Capital Controls, Exchange Rate Volatility, and the Risk Premium*

By Michael Frenkel and Georg Stadtmann

Abstract

We use the Jeanne / Rose (2002) noise trader framework in foreign exchange markets to introduce a tax on international capital flows. As such a tax exerts two effects in opposite directions, we derive the capital control level that minimizes the risk premium and show the conditions under which a zero capital control level is optimal.

Zusammenfassung

In diesem Beitrag wird das von Jeanne / Rose (2002) entwickelte Noise-Trader-Modell einer offenen Volkswirtschaft um eine Tobin Tax auf Devisenmarkttransaktionen erweitert. Die Einführung einer solchen Steuer beeinflusst die Risikoprämie über zwei verschiedene Kanäle. Da diese Kanäle gegenläufig auf die Höhe der Risikoprämie wirken, zeigt der Beitrag die Determinanten der optimalen Höhe der Risikoprämie. Anhand der Optimalitätsbedingung kann auch abgeleitet werden, unter welchen Bedingungen besser auf die Einführung einer solchen Steuer verzichtet werden sollte.

1. Introduction

Following the breakdown of the Bretton Woods System in 1973, nominal exchange rate volatility increased dramatically leading to significantly higher variability of the real exchange rate compared with the previous three decades. As a tool to regain exchange rate stability, Tobin (1974) suggested in his Janeway Lectures at Princeton a uniform international tax on all spot transactions in the foreign exchange market. Such a tax should work as *sand in the*

gears of international financial markets and thereby reduce the short-term focus of certain myopic speculators. However, the idea was rejected by many economists and politicians from the beginning. Twenty years later, Tobin (1996) evaluated the success of his idea as follows: *"In fact, one might say it sank like a rock. The community of professional economists simply ignored it. The interest that occasionally arose came from journalists and financial pundits. It was usually triggered by currency crises and died out when the crisis passed from the headlines."*

Several episodes of turbulence in world financial markets in recent years have reanimated the interest in capital controls as a means to stabilize the foreign exchange system of a country.[1] Among such controls, the Tobin tax still represents the most prominent form.[2] It is also very popular with a number of NGOs which see the *Tobin tax* as an instrument in their fight against globalization. One NGO, the ATTAC group, was even able to create such high political pressure that the Tobin tax was put on the agenda of several European governments. For example, the French parliament already enacted a Tobin tax in 2001, but its implementation was made dependent all other member states of the European Union adopting such a tax too (Spahn, 2002, 2). In a study commissioned by the German Federal Ministry for Economic Cooperation and Development, Spahn (2002) examined the feasibility of a tax on foreign exchange transactions. He concludes that such a transaction tax should be implemented if it is jointly adopted by all member states of the EU in cooperation with Switzerland.[3] Belgium put the Tobin tax on the agenda of the ECOFIN meeting in September 2001, where it was at least discussed among governments although no specific decision on it was taken.[4]

Empirical findings of several surveys conducted among foreign exchange traders (e.g., Allen/Taylor, 1990, and Menkhoff, 1997) examine the relative importance that traders attach to chartist or technical analyses[5] versus fundamental analyses over different forecasting horizons.[6] The outcome of these

---

[1] See Blecker (1999), Kochhar et al. (1999), Liu (2000), Edison/Reinhart (2000), as well as Kaplan/Rodrik (2001).

[2] Even in academia, the Tobin tax has re-emerged as new contributions show. See for example Menkhoff/Michaelis (1995), Eichengreen/Tobin/Wyplosz (1995), Nadal De Simone (1997), Jeanne (1996), Davidson (1998), Bird/Ramkishen (1999), Palley (1999), De Angelis (1999/2000), Edwards (2002), Mende/Menkhoff (2003), Westerhoff (2003), Reitz/Slopek (2003).

[3] See Frenkel/Langhammer (2002) and Fendel/Stadtmann (2003) for a critical analysis of the Spahn study.

[4] Due to the terror attacks of September 11, 2001, the agenda was changed and the Tobin tax was only discussed briefly.

[5] Neely (1997) uses the label *'technical trading'* for both chartism and mechanical trading rules.

studies is that many foreign exchange traders rely on chart analyses or technical instruments when forming their expectations for short horizons. By contrast, they rely more on macroeconomic fundamentals when forming their expectations for longer horizons.

On the basis of the findings of these survey studies, we argue in this paper that the noise-trader framework is a sensible approach to analyze the effects of introducing a Tobin tax. To this end, we first review the contributions to the academic literature that deal with heterogeneous agents and a Tobin tax.

