International monetary policy co-ordination: some lessons from the literature

By Charles Nolan and Eric Schaling of the Bank's Monetary Assessment and Strategy Division.

This article provides a brief survey of the academic literature on monetary policy co-ordination. Particular attention is given to identifying any guidance it may offer on how best to arrange the nominal framework between EU countries in the run up to, and following, EMU.[1]

Introduction

Economic theorists and policy-makers have long been aware that the results of a country's choice of monetary stance depend in part on the choices that other countries make. For example, in 1752 David Hume outlined an approach to monetary links between economies that has a clear echo in modern approaches to open-economy macroeconomics. On the policy front, the international Gold Standard and its close relation, the Bretton Woods system, were thought to provide a coherent framework for domestic macroeconomic policy within the context of international constraints. And questions regarding the appropriate form and degree of monetary policy co-ordination are relevant today, particularly in the context of prospective European Economic and Monetary Union (EMU). This article takes a brief look at some of the key lessons from the modern theory of international monetary policy co-ordination and relates them to recent discussions on EMU.[2]

Co-ordination versus co-operation

The modern academic literature on macro-policy co-ordination can be traced to Cooper (1969). He defined *co-ordination* as the extent to which policy-makers in one country recognise the objectives and prospective actions of policy-makers in other countries in determining their own actions. He distinguished two polar cases: no co-ordination and full co-ordination. Cooper argued that as economies become more interdependent, perhaps because of a high dependence on foreign trade and/or because of increased capital mobility, a lack of policy co-ordination may be increasingly costly because it makes national objectives more difficult to attain. The model, however, provided little guidance on how particular spill-over effects might affect different economies and thus on appropriate policy responses.

A major analytic step forward was made by Hamada (1976). His use of game theory gave firmer substance to, and permitted extensions of, the earlier work.[3] In his world there are two countries with a fixed exchange rate. Disequilibrium in the balance of payments occurs when the demand for money differs from its supply. There are two channels of international interdependence:

(1) the world rate of inflation is the weighted average of domestic and foreign credit expansion; and

(2) one country's trade surplus is the other country's deficit.

Each government is assumed to aim for target levels of inflation and trade surpluses. When one country ignores the other country's objectives (which here are similar to its own) the result is worldwide *deflation*. The myopia regarding the other country's monetary stance means that both countries continue tightening monetary policy in an attempt to achieve a trade surplus until the losses from deflation become too high. Alternatively, if both countries aim for a trade deficit, the result will be an excessive rate of global monetary expansion and worldwide inflation. That is called the *non-co-operative* solution.

In the case of *co-operation*, the two countries are assumed to collaborate and decide jointly on policy in both countries, with the result that they both achieve a better outcome. Although this example is a little *ad hoc*, some have argued that it bears some relation to reality. For instance, Hamada (1985) interprets the Bretton Woods system from the mid-1960s to the early 1970s as a situation of asymmetric preferences in which the United States wanted to run a larger trade deficit than the (collective) trade surplus desired by the rest of the world. The key question which remains is that if gains from co-operation are available, why are they

(1) The authors would like to thank Andrew Hughes Hallet for helpful comments on an earlier version of this article.

(2) Economies can be interdependent in a number of ways. Monetary links operate via capital markets, exchange rates and interest rates. In addition, there may be real income links where increased demand in one economy increases the income of another economy via an increase in demand for its exports. There may also be relative price spill-over effects and terms of trade links. Related to this, there may be fiscal links working through tax policy which can affect either the terms of trade directly or the net of tax return on internationally mobile capital. This latter topic is extensively surveyed in a recent article by Persson and Tabellini (1995b). This article focuses primarily on monetary policy links. However, the theoretical and empirical studies reviewed are rarely concerned exclusively with monetary variables and monetary interactions between economies.

