Are Capital Controls Effective in the Foreign Exchange Market?

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Abstract

One of the reasons for governments to use capital controls is to obtain some degree of monetary independence. This paper investigates the link between capital controls and interest differentials/ forward premia. This to test whether they can indeed give governments the power to drive exchange rates away from parity conditions. Two capital control variables are constructed to measure liberalization in a panel of Western European countries. Results show that capital controls do not give governments extra monetary freedom. There is even some evidence that capital controls decrease the level of monetary freedom governments enjoy.

Keywords: Capital controls; Exchange Rates; Interest differentials; Forward premia; Monetary freedom

JEL: E42, F21, F31, G15

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Abstract

One of the reasons for governments to use capital controls is to obtain some degree of monetary independence. This paper investigates the link between capital controls and interest differentials/ forward premia. This to test whether they can indeed give governments the power to drive exchange rates away from parity conditions. Two capital control variables are constructed to measure liberalization in a panel of Western European countries. Results show that capital controls do not give governments extra monetary freedom. There is even some evidence that capital controls decrease the level of monetary freedom governments enjoy.

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Introduction

One of the largest puzzles in international finance is the apparent failure of both forward premia and interest differentials to predict future spot exchange rates during the post-Bretton Woods period. A vast body of literature has been developed to document and explain the large deviations from parity conditions[1].

Another topic that receives recent interest of both the academic community and policy makers is the issue of capital controls and financial liberalization. The shockwave that was sent through the international financial system when the Asian tigers — most of them recently liberalized — crashed hallmarked a distinct change in the debate. Academic authors such as Krugman (1999) and Rodrik (1998) support controls in some specific situations. The IMF also moved to stress the importance of a good phasing out of controls to limit the stress liberalization puts on a financial system.

The two topics are intertwined in the sense that one of the main reasons to impose controls is to insulate an economy from international forces (Ariyoshi, Habermeier, Laurens, Otker-Robe, Canales-Kriljenko, and Kriljenko, 2000). Governments may choose for the freedom to pursue a fixed exchange rate together with (limited) monetary freedom, at the cost of imperfect capital mobility. If monetary freedom is indeed achieved together with a stable fixed exchange rate, this implies that parity conditions have to be violated.

In this light the paper investigates whether the existence of capital controls does explain (part of) the observed deviations from the forward efficiency hypothesis. Given the above it is not surprising that many papers cursorily mention the fact that capital controls might have an effect on Uncovered Interest Parity (UIP) (e.g. Chinn and Meredith, 2005; Dahlquist and Gray, 2000; Frankel and Poonawala, 2006; Gros, 1992); however, they do not specifically look *if* they actually have an effect.

The research question is relevant for a number of reasons. Not only is it important for governments to evaluate wether their controls are creating the desired monetary freedom; as capital controls are costly they should be liberalized if they do not achieve the desired goal. Investors and international policy makers also care about the effect of capital controls. As the parity conditions are a sign of financial integration, deviations due to capital controls imply imperfect integration and reduced risk sharing opportunities.

Looking at evidence from Western Europe, where most countries liberalized their capital accounts in the 80's and beginning of the 90's, we find very little evidence that capital controls did affect uncovered interest parity.

[1]Some of the most influential early work in this field are Frankel (1976), Fama (1984), Frankel and Froot (1987), & McCallum (1994) amongst others. Recent surveys include Chinn (2006), Engel (1996), and Taylor (1995)

The paper is structured as follows. Section 1 gives an overview of the research in the field with some previous evidence on the effect of capital controls. In Section 2 the choice and construction of our two capital control variables are explained in detail, together with the other data sources. Section 3 shows the results of estimating the Fama (1984) specification and how the capital control variables influence the results. In section 4 the conclusion is presented.

1 Overview

If markets are working efficiently, investors should not be able to reap systematic abnormal returns on exchange rates. In the financial literature this has lead to the formation of both forward unbiasedness and UIP, written here in the common log-linear form:

$$E_t s_{t+1} - s_t = \alpha + (f_{t,1} - s_t) + \epsilon_{t+1} \tag{1}$$

$$E_t s_{t+1} - s_t = \alpha + (r_{t,1} - r^*_{t,1}) + \epsilon_{t+1} \tag{2}$$

Where E is the expectations operator, s_t and $f_{t,1}$ the natural logarithm of the spot and 1 period forward exchange rate, r and r^* the 1 period nominal interest rates on similar domestic and foreign securities respectively, and α_i and $\epsilon_{i,t+1}$ the risk premia and forecasting errors.

Forward unbiasedness(equation 1) implies that investors will speculate away any differences between the expected spot rate and the forward rate, making it an unbiased forecaster for future spot rates. Similarly UIP(equation 2) predicts that currency adjusted returns on similar types of deposits should be equal, as any gains from interest differentials will be speculated away by investors, leading to an appropriate adjustment of the exchange rate.

Many papers invoke the Covered Interest Parity (CIP) relation to treat the forward unbiasedness and UIP as equivalent; they employ equation 1 to test for the UIP (condition 2). UIP is normally more informative economically, while data is more readily available on forward rates (see e.g. McCallum (1994) who pointed this out). While in general there is very strong empirical support for CIP to hold, it may break down if limits to arbitrage are imposed.[2]

As the empirical evidence is not very supportive of forward unbiasedness and UIP, a large range of extensions has been proposed to remedy their apparent failure. Some of the extensions include time varying risk premia α_t (Frankel and Froot, 1987; Cavaglia, Verschoor, and Wolff, 1994; Wolff, 1987), Learning (Lewis, 1989), Expectational issues such as distorted beliefs (Gourinchas and

[2] As this paper is specifically looking at the possible effects of capital controls, care is taken to test separately for both conditions, without relying on the CIP condition to hold.

Tornell, 2004) and peso problems (Kaminsky, 1993; Flood and Rose, 1996), as well as evidence for longer horizons (Lothian and Wu, 2005; Chinn and Meredith, 2005).

Capital controls are also a possible candidate to introduce distortions in the parity relations. By limiting international capital mobility, countries limit the possibilities of investors to speculate on exchange rate movements. This weakens the link between spot exchange rates on the one hand and forward rates and interest differentials on the other. As already stated, several papers that investigate the UIP mention this fact[3].

Capital controls in themselves remain a controversial topic. They seem to swing like a pendulum from advocates of open markets to those that advocate some form of control on international capital. The argument dates back as far as the mercantilists who sought to control flows of bullion. This ideological school was subsequently denounced by Adam Smith in favor of free markets. The 20th century saw a large revival of capital controls, driven by the war effort of both world wars. After the world wars the Bretton Woods system coupled capital controls to the fixed exchange rates; Keynes —revived by Tobin (1978) —saw capital controls as an important element to the stability of Bretton Woods. The fall of Bretton Woods was followed by a widespread effort towards liberalization that lasted all through the nineties.