Frankel (1996, pp. 71 – 72) integrates heterogeneous traders into a simple static monetary model. In this framework, some market participants (referred to as investors) reduce and some other market participants (referred to as speculators) increase exchange rate volatility. Although Frankel does not explicitly introduce a Tobin tax into the model, he finds that measures like a transaction tax reduce the variability of the exchange rate.

De Grauwe / Dewachter / Embrechts (1993) use non-linear relationships to construct chaotic models of foreign exchange markets. In these models, the exchange rate process is driven by several groups of FX traders which use different forecasting techniques (e.g., fundamental versus technical analysis). Westerhoff (2003) uses this framework and develops a model of heterogeneous interacting agents. The decision of the forecasting model applied by a trader depends on profit considerations as well as the communication between agents. Levying a Tobin tax leads to a crowding out of speculators and stabilizes the dynamics. However, as a negative side effect, misalignments can still occur when tax rates are too high.

Buch / Heinrich / Pierdzioch (1999) use a Dornbusch-style framework and assume that the relative importance of technical traders (or chartists) in the foreign exchange market depends on the magnitude of the Tobin tax. In this context, the chartists are the *"bad guys"* because their trading destabilizes the exchange rate. The *"good guys"* are the rational agents who know the equilibrium exchange rate and are aware of destabilizing trading behavior of the chartists. This group of traders stabilize the exchange rate.

Frenkel et al. (2002) extend the work of Buch / Heinrich / Pierdzioch (1999) by introducing a capital stock into their framework. In this setting the implementation of a transaction tax may reduce growth. As foreign investors who have to pay the tax will demand an appropriate compensation, the domestic interest rate increases. This reduces real capital formation and output. The authors also demonstrate that a Tobin tax can reduce exchange rate volatility triggered by monetary shocks but it initially even increases volatility.

---

[6] See also the work of Taylor / Allen (1992) and Frankel / Froot (1988, 1990). For recent empirical evidence, see Menkhoff (1998, 2001), Cheung / Wong (2000), and Cheung / Chinn (2001).

Kolck / Rübesamen (2000) assume that the exchange rate path is influenced by the arrival of news about fundamentals. Market participants react to such news and change their exchange rate expectations. They assume that the news process consists of a common component ϕ_t that is equal for all traders and a trader specific 'disagreement' component Ψ_{it}. The change of the spot exchange rate (s_t) is equal to

$$(1) \qquad \Delta s_t = \phi_t + \bar{\Psi}_t$$

with

$$(2) \qquad \bar{\Psi}_t = \frac{1}{n}\sum_{i=1}^{n}\Psi_{it} \, ,$$

where n is the number of traders in the foreign exchange market. They point out that a Tobin tax does not influence the occurrence of new information but it reduces the speculative activity of the trader due to higher transaction costs. Traders act on the same news with a lower expected exchange rate change. They model this effect by introducing a factor τ into equation (1) that reduces the change in the spot rate. The variable τ indirectly represents the Tobin tax. The higher the tax rate (τ) is, the lower is the change in the exchange rate due to the occurrence of new information.

$$(3) \qquad \Delta s_t = \tau(\phi_t + \bar{\Psi}_t) \quad \text{with} \quad 0 < \tau < 1 \, .$$

The variance of the expected exchange rate is equal to

$$(4) \qquad Var[\Delta s_t] = \tau^2\left(\sigma_\phi^2 + \frac{\sigma_\Psi^2}{n}\right),$$

where σ_ϕ^2 (σ_Ψ^2) is the variance of ϕ (Ψ). Since $0 < \tau < 1$, the expected exchange rate volatility is reduced by the Tobin tax. Nevertheless, this finding cannot be regarded as the end of the dispute. As Kolck / Rübesamen (2000) point out, their model neglects the influence of the Tobin tax on the overall number of foreign exchange traders. If the number of foreign exchange traders (n) is reduced by the introduction of the Tobin tax this factor has to be considered in equation (4) which counteracts the primary effect on the variance of the exchange rate. This is the starting point of our analysis.

The remainder of the paper is organized as follows. The second section explains the structure of the model. The third section analyzes the effects on the risk premium and the interest rate induced by capital controls that can be modelled as a tax on international capital flows. The fourth section points to some indirect empirical evidence of capital control effects on the risk premium. The fifth section presents the summary and main conclusions.

