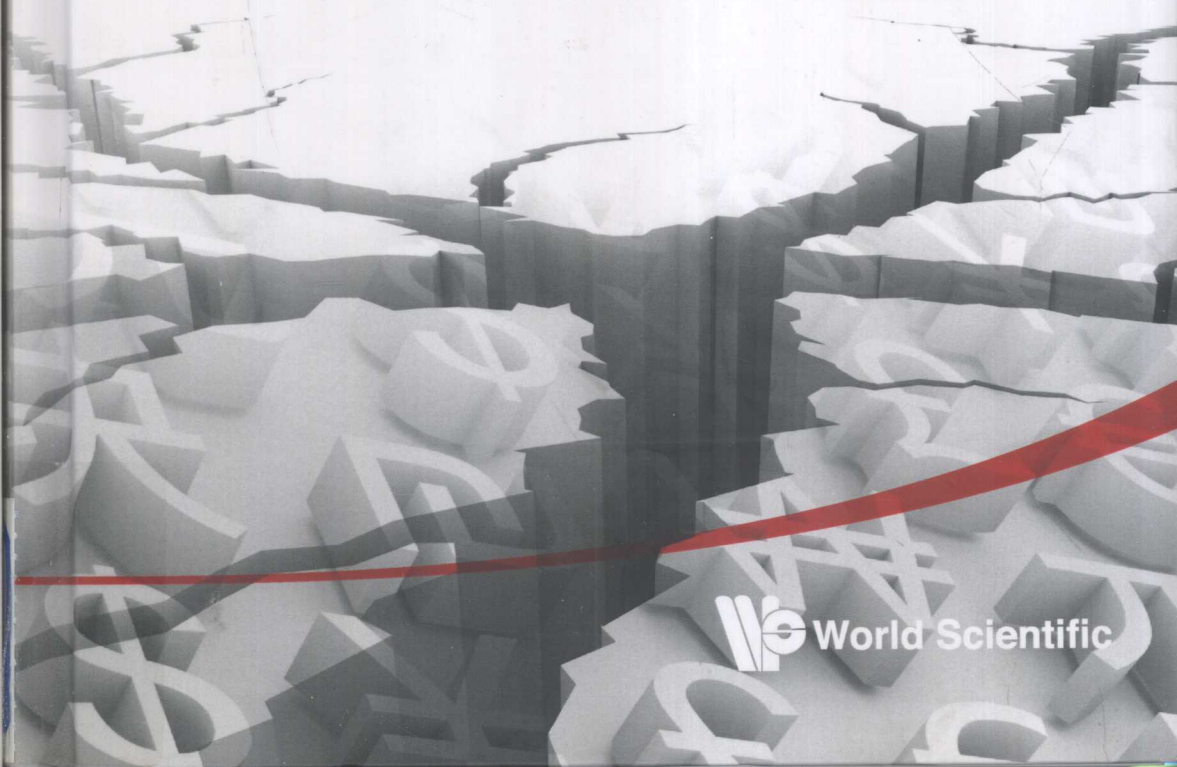
CURRENCIES, CRISES, FISCAL POLICY, AND COORDINATION

Paul R Masson *Editor*



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Introduction

This book assembles a selection of my papers in international money and finance, some published in journals or conference volumes that make them less accessible than they perhaps deserve to be. In particular, the IMF *Staff Papers* had the right of first refusal to publish papers written by staff of the International Monetary Fund during at least the first ten years of my employment, explaining why many of my papers are published there. Moreover, there are several threads to my work that I would like to describe in more detail, by grouping together papers written over a span of years. Though distant in time, they nevertheless are inspired by the same preoccupations and attempts to probe in ever greater depth the same issues. I also try to identify areas where I think further research would be fruitful. The introduction discusses the context in which each of the articles were written and sketches their context. A final chapter draws on my experience in policy institutions over three decades, discussing the role of research and models in policymaking and speculating on the evolution of the international monetary and financial system.

Part I. Exchange Rate Dynamics and Currency Regime Choice

Part I is composed of papers that provide empirical models for explaining the determination of exchange rate levels and the choice of exchange rate regimes. For at least the decade after the breakdown of the Bretton-Woods system and the move to generalized floating of currencies in 1973, a key issue that economists grappled with was what drives exchange rates. The simple models that were available at that time, such as purchasing power parity or the monetary theory of the exchange rate, were quickly seen to be inadequate. The set of determinants included in these models was too limited, and they did not pay enough attention to dynamics. Exchange rates seemed at times not to reflect fundamentals at all; at others, they seemed to overshoot in response to fundamentals. Dornbusch's 1976 model

of overshooting with respect to price shocks was influential, as were various portfolio balance models (e.g., Branson, Halttunen and Masson, 1977) that amplified the monetary model to include a richer set of assets.