Recently the pendulum seems to be at a turning point. The widespread financial consequences of the 1997 Asian crisis rekindled the debate on the virtues and vices of capital controls. Those countries that had liberalized their capital accounts were hit hardest, while Malaysia, China, and India – all three relying on capital controls to weather the storm – seemed to suffer less from the fallout. Several prominent authors publicly supported Malaysia in its imposition of capital controls (Stiglitz, 2002; Krugman, 1999; Eichengreen, 2004; Kaplan and Rodrik, 2002).

The argument for capital controls focuses on the theory of the second best. We live in an imperfect world, and examples of market failures are plenty. In such a world, introducing an extra distortion such as capital controls might work welfare enhancing by offsetting some of the other distortions. This is especially the true if markets are incomplete and are typified by asymmetric information such as in emerging markets (see e.g. Stiglitz, 2002). In the absence of a good institutional framework, controls on inflows can ration capital to limit the negative effects of capital controls.

[3]for instance, if interest differentials instead of forward premia are used, capital controls are quoted as a reason to use offshore eurocurrency rates, as those should be least affected by any effects of capital controls. Dooley and Isard (1980) for instance explicitly use the interest differential between German euro-rates and onshore rates to measure the effect of capital controls

More specific to what is tested in this paper, capital controls are often used as a tool to influence exchange rate movements. Many governments see (real) exchange rate volatility as a negative thing and hope to dampen the volatility of the movements. Eichengreen, Rose, and Wyplosz (1994) also remark that capital controls can play a role in sustaining fixed exchange rate regimes, especially if they are aimed towards creating a currency union, such as the EMS. Like Keynes, Eichengreen, Rose, and Wyplosz (1994) also point out that the (little) monetary freedom that might be created by the controls can be valuable to national governments. It allows them to use both the monetary and fiscal instruments to guide the economy.

However, one should not forget the nature of capital controls: they remain a distortion and should only be maintained if the benefits outweigh the costs. And the costs of capital controls can be sizeable; the direct administrative costs alone are not trivial. For a control to remain effective, it has to be revised often to close the loopholes used by investors; time and resources have to be expended to execute the controls; authorizations have to be given and taxes collected.

The economic effects can also be large, even though there is no clear effect on economic growth (Rodrik, 1998). Controls limit the possibility of portfolio diversification (Voth, 2003). This also decreases the amount of risk that can be shared and diversified. Thus the cost of capital increases for local firms (Bekaert and Harvey, 2000) [4]. Even worse, there is also some evidence that capital controls might actually worsen the problems they try to solve. The volatility of exchange rates might be exacerbated by capital controls (Glick and Hutchison, 2005) and they can increase the probability of a currency crisis (Bordo, Eichengreen, Klingebiel, and Martinez-Peria, 2001). Dornbusch (1998) even warns of the possibility of contagion due to capital controls. Therefore it is important to pinpoint the effects of capital controls to allow policy makers to correctly assess the size of the benefits and costs.

Yet it is difficult to precisely pin down the theoretical and empirical effects of capital controls for several reasons. First of all, there is no such thing as a universal 'capital control' that is used; the variety used is innumerable. Without being exhaustive, capital controls can be split into administrative controls such as outright bans, and market based controls such as taxes; controls that aim to curb short-term capital flows versus long-term capital flows; or controls on inflows versus controls on outflows.

The most straightforward case to consider is probably the so-called 'Tobin tax' which taxes all foreign exchange transactions by a fixed percentage τ. This is an example of a market based control aimed at short term in- and outflows.

[4] Forbes (2005) summarizes a number of other costs that capital controls impose on a microeconomic level

It is named after James Tobin, who famously proposed to introduce this tax world wide to throw 'sand in the wheels' of international finance in 1978. This tax is used here as an example of what the effects of capital controls might be on UIP.

For exposition, presume that both the US and the UK apply a Tobin tax. If an American investor decides to invest into a 1 month deposit in the UK, he will exchange Dollars into Pounds, paying tax to the British government for buying Pound. The rest he invests in a British deposit, transferring it back to Dollars after one period, paying tax to the American government for buying Dollars. This is only profitable if:

$$1 + r^{\$} \leq (1-\tau)S_t(1+r^p)\frac{1}{S_t+1}(1-\tau) \tag{3}$$

where $r^{\$}$, r^p, S_t, and τ are the US interest rate, the UK interest rate, the spot exchange rate, and the Tobin tax respectively. In other words it is only profitable to borrow Dollars to invest in Pounds (or borrowing Pounds to invest in Dollars) if the expected uncovered interest differential is bigger than taxes that have to be paid. In effect this creates a band in which arbitrage is not profitable:

$$(1-\tau)^2\frac{(1+r)}{(1+r^*)} \leq \frac{S_t+1}{S_t} \leq \frac{1}{(1-\tau)^2}\frac{(1+r)}{(1+r^*)} \tag{4}$$

Another well-documented and analyzed example is the unremunerated reserve requirement(URR) that has been employed by Chile. This control specifically targeted short term capital inflows into Chile, by requiring investors to deposit a fixed percentage of their investment, set at 30%, in a non-interest bearing deposit for a period of one year.

Herrera and Valdes (1999) have built a theoretical model that shows that a Chilean style URR can sustain a sizeable interest differential for short term deposits if investors are assumed to have a static investment horizon. In the more realistic case where investors dynamically select their investment horizon, sustainable interest differentials drop to a modest 2% per annum.

Moreover, Valdes-Prieto and Soto (1998) stress that capital is very fungible thus limiting the effectiveness of capital controls if they are not completely watertight. They show that the monetary autonomy created by the Chilean capital controls was rather negligible. De Gregorio, Edwards, and Valdes (2000) find very similar results. They find some effects of the capital controls on interest differentials. But effect on the real exchange rate, one of the main targets for Chilean monetary policy, is only minor.

The previous paragraph already brings up the second point why it is very difficult to theoretically pin down the effects of capital controls. Even if controls should in theory create sustainable interest differentials, the fungibility of capital will erode the effect of the controls. Investors will look for ways to circumvent the controls by shifting into sectors that are not taxed, such as derivatives. Another oft cited way to circumvent capital controls is to use transfer pricing of products to shift the foreign exchange from the controlled capital account to the (presumably) liberalized current account. It can only be expected that investors become more adept at circumventing the controls as time passes by, deteriorating the effectiveness even more over time, unless the government continually keeps closing loopholes.