2. The Model

We start from the model of Jeanne / Rose (2002) which combines a standard microeconomic noise trader approach with a macroeconomic monetary approach. While Jeanne / Rose also derive the multiple equilibrium characteristic with an extended model structure, we focus on the basic structure with exogenous entry. This model structure is sufficient to derive the main conclusions of our paper.[7] We extend their approach by taking into account price controls on foreign exchange transactions. The monetary macroeconomic framework consists of an equilibrium condition for the domestic (5) and the foreign (6) money market as well as the purchasing power parity (PPP) condition (7):

$$(5) \qquad m_t - p_t = -\beta r_t$$

$$(6) \qquad m_t^* - p_t^* = -\beta r_t^*$$

$$(7) \qquad s_t = p_t - p_t^* + \epsilon_t \ .$$

The variables m, p, β, r, and s denote the money supply, the price level, the semi-interest elasticity of money demand, the interest rate, and the spot exchange rate expressed as the price of the foreign currency in domestic currency units, respectively. Foreign variables are indicated by an asterisk and are assumed to be constant so that their time index is dropped in the following analysis. All variables except for the interest rate are in logarithms. Income is normalized to unity so that its log value drops out of the money demand function. The exchange rate is equal to the ratio of domestic and foreign price levels plus an i.i.d. normal shock (ϵ). Combining (5), (6), and (7) yields the standard exchange rate equation of the monetary approach:

$$(8) \qquad s_t = (m_t - m^*) + \beta(r_t - r^*) + \epsilon_t \ .$$

Following Jeanne / Rose (2002), we consider two different groups of traders in the foreign exchange market. One group consists of informed investors who have rational expectations. The other group consists of noise traders who misperceive the first moment of the return on domestic interest-bearing assets like, for example, bonds. The latter hypothesis is a standard assumption in the noise trader literature and was introduced by DeLong et al. (1990). To derive the behavior of the two groups of traders, the framework of an overlapping generations model is used. All traders take into account

---

[7] Given the multiple equilibrium characteristics of their extended version, Jeanne / Rose (2002) derive the conclusion that fixed exchange rates are preferable. Our paper does not focus on the optimality question of a specific exchange rate system. It rather discusses the effects of a capital control in a flexible exchange rate system.

two periods. In the first period, investors allocate their wealth between domestic and foreign bonds. In the second period, investors convert all of their foreign bonds into domestic currency and consume their wealth. Both types of investors are endowed with the same initial wealth in domestic currency and have the same utility function. An investor (j) maximizes the following CARA utility function with respect to the amount (b_t^j) invested in the domestic bonds market:

$$(9) \qquad \max_{b_t^j} \bar{U}_t^j = E_t^j\left(-\frac{1}{e^{\alpha W_{t+1}^j}}\right).$$

Here, W_{t+1}^j and α denote the wealth of investor j in period $t+1$ and the coefficient of absolute risk aversion, respectively. Wealth in period $t+1$ is equal to:

$$(10) \qquad W_{t+1}^j = (1 + r^*)W_t + b_t^j \rho_{t+1} \ .$$

The first term on the right hand side of equation (10) is the product of initial wealth and the foreign interest rate factor, while the second term is the product of the amount b_t invested in domestic bonds and their (ex-post) excess return (ρ_{t+1}) which can also be interpreted as the risk premium. The latter is defined as

$$(11) \qquad \rho_{t+1} = r_t - r^* - (s_{t+1} - s_t) \ .$$

All informed investors are homogeneous and have rational expectations so that we can write for the market's expected value and variance of excess return:

$$(12) \qquad E_t(\rho_{t+1}) = E_t^j(\rho_{t+1})$$

$$(13) \qquad Var_t(\rho_{t+1}) = Var_t^j(\rho_{t+1}) \ .$$

By contrast, noise traders have imperfect knowledge. Although they perceive the second moment of returns correctly, they misperceive the first moment:

$$(14) \qquad E_t^j(\rho_{t+1}) = (1 - c)(\bar{\rho} + \nu_t) \ .$$

The noise element (ν_t) in the model is a stochastic i.i.d. normal shock common across all noise traders. The variable $\bar{\rho}$ denotes the unconditional mean of the excess return which can be interpreted as the average risk premium. The new element we introduce into the model is the yield equivalent (c) of a capi-

tal control on foreign exchange transactions with $c \geq 0$.[8] The control could take the form of, for example, a Tobin tax, a minimum reserve requirement, or a tax on the return of the investment associated with capital inflows. The modeling of the capital control indicates that it does not cover all forms of capital flows. Particularly, we do not take into account outright prohibitions of certain international capital flows and quantity restrictions. We assume that a higher capital control reduces the noise traders expected returns.