(3) Game theory is an approach to analysing interactions between agents under different assumed scenarios. An example is the well known 'Prisoners' Dilemma'. Assume two accomplices in a crime are being questioned separately by the police. The police confront both criminals with a simple proposition: confess and provide evidence against their colleague and the sentence will be light. However, both criminals know that if they do not say anything then the police, for want of evidence, will have to free them. The optimal strategy for the criminals is to say nothing and walk free. However, they are not allowed to consult one another and both know that if the other confesses and implicates the other, then they will face a hefty sentence while their former colleague gets off relatively lightly. With nothing to ensure the *co-operative* (say nothing) game, both confess and both go to prison. The *non-co-operative* strategy is played in the absence of incentives to support the co-operative solution.

not collected? The literature which grew out of the above models points to a number of possible explanations. First, countries may not trust each other to deliver on an agreed policy stance. Second, as a technical matter, countries may not be able to decide on which policy variables they should co-ordinate—should they take joint decisions on their money supplies, interest rates, exchange rates, and so on? And, even if they can decide on which variables they should co-ordinate, they must then have a set of institutional arrangements to allow co-operation to work effectively. Finally, in practice, the gains from co-operation may not be very large and, as a complicating factor, may be asymmetrically distributed. Our focus will be primarily on the first and third of these. We shall touch briefly on the second issue towards the end of this article when we look at the lessons which this literature offers for EMU.

Theoretical analyses of the gains from co-ordination

In this section we look at the circumstances which may or may not lead countries to co-operate.

Canzoneri and Gray (1985) focused on structural differences between economies (for example, one economy may have a higher propensity to import than another), rather than differences in preferences of the policy-makers. They analysed a two-country model in which the respective governments are concerned with both the inflation rate and the level of output. Both countries are assumed to face a common supply shock. The authorities then face a trade-off between inflation stabilisation and monetary accommodation of the shock.

Canzoneri and Gray consider cases where a monetary expansion is a *beggar-thy-neighbour* policy (that is, a monetary expansion causes increased output in the home country at the expense of lower output in the other country; the spill-over effects are said to be negative); a *locomotive* policy, where the spill-overs are positive; and an *asymmetric* case where a foreign monetary expansion is a beggar-thy-neighbour policy while a boost in the home money supply is a locomotive policy. The transmission of monetary policies across countries can occur through a number of channels: capital mobility, foreign trade, and wage indexation; the overall transmission effect of policy depends on the relative importance of these channels.

Depending on which of the three cases prevail—ultimately an empirical matter—the gains from co-operation will differ. In any event, this analysis implies that there are a variety of co-operative outcomes that are superior to the non-co-operative outcome. But one problem with all of these better outcomes is that they provide incentives for one or both of the players to renege on an existing agreement. This is because if one country can convince the other country that it is co-operating when in fact it is just maximising its own interests then this can yield an even higher pay-off for that country than the co-operative solution.(1)

Canzoneri and Henderson (1988, 1991) develop this analysis in a model in which there are also periodic supply-side shocks affecting the economies. In this model, worldwide monetary expansion turns out to be too low in the absence of policy co-ordination. Central banks try to limit the inflationary consequences of a negative supply-side shock without taking into account its adverse consequences (a real exchange rate depreciation of the foreign currency) on the other country. However, once the shock ends the conflict also ends and the problems associated with a lack of policy co-ordination prove to be limited and transitory. But if the conflict is continuous (for instance, there may be 'disagreement' over the appropriate level of the real exchange rate), then unco-ordinated policy-making implies a common *deflationary bias* as both countries try to appreciate their currencies (so as to boost the purchasing power of their national income). In this example the desirability of co-operation is clear, but there may be no incentive to bring it about.

However, this pessimistic conclusion may be altered if the models are extended to include repeated games in which the policy-maker can establish a reputation for acting in a particular way. Where countries interact repeatedly they may have a stronger incentive to maintain the goodwill of their partners. So an interest in long-term co-operation may overcome the incentive to seek an immediate advantage through non-co-operation. Therefore, under some conditions, it might be reasonable to suppose that players might change their strategy and play a less 'opportunistic' game. As Barro and Gordon (1983) found in a closed economy context, establishing a reputation for playing co-operatively can improve everyone's outturn. If countries interact repeatedly then Canzoneri and Henderson conclude that non-co-operative policy-making need not be harmful. However, some institutional forum for countries to discuss with each other their current and prospective policies may still be necessary.(2)

