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## Taxing short-term capital flows - An option for transition economies?

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## Taxing Short-Term Capital Flows — An Option for Transition Economies?

by Claudia M. Buch, Ralph P. Heinrich, and  
Christian Pierdzioch

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- The currency crises in Southeast Asia have once again exemplified the risks of integrating emerging market economies into international capital markets. Hence, proposals to throw “sand in the wheels” of international capital markets by taxing or otherwise restricting capital flows have re-entered policy discussions. The transition economies of Central and Eastern Europe are a group of countries for which potential policy lessons seem particularly urgent. The more advanced transition economies have imported substantial amounts of foreign capital in recent years, and longer-term foreign direct investment has accounted only for about one-third of these inflows.
- Essentially, the case for taxing cross-border capital flows is based on the notion that financial markets react faster than goods markets. This market imperfection may cause fluctuations in the real economy which are not linked to fundamentals. Hence, a corrective tax or other restrictions on short-term capital flows may enhance welfare if certain assumptions are met.
- However, taxes on cross-border capital flows face substantial enforcement problems. In order to prevent tax evasion, the tax would have to be levied on a broad base. The experience of Chile with reserve requirements on capital inflows suggests that tax evasion may increase over time, hence progressively eroding the effectiveness of the tax. Moreover, since the tax would have to be introduced unilaterally in the transition, also desirable capital inflows would be diverted to third countries.
- Quite apart from enforcement problems, it is not clear whether taxes on cross-border capital flows reduce volatility in financial markets. The introduction of the tax by itself leads to an overshooting of the exchange rate. If the tax had to be abolished again in the future, such an overshooting would take place even twice. In addition, there is no clear-cut evidence as to which type of capital flows are the most volatile and how volatility of capital flows and of exchange rates changes after the imposition of capital controls.
- There is ample evidence that sticking to fixed exchange rates which are inconsistent with domestic fundamentals increases the risk of a crisis. This risk is particularly pronounced if weak macroeconomic fundamentals coincide with weak institutions and incentive systems on a microlevel. Taxes on short-term capital flows do not solve the problem of the induced exchange rate misalignment but may rather delay adjustment efforts. Conversely, structural reforms at the domestic level can reduce the exposure of the transition economies to volatile capital flows.
- Perhaps the most important policy implication is the crucial need to disseminate transparent, timely, and reliable information to the international investment community in order to reduce the amount of noise trading in financial markets. Because commercial banks are the key link between domestic and international financial markets, the enforcement of prudential regulations against excessive foreign borrowing of banks, as enshrined in the guidelines of the Bank for International Settlements in Basle, should be the focus of policymakers.
- The transition economies also have to take into account that the membership in the OECD and the envisaged membership in the European Union restrain their policy options. Incidentally, the conditions of EU membership by themselves can reduce the exposure of the new members to adverse external shocks by enhancing macroeconomic stability and by strengthening institutions.

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## 1. The Issue

The currency crises that have hit Southeast Asia in the past months have once again exemplified the potential risks of integrating emerging market economies into international capital markets.<sup>1</sup> Although the countries had long been praised for their strong reliance on long-term foreign direct investment (FDI) to finance current account imbalances, they have yet turned out to be vulnerable to reversals of short-term capital flows just as many other developing countries, notably in Latin America, before.<sup>2</sup> If short-term capital flows (suddenly) reverse, countries are forced into severe adjustment crises because flows of goods and services tend to react less quickly. Hence, limiting inflows of (short-term) capital by imposing taxes has entered policy discussions once again as an option to limit the exposure to volatile capital flows. A tax on short-term capital inflows has particular appeal.<sup>3</sup>

The transition economies of Central and Eastern Europe are a group of countries for which potential policy lessons seem particularly urgent. The more advanced reform countries such as the Czech Republic, Hungary, Poland, and Estonia have temporarily imported capital by the amount of more than 10 percent of Gross Domestic Product (GDP) in the past couple of years. While foreign direct investment has been important for these economies, portfolio investment and other short-term capital flows have increased as well recently. Sustainable current account positions have, thus, become a major policy issue for the reform countries (EBRD 1998; Fries et al. 1998), and taxes on short-term capital flows are among the policy options being discussed. The Polish Finance Minister, for example, has recently indicated that he is considering measures to control short-term capital flows.<sup>4</sup>

Yet, the maintenance or imposition of restrictions on capital account transactions may not seem warranted in view of the envisaged membership in the European Union of these econ-

omies and of the commitments towards capital account convertibility made under membership in the OECD. However, as taxes on short-term capital flows are also being discussed in the West,<sup>5</sup> it is probable that the European Union (EU) would consent at least to the maintenance of temporary controls for the new members.

This paper discusses whether the implementation of a tax on short-term capital flows can make the transition economies of Central and Eastern Europe less vulnerable to adverse external shocks and to sudden withdrawals of foreign capital. The following section outlines the main arguments which are advanced by the supporters and opponents of a transactions tax on foreign capital flows. We also develop a simple theoretical framework which allows us to study the effects of a tax on capital inflows. The model reveals that it is important to distinguish between two effects of a transactions tax. On the one hand, a transactions tax might be a useful tool to discourage destabilizing trading strategies on the foreign exchange market. On the other hand, it should be taken into account that a tax on foreign capital flows pushes the economy to a new steady state. This induces an overshooting of the exchange rate if "super efficient" financial markets react faster than goods markets. Thus, the implementation of a transactions tax by itself can be viewed as a source of additional (excess) volatility of the exchange rate. Section 3 briefly discusses the experience of Chile which maintains a deposit requirement for short-term capital inflows. Section 4 gives an account of the structure of capital flows of the transition economies and of the restrictions which currently pertain to the capital account of the balance of payments. We restrict our analysis to four of the more advanced reform countries — i.e., the Czech Republic, Estonia, Hungary, and Poland — because the policy issues of high capital inflows are most relevant for these countries. Section 5 concludes.

## 2. Is There a Case for Capital Controls?

Before discussing the pro's and con's of the taxation of capital flows, it is useful to clarify a few concepts. *First*, a distinction needs to be made between exchange rate volatility and exchange rate misalignment. While the former implies exchange rate movements around a trend, the latter implies a movement of the exchange rate away from its fundamental value. Volatility may be very low in this case. While taxes on short-term capital address the former, they are unable (and not intended) to deal with the latter.<sup>6</sup> *Second*, we are concerned with real rather than nominal exchange rates. Ultimately, the level of the real exchange rate is determined by economic fundamentals such as differences between countries in productivity and in preferences. Because a high volatility of the real exchange rate is unlikely to be a mere reflection of changes in underlying fundamentals, it may, thus, have negative feedback effects on the real sector.

### 2.1. The Proposals<sup>7</sup>

In his original proposal Tobin advocates throwing "some sand in the wheels of excessively efficient international money markets" by means of an "internationally uniform tax on all spot conversions of one currency into another" (Tobin 1978: 154–155). The Tobin tax, thus, covers all foreign exchange transactions and all traders. It is collected by the national tax authorities at a low tax rate which is invariant to the interest rate. Implementation must be worldwide, and the main intention of the tax is to reduce real exchange rate volatility.<sup>8</sup>

During the past two decades of academic discussion, alternative variants have been discussed. Eichengreen et al. (1995: 166), for example, propose a "tax or deposit requirement to all domestic-currency lending to nonresidents [...] regardless of the market in which they are booked." While it does not become entirely clear why this tax would apply to nonresidents only, it is intended to prevent speculation

against EU currencies prior to the introduction of the euro. The main intention of this tax is to protect the domestic balance of payments. It would, thus, be levied at a relatively high rate and would rise with the domestic interest rate, i.e., with the opportunity cost of the reserve requirement. Implementation would be on a national level.

Garber and Taylor (1995) discuss zero-interest margin deposits or prudential bank capital requirements against net foreign exchange positions as two additional options. Both restrictions would raise the effective costs of foreign loans and, thus, make borrowing from abroad less attractive. In the following, we mainly restrict ourselves to these modified proposals, i.e., on proposals to introduce taxes or other restrictions on (short-term) capital inflows.

### 2.2. Volatility and the Real Sector

The basic intuition behind Tobin's proposal is the notion that "super efficient" financial markets react faster than goods markets. Moreover, the underlying assumption is that the interaction of traders on financial markets gives rise to herding behavior and noise trading. This, in turn, drives a wedge between the price of a financial instrument and its fundamental value and, thus, causes excessive volatility in the price of financial variables. The fast and sudden changes in financial markets are in contrast to delayed responses of the real sector. This might be sub-optimal because physical investment and exports may be reduced, resources may be misallocated, and overall growth and welfare may suffer. The proposal to establish a transactions tax is, thus, based on a second-best framework.

