RESERVES OVER THE TRANSITIONS TO FLOATING:

LESSONS FROM THE DEVELOPED WORLD*

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Comments welcome

Abstract

This papers highlights the evolution of official international reserves in several developed countries that have transited towards a scheme of Inflation Targeting (IT) and/or floating exchange rates. The aim is to find stylized facts and draw lessons of interest to other countries, such as Brazil, Chile and Mexico, which have revamped their monetary and exchange rate arrangements along those lines, or are in the process of doing so. We study six countries that clearly switched to a floating exchange rate regime, as well as to an IT framework for the conduct of monetary policy. First, we find that *both* the adoption of a floating exchange rate *and* an IT framework are associated with a persistent 10% to 20% reduction in real official reserves held at the Central Bank. Second, this reduction in official reserves corresponds mainly to a reallocation of international liquidity towards the private financial sector, that accommodates part of the effect on the level or composition of the net foreign asset position of the countries. Third, there appears to be a clear change in the correlation between interest rate differentials and the dynamics of official reserves, suggesting that the empirical prediction of Mundell-Fleming regarding the exogeneity of money supply holds strongly in the modern world of interest rate rules. Fourth, the latter also shows that, once constraints on exchange rate volatility are removed, the stock of reserves can be determined independently by the Central Bank, according for example to cost-benefit analysis, without hindering the credibility of the floating regime.

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1. Introduction

Recently a number of emerging economies have adopted formal Inflation Targeting (IT) frameworks to guide the conduct of their monetary policy. The reasons for the adoption of this framework vary, but seems to be associated with the exhaustion of exchange rate targets, as well as the need to bolster the credibility of monetary policy and anchor expectations in a floating exchange rate regime. Indeed, Brazil, Chile and Mexico all adopted a floating scheme in the aftermath of costly defenses of their respective currencies. Note however the differences. In Chile, the Central Bank successfully defended the exchange rate band, after only a light loss in reserves. Moreover, the decision to float was taken in September 1999, a year after the last speculative attack that followed the Russian default and the financial turmoil after the LTCM bailout. México, on the other hand, was forced to float after massive reserve losses and a failed attempt at a controlled devaluation in December of 1994. Brazil, finally, voluntarily suspended the defense of the peg in January 1999, after providing increased hedging to the private sector and only at a moderate loss of reserves.

After these countries decided to float, then a question arises about what is the appropriate level of reserves once the transition has happened. Since Mundell-Fleming, it is known that reserves are uncorrelated with changes in the money supply under a floating regime. However, the *level* of reserves is indeterminate in that model: as an extension of IS-LM, the only portfolio choice endogenously given is the allocation of financial wealth between money and bonds. Even a portfolio-balance approach that considers imperfect substitutability of foreign and domestic denominated bonds will not give an equilibrium level of reserves. Moving to an intertemporal setting does not help either: indeed, the intertemporal approach to the current account stresses the role of the *net* foreign asset position in determining the equilibrium path of asset prices. Given that these models generally assume perfect capital mobility, it is not easy to find a justification for *gross* demand of *liquid* foreign assets. One then needs to look elsewhere for a theoretical justification of an equilibrium level of reserves.

One option is the currency crisis literature. However, crises are more likely in fixed or semi-fixed exchange rate arrangements, where it is obvious that, *ceteris paribus*, a larger pool of reserves at the Central Bank will bolster the sustainability of the exchange rate commitment. A similar approach can be derived from the venerable and almost forgotten literature on optimal demand for reserves, but unfortunately it is of not much help in a world of capital mobility and floating exchange rates.

Calvo and Reinhart (2000) have made the point that even in a free floating exchange rate regime the exchange rate actually do not float freely because the countries, especially the developing ones, have "fear of floating", and in general are wary of large currency swings. Consequently, in the practical ground is not easy to differentiate a free-floating regime from a soft peg or a managed regime. However, they also shows that the form of intervention has moved from direct interventions in the exchange rate market to changes in interest rates aiming to affect exchange rate (in managed or free floating regimes). Hence, there is not a very clear cut evidence from the point of view of emerging economies, regarding what the appropriate level of reserves should be.

Feldstein (1999) pointed out that the key point in self-protection from international crises is the building of a stock of international liquidity. Countries with enough international liquidity could better address international crises. However, the availability of international liquidity can take different forms: official reserves, international liquidity at commercial banks, or ready sources of foreign currency loans. Hence, in the grounds of avoiding international currencies the important point is how to build international liquidity and necessarily the optimum level of official international reserves. The latter could be true in a context of market-failures that make difficult for the private sector to accumulate international liquidity.

Also, in a world with imperfect (international and national) capital markets, lower levels of international reserves have been associated with higher probability of contagion and liquidity crises and bank runs (Chang and Velasco, 1999).

Moreover, in the case of an inefficient intertemporal allocation of international liquidity, due to the weak links of a country with international capital markets and the existence of under-developed financial markets, it would be optimal for the monetary authority to accumulate reserves during the booms and to spend them during the periods of shortage (Caballero and Krisnamurthy (2000) developed this point, and Caballero (2000) applied it to the experience of three Latin-American countries).[1]

Thus, a theoretical motivation for holding reserves under a floating exchange rate is hard to come by, especially if the exchange rate regime is fully credible and there are varying degrees of access to international financial markets. On the other hand, cross-country evidence can be misleading, because of noise and institutional idiosyncrasies. That is why we adopt a

pragmatic approach in this paper, putting low weight on theory and cross-country comparisons, and focusing instead on a case studies approach. However, it is necessary to give at least a broad look at the cross-country data, which we do in Section 2.

The core of the empirical part of the paper is in Section 3. There we focus on four stylized facts that emerge from the direct analysis of the data. These four facts are as follows:

i. The switch to a floating regime is associated with a persistent reduction of real official reserves, of around 10%.

ii. There is an added reduction in official reserves when countries adopt an inflation-targeting framework.

iii. The correlation between the interest rate spread and reserves is positive under a fixed or managed regime, and becomes insignificant or even negative under the float and IT schemes.

iv. Although the evolution of the net foreign asset position of these countries cannot be traced directly to the regime switch, there does seem to be an increase in the international liquidity holdings of the financial sector, which partly offsets the reduction in official reserves.

Finally, we present the conclusions in section 4.

2. Cross-country evidence

In this section we use a cross-country perspective to study, at a level of stylized facts, the relation between (public and total) international reserves and the exchange rate regime. The objective is to motivate the analysis of the next section, when we study in detail the experience of six countries in the path from fixed or manages exchange rate regimes to flexible system.

