one year period.

Third, Chilean firms and banks are permitted to access global debt markets only if their credit ratings are of a minimum level/quality.

While questions regarding the effectiveness of the controls in reducing aggregate capital inflows remain unresolved, there is nonetheless a growing body of literature which suggests that the Chilean controls, while not significantly impacting the level of capital inflows (and therefore the extent of real exchange rate appreciation), have been effective in extending the duration (maturity structure) of such inflows[26]. Chile has enjoyed greater levels of FDI, both relative to other Latin American economies and as a proportion of aggregate capital inflows into the respective countries (especially Mexico and Argentina, both of which have allowed for largely unfettered capital flows).

With relatively lower levels of external indebtedness - which is a key criteria determining the potential vulnerability of an economy to a currency and financial crisis (Rajan, 1998a) - and a sound financial system, the Chilean economy has been relatively

[26] See for instance, Reinhart and Reinhart (1996), Montiel and Reinhart (1997), Valdes-Prieto and Soto (1997). Cardens and Barrera (1997) find similar results with regard to the capital controls imposed by Colombia.

less impacted by the Tequila crisis of 1994-95 than other Latin American economies[27]. Chile has generally enjoyed a faster and steadier growth (both in terms of being less variable and less inflationary) compared to either Mexico or Argentina (Neuhas et al., 1998). The Chilean experience in the active management of capital inflows is therefore being increasingly seen as at least indicative of the potential benefits of restraints on capital inflows. - This discussion is taken up again in the concluding section[28].

5. The Need for a Flexible Exchange Rate Regime and a Discussion of Exchange Rate Variability

As well documented, the virtual absence of worries about currency fluctuations relative to the US$ - along with implicit or explicit sovereign guarantees against institutional bankruptcies - was the primary reason for 'over-borrowing' by (or 'over-lending' to) the East Asian economies (Radelet and Sachs, 1998a,b and Rajan, 1998a). As creditors became unwilling to rollover short-term loans, what began as a liquidity-crunch quickly degenerated into a full-blown insolvency crisis, as the sharp nominal devaluations led to a consequent increase in the local value of the mainly dollar-denominated liabilities.

[27] Arguably, Chile's success in terms of being able to avoid the Tequila crisis may have been responsible for a general bullishness in the economy. Paradoxically, the enthusiasm to invest in the economy may consequently have led to the erosion of the effectiveness of capital restraints, as participants searched for and found channels of evasion. Thus, the very effectiveness of capital restraints in ensuring relative stability in an economy in the short-term, could have been the reason for their eventual ineffectiveness over the medium and longer- terms. In fact, it has been found that a one percent increase in the (implicit) Chilean tax has a greater impact when the trend economic growth is low than when high (Larrain et al., 1997).

[28] Conversely, the Chilean model also highlights one of the major drawbacks of capital flows. Specifically, trade credits are also subjected to the implicit tax (thus acting as a trade barrier), because with this exemption, there could be non-negligible evasion under the guise of trade credit. The result of this has been that Chile's international trade has been somewhat adversely impacted, thus being welfare-reducing. In other words, controls on inflows have by no means been an unmitigated blessing. More generally, the adverse impact of capital restraints on international trade in a cross-section of countries has been empirically confirmed by Tamirisa (1998).

Generally, if macroeconomic policies are inconsistent with the prevailing peg, and to the extent that other domestic prices and costs are sticky in the short and medium terms, this would lead to exchange rate misalignments, which get magnified in open global capital markets and are difficult to undo (given that devaluation becomes a highly political issue)[29]. Consequently, maintaining a rigid peg is particularly inviting to speculative attacks. Such attacks involve selling the currency short, and, in the absence of any risk of currency appreciation, the only cost of short selling a currency is that incurred in initially borrowing the currency (i.e. a 'one way' or 'sure' bet). IMF (1997a), Obstfeld (1995), Obstfeld and Rogoff (1995) and many others have also argued that the financial crises of the 1990s have underscored the need for greater flexibility in exchange rates in an open global capital market, particularly among small, open economies.

In addition, we have noted that the interest rate defense of a fixed exchange rate regime is unlikely in the presence of a fragile financial system (elaborated in Rajan, 1999b). Accordingly, it would seem that the greater the degree of financial fragility, the less 'fixed' ought to be the country's exchange rate. Indeed, Eichengreen (1999, p.9) has noted that "countries that seek to limit exchange rate flexibility must subject their financial systems to exceptionally strict prudential standards"[30].

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[29] Consider the following quote by James Tobin (1998, p.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's 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.

[30] Hausmann and Gavin (1995) also note that Venezuela was able to overcome a negative oil shock due to flexibility in its exchange rate. Accordingly, Calvo (1995) notes that "(t)his is an interesting observation, because it links the banking system to the traditional debate over flexibility versus fixed exchange rates."

5.1 'Excessive' Exchange Rate Variability

Given the problems with maintaining a fixed exchange rate system on the one hand, and the non-viability of other options such as a currency board or single currency on the other (see Eichengreen and Wyplosz, 1994)[31,32], we seem to be left with the alternative of a flexible exchange rate (though not necessarily a 'pure float'). This however leads to yet another issue to be tackled, viz. 'excessive' exchange rate variability, in the sense of being far too great to be explained by underlying fundamentals.

In this light, some recent survey studies of significance should be noted.

First, in one of the earliest surveys of leading market participants around the world, the Group of Thirty (1985) reported 97 percent of bank respondents and 87 percent of securities houses believed the use of technical trading models to have played a significant role on the forex market transactions.

