FOREIGN EXCHANGE INTERVENTION AND THE POLITICAL BUSINESS CYCLE: A PANEL DATA ANALYSIS

Axel Dreher* and Roland Vaubel**

August 2006

Abstract

By combining expansionary open market operations with sales of foreign exchange, the central bank can expand the monetary base without depreciating the exchange rate. Thus, if there is a monetary political business cycle, sales of foreign exchange are especially likely before elections. Our panel data analysis for up to 158 countries in 1975-2001 supports this hypothesis. Foreign exchange reserves relative to trend GDP depend negatively on the pre-election index regardless of the exchange rate system. The relationship is significant and robust irrespective of the type of electoral variable, the choice of control variables and the estimation technique.

Keywords: Foreign exchange interventions, political business cycles

JEL Classification Numbers: F31, E58

* ETH Zurich, KOF & Department of Management, Technology, and Economics, Weinbergstrasse 35, 8032 Zurich, Switzerland, e-mail: mail@axel-dreher.de

** University of Mannheim, Dept. of Economics, D-68131 Mannheim, Germany, e-mail: vaubel@rumms.uni-mannheim.de

1. The Hypothesis

There is abundant evidence that many central banks tend to pursue significantly more expansionary monetary policies before elections than in normal times.[1] This is true even for independent central banks[2] – especially if most members of the central bank council have been appointed by the incumbent government or the ruling parties.[3] However, there are also cases in which we would not expect a monetary political business cycle – for example, if there is no doubt about the reelection of the government, if the election has to be called at short notice or if the central bank is independent and the government lacks a partisan majority in the central bank council. Thus, the evidence is likely to vary across countries and over time.[4]

What has not been analyzed so far is the way in which monetary acceleration before elections is brought about. This is surprising because the economic and electoral effects of an accelerating monetary base growth may crucially depend on whether and to what extent the central bank expands the domestic or the foreign component of the monetary base. The main difference of effect relates to the exchange rate. If the exchange rate is fixed, the central bank is likely to prefer a monetary expansion without devaluation. However, even under a flexible exchange rate regime, the authorities will probably wish to minimize the exchange rate effects of the monetary acceleration because a depreciation of the currency would be a very visible sign of pre-electoral pump-priming and because it would instantaneously raise import prices

[1] For international panel data analyses see notably Alesina, Cohen, Roubini (1992, Table 7) and Dreher, Vaubel (2004, Table 2). Time series analyses for the industrial countries have been presented by Soh (1986, Table 5).
[2] See Soh's results for Germany, Switzerland and the United States. For the U.S. see also Grier (1987), Havrilesky (1995, Ch. 4) and Carlsen (1997) and for Germany Berger, Woitek (1997) and Lohmann (1998).
[3] See Vaubel (1993, 1997a, b) for Germany and McGregor (1996) for the U.S.

and feed into the general price level. Foreign exchange intervention can be used to reduce the unwelcome exchange rate effect of an expansionary pre-electoral monetary policy (Vaubel 1991, 2005).

A loss of foreign exchange reserves, it is true, may also be unpopular but it is less visible and less important to the general public than exchange rate depreciation and import price inflation. Whether it is also less important to the monetary authorities is an issue that can and ought to be tested.

We use the asset market approach (the monetary and the portfolio balance approach) to recapitulate why sales of foreign exchange tend to reduce the depreciation associated with a given increase of the monetary base.

Ideally, the central bank might also wish to increase the monetary base of the foreign reserve currency to which its own currency is pegged. In the monetary approach to the exchange rate, this would create room for raising domestic monetary base growth while maintaining the exchange rate parity. The domestic central bank can achieve this objective by first selling foreign exchange reserves in exchange for its own central bank money, then sterilizing the reduction of its central bank money supply through open-market operations and finally raising its own rate of monetary expansion in line with the foreign monetary acceleration which its foreign exchange interventions have brought about.

Of course, the sequence of events may be the reverse. The central bank may start by increasing its monetary base through open market operations, then prevent depreciation by selling foreign currency and finally sterilize the foreign exchange intervention at home. The

[4] Another problem is that incumbents who resort to pump-priming before elections because they fear that otherwise they would not be re-elected may not achieve their objective. Thus, Dreher (2004) and Brender/Drazen (2006) do not find a significant effect of fiscal and monetary policies on re-election probabilities.

central bank is likely to prefer this sequence because the incipient depreciation can serve as a justification for the foreign exchange intervention.

If the exchange rate is rigidly fixed, all three operations have to be executed simultaneously.

In any case, we should expect that some part of the foreign component of the monetary base is substituted by the domestic component prior to elections and that this phenomenon is not confined to fixed exchange rate regimes.

So far the analysis has assumed that the foreign central bank does not sterilize the increase of its monetary base due to the intervention. Since the foreign central bank issues a reserve currency and represents a large country, this assumption is not likely to be warranted. In fact, the International Monetary Fund obliges the central banks of its member states to inform each other about their foreign exchange interventions, and the U.S. Federal Reserve System is known to sterilize foreign dollar interventions as a rule. Thus, the more relevant case is a foreign exchange intervention that is sterilized in both countries.

In this case, the ultimate change in the reserve currency country is not an increase in the monetary base but an increase in the supply of bonds. Its exchange rate effect cannot be analyzed in the framework of the monetary approach because the latter views bonds denominated in different currencies as perfect substitutes. The portfolio balance approach has to be used.

If the sale of reserve currency is sterilized by both central banks, the net effect is an increase in reserve currency bonds and a decrease in domestic currency bonds. In the portfolio balance approach, this asset substitution in supply causes an appreciation of the domestic currency, thus raising the domestic rate of monetary expansion consistent with exchange rate

stability. Once more, the intervention enables the domestic central bank to step up monetary expansion before the election without risking a depreciation of the currency.