Our approach is as follows. We relate the level of international reserves (scaled in five different ways) in 1997 with its lagged level in 1990, 1980, and 1970, and with a variable that measures the switch of the exchange rate regime towards a floating. We define reserves as official reserves excluding gold plus international liquidity in the financial sector. The main regression to estimate is:

$$\ln(R_{97}) = \theta + \alpha \ln(R_{lagged}) + \gamma D \text{ ,}$$

[1] However, if the efficiency and completeness of financial markets (in terms of both internal markets and in the access to external markets) were related to the level of economic development, the demand for international reserves would be lower as the country develops. The empirical evidence strongly supports this hypothesis.

where R is the total holdings of reserves, D is the dummy for the change in exchange rate regime, and θ, α, and χ are parameters to be estimated. The results are presented in the Table 1 and figures 1 to 3. Several facts stand out from this exercise.

First, it is possible to appreciate that reserves are persistent. This is consistent with the fact that gross external assets are also highly persistent over time (see Kraay, Loayza, Servén, and Ventura, 2000). However, in the case of floating regimes this persistence is lower. Indeed, as shown in Table 1, the effect of the change to (from) a floating regime is related to a decrease (increase) in total and official reserves. This suggests that in floating regimes the level of international reserves is lower than in managed or fixed regimes.

Secondly, the level of official international reserves in floating countries is not zero. In fact, the level of reserves scaled to GDP, total imports, and M2 in free-floating countries (not free-floating countries) is 0.05 (0.10), 0.18 (0.33), and 0.24 (0.33), respectively. This can indicate one of several possibilities

(i) Even in free floating regimes official reserves play a role, that goes beyond the traditional one related to supporting a peg.

(ii) The transition of the level of international reserves from fixed or managed exchange rate regimes is not fast, because of potentially negative macroeconomic effects. For instance, the credibility and sustainability of the free-floating regime could be affected by fast sales of public reserves, or a swift exchange rate appreciation could reveal other problems in the financial sector.

Third, the effect of a floating regime seems to be related mainly to changes in official reserves, as is apparent from the estimated coefficients of Table 1. This suggests that the ratio of private reserves to total reserves would decrease in more flexible exchange rates. In fact, the world average (median) of the share of the private sector in total international reserves is 0.47 (0.45) in the countries where the exchange rate floats freely, otherwise this proportion is 0.36 (0.30) (and the difference is statistically significant). This difference could imply that the main effect of a floating regime is the reallocation of international liquidity towards the financial sector, away from the Central Bank.

Finally, it is interesting to analyze the temporal trend in the ratio of private to total reserves. As is apparent in Figure 4, there is a significant change in this ratio after the collapse of the Bretton-Woods system. This trend remains up to the early 1990s and, during the last two decades the ratio was stable (with some negative trend in the 1990s).

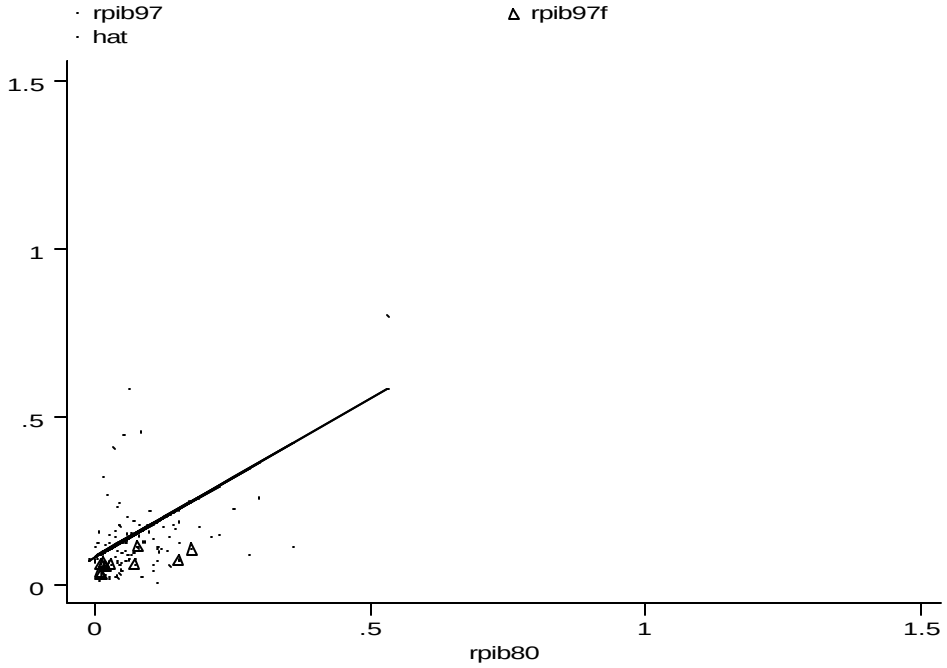
Summing up these four stylized facts, first free-floating countries have both less international reserves, and a larger share of the private sector in total reserves, and, second, the increasing trend in private reserves is not related with a global phenomenon. These trends motivate our next section where we address the transition to free-floating in terms of international reserve management.

Table 1 – The effect of floating regime: Cross-Country Evidence

Scaling Variable **Reserve Variable**	GDP	Imports	M2	Wealth	Gross International Assets
	1990-97				
Public	-0.02	-0.14	0.02	0.00	0.01
Total	-0.02	-0.08	0.11*	-0.00	-0.18
	1980-97				
Public	-0.06*	-0.20***	-0.05	-0.01*	-0.04
Total	-0.06	-0.23**	-0.04	-0.03	-0.06
	1970-97				
Public	-0.09*	-0.09	-0.11**	-0.01**	-0.10
Total	-0.14*	-0.65***	-0.05	-0.05**	-0.22*

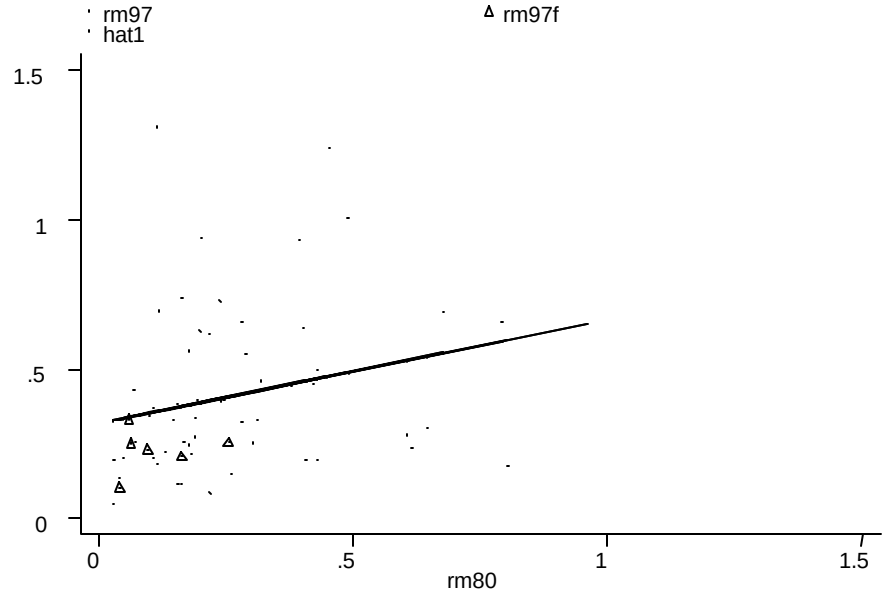
Notes: Every regression includes at least 115 countries. The effect of float is measured as the coefficient on the change in an exchange rate regime dummy. This takes the value +1 if it changed to free exchange rate, 0 if it did not change, and –1 if it changed from a free exchange rate—after controlling by the initial level of reserves (scaled to each variable). *, **, *** indicate statistically significant at 10%, 5%, and 1%, respectively.