Second, surveys by Frankel and Froot in the early 1990s (compiled in Frankel, 1993) using Money Market Services (MMS) International and the Economist Financial Report data bases, found that there exist two broad groups of participants: the 'chartists', who consciously used analytical techniques ('momentum' models) to forecast

[31] The currency board option can only be considered in the much longer-term once a significant degree of stability has been reached. This is so for a number of reasons. First, during a period of market uncertainty (especially when the market is thin), no one is certain of the appropriate exchange rate at which the currency ought to be pegged. Second, a currency board requires the presence of adequate reserves. Third, a currency board automatically requires that interest rates be hiked to a level sufficient to maintain the peg in case of a currency run. Insofar as the countries are currently in recessionary state, and the banking sector is already terribly fragile, there is the very real question of whether the governments will be willing to allow for such a policy if required (i.e. the policy/permanence of the institutional structure lacks credibility). In addition, the relative success of the Singapore and Taiwanese economies, which allowed their currencies to depreciate during the height of the Asian crises in comparison to the Hong Kong economy (which adhered to the currency board, though with some intervention), suggests the need for greater exchange rate flexibility in response to various exogenous shocks, failing which there will have to be compensating internal flexibility (in the forms of labour mobility, variations in nominal wages, etc.).

[32] Eichengreen and Wyplosz (1994) argue that a single, regional currency zone is the most attractive option for small, open economies in the longer-term.

exchange rates - this involves extrapolating trends and patterns; 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, the two groups. They found that for every 1 percent appreciation in the US$, the median respondent expected a further 0.13 percent appreciation over a one-week horizon, this continuing over the next few weeks (but at lower rates). However, over the three, six and twelve month periods, the US$ is expected to have depreciated below the original (pre-appreciation) value.

Third, a questionnaire study of the London forex market by Allen and Taylor (1989) led them to a broadly similar conclusion. The Frankel-Froot survey revealed the use of technical analysis to have become more prevalent in the 1990s and chartists seemed to dominate the market in the short-term. This is consistent with the Allen-Taylor study which revealed that about 90 percent placed some weight on technical analysis, with this proportion becoming much smaller as the time horizon diminished (about 15 percent). In similar vein, while less than 10 percent of respondents felt that pure fundamental analyses determined exchange rate values within three months, this figure rose to over 30 percent 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 are determined by an interaction of chartism and fundamentalism at all times, with the weight shifting towards the latter over longer horizons and vice versa.

Fourth, a survey of senior forex traders in the main Asian centers (viz. Japan, Singapore and Hong Kong) by Yin-Wong and Wong (1997) suggests that only about 5 percent of respondents were of the opinion that intra-day exchange rate fluctuations reflect changes in fundamentals. This proportion rose to 80 percent in the case of long-run exchange rate movements (i.e. longer than six months). About 80 percent of respondents also viewed 'bandwagon effects', 'over-reaction to news' and 'speculative

forces' as dominating intra-day exchange rate movements. Medium-run exchange rate movements (i.e. periods less than 6 months) were generally thought to be driven by mechanical trading rule (40 percent) and economic fundamentals (30 percent). Of particular interest is the fact that traders viewed the exchange rates over the long run horizon as being the least predictable, despite feeling that exchange rates were driven by fundamentals.

In addition to these surveys, in a recent study of based on US Treasury forex data, Wei and Kim (1997) found that large market players were likely to have contributed to market volatility, suggesting they trade on noise rather than on information. This is consistent with a number of other studies such as Neely (1997), which have found that mechanical trading rules are most profitable for banks and large financial institutions. The significance of this conclusion arises from the fact that one would expect larger players to have better information sets than smaller ones. According to the same source, the profitability of such trading rules diminishes rapidly with time, turning negative over horizons of over a year.

De Long et al. (1989) have emphasised that such market heterogeneity and characteristics are common to all financial assets, including exchange rates. They refer to the 'speculators' as 'trend chasers', 'positive feedback investors' or 'noise traders'; while 'arbitrageurs' make use of all available information in forming expectations.

5.2 A Simple Model

Motivated partially by the above surveys, Frankel (1996) has attempted to specify a fairly realistic structure for the forex market, taking into account the heterogeneity of, and interaction between, the two groups of agents. The importance of formalising exchange rate volatility is that it helps clarify thinking on *if* and *how* a levy on capital flows may be beneficial. Such rigour has, for the most part, been largely missing from current debates on forex market instability. While we extend and elaborate upon

the original Frankel model in Appendix 2, the important conclusions of the model are summarised below:

a) The benefit of a flexible exchange rate regime for any one country is the ability to undertake independent macroeconomic policy (and thus experience differing inflation rates), though the drawback is its greater variability relative to a fixed/pegged one.

b) The greater the proportion of 'long-term investors' or 'fundamentalists' - i.e. those who make use of conventional macroeconomic exchange rate theories - in the market, the less variable the exchange rate.

c) To the extent that 'chartists' - who consciously used analytical techniques or trading rules to forecast exchange rates - tend to dominate the market, we expect that the exchange rate would be very variable in the short-term, with this variability falling over time in the absence of random shocks. In order words, "fundamental things apply as time goes by" (Flood and Taylor, 1996, p.283).

d) There may however exist a vicious cycle, in which speculation and variability feeds on itself. This may at least partly rationalise the Yin-Wong and Wong finding about the perceived lowest predictability of long-run exchange rates, and the Frankel and Froot findings about the use of technical analysis having become more prevalent in the 1990s.

e) Apart from the suggestive role to be played by using the US$ (or any major currency) as a nominal anchor, the importance of a Tobin tax (TT) or any cost-based levy in reducing exchange rate volatility also becomes apparent. In particular, one of the aims of a TT is to reduce the volatility of spot exchange rates by lessening the speculative element (i.e. agents with extrapolative expectations) in the market (Tobin, 1996).