We also assume that the size of the noise traders' misperception is proportional to the true unconditional exchange rate variance:

$$(15) \qquad Var(\nu) = \lambda Var(s) \quad \text{with} \quad \lambda > 0 \; .$$

The average risk premium is equal to the average interest rate differential

$$(16) \qquad \bar{\rho} = \bar{r} - r^* \; .$$

Together with equation (8), this implies that the average exchange rate is equal to the average money supply differential adjusted for the average risk premium:

$$(17) \qquad \bar{s} = \bar{m} - m^* + \beta \bar{\rho} \; .$$

As can be shown, maximizing (9) with respect to b_t^j is equal to maximizing the following mean variance objective function

$$(18) \qquad \Omega = E_t^j(W_{t+1}^j) - \frac{\alpha}{2} Var_t^j(W_{t+1}^j) \; .$$

Maximization yields the following bond demand of an individual trader:

$$(19) \qquad b_t^j = \frac{E_t^j(\rho_{t+1})}{\alpha Var_t^j(\rho_{t+1})} \; .$$

Taking into consideration equations (12), (13), and (19), the utility maximizing demand of a rational investor for domestic bonds is given by $E_t(\rho_{t+1})/[\alpha Var_t(\rho_{t+1})]$, while the demand of a noise trader can be derived from equations (14) and (19) as $(1-c)(\bar{\rho} + \nu_t)/[\alpha Var_t(\rho_{t+1})]$. With $\bar{B}$, N,

---

[8] One may argue that the specification of equation (14) requires the government to be able to exactly identify the two groups of traders. However, this is not necessary and, in reality, cannot be expected anyway. What has to be assumed is that the capital control affects noise traders more than rational investors. For example, the main idea of the Tobin tax is to implement a uniform tax which applies to all FX transactions but is intended to hit particularly the profitability of transactions with a shorter time horizon of the underlying investment. Therefore, the asymmetric modeling of the two groups under consideration is a simple way of modeling the intention of such capital controls.

and n denoting the stock of bonds, the number of rational agents and noise traders, respectively, equilibrium in the domestic bonds market is given by

$$(20) \qquad \bar{B} = \frac{NE_t(\rho_{t+1}) + n(1-c)(\bar{\rho} + \nu_t)}{\alpha Var(s)}.$$

Taking the expectations of (20) at time $t-1$ leads to

$$(21) \qquad \bar{B} = \frac{N\bar{\rho} + n(1-c)\bar{\rho}}{\alpha Var(s)}.$$

This yields the average risk premium $(\bar{\rho})$ as

$$(22) \qquad \bar{\rho} = \frac{\alpha\bar{B}}{N + n(1-c)} Var(s) .$$

The average risk premium depends positively on the risk aversion parameter, the supply of domestic bonds, and the variance of the exchange rate. For a given value of exchange rate variance, the average risk premium is higher in the presence of the capital control because the control leads to a lower response of noise traders to noise-trader specific shocks. In this case, the remaining group of rational agents needs an incentive to invest a higher share of their wealth in domestic bonds. This, in turn, requires an increase in the risk premium reflecting the reduction in the risk-bearing capacity of the market.

The deviation of the exchange rate at time t from its mean value can be derived as

$$(23) \qquad (s_t - \bar{s}) = \frac{1}{1 + \beta}\left[m_t - \bar{m} + \epsilon_t - \frac{n}{N}\beta(1-c)\nu_t \right] .$$

This deviation depends on the money supply shock, the PPP shock (ϵ_t), and the size of the noise-trader specific shock (ν_t). The distortion effect of the noise-trader specific shock on the exchange rate is the greater, the larger the number of noise traders is. According to equation (14), a positive shock increases the expected excess return of the noise trader group and leads to higher demand for domestic bonds. As a consequence, the domestic currency appreciates.

Taking into account $Var(\nu) = \lambda Var(s)$, the variance of the exchange rate can be derived from equation (23) as

$$(24) \qquad Var(s) = \frac{Var(m + \epsilon)}{(1 + \beta)^2 - \left[\beta\frac{n}{N}(1-c) \right]^2 \lambda} .$$

The lower the variability of the money supply shock and the PPP shock are, the smaller is the variance of the exchange rate. Exchange rate volatility also

declines, when a capital control is implemented. Given that the capital control increases the average risk premium directly through its effect shown in equation (22) and that it decreases it indirectly through the effect on the exchange rate variance as shown in equation (24), it exerts two effects in opposite direction. Thus, a capital control can increase or decrease the risk premium. This raises the question about the level of capital controls that minimizes the risk premium. We turn to this question in the next section.