Figure 1
Reserves to GDP (1997 vs. 1980)



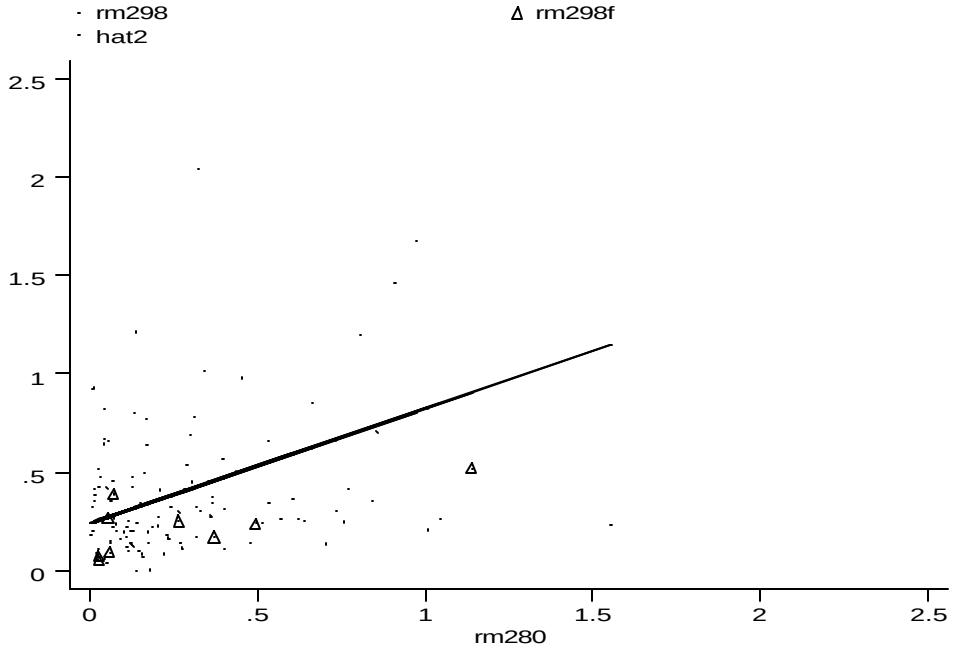
Notes: the solid line indicates the slope in the regression between reserves to GDP in 1997 and in 1980, the triangles identify free-floating countries in 1997.

Figure 2
Reserves to Imports (1997 vs. 1980)



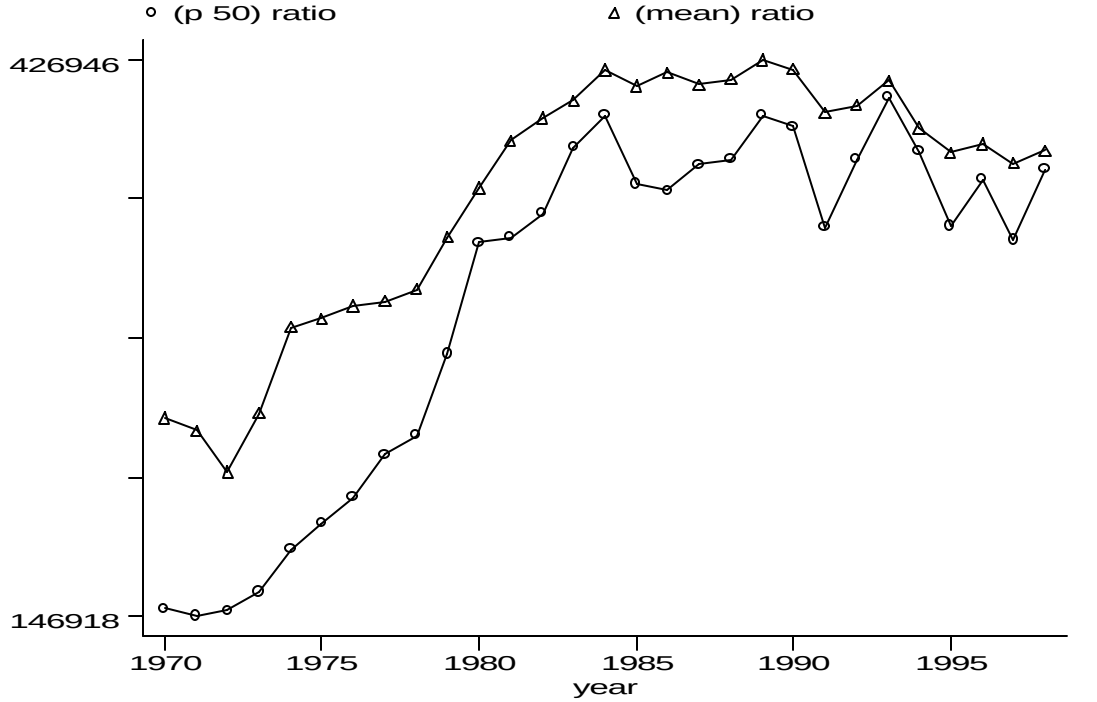
Notes: the solid line indicates the slope in the regression between reserves to imports in 1997 and in 1980, the triangles identify free-floating countries in 1997.

Figure 3
Reserves to M2 (1997 vs. 1980)



Notes: the solid line indicates the slope in the regression between reserves to M2 in 1997 and in 1980, the triangles identify free-floating countries in 1997.

Figure 4
Average and median of the ratio of private to total international reserves (by year)



Notes: the solid line with circles indicates the median, and the line with triangles indicates the mean.

3. Framework and main results

The choice of specific countries to consider is difficult. First, the date of the change in regime towards floating must be known with some certainty, as well as the circumstances surrounding the decision. Secondly, the floating exchange rate regime must be credible, in that agents do not perceive the existence of implicit exchange rate targets. Finally, data availability must be such that high frequency (monthly) regressions are possible, with a sufficient span of data for both fixed and floating regimes.

Satisfying these conditions allows us to identify a clear regime switch and a good empirical strategy. If the date is not clear, then it is hard to select the different samples. Also, if the floating exchange rate regime is not credible then the comparisons are not interpretable.

We end up with six countries: Australia, Canada, New Zealand, the UK, Switzerland, and France. We acknowledge that any choice of countries might be disputable, for example by pointing out that the experiences of developed countries are not useful for emerging market economies. One avenue of critique is pointing out the weakness of the latter's institutions. However, according to our view this is not a valid criticism. First, the growth literature widely recognizes that over the long run, catch-up depends on the quality of institutions. Hence, it is natural to look at the developed world for hints at the different paths that institutional development can take. Secondly, an important specific avenue of institutional improvement lies in achieving better macroeconomic policy and an increase in macroeconomic stability. This is precisely what has been happening with Inflation Targeting, where the experiences of a few countries (that actually belong to our sample of case studies) has guided the design of monetary policy in recent years in Chile and Brazil.