Although the above suggests that it is not feasible to pinpoint the size of the effect of capital controls, the same is not true for the direction. As the controls are directed at distorting UIP and forward unbiasedness, it is our hypothesis that the existence of controls should drive the coefficients in equations 1 and 2 away from unity if they are effective. Moreover, the effect is hypothesized to be negative in sign, as most countries want to dampen the movement of the exchange rate to create some exchange rate stability. This corresponds with the fact that most studies find coefficients for β below 1[5].

2 Data

The numerary of the exchange rates is the US Dollar. The data run from January 1983 to December 1998. The beginning of the sample is constrained by data availability; Miniane (2004) has constructed his sample starting from 1983. The year 1983 also hallmarks the end of interest control in the United States, the so-called regulation Q. Thus the starting date ensures that the numerary currency is free of both domestic and international controls on capital, isolating the effect of the controls to those employed by the domestic countries. The end of the sample is chosen so as to coincide with the de facto start of the Euro, which fixes all European currencies to each other. As most countries are part of the Euro-region, this would effectively have led to a large drop in the cross-sectional dimension.

The paper focuses on the capital market liberalizations that took place in Western Europe. The selection of countries is based on two simple criteria. A country is included if it has data available on the liberalization date in at least one of the two indices that measure capital controls, and the liberalization took place within the sample period [6].

[5] e.g. Fama (1984), McCallum (1994), Engel (1996), Gourinchas and Tornell (2004), and Chinn and Meredith (2005) all report predominantly negative betas, while Chinn (2006) reports positive betas below 1.

[6] The complete sample consists of 8 countries: Denmark, France, Italy, Norway, Austria,

Exchange rate data on both spot and forward rates is obtained from Thomson DataStream. All exchange rates are expressed in local currency units per US Dollar. Forward rates are taken for the last day of the month, which is similar to most other studies that investigate forward unbiasedness. 1-month money market rates are obtained from the International Financial Statistics which reports every 15^{th} of the month; consequently spot rates for the UIP equation are matched to the middle of the month.

[Table 1 about here.]

2.1 Capital controls

The last couple of years have seen an increasing number of indices that try to capture the extent to which countries impose controls on international capital transactions. For example both Edison and Warnock (2003) and Bekaert, Harvey, and Lundblad (2005) developed indices that date the liberalization of equity markets; additionally another stream of literature has tried to improve on the traditional dummy variable on capital account restrictions, published yearly by the IMF. Both indices of Kaminsky and Schmukler (2003) and Miniane (2004) belong to the latter type of measures, as we are interested more in access to forward exchange markets and fixed income securities, rather than equity markets.

[Table 2 about here.]

Kaminsky and Schmukler (2003)(henceforth to be called K & S) have extracted information from a plethora of sources, including the IMF, to date the liberalization of capital markets. For each year they indicate whether a market is either 'repressed', 'partially liberalized', 'or fully liberalized'. The degree of control on the capital account is measured by looking at regulations on offshore borrowing, multiple exchange rate regimes, and controls specific to capital outflows. A market is deemed 'fully liberalized' if there are no multiple exchange rates or restrictions on outflows, and only minor impediments to offshore borrowing.

In our study, the date of liberalization is taken to be the first month that the capital account is classified as 'fully liberalized' by K & S (equation 5). In the sample under investigation there have been no temporary controls; all countries started with a (partially) closed market and have then moved to a liberalized

Portugal, Spain, and Sweden.

market, without reimposing controls on the capital account later on.

$$CAP_{i,t}^{K\&S} = \begin{cases} 0, & \text{if KS = `fully liberalized'}; \\ 1, & \text{else.} \end{cases} \tag{5}$$

Miniane (2004) has developed a *de jure* index based on the new post-96 classification of the IMF[7]. The index comprises a total of 13 segments; they include capital markets, direct investment, financial institutions, and multiple exchange rates. The final index calculates the proportion of segments that have capital controls. As with all indices constructed, this index is still imperfect. The measure is de jure in nature and does not measure the severity of the capital controls. However, the measure contains a lot more information than the IMF variable that is used throughout earlier studies.

A score of 0 indicates a fully liberalized market, and a score of 1 a fully closed market. As none of the countries achieves a score of 0 (the US for instance has a score of 0.29) and there seem to be two modes around 0.2 (open) and 0.8 (closed), we classify all economies with a score of less than 0.5 as open, and economies with scores equal to or above 0.5 as closed (equation 6)[8]. Moreover, Miniane (2004) only reports the situation per the 31^{st} of December; thus, the December value is filled into the other months to obtain a monthly variable, implying that all liberalizations are dated on January.

$$CAP_{i,t}^{Miniane} = \begin{cases} 0, & \text{if Miniane} < 0.5 \\ 1, & \text{if Miniane} \geq 0.5 \end{cases} \tag{6}$$

3 Results

3.1 Standard Specification

Tables 3 and 4 report the estimation results for the UIP and forward unbiasedness regressions. The results are estimation using Seemingly Unrelated Regression (SUR) Estimation , allowing correlation between the cross-sectional error terms. Correlation between the different exchange rates can be expected as most of the countries in the sample took part in the European Monetary System (EMS). These correlations make SURE preferable over OLS. Fixed effects have been included in the estimation; f-tests cannot reject the null that all the $\alpha's$ are equal to zero, so these results have been suppressed for brevity.

[7] Before 1996, the IMF only reported a binary variable indicating the existence of capital controls. The new Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) has expanded the coverage on capital controls. In a tabulated format they report on controls in 13 main segments, of which most are even further disaggregated

[8] The results are not very sensitive if the cut-off point is varied between 0.4 – 0.6

The first columns show the results for the standard regression specifications. As expected, all coefficients lie well below the hypothesized value 1 and some coefficients are negative. Italy seems to give the best fit for UIP as the null of 1 cannot be rejected whilst the null of 0 can be rejected at the 10% level. Italy also shows a relatively good fit for the forward regression. It can also be noted that the fit for the forward unbiasedness is in general better than that of the UIP, coinciding with the fact that most papers use forward rate data when testing for UIP relations. The restricted SUR coefficient for UIP comes at 0.08, almost equal to 0. The forward unbiasedness seems to fare a little bit better at 0.36. This is actually a rather high result, compared to the findings of most other studies.