Figure 1 contains the standard graphical exposition of the short run effects which are relevant for the electoral cycle.[5] It shows all combinations of the nominal exchange rate (E) and the domestic interest rate (i) consistent with equilibrium in the domestic money market (MM), the market for domestic currency bonds (BB) and the market for foreign currency bonds (FF).[6] In Figure 1, a sale of reserves that is sterilized in both countries shifts the BB curve to the left from BB_o to BB_1 (the purchase of domestic currency bonds lowers their rate of return i) and the FF curve down from FF_o to FF_1 (the sale of foreign currency bonds lowers E). The net effect is an appreciation of the domestic currency (from E* to E_{FEI}) and a drop in the domestic interest rate from i_A to i_{FEI}. The equilibrium moves from point A to point FEI. The domestic central bank may now return to E* by implementing an expansionary open market operation shifting MM to MM_2 and BB further to BB_2 so that equilibrium point B is reached. Thus, it may increase monetary expansion and lower the interest rate without depreciating the exchange rate.

If the central bank raised the domestic component of the monetary base without reducing the foreign component at the same time, both the BB and the MM curves would shift

[5] For a textbook exposition see, e.g., Claassen (1996: 76ff.). The graph is related to Branson (1977) but Branson does not cover the case of foreign exchange interventions. For simplicity, we ignore all secondary wealth effects.

[6] The equilibrium condition for the money market (MM) slopes upwards because an increase in the interest rate reduces the demand for money whereas an increase in E (a depreciation of the domestic currency) raises the value of foreign-currency bonds and total portfolio size in terms of the domestic currency and thereby increases the demand for domestic money. The equilibrium condition for domestic currency bonds (BB) slopes downwards because the demand for these bonds depends positively on both i and E, i.e., portfolio size. The equilibrium condition for foreign currency bonds (FF) is also downward sloping because an increase in the domestic interest rate reduces the demand for foreign currency bonds while the depreciation of the domestic currency increases the supply of foreign currency bonds in terms of the domestic currency. However, FF is flatter than BB because changes in i have a stronger effect on the demand for domestic currency bonds (i is their own rate of return) than on the demand for foreign currency bonds.

to the left, intersecting at OMO, and the lower domestic interest rate i_B could only be attained at the (electoral) cost of depreciating the currency to E_{OMO}.

The combination of a fully sterilized sale of foreign exchange and an expansionary domestic open market operation does not stimulate the economy unless it is unexpected – at least in part. Thus, it is a Keynesian strategy. Indeed, in the negotiations at Bretton Woods in 1944, it was Lord Keynes who insisted that the newly founded fixed exchange rate system should be bolstered up by a generous supply of subsidized foreign exchange credits to be provided by the newly founded International Monetary Fund. The foreign exchange credits would give the member countries some leeway to pursue their own macroeconomic policies irrespective of their international exchange rate commitments. It was also clear that the credits would enable the governments to generate monetary political business cycles.[7]

2. Empirical specification and results

Our hypothesis predicts that foreign exchange reserves drop before elections and are replenished sometime thereafter. It also predicts that the fall of the foreign component of the monetary base is overcompensated by an increase in the domestic component. In the following, we test only for the first part of the hypothesis because there exists already ample evidence that the rate of expansion of the money supply and hence of the monetary base tends to rise prior to elections.[8]

[7] The GMM estimates of Dreher, Vaubel (2004) show that new net non-concessional credits from the International Monetary Fund relative to GDP are significantly larger prior to elections.

[8] Moreover, a simple regression of M2 (in percent of GDP) on our pre-election index introduced below yields a positive and highly significant coefficient.

Our dependent variable is the log of international reserves to trend GDP. As in other studies (e.g., Lane and Burke 2001), GDP is used as a scale variable. We employ trend GDP rather than current GDP because the latter may also be affected by the political business cycle. However, our results do not depend on this modification. Trend GDP is calculated with the Hodrick-Prescott filter. Following the bulk of recent literature, international reserves are measured net of gold holdings because central banks do not cyclically vary their holdings of gold reserves. But inclusion of gold reserves, valued at SDR 35 per ounce, would not change the main results of the paper.

We measure the pre-election period by the share of the year which is within twelve months prior to a national election.[9] Similarly, the post-election period is measured by the share of the year which is within twelve months after an election. To test the robustness of our results, we alternatively include an election year dummy in the following section.

As for the other explanatory variables, we follow Lane and Burke (2001) as closely as possible.[10] GDP per capita is included to control for development. More developed countries may wish to hold smaller amounts of reserves as they are more rarely affected by speculative crises. However, since they can afford to hold more reserves, the expected impact of per capita GDP is not obvious a priori. The sum of exports and imports (in percent of GDP) measures a country's openness to trade. More open countries are expected to hold more reserves as they are more vulnerable to external shocks. Another explanatory variable is the level of external debt (in percent of GDP) because reserves might serve as collateral for debt or be used to offset sudden capital outflows. Since empirical studies find external debt to be

[9] For example, if the election took place in February, the index would take the value of 2/12 in that year and 10/12 in the year before. A similar variable is employed in Dreher and Vaubel (2004).

among the most important causes of currency crises (Dreher, Herz and Karb 2004), more reserves might be accumulated to account for this risk.

The standard deviation of the growth rate of exports (over the last five years) is employed to measure external volatility. If volatility is high, reserve levels are more likely to hit their lower bound. Thus, higher volatility should lead countries to hold more reserves.[11] A variable measuring the degree of exchange rate flexibility is also included. It is usually assumed that peggers hold more reserves than floaters. However, as we have explained in section 1, politicians may have a keen interest in accumulating foreign reserves even under a flexible exchange rate regime.[12]

We do not include money growth and the budget deficit because they contain the electoral effect which we want to isolate, i.e., they are collinear with our pre-election variable. (If included, their coefficients are completely insignificant.)