A delayed response of the real sector can be modeled in a variety of ways. A classical framework which allows to model sluggish adjustment of the real sector of an open economy to exogenous shocks is the sticky-price model developed by Dornbusch (1976). We now employ this setup to shed light on the implications of

the introduction of a transactions tax on the dynamics of this model as well as on the equilibrium exchange rate and price level. We extend the Dornbusch model in two regards. First, we incorporate a transactions cost parameter which captures the impact of a tax on capital inflows the economic system.<sup>9</sup> Second, we modify the basic version by allowing for the presence of technical traders (chartists) on the foreign exchange market because one argument in favor of a transactions tax is that it might be capable of reducing the volatility of the exchange rate by discouraging nonfundamental trading strategies on the foreign exchange market. Our speci-

fication of the sticky-price model can be viewed as a simplified version of the framework constructed by DeGrauwe (1992) to study deterministic chaotic dynamics on the foreign exchange market. Box 1 summarizes the main features of the model.

The magnitude of the transactions tax parameter alters both the dynamics of the model outside the steady state and the coordinates characterizing the steady state (point A in Figure 1a) of the system.<sup>10</sup> The dynamic behavior of the system is shown in Figure 1a. The schedule *PP* represents all combinations of the exchange rate and the price level in the  $(e, p)$  plane for which

*Box 1 – Crowding Out the Crowd: The Formal Model*

- |     |  |                     |
|-----|--|---------------------|
| [1] | $dp = \phi(y - \bar{y})dt$                 | price adjustment,   |
| [2] | $y = \delta(e - p)$                        | output demand,      |
| [3] | $m - p = \kappa\bar{y} - \lambda r$        | money market,       |
| [4] | $E(de) = (r - \tau - r^*)dt, 0 < \tau < 1$ | currency arbitrage, |

where  $E$  = expectations operator, \* = foreign variable. Equation [1] states that any deviation of domestic aggregate demand  $y$  from the natural output  $\bar{y}$  induces a sluggish adjustment of the domestic price level. Aggregate demand [2] is an increasing function of the real exchange rate  $e - p$ . The nominal exchange rate  $e$  is defined as the domestic currency price of the foreign currency. Money demand depends on natural output and the domestic instantaneous interest rate  $r$ . Equation [4] is a modified version of the uncovered interest rate parity. Any differential between the domestic and the foreign instantaneous interest rate  $r^*$  has to be covered by corresponding exchange rate expectations. This fundamental relation holds in the present framework, too. However, we assume that domestic authorities have already implemented a transactions tax  $\tau$  on capital inflows which reduces the interest earnings from holding domestic assets. For simplification, we ignore the use of the proceeds of the tax. The adjusted or net interest rate differential is compensated through corresponding exchange rate expectations  $E$  which are a weighted average of the expectations of two types of market participants (Frankel and Froot 1990; DeGrauwe 1992):

- |     |   |                             |
|-----|---|-----------------------------|
| [5] | $E(de) = w\tilde{E}(de) + (1 - w)\alpha(1 - \tau)(e - \bar{e})dt$ | exchange rate expectations, |
|-----|---|-----------------------------|

with  $0 < w < 1$ . The term  $\alpha(e - \bar{e})$  represents the extrapolative exchange rate expectations of market participants which behave like technical traders. A current deviation of the exchange rate from the long-run equilibrium level  $\bar{e}$  induces these chartists to believe that this gap will become even larger in the next instant of time. The second type of traders are the fundamentalists. The fundamentalists are assumed to know the structural equations of the model and are aware of the presence of the chartists. Thus, fundamentalists are able to form exchange rate expectations taking into account both the dynamics of the macroeconomic framework as well as the impact of technical traders on the time path of the exchange rate. The exchange rate expectations of fundamentalists are model-consistent and can, thus, be employed to trace out the dynamics of the exchange rate:  $\tilde{E}(de)/dt = de/dt$ . Finally, we follow the literature in assuming that the relative importance of technical traders on the foreign exchange market depends on the magnitude of the transactions tax (Frankel 1996). We capture this by introducing a second multiplicative term  $0 < (1 - \tau) < 1$  into the elasticity  $\alpha$  of the exchange rate expectations of technical traders with respect to the deviation of the exchange rate from the steady-state level.

Figure 1 – The Dynamics of the Model and the Impact of a Transactions Tax

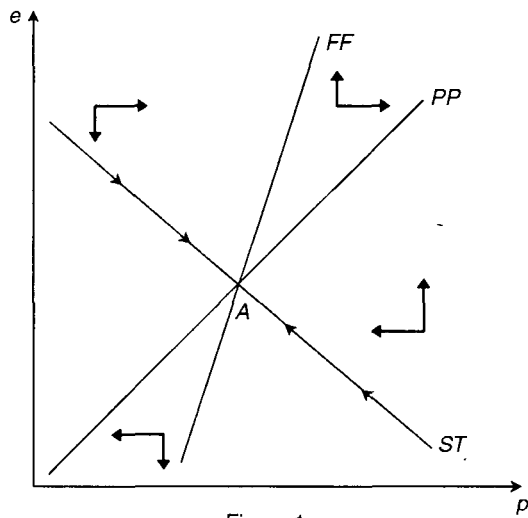


Figure 1a

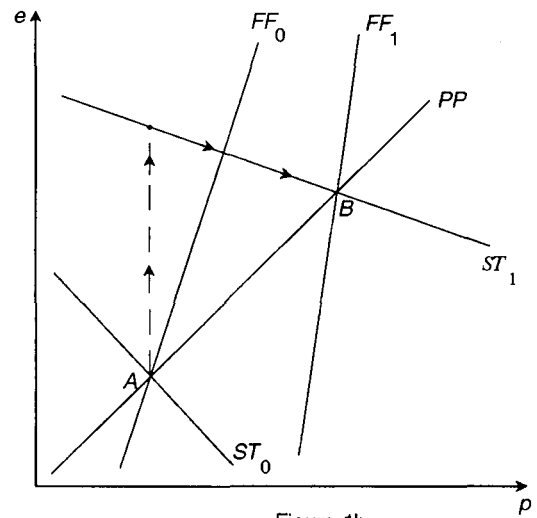


Figure 1b

aggregate demand equals the natural output and for which, thus, the rate of change of the price level is zero. For points above (below) this line, the inflation rate is positive (negative) due to the expenditure-switching effect caused by a real depreciation (appreciation) of the domestic currency which induces aggregate demand to exceed (to fall below) the natural output level. The  $FF$  line visualizes all combinations of the exchange rate and the price level in the  $(e, p)$  plane which imply stationarity of the exchange rate. Points to the right (left) of the  $FF$  schedule indicate that the interest rate differential outmatches (understates) the exchange rate expectations of the chartists, requiring a depreciation (an appreciation) of the domestic currency. The stable trajectory of the system is denoted as  $ST$  in Figure 1.

Figure 1b illustrates the various effects which take place in the aftermath of a (nonanticipated) change of the transactions tax parameter  $\tau$ . The  $FF$  schedule becomes steeper and shifts to the right. The introduction of the transactions tax results in an instantaneous depreciation of the domestic currency. The nominal exchange rate overshoots the new long-run equilibrium level as the currency arbitrage condition given in equation [4] stipulates that the negative (net) interest rate differential caused by the nonanticipated implementation of the tax has to be covered by corresponding appreciation expecta-

tions for the domestic currency. The overshooting of the nominal exchange rate, however, is reduced as the transactions tax increases the slope of the stable trajectory. This effect reflects our *assumption* that a transactions tax dampens the influence of technical traders on the foreign exchange market. Nevertheless, the domestic currency faces a temporary real devaluation and this causes an increase of the domestic inflation rate. As the economy slides along the stable trajectory in the direction of the new steady state, the excess demand on the commodity market is dampened by the increase in the price level as well as the concomitant appreciation of the domestic currency. Finally, the economy reaches a new steady state (point B in Figure 1b) which is characterized by a higher price level and a devalued domestic currency.<sup>11</sup>

Note that the increased slope of the saddle-path of the system due to the transactions tax reduces the overshooting of the nominal (and real) exchange rate which ensues from domestic money supply shocks. Thus, our simple model also serves to formalize the argument that a transactions tax can help to expand the autonomy of national monetary policy.

In summary, a transactions tax on capital inflows is capable of reducing the amplitude of exchange rate fluctuations by increasing the slope of the trajectory of the system. There is, however, no free lunch. Policymakers should

take into account that the implementation of a transactions tax by itself is an exogenous shock which pushes the economy to a new steady-state equilibrium. The new steady state is characterized by a depreciated domestic currency and a higher domestic price level. Moreover, sluggish price adjustment on the commodity market causes a temporary overshooting of the exchange rate relative to the new long-run equilibrium level. The implementation of a transactions tax on cross-border capital flows, thus, by itself induces additional fluctuations of the exchange rate.