The righthand-side columns include the effects of capital controls directly, given by the coefficient γ. The first set of results use the liberalization dates of Kaminsky and Schmukler (2003), while the second set uses the liberalization dates generated out of the data by Miniane (2004). Fixed effects have again been suppressed to preserve space. Separate dummies measuring the effect of capital controls on the risk premium have not been included. These dummies would capture any effect of political risk associated with capital controls. However, the data show very little evidence of heterogeneity in the intercepts. The inclusion of the capital control dummy does not lead to any significant results. [9]

3.2 Uncovered Interest Parity

[Table 3 about here.]

Looking at the UIP regression (tabel 3), the new β represents the 'true' UIP coefficient; i.e. the coefficient that prevails in liberalized markets. γ represents the additional effect because of capital controls, making $(\beta + \gamma)$ the estimated UIP coefficient in controlled markets. For capital controls to have the effect of giving some monetary freedom, $(\beta + \gamma)$ should be smaller than β. If capital controls have no effect, then the two should be equal, implying that γ is equal to zero.

Looking at the sample based on Kaminsky and Schmukler (2003), only Sweden seems to be able to drive the UIP away from 1 (albeit also insignificantly). Italy and Spain also have a negative γ, which is much smaller in size than the -0.77 of Sweden. The other countries show positive coefficients. France forms the outlier on the other side with a coefficient of 1.07, the rest again have coefficients close to zero. Jointly the capital control variable turns out to be insignificant. Looking at β, also nothing surprising happens. One extra country (Portugal) shows a negative coefficient, the rest are slightly lower than their initial values;

[9] results are available from the authors upon request

UIP can be rejected for 6 out of 7 countries. These results correspond (by construction) to the small positive loadings on the capital controls. The opposite is the case for $(\beta + \gamma)$; values are on average slightly closer to one, and for France the UIP hypothesis can no longer be rejected. Overall, this set of results supports the view that capital controls are not effective. Perhaps a rather bleak — but to many not unexpected — message for governments considering to impose controls in the hope it will give some autonomy. However, the following results, that *do* show some effects of capital controls, are even less positive to governments.

The second set of results using the Miniane (2004) index rejects the null of no effects of capital controls. The aggregate coefficient of γ stays rather constant at an insignificant 0.22 (versus 0.20). This would indicate that the capital controls have different effects on different countries.

Spain is able to (significantly) dampen the effect of interest differentials on exchange rates. Italy and Sweden have insignificant negative values for γ. All other countries show a UIP coefficient is rather *higher* when capital controls are in place, than in a liberalized market. For example, Portugal scores a β of -0.20 when liberalized, but comes as high as 0.77 when controls are still in place, a difference of 0.97. France also shows a big difference from -0.79 in liberalized markets to 0.67 when capital controls were still in place. Both are significant changes at the 5% level and are now insignificantly different from 1.

For beta, Norway again switches sign of β, most other countries also show lower values. Spain and Italy, which have negative $\gamma's$ however, show very high coefficients for β even up to 0.92 for Italy.

3.3 Forward Unbiasedness

[Table 4 about here.]

The results for Forward Unbiasedness (table 4) are similar to those of the of the UIP results for the Miniane sample. They are only more pronounced. The results again reject the hypothesis that capital controls have no effect on forward unbiasedness. However, the restricted coefficient shows that γ is positive, rather than negative as hypothesized. Thus capital controls are driving the results *towards* forward unbiasedness, not away. Both K & and Miniane show a coefficient of around 0 (0.09 and -0.16 respectively) in the absence of capital controls, and 0.44 otherwise. Moreover, the restricted capital control coefficient is now significant in both samples, at 5% and 1%.

The tests also reveal that the effects are not homogeneous between countries. In general it can be noted that the dispersion of the coefficients is larger. The absolute size of the coefficients is bigger than those of the UIP regressions.

The standard errors on the other hand stay relatively similar in size, making it possible to make better predictions on the effect of capital controls. In the case of France, the existence of capital controls even pushes the sum of β and γ above unity.

Looking at the results, the same pattern emerges as for the UIP. On one side, Spain, Sweden, and Italy have negative coefficients. Of the negative $\gamma' s$ only the one of Spain in the second sample is significant. This is also the only instance in our entire sample where the liberalized UIP coefficient scores above 1.

In short, the forward regressions only reinforce the first results; there is very slight evidence that countries can use capital controls to drive exchange rates away from parities. Instead the little evidence that is there, points in the opposite direction, showing that exchange rates are actually more sensitive to forward premia when capital controls are in place.

3.4 Cross-Rates

[Table 5 about here.]

[Table 6 about here.]

[Table 7 about here.]

[Table 8 about here.]

Normally, the two specifications tested above should be numerary-invariant (Schotman, Straetmans, and de Vries, 2005). However, it cannot be excluded that the effects of capital controls differ across countries. In the sample at hand, most countries were part of the EMS. Thus it might be interesting to look at the interaction with two most influential currencies within Europe, the Pound Sterling and the Deutsche Mark (DM). The DM was seen by many as the unofficial leading currency within the EMS. Making the German financial markets an important anchor for the local governments. The Pound plays a less central role in the EMS, as England decided to step out of the exchange rate mechanism after the peg was broken in 1992. Still, it represents one of the major currencies in the world and the second largest economy in the EU. On a side note, both currencies have been liberalized before 1983, isolating the effect of capital account liberalization on the host countries in the sample.

The results for the Pound and Mark regressions can be seen in tables 5 to 8. The cross rates show no significantly different story compared to the previous two tables. Most coefficients change only moderately. For the plain regressions without capital controls, the restricted coefficients are very much alike. The difference between the lowest and highest estimate is less than 0.15. The differences are somewhat bigger for the regressions that include the capital control variables. For the UIP regression, the dispersion in the coefficients is smaller; most coefficients lie closer to zero. For the forward unbiasedness regressions the opposite is the case. The coefficients lie further away from zero, compared to the Dollar results. This counts for both the negative values and positive values.

The signs of most coefficients are also preserved in most cases. However, there are some sign changes that deserve some attention. In the forward regression against the Pound, the γ coefficients suddenly appears large and positive, rather than negative. This only goes for the K & S variable, the Miniane variable still has a negative loading. Moreover, Italy also shows positive coefficients for γ in 3 out of the 8 regressions. Austria has the opposite. In all specifications it has a positive coefficient for γ, except for forward regression against the Mark.

The gist of the results remain the same, however. There are some countries that are able to create lower responsiveness of their exchange to interest rate differentials and forward rates with capital controls (Spain, Sweden, and Italy), but more countries actually experience a larger responsiveness. The latter group is also more pronounced in terms of size of the coefficients and significance. For the forward regressions, the average restricted γ is about 0.80.