6. A Currency Transaction Tax

Before proceeding though, two caveats are in order. First, the administrative requirements, incentives created for rent-seeking activities and the general 'porousness' of quantitative restrictions, particularly in the medium- and longer-terms (Johnston and Ryan, 1994 and Mathieson and Rojas-Suarez, 1993) on the one hand, as well as the *potential* for generating fairly substantial tariff revenues on the other, leads us to consider only cost-based levies. More generally, the usual tariff versus quota argument in the trade literature is also valid here.

Second, the case is often made for a temporary introduction of capital restrictions during periods of intense currency runs, as has been undertaken by a number of countries (The Economist, February 4, 1996, p.72 and IMF, 1997a,b)[33]. However, our focus is on *uniform, permanent* (in the sense of being in place as a preventive measure and as long as it takes to establish 'solid' banking structures) and thus *non-discretionary* restraints (levies). The motivation for these include the following:

a) there are always lags in policy formulation and implementation;

b) there will most probably exist some inertia in removing the controls (not unlike import restraints legally allowed in the case of a temporary balance of payments crisis); and, most importantly,

c) there could be a perpetuation of the situation, as the introduction of the controls may be interpreted as a confirmation/signal of profligate policies being pursued

[33] This is an opportune point to note that, while not taking anything away from the extensive and influential contributions to the literature by Barry Eichengreen and collaborators, there is a lack of clarity as to their exact position on capital restraints. For instance, Eichengreen, et al. (1996b) and Eichengreen and Wyplosz (1994, 1996) propose "temporary measures" in the form of non-interest-bearing deposit requirements. On the other hand, Eichengreen, et al. (1996c, p.296) conclude that "economists, *including the authors of this paper*, resist the idea of interfering in the operation of the markets" (emphasis added). The dates of the various papers seems to rule out a gradual shift of the authors' views over time. Regardless, when they do advocate restraints on capital flows, they do so in order to discourage a speculative attack when it is threatening to occur, rather than being preventive (see Eichengreen et al, 1996b, pp.321-4 for the most explicit statement of this).

by the authorities, hence generating further short-selling of the currency (a time-inconsistency problem).

This said, one must add three important caveats. First, such policies will probably be far more successful in (and ought to be aimed at) moderating (short-term) capital *inflows* (especially debt financing), rather than *outflows* (we will come back to this point a number of times). In other words, the aim should be to prevent excessive 'booms' from occurring in the first instance, rather than attempting to eliminate the 'busts' that invariably follow. This is also consistent with cross-country experiences with capital restraints (Reinhart and Smith, 1997).

Second, such policies ought not to be considered (at least publicly) at a time of a crisis. This will only exacerbate an already bearish and uncertain situation.

Third, by no stretch are such curbs offered as panacea for international financial crises. The primary focus must be on getting the 'fundamentals' right. These refer both to the overall macroeconomy (fiscal deficits, inflation etc) in general and the banking and financial sector in particular. In a sense, there ought to be little disagreement about this, as the literature on 'optimal' sequencing of economic liberalisation has emphasised that capital account liberalisation must be the last stage of the process.

6.1 The Tobin Tax (TT) Proposal

Against this background, the remainder of this section is devoted to a discussion of the TT, originally proposed by Nobel Laureate James Tobin in 1978 (see Tobin, 1978, 1996 and Kaul, et al., 1996). A 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 a TT is claimed to be inversely proportional to the length of the transaction, i.e. shorter the holding period, the heavier the burden of tax (see Appendix 3 for a formalisation). For instance, a TT of 0.25 percent implies that a twice daily round trip carries an annualised rate of 365 percent; while in contrast, a round trip

made twice a year, carries a rate of 1 percent. Accordingly, and considering that 80 percent of forex turnover in 1995 involved round trips of a week or less (Appendix 1), the TT ought to help reduce exchange rate volatility and concomitantly curtail the intensity of 'boom-bust' cycles (Tobin, 1996).

In light of the extreme turbulence in international financial markets, there has recently been a proliferation of articles on the TT[34]. While the *theoretical* rationale for sprinkling sand in the wheels of international finance is largely uncontested, a reading of the literature suggests much skepticism about why a TT may not be *practically* feasible. We highlight and discuss the main concerns below.

1) Currency transactions will migrate to offshore tax havens (Geographical Substitution)

It is argued that a TT cannot be applied unilaterally, as this will merely lead to a migration of forex transactions to another country (tax haven). In light of this, it has appropriately been noted that the geographical coverage of the tax must be universal in the sense of including all countries. However, as long as the TT is levied on the trading site rather than the booking or settlement site, the high fixed costs involved in developing the human and physical infrastructure on the one hand, along with fairly 'moderate' levies on the other, ought to act as a disincentive of sorts to market migration. Accordingly, rather than being universal, the TT need be imposed only by all the major financial centers (noted in Appendix 1) [35].

[34] See, for instance, the papers collected in the United Nations Development Programme-sponsored book (Haq, et al., 1996), papers in the *Economic Journal Policy Forum* (volume 105, 1995), Bird and Rajan (1999a,b), Davidson (1997), Felix (1996a) and Raffer (1998). According to Raffer (1998), there has been far less discussion on the topic than probably might otherwise have been, due to a passage of a bill - titled 'Prohibition on United Nations Taxation Act of 1996' - by the 104th US Congress "to prohibit UN officials and UN agencies from developing or promoting Tobin's proposal, or any other international taxation scheme."