Chapter 1 uses a portfolio balance model to consider whether a country's net foreign asset position matters qualitatively for dynamic adjustment to shocks. In particular, if a country is a net debtor, does it face a potentially explosive adjustment of debt deflation, as exchange rate depreciation makes foreign debts more onerous, lowering wealth and causing further depreciation? In other words, a net creditor country could be self-adjusting because a negative current account shock would lead to a depreciation that would re-establish equilibrium. In contrast, a depreciation in the case of a net debtor country would lead to lower wealth, reducing desired foreign borrowing, which itself would lead to further depreciation (until the explosive process was somehow brought to an end by factors not captured in the model). It should be emphasized that the model was very simple — the menu of assets included only domestic money and bonds, and foreign bonds (or borrowing, if negative) — and it was assumed that all foreign assets/liabilities were denominated in foreign currency.

The article gives a nuanced view as to whether net foreign liabilities could be the source of instability. While rational expectations would rule out such instability (as the exchange rate would jump to a saddle path leading directly to the new equilibrium), if expectations had an adaptive element to them, then instability could result. Learning behavior, for instance, could introduce adaptive expectations in some form. Interestingly enough, the instability highlighted in this paper was very much in evidence almost two decades later during the Asian crisis of 1997–98. Countries such as Thailand and Indonesia, which had borrowed in foreign currency in order to invest in domestic property markets, saw a downward spiral of their currencies that proceeded for many months until external assistance helped bring it to an end.

The second chapter also considers economic dynamics, but in a model in which the authorities intervene by selling foreign currency in order to stabilize the rate. What should be the form of their intervention rule? Is there evidence that countries were in fact stabilizing their exchange rates? It concludes that foreign exchange market intervention aimed to resist movements in the deutsche mark's real exchange rate, but that this intervention had very little effect on the path for exchange rates over the period from 1973 to 1983.

The third and fourth chapters address a more general issue, namely the choice of the exchange rate regime itself. By the end of the 1990s, more and more countries with implicit or explicit exchange rate pegs were forced to abandon them in the face of speculative attacks. This led some (e.g., Eichengreen, 1994; Obstfeld and Rogoff, 1995) to suggest that only the polar cases of a "hard" peg (like a currency board, or perhaps only a currency union) and a freely flexible exchange rate were viable alternatives. This was termed the "hollowing out hypothesis." However, their contention was never tested in a formal sense, other than by observing the exits from pegged rate regimes. My 2001 paper propounded an explicit test for hollowing out, namely that one or both of the poles should be absorbing states, or together they should form a closed set (in a Markov transition model with three exchange rate regime states — fixed, intermediate and floating), and that the intermediate exchange rate regime itself should *not* be an absorbing state. If the hypothesis were true, all intermediate regimes would disappear in the limit as time went to infinity.

It turned out that this hypothesis was not in fact supported by the data. The estimated transition matrix implied that neither of the two poles was an absorbing state. While it suggested that there might be some further decline in intermediate regimes in the future, they would not disappear entirely. There seemed to be a good intuitive explanation for why this might be so: even if not ultimately sustainable, adjustable pegs served a useful purpose, in particular, in facilitating what are called "exchange-rate-based stabilizations." When countries with weak central banks experience a wage-price spiral that risks getting out of hand, they benefit like Odysseus from "tying themselves to the mast" with an exchange rate peg, limiting the scope for monetary accommodation. Though not a permanent solution, it seems likely that some countries periodically need that sort of imported discipline for a period of time.

The final chapter in Part I attempted to confirm this story by explaining the transitions between exchange rate regimes using a set of common macroeconomic variables. The distinction was made between voluntary and involuntary transitions: the decision to undertake an exchange-rate-based stabilization described above would clearly be voluntary, while a speculative attack might provoke an involuntary transition. The empirical estimates uncovered an interesting regularity in transitions: unsatisfactory macroeconomic outcomes (low growth or high inflation) tended to increase the *transitions away from all regimes* — whatever they were. In other words, unsatisfactory macro performance leads to major policy

changes. This helps us understand why intermediate regimes are likely to continue to exist in the future, as countries continue to face severe negative shocks.