4 Conclusion

In this paper we investigate the link between capital controls and UIP and forward unbiasedness. One of the important reasons for governments to use capital controls is to maintain a degree of monetary independence. If capital controls indeed allow for monetary freedom and exchange rate regulation simultaneously, this should result in deviations from parity conditions.

The results show that capital controls are not able to drive interest rates and forward rates (further) away from parity conditions. Instead there is slight evidence that capital controls increase the responsiveness of exchange rates to those variables.

This is in contrast to the hypothesized effect of capital controls on exchange rates. Moreover it is in contrast to the objectives of the governments that employ capital controls. The results of this paper show that governments might even have less room to set monetary policy if capital controls are employed, as shown by the coefficients that lie closer to parity conditions.

This is in line with other papers that find that capital controls might actually reach the opposite effect than what they are used for. Glick and Hutchison (2005) find for instance that capital controls increase the likelihood of a speculative attack and a currency crisis. This while many governments employ controls in the hope they insulate their economy from currency crises.

These results once more accentuate the fact that governments should not overestimate the effects of capital controls and even consider that they can backfire. Recent history has provided us with just such an example where capital controls backfired; the capital controls imposed by Thailand in December 2006 come to mind. Thailand was forced to back down on it's newly imposed controls within a day, after the Thai stock market crashed. It proves as a little reminder to those considering capital controls: 'caveat emptor', or let the user of capital controls beware.

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Table 1: Descriptive Statistics

	$s_{t+1} - s_t$		$f_t - s_t$		$i_t - i_t^*$	
Country	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev
Austria	-0.19	3.28	-0.06	0.24	0.19	0.26
Denmark	-0.14	3.25	0.15	0.29	0.12	0.22
France	-0.10	3.22	0.14	0.25	0.44	0.23
Italy	0.10	3.20	0.39	0.25	0.29	0.30
Norway	0.04	3.02	0.26	0.30	-0.06	0.24
Portugal	0.33	3.25	0.83	1.07	0.55	0.38
Spain	0.06	3.24	0.45	0.36	0.42	0.29
Sweden	0.05	3.06	0.26	0.34	0.30	0.50

Notes: All exchange rates are expressed in local currency units per U.S. Dollar. $s_{t+1} - s_t$ is the monthly change in the spot exchange rate expressed in local currency units per Dollar; $f_t - s_t$ is the 1 month forward premium; $r_t - r_t^*$ is the money market rate differential vis-a-vis America. All variables are expressed as monthly percentages.
s_t is defined at the end of the month.

Table 2: Liberalization Dates

Country	K & S	Miniane
Denmark	September 1988	January 1988
France	December 1989	January 1989
Italy	December 1991	January 1988
Norway	December 1987	January 1989
Austria	n/a[a]	January 1991
Portugal	July 1992	January 1991
Spain	December 1992	January 1992
Sweden	December 1988	January 1989

Notes: *K & S* and *Miniane* refers to liberalization measured according to Kaminsky and Schmukler (2003) and Miniane (2004), respectively. As Miniane only reports on capital controls annually, all liberalizations are set at the beginning of the year following the liberalization.
[a] Kaminsky and Schmukler do not have Austria in their sample.

Table 3: Uncovered Interest Parity

Country	Plain	K & S			MINIANE		
	β	β	γ	$\beta+\gamma$	β	γ	$\beta+\gamma$
Denmark	-0.17 †††	-0.78 $^{\dagger\dagger\dagger}_{**}$	0.14	-0.64 †††	-0.62 $^{\dagger\dagger\dagger}_{**}$	0.43	-0.19 †††
	(0.21)	(0.32)	(0.52)	(0.51)	(0.30)	(0.45)	(0.39)
France	-0.19 †††	-0.97 $^{\dagger\dagger\dagger}_{**}$	1.03	0.06	-0.79 $^{\dagger\dagger\dagger}_{**}$	1.45 **	0.67
	(0.29)	(0.41)	(0.80)	(0.77)	(0.39)	(0.72)	(0.65)
Italy	0.79 *	0.59	-0.18	0.41	0.92 *	-0.43	0.49
	(0.44)	(0.51)	(0.41)	(0.49)	(0.55)	(0.44)	(0.47)
Norway	-0.05 †††	-0.38 †††	0.16	-0.22 †††	-0.26 †††	0.10	-0.16 †††
	(0.27)	(0.33)	(0.43)	(0.33)	(0.35)	(0.43)	(0.36)
Austria	-0.06 †††				-0.87 $^{\dagger\dagger\dagger}_{*}$	1.13 *	0.26 †
	(0.25)				(0.45)	(0.59)	(0.43)
Portugal	0.36 ††	-0.09 ††	0.42	0.33 ††	-0.20 †††	0.97 **	0.77
	(0.27)	(0.39)	(0.35)	(0.29)	(0.32)	(0.32)	(0.30)
Spain	0.33 ††	0.07 ††	-0.04	0.03 ††	0.62	-0.78 **	-0.17
	(0.31)	(0.34)	(0.35)	(0.41)	(0.43)	(0.38)	(0.33)
Sweden	-0.03 †††	-0.12 †††	-0.77	-0.89 †††	-0.03 †††	-0.73	-0.76 ††
	(0.21)	(0.21)	(0.71)	(0.73)	(0.22)	(0.73)	(0.74)
R^2	0.0189	0.0283			0.0378		
Restricted	0.08 †††	-0.10 †††	0.20	0.10 †††	-0.07 †††	0.22	0.15 †††
	(0.13)	(0.17)	(0.17)	(0.19)	(0.18)	(0.19)	(0.15)
R^2	0.0138	0.0151			0.0139		
$\forall\alpha_i$ equal	1.03	0.54			0.79		
$\forall\beta_i$ equal	1.28	1.75			2.17 **		
$\forall\gamma_i$ equal			0.82			4.07 ***	
$\forall\gamma_i = 0$			0.73			3.77 ***	

notes: $\Delta s^{l/\$}_{i,t+1} = \alpha_i + \beta_i * (i_{i,t} - i^{\$}_{i,t}) + \gamma_i * I^{cap}_{i,t} * (i_{i,t} - i^{\$}_{t}) + \epsilon_{t+1}$, $\Delta s^{l/\$}_{i,t+1}$ is the change in the spot exchange rate, $(i_{i,t} - i^{\$}_{i,t})$ the interest differential between the local and Dollar 1 month money market rate, $I^{cap}_{i,t}$ the dummy indicating the existence of capital controls, and $\epsilon_{i,t+1}$ the error term. (standard errors in brackets). Data is middle of the month.