[35] The existence of a regional contagion effects is suggestive of the possibility of applying a TT on a *regional* as opposed to a *global* basis, so long as the major regional financial centers are included and the tax is set at a 'punitive' rate. Thus, in the case of Asia, it is important that Japan

2) Currency transactions will migrate to other financial instruments (Asset Substitution)

It is argued that if the TT is limited to spot transactions as per Tobin's original suggestion, this will lead to a tax-saving reallocation of financial transactions from traditional spot transactions to derivative instruments. This is a valid criticism and suggests that the application of the TT include derivative products such as forwards, futures, options and swaps. While financial engineering will almost certainly lead to the development of new (synthetic) instruments, thus allowing for some evasion, this is by no means unique to a TT. For instance, income and corporate tax evasion/avoidance have become industries onto themselves. However, as long as the tax is levied at a 'moderate' rate, the scope for substitution away from traditional spot and derivative instruments ought to be limited (especially given that the synthetic positions created may not exactly replicate the original transaction). As in the case of the derivative products that have now become common usage by market participants, the TT could be extended to new derivative products once their use becomes extensive. In other words, the development of new financial instruments will not be instantaneous, and evasion/avoidance may be plugged as and when they arise.

3) The TT is relatively ineffective in averting speculative activity during a crisis period

It has often been stated that a punitive TT is relatively ineffective in preventing capital outflows during a period of crisis. For instance, Dornbusch (1998) recently noted that a "Tobin tax would not have avoided the Asian bankruptcy. Anyone who contemplates 30 percent depreciation will happily pay 0.1 percent Tobin tax." This point has been recently formalised by Davidson (1997), who has shown that, other things

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(Tokyo), Singapore, Hong Kong and possibly Australia (given its geographic proximity to Asia and close linkages it has had with Asian economies), all enforce the TT in unison.

being equal, the effectiveness of a TT is dependent on the tax rate relative to expected change in the nominal spot currency values. Thus, during a crisis period when the expected exchange rate variations are very large, the TT will be least effective in restraining capital flows.

While an important point, it paradoxically enhances the argument for a TT. To be specific, we have argued that the aim of a TT ought to be to prevent a crisis from occurring in the first place by mitigating surges in capital inflows during boom periods. The fact that a TT is relatively ineffective in a crisis period on the one hand, and bad fundamentals are invariably the initiating cause of such crises on the other, implies that a TT levied at a moderate rate will not prolong a regime that is unsustainable. In other words, the discipline of the market will remain in operation despite the TT. This, as noted in Section 3.2, was one of the main arguments used by opponents on capital flows generally, and is therefore a critical point.

4) The TT may have a perverse effect on capital flows, falling more heavily on long-term than short-term ones

Tobin (1996, p.xi) has noted that "the essential property of the transactions tax - the beauty part" is "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." However, Davidson (1997) has argued that, insofar as agents engaged in international trade in goods and services, 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 arrived at 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). In Appendix 3 we show 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 in Appendix 3, once again emphasises that the aim of a TT must be focused on preventing excessive capital inflows (booms) rather than stemming capital outflows (busts). To the extent that during a boom, there will be an anticipated upward pressure on the domestic currency, the burden of the TT does 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, loosened during a bust. This contrasts with the general argument for a tightening or imposition of temporary controls during a crisis, but is consistent with the Chilean experience with interest free deposit requirements.

7. Concluding Observations

With the ever-escalating frequency and intensity of financial crises, they can no longer be dismissed as mere aberrations in an otherwise well-functioning global capital market. While emphasising the need for measures to enhance the soundness of banking and financial systems (particularly prudential supervision), the ferocity of the East Asian crises have belatedly but surely awakened policy-makers to the need to reform the global financial architecture. Though this term is admittedly (and intentionally?) vague, one aspect of the reforms often discussed has been the possible introduction of some "frictions into the sand of the wheels of international finance".

In view of this, looking beyond the current crises, the rational and economic effects of imposing levies of capital flows, particularly a TT, have been explored. While much research needs to be done in order to determine issues such as optimal tax rate, coverage, and the like, there is a broad consensus that a punitive tax rate of about 10 to

25 basis points (0.10 to 0.25 percent) at a global level would be reasonable. Broad, conservative estimates based on this tax range using global forex figures for 1995, are for revenues of anywhere between US$140bn and US$300bn to be generated annually (Bird and Rajan, 1999a,b). This revenue-generating potential of the TT becomes particularly appealing and significant at a time when serious doubts are being raised about the ability of the IMF and other multilateral institutions to generate sufficient financial resources to deal with the next crisis, if and when it occurs (Dunne, 1998)[36]. We have argued that the TT must be applied counter-cyclically, tightened during a boom, reduced (to zero) during a currency run. The TT, if successfully implemented, ought also to diminish exchange rate volatility.

In the final analysis, to the extent that the political will to obtain an international agreement on such a levy remains in doubt on the one hand (given that it must be universally applied, at least by all major financial centres)[37], and since small, open, developing economies are most impacted by the vagaries of the financial markets on the other, each country ought to consider the unilateral imposition of the Chilean-type measures which restrain capital inflows (especially short-term debt financing). Indeed, even the IMF has recently acknowledged that the Chilean system of controls on capital inflows may well be an option worth considering, simultaneously with other necessary and well-designed prudential regulations on banks and other institutions, particularly with regard to open forex positions and maturity mismatches (Fischer, 1998b and IMF, 1998). This seems to be fast becoming the consensus view and may be a good and

[36] This is particularly so at a time when serious suggestions are being made regarding the need for the IMF or some other multilateral agency to perform the role of an international lender of last resort (ILOLR), i.e. providing liquidity to crises-hit, but structurally sound economies immediately (Wolf, 1998 and Financial Times, September 22, 1998). See Bird and Rajan (1999a,b) for a discussion of the revenue potential of the Tobin tax, a critique of expanding the Fund's role to include the ILOLR function and an evaluation of alternative uses of a Tobin tax.