Another way to criticize the choice of cases is to mention the wide differences in the pattern of trade and production between the developed world economies and emerging market economies. On one level, it is possible that this difference is permanent, given the heterogeneity of natural resource endowments. However this is not the case for countries like Australia, New Zealand and Canada, that despite a substantial diversification remain important natural resource exporters. Nevertheless, on a more fundamental level the same process of convergence mentioned above should allow for an endogenous change in the pattern of trade. Thus, the observation of differences in this respect is not a deterrent for a comparative analysis.

3.1 Analytical framework

The focus of this paper is empirical, but in any case we need some structure to guide it. For this purpose, we rely on the traditional literature on the optimal determination of reserves. Some caveats apply to a straightforward application of this framework however. Indeed, this literature spawned during Bretton-Woods and the inter-war period, which witnessed a very different institutional arrangement that the one seen today. First, pervasive capital controls limited substantially the openness of the capital account, consistent with the widespread use of fixed exchange rates. Some exit clauses existed that allowed countries to realign their exchange rates or obtain support from the IMF in case of temporary balance of payments difficulties. These were triggered mainly by shocks to the current account, for example because of terms of trade shocks. Thus, the prototypical model of reserve determination implies the following demand for reserves[2]

$$\overline{R} = \alpha_0 + \alpha_1 (i^* + \hat{e} - i) + \alpha_2 M + \alpha_3 \sigma_{tt}$$

A higher *stock* demand for reserves results from a lower opportunity cost, given by the spread of foreign interest rates with domestic interest rates ($i^* + \hat{e} - i$); a higher volatility of the terms of trade (σ_{tt}), that increases the hazard of running into balance of payments difficulties; or a higher *flow* of imports (M), which captures the appropriate scaling variable.

Nowadays however, in a world of floating exchange rates and free movement of capital across countries, it is recognized that the shocks to the capital account might be more relevant that those to the current account. Indeed, in a world of perfect capital mobility, temporary terms of trade disturbances should not pose any difficulties to the real economy, as long as they can be financed through increased borrowing. However, weak financial links with the world capital markets might require adjustment to these real shocks, and they might be themselves sources of fluctuations for the real economy. An extension of the model might suggest that the *stock* demand for reserves depends also on the stock of foreign exchange liabilities as well as the stock of domestic credit in the economy. Moreover, the sterilization of capital inflows, which has been a prevalent fact in emerging economies over the last decades, in practice puts some doubts on the expected sign of α_1[3]. In any case, interest rate differentials are endogenously determined.

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[2] Frenkel and Jovanovic (1981) present a carefully derived version of this prototypical model.

[3] This fact is highlighted in García (1999), where a positive correlation between reserves and international interest rates is observed across non-OECD countries.

Given these considerations, we take an approach that relates the level of reserves *in the long run* to the flow of imports (M), the stock of foreign assets (FA) and liabilities (FL), the stock of central bank credit (CBC), GDP and the volatility of the terms of trade (σ_{tt}). We do not include interest rate differentials in the long run specification, because they are likely to be endogenous to the stock variables. However, we add a measure of the volatility of the terms of trade to capture exogenous changes in this spread.

$$\overline{R} = \alpha_0 + \alpha_1 M + \alpha_2 FA + \alpha_3 FL + \alpha_4 CBC + \alpha_5 GDP + \alpha_6 \sigma_{tt}$$

In the short run, we postulate an error correction mechanism that governs the dynamics of reserves. Even though in the long run specification we assume that monetary policy is neutral, it can have effects in the short run. Thus we include in the error correction specification the spread between domestic and foreign interest rates. Also, the dynamics can be affected by the choice of the exchange rate regime.

$$\partial R = \beta_0^{er} + \beta_1^{er} (i - i^* - E[\hat{e}]) + \beta_2^{er} \partial R_{-1} + \beta_3^{er} (R_{-1} - \overline{R}_{-1})$$

In this expression, $\beta_x^{er} = \beta_x^{fx} + \beta_x^{fl} D_{fl} + \beta_x^{it} D_{it}$, where D_{fl} is a dummy that takes the value 1 after the switch to a floating exchange rate regime, and D_{it} is a dummy that takes the value 1 when a formal IT framework is adopted. Several options are open to modeling expected devaluations. We take two extreme cases: the exchange rate is a random walk, therefore expected devaluation is a constant, and the case where expected devaluation equals effective devaluation.

In the estimation also were included the *US$/DM* and *Yen/US$* exchange rates, to capture movements in reserves associated with capital gains or losses. Most of the time these did not come out statistically significant, and therefore are excluded from the presentation of the results below. Table 2 reports a description of the variables used and their respective sources.

Table 2 – Variables used in the estimation

Variable		
R	Reserves	Log of real official reserves in dollars, excluding gold, deflated by U.S. WPI.
M	Imports	Log of real imports in dollars, deflated by U.S. WPI.
CBC	Central Bank credit	Log of real central bank credit in dollars, deflated by U.S. WPI.
FA	Total foreign assets	Log of real foreign assets in dollars, deflated by U.S. WPI. From Kray *et al.* (2000), monthly interpolation with cubic spline.
FL	Total foreign liabilities	Log of real foreign liabilities in dollars, deflated by U.S. WPI. From Kray *et al.* (2000), monthly interpolation with cubic spline.
GDP	Gross domestic product	Log of real gross domestic product in dollars, deflated by U.S. WPI. Monthly interpolation using industrial production.
σ_{tt}	Terms of trade volatility	Log of terms of trade variance, constructed as the second difference of log terms of trade, with a 12 month moving window. The terms of trade are defined as the ratio of unit export and import values
D_{fl}	Dummy variable, indicates free float.	From Goldfjan and Valdés (1999), extended until 1999
D_{fx}	Dummy variable, indicates fixed regime.	Same as above.
D_{it}	Dummy variable, indicates IT	Several sources.

3.2 Main Results

Here we focus on four main results that emerge from the direct analysis of the data. These are as follows:

i. The switch to a floating regime is associated with a persistent reduction of real official reserves of around 10%.

ii. There is an added reduction in official reserves when countries adopt an inflation-targeting framework.

iii. The correlation between the interest rate spread and reserves is positive under a fixed or managed regime, and becomes insignificant or even negative under the float and IT schemes.

iv. Although the evolution of the net foreign asset position of these countries cannot be traced directly to the regime switch, there does seem to be an increase in the international liquidity holdings of the financial sector, which partly offsets the reduction in official reserves.