### 2.3. Does a Transactions Tax Reduce Volatility?

The welfare-enhancing effect of a transactions tax depends upon the assumption that the tax reduces the volatility of exchange rates. Indeed, the idea is to introduce a uniform tax rate on *all* foreign capital flows. This implies that short-term investment would be much more discouraged than long-term investment. Short-term oriented investment strategies, in turn, are assumed to raise the volatility of the exchange rate. Thus, it is implicitly presupposed that market participants which pursue destabilizing trading strategies and which rely on noisy signals have a shorter time horizon than sophisticated investors. The latter would come up with the decision to invest only after assessing the fundamental value of a financial instrument. DeLong et al. (1990) have formally demonstrated that the presence of noise traders causes a significant deviation of the price of a financial variable from its fundamental value only if the time horizon of sophisticated investors is *shorter* than the time horizon of noise traders. In such a situation, the market risk generated by the presence of noise traders prevents sophisticated investors from pursuing arbitrage strategies which would eliminate the gap between the price of a financial instrument and its fundamental value. This argument reveals that the optimality of transactions tax critically depends upon the time horizon of the various groups of

market participants on the foreign exchange market.

Even if the time horizon of noise traders is relatively long compared to the time horizon of sophisticated traders, the notion that a transactions tax dampens market volatility is not clear. Rather, the capability of a transactions tax to reduce the volatility of the prices of financial instruments can be questioned for three additional reasons. First, it is most unlikely that a small transactions tax eliminates the huge profits sometimes generated as the result of successful speculation. Second, a transactions tax might reduce the liquidity of the market for the instrument which is subject to the tax. This, in turn, would imply that compared to a situation without a transactions tax even relatively small exogenous shocks could entail large movements of the price of the financial instrument. And, third, a transactions tax might induce only a shift of volatility. The financial instrument which is subject to the transactions tax would be traded less frequently. Optimizing agents would try to evade paying the tax by investing in other financial instruments or by generating the payoff of the taxed instrument synthetically by means of financial derivatives.<sup>12</sup> This, of course, might pave the way for the implementation of transactions taxes on these alternative financial instruments.

From an empirical point of view, the question whether a transactions tax reduces volatility is rather difficult to answer. Since taxes on foreign exchange transactions have hardly been implemented, direct empirical evidence is not available. Some indirect evidence can be gauged from countries such as Chile which have imposed restrictions on certain types of capital inflows (see Section 3 below). Indirect evidence could also be obtained from transactions taxes that have been introduced into other markets. Campbell and Froot (1994), for example review the experience with transactions taxes in securities markets. They find that the implementation of transactions taxes leads to a reduction in overall trading and to a migration of trades to unregulated markets. Other studies suggest that trading volume and volatility are positively related (Stulz 1994: 305). Yet, because the micro-



structures of securities and foreign exchange markets differ quite considerably and because behavioral changes induced by the introduction of taxes are not accounted for in these studies, no strong inference can be drawn.

#### 2.4. Can the Tax Be Implemented?

Apart from the issue whether a tax on capital flows would be desirable, there is the question of how difficult it would be to implement such a tax. There are two aspects here. One is whether the tax could be agreed upon, and enforced on the broad international scale envisaged by its proponents. We are skeptical. Given this skepticism, one can ask what effects a unilateral imposition of capital controls might have, particularly from the point of view of transition economies, which are our main focus here.

A transactions tax would ideally be imposed globally because the imposition only in one country would be expected to essentially drive foreign exchange trading offshore (Frankel 1996). The tax would only become binding if the imposition of such a policy instrument was the outcome of an international agreement. To the present day, such an agreement has not been achieved, and the degree of policy coordination necessary to carry out such a plan will likely prevent it from being realized in the near future.

Even if an international agreement on transactions taxes could be established, it is an open question whether this global coordination of economic policy results in a stable equilibrium.<sup>13</sup> The problem of stability arises because, like in any cartel, individual countries might be tempted to undercut the agreed tax rate to increase their volume of onshore trading. Such a disregard of the international agreement could be expected to provoke a response of other countries. As a consequence, the whole international system of transactions taxes could break down.

Given these obstacles to a global tax on capital flows, the only option currently open to transition economies would be a unilateral tax. In this case though, any potential benefits in terms of reduced volatility would have to be weighed against a possible loss in attractiveness for for-

eign investors relative to other emerging markets which do not impose such taxes. But apart from this, making the tax stick would require that the tax be levied on as broad a base as possible inclusive of transactions relating to trade in goods and services. Otherwise, optimizing economic agents could avoid paying the tax by carrying out transactions in financial instruments which are not subject to the tax. For example, agents might prefer to circumvent a tax by generating cash flows synthetically by utilizing, e.g., financial derivatives. Administering a tax with such a wide scope might overstretch the administrative capacities especially of less advanced transition economies. This is true all the more since the tax would have to be imposed unilaterally so that there would be limited scope for cooperation with other countries in keeping track of transactions for tax purposes. On balance, therefore, there are formidable obstacles to a successful implementation of a transactions tax in transition economies.

#### 2.5. Do Capital Controls Send the Right Signal?

Capital controls by definition impede the free flow of capital. If we take for granted that a worldwide implementation of a tax on foreign exchange transactions is hardly feasible, a country which decides to levy such a tax on capital flows *ceteris paribus* takes a relatively more interventionist stance than other countries. Even if such controls are justified in a second-best framework, they might in principle be used to serve other political goals as well. If foreign investors are incompletely informed about the actual intentions of a government, the introduction of capital controls might, thus, send negative signals. Bartolini and Drazen (1997) have formalized this argument. They show that capital controls can have negative effects on total investment because they send negative signals about future policies to investors. Their result hinges upon the assumption that information about the type of a government is asymmetrically distributed between investors and governments. Governments can raise revenue by tax-

ing the capital stock in their country, and they differ with respect to the alternative sources of income to which they have access. In this model, the imposition of capital controls sends a negative signal to investors that governments lack alternative sources of income and are, thus, likely to impose controls in the future. Conversely, abolishing controls on capital outflows sends a positive signal and increases net capital inflows.<sup>14</sup>

If uncertainty about the course of domestic policies prevails and if investment projects are irreversible, investors are also induced to postpone investment.<sup>15</sup> This has implications for the volume and structure of capital inflows as well as for the sequencing of capital account liberalization. Generally, in the presence of uncertainty, capital inflows will be biased towards relatively liquid, short-term investments (Buch, Heinrich, and Pierdzioch 1998). Labán and Larrain (1997) have also taken issue with the common practice to be more liberal with the liberalization of capital inflows rather than outflows. They show that a relaxation of controls on capital outflows, aimed at reducing the scope for a real appreciation of the domestic currency, may actually increase net capital inflows rather than lowering them. In the presence of capital controls, the option to defer the investment decision has a positive value to investors. This option value of waiting is positive if uncertainty about the future prevails, if the current investment opportunity is available also in future periods, and if capital controls make investment

irreversible. Conversely, policy measures that reduce the option value and, thus, increase investment are those which either reduce the irreversibility of investment (for example, by lowering controls on capital outflows) or reduce uncertainty about future investment conditions.

While Labán and Larrain (1997) emphasize that capital controls increase the irreversibility of international investments and, thus, enhance the option value of waiting, Tornell (1990) argues that a transactions tax is capable of reducing the volatility of financial variables and that it is therefore a proper instrument to eliminate the “irreversibility distortion.” In his model, the Tobin tax is utilized as an instrument to shield a small open economy from “rumors” which are modeled as the realizations of a continuously evolving stochastic process. A transactions tax reduces the volatility of the domestic real interest rate and this, in turn, reduces the option value of realizing debt-financed irreversible investment projects. The optimality of a transactions tax, however, crucially hinges upon two assumptions. First, policymakers must be able to disentangle movements of financial variables which reflect changes of fundamentals from movements which are merely attributable to rumors or to noise. And, second, while the empirical evidence indicates that investment decisions of firms are indeed sensitive to uncertainty and irreversibility,<sup>16</sup> it is open to discussion whether a transactions tax can actually serve to reduce the volatility of asset prices.

### 3. What Are the Lessons from Chile?

Chile is typically being cited as one of the prime examples for the effectiveness of Tobin-type capital controls. Yet, the restrictions that Chile has imposed on capital inflows are non-uniform and would, thus, not qualify as pure Tobin taxes.<sup>17</sup> Since 1991, foreign loans and deposits by nonresidents in Chile have generally been subject to a 20 percent nonremunerated reserve requirement. The reserve requirement rate was raised to 30 percent in May 1992, and

the deposit period was then fixed to one year. Also, a 1.2 percent stamp tax on local currency credits was at that time extended to foreign loans as well, excluding trade credits.

At first sight, the reserve requirements were a success: While in the short run restricted short-term capital was substituted by nonrestricted capital, the overall volume of short-term capital inflows was reduced in the longer term (Labán et al. 1997). Hence, Labán et al. (1997: 21) con-

clude that “the case for the ineffectiveness of capital controls may have been overstated.” Yet, there are three observations which cast shadows on the Chilean experience.