[37] Bird and Rajan (1999a) take pains to emphasise how a Tobin tax ought to be appropriately 'packaged' or 'presented' to policy-makers so as to gain political acceptance.

concrete first step towards reaching a broader and more practicable agreement on reforming the international financial architecture in general.

Some have argued that the sound macro fundamentals and robust financial system that have been key to Chile's success, not the restraints on capital flows per se. In any case, Chile took about a decade to upgrade its banking system to the present condition, and most would agree that the Chilean controls were useful as an 'interim' arrangement until the country developed first-world institutions.

Appendix 1: An Overview of the Global Forex Market

The primary data on forex markets is obtained from the latest triennial central bank survey of forex and derivative market activity in 43 countries, conducted in April 1998 by the Bank for International Settlements (BIS, 1998). Referring to table A-1, *daily* global forex trades (i.e. traditional instruments of spots, swaps and forwards) have seen a phenomenal increase from US$18.3bn in 1977 to US$1490bn by 1998[38].

Of the total turnover in 1995, only 41 percent were spot transactions (table A-2). The remainder were in the form of derivatives, with swaps constituting the bulk of all financial transactions (46 percent), futures, forwards, options and other 'exotic' derivatives making up the remainder[39]. Financial derivatives in 1977 comprised a negligible portion of total forex transactions. Indeed, even in 1989, spot transactions constituted about three-fifths of the share of daily forex turnover. With the expected continuation of innovations in financial instruments, the use of financial derivatives is concomitantly anticipated to rise in the future. It is therefore imperative that academics and policy-makers pay far closer attention to their economic costs and benefits.

Financial derivatives have allowed private agents to leverage their capital manifold, hence contributing to the precipitous growth in the forex market. Specifically, anywhere between 60 and 90 percent of forex transactions are of the inter-dealer variety. This phenomenon of repeated passing of inventory balances between dealers is

[38] Three points ought to be noted. First, to obtain forex volumes, we need to multiply the daily turnover by 250 (trading days). Second, the growth would have been slower if measured in some other major currency (such as the Deutsche mark or Japanese yen), given the depreciation of the US$ between 1989 and 1995. Third, other issues relating to intertemporal comparisons of the survey have been noted in BIS (1996) and Felix (1996a).

[39] In general terms, a *derivative* is a synthetic financial instrument derived from some underlying assets such as currencies and equities; a *forward* is a promise/obligation to buy/sell the underlying asset in question - that is tailor-made according to size and maturity and traded 'over-the-counter' (OTC) - at a predetermined price and future date; a *future* is a standardised and more liquid form of a future which is traded on exchanges; an *option* is the right but not obligation to buy/sell the underlies; and a *swap* is an exchange of two principals (generally currencies or interest rates) with an offsetting future transaction.

termed the 'hot potato' process - not unlike the typical text-book money multiplier - and describes how an initial forex transaction sets into motion a series of chain reactions or transactions with other banks or financial agents, which attempt to rebalance their financial inventories, so as to have net neutral positions (both in terms of net worth as well as timing)[40]. This hot potato process helps to partly explain the seeming herd mentality or clumping together of forex flows. Apart from the wholesale or decentralised and spontaneous dealership aspects of the market, the remainder of forex turnover is by the retail market, i.e. transfers between banks or financial agents and 'non-financial' customers such as exporters, mutual fund holders, and the like. Consistent with the high trading volume, almost 82 percent of the spot forex turnover has a maturity of less than seven days. The predominance of the inter-dealer transactions is also reflected in the acute and growing concentration of business in a handful of financial institutions. For instance, the market share of the top 20 institutions in the US rose from 60 to 70 percent from 1992 to 1995, the corresponding figures being 63 and 68 percent in the UK. In Japan, the top ten institutions constituted 51 percent in 1995, up from 44 percent in 1992 (BIS, 1996).

A. Geographical Composition

The forex market is highly concentrated geographically, with four countries accounting for 65 percent of all transactions (table A-3). Specifically, the UK is the largest, with a 32 percent market share, followed by the US with 18 percent and Japan and Singapore with 8 and 7 percent respectively. This concentration is consistent with the oft-noted geographical triad of Europe-US-Asia Pacific. The other four countries with market shares of some significance are Germany (5 percent), France, Hong Kong and Switzerland (4 percent each). Apart from Australia and Canada (2 percent each), the remainder is divided among other European markets. Of some surprise is the fact that,

[40] Lyons (1996) provides an excellent discussion and empirical validation of the hot potato effect.

while Japan's market share has fallen sharply (from a high of 15 percent in 1989), those of the other three financial centers in the Asia Pacific have also declined (by 1 percentage point each). Thus, contrary to popular belief, the erosion of Tokyo as a financial center is not due to the Asia Pacific competitors. Rather, the UK seems to have been the main beneficiary of Tokyo's relative decline, its share rising by 6 percentage points during the period, while that of the US rose by 2 percentage points. This broad data seems to suggest that the top three viz. London, New York and Tokyo being international financial centers, may, to some extent, be in direct competition with one another. Even this thesis though is in doubt, given the differing time-zones that each center caters to (especially Japan and the US where the overlap is minimal). London's favourable geographical location, time-zone and agglomeration economies which have led to depth in the capital markets, are broad reasons for its preeminent position. The other major centers - Hong Kong, Singapore and possibly Australia in the Asia Pacific; Germany, France, Switzerland and others in Europe - are primarily regional competitors[41]. Indeed, if Japan's downward trend continues it too will have to be considered only a regional financial center.