Table 3 presents the estimates of the long run relationship between official reserve holdings and various macroeconomic aggregates. Table 4 uses the results of this estimation in an error correction model of the dynamics of reserve accumulation.[4]

Table 3 – Long-run estimations

Country Variable	Australia	Canada	France	New Zealand	Switzerland	United Kingdom
Dependent Variable: Log (Real International Reserves in US$)						
Constant	-0.87 (1.41)	-10.86 (2.22)	1.18 (1.73)	-2.04 (1.97)	0.12 (0.24)	-2.27 (2.36)
M	-0.11 (0.95)	2.41 (5.59)	-0.67 (2.39)	-0.43 (2.23)	0.88 (3.54)	1.74 (12.03)
CBC	-0.51 (9.38)	-2.57 (3.24)	0.04 (0.28)	-0.06 (0.55)	-0.02 (0.27)	-2.26 (5.26)
FA	4.46 (6.14)	-0.32 (0.65)	3.80 (5.42)	1.26 (4.71)	-	0.14 (0.56)
FL	-3.46 (6.08)	0.14 (0.19)	-3.08 (4.34)	0.15 (0.59)	-	-0.13 (0.68)
σ_{tt}	0.03 (1.48)	-0.15 (3.38)	0.03 (0.92)	0.06 (1.46)	0.07 (2.08)	0.03 (1.20)
GDP	0.52 (3.42)	0.27 (0.32)	0.69 (1.69)	0.12 (0.74)	0.64 (2.70)	-0.09 (0.48)
Sample	1967:12 1997:12	1966:12 1997:12	1968:12 1997:12	1977:04 1997:12	1967:01 1999:12	1966:12 1997:12
R^2	0.84	0.55	0.79	0.90	0.87	0.84
DF Test for Residuals	-3.43	-2.71	-4.46	-3.59	-3.38	-3.25

Note: Absolute Newey-West of t-statistics are presented in parenthesis.

[4] In general the long run estimations present some instability in the different policy periods (tested using Chow-tests). This instability, however, does not produce significant changes in the four main results mentioned before. These findings from re-estimated long-run equations for each specific period were used in the ECM and, despite changes in dynamic and impact effects, the results hold.

Table 4 - Error correction models

Country Variable	Australia	Canada	France	New Zealand	Switzerland	United Kingdom
Dependent Variable: Change in Log (Real International Reserves in US$)						
Constant	0.00 (0.79)	-0.02 (1.96)	0.00 (0.16)	-0.01 (0.89)	0.03 (2.25)	0.00 (0.47)
Free	-0.04 (2.76)	0.00 (0.21)	-0.11 (7.26)	-0.54 (19.94)	-0.10 (11.57)	0.01 (0.46)
Flexible	-	-	-0.08 (4.26)	-	0.04 (1.14)	-0.04 (4.51)
Target	-0.09 (7.27)	-0.16 (10.22)	-	-0.04 (2.38)	-	-0.10 (4.61)
Target 1	-	-	-	-	-	-0.11 (18.23)
Error correction	-0.11 (2.94)	-0.04 (0.76)	0.05 (2.25)	-0.25 (4.42)	-0.15 (2.20)	-0.06 (1.39)
* Free	-0.00 (0.05)	0.04 (0.74)	-0.08 (2.50)	-0.13 (1.38)	0.06 (0.84)	0.03 (0.69)
* Flexible	-	-	-0.11 (3.52)	0.38 (3.65)	-0.13 (1.54)	0.02 (0.43)
* Target	0.09 (1.35)	0.04 (0.32)	-	-	-	0.01 (0.24)
* Target 1	-	-	-	-	-	0.01 (0.34)
Lagged change in reserves	0.28 (2.74)	-0.26 (2.32)	0.12 (1.08)	-0.24 (1.99)	-0.34 (4.92)	-0.00 (0.03)
* Free	0.09 (0.67)	-0.04 (0.19)	0.16 (1.08)	0.36 (2.07)	-0.02 (0.33)	-0.06 (0.29)
* Flexible	-	-	-0.16 (1.04)	-	0.21 (1.36)	-0.38 (1.78)
* Target	-0.52 (4.14)	0.12 (0.61)	-	-0.32 (2.16)	-	-0.16 (0.98)
* Target 1	-	-	-	-	-	0.20 (1.60)
Interest rate spread (i-i*)	0.44 (2.01)	1.42 (2.48)	1.66 (2.74)	1.30 (2.00)	1.20 (2.06)	-0.13 (0.76)
* Free	-0.48 (1.68)	0.71 (0.72)	-2.21 (3.08)	-0.63 (1.00)	-0.77 (1.55)	0.20 (1.13)
* Flexible	-	-	-1.47 (2.36)	-	-0.60 (0.58)	0.24 (1.65)
* Target	0.04 (0.08)	-1.86 (1.97)	-	-0.26 (0.75)	-	-0.31 (1.35)
* Target 1	-	-	-	-	-	-1.17 (2.03)
R^2	0.15	0.12	0.10	0.26	0.20	0.04

Note: Absolute Newey-West of t-statistics are presented in parenthesis.

The results mentioned above appear quite clearly. First, for all countries the adoption of a floating regime is associated with a reduction in the growth rate of real official reserves. This is also the case for the switch to an IT framework. All but three of the fourteen regime switching dummies are large, negative and statistically different from zero. The three other cases are non statistically significant from zero. Although the size of these coefficients varies, they range from a low of –0.56 to a high of –0.04. Most of them are clustered around –0.1. That is, the regime switch (either the float or IT framework) is associated with a 10% drop in real official reserves.

This could be only a transient phenomenon. That is why it is relevant to examine the implied impulse responses to the regime change, which also allows the coefficients on the lagged change in reserves to vary. Figures 5 to 10 show the results for the different countries. In general, the impact on reserves is quite persistent, but there does not seem to be a clear cut pattern of change in the size of the lagged coefficient. Another variable that determines the degree of persistence of the reserve drop is the error correction term. In general, the regime switch tends to reduce the size of this term, which implies a more persistent process for reserves under a float or IT scheme. This, coupled with the size of the lagged coefficient, implies very persistent deviations of reserves in all cases.

Across fixed or managed exchange rate regimes, it is readily apparent the positive correlation between the short term domestic interest rates and the change in reserves. This reveals the strong effect of sterilized intervention on interest rates, a phenomenon that is not unknown in emerging economies. However, the switch in regime allows a sharp reversal of this correlation, revealing a recovery of monetary independence under floating exchange rates and IT. Mundell-Fleming has implications along these lines, but that are strictly related to the correlation between money supply and reserves. We see here that this correlation also shows up between interest rates and reserves.

Now, it is not only relevant to observe the reduction in official reserves, but it is necessary to assess how the economy accommodates this reduction. The traditional literature on optimal reserve accumulation assumes that the opportunity cost of holding reserves is related to the marginal productivity of capital, or interest payments on foreign liabilities. Thus, one possibility is that the reduction in official reserves holdings at the Central Bank is associated with a higher current account deficit, through more investment, or a reduction in

foreign debt. In the first case, there would be a fall in the net foreign asset position of the country, while in the second both gross foreign assets and liabilities would fall. What is the evidence?