$*(\dagger), **(\dagger\dagger), ***(\dagger\dagger\dagger)$, indicates a significant difference from 0(1) at the 10%, 5%, and 1% respectively. Sample period: January 1983 to September 1998.

Table 4: Forward Unbiasedness

Country	Plain	K & S			MINIANE		
	β	β	γ	$\beta+\gamma$	β	γ	$\beta+\gamma$
Denmark	-0.51 $^{\dagger\dagger\dagger}_{***}$	-1.02 $^{\dagger\dagger\dagger}_{***}$	0.88 *	-0.14 †††	-1.04 $^{\dagger\dagger\dagger}_{***}$	0.88 **	-0.16 †††
	(0.16)	(0.25)	(0.49)	(0.44)	(0.22)	(0.40)	(0.35)
France	0.30 †††	-0.78 $^{\dagger\dagger\dagger}_{***}$	2.29 ***	1.51 ***	-0.75 $^{\dagger\dagger\dagger}_{***}$	2.36 ***	1.61 $^{\dagger\dagger\dagger}_{***}$
	(0.20)	(0.31)	(0.45)	(0.36)	(0.28)	(0.39)	(0.30)
Italy	0.48	0.42	-0.14	0.28	0.69	-0.49	0.20
	(0.46)	(0.51)	(0.48)	(0.54)	(0.52)	(0.51)	(0.54)
Norway	-0.26 †††	-0.69 $^{\dagger\dagger\dagger}_{***}$	0.85 *	0.15 ††	-0.63 $^{\dagger\dagger\dagger}_{***}$	0.58	-0.05 †††
	(0.28)	(0.33)	(0.44)	(0.38)	(0.35)	(0.45)	(0.36)
Austria	-0.12 †††				-1.11 $^{\dagger\dagger\dagger}_{***}$	1.04 **	-0.08 †††
	(0.20)				(0.34)	(0.43)	(0.31)
Portugal	0.50 $^{\dagger\dagger\dagger}_{***}$	0.13 †††	0.41	0.55 $^{\dagger\dagger\dagger}_{***}$	0.17	0.34	0.51 $^{\dagger\dagger\dagger}_{***}$
	(0.09)	(0.27)	(0.26)	(0.09)	(0.26)	(0.25)	(0.09)
Spain	0.68 ***	0.62 **	-0.17	0.46	1.21 ***	-1.00 **	0.21 †††
	(0.26)	(0.27)	(0.35)	(0.38)	(0.36)	(0.36)	(0.28)
Sweden	0.41 †	0.38 †	-0.78	-0.41 ††	0.47	-1.07	-0.60 ††
	(0.32)	(0.33)	(0.68)	(0.70)	(0.34)	(0.70)	(0.71)
R^2	0.0497	0.0683			0.0851		
Restricted	0.36 $^{\dagger\dagger\dagger}_{***}$	0.09 †††	0.35 **	0.44 $^{\dagger\dagger\dagger}_{***}$	-0.16	0.60 ***	0.44 $^{\dagger\dagger\dagger}_{***}$
	(0.07)	(0.15)	(0.14)	(0.08)	(0.16)	(0.16)	(0.08)
R^2	0.0298	0.0349			0.0382		
$\forall\alpha_i$ equal	1.48	1.24			1.24		
$\forall\beta_i$ equal	5.71 ***	4.94 ***			6.23 ***		
$\forall\gamma_i$ equal			4.50 ***			7.47 ***	
$\forall\gamma_i = 0$			4.44 ***			7.14 ***	

notes: $\Delta s^{l/\$}_{i,t+1} = \alpha_i + \beta_i * (f^{l/\$}_{i,t,1} - s^{l/\$}_{i,t}) + \gamma_i * I^{cap}_{i,t} * (f^{l/\$}_{i,t,1} - s^{l/\$}_{i,t}) + \epsilon_{i,t+1}$, $\Delta s^{l/\$}_{i,t+1}$ is the change in the spot exchange rate, $(fl/\$_{t,1} - sl/\$_t)$ the forward premium, $I^{cap}_{i,t}$ the dummy indicating the existence of capital controls, and $\epsilon_{i,t+1}$ the error term. (standard errors in brackets).

$*(\dagger), **(\dagger\dagger), ***(\dagger\dagger\dagger)$, indicates a significant difference from 0(1) at the 10%, 5%, and 1% respectively. Sample period: January 1983 to December 1998.

Table 5: Uncovered Interest Parity Pound

Country	Plain	K & S			MINIANE		
	β	β	γ	$\beta+\gamma$	β	γ	$\beta+\gamma$
Denmark	-0.06 †††	-0.39 ††† ***	0.35	-0.05 †††	-0.18 †††	0.18	0.00 †††
	(0.09)	(0.24)	(0.24)	(0.22)	(0.12)	(0.20)	(0.18)
France	-0.05 †††	-0.48 ††† **	0.35	-0.13 †††	-0.18 †††	0.13	-0.05 †††
	(0.12)	(0.22)	(0.22)	(0.19)	(0.16)	(0.20)	(0.17)
Italy	0.06 †††	-0.09 †††	0.09	-0.01 †††	0.12 †††	-0.13	-0.01 †††
	(0.16)	(0.26)	(0.26)	(0.18)	(0.23)	(0.26)	(0.19)
Norway	-0.21 ††† *	-0.46 ††† ***	0.41	-0.05 †††	-0.37 ††† **	0.31	-0.06 †††
	(0.12)	(0.28)	(0.28)	(0.22)	(0.17)	(0.28)	(0.20)
Austria	0.03 †††				-0.42 ††† *	0.42 **	0.00 †††
	(0.12)				(0.25)	(0.19)	(0.13)
Portugal	0.18 †††	-0.23 †††	0.46 **	0.23 ††† *	-0.17 †††	0.49 ***	0.32 ††† **
	(0.12)	(0.19)	(0.19)	(0.13)	(0.17)	(0.18)	(0.13)
Spain	0.01 †††	-0.11 †††	0.30	0.19	0.36 ††† *	-0.58 **	-0.22 †††
	(0.13)	(0.44)	(0.44)	(0.45)	(0.21)	(0.23)	(0.14)
Sweden	-0.30 ††† ***	-0.33 ††† ***	-0.31	-0.64 †††	-0.26 ††† **	-0.32	-0.59 †††
	(0.10)	(0.45)	(0.45)	(0.45)	(0.10)	(0.45)	(0.44)
R^2	0.0244	0.0369			0.0393		
Restricted	-0.07 †††	-0.26 ††† ***	0.34 ***	0.08 †††	-0.21 ††† ***	0.24 ***	0.03 †††
	(0.06)	(0.07)	(0.09)	(0.09)	(0.07)	(0.08)	(0.07)
R^2	0.0133	0.0276			0.0203		
$\forall\alpha_i$ equal	1.23	2.08 *			1.51		
$\forall\beta_i$ equal	2.08 **	0.92			1.62		
$\forall\gamma_i$ equal			0.49			3.14 ***	
$\forall\gamma_i = 0$			1.57			3.18 ***	