Table A-4 shows that the US$ constituted the bulk of transactions (87 percent), with the Deutsche mark (30 percent), Japanese yen (21 percent) and the Pound Sterling (11 percent) being the three next largest[42]. Significantly, the US$ is the only truly 'global' currency, with the result that it is most widely used as the vehicle currency for cross-border transactions (Tavlas, 1997). The DM's share is predominantly because of its use in Europe, hence signifying its position as the anchor of the EMS. The Japanese yen expectedly is most widely used in the Asia Pacific region, though even here it is the US$

[41] Though even here the extent of regional competition is at times limited. For instance, Hong Kong and Singapore have developed unique niches, both in market areas serviced and types of businesses that predominate (Handley, 1998).

[42] Note that the two-way currency transactions, with each side of the transaction counted distinctly, must necessarily mean that the total is 200 percent.

that predominates, i.e. there is no 'yen bloc' (also see Frankel and Wei, 1998, p.200). The relatively low (and declining) share of the pound sterling in comparison to London's predominant market share of forex turnover, emphasises the high and growing internationalisation of the London forex market.

B. Forex Growth in Comparative Perspective

To put the growth in forex transactions in perspective, consider concomitant trends in and distribution of global trade (simple average of exports and imports) and official gold and forex reserves (Table A-5). Revealingly, the trade-to-forex volume ratio has seen a striking decline from 23.9 percent in 1977 to 1.6 percent in 1995. This provides some, albeit crude validation of the thesis regarding the growing delink between forex transactions and real economic activities, with the former far exceeding the financing requirements of the latter. This point may be further emphasised by comparing patterns of world trade (exports) with those of the forex market noted above. In 1995, the US constituted 13.4 percent of global trade, Japan 7.7 percent, the UK 5.0 percent, Hong Kong 3.7 percent, Singapore 2.5 percent and industrial countries as a whole (excluding US, UK and Japan) about 50 percent (IMF, International Financial Statistics Yearbook, 1997).

Comparison of the distribution of trade flows with that of forex turnover reveals that only in the cases of the US and Japan is the distribution of their respective market shares in forex transactions more or less consistent with their respective shares of global trade. This point is further emphasised by the fact that the bulk of transactions in these two markets involve the domestic currency (over 70 percent). Hence, the growing share of the US market and the simultaneous decline of the Japanese share previously noted, are probably more due to the relative buoyancy of real economic activity in the former and continued economic slump of the latter, rather than because of the dynamics of 'head-to-head' competition. This apart, the UK's forex market share significantly

exceeds its global trade share. Hong Kong's and particularly Singapore's forex market shares are also well in excess of their respective trade shares. London, Singapore and Hong Kong also have the highest share of transactions involving non-domestic currencies. All this underscores the roles that the financial sectors in these economies play as independent growth engines, as opposed to mere 'bridesmaids' roles vis-à-vis expansions of domestic respective real economic activities.

While official reserves-to-exports ratio on average remained relatively constant at 26 percent in 1995 (up from 22.6 percent in 1977, but down from the peak of 29.9 percent in 1983), consider the official reserves-to-forex (daily) turnover ratio. This declined sharply from 14.5 days in 1977 to just 1.1 days by 1995, thus suggesting a much-diminished ability of monetary authorities to defend currencies in the face of speculative attacks. For completeness, we compare the distribution of forex transactions with the corresponding region-wise share of aggregate official reserves. In 1995, Japan had 12.7 percent of global official reserves (including SDRs), the US 6.1 percent, Singapore 4.7 percent, the UK 2.9 percent and industrial countries as a whole (except for the three mentioned above) about 43 percent. Figures were unavailable for Hong Kong (IMF, International Financial Statistics Yearbook, 1997).

Table A-1
Daily Global Forex Turnover, 1977-98
(US$ billion)

Year	Excluding Derivatives[a]	Including Derivatives[b]
1977	18.3	n.a.
1980	82.5	n.a.
1983	119.0	n.a.
1986	270.0	n.a.
1989	590.0	620.0
1992	820.0	880.0
1995	1190.0	1260.0
1998	1490.0	n.a.

Notes: a) Includes spot, outright forward and swaps
b) Includes in addition futures and options
Sources: BIS (1996, 1998) and Felix (1996a)

Table A-2
Daily Global Forex Turnover Including Derivatives, 1989-98
(US$ billion)

Categories	1989		1992		1995		1998	
	Amount	Share (%)	Amount	Share (%)	Amount	Share (%)	Amount	Share (%)
Spot	350	56.5	400	45.5	520	41.3	590	n.a.
Swaps + Outright Forwards[a]	240	38.7	420	47.7	670	53.2	900	n.a.
Reporting gaps	30	4.8	60	6.8	70	5.6	n.a.	n.a.
Total	620	100.0	880	100.0	1260	100.0	n.a.	n.a.