3. The Optimal Capital Control

In order to derive the value of c that minimizes the risk premium, we combine equations (24) and (22). We define $\xi \equiv (1 - c)$ and get:

$$(25) \qquad \bar{\rho} = \frac{\alpha \bar{B}}{N + n\xi} \frac{Var(m + \epsilon)}{(1 + \beta)^2 - \left[\beta \frac{n}{N} \xi\right]^2 \lambda} \ .$$

Computing the derivative of ρ with respect to ξ, we get for the decisive part of the first derivative:

$$(26) \qquad \frac{\partial \bar{\rho}}{\partial \xi} = \left[n(1 + \beta)^2 - 2\lambda \beta^2 \frac{n^2}{N} \xi - 3\lambda \beta^2 \frac{n^3}{N^2} \xi^2 \right] = 0 \ .$$

Dividing by $-3\lambda \beta^2 n^3 / N^2$ yields the condition

$$(27) \qquad \xi^2 + \frac{2}{3} \frac{N}{n} \xi - \frac{(1 + \beta)^2 N^2}{3\lambda \beta^2 n^2} = 0 \ .$$

Solving (27) for ξ leads to:

$$(28) \qquad \xi = -\frac{1}{3} \frac{N}{n} \pm \sqrt{\frac{N^2 \lambda \beta^2 + 3(1 + \beta)^2 N^2}{9\lambda \beta^2 n^2}} \ .$$

Since $\xi \equiv (1 - c) \geq 0$, we only have to consider the positive root. The first-order condition for the minimum of the risk premium leads to the unique solution for the optimal capital control $\hat{c}$

$$(29) \qquad \hat{c} = 1 - \left[-\frac{N}{3n} + \frac{N}{3n} \sqrt{1 + \frac{3(1 + \beta)^2}{\lambda \beta^2}} \right] \quad \text{and}$$

$$(30) \qquad \hat{c} = 1 - \frac{N \left[\sqrt{1 + \frac{3(1+\beta)^2}{\lambda \beta^2}} - 1 \right]}{3n} \ .$$

Equation (30) shows that the optimal control level ranges between zero and one. Several parameters affect $\hat{c}$. For example, the smaller the group of noise traders is, the smaller is the distortion due to these traders' misperception of asset returns and the smaller is the capital control that limits the noise trading activity to an optimal level. Although it may be challenging in practice to determine the number of noise traders relative to the number of rational traders, some indication for this ratio may be derived from surveys on how intensively technical trading methods relative to fundamental analysis are used in foreign exchange markets. Likewise, the interest elasticity of money demand (β) can be derived from empirical analyses of money demand functions.

There is an additional interesting implication of equation (30): If the expression on the right-hand side of this equation generates a negative value, the optimal control is zero meaning that even at low levels of c, the beneficial effects cannot outweigh the negative effects.

4. Some Indirect Empirical Evidence

Since the two effects of a capital control on the risk premium that are highlighted in this paper work in opposite direction, it is ambiguous whether the Tobin tax increases or decreases the risk premium and the interest rate. Hence, this question ultimately becomes an empirical one. However, it is not easy to find an answer to this question because a Tobin tax has never been implemented. Nevertheless, some indirect evidence on the empirical question of the Tobin tax effects can be derived from existing studies of capital controls.

Empirical studies on the effects of capital controls either focus on individual country cases or on cross sections of country groups. Regarding the experience of individual countries, two of the most intensely studied cases are the ones of Malaysia and Chile. For example, Kaplan / Rodrick (2001) provide an extensive overview of the Malaysian capital controls and exchange rate restrictions. It is still disputed whether or not such controls helped Malaysia to recover from the aftermath of the Asian crisis faster than other countries in the region (see also Kochhar et al., 1999, Liu, 2000, Edison / Reinhart, 2000, Johnson / Mitton, 2003, Doraisami, 2004). Kaplan / Rodrik (2001) find that Malaysia recovered faster from the crisis. Nevertheless, the authors do not rule out that the implementation of capital controls could have had some adverse effects on investment in the long run, especially if considering that foreign direct investment played an important role in Malaysia's successful economic development before the Asian crisis. They stress that the controls are too recent to ascertain with any degree of certainty their long-term consequences.

Valdes-Prieto / Soto (1998) investigate the Chilean unremunerated reserve requirement (URR), a selective control in June 1991. Their estimates show

that the main effect was a substitution of exempted capital flows for short term flows. Hence, the Chilean URR did not discourage total net short-term credit inflows to the private sector. This implies that this control failed to contribute to monetary autonomy.[9] Laurens / Cardoso (1998) also examine the case of Chile and find that the interest rate differential between Chile and the U.S. increased due to higher interest rates in Chile after the introduction of the capital controls.

Nadal-De Simone / Sorsa (1999) critically review different studies evaluating the Chilean experience. They summarize the main findings of the studies and relate it to the multi-dimensional objectives of these capital controls. They conclude that there is some evidence that

• the URR was successful in increasing domestic interest rates;

• there is relatively weaker evidence that the URR altered the composition of capital inflows in favor of medium- and long-term capital inflows;

• there is mixed and weak evidence that the URR reduced the magnitude of capital inflows; and

• there is no evidence that the URR affected the real exchange rate.