Lane and Burke also include population, M2 relative to GDP, and the share of short-term debt in total external debt as explanatory variables. As we are not entirely convinced by their arguments for doing so,[13] we omit these variables in our initial and preferred estimates

---

[10] The authors derive them from the model of Frenkel and Jovanovic (1981). Central banks face a trade-off between macroeconomic adjustment costs in the absence of international reserves and the opportunity costs of holding them.

[11] This measure for external volatility has also been employed, among others, by Edwards (1985), Flood and Marion (2002, 2004) and Choi and Baek (2004).

[12] Williamson (1976) suggests that more reserves might be held under flexible regimes to compensate for destabilizing capital flows. Grimes (1993) even argues that the level of reserves might not be influenced by the exchange rate regime at all when the opportunity costs of holding reserves is sufficiently small or if central banks are highly risk averse regarding reserve shortages.

[13] According to Lane and Burke (2001), population is used as a proxy for country size because „if the absolute level of international reserves matters in deterring speculators, a larger country may be able to survive with a lower reserves/ GDP ratio." Why should the absolute level of reserves matter, and is population a good proxy for the size of the country or economy? Their rationale for including the M2/GDP ratio is that international reserves are higher "to the extent that the liabilities of the domestic financial sector are partly denominated in foreign currency." Is the M2/GDP ratio in any way related to the share of foreign currency liabilities? The share of short term debt in total external debt rises at the time of international debt and currency crises when foreign exchange reserves fall. Thus, reserves and short term debt are common-cause interdependent, and the correlation between them is, at least partly, spurious.

(Table 1) but our tests for robustness (Tables 2 and 3) include them. In addition, we control for the exchange rate, as the ratio of foreign reserves to trend GDP is affected by variations in the exchange rate. For example, an incipient depreciation due to pre-electoral pump-priming might otherwise be reflected in a (spurious) positive impact of elections on reserves.

We do not follow Lane and Burke in estimating a cross-section. They chose a cross-section analysis because they wanted to abstract from cyclical fluctuations in reserves. However, cyclical fluctuations induced by elections are precisely what we are interested in. Thus, we need pooled time-series cross-section analyses (panel data).

The annual data cover the years 1975-2001 and extend to a maximum of 146 countries.[14] We confine our sample to countries which had at least one election during the sample period (including some which may not be considered fully democratic, because authorities in those countries might equally well want to exploit the political business cycle). Since some of the data are not available for all countries or years, the panel data are unbalanced and our number of observations depends on the choice of explanatory variables. Since there was significant first-order autocorrelation in all models excluding the lagged dependent variable, the disturbance term is modeled as an AR(1) process in those specifications. We found significant fixed country and period effects in all specifications. However, the coefficients of the country and time effects are not reported in the tables. All variables, their precise definitions and data sources are listed in the appendix.[15]

[14] Our selection of countries is determined by data availability. The countries included in our sample are listed in Appendix C. The period of observation ends in 2001 because the de facto exchange rate regimes according to Reinhart and Rogoff (2004) are not available thereafter.

[15] Due to the difference in estimation procedure, we have to deviate slightly from column 8 of Lane and Burke's Table 7. Lane and Burke include the fraction of years a country had restrictions on the capital account over the sample period and a dummy for countries heavily dependent on oil revenues. Since these variables do not vary over time, we cannot use them in our fixed effects specifications.

As can be seen in column 1 of Table 1, reserve holdings are significantly lower when the standard deviation of export growth rises, with a coefficient significant at the one percent level. This result is not in line with the hypothesis. As will be seen, however, it is not robust with respect to the inclusion or omission of control variables. Moreover, throughout the analysis, omission of this variable would not qualitatively affect our results. At the one percent level of significance, and in line with our a priori hypothesis, openness to trade leads to higher reserve holdings. The fixed exchange rate dummy, based on the (de facto) classification of Reinhart and Rogoff (2004) has no significant impact on reserves. This is in line with previous research (e.g., Lane and Burke 2001). The results also show that the official exchange rate, external debt, and GDP per capita do not significantly influence reserve holdings. As for the electoral cycle, the pre-election index takes a negative coefficient which is significant at the five percent level. The post-election index, however, is completely insignificant.

Regarding the quantitative impact of the explanatory variables, a ten percentage points increase in trade openness increases the level of international reserves (relative to trend GDP) by seven percent. An 0.1 percentage point increase in the standard deviation of export growth reduces them by seven percent. Twelve months prior to an election, reserve holdings are almost 9 percent lower than otherwise.

Column 2 includes the lagged dependent variable. As can be seen, most previous results remain. The pre-election index is still significant at the five percent level – the post election index remains insignificant. The lagged dependent variable is highly significant: 32 percent of the desired adjustment takes place contemporaneously. The regression explains 61 percent of the variation of the dependent variable.

However, there is a problem with fixed effects panel data regressions including the lagged dependent variable. Since the lagged endogenous variable is correlated with the error term in the presence of fixed country effects, the OLS estimator is biased and inconsistent in a short panel (Nickel 1981). For this reason, we proceed to the Generalized Methods of Moments (GMM) estimator suggested by Arellano and Bond (1991). This estimator removes the fixed country effects by first-differencing the equation. Lagged levels of the dependent variable and differences of the exogenous right hand side variables are then used as instruments. The period effects and the other indices/dummies are strictly exogenous variables and are simply instrumented by themselves.