Frankel and Rockett (1988) are pessimistic about the gains from co-ordination. They investigate, using theory and simulations on a number of macroeconometric models, the gains from co-ordination when the true structure of the economy is unknown. They find that, even though policy-makers can agree on a joint policy stance, the outturn is as likely to be detrimental to the countries as to be beneficial. However, that may also be too pessimistic a conclusion. What is central to the conclusion, as the authors recognise, is countries' failure to identify the true model and alter their bargaining strategy to cope with this risk. Subsequent studies(3) have reversed this result. For instance, if policy-makers, perhaps through 'trial and error' or through constructive disagreements with other policy-

(1) For an illustration of a related point in the context of the credibility of domestic monetary policy, see Schaling (1995), pages 29–32.
(2) Repeated games can produce many different welfare improving outcomes over the non-co-operative outcome. So countries may need help co-ordinating on any one of these.
(3) Gosh and Masson (1991) and Holtham and Hughes Hallett (1992).

makers, can learn about the structure of the economy, the success rate for co-ordination improves substantially on the Frankel-Rockett results. On this view, then, co-operation is seen in a better light.

An example where co-operation does *not* pay was suggested by Rogoff (1985).[1] He noted that a surprise inflation leads to a real exchange rate depreciation, which may exacerbate the initial inflationary impulse. This will encourage countries to avoid what de Groof and Schaling (1991) call *beggar-thy-self* policies. But if two countries agreed to co-ordinate policies and inflate together, this exchange rate depreciation can be avoided. As a consequence, the incentives to inflate are greater with co-ordination than without, although the stabilisation policy may be more efficient since the exchange rate externality is internalised. As Romer (1993) pointed out, the intuition behind that result is straightforward: by co-ordinating policy, the two countries turn themselves into a single, larger and less open economy. In doing so, these countries reduce the harm due to the surprise inflation (the consequent real depreciation). However, the upshot is that the equilibrium rate of inflation rises.[2]

Although these theoretical studies provide important insights, it is clear that they offer few unambiguous results on the necessity or desirability of international policy co-ordination. Researchers have therefore turned to econometric models of the economy to conduct policy 'experiments'. These have generally taken the form of 're-running history' assuming some kind of co-ordination scheme was in place. We now review the key conclusions of that branch of the literature.

Empirical estimates of the gains from co-ordination

Frankel and Rockett (1988) suggest that we should be cautious when assessing quantitative analyses since these tend to take the form of simulations on large macroeconometric or small calibrated models, the findings of which may not be robust across models. Nonetheless, the empirical studies which have been undertaken have generally found the benefits to be significant but not large, in part because the spill-over effects in empirical (as opposed to calibrated) models tend to be rather low.[3] Oudiz and Sachs (1984) estimated that the welfare gains from co-operation among the group of three largest countries (G3) in the period 1984–86 would be equal to about 0.2% higher GNP over the three year period for the United States, compared with the best non-co-operative outcomes. Similar calculations for Japan and Germany show welfare gains equivalent to 1% and about 0.3% of GNP respectively. Later studies have suggested that the gains from co-ordination among the OECD economies may be larger. In a more general analysis which allowed for dynamic decision-making,[4] Hughes Hallet (1986a, b, 1987), looking at the period following the 1973 oil price shock, found that the total gains for the United States were equivalent to around an extra 0.5% annual GNP growth over five years. The corresponding figure for the EEC[5] was 1.4%. The author concludes, however, that most of these gains are not due to co-ordination as such, but to policies being set in a manner which takes account of other countries' intentions. This suggests that information exchange (on, for example, policy intentions) between countries might play an important role in the formation of optimal policies. Currie, Levine and Vidalis (1987) have also suggested relatively small gains in the absence of major shocks, or continuing conflict, based on calculations from versions of the Liverpool and OECD models for the United States and the European Union or OECD respectively.