However, the authors also point out that the studies mentioned above have some methodological problems with respect to measuring the different forms of capital flows as well as econometrical problems due to the omission of important control variables such as fiscal policy. Hence, they conclude that it seems premature to point at the Chilean experience as supportive of the effectiveness of capital controls.[10]

Ambiguous results are also presented in multi-country studies.[11] Gruben / McLeod (1998) find in their study of Asian and Latin American countries that

---

[9] When a government implements a capital control, financial agents will always try to circumvent the controls to evade taxation. Gros (1987) analyzes these mechanisms in a theoretical model and finds that capital controls can only provide temporarily autonomy for the national monetary policy. This theoretical hypothesis is in line with the finding of De Gregorio / Valdes / Edwards (2000) for the Chilean case which demonstrate that it is 'difficult to pin down long-run effects of the URR'.

[10] Forbes (2003) analyzes whether firm size played a role in how the Chilean capital controls affected the financial constraints of publicly traded companies. The results show that smaller traded firms in Chile experienced significant financial constraints and these constraints decreased as firm size increased.

[11] For example, Eichengreen (2001, 341) points out with respect to the effects of capital account liberalization: *"Capital account liberalization [...] remains one of the most controversial and least understood policies of our day. One reason is that different theoretical perspectives have very different implications for the desirability of liberalizing capital flows. Another is that empirical analysis has failed to yield conclusive results."* See also Eichengreen / Leblang (2002) for a recent survey on the literature on the effects of capital account liberalization.

capital controls generally influence growth negatively. Hence, they conclude that *"if a government decides to use capital controls to reduce volatility ... the price is some growth."* Thus, the empirical evidence, while also not completely unambiguous, seems to imply a risk premium-increasing effect of capital controls.[12] Forbes (2004) argues in a recent paper that it is very hard to find clear cut effects of the aggregate impact of capital controls. However, she points out that detailed microeconomic studies are able to detect significant distortions generated by capital controls.

Thus, the existing empirical evidence, points neither to a risk premium-increasing effect of capital controls nor to a risk-premium decreasing effect. However, there seems to be one finding common in all studies: The effects are not stable over time; the reason for this could be that financial agents adjust their behavior to the restrictions imposed by policymakers.

5. Summary and Conclusions

This paper combines a monetary macroeconomic model and a microeconomic noise trader model in order to study the effect of capital controls on the risk premium. While Buch et al. (1999) as well as Frenkel et al. (2002) postulate that the risk premium increases with the implementation of a Tobin tax, Kolck / Rübesamen (2000) show that this kind of tax is able to reduce exchange rate variability, leading to a decrease of the risk premium. We are able to identify two effects which work in opposite directions: On the one hand, a capital control lowers the variability of the exchange rate and reduces the risk premium as well as the interest rate of a small open economy. This effect seems to be the positive effect of the tax, because it amplifies the growth potential of the economy under consideration. On the other hand, a capital control reduces the number of noise traders and thereby the risk-bearing capacity of the market. As a consequence, the group of rational investors as well as the remaining noise traders have to hold a larger share of risky assets. As their risk exposure increases, they demand a higher risk premium which leads to an increase in the interest rate and therefore, lowers the growth potential of the economy.

We also derive the level of capital controls that minimizes the risk premium. This optimal tax rate varies with the size of the noise trader group: The more noise traders there are in the market, the higher is the optimal tax rate,

---

because in this case, the dampening effect of exchange rate volatility more than offsets the effect of a reduction in the risk bearing capacity of the market.

The policy implication of our analysis is that policy makers should be aware of the risk premium effects of capital controls and the existing uncertainties of determining the direction in which a control could affect it. As our analysis shows, only under specific conditions a detrimental effect of capital controls on the risk premium can be excluded.

References

Allen, H. / *Taylor,* M. P. (1990): Charts, Noise and Fundamentals in the London Foreign Exchange Market, Economic Journal, Supplement 100: 49 – 59.

Belke, A. / *Gros,* D. (2002): Designing EU-US Atlantic Monetary Relations: Exchange Rate Variability and Labour Markets, World Economy 25 (6): 789 – 813.

– (2003): The Cost of Financial Market Variability in the Southern Cone, in: Revue Economique 54 (5): 1091 – 1115.

Bird, G. / *Rajan,* R. S. (1999): Time for Tobin? It May Now Be Time to Reconsider the Tobin Tax, in: New Economy 6(4): 229 – 233.