Since there are more instruments than right-hand side variables, the equations are over-identified and the instruments must be weighted. The Arellano-Bond one-step estimator uses the identity matrix as a weighting matrix. The two-step estimator weighs the instruments asymptotically efficiently using the covariance of the one-step estimates. However, standard errors tend to be under-estimated by the two-step estimator (Arellano and Bond 1991: 291). For this reason, we report the one-step estimates only.

We employ a Sargan test to ensure that the instruments are not correlated with the error term, and we use the Arellano-Bond test for second-order autocorrelation in the first difference residuals because the estimator would not be consistent in the presence of second-order correlation. In line with the bulk of literature, these tests are based on the two-step estimator.

Column 3 of Table 1 reports the results. While trade openness remains significant at the one percent level, the negative coefficient of the standard deviation of export growth which ran counter to the hypothesis is no longer significant. Again, the coefficient of the pre-

election index is negative and significant at the five percent level. At the ten percent level of significance, reserves rise within twelve months after an election. Both the Sargan test and the Arellano-Bond test clearly accept the specification, indicating that the estimator is consistent.[16]

3. Testing for Robustness

How robust are these results to changes in the selection of explanatory variables and the measurement of the electoral effect? To increase the number of observations and degrees of freedom, we omit the variables GDP per capita, exchange rate, the fixed exchange rate dummy, and government debt which have been insignificant in most previous regressions.

First, regarding additional variables, we follow the previous literature to identify candidate variables. Choi and Baek (2004) suggest including GDP as a measure of size, squared per capita GDP in addition to GDP per capita, financial openness (measured as gross private capital flows as a share of GDP) and lending interest rates (as a proxy for opportunity costs of holding reserves). Lane and Burke (2001) propose the M2/GDP ratio as a measure of financial depth and population as a proxy for country size. They also use short term debt as a share of total debt. As an additional test, we employ the IMF's de jure exchange regime classification instead of the de facto classification by Reinhart and Rogoff (2004) included above.

[16] We also tested for the impact of fixed exchange rate regimes on international reserve holdings, interacting all independent variables (except the exchange rate which merely allows for valuation effects) with this dummy. The interaction terms are jointly, and especially with the pre-election index, insignificant. Thus, international reserves do not significantly depend on the exchange rate regime.

Second, we try a simple election year dummy in place of our pre- and post-election indices because the rundown of reserves before the election may trigger a speculative crisis which continues beyond the election day.

Table 2 contains the results of the OLS regressions, Table 3 the consistent GMM regressions.[17] In column 1 of both Tables, the IMF's de jure classification of the exchange rate regime replaces the de facto regime. The coefficient remains insignificant. Among the additional variables (columns 2-8), only money/GDP and, in the OLS regressions, short-term debt, population and financial openness pass the 10 per cent significance test. In all regressions which are consistently estimated by GMM, the coefficient of the pre-election index is negative and significant at least at the 10 per cent level. The same holds for all except one OLS regressions. When the lending interest rate is included, its coefficient is marginally insignificant. Since this variable is also influenced by the political business cycle, this is not surprising. The results also confirm that the significance of the post-election index depends on whether the regression is estimated by OLS or consistently by GMM.

In Table 4, we use an election year dummy instead of the pre- and post-election indices. The results are very similar to the previous ones. We also replicated the regressions of Tables 2 and 3 with the election year dummy. Its coefficient is negative and significant in all regressions.

In summary, our result is robust regarding the inclusion of other control variables suggested in the literature. As for the quantitative impact of elections, the smallest significant coefficient (Table 2, column 2, among others) implies that reserve holdings are 5.5 percent

[17] Again, all variables have also been interacted with the regime dummy. As the results are qualitatively identical to those reported previously, we do not reproduce these regressions here. We also replicated all (OLS-) regressions with GMM, obtaining qualitatively similar results. These results are available upon request.

lower in pre-election years; the highest coefficients (Table 3, column 8) indicate a reduction of 11 percent in pre-election years.

4. Conclusion

Democratic elections tend to have a significantly negative effect on the level of foreign exchange reserves relative to trend GDP. This result is robust to the measurement of the election effect and the choice of control variables. It is fully consistent with the hypothesis that central banks use foreign exchange interventions to gain leeway for expansionary open market operations without depreciating the currency at election time.

The evidence is compatible with the alternative hypothesis that elections raise political risk and induce capital flight. Even though the expected change of government may just as well cause a net inflow of capital, there may be a pre-electoral risk premium which reduces net capital flows. We have tested for this possibility but we do not find a significant correlation between our pre-election index and net private capital flows.

Our results are also in line with the hypothesis suggested by Aizenman and Marion (2004) that a 'tough' administration has little incentive to accumulate reserves if there is some probability that a future administration will be 'soft' (and will thus allocate the reserves to favoured groups).[18] As elections might lead to a change in regime, 'tough' governments might reduce their holdings of reserves. However, including the interaction of the pre-election index with a dummy for right-wing governments or the share of seats held by the ruling party

[18] See also Aizenman and Marion (2002).

as classified by Beck et al. (2001) does not yield a significant coefficient in any specification, while the significance of the pre-election index is not affected.[19]

As there is ample evidence of monetary political business cycles we conclude that central banks tend to run down their foreign exchange reserves at election time in order to mitigate the exchange rate effect of their expansionary monetary policies and replenish them sometime thereafter.

[19] We also interacted the pre-election variable with the share of votes received by the incumbent in the previous election. However, missing observations reduce the sample size by more than half, with almost all coefficients (including the interaction term) becoming insignificant.

References

Aizenman, J., Marion, N., 2002. The High Demand for International Reserves in the Far East: What's Going On? Journal of the Japanese and International Economies 17, 3, 370-400.

Aizenman, J., Marion, N., 2004. International Reserve Holdings with Sovereign Risk and Costly Tax Collection. Economic Journal 114, 127, 569-591.