Part II. Currency Crises, Credibility, and Contagion

The decade of the 1990s brought a revival of interest in currency crisis models — that is, models that attempt to explain why speculative attacks occur and whether they will be successful or not. The first generation of such models (Krugman, 1979; Flood and Garber, 1984) made precise predictions about the moment a speculative attack would occur: arbitrage would ensure that it would occur no later than the date when super-normal profits would be eliminated. The timing would be dictated by the trend deterioration in economic fundamentals, in particular, the growth in domestic credit to finance government deficits that was in excess of growth in money demand.

Though first generation models shed some light on earlier balance of payments crises, the crisis in the European Monetary System was hard to explain using such models, since the economic fundamentals of countries like France were good — the fiscal position was in balance, the trade account was in surplus, and inflation was low. Instead, it seemed necessary to allow for self-fulfilling expectations by market participants — if they thought the peg was sustainable, then it was; while a crisis of confidence brought on a speculative attack that brought down the peg. Obstfeld (1994) was the first to formalize a model that made such a situation understandable in the European context. He showed under what conditions self-fulfilling expectations were possible: fundamentals should be neither very good nor very bad, but had to be in an intermediate range for multiple equilibria driven by shifts in expectations to be possible.

If expectations by market participants were key, then it was clearly in the interest of the authorities to attempt to influence those expectations by establishing their credibility and commitment to the exchange rate peg. If speculators were convinced that the central bank and government would do everything possible to defend the peg, then they would hesitate to speculate against the currency. Therefore, by acting "tough," such as through implementing fiscal austerity and imposing high interest rates, the authorities could convince speculators to back off.

To Allan Drazen and myself, this explanation seemed much too simplistic to be a useful guide for government policy. Our paper (Chapter 5),

completed in August, 1992 — before the EMS crisis had really taken hold — developed a model in which acting tough might be precisely the wrong thing to do to establish credibility. As in Obstfeld's work, commitment to an exchange rate peg was viewed as only instrumental — wider objectives were satisfactory output growth and low inflation. So credibility of that commitment could be hurt, not helped, by fiscal austerity and high interest rates, since they had persistent negative effects on output. Hence, there was a trade-off here for governments; they needed to recognize that at some point, there was little they could do to make the exchange rate peg sustainable, since their actions would be seen as self-defeating. Our empirical work tended to confirm this broader framework for understanding policy credibility (one which could also be applied to a wider set of policy issues than just exchange rate pegs).

The next chapter, Chapter 6, applied this notion of policy credibility to the United Kingdom's abandonment of its peg in September 1992 by using a dynamic version of the above model. The unobserved variable, policy credibility, was allowed to change over time, and it was estimated using a Kalman filter. In this way, the mapping between economic fundamentals and financial variables could be made more complex, helping to explain a deterioration in the latter despite no change in the former. This technique allowed one to trace the market's increasing scepticism with respect to the UK authorities' commitment to the peg — ending in its ultimate abandonment. The same model was also applied to Mexico's move to a floating exchange rate in December 1994 (Agénor and Masson, 1999).

A different approach was taken in Chapter 7, written with Olivier Jeanne. We tested whether a model with multiple equilibria due to self-fulfilling expectations fit the data for France better than a single-equilibrium model based on economic fundamentals alone. The model here is a generalization of the Obstfeld model and of Jeanne's previous work; unlike those models, it is dynamic and implies that there are potentially an infinite number of equilibria, some of which may be associated with chaotic dynamics. The empirical testing rejects the hypothesis of a unique equilibrium and thus tends to confirm the existence of self-fulfilling expectations (also termed "sunspots," since they are driven by random variables that are extraneous but nevertheless influence outcomes by affecting expectations) in the determination of pressures on France's exchange rate parity within the EMS.

The currency crises in Asia in 1997–98 highlighted a feature evident in a number of earlier crises (including those in the EMS and Mexico): a

crisis in one country often triggers crises in others. My paper aimed to do two things: 1) to distinguish contagion from interdependence, that is, the normal spillovers that occur through international trade or capital flows; and 2) to provide a simple model in which contagion that was completely unrelated to economic interdependence was possible. The key is to work with a model in which self-fulfilling expectations can occur, such as that of the previous chapter. I extended this model to a multi-country context in Chapter 8, allowing the sunspots to be correlated. The model has empirical predictions; contagion requires a country's fundamentals to be in the intermediate zone — neither too good nor too bad (otherwise the attack would already have occurred). Simple calculations showed that many of the Asian countries affected by contagion during 1997–98 were indeed in the intermediate zone in which — according to the model — self-fulfilling attacks were possible.