Figure 5
Australia: Impulse-Response from Policy Shifts

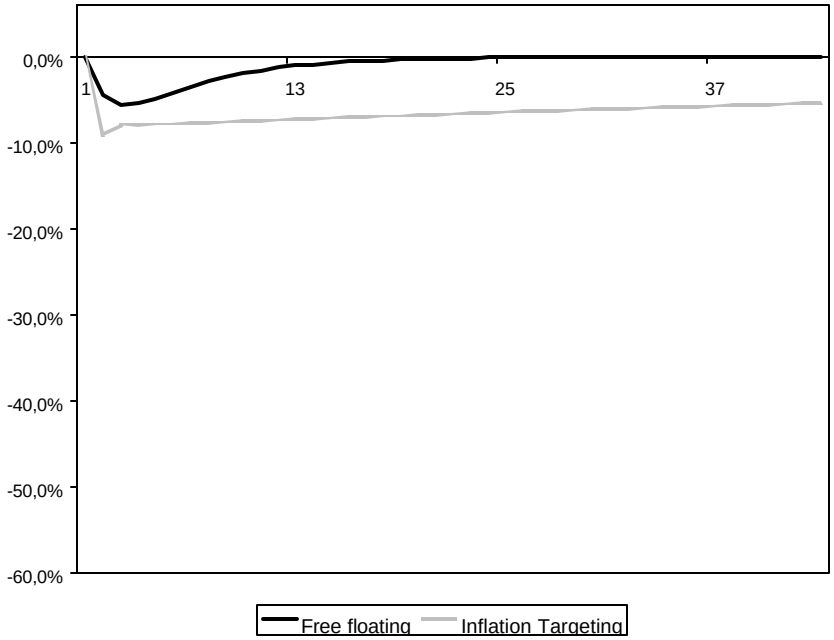


Figure 6
Canada: Impulse-Response from Policy Shifts

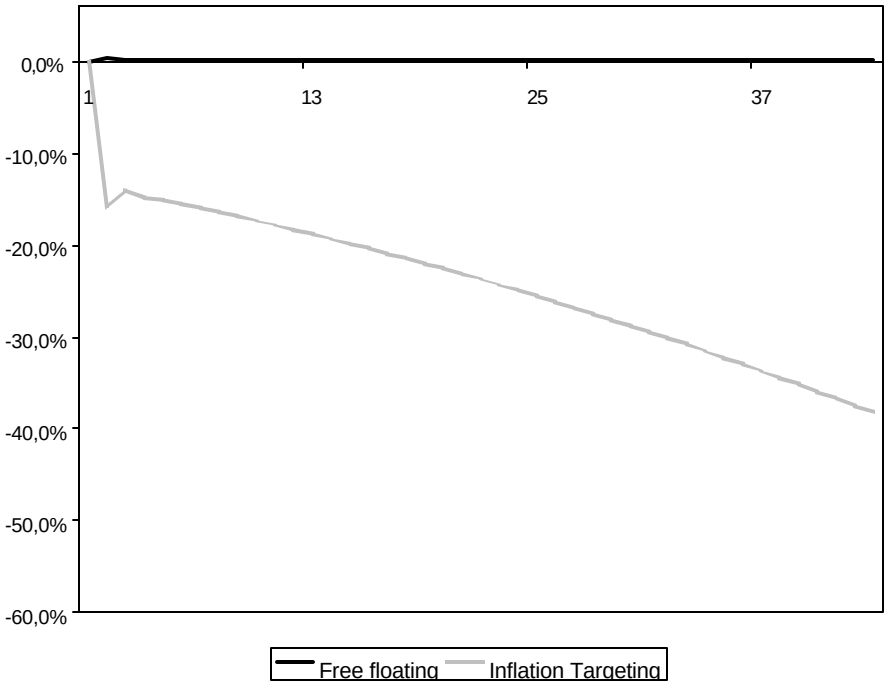


Figure 7
France: Impulse-Response from Policy Shifts

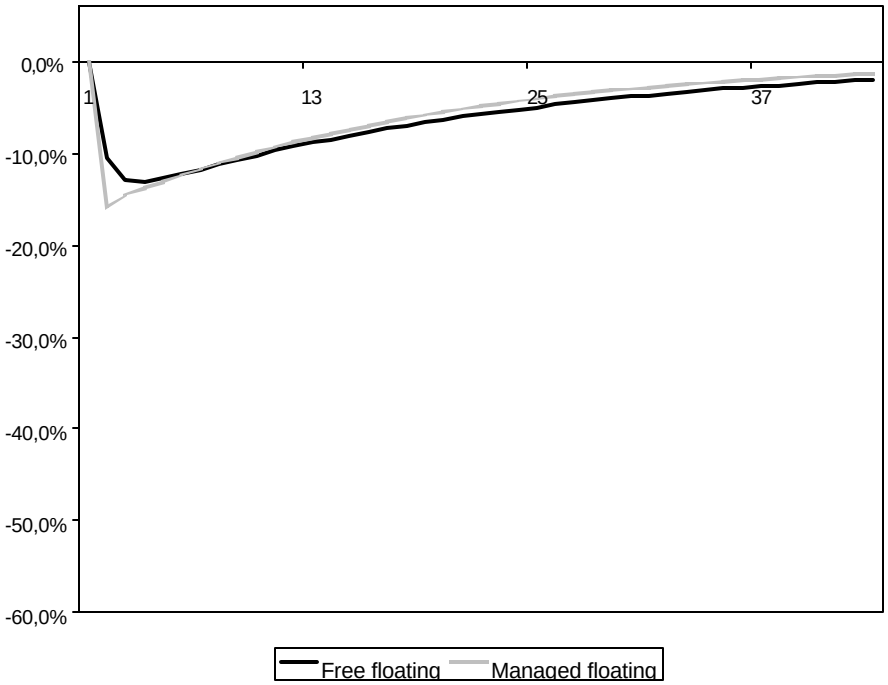


Figure 8
New Zealand: Impulse-Response from Policy Shifts

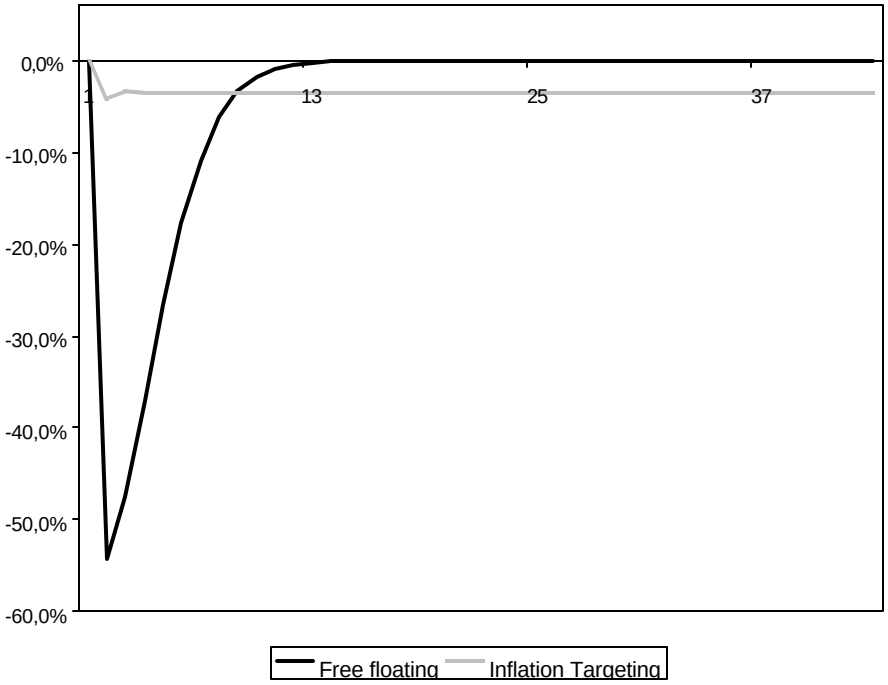


Figure 9
Switzerland: Impulse-Response from Policy Shifts

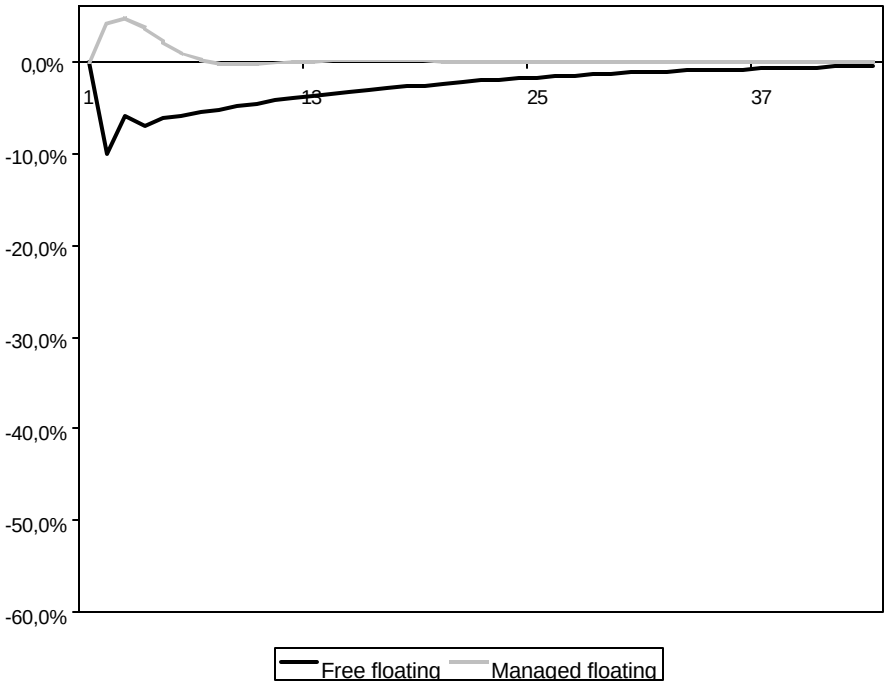


Figure 10
United Kingdom: Impulse-Response from Policy Shifts

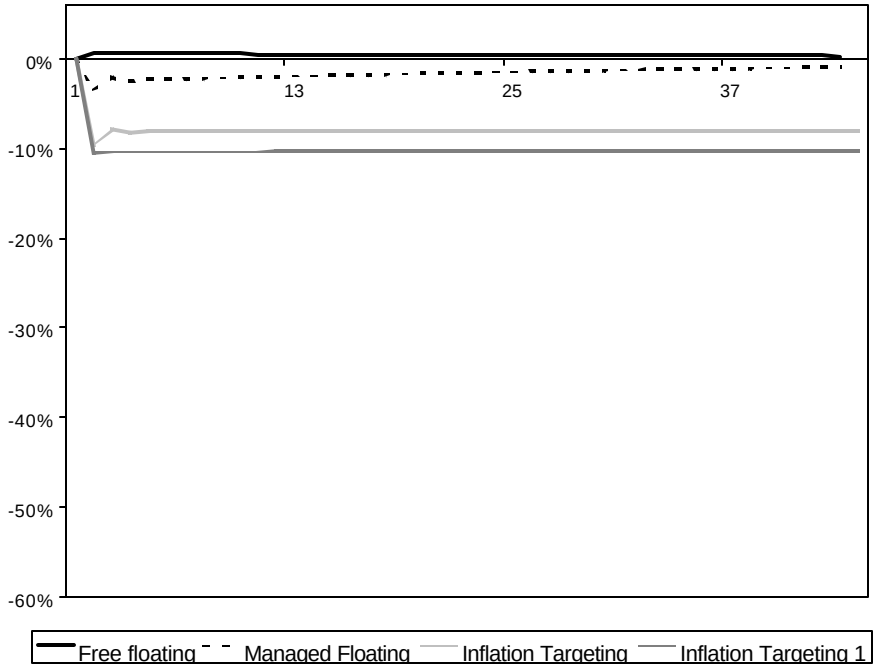


Table 5 – Structure of the International Investment Position

Pre-float					
Period	United Kingdom 1966-90	France 1970-75	Canada 1966-84	New Zealand 1973-84	Australia 1973-82
Total foreign assets (US$ mill.)	557230	110694	90309	3310	13170
Composition:			*(% of total foreign assets)*		
official reserves	*3.7*	*11.8*	*11.6*	*30.8*	*34.1*
int´l liquidity	*0.1*	*57.1*	*35.3*	*14.1*	*2.9*
rest	*96.2*	*31.1*	*53.1*	*55.1*	*63.0*
Total foreign liabilities (US$ mill.)	430505	110311	191470	27657	66934
Net Foreign asset position					
(US$ mill.)	126725	383	-101161	-24347	-53764
(% of GDP)	*21.3*	*0.0*	*-29.6*	*-60.8*	*-24.9*

Post-float						
Period	United Kingdom 1992-97	France 1976-80	Canada 1985-97	New Zealand 1985-1997	Australia 1983-97	Switzerland 1983-1996