Alesina, A., Cohen, G.D., Roubini, N., 1992. Macroeconomic Policy and Elections in OECD Democracies, in: Cukierman, A., Hercowitz, Z., Leiderman, L. (Eds.), Political Economy, Growth and Business Cycles. MIT Press: Cambridge, Mass., pp. 227-262.

Arellano, M., Bond, S., 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. Review of Economic Studies 58, 277-297.

Bahmani-Oskooee, M., Brown, F., 2002. Demand for International Reserves: A Review Article. Applied Economics 34, 1209-1226.

Beck, T., Clarke, G., Groff, A., Keefer, P., Walsh, P., 2001. New Tools in Comparative Political Economy: The Database of Political Institutions. World Bank Economic Review 15, 1, 165-176.

Berger, H., Woitek, U., 1997. Searching for Political Business Cycles in Germany. Public Choice 91, 179-197.

Branson, W., 1977. Asset Markets and Relative Prices in Exchange Rate Determination. Sozialwissenschaftliche Annalen, 69-89.

Brender, A., Drazen, A., 2006, How Do Budget Deficits and Economic Growth Affect Reelection Prospects? Evidence from a Large Cross-Section of Countries, NBER Working Paper 11862.

Carlsen, F., 1997. Opinion Polls and Political Business Cycles: Theory and Evidence for the United States. Public Choice 92, 387-406.

Choi, C., Baek, S.-G., 2004. Exchange Rate Regimes and International Reserves, mimeo.

Claassen, E. M., 1996. Global Monetary Economics. Oxford University Press, Oxford.

Disyatat, P., Mathieson, D., 2001. Currency Crises and the Demand for Foreign Reserves, Working Paper, IMF Research Department.

Dreher, A., 2004, The Influence of IMF Programs on the Re-election of Debtor Governments, Economics & Politics 16, 1, 53-75.

Dreher, A., Vaubel, R., 2004. Do IMF and IBRD cause moral hazard and political business cycles? Evidence from Panel Data. Open Economies Review 15, 5-22.

Dreher, A., Herz, B., Karb, V., 2004. Is There a Causal Link between Currency and Debt Crises? International Journal of Finance and Economics, forthcoming.

Edwards, S., 1985. On the Interest-Rate Elasticity of the Demand for International Reserves: Some Evidence from Developing Countries. Journal of International Money and Finance 4, 287-295.

Flood, P., Marion, N., 2002. Holding International Reserves in an Era of High Capital Mobility, Brookings Trade Forum 2001. The Brookings Institution, Washington, D.C., pp. 1-68.

Frenkel, J., Jovanovic, B., 1981. Optimal International Reserves: A Stochastic Framework. Economic Journal 91, 507-514.

Grier, K. B., 1987. Presidential Elections and Federal Reserve Policy: An Empirical Test. Southern Economic Journal 54, 475-486.

Grimes, A., 1993. International Reserves under Floating Exchange Rates: Two Paradoxes Explained. The Economic Record 69, 411-415.

Haan, J. de, Sturm, J.-E., 2003. Economic Freedom and Economic Growth: A Reassessment of Evidence Based on Cross-Country Growth Regressions, mimeo.

Havrilesky, T., 1995. The Pressures on American Monetary Policy, 2nd ed., Kluwer, Boston etc.

International Monetary Fund, various years, Annual Report on Exchange Arrangement and Exchange Restrictions, Washington, D.C.

Lane, P. R., Burke, D., 2001. The Empirics of Foreign Reserves. Open Economies Review 12, 4, 423-434.

Lohmann, S., 1998. Federalism and Central Bank Independence: The Politics of German Monetary Policy, 1957-92. World Politics 50, 401-446.

McGregor, R. R., 1996. FOMC Voting Behavior and Electoral Cycles: Partisan Ideology and Partisan Loyalty. Economics and Politics 8, 17-32.

Nickell, S. J., 1981. Biases in Dynamic Models with Fixed Effects. Econometrica 49, 1417-1426.

Reinhart, C. M., Rogoff, K. S., 2004. The Modern History of Exchange Rate Arrangements: A Reinterpretation. Quarterly Journal of Economics 119, 1, 1-48.

Rousseeuw, P. J., 1984. Least Median of Squares Regression. Journal of the American Statistical Association 79, 871-880.

Soh, B. H., 1986. Political Business Cycles in Industrialized Democratic Countries. Kyklos 39, 31-46.

Vaubel, R., 1991. The Political Economy of the International Monetary Fund: A Public Choice Analysis, in: Thomas D. Willett, Roland Vaubel (Eds.), The Political Economy of International Organizations: A Public Choice Approach. Westview Press, Boulder, Col., pp. 204-244.

Vaubel, R., 2005. Foreign Exchange Accumulation by Emerging and Transition Economies: An Explanation and Critique, mimeo.

Williamson, J., 1976. Exchange Rate Flexibility and Reserve Use. Scandinavian Journal of Economics 78, 2, 327-39.

World Bank, 2003. World Development Indicators, CD-ROM. Washington, D.C.