The distribution of gains from co-ordination

The distribution of the gains from co-operation might also be important.[6] Studies generally find that such gains are not evenly distributed. Oudiz and Sachs (1984), for example, found gains distributed roughly 2:1 in favour of Germany relative to the United States for two different models. Hughes Hallett's (1986b) study of the United States and EEC in the mid-1970s, using a range of bargaining models, suggests gains distributed 2:1 in favour of the EEC, consistent with the earlier finding.[7] Currie and Levine (1993) conclude that, whatever the overall gains, it will be hard to secure and maintain a co-ordination agreement in the face of significant uncertainties; and if those who reap the gains and those who shoulder the burden of adjustment are different players, there may be political difficulties in securing any agreement. However, care should be taken in assessing distributional issues, since it is not whether gains are evenly distributed that matters, but whether or not countries are better off compared with the best non-co-operative solution.

Policy co-ordination in practice

In practice, mechanisms for monetary policy co-operation generally take the form of exchange rate arrangements in which countries undertake to fix the value of their currency, to a greater or lesser extent, against some 'anchor' currency. Canzoneri and Gray (1985) and Canzoneri and Henderson (1991) model this by letting one country, the anchor of the system, set its domestic monetary policy independently, with the other country fixing its exchange rate accordingly. In the terminology of game theory this is known as a *Stackelberg* or *leader-follower* framework. These and other models of exchange rate regimes can give differing results. Abstracting from credibility effects,[8] the more symmetric

(1) A similar example, which we do not describe, has been suggested by Oudiz and Sachs (1985).
(2) Whether or not this is a realistic case depends on what mechanisms support a country's 'membership' of such a scheme. Although the two policy-makers benefit from co-operation, they do so at the expense of the private sector.
(3) And even when spill-over effects are large, this does not always imply that co-operation and non-co-operation will lead to very different outcomes. See Canzoneri and Minford (1988).
(4) Dynamic aspects include considerations about the timing of policy changes and temporal shifts in the policy response elasticities.
(5) Importantly, for the purposes of this study, the EEC was treated as a single country with a single economic policy.
(6) This refers to the *positive* issue of actual distributions, and not the *normative* aspect of the distribution as implied by the Nash bargaining solution.
(7) For more details about various empirical results see Canzoneri and Henderson (1988) and Bryant (1993).
(8) See Giavazzi and Pagano (1988) for an analysis of these issues.

economies are (that is, the more similar are the structures of the economies and the policy-makers' preferences over, say, output and inflation) and the more that economies face the same shocks, then it is likely that such exchange rate regimes will be welfare enhancing. But if shocks tend to be region specific then fixing exchange rates becomes less attractive.[1][2]

It should be clear that exchange rate fixing will fall short of the full joint-optimisation exercise across countries depicted in the literature. There has therefore been much research into how far partial co-ordination schemes—such as exchange rate target zones—go in attaining the benefits from full co-ordination.[3] This predominantly empirical research indicates that targeting improves economic performance only marginally compared with the best non-co-operative policy. And this performance, in turn, is very close to the fully co-operative outturn. The conclusion of this research seems to be that policy-makers might better expend effort in attaining the benefits of better balance in domestic policies before chasing what appear to be the marginal gains from co-ordination schemes. However, Hughes Hallet (1992) concludes that these results are not necessarily arguments against exchange rate targeting arrangements since these may provide a useful framework for the setting of policy and a highly visible yardstick against which to measure policy.[4]

'Ins' and 'outs'

The policy co-ordination literature reviewed here may provide some clues on how to arrange the nominal framework between EU countries in the run up to, and following, EMU. For example, what is the optimal arrangement between the 'ins' and the 'outs'? Recently, Persson and Tabellini (1995a) have recommended a system of inflation targets for both the 'ins' and the 'outs'. They suggest that their proposal solves the co-ordination problem of monetary policy in Europe, especially in the period immediately following unification. In particular, they argue that it is superior to an 'asymmetric' regime where the 'outs' peg their currencies to the euro,[5] and that this solves the credibility problem without any further formal restraints on the discretion of individual policy-makers. This proposal, however, might in effect be similar to the exchange rate target zone proposal mentioned above, in that any benefits from such a scheme are the result of a better balance in domestic macroeconomic policies rather than the degree of co-ordination.