Total foreign assets (US$ mill.)	2040084	2548565	1235212	142067	907674	610031
Composition:			*(% of total foreign assets)*			
official reserves	*2.3*	*7.1*	*5.9*	*37.1*	*18.9*	*8.1*
int´l liquidity bk	*0.1*	*59.9*	*26.1*	*14.5*	*13.7*	*42.0*
rest	*97.6*	*33.1*	*68.0*	*48.3*	*67.4*	*49.9*
Total foreign liabilities (US$ mill.)	1653197	215314	376537	48673	203048	213708
Net Foreign asset position						
(US$ mill.)	386887	2333250	858675	93393	704626	396323
(% of GDP)	*-2.4*	*6.3*	*-29.5*	*-77.6*	*-40.4*	*104.4*

Table 5 shows the changing structure of the international investment position in the selected countries. The econometric results above pointed at a reduction in the absolute level of official reserves through the change in regime. As can be appreciated, there is a compositional effect also. The share of official reserve holdings in total foreign assets drops in all countries, except New Zealand. This shift is quite substantial, almost by half. Moreover, part of this fall is accommodated by an increase in international liquidity held at the financial sector. This is more apparent by looking at Figure 11, which tracks the share of total reserves (defined as official reserves plus liquidity holdings at the financial sector) held by the private sector. In must cases there is a clear trend upward after the switch to a floating regime.