Blecker, R. A. (1999): Taming Global Finance: A Better Architecture for Growth and Equity, Economic Policy Institute, Washington D.C.

Buch, C. M. / *Heinrich,* R. P. / *Pierdzioch,* C. (1999): Foreign Capital and Economic Transformation: Risks and Benefits of Free Capital Flows, Institut für Weltwirtschaft, Kieler Studien 295.

Cheung, Y.-W. / *Chinn,* M. D. (2001): Currency traders and exchange rate dynamics: a survey of the US market, Journal of International Money and Finance 20: 439 – 471.

Cheung, Y.-W. / *Wong,* C. Y.-P. (2000): A survey of market practitioners' views on exchange rate dynamics, Journal of International Economics 51 (2): 401 – 419.

Davidson, P. (1997): Are Grains of Sand in the Wheels of International Finance Sufficient to Do the Job When Boulders Are Often Required? Economic Journal 107(442): 671 – 686.

De Angelis, M. (2000): Capital Movements, Tobin Tax, and Permanent Fire Prevention: A Critical Note, Journal of Post Keynesian Economics 22 (2): 187 – 195.

De Grauwe, P. / *Dewachter,* H. / *Embrechts,* M. (1993): Exchange Rate Theory – Chaotic Models of Foreign Exchange Markets, Oxford.

De Gregorio, J. / *Edwards,* S. / *Valdes,* R. O. (2000): Controls on Capital Inflows: Do They Work?; Journal of Development Economics 63 (1): 59 – 83

De Long, B. J. / *Shleifer,* A. / *Summers,* L. H. / *Waldmann,* R. J. (1990): Noise Trader Risk in Financial Markets, Journal of Political Economy 98 (4): 703 – 738.

Doraisami, A. (2004): From Crisis to Recovery: The Motivations for and Effects of Malaysian Capital Controls, Journal of International Development 16: 241 – 254.

Edison, H. J. / *Reinhart,* C. M. (2000): Capital Controls During Financial Crises: The Case of Malaysia and Thailand, Board of Governors of the Federal Reserve System International Finance Discussion Paper, Number 662.

Edwards, S. (1999): How Effective are Capital Controls?, NBER Working Paper No. 7413, Boston.

– (2002): Capital Mobility, Capital Controls, and Globalization in the Twenty-First Century; Annals of the American Academy of Political and Social Science 579 (iss. 0): 261 – 270.

Eichengreen, B. (2001): Capital Account Liberalization: What Do Cross-Country Studies Tell Us?, The World Bank Economic Review 15 (3): 341 – 365.

Eichengreen, B. / *Leblang,* D. (2002): Capital Account Liberalization and Growth: Was Mr. Mahathir Right?, NBER Working Paper No. 9427, Boston.

Eichengreen, B. / *Tobin,* J. / *Wyplosz,* C. (1995): Two Cases for Sand in the Wheels of International Finance, Economic Journal 105 (428): 162 – 172.

Fendel, R. / *Stadtmann,* G. (2003): Zur Durchführbarkeit einer Devisentransaktionssteuer – Anmerkungen zur Machbarkeitsstudie von Prof. Paul Bernd Spahn, Zeitschrift für Wirtschaftspolitik 52 (2): 274 – 287.

Forbes, K. J. (2003): One Cost of the Chilean Capital Controls: Increased Financial Constraints for Smaller Traded Firms, NBER Working Paper No. 9777, Boston.

– (2004): Capital Controls: Mud in the Wheels of Market Discipline; NBER Working Paper No. 10284, Boston.

Frankel, J. (1996): How Well Do Foreign Exchange Markets Work: Might a Tobin Tax Help? in: Haq, M. / Kaul, I. / Grunberg, I. (eds.): The Tobin Tax: Coping with Financial Volatility: 41 – 81.

Frankel, J. / *Froot,* K. (1988): Chartists, Fundamentalists and the Demand for Dollars, Greek Economic Review 10: 49 – 102.

– (1990): Chartists, Fundamentalists and Trading in Foreign Exchange Markets, American Economic Review, Papers and Proceedings: 181 – 85.

Frenkel, M. / *Langhammer,* R. (2002): Tobin-Steuer: Neue Vorschläge entkräften nicht alte Einwände, Wirtschaftsdienst 82: 548 – 554.

Frenkel, M. / *Nickel,* C. / *Schmidt,* G. / *Stadtmann,* G. (2002): The Effects of Capital Controls on Output and Exchange Rate Volatility, International Economic Journal 16 (4): 27 – 51.

Goldstein, M. (1995): Coping with Too Much of a Good Thing: Policy Responses for Large Capital Inflows to Developing Countries, Institute for International Economics, Washington D.C.