Figure 1

Foreign exchange intervention in the portfolio balance model

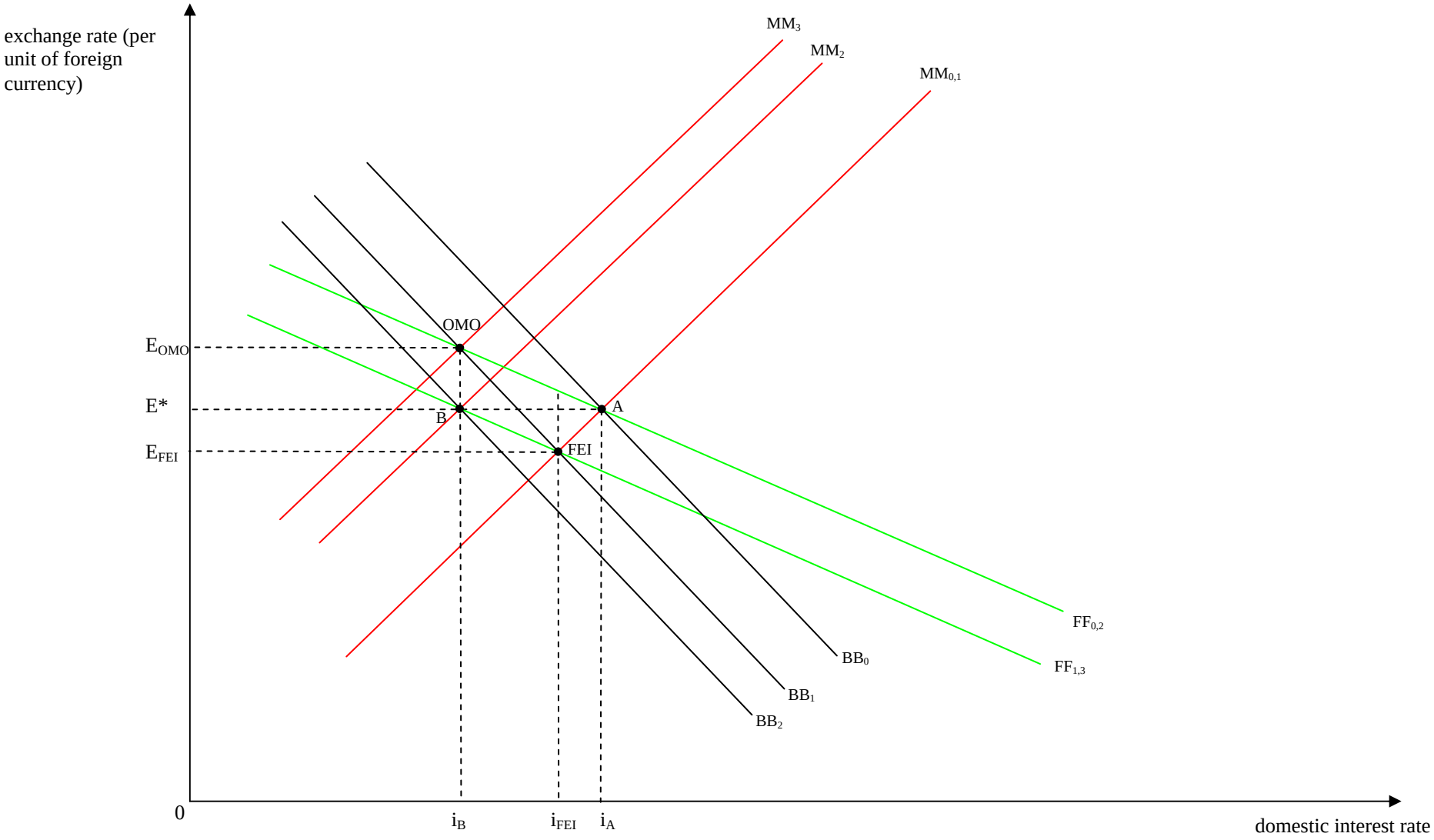

Table 1: International Reserves relative to trend GDP (logarithm, 1975-2001)

Explanatory Variables	(1)	(2)	(3)
Part of the year which is within	-0.088	-0.098	-0.15
12 months prior to an election	(2.21**)	(2.19**)	(2.94***)
Part of the year which is within	-0.006	0.041	0.095
12 months after an election	(0.15)	(0.91)	(1.84*)
Fixed Exchange Rates,	0.095	0.066	-0.370
Dummy	(1.47)	(1.23)	(0.97)
Exchange Rate	0.000	0.000	-1.03E-06
	(0.38)	(0.48)	(0.95)
GDP per capita	0.445	0.004	-0.430
	(1.61)	(0.04)	(2.12**)
Openness	0.006	0.004	0.01
	(3.18***)	(3.42***)	(2.81***)
Debt (percent of GDP)	-0.001	-3.84E-04	-3.13E-06
	(1.4)	(0.95)	(0.01)
Export Growth,	-0.667	-0.280	-0.12
Standard Deviation	(2.75***)	(1.7*)	(0.49)
Lagged Endogenous		0.678	0.61
Variable		(33.16***)	(21.77***)
Number of countries	75	75	75
Number of observations	1353	1419	1341
Method of Estimation	OLS AR(1)	OLS	GMM
R^2 (overall)	0.14	0.61	
Sargan Test (p-level)			1.000
Arellano-Bond-Test (p-level)			0.740

Notes:
Fixed country and period effects included in OLS regressions; fixed period effects included in GMM regression.
(robust) t-statistics in parentheses:
*, **, ^{o} significant at the 1, 5 and 10 percent levels respectively

Table 2: International Reserves relative to trend GDP (logarithm, 1975-2001): tests for robustness

Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Part of the year which is within	-0.062	-0.055	-0.057	-0.049	-0.055	-0.057	-0.057	-0.073
12 months prior to an election	(2.04**)	(1.96*)	(2.02**)	(1.57)	(1.93*)	(1.83*)	(2.03**)	(2.05**)
Part of the year which is within	0.021	0.006	0.001	0.022	0.007	0.009	0.003	0.023
12 months after an election	(0.67)	(0.2)	(0.03)	(0.69)	(0.23)	(0.28)	(0.11)	(0.63)
Fixed Exchange Rates,	-0.026							
de jure, Dummy	(0.84)							
Openness	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.003
	(3.93***)	(3.49***)	(3.95***)	(4.17***)	(3.73***)	(4.09***)	(3.73***)	(3.39***)
Export Growth,	-0.239	-0.111	-0.111	-0.235	-0.087	-0.080	-0.070	-0.010
Standard Deviation	(2.19**)	(1.12)	(1.08)	(1.77*)	(0.87)	(0.76)	(0.7)	(0.08)
GDP		-0.021						
		(0.53)						
GDP per capita			0.000					
			(1.47)					
GDP per capita squared			0.000					
			(0.01)					
Lending interest rate				0.000				
				(0.12)				
Financial Openness					-0.001			
					(2.43**)			
M2/ GDP (t-1)						-0.003		
						(2.53**)		
Population							0.337	
							(2.44**)	
Short-term debt (percent								-0.004
of total external debt)								(2.42**)
Lagged Endogenous	0.711	0.708	0.712	0.679	0.708	0.698	0.706	0.694
Variable	(47.44***)	(49.21***)	(51.02***)	(41.78***)	(48.73***)	(46.32***)	(50.51***)	(42.24***)
Number of countries	113	146	145	138	143	132	146	116
Number of observations	2269	2636	2614	2095	2491	2295	2636	1959
Method of Estimation	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
R^2 (overall)	0.61	0.61	0.62	0.57	0.61	0.61	0.61	0.62

Notes:
Fixed country and period effects included in OLS regressions.
(robust) t-statistics in parentheses:
*, **, ^{o} significant at the 1, 5 and 10 percent levels respectively

Table 3: International Reserves relative to trend GDP (logarithm, 1975-2001): tests for robustness

Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Part of the year which is within	-0.091	-0.088	-0.078	-0.077	-0.072	-0.076	-0.083	-0.110
12 months prior to an election	(2.27**)	(2.34**)	(2.12**)	(1.79*)	(1.97**)	(1.94*)	(2.39**)	(2.46**)
Part of the year which is within	0.075	0.077	0.078	0.060	0.084	0.077	0.081	0.110
12 months after an election	(1.71*)	(1.96**)	(1.93*)	(1.32)	(2.2**)	(1.79*)	(1.94*)	(2.26**)
Fixed Exchange Rates,	-0.022							
de jure, Dummy	(1.62)							
Openness	0.005	0.004	0.005	0.005	0.005	0.005	0.005	0.005
	(2.85***)	(2.42**)	(3.09***)	(2.99***)	(2.51**)	(2.66***)	(2.71***)	(2.7***)
Export Growth,	-0.306	-0.133	-0.154	-0.367	-0.205	-0.055	-0.120	-0.075
Standard Deviation	(1.52)	(0.75)	(0.82)	(1.58)	(1.1)	(0.28)	(0.7)	(0.34)
GDP		0.017						
		(0.14)						
GDP per capita			3.08E-05					
			(0.5)					
GDP per capita squared			-1.56E-09					
			(1.17)					
Lending interest rate				0.000				
				(0.73)				
Financial Openness					0.000			
					(0.46)			
M2/ GDP (t-1)						-0.005		
						(2.33**)		
Population							0.406	
							(0.78)	
Short-term debt (percent								-0.003
of total external debt)								(1.44)
Lagged Endogenous	0.679	0.688	0.686	0.535	0.702	0.669	0.693	0.651
Variable	(10.58***)	(11.71***)	(11.74***)	(6.71***)	(14.18***)	(11.91***)	(13.54***)	(11.03***)
Number of countries	113	145	144	137	142	130	145	145
Number of observations	2153	2485	2464	1943	2341	2157	2485	2485
Method of Estimation	GMM	GMM	GMM	GMM	GMM	GMM	GMM	GMM
Sargan Test (p-level)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Arellano-Bond-Test (p-level)	0.87	0.50	0.59	0.68	0.28	0.44	0.41	0.77

Notes:
Fixed period effects included.
(robust) t-statistics in parentheses:
*, **, ^{o} significant at the 1, 5 and 10 percent levels respectively

Table 4: International Reserves relative to trend GDP (logarithm, 1975-2001): tests for robustness

Explanatory Variables	(1)	(2)	(3)
Election year dummy	-0.098	-0.114	-0.123
	(3.76***)	(3.38***)	(3.65***)
Fixed Exchange Rates,	0.098	0.056	-0.004
Dummy	(1.55)	(1.08)	(0.26)
GDP per capita	-0.049	0.030	-0.338
	(0.31)	(0.28)	(1.74*)
Openness	0.005	0.004	0.005
	(2.62***)	(3.33***)	(2.57***)
Debt (percent of GDP)	-0.001	0.000	0.000
	(1.78*)	(0.91)	(0.28)
Export Growth,	-0.612	-0.3053	-0.1274
Standard Deviation	(2.61***)	(1.91*)	(0.54)
Lagged Endogenous		0.693	0.629
Variable		(35.01***)	(23.43***)
Number of countries	75	75	75
Number of observations	1425	1491	1413
Method of Estimation	OLS AR(1)	OLS	GMM
R^2 (overall)	0.13	0.62	
Sargan Test (p-level)			1.00
Arellano-Bond-Test (p-level)			0.23

Notes:
Fixed country and period effects included in OLS regressions; fixed period effects included in GMM regression.
(robust) t-statistics in parentheses:
*, **, ^{o} significant at the 1, 5 and 10 percent levels respectively