notes: $\Delta s^{l/£}_{i,t+1} = \alpha_i + \beta_i * (i_{i,t} - i^{£}_{i,t}) + \gamma_i * I^{cap}_{i,t} * (i_{i,t} - i^{£}_{t}) + \epsilon_{t+1}$, $\Delta sl/£_{i,t+1}$ is the change in the spot exchange rate, $(i_{i,t} - i^{£}_{i,t})$ the interest differential between the local and foreign 1 month money market rate, $I^{cap}_{i,t}$ the dummy indicating the existence of capital controls, and $\epsilon_{i,t+1}$ the error term. (standard errors in brackets). Data is middle of the month.

$*(\dagger), **(\dagger\dagger), ***(\dagger\dagger\dagger)$, indicates a significant difference from 0(1) at the 10%, 5%, and 1% respectively. Sample period: January 1983 to September 1998.

Table 6: Uncovered Interest Parity Deutsche Mark

Country	Plain	K & S			MINIANE		
	β	β	γ	$\beta+\gamma$	β	γ	$\beta+\gamma$
Denmark	-0.04 †††	-0.24 †††	0.21	-0.03 †††	-0.13 †††	0.11	-0.02 †††
	(0.10)	(0.15)	(0.15)	(0.10)	(0.15)	(0.13)	(0.10)
France	0.12 †††	-0.60 $^{\dagger\dagger\dagger}_{*}$	0.69 **	0.09 †††	-0.49 †††	0.58 **	0.10 †††
	(0.12)	(0.32)	(0.32)	(0.13)	(0.31)	(0.28)	(0.13)
Italy	0.04 †††	0.12 ††	-0.09	0.03 †††	0.15 ††	-0.13	0.02 †††
	(0.16)	(0.25)	(0.25)	(0.18)	(0.33)	(0.22)	(0.19)
Norway	-0.04 †††	-0.21 †††	0.21	0.00 †††	-0.11 †††	0.08	-0.03 †††
	(0.11)	(0.16)	(0.16)	(0.13)	(0.23)	(0.21)	(0.12)
Austria	-0.06 †††				-0.62 †††	0.63	0.01 †††
	(0.17)				(0.51)	(0.57)	(0.19)
Portugal	0.28 $^{\dagger\dagger\dagger}_{**}$	0.02 †††	0.25	0.27 $^{\dagger\dagger\dagger}_{**}$	-0.19 †††	0.40 **	0.21 $^{\dagger\dagger\dagger}_{*}$
	(0.12)	(0.21)	(0.21)	(0.12)	(0.23)	(0.18)	(0.12)
Spain	-0.23 $^{\dagger\dagger\dagger}_{*}$	-0.20 †††	-0.16	-0.36 $^{\dagger\dagger\dagger}_{*}$	0.27 ††	-0.37	-0.11 †††
	(0.13)	(0.16)	(0.16)	(0.21)	(0.33)	(0.25)	(0.14)
Sweden	-0.13 †††	-0.12 †††	-0.14	-0.26 †††	-0.11 †††	-0.14	-0.25 †††
	(0.10)	(0.20)	(0.20)	(0.21)	(0.10)	(0.21)	(0.21)
R^2	0.0239	0.0337			0.0348		
Restricted	-0.01 †††	-0.12 $^{\dagger\dagger\dagger *}$	0.18 ***	0.06 †††	-0.11 †††	0.15	0.04 †††
	(0.05)	(0.07)	(0.06)	(0.06)	(0.07)	(0.08) **	(0.16)
R^2	0.0134	0.0213			0.0161		
$\forall\alpha_i$ equal	1.59	1.18			1.04		
$\forall\beta_i$ equal	2.23 **	0.52			0.64		
$\forall\gamma_i$ equal			9.02			2.07 **	
$\forall\gamma_i = 0$			1.51			2.04 **	

notes: $\Delta s^{l/dm}_{i,t+1} = \alpha_i + \beta_i * (i_{i,t} - i^{dm}_{i,t}) + \gamma_i * I^{cap}_{i,t} * (i_{i,t} - i^{dm}_{t}) + \epsilon_{t+1}$, $\Delta s^{l/dm}_{i,t+1}$ is the change in the spot exchange rate, $(i_{i,t} - i^{dm}_{i,t})$ the interest differential between the local and foreign 1 month money market rate, $I^{cap}_{i,t}$ the dummy indicating the existence of capital controls, and $\epsilon_{i,t+1}$ the error term. (standard errors in brackets). Data is middle of the month.

$*(\dagger), **(\dagger\dagger), ***(\dagger\dagger\dagger)$, indicates a significant difference from 0(1) at the 10%, 5%, and 1% respectively. Sample period: January 1983 to September 1998.