Gros, D. (1987): The Effectiveness of Capital Controls: Implications for Monetary Autonomy in the Presence of Incomplete Market Separation, International Monetary Fund Staff Papers 34 (4): 621 – 642.

Gruben, W. C. / *McLeod,* D. (1998): Capital Flows, Savings, and Growth in the 1990s, The Quarterly Review of Economics and Finance, Volume 38 (3): 287 – 302.

Jeanne, O. (1996): Would a Tobin Tax Have Saved the EMS? Scandinavian Journal of Economics 98 (4): 503 – 520.

Jeanne, O. / *Rose,* A. (2002): Noise Trading and Exchange Rate Regimes, The Quarterly Journal of Economics 117 (2): 537 – 569.

Johnson, S. / *Mitton,* T. (2003): Cronyism and capital controls: evidence from Malaysia, Journal of Financial Economics 67: 351 – 382.

Kaplan, E. / *Rodrik,* D. (2001): Did the Malaysian Capital Controls Work?, NBER Working Paper No. 8142, Boston.

Kochhar, K. / *Roger,* S. / *Tzanninis,* D. / *Johnston,* B. / *Moore,* M. / *Otker-Robe,* I. (1999): International Monetary Fund Malaysia, Selected Issues, June 23, 1999, [http: // www.imf.org / external / pubs / cat / longres.cfm?sk=3227.0].

Kolck, G. / *Rübesamen,* D. (2000): Tobin Tax and Exchange Rate Volatility, in: Rübel, G.: Real and Monetary Issues of International Economic Integration, Schriften zu internationalen Wirtschaftsfragen, Band 28.

Laurens, B. / *Cardoso,* J. (1998): Managing Capital Flows: Lessons from the Experience of Chile, IMF Working Paper, No. 168, Washington D.C.

Liu, O. (2000): Malaysia fashions own path to recovery, looks to strengthen growth, IMF Survey, International Monetary Fund 29(17): August 28, 2000, 282 – 284.

Mende, A. / *Menkhoff,* L. (2003): Tobin Tax Effects Seen from the Foreign Exchange Market's Microstructure; International Finance 6 (2): 227 – 247.

Menkhoff, L. (1997): Examining the Use of Technical Currency Analysis, International Journal of Finance and Economics 2 (4): 307 – 318.

– (1998): The Noise Trading Approach – Questionnaire Evidence from Foreign Exchange, Journal of International Money and Finance 17 (3): 547 – 564.

– (2001): Short-Term Horizons in Foreign Exchange? Survey Evidence from Dealers and Fund Managers, Kyklos 54 (1): 27 – 47.

Menkhoff, L. / *Michaelis,* J. (1995): Steuern zur Begrenzung unerwünschter Währungsspekulation, in: Aussenwirtschaft 50 (3): 443 – 462.

Nadal-De Simone, F. / *Sorsa,* P. (1999): A Review of Capital Account Restrictions in Chile in the 1990s, International Monetary Fund Working Paper WP / 99 / 52, Washington D.C.

Nadal-De Simone, F. (1997): The Tobin Tax: Coping with Financial Volatility – A Review, Singapore Economic Review 42 (1): 32 – 49.

Neely, C. J. (1997): Technical Analysis in the Foreign Exchange Market: A Layman's Guide, Federal Reserve Bank of St. Louis Review 79 (5): 23 – 38.

Palley, T. I. (1999): Speculation and Tobin Taxes: Why Sand in the Wheels Can Increase Economic Efficiency, Journal of Economics (Zeitschrift fur Nationaloekonomie) 69 (2): 113 – 126.

Reitz, S. / *Slopek,* U. (2003): Macroeconomic Effects of Throwing Sand in the Wheels of Foreign Exchange Markets, Jahrbuch für Wirtschaftswissenschaften (Review of Economics) 54 (2): 187 – 213.

Spahn, P. B. (2002): On the Feasibility of a Tax on Foreign Exchange Transactions, Report to the Federal Ministry for Economic Cooperation and Development, [http: // www.wiwi.uni-frankfurt.de / professoren / spahn / tobintax /].

Taylor, M. P. / Allen, H. (1992): The Use of Technical Analysis in the Foreign Exchange Market, Journal of International Money and Finance 11 (3): 304 – 314.

Valdes-Prieto, S. / *Soto,* M. (1998): The Effectiveness of Capital Controls: Theory and Evidence from Chile, Empirica 25 (2): 133 – 164.

Westerhoff, F. (2003): Heterogeneous Traders and the Tobin Tax; Journal of Evolutionary Economics 13 (1): 53 – 70.