Conclusions

Theoretical analyses often suggest that, in their own interests, countries ought to set policy co-operatively. Not doing so risks economic outcomes which are likely to benefit no one. Empirical analyses indicate that the incremental benefit to such co-operation over the welfare outcome associated with the best non-co-operative policies, is probably positive but also likely to be limited. There are two basic reasons for this. First, the links between economies are generally such that the spill-over effects are small. Second, empirical work suggests that poor economic performance in the past often has at its root poorly designed domestic policies and not primarily a lack of policy co-ordination. In designing a nominal framework for the 'ins' and the 'outs', EU policy-makers should therefore aim to ensure domestic stability across individual member countries. A free exchange of information about policy intentions is important since taking account of other countries' intentions will yield benefits.

(1) When there are asymmetries in preferences or the stochastic structures of the respective economies, this conclusion can be reversed. See Hughes Hallet (1993,1994).
(2) It can also be shown that the distribution of the welfare gains will depend on who is the leader and who is the follower. For an illustration of this point see Canzoneri and Henderson (1991), pages 27–31.
(3) See Currie and Wren-Lewis (1989) and Hughes Hallett (1992).
(4) There are, however, problems with using the exchange rate as a measure of policy stance. See the discussion in Canzoneri, Nolan and Yates (1996).
(5) The desirability of a common nominal framework seems to be a general result from this literature, and is intuitively plausible since, as Canzoneri and Henderson (1988) point out, although one country's choice of instrument does not affect its own policy trade-offs it will affect other countries'. For example, if one country targets growth in a monetary aggregate then domestic velocity shifts may be transmitted to other countries through the exchange rate. If that country is targeting the exchange rate, such a velocity shock may have important implications for policy. For more discussion on the choice of instrument, see Canzoneri and Henderson (1988), pages 119–21.

References

Barro, R and Gordon D (1983), 'Rules, discretion and reputation in a model of monetary policy', *Journal of Monetary Economics*, July.

Bryant, R (1993), 'International Co-operation of National Macroeconomic Policies: Where Do We Stand', *mimeo*, Brookings Institution, April.

Canzoneri, M B, Nolan, C and Yates, A (1996), 'Mechanisms for Achieving Monetary Stability: Inflation Targeting versus the ERM', *Journal of Money, Credit, and Banking*, forthcoming.

Canzoneri, M and Gray, J (1985), 'Monetary Policy Games and the Consequences of Non-co-operative Behaviour', *International Economic Review*, 26, pages 547–64.

Canzoneri, M and Henderson, D (1988), 'Is Sovereign Policy-making Bad?', *Carnegie-Rochester Conference Series on Public Policy*, 28, pages 93–140.

Canzoneri, M and Henderson, D (1991), *Monetary Policy in Interdependent Economies*, MIT Press.

Canzoneri, M and Minford, P (1988), 'When International Policy Co-ordination Matters: An Empirical Analysis', *Applied Economics*, 20, pages 1,137–54.

Cooper, R (1969), 'Macroeconomic Adjustment in Interdependent Economies', *Quarterly Journal of Economics*, 98, November, pages 1–24.

Currie, D and Levine, P (1993), *Rules, Reputation, and Macroeconomic Policy Co-ordination*, page 62.

Currie, D, Levine, P and Vidalis, N (1987), 'International Co-operation and Reputation in an Empirical Two-Bloc Model', in Bryant, R and Portes, R (eds), *Global Macroeconomics: Policy Conflict and Co-operation*, London.

Currie, D and Wren-Lewis, S (1989), 'Evaluating Blueprints for the Conduct of International Macroeconomic Policy', *American Economic Review*, 79, pages 264–69.

Frankel, J and Rockett, K (1988), 'International Macroeconomic Policy Co-ordination When Policy-makers Do Not Agree on the True Model', *American Economic Review*, 78, June, pages 318–40.

Giavazzi, F and Pagano, M (1988), 'The advantage of tying one's hands: EMS discipline and central bank credibility', *European Economic Review*, 32, 1,055–82.

Gosh, R A and Masson, P R (1991), 'Model Uncertainty, Learning and the Gains from Co-ordination', *American Economic Review*, 81, pages 465–79.