First, there was a relatively strong increase in the standard deviation of capital inflows subject to controls after the controls had been introduced. In the four years prior to the introduction of the controls, the coefficient of variation (standard deviation/mean) was 1.52, and it increased to 4.22 in the four subsequent years.<sup>18</sup> This contributed to the increase in the overall coefficient of variation of short-term capital flows from 0.77 to 1.00 as noncontrolled short-term capital flows were much less volatile throughout (0.91 and 1.00, respectively). Measured by the coefficient of variation, long-term capital inflows were more volatile than short-term flows throughout but were determined in any case by different factors than short-term capital flows.

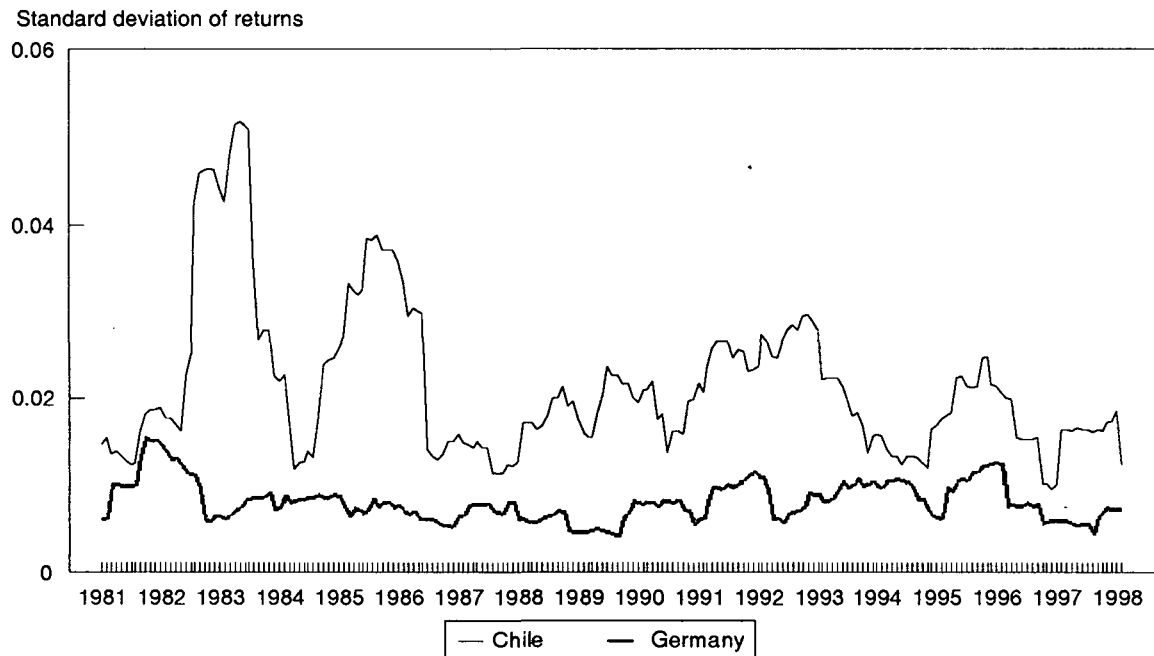
Second, because markets found ways to circumvent the reserve requirements, the Chilean authorities successively had to expand the coverage of the controls (Labán and Larrain 1998). In 1995, the deposit requirement was extended to other financial investments, excluding FDI and first issues of American Depository Receipts (ADRs). In 1996, reserve requirements were extended to credits after their first rollover. Also, the maximum proportion of foreign investment projects that can be financed through debt was lowered from 70 to 50 percent, and the minimum amount of foreign direct investment exempted from the reserve requirement was raised. These adjustments became necessary because trades migrated to less regulated markets. The interesting point may be that extended coverage of the controls appears to have become necessary only after a relatively long time.

Third, Chile’s currency has come under pressure recently as a result of the Asian crises to which Chile is heavily exposed due to its large exports to that region. In response, the government has now reduced from 30 to 10 percent the mandatory noninterest-bearing deposit it had imposed on short-term capital inflows in 1991. The intention is to attract more capital in order to support the currency and to prevent a

further devaluation which would hurt firms with open foreign exchange liabilities (Banco Central de Chile 1998). Thus, precisely at a time when currency turmoil elsewhere would suggest that a transactions tax would prove particularly useful, the Chilean authorities are apparently concluding that, whatever the benefits of the tax, they can no longer afford to turn away foreign capital.

This may have to do with the fact that there is no evidence that the introduction of controls on short-term capital flows has had an immediate restraining impact on real exchange rate volatility. After a prolonged period of real depreciation, the Chilean peso has appreciated considerably in real terms since 1991. Real exchange rate volatility as measured by historical coefficients of variation has come down significantly since the debt crises of the early 1980s, although it remains clearly higher than for instance in Germany (Figure 2a). Consistently with our model above, volatility actually rose in 1991 and 1992 when the controls were first introduced. It also rose in both 1995 and 1997 during the Mexican and Asian crises. However, it should be noted that these movements in volatility were relatively minor. Moreover, the reserve requirement on short-term capital inflows was adopted immediately after the currency crisis in neighboring Argentina in 1989–90. As Figure 2b demonstrates, real exchange rate volatility in Argentina increased dramatically during that period. So we cannot rule out that the introduction of reserve requirements in Chile, while not reducing volatility, at least prevented it from increasing in the wake of the crisis in Argentina. Similarly, Mexico experienced a marked increase in real exchange rate volatility during its balance of payments crisis in late 1994 and early 1995 (Figure 2c), with only minor consequences for volatility in Chile. Again, this might conceivably have been due to Chile’s reserve requirements on short-term inflows. Nonetheless, the relative immunity of the Chilean currency to crises in Argentina, Mexico, and Asia may have more to do with the underlying strength of the Chilean economy and the depth of its structural reforms in the 1980s than with capital controls (Labán and Larrain 1998; Sachs et al. 1996).

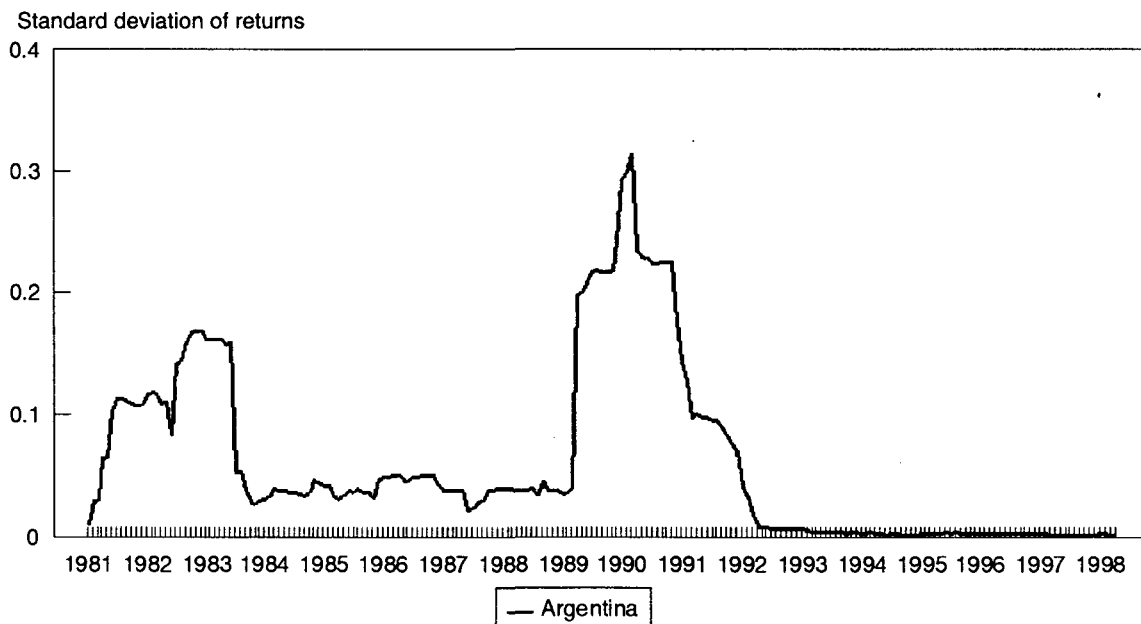
Figure 2a – Real Exchange Rate Volatility in Chile and Germany, 1981–1998



Note: Standard deviation of percentage change in real effective exchange rate over the previous 12 months, based on relative consumer prices.

Source: IMF (1998c); own calculations.