While models with self-fulfilling speculative attacks are clearly a useful generalization of the unique-equilibrium models, they have had some unsatisfactory features. The models discussed above all assume that there is a representative agent — that is, everyone is essentially the same. This precludes a consideration of how expectations can differ among investors who interact with one another and influence one another's behavior. Heterogeneity of expectations is essential to understand why trading occurs and how agents come to focus on one or another equilibrium.

The final chapter in Part II introduces heterogeneity and moves away from the assumption of rational expectations. Instead, agents are assumed to modify their expectations in the light of their investment success and by imitating the strategies of others (but only episodically). The resulting interaction of many agents is thus very complex and can produce complex dynamics in asset prices. The model requires simulation techniques to solve, but some features can be determined analytically. An earlier paper of mine with Jasmina Arifovic (Arifovic and Masson, 2004) demonstrated that the distribution of expectations could be important for understanding currency crises; when expectations were bunched together with a few outliers, the exchange rate peg was fragile. For some values of the parameters, boom and bust cycles — that is, self-reinforcing expansions followed by crises — were possible.

Chapter 9, written with Tim Gulden and Shubha Chakravarty, extended that model by adding another country and a market maker dealing in both countries' bonds, and it considered the possibility of contagion. For some parameterizations, the actions of the market maker could trigger coincident

crises; moreover, the simulations uncovered the interesting feature that the interactions among agents could cause the distribution of interest rate changes to be fat-tailed. Fat tails, that is kurtosis in excess of that of the normal distribution, are a feature of many asset prices, but there are few models that are capable of explaining it. Models with interacting agents need to be explored further in the quest for a deeper understanding of financial markets.

Part III. Fiscal Policy in Currency Unions

An important area of research over the last two decades — largely inspired by the European Union but with applications to other regions — focussed on the interaction between national fiscal policies and a supranational central bank in the context of a currency union. This is an area that has fascinated me by its subtle complexities, which are still being played out in the EU as policymakers have come to see the need for institutional reform in the light of failures of the Stability and Growth Pact and debt crises facing Greece, Ireland, and Portugal.

The papers in Part III explore two aspects of that interaction. Chapter 10 examines whether, in fact, Europe's national governments are able to carry out fiscal policy adequately — using as benchmarks, the states and provinces in the monetary unions constituted by the United States and Canada, respectively. Here it is necessary to try to distinguish empirically between two roles of fiscal policy: stabilization, that is, reducing the amplitude of the business cycle, and redistribution between regions, which involves transfers to those areas that are negatively affected by shocks from those better off.

It turns out that Canada and the United States differ importantly from Europe in one of those dimensions, namely redistribution. A fiscal federation does a fair amount of redistribution through collecting higher tax revenues from better-off regions, and it also spends more in the regions suffering from a negative shock (unemployment benefits, among others). Neither of these channels is important in Europe, however, suggesting to Tamim Bayoumi and myself that lack of redistribution might well generate strains within the euro zone. A decade and a half later, we are seeing exactly that, in response to severe downturns in Greece and other countries. This has led the euro zone to put in place an initial mechanism to assist countries in difficulty (the exact form this will take in the future is still being worked out as this introduction is being written in late 2010). As for

stabilization, countries in Europe seem to do at least as much as states and provinces in the United States and Canada.

Chapter 11, also written with Tamim Bayoumi, goes further in its exploration of fiscal policy in currency unions by considering how Ricardian equivalence impacts the relative effectiveness of stabilization policy at the regional and sub-regional levels. The advocates of Ricardian equivalence argue that tax cuts (or financing spending by running deficits rather than raising taxes) have no effect because agents anticipate having to pay higher taxes later. But the key to understanding fiscal policy in a federation is that those paying the higher taxes later may not be those benefiting today, thus suggesting that to be most effective, stabilization policy should be operated at the highest level of government. Using data for Canada, we confirm this view as we find that stabilization at the local level is only one-third to half as effective as stabilization at the national level. Again, this suggests that Europe may need to adapt its fiscal institutions.