Notes: a) Swaps were about US$320 billion in 1992 and US$580 in 1995. Data not available for 1989 which did not separate the two items
Sources: BIS (1996, 1998) and Felix (1996a)

Table A-3
Geographical Distribution of Forex Turnover, 1989-98
(Daily Averages in US$ billion)

Country	April 1989		April 1992[c]		April 1995		April 1998	
	Amount	Share (%)	Amount	Share (%)	Amount	Share (%)	Amount	Share (%)
UK	184.0	26	290.5	27	463.8	30	637.7	32
USA	115.2	16	166.9	16	244.0	16	350.9	18
Japan	110.8	15	120.2	11	161.3	10	148.6	8
Singapore	55.0	8	73.6	7	105.4	7	139.0	7
Germany	n.a.	n.a.	55.0	5	76.2	5	94.3	5
Switzerland	55.0	8	65.5	6	86.5	6	81.7	4
Hong Kong	48.8	7	60.3	6	90.2	6	78.6	4
France	23.2	3	33.3	3	58.0	4	71.3	4
Australia	28.9	4	29.0	3	39.5	3	46.6	2
Canada	15.0	2	21.9	2	29.8	2	41.0	2
Others[a]	80.0	11	129.1	12	172.9	11	294.4	14
Total[b]	717.9	100	1076.2	100	1571.8	100	1971.0	100

Notes: a) Approximate
b) Total 'net-gross' turnover, i.e. adjusted for local double-counting ('net-gross')
c) Data for 1992 not adjusted for double-counting
Source: BIS (1998)

Table A-4
Use of Major Currencies on One Side of the Transaction, 1989-98
(as % of Global Gross Forex Turnover)

Currency	April 1989	April 1992	April 1995	April 1998
US $	90	82	83	87
Deutsche Mark	27	40	37	30
Japanese Yen	27	23	24	21
Pound Sterling	15	14	10	11
French Franc	2	4	8	5
Swiss Franc	10	9	7	7
Canadian $	1	3	3	4
Australian $	2	2	3	3
ECU and other EMS Currencies	4	12	15	17
Others	22	11	10	15
Total	200	200	200	200

Source: BIS (1998)

Table A-5
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 (1996) and IMF, International Financial Statistics Yearbook, various issues

Appendix 2: A Simple Model of Exchange Rate Instability

This appendix provides a simple formalisation of the discussion of forex instability in Section 5.1. Given the predominance of the US$ in forex transactions, we consider only bilateral exchange rates and assume the other (focus) currency to be the baht (b). All variables are in log form.

$$s = m - d + u \qquad (1)$$

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

$$d = wd_i + (1 - w)d_s \qquad (2)$$

where: w = fraction of long-term participants or 'fundamentalists'; (1 - w) = fraction of short-term participants (speculators) or chartists; d_i = relative domestic asset demand by the fundamentalists; d_s = relative asset demand by the chartists. As noted, the chartists have extrapolative (or momentum) forecasts, i.e. they expect the exchange rate to diverge from equilibrium (hence creating a 'bubble')[43], while the fundamentalists expect a convergence. Accordingly, we rewrite the relative demand for domestic assets (d) as follows

$$d = [wf_i q\ (s - \underline{s}) - (1 - w)f_s d\ (s - \underline{s})] \qquad (3)$$

where: f_i and f_s denote the demand elasticities of the fundamentalists and chartists for foreign assets with respect to their corresponding expectations; q and d are the rates of

[43] Neely (1997) provides an illuminating primer on technical analysis in the forex market.

expected convergence (by the fundamentalists) and divergence (by the chartists) of the spot rate from the long-run 'equilibrium level', which is denoted by $\underline{s}$. Thus, the fundamentalists' behaviour is 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 (all of which essentially extrapolate past trends), tend to have a destabilising effect.

Frankel assumes $\underline{s}$ to be a constant. *A priori*, one would expect to obtain much richer results by attempting to specify the equilibrium exchange rate. While there are a number of theories of spot exchange rates (see for instance Flood and Taylor, 1996 and Frankel and Rose, 1995), there is no general agreement as to what constitutes the equilibrium exchange rate. Nevertheless, 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 percent annually, a half-life of about 4.6 years (Rogoff, 1994). In similar vein, Flood and Taylor (1996) show that the explanatory power of PPP rises sharply when a five-year average time horizon is considered. Accordingly, we take PPP as the long-run equilibrium exchange rate[44].

$$\underline{s} = p_b - p_u \qquad (4)$$

[44] It should be noted that the time horizon of focus of chartists is usually a few hours at least, and almost certainly less than a year. Given the above-noted five-year time period for the PPP to hold, it may be necessary to consider another ('medium-term') model of exchange rate fundamentals. The problem then arises as to which macroeconomic exchange rate model to use (i.e. monetary model with or without price flexibility, portfolio balance theory, a hybrid version, etc.). This would be an interesting survey to conduct with the relevant private sector agents. Indeed, as previously noted, the survey by Yin-Wong and Wong (1997) is revealing, in that long-run exchange rates - while believed to be based on fundamentals - are overwhelmingly viewed as being unpredictable. The authors conclude that this may reflect the difficulty in forecasting fundamentals, or the absence of a definite choice of exchange rate models.

Substituting (2) and (4) into (1), we get[45]:

$$s = \{m + [wf_i q - (1 - w)f_s d](p_b - p_u) + u\}$$

$$[1 + wf_i q - (1 - w)f_s d]$$

$$v(s) = (1/A^2)\{v(m) + [wf_i q - (1 - w)f_s d]^2 v(p_b) + [wf_i q - (1 - w)f_s d]^2 v(p_u) + v(u) - 2[wf_i q - (1 - w)f_s d]\text{cov}(m,p_u) + 2[wf_i q - (1 - w)f_s]\text{cov}(m,p_b) - 2[wf_i q - (1 - w)f_s d]\text{cov}(p_b,p_u)\} \quad (5)$$

where v = variance and $A = [1 + wf_i q - (1 - w)f_s d]$. We assume that $\text{cov}(u,m) = \text{cov}(u,p_u) = \text{cov}(u,p_b) = 0$ and $A > 0$.