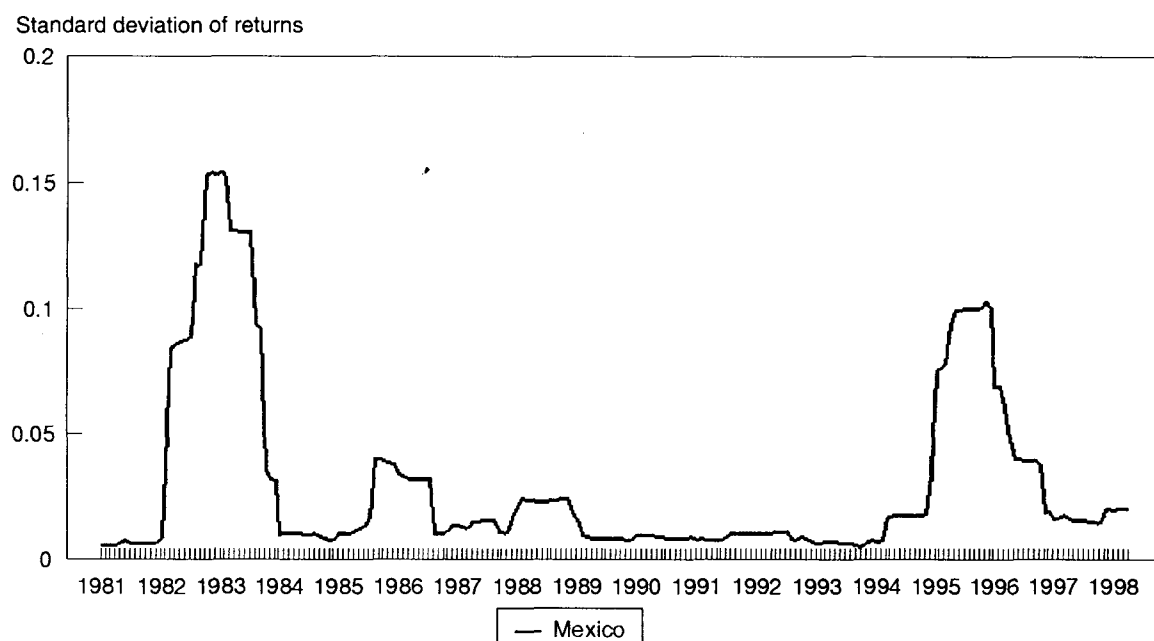
Figure 2b – Real Exchange Rate Volatility in Argentina, 1981–1998



Note: Standard deviation of percentage change in real exchange rate over the previous 12 months, based on consumer prices relative to the US dollar.

Source: IMF (1998c); own calculations.

Figure 2c – Real Exchange Rate Volatility in Mexico, 1981–1998



Note: Standard deviation of percentage change in real exchange rate over the previous 12 months, based on relative consumer prices relative to the US dollar.

Source: IMF (1998c); own calculations.

#### 4. Where Do the Transition Economies Stand?

During the past couple of years, the more advanced transition economies of Central and Eastern Europe have attracted quite sizable capital inflows. Although gross inflows have been small relative to global capital flows, they have been substantial if compared to GDP, reaching up to 10 percent of GDP in recent years (Buch and Heinrich 1998a). Between 1989 and 1996, about 52 percent of gross inflows into the transition economies of Central and Eastern Europe were credits and other capital flows, followed by FDI (32 percent), and portfolio capital (16 percent) (Table 1). In the years to come, the share of portfolio capital is likely to increase because the markets are still not very closely integrated with world capital markets and, thus, offer substantial diversification gains for foreign investors (Buch, Heinrich, and Piazzolo 1998; Linne 1998). This holds even more because EU membership will reduce institutional barriers for foreign (EU) investors.

Table 1 – Capital Flows to Eastern Europe, 1989–1996 (percent of gross inflows)

	FDI	Portfolio	Other
Czech Republic	19.0	14.3	66.7
Estonia	42.2	11.3	46.5
Hungary	77.9	46.7	-20.8
Poland	110.2	10.3	-20.5
European transition economies	32.1	16.2	51.7
<i>Memorandum:</i>			
World	17.8	42.2	39.6
Developing countries	33.6	29.9	36.3

Source: IMF (1998a); own calculations.

##### 4.1. Capital Account Liberalization and Exchange Rate Policy

###### *Capital Account Liberalization*

Since the demise of the communist regime under which the transition economies of Central and Eastern Europe were virtually closed off

from the (private) international capital markets, progress in capital account liberalization has advanced quite far in the countries under review.<sup>19</sup> Yet, the authorities maintain controls on various capital account items, in particular as regards short-term capital flows, and they limit the amount of foreign borrowing of commercial banks.

Estonia is the only country under review in this paper which has fully liberalized the capital account of its balance of payments. However, in order to curb growth of domestic credit in response to heavy foreign borrowing of Estonian commercial banks in recent years, the Bank of Estonia has gradually tightened reserve requirements for commercial banks. In July 1997, a 10 percent reserve requirement was imposed on the net liabilities of Estonian commercial banks vis-à-vis nonresidents, and the effective reserve requirement was further raised (Eesti Pank 1998a). Since July 1998, the reserve requirements have become more restrictive because the cash component has been raised and because financial guarantees provided by commercial banks to nonbank financial institutions have been included. The Bank of Estonia intends to take further measures if those already implemented should not help to slow down domestic credit growth sufficiently (Eesti Pank 1998b).

The three Visegrad countries under review retain controls on various types of capital flows, particularly on short-term capital flows. Generally, the Czech Republic has shown a more liberal attitude with respect to short-term capital flows than Hungary or Poland (Backé 1996). While general prudential regulations regarding the foreign exchange exposure of banks remain in place, a special limit on the short-term open foreign exchange position of commercial banks vis-à-vis nonresidents, which had been in place since August 1995, was abolished in October 1997 (IMF 1998d). But the Czech foreign exchange law contains a relative comprehensive safeguard clause which allows the Central Bank to impose deposit requirements on inward capital flows in times of severe balance of payments problems and to stop certain transactions entirely (CNB 1995: 27). The Central Bank did instruct commercial banks not to lend in koruna

to nonresidents during the May-1997 crisis, but apparently this instruction was not enforced strictly.<sup>20</sup>

In the case of Poland, cross-border financial credits to nonbanks with a maturity of less than one year are restricted (OECD 1997: 14). This restriction is scheduled to be abolished by December 1999. A new foreign exchange law which is currently under review intends to ease access of Polish firms to foreign loans. Although the option to introduce a tax on short-term capital is not explicitly contained in the new law, the possibility to impose reserve requirements on commercial banks' foreign borrowing in times of balance of payments problems has been retained.

Finally, the Hungarian foreign exchange law foresees restrictions on short-term financial flows (OECD 1997: 90; Elkan 1998: 94). Loans with a maturity of less than one year, for example, do require prior notification of and approval by the National Bank. Purchases by Hungarian residents of securities issued by enterprises in OECD countries are restricted to securities with a maturity of more than one year.

#### *Exchange Rate Policies*

All countries have chosen some form of fixed exchange rate regime, ranging from the currency board in Estonia as the most restrictive version to the strategy of dirty floating of the Czech National Bank. Poland and Hungary lie between these two cases as both have established a pre-announced crawling peg.

In Estonia, domestic currency can only be issued if the international reserves of the central bank increase. This full backing of the monetary base is intended to serve as a buffer against speculation. At the same time, the high commitment of the monetary and fiscal authorities to defend the fixed parity of the Estonian kroon to the D-mark may induce market participants to neglect potential foreign exchange risks in their borrowing decisions and may cause excessive domestic lending.

After pegging the exchange rate of the forint to a basket of currencies and devaluing its value in discrete steps, the National Bank of Hungary moved to a pre-announced crawling peg in

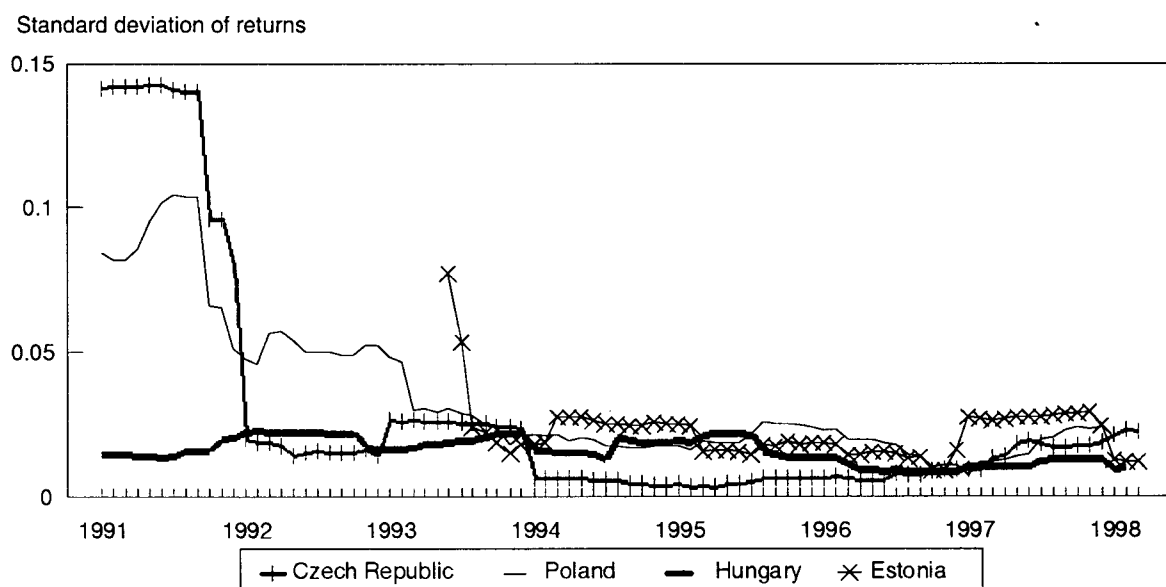
March 1995 to strike a balance between bringing down domestic inflation and maintaining competitiveness in the export sector. The monthly devaluation was set at 1.9 percent for the first three months that the scheme was operative and at 1.3 percent for the following months. As of 1997, the monthly rate of crawl was reduced to 1.1 per month on average and was below 1 percent in early 1998 (NBH 1998).