Appendix A: Variable Definitions and Sources

Variable	Source	Definition
log (International Reserves / trend GDP)	World Bank (2003)	Net international reserves comprise special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. Gold holdings are excluded. Data used are the log (reserves divided by trend GDP). The trend GDP series has been calculated employing the Hodrick-Prescott filter.
Election, Dummy	Beck et al. (2001)	Equals one in years of national elections and zero otherwise.
Part of the year which is within 12 months prior to an election	Own calculations based on Beck et al. (2001)	Includes the election month as being part of the pre-election period. For example, if an election would be in February, the index would take the value of 2/12 in that year and 10/12 in the year before.
Part of the year which is within 12 months after an election	Own calculations based on Beck et al. (2001)	Includes the election month as being part of the post-election period. For example, if an election would be in February, the index would take the value of 11/12 in that year and 1/12 in the year after.
Fixed Exchange Rates (de facto), Dummy	Reinhart and Rogoff (2004)	Equals zero if one of the following categories applies: Freely Floating, Freely Falling, Freely Falling/Freely Floating, Freely Falling/Managed Floating, Freely Floating/Dual Market, Freely falling/Dual Market, Freely Falling/Multiple Rates, Freely Falling/Crawling Band, Freely Falling/Parallel Market.
Fixed Exchange Rates (de jure), Dummy	IMF, various years	Equals zero if classified as freely fluctuating (1971-73), not maintained within relatively narrow margins (1974-82), more flexible arrangements (1983-98), managed floating or independently floating (1999-2001).
Exchange Rate	World Bank (2003)	Official exchange rate (LCU per US$, period average).
GDP per capita (logarithm)	World Bank (2003)	GDP per capita is gross domestic product divided by midyear population. Data are in constant U.S. dollars.

Appendix A (continued)

Variable	Source	Definition
GDP (logarithm)	World Bank (2003)	GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in constant U.S. dollars.
Openness	World Bank (2003)	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product. Data are in percent of GDP.
Financial Openness	World Bank (2003)	Gross private capital flows are the sum of the absolute values of direct, portfolio, and other investment inflows and outflows recorded in the balance of payments financial account, excluding changes in the assets and liabilities of monetary authorities and general government. Calculated as a ratio to GDP in U.S. dollars.
Lending Interest Rate	World Bank (2003)	Lending interest rate is the rate charged by banks on loans to prime customers.
Debt (percent of GDP)	World Bank (2003)	Total external debt is the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Data are in percent of GDP.
Short-term debt (percent of total external debt)	World Bank (2003)	Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt.
Money (percent of GDP)	World Bank (2003)	Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government.
Population (logarithm)	World Bank (2003)	Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship – except for refugees not permanently settled in the country of asylum.
Export Growth (Standard Dev.)	World Bank (2003)	Standard Deviation of previous five years of growth rate of exports of goods and services.

Appendix B: Descriptive Statistics (Estimation Sample)

Variable	Min	Max	Mean	Std. Dev. (overall)
log (International Reserves/trend GDP)	-9.37	0.23	-2.88	1.27
Election, Dummy	0	1	0.28	0.45
Part of the year which is within 12 months prior to an election	0	1	0.24	0.34
Part of the year which is within 12 months after an election	0	1	0.24	0.33
Fixed Exchange Rates (de facto), Dummy	0	1	0.82	0.38
Fixed Exchange Rates (de jure), Dummy	0	1	0.56	0.49
Exchange Rate	1.67e-12	625218	1442.86	21678
GDP per capita (log)	3.90	10.94	7.57	7.56
GDP (log)	16.48	29.94	22.52	2.42
Openness	6.32	361.18	68.14	42.11
Financial Openness	0.002	800.64	15.50	41.81
Lending Interest Rate	1.26	4774.53	22.93	102.90
Debt (percent of GDP)	0	1064.41	73.20	74.19
Short-term debt (percent of total external debt)	0	83.37	14.16	11.69
Money (percent of GDP)	4.11	237.37	40.61	29.58
Population (log)	9.84	20.96	15.17	2.06
Export Growth (Standard Dev.)	0.1	1.43	0.15	0.14

Appendix C: Country List

Albania	Egypt	Macedonia, FYR	Somalia
Algeria	El Salvador	Madagascar	South Africa
Angola	Estonia	Malawi	Spain
Argentina	Ethiopia	Malaysia	Sri Lanka
Armenia	Fiji	Maldives	St. Lucia
Australia	Finland	Mali	Sudan
Austria	France	Malta	Suriname
Azerbaijan	Gabon	Mauritania	Sweden
Bahamas	Gambia	Mauritius	Switzerland
Bangladesh	Georgia	Mexico	Syrian Arab Republic
Barbados	Germany	Mongolia	Tajikistan
Belarus	Ghana	Morocco	Tanzania
Belgium	Greece	Mozambique	Thailand
Belize	Grenada	Namibia	Togo
Benin	Guatemala	Nepal	Trinidad and Tobago
Bolivia	Guinea	Netherlands	Tunisia
Botswana	Guinea-Bissau	New Zealand	Turkey
Brazil	Guyana	Nicaragua	Turkmenistan
Bulgaria	Haiti	Niger	Uganda
Burkina Faso	Honduras	Nigeria	Ukraine
Burundi	Hungary	Norway	United Kingdom
Cameroon	Iceland	Pakistan	United States
Canada	India	Panama	Uruguay
Cape Verde	Indonesia	Papua New Guinea	Vanuatu
Central African Republic	Ireland	Paraguay	Venezuela
Chad	Israel	Peru	Vietnam
Chile	Italy	Philippines	Yemen, Republic
Colombia	Jamaica	Poland	Zambia
Comoros	Japan	Portugal	Zimbabwe
Congo, Dem. Republic	Jordan	Romania	
Congo, Rep.	Kazakhstan	Russian Federation	
Costa Rica	Kenya	Rwanda	
Cote d'Ivoire	Korea, Rep.	Samoa	
Croatia	Kuwait	Senegal	
Cyprus	Kyrgyz Republic	Sierra Leone	
Czech Republic	Lao PDR	Singapore	
Denmark	Lebanon	Slovak Republic	
Dominican Republic	Lesotho	Slovenia	
Ecuador	Lithuania	Solomon Islands	