A second aspect discussed in Part III is whether a country would gain from entering into monetary union with others having different degrees of fiscal discipline. Fundamental to the analysis here is the notion that central banks are never completely independent of the financing needs of governments (this is most obviously true for Africa, which is the subject of Chapter 12, but recent events have also shown its relevance even for Europe). This chapter, which was written jointly with Xavier Debrun and Catherine Pattillo, develops a model in which fiscal asymmetries may interfere with the feasibility of monetary unions. A country's welfare is assumed to depend on keeping inflation low and increasing output, as well as achieving a target for government spending. There may, in addition, be an element of government spending that corresponds to non-productive expenditure, fueled, for instance, by corruption. The model expands the criteria that should be satisfied by a successful monetary union: not only should countries not face shocks that are very different (as in an optimum currency area à la Mundell), they should also not face very different financing needs (due to both productive and non-productive spending and tax inefficiency). When we applied these criteria to monetary union projects in Africa, we found that in many cases, the fiscal asymmetries, combined with a low level of regional trade, made creating a common currency welfare-deteriorating — calling into serious question the enthusiasm in Africa for emulating the euro zone. Even if a generous estimate is made of the trade creation induced by a common currency was taken into account, monetary unions are judged to be undesirable (Masson, 2008).

Part IV. International Economic Policy Coordination and Uncertainty

In the 1970s and 1980s, policy coordination was an active area of economic research, consistent with the interest shown by policymakers, who recognized the deficiencies of the "non-system" created by the move to generalized floating of exchange rates. The empirical academic research generally concluded that policy coordination, defined as the joint maximization of welfare by two countries acting together, could be beneficial, but that the gains were likely to be small — typically less than one percent of GDP (McKibbin, 1997). Other work pointed to the obstacles to reaching agreement, including disagreement as to the correct model of the economy (Frankel and Rockett, 1988).

In a joint work with Atish Ghosh, we argued that it was essential to distinguish disagreement over the true model from uncertainty about the effects of policy — and that uncertainty itself could increase, not decrease, the gains from coordination. The seminal work of William Brainard for a closed economy provides the intuition (Brainard, 1967): while only one instrument is needed to target one variable in the case of certainty (or if uncertainty relates only to additive shocks), with uncertainty about the effects of policy, using several instruments is necessary to achieve the best outcomes. With such uncertainty, policymakers need to be concerned with both the mean error in hitting the target and its variance around the target. In a global context with more than one country, governments would also like to have more instruments, precisely in order to avoid the negative welfare effects of greater variance around targeted variables. Policy coordination with other countries gives them partial control over additional instruments that affect domestic variables — namely foreign governments' policies. Gains from coordination are particularly large when uncertainty attaches to the international *transmission effects* of policy, rather than just their domestic effects.

Chapter 13 quantifies the gains from policy coordination in the context of model uncertainty, using a small two-country model of the world economy. Confidence regions around the parameters quantify the degree of model uncertainty. Ghosh and I show that uncertainty can increase the discounted present value of welfare gains from policy coordination by as much as a factor of two, relative to the certainty case. So gains could in fact be considerably larger than earlier estimated.

While that chapter assumed that the expected value of the true model's

parameters was given by the unique set of model estimates, in Chapter 14, we assume instead that the structure of the true model is unknown, but can take one of three alternative forms suggested by economic theory. Each model is a variant of the mainstream Oudiz-Sachs model, but differs in terms of the form of the Phillips curve and the money demand function. Not knowing the true model, policymakers are assumed to learn from the macroeconomic outcomes and update their priors concerning the probability of each model being the correct one. We confirm the results of Frankel and Rockett, that having a large prior on an incorrect model could lead policy coordination to reduce welfare. However, with the additional assumption (which seems plausible) that policymakers learn from experience, policy cooperation dominates non-cooperation or simple uncoordinated policy rules (like a Friedman rule for money growth).

Chapter 15 makes the idea of model uncertainty more concrete by focusing on uncertainty in financial markets. Not only is uncertainty a central feature of investment decisions, it also seems to rise dramatically in times of financial crisis. As discussed in the previous two chapters, greater uncertainty can give rise to increased gains from policy coordination, helping to explain why international economic policy coordination is episodic. In normal times, potential gains may not be worth the time and resources involved in reaching agreement, but that may change when uncertainty spikes up. This chapter analyses the 1987 stock market crash in this light, explaining with the aid of a micro-founded model why countries coordinated their interest rate declines. The recent global financial meltdown of 2008–09, which led to unprecedented coordination of monetary and fiscal policies, are a further confirmation of the posited effect of uncertainty on coordination. The G20 summits at the height of the crisis showed an unusual unity of purpose, which, as the crisis receded, also tended to dissipate.

Conclusion

This last chapter attempts to pull together some lessons from the development of academic-style models and their application to real world policy issues, drawing on my experience from working in official institutions and at a university. Comparisons are drawn between policy research and academic research, concluding that they are not the same — nor should they be. In addition, the chapter includes some speculation on how the international monetary and financial system may evolve in coming decades and discusses research topics in that light.

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