Similarly, the National Bank of Poland moved from a fixed exchange rate regime to a pre-announced crawling peg in October 1991. While the crawling peg was mainly intended to serve as a nominal anchor for domestic prices, concern for the current account position prompted several discrete adjustments in the parity through 1995. The band within which the exchange rate is pegged has been 7 percent on either side since spring 1995. A further widening of the band is currently under discussion in order to fend off speculative attacks which might be triggered by the substantial and rising current account deficit. Despite these concerns about the current account position, the monthly rate of the crawl was reduced from 1 to 0.8 per-

cent in March 1998, implying a slower real depreciation in the short run.

The Czech Republic devalued its nominal rate in three steps by a total of 70 percent in 1990 and then maintained a peg to a basket of US dollar and D-mark through spring 1997. The band within which the peg was allowed to fluctuate was widened from 0.5 to 7.5 percent on either side in February 1996 in response to large capital inflows which were swelling domestic money supply and creating inflationary pressures.<sup>21</sup> Despite the ensuing nominal appreciation, expansionary wage policies and insufficiently tight fiscal policies caused a further widening of the already large current account deficit to eventually unsustainable levels. Political uncertainty after inconclusive parliamentary elections in the fall of 1996 as well as the incipient crises in Southeast Asia further undermined the credibility of the exchange rate until in May 1997 speculative attacks forced the central bank to abandon the peg. Since then, the Central Bank has followed a policy of managed floating combined with an inflation target.

Figure 3 – Real Exchange Rate Volatility in Transition Economies, 1991–1998



Note: Standard deviation of percentage change in real exchange rate over the previous 12 months, based on consumer prices and the average of the exchange rates vis-à-vis the US dollar and the D-mark.

Source: IMF (1998c); own calculations.

Turning to real exchange rates, the early phase of the transformation process was characterized by high volatility due to successive rounds of nominal devaluations and price liberalizations. The exception is Hungary where the initial misalignment had been less severe and the number of centrally set prices had been lower. Real exchange rate volatility has come down significantly since (Figure 3). In the mid-1990s, it was generally comparable to, for instance, Chilean levels, and fell even close to German levels in the Czech Republic. The currency crises erupting in Asia in 1997 have led to more volatility in the transition economies as well, particularly in Estonia and the Czech Republic, but again the impact has not been more pronounced than in Chile.<sup>22</sup>

#### 4.2. Structure of Capital Flows

Table 2 presents data on the volume and volatility of capital inflows for the transition economies under review as well as for Chile. A common time frame, ranging from the first

(second) quarter of 1993 through the latest available observation in 1997, has been chosen.

On average, quarterly net capital inflows for Chile and for the Czech Republic were surprisingly similar. Also the coefficient of variation was similar with "other" capital flows showing the greatest variability. As regards gross inflows, however, Chile experienced greater flows of FDI whereas in the Czech Republic other capital inflows (mainly bank credits) dominated. Interestingly, the greater variability of these other capital flows was caused by capital outflows rather than inflows. Gross inflows in the category "other investments" were even less volatile than inflows of FDI and of portfolio capital. This suggests that the variability of capital flows was to a large degree caused by capital exports of residents. In fact, during 1997, (net) foreign assets of the Czech Republic (excluding the National Bank) increased by \$ 4.4 billion while foreign liabilities rose by \$ 3.3 billion. Hence, the net outflow of capital in the category "other investment" of \$ 1.1 billion was mainly caused by an increase in residents' foreign assets.

Table 2 – Volume and Volatility of Quarterly Capital Flows, 1993–1997 (billion US dollars)<sup>a</sup>

	Gross inflows			Net inflows		
	FDI	portfolio	other	FDI	portfolio	other
<i>Chile</i>						
Mean	0.52	0.24	0.44	0.33	0.21	0.44
$\sigma$	0.33	0.26	0.52	0.30	0.26	0.69
CV (%)	0.64	1.08	1.18	0.93	1.23	1.57
<i>Czech Republic</i>						
Mean	0.34	0.31	1.14	0.33	0.28	0.40
$\sigma$	0.32	0.33	0.52	0.33	0.27	0.64
CV (%)	0.96	0.95	0.46	1.00	0.99	1.60
<i>Estonia</i>						
Mean	0.05	0.02	0.06	0.05	0.01	0.03
$\sigma$	0.02	0.03	0.04	0.02	0.03	0.05
CV (%)	0.43	1.84	0.71	0.52	4.48	1.57
<i>Hungary</i>						
Mean	0.62	0.38	-0.21	0.61	0.38	-0.21
$\sigma$	0.80	0.60	0.48	0.80	0.61	0.46
CV (%)	1.29	1.57	-2.30	1.31	1.60	-2.21

<sup>a</sup> $\sigma$  = standard deviation, CV = coefficient of variation = standard deviation/(arithmetic) mean, Hungary: 1993:2–1997:2, Czech Republic: 1993:1–1997:4, Estonia: 1993:3–1997:1, Chile: 1993:1–1997:1. For Poland, consistent data (excluding information on portfolio capital flows) have only been available up to the second quarter of 1995. Quarterly data.

Source: IMF (1998c); unpublished data of the Czech National Bank.



The data for Hungary are somewhat more difficult to interpret because large net capital outflows were booked under “other investments” as a result of the repayment of foreign debt. Again, other capital flows and portfolio capital flows show the greatest variance but inflows of FDI have been relatively volatile as well which is to a large extent the result of FDI in connection with the privatization process. For Estonia, portfolio capital flows are clearly more volatile than inflows of FDI but also than inflows of other forms of capital.

Because comparable quarterly data for Poland are only available through 1995, Table 3 additionally reports data on monthly net capital flows for Hungary and Poland. Generally, FDI flows have been less volatile than non-FDI flows. For Hungary, again, “other investment” has been more volatile than portfolio investment. Data for 1989 through 1995 also show that short-term

capital was more volatile than medium- and long-term capital (including FDI). The data for Poland are biased because of the repayment and rescheduling of foreign debt that took place in 1995. Hence, long-term credits appear much more volatile than they probably are in “normal” times. Interestingly, however, short-term credits and other short-term capital flows do not appear to be more volatile than portfolio investments.

Overall, there is, thus, no consistent pattern of volatility of capital inflows — while FDI has been relatively stable, portfolio capital and other capital flows cannot unequivocally be ranked by volatility. Claessens et al. (1995) come to a similar conclusion as they find that the classification of capital flows according to the standard categories provides little evidence about their actual volatility. Which type of capital flow contributes more to instabilities in the capital account of the balance of payments, thus, depends to a large extent on country characteristics.

Yet, the exposure of emerging markets to sudden shifts in investor sentiment not only depends on the historic patterns of volatility but also on the share of short-term capital imports in total capital inflows. One consistent source of information are the statistics on external indebtedness published by the Bank for International Settlements (BIS). According to these data, Eastern Europe has had a relatively lower share of short-term loans (maturity of up to one year) since the end of 1995 as compared to Asia or Latin America (Table 4). Until mid-1997, this share had been on the increase. While the Asian crises has not reduced overall lending to the transition economies, the structure of foreign loans has yet changed towards relatively more long-term loans. Interestingly, within the Eastern European region, the Czech Republic and Estonia have the highest share of short-term loans in their total external bank credit. To some extent, this is due to the greater stock of foreign debt that Hungary and Poland (as well as Russia) inherited from the socialist regime.

Table 3 – Volume and Volatility of Monthly Capital Flows, 1991–1997 (million US dollars)<sup>a</sup>

	Mean	Standard deviation	Coefficient of variation (%)
	(1)	(2)	(3)
<i>Hungary</i>			
<i>1991–1997</i>			
FDI	172.1	364.74	2.12
Non-FDI	42.01	401.67	9.56
<i>1996–1997</i>			
FDI	148.35	89.33	0.60
Portfolio investment	-73.74	195.41	-2.65
Other investment	-139.04	438.41	-3.15
<i>Poland</i>			
<i>1992–1997</i>			
FDI	115.9	127.7	1.10
Other short-term capital flows	116.0	275.1	2.37
Long-term credit	-17.1	169.2	-9.89
<i>1995–1997</i>			
FDI	192.8	136.7	0.71
Portfolio investment	97.5	225.9	2.32
Short-term credit	6.18	59.23	9.59
Long-term credit	7.68	76.51	9.97
Other short-term capital flows	148.44	284.62	1.92

<sup>a</sup>Coefficient of variation = standard deviation/(arithmetic) mean (in %).