This could be merely a reflection of a worldwide trend towards the privatization of reserve holdings, which is apparent in Figure 4. However, we do not think that this is the case, except perhaps for Switzerland and France. Their shift towards floating and the increase in the share of private reserves in these countries coincided with the break up of Bretton-Woods and the first oil shock. These events are likely candidates to explain Figure 4. However, for the rest of the countries selected, the shift to floating and the increase in the share of private reserves occurred later, when the worldwide trend was flat. The test performed in section 2 showed

that, on average, the share of reserves held at the financial sector was higher for floating countries.

4. Conclusions

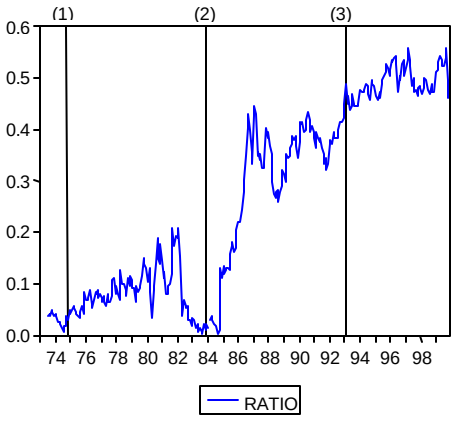
This paper studies the effects of the transition from fixed or semi–rigid exchange rate regime to a flexible regime. The main findings indicate an average reduction in the accumulation of reserves of approximately 10% when a country adopts a flexible parity. Furthermore, this effect is reinforced when the country sets an inflation targeting framework.

Moreover, the reduction in official reserves in the countries that adopt a flexible exchange rate regime is partially compensated by the reaction of the private sector. This sector tends to accumulate reserves after the establishment of the new regime. The main hypothesis for this reaction is that the private sector has to insure itself to the exchange rate risk, because the implicit guarantee of a fixed exchange rate regime disappear.

As was mentioned in the paper, the analysis of the developed countries experience is useful for emerging economies that have implemented flexible exchange rate regimes and adopted inflation targeting frameworks. Certainly, the results of this paper could give some light to the design and implementation of strategies to manage international reserves.

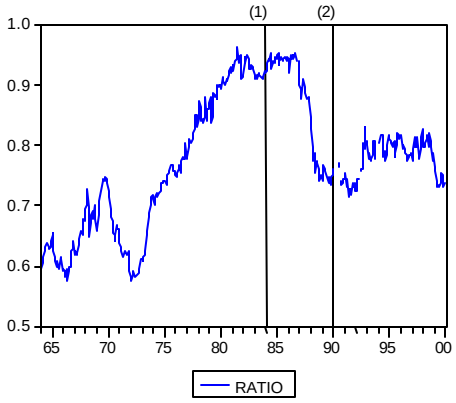
Figure 11 – <u>Share of total reserves held by commercial banks.</u>

AUSTRALIA



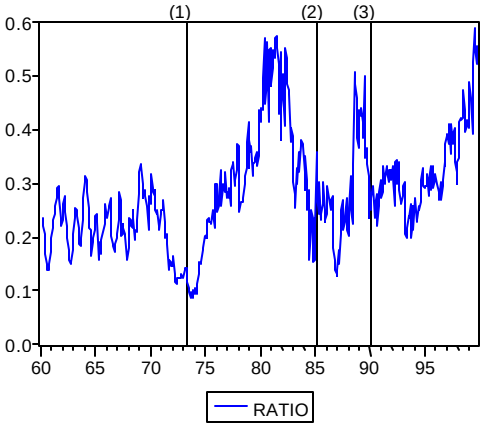
(1): fixed to flexible
(2) flexible to free
(3): inflation targeting

CANADA



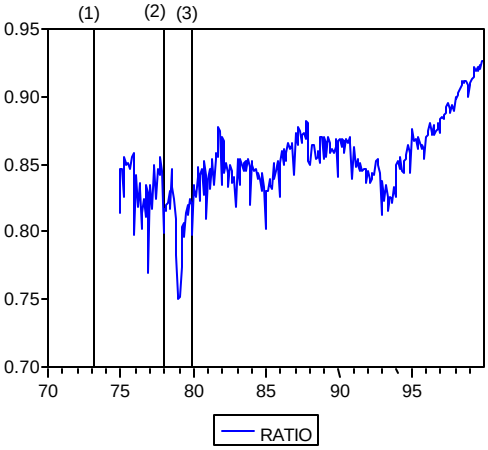
(1) flexible to free
(2) inflation targeting

NEW ZEALAND



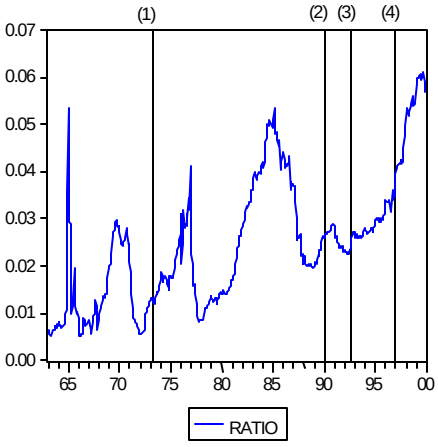
(1) fixed to flexible
(2) flexible to free
(3) inflation targeting

SWITZERLAND



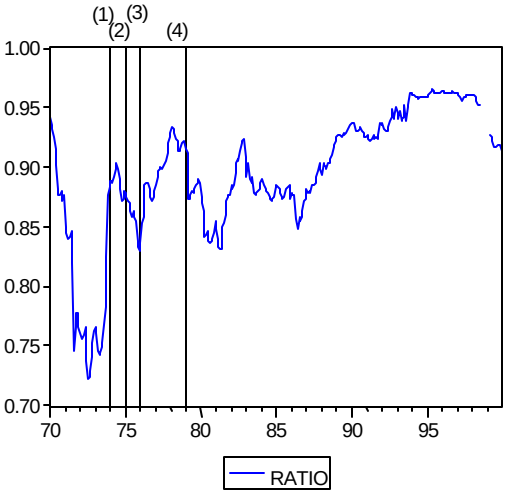
(1) fixed to free
(2) free to flexible
(3) flexible to free

UNITED KINGDOM



(1) fixed to free
(2) free to flexible
(3) flexible to free
and inflation targeting I
(4) inflation targeting II

FRANCE



(1) fixed to free
(2) free to flexible
(3) flexible to free
(4) free to flexible

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