Based on simple forex market demand and supply analytics, we would expect $\text{cov}(m, p_u) < 0$ and $\text{cov}(m, p_b) > 0$. Ignoring for the moment the last term in (5), it is clear that the endogenisation of the equilibrium exchange rate leads to an increase in v(s) compared to if s was treated as a constant. This would be expected *a priori*. The last term is quite interesting. Broadly, if one country (Thailand) pegged it's exchange rate to the other (US), we would expect price levels (or more generally, inflation rates) in the two countries to be correlated (imported inflation), but the advantage would be a relatively more stable bilateral exchange rate. This is exactly the result obtained, i.e. if a pegged rate were pursued, $\text{cov}(p_b, p_u) > 0$. On the other hand, if the two countries maintained largely independent macroeconomic policies and allowed for freely floating exchange rates, we would expect $\text{cov}(p_b, p_u)$ to be close to zero and v(s) would correspondingly increase.

[45] Strictly speaking, the PPP ought to involve only the tradable goods sector, i.e. $P = P^T(1\text{-}a)P^{NT}$, where P_f = price of tradables and P^{NT} = price of nontradables.

If $\underline{s}$ were constant, as in Frankel's original specification, it would be trivial to note that $\partial v(s)/\partial w$ **<** 0, i.e. the greater the proportion of long-term investors or fundamentalists in the market, the less variable the exchange rate. Further, $\partial v(s)/\partial(f_i q)$ **<** 0 and $\partial v(s)/\partial(f_s d)$ **>** 0, i.e. the more sensitive or responsive the speculators to the expected divergence between the spot and equilibrium exchange rate relative to the fundamentalists, the more variable will be the spot exchange rate. While the introduction of PPP does complicate the comparative statics, it can be easily shown that, with the maintained assumption of $A > 0$, the above results go through. For a given w, this in turn is more likely the larger ($f_i q$) and the lower ($f_s d$); or conversely, for a given ($f_i q$), the lower ($f_s d$) and the larger w. In general therefore, it is revealing to note that Frankel's original results hold in this relatively more realistic specification.

In the short-term, we would expect chartists/speculators to dominate the market both in terms of share of market participants (low w), as well as in terms of the intensity of their actions (high $f_s d$). In the longer-term though, once exchange rates are beyond a certain level, the general perception is one of gross under/over-valuation, with the result that relatively more market participants start paying much closer attention to fundamentals. This is not unlike 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 eventually is pulled backed by the anchor in economic fundamentals. In the context of this model, w rises, as does $f_i q$, while $f_s d$ will diminish, as the people are less willing to continue extrapolating at the same rate. We expect therefore that the exchange rate would be very variable in the short-term, with this variability falling over time in the absence of random shocks (the term u in this model). The model also offers an explanation for the seeming growing variability of exchange rates over time. In particular, the more variable the exchange rate, the less certain participants are about fundamentals driving the market, with the result that the proportion of speculators rises

(w falls). In other words, there might exist a vicious cycle in which speculation and variability feed on each other.

Appendix 3: A Simple Model of the Effects of a Tobin Tax

This appendix provides a simple formalisation of the discussion of the effects of a Tobin tax (TT) discussed in Section 6.1. 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 (defined as domestic currency per unit of foreign currency)

s^e = expected exchange rate

y = duration of investment measured as the number of years

t = TT per transaction

Assume that both the principal and interest earnings are subjected to the tax (paid in domestic currency). The TT may be modeled as a tax on interest earnings on foreign income. We assume the tax is applied on both the principal and interest. By arbitrage, the after-tax returns should be equalised between both countries. Thus,

$$[(1 - t)/(1 + t)](1 + yi_f)\,(s^e/s) = (1 + yi_h) \qquad (1)$$

The left-hand side of (1) is the after-tax returns on investing in the foreign country. Note that the tax on foreign interest income earned will be penalised twice (when it enters and leaves the country). The right-hand side is simply the return from investing at home. Solving for the foreign rate of return:

$$i_f = (1/y)[(1 + t)/(1 - t)(s/s^e) - 1] + i_h[(1 + t)/(1 - t)](s/s^e) \qquad (2)$$

Dropping the second term on the right hand side in (2) without loss of much generality and assuming $s = s^e$, we have:

$$i_f = (1/y)[2t/(1 - t)] \quad (3)$$

(3) obtains the result that, *ceteris paribus*, the longer the duration, the lower the 'required' foreign rate of return (i.e., $\partial i_f / \partial y < 1$). 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 1 year, the required foreign investment to attract foreign capital inflow is about 2 percent a year, while it is a massive 115 percent for an investment with a 1 week horizon.

Taking the first derivative of i_f with respect to y:

$$(\partial i_f / \partial y) = -(1/y^2)[(1 + t)/(1 - t)(s/s^e) - 1] \quad (4)$$

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. The more general case is shown by (2). It is obvious that as long as condition (3) below is satisfied, the above result goes through:

$$(s^e/s) = (1 + t)/(1 - t) \quad (5)$$

For t = 0.1, condition (5) implies that $(s^e/s) = 1.2$. If the home country is faced with a balance of payments or financial 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 percent (i.e. condition (5) is violated). Indeed, this is part of the definition of a currency crash a la Frankel and Rose (1996). In other words, a TT applied at a punitive rate 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 appreciating significantly, i.e. (s^e/s) < 1, condition (5) is satisfied, thus ensuring that short-term capital inflows face relatively higher tax burdens than do long-term flows. In other words, a TT is effective as a preventive tool against a boom, as opposed to slowing the speed of outflows during a bust. Indeed, given the perverse impact noted during a bust, it is best to reduce the TT (to zero) at a time of a currency run, i.e. it ought to be implemented counter-cyclically, as is the case of the Chilean non-remunerated deposit requirement.

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