Source: Unpublished data of the National Bank of Hungary and the National Bank of Poland; own calculations.

Table 4 – Share of Short-Term Credit in Foreign Liabilities, 1992–1997<sup>a</sup>

	Mid-1992	1993	1995	1996	Mid-1997	1997
Asia	59.0	62.8	63.5	61.5	62.2	60.6
Eastern Europe	27.3	37.2	39.1	44.2	50.8	43.4
Czech Republic	...	...	48.6	49.3	53.4	50.0
Estonia	...	...	33.8	45.8	39.5	47.8
Hungary	23.8	26.9	34.6	39.2	37.0	34.2
Poland	31.4	33.1	29.6	33.2	46.2	38.1
Russia <sup>b</sup>	20.7	35.6	39.4	46.3	55.4	44.9
Latin America	43.4	50.0	52.3	53.7	52.3	54.8
Chile	42.7	52.4	54.7	51.2	43.3	49.8

<sup>a</sup>Foreign liabilities comprise liabilities vis-à-vis banks in the BIS reporting area only (maturity < 1 year). — <sup>b</sup>1992 and 1993: former Soviet Union.

Source: BIS (1994, 1998a).

### 4.3. External Commitments

The envisaged membership in the European Union and the concomitant participation in the Single Market is by far the most challenging commitment regarding capital account liberalization faced by the new members. The ground for future EU membership was laid already in December 1991 when the Visegrad countries signed Europe Agreements with the EU. Estonia's Europe Agreement followed in mid-1995. With regard to the capital account, the Europe Agreements contain the following provisions.<sup>23</sup> While the convertibility of the currencies for current account transactions and for FDI in the nonfinancial sector is ensured, capital account transactions and FDI in banking can be more tightly regulated. During the first phase of a ten-year association period, the preconditions for the full adoption of EU regulations concerning the free flow of capital must be created, during the second phase, the need for the maintenance of restrictions on the capital account will be assessed. Estonia has, in contrast to the Visegrad countries, already liberalized its capital account vis-à-vis the EU for portfolio capital flows and for foreign bank credits. In addition to the Europe Agreements, the EU has outlined the prerequisites for accession to the Union in its White Book of 1995 (EU 1995a). Future members of the EU must accept the entire *acquis communautaire* and the regulations of the internal market. This implies, among others,

the acceptance of the principles of mutual recognition of banking licenses, of minimum harmonization, and of home country control which are enshrined in the Second Banking Directive of the EU of 1993. In addition, the capital account must be liberalized also for short-term capital flows, and restrictions can be maintained only in cases of severe external imbalances and upon approval by the EU.

Apart from the EU regulations, the statutes of the International Monetary Fund (IMF) and the General Agreement on Trade in Services (GATS) of the Uruguay Round deal with the liberalization of capital flows. However, the regulations of the EU concerning the internal market impose the most stringent requirements on the reform countries. Articles VIII and XIV of the IMF, for example, only deal with current account and limited capital account convertibility.

Membership in the EU, thus, imposes the most demanding constraints on the reform countries. While these commitments go beyond the degree of financial openness already obtained — and may, thus, potentially increase the exposure to adverse external shocks — it is interesting to note that the conditions of EU membership by themselves reduce the potential of foreign exchange crises. Two factors are responsible for this:

*First*, membership in the EU implies the adoption of a common institutional framework and the participation in the Single Market. This reduces uncertainty of foreign investors concerning the future economic development in the new member countries. Reduced uncertainty, in turn, tends to bias capital inflows towards relatively longer-term inflows such as FDI and, thus, reduces the risk of a sudden reversal of capital flows. Taking over the institutional framework of the EU can also have a positive impact on macroeconomic stability. If the new members took the stability standards of the EU as a benchmark for their own monetary and fiscal policies, the risk of a balance of payments crisis triggered by inconsistent domestic policies would be reduced.

*Second*, allowing for the market entry of foreign banks and adopting the regulatory frame-

work of the EU for the banking sector and for financial markets potentially improves the quality of investment of foreign capital. Capital inflows are put to more productive uses, and this enhances the potential to service foreign obligations in the long run. The efficiency and the stability of the domestic banking system are of key importance for the sustainability of integrating into international capital markets. Because foreign capital flows are often, directly or indirectly, intermediated by domestic banks, negative feedback effects between banking and

balance of payments crises can arise (Buch and Heinrich 1997). This holds in particular because in many reform countries privatization of the large state-owned banks proceeds only gradually, because nonperforming loans remain above values observed in developed market economies, and because banking supervision is often swamped with its new tasks. In this environment, the market entry of foreign banks and the adoption of international banking standards can help to improve the quality of banking.

## 5. Outlook

Nonequity flows of foreign capital tend to be more volatile than flows of foreign direct investment. This, together with the relatively large dependence of some transition economies on foreign capital, raises the issue whether and how nonequity capital inflows from abroad should be regulated. Essentially, the case for a transactions tax on short-term capital inflows is based on the notion that financial markets react faster than goods markets. This market imperfection may cause fluctuations in the real economy which are not linked to fundamentals and, hence, a corrective tax may enhance welfare. The main upshot of our analysis is that the introduction of restrictions on short-term capital flows can be welfare-enhancing only under special conditions. Policymakers must, thus, also take the following aspects into account.

*First*, taxes on capital flows cannot substitute for structural reforms. Recent evidence from the currency crises in Asia has shown the importance of structural deficiencies (corporate governance issues featuring prominently) for balance of payments problems.<sup>24</sup> Taxes on short-term capital flows do not solve the problem of the induced exchange rate misalignment but may rather delay adjustment efforts. Proponents of a tax would object that it is precisely this additional breathing time that governments gain which makes the tax attractive. Yet, this window of opportunity may fail to deliver what it promises. Externally, the imposition of restric-

tions on the capital account may send a negative signal to foreign investors that the authorities are unable to solve the structural problems they are facing. This loss in confidence may cause a retreat of foreign capital over and above the amount originally intended. Internally, opponents to reforms may gain ground if the external environment fails to signal inconsistent policies, thus preventing efficient use of the additional time.

*Second*, the actual design and enforcement of the tax is an open issue. In order to be effective, the tax should apply to residents and nonresidents alike. Recent evidence of the Czech Republic has shown that domestic residents are at least as sensitive to deteriorating news as foreigners are. Restrictions on capital inflows would, thus, not suffice to reduce the volatility of capital flows. In addition, there is no clear-cut evidence as to which type of capital flows are the most volatile and how volatility changes after the imposition of controls.

*Third*, the capacity and ability to enforce the tax is crucial. If current account and capital account transactions have been liberalized in general, agents would be willing to pay any amount up to the level of the tax in order to avoid the tax. While this adjustment mechanism does not completely erode the effectiveness of the tax, it still reduces its impact. The Chilean experience has revealed that isolated restrictions on individual capital account items are not

effective in the medium run. Although the need to adjust did not arise instantaneously, coverage of capital account restrictions had to be expanded over time in order to prevent evasion. Notice, however, that the general notion that capital account restrictions can hardly be effective is not unequivocally supported by the Chilean evidence as the reserve requirement seems to have served to reduce inflows of short-term capital. Eventually, this has induced policymakers to lower the rate of reserves.

*Fourth*, even though a transactions tax may be effective in reducing inflows of (short-term) capital, it is not clear both from a theoretical and from an empirical point of view that the tax reduces volatility in financial markets. On a more formal level, we have argued that the introduction of a tax on capital inflows by itself can lead to an overshooting of the exchange rate because it is conceptually identical to a negative shock to the domestic interest rate. This is what may have occurred in Chile in 1992 and 1993. If, as is the case for the transition economies upon membership in the EU, the tax had to be abolished again in the future, this adjustment would take place even twice. A similar reasoning applies to transactions taxes being used as short-term emergency measures.<sup>25</sup> Unfortunately, there is hardly any evidence on the effectiveness of transactions taxes in the foreign exchange market with respect to the reduction of volatility. In particular, real exchange rate volatility in the advanced transition economies does not appear to have risen more strongly during the recent Asian crises than in Chile.

*Fifth*, the envisaged membership in the European Union as well as membership in the OECD restrains the choices of the transition economies under review. Incidentally, the conditions of EU membership by themselves can reduce the exposure of the new members to adverse external shocks by enhancing macroeconomic stability and by strengthening institutions.

While these issues make us skeptical with regard to the usefulness and effectiveness of taxes on (short-term) capital flows, there are yet a

few policy lessons that the transition economies can take from the preceding discussion.