Table 7: Forward Unbiasedness Pound

Country	Plain	K & S			MINIANE		
	β	β	γ	$\beta+\gamma$	β	γ	$\beta+\gamma$
Denmark	-0.56 ††† ***	-1.19 ††† ***	1.90 ***	0.70	-1.01 ††† ***	1.02 ***	0.01 †††
	(0.17)	(0.28)	(0.52)	(0.45)	(0.19)	(0.38)	(0.35)
France	0.34 ††† *	-0.85 ††† **	2.39 ***	1.54 ***	-0.47 ††† **	1.46 ***	0.99 ***
	(0.20)	(0.34)	(0.50)	(0.36)	(0.26)	(0.38)	(0.29)
Italy	0.04 ††	0.17	-0.33	-0.17 ††	0.34	-0.68	-0.34 ††
	(0.42)	(0.64)	(0.72)	(0.49)	(0.54)	(0.72)	(0.57)
Norway	-0.74 ††† ***	-1.49 ††† ***	1.60 **	0.11	-1.53 ††† ***	1.52 **	-0.01 ††
	(0.30)	(0.38)	(0.69)	(0.54)	(0.42)	(0.72)	(0.51)
Austria	0.00 †††				-1.50 ††† ***	1.29 ***	-0.21 †††
	(0.22)				(0.46)	(0.35)	(0.23)
Portugal	0.52 †††	0.32 ††	0.16	0.47 ††† ***	0.44 †	0.05	0.48 ††† ***
	(0.08)	(0.33)	(0.33)	(0.09)	(0.32)	(0.31)	(0.08)
Spain	0.49 †† *	1.48 ***	-1.60 ***	-0.12 †††	1.65 ***	-1.80 ***	-0.15 †††
	(0.26)	(0.43)	(0.49)	(0.29)	(0.42)	(0.48)	(0.29)
Sweden	-0.25 †††	-1.31 ††† *	1.35	0.04 †††	-0.08 ††	-1.97 *	-2.05 ††† **
	(0.38)	(0.73)	(0.82)	(0.43)	(0.40)	(1.16)	(1.09)
R^2	0.0564	0.0844			0.0871		
Restricted	0.33 ††† ***	-0.47 ††† **	0.93 ***	0.47 ††† ***	-0.33 ††† **	0.74 ***	0.41 †††
	(0.07)	(0.20)	(0.20)	(0.08)	(0.14)	(0.14)	(0.08) ***
R^2	0.0272	0.0458			0.0428		
$\forall\alpha_i$ equal	1.56	1.45			1.84 *		
$\forall\beta_i$ equal	7.05 ***	6.75 ***			7.16 ***		
$\forall\gamma_i$ equal			6.69 ***			5.92 ***	
$\forall\gamma_i = 0$			6.68 ***			6.25 ***	

notes: $\Delta s^{l/£}_{i,t+1} = \alpha_i + \beta_i * (f^{l/£}_{i,t,1} - s^{l/£}_{i,t}) + \gamma_i * I^{cap}_{i,t} * (f^{l/£}_{i,t,1} - s^{l/£}_{i,t}) + \epsilon_{i,t+1}$, $\Delta s_{i,t+1}$ is the change in the spot exchange rate, $(f^{l/£}_{t,1} - s^{l/£}_{t})$ the forward premium versus the pound, $I^{cap}_{i,t}$ the dummy indicating the existence of capital controls, and $\epsilon_{i,t+1}$ the error term. (standard errors in brackets).

$*(\dagger), **(\dagger\dagger), ***(\dagger\dagger\dagger)$, indicates a significant difference from 0(1) at the 10%, 5%, and 1% respectively. Sample period: January 1983 to December 1998.

Table 8: Forward Unbiasedness Deutsche Mark

Country	Plain	K & S			MINIANE		
	β	β	γ	$\beta+\gamma$	β	γ	$\beta+\gamma$
Denmark	-0.61 $^{\dagger\dagger\dagger}_{***}$	-1.67 $^{\dagger\dagger\dagger}_{***}$	1.58 ***	-0.09 †††	-1.48 $^{\dagger\dagger\dagger}_{***}$	1.37 ***	-0.11 †††
	(0.17)	(0.21)	(0.23)	(0.17)	(0.20)	(0.23)	(0.18)
France	0.64 $^{\dagger\dagger}_{***}$	-0.25 ††	1.07 **	0.83 ***	-0.31 †††	1.07 **	0.76 ***
	(0.18)	(0.49)	(0.47)	(0.19)	(0.46)	(0.43)	(0.18)
Italy	-0.07 ††	-0.35 †	0.40	0.05 ††	-0.24	0.11	-0.13 ††
	(0.43)	(0.77)	(0.57)	(0.45)	(0.79)	(0.56)	(0.45)
Norway	-0.27 †††	-0.67 $^{\dagger\dagger\dagger}_{*}$	0.83 **	0.16 †††	-0.87 $^{\dagger\dagger\dagger}_{*}$	0.76 *	-0.11 †††
	(0.24)	(0.34)	(0.36)	(0.27)	(0.45)	(0.45)	(0.26)
Austria	0.29 †				1.09	-0.92	0.17 ††
	(0.38)				(0.82)	(0.96)	(0.45)
Portugal	0.49 $^{\dagger\dagger\dagger}_{***}$	0.07 ††	0.44	0.51 $^{\dagger\dagger\dagger}_{***}$	0.29 †	0.18	0.46 $^{\dagger\dagger\dagger}_{***}$
	(0.08)	(0.38)	(0.36)	(0.08)	(0.38)	(0.37)	(0.09)
Spain	0.21 †††	0.27 †††	-0.33	-0.07 ††	1.69 ***	-1.43 ***	0.26 †††
	(0.24)	(0.25)	(0.42)	(0.50)	(0.49)	(0.43)	(0.24)
Sweden	-0.31 †††	-0.03 ††	-0.20	-0.22 ††	-0.05 †††	-0.46	-0.51 †††
	(0.38)	(0.45)	(0.51)	(0.46)	(0.45)	(0.51)	(0.46)
R^2	0.0563	0.1011			0.0913		
Restricted	0.31 $^{\dagger\dagger\dagger}_{***}$	-0.30 $^{\dagger\dagger\dagger}_{**}$	0.67 ***	0.37 $^{\dagger\dagger\dagger}_{***}$	-0.46 $^{\dagger\dagger\dagger}_{***}$	0.87 ***	0.41 $^{\dagger\dagger\dagger}_{***}$
	(0.07)	(0.13)	(0.12)	(0.07)	(0.15)	(0.15)	(0.08)
R^2	0.0262	0.0506			0.0449		
$\forall\alpha_i$ equal	2.95 ***	2.39 **			3.10 ***		
$\forall\beta_i$ equal	7.43 ***	7.40 ***			6.99 ***		
$\forall\gamma_i$ equal			4.62 ***			5.90 ***	
$\forall\gamma_i = 0$			8.28 ***			7.29 ***	

notes: $\Delta s^{l/dm}_{i,t+1} = \alpha_i + \beta_i * (f^{l/dm}_{i,t,1} - s^{l/dm}_{i,t}) + \gamma_i * I^{cap}_{i,t} * (f^{dm}_{i,t,1} - s^{dm}_{i,t}) + \epsilon_{i,t+1}$, $\Delta s_{i,t+1}$ is the change in the spot exchange rate, $(f^{l/dm}_{t,1} - s^{l/dm}_{t})$ the forward premium versus the Deutsche mark, $I^{cap}_{i,t}$ the dummy indicating the existence of capital controls, and $\epsilon_{i,t+1}$ the error term. (standard errors in brackets).

$*(\dagger), **(\dagger\dagger), ***(\dagger\dagger\dagger)$, indicates a significant difference from 0(1) at the 10%, 5%, and 1% respectively. Sample period: January 1983 to December 1998.