Groof, R J de and Schaling E (1991), 'Monetary and Fiscal Policy in Interdependent Two-Sector Economies', *De Economist*, 139, pages 427–44.

Haldane, A (Ed), (1995), *Targeting Inflation*, Bank of England.

Hamada, K (1976), 'A Strategic Analysis of Monetary Interdependence', *Journal of Political Economy*, 84, pages 667–700.

Hamada, K (1985), *The Political Economy of International Monetary Interdependence*, Cambridge.

Holtham, G and Hughes Hallet, A (1992), 'International Macroeconomic Policy Co-ordination when Policymakers Do Not Agree on the Model: Comment', *American Economic Review*, 82, pages 1,043–50.

Hughes Hallet, A (1986a), 'Autonomy and the Choice of Policy Instrument in Asymmetrically Dependent Economies: An Investigation of the Gains from International Policy Coordination', *Oxford Economic Papers*, 38, pages 516–44.

Hughes Hallet, A (1986b), 'International Policy Design and the Sustainability of Policy Bargains', *Journal of Economic Dynamics and Control*, 10, pages 467–94.

Hughes Hallet, A (1987), 'Robust Policy Regimes for Interdependent Economies: A New Argument for Co-ordinating Economic Policies', *CEPR Discussion Paper*, No 151.

Hughes Hallet, A (1992), 'Target Zones and International Policy Co-ordination: The Contrast Between Necessary and Sufficient Conditions for Success', *European Economic Review*, 36, pages 893–914.

Hughes Hallet, A (1993), 'Exchange Rates and Asymmetric Policy Regimes: When Does Exchange Targeting Pay?', *Oxford Economic Papers*, 45, pages 191–206.

Hughes Hallet, A (1994), 'On the Imperfect Substitutability of Policy Regimes: Exchange Rate Targeting versus Policy Co-ordination', *Economic Letters*, 44, pages 159–64.

Hume, D (1752), 'Political Discourses', in *Essays, Moral, Political and Literary*, London.

Johnson, H (1972), 'The Monetary Approach to the Balance of Payments Theory', *Journal of Financial and Quantitative Analysis*, 7, No 2, pages 1,555–72.

Nolan, C and Schaling, E (1996), 'Inflation Targeting and Incentive Performance Contracts under Uncertainty', *mimeo*, Bank of England, forthcoming.

Oudiz, G and Sachs, J (1984), 'Macroeconomic Policy Co-ordination Among the Industrial Economies', *Brookings Papers on Economic Activity*, 1, pages 1–64.

Oudiz, G and Sachs, J (1985), 'International policy co-ordination in dynamic macromodels' in Buiter, W and Marston, R (eds), *International Economic Policy Co-ordination*, Cambridge, CUP.

Persson, T and Tabellini, G (1995a), Monetary Cohabitation in Europe', paper presented at the AEA Meetings, San Francisco, January.

Persson, T and Tabellini, G (1995b), 'Double-Edged Incentives: Institutions and Policy Coordination', Chapter 38, *Handbook of International Economics*, Vol III, in Grossman, G and Rogoff, K (eds), *Elsevier*, pages 1,973–2,030.

Phillips, A (1954), 'Stabilisation Policies in a Closed Economy', *The Economic Journal*, 64, pages 290–323.

Phillips, A (1957), 'Stabilisation Policies and the Time Form of Lagged Responses', *The Economic Journal*, pages 265–77.

Raith, M (1993), International Policy Co-ordination as a Strategic Bargaining Game', *mimeo*, University of Bielefeld, May.

Rogoff, K (1985), 'Can International Monetary Policy Co-ordination be Counterproductive?', *Journal of International Economics*, 18, pages 199–217.

Romer, D (1993), 'Openess and Inflation: Theory and Evidence', *Quarterly Journal of Economics*, November, pages 696–903.

Schaling, E (1995), 'Institutions and Monetary Policy: Credibility, Flexibility and Central Bank Independence', Edward Elgar.

Tinbergen, J (1952), *On the Theory of Economic Policy*, Amsterdam.

Walsh, C (1995), 'Optimal Contracts for Central Bankers', *American Economic Review*, 85, No 1, March, pages 150–67.