*First*, structural reforms at the domestic level can reduce the exposure of emerging market economies to volatile capital flows. Recent evidence suggests that changes in the composition of capital inflows away from long-term FDI towards short-term flows in the Asian economies have been promoted by sterilization policies which held domestic interest rates at high levels (Kaminsky and Reinhart 1998). In addition, there is ample evidence that sticking to fixed exchange rate regimes which are inconsistent with domestic fundamentals increases the risk of a crisis. This risk is particularly pronounced if weak macroeconomic fundamentals coincide with weak institutions and incentive systems on a microlevel.

*Second*, perhaps the most important policy implication apart from the need for sound structural reforms is the crucial need to disseminate transparent, timely, and reliable information to the international investment community. Better information policies would substantially reduce the costs of obtaining information for market participants. Although this would not eliminate the presence of noise traders, improved availability of information is likely to increase the importance of fundamentalists in the market.

*Finally*, because commercial banks are the key link between domestic and international financial markets, they probably also face the greatest exposure to foreign exchange risks. Hence, safeguards against excessive foreign borrowing of banks should be the focus of policymakers. Incidentally, a regulatory framework which takes foreign exchange risks into account is already given by the core principles for effective banking supervision of the Bank for International Settlements and need not be designed anew for the reform countries. The transition economies should take into account, however, that these general guidelines have mainly been drafted with an eye on banks from developed market economies. Hence, it may be necessary to adjust the standards to the specific needs of the reform countries.

## Appendix

In this appendix we derive the slopes of the loci of stationarity,  $PP$  and  $FF$ , depicted in Figure 1 and provide a formal analysis of the impact of a transactions tax on the dynamic adjustment path  $ST$  of the system as well as on the steady-state exchange rate and price level.

The system of ordinary differential equations given in equations [1]–[5] (Box 1) can be written compactly as:<sup>26</sup>

$$[A.1] \quad \begin{pmatrix} dp/dt \\ de/dt \end{pmatrix} = \begin{pmatrix} -\phi\delta & \phi\delta \\ (\lambda\omega)^{-1} & -\alpha(1-\tau)(1-\omega)\omega^{-1} \end{pmatrix} \begin{pmatrix} p \\ e \end{pmatrix} + \begin{pmatrix} 0 \\ -\omega^{-1}\tau + \alpha(1-\tau)(1-\omega)\omega^{-1} - \bar{e} \end{pmatrix}$$

The slopes of the lines of stationarity of the system are given by:

$$[A.2] \quad \left. \frac{de}{dp} \right|_{dp/dt=0} = 1$$

$$[A.3] \quad \left. \frac{de}{dp} \right|_{de/dt=0} = \frac{1}{\alpha\lambda(1-\tau)(1-\omega)}$$

Equation [A.3] highlights that the slope of the line of stationarity of the exchange rate critically depends on the magnitude of the transactions tax: an increase of the tax rate implies that the  $FF$  line becomes steeper.

In Figure 1 it is assumed that the slope of the  $FF$  line exceeds the slope of the  $PP$  schedule. This assumption implies that the determinant of the coefficients matrix  $\phi\delta\omega^{-1}[\alpha(1-\omega)(1-\tau) - \lambda^{-1}]$  of the system given in equation [A.1] exhibits a negative sign and the model is saddlepath-stable. The slope of the saddlepath can be

computed as the negative root of the following characteristic quadratic equation

$$[A.4] \quad f(\theta) = a_{12}\theta^2 + (a_{11} - a_{22})\theta - a_{21},$$

where the  $a_{ij}$  denote the corresponding elements of the coefficients matrix of the system. Equation [A.4] reveals that the slope of the stable trajectory of the system depends on the coefficient  $a_{22}$  and is, thus, altered by a change of the tax rate. The impact of the transactions tax on the slope of the line  $ST$  can be identified by setting  $\theta$  equal to the slope of the stable trajectory and differentiating equation [A.4]:

$$[A.5] \quad \frac{\partial f}{\partial \theta} \frac{\partial \theta}{\partial a_{22}} + \frac{\partial f}{\partial a_{22}} = 0$$

We know that  $\partial f / \partial a_{22} > 0$ . Moreover, it follows directly from the negative slope of the stable trajectory and from the strict convexity of the characteristic quadratic equation in  $\theta$  that  $\partial f / \partial \theta < 0$  if  $\theta$  is equal to the slope of  $ST$ . For equation [9] to hold, it must therefore be true that  $\partial \theta / \partial a_{22} > 0$ . Since  $\partial a_{22} / \partial \tau > 0$ , it follows that the increase of the tax rate raises the slope of the stable trajectory.

Finally, it is important to take into account that the implementation of a transactions tax on capital inflows induces a shift of the  $FF$  schedule and, thus, entails a change of the steady-state level of the exchange rate and of the price level:

$$[A.6] \quad \frac{d\bar{e}}{d\tau} = \frac{d\bar{p}}{d\tau} = \lambda$$

## Endnotes

- 1 We use the term currency crises in a broad sense as characterizing periods of increased exchange rate volatility, large devaluations, and losses of foreign exchange reserves.
- 2 See, for example, Kaminsky and Reinhart (1998: 447).
- 3 BIS (1998b: 187), Chote (1998: 29), and *The Economist* (14.3.1998) summarize the discussions. Controls on short-term capital inflows have recently been imposed in Brazil (*Financial Times*, 27.3.1998).
- 4 The following quote has been taken from RFE-RL Newslines (<http://www.rferl.org/newslines/1998/04/210498.html>): *Balcerowicz says that while he strongly supports liberal and open global trade in goods [...] he is willing to consider measures to have some controls available on the flow of short-term capital. [...] Balcerowicz says the "size and speed" of the movement of this kind of money has become unbelievable in the growing global market place, a new problem for which he said he is open to "new ideas."*
- 5 The German parliament has, for example, recently discussed a Tobin tax proposal. Although the proposal was eventually rejected, most opposition parties have in principal been sympathetic to the idea.
- 6 According to Garber and Taylor (1995: 173), the tax has also been proposed as a means to deal with exchange rate misalignment by inducing speculators to focus on long-run fundamentals.
- 7 The following classification largely draws on Frankel (1996).
- 8 The purpose of the tax is also to expand the autonomy of national monetary policy (Eichengreen et al. 1995: 165; Tobin 1998).
- 9 Our approach is, thus, not identical to the Tobin proposal which would require a tax on in- and outflows of capital. But it is compatible with restrictions on capital inflows that can be expressed as a tax equivalent.
- 10 This result is derived in more detail in the Appendix.
- 11 In the Appendix it is shown that the long-run effect of the implementation of a tax on capital flows depends upon the interest elasticity of money demand  $\lambda$ . During the transformation process, however, money demand might undergo quite substantial structural breaks, which might deem it impossible to obtain reliable estimates of the interest elasticity. While first empirical evidence suggests that this problem becomes less pressing as the transition process unfolds (Buch 1998a, 1998b), it has certainly to be taken into account at the early stages of reforms. Hence, uncertainty about the structure of money demand would complicate a prediction of the magnitude of the long-run effects of the tax.
- 12 A discussion of the implications of a transactions tax for derivatives markets can be found in König (1997).
- 13 The problem which arises in this context has also been analyzed in the theory of international trade under imperfect competition (Helpman and Krugman 1990).
- 14 The latter argument, however, does not necessarily apply if economic agents believe that a current abolition of capital controls will be reversed in the future. Wijnbergen (1985) stresses that even in the aftermath of a trade liberalization uncertainty regarding a future reversal of economic policy and, thus, uncertainty regarding the future rate of return of investment implies that investors will postpone irreversible international investments in physical capital.
- 15 Dixit and Pindyck (1994) survey various models of irreversible investment under uncertainty.
- 16 See, for example, Episcopos (1995) and Leahy and Whited (1996) for the United States, Goodson (1995) for New Zealand, and Seppelfricke (1996) and Mailand (1997) for Germany.
- 17 The following information has been taken from Labán and Larrain (1998), Ffrench-Davis et al. (1995), and IMF (1998b).
- 18 These data were calculated from Labán et al. (1997: Table 1).
- 19 For a comprehensive survey of convertibility issues in transition economies see Backé (1996).
- 20 In addition, the government used moral suasion to induce the large — and partly state-owned — banks not to speculate against the Czech koruna.
- 21 Through December 1996, this widening of the band reduced the volatility of the nominal exchange rate (Kocenda 1998).
- 22 This is also true for Argentina or Mexico for that matter.
- 23 See EU (1993a, 1993b, 1994, 1995b), and Kuschel (1992).
- 24 See Diehl and Schweickert (1998) for an in-depth analysis of the Asian currency crises.
- 25 Guitián (1998: 17), for example, suggests capital controls not as a "standard weapon in a country's policy arsenal," but as transitory instruments, ideally being used under the supervision of an international organization.
- 26 The log of the domestic money stock, the foreign interest rate and the log of natural output are fixed at zero. Note that one could allow the weights  $w$  to depend directly on the tax rate. Such a specification, however, would complicate the comparative statics of our analysis. Since we are interested to keep the algebra involved in the derivation of our main results as simple as possible, we decide to employ the adjustment scheme given in equation [5] (Box 1).

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