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Chapter Title: On Transmission and Coordination Under Flexible Exchange Rates

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1 On transmission and coordination under flexible exchange rates*

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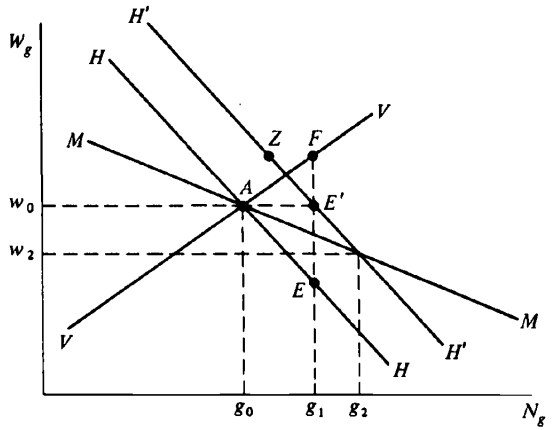
This paper considers the need for macroeconomic policy coordination under flexible exchange rates and the nature of the equilibria that may be reached in the absence of coordination. It was inspired by the extensive discussions that have taken place on the need for coordination, and especially by the so-called 'locomotive theory' of the late nineteen seventies, which suggested that coordinated expansion would be easier than expansion by any one country on its own. Essentially, the initial model presented here is a formalisation of popular arguments that lack of coordination of macroeconomic policies leads to more deflation than would an efficient or optimally coordinated set of policies. The model includes a short-term non-vertical Phillips curve – and hence assumes that macroeconomic management can affect employment and output.

The main model is presented in Part I. This is a condensation of Corden (1983b), where the model and its implications are spelt out in more detail. Part II analyses in detail a qualification that seems important, namely that one country needs to take into account the possible future adverse effects on itself of increased inflation in the other country. This qualification, which was only briefly discussed in Corden (1983b), involves intertemporal considerations that are ignored in the short-term (and short-sighted) approach of Part I. Finally, Part III both extends and qualifies the discussion. It is argued that the main model may be more relevant for a world of many countries, even though the formal model is a two-country model. On the other hand, the limitations of the whole short-term approach are also noted. In addition, the effects of introducing international capital movements are sketched out.[1]

I A two-country model of macroeconomic policy interaction

We now build a simple two-country model, beginning with one of the countries, Germany. The analysis will be completely symmetrical, so that



1.1 The effects on Germany of US expansion

the foundations also apply to the other country, the United States. The exchange rate floats and there are no international capital movements.[2]

The real wage, employment and the terms of trade

The German production function and capital stock are given. German employment, N_g varies so as to equate the marginal product of labor with the real wage in terms of Germany's own product, i.e. the *product real wage*, R_g. The German terms of trade are T, an increase being an improvement. The crucial distinction must then be made between the product real wage, R_g and the *income real wage*, W_g, where $W_g = W_g$ (R_g, T). The income real wage reflects the consumption basket of wage earners and is the nominal wage deflated by a price index of the home-produced and the imported good. For a given R_g, an improvement in the terms of trade would raise W_g.

Figure 1.1 shows the German income real wage, W_g on the vertical axis and German employment, N_g on the horizontal. MM is the marginal product of labor curve, drawn for constant terms of trade, T. A movement down the curve results from a fall in R_g, which (with T constant) causes W_g to fall. An improvement in the terms of trade would shift the curve upwards.

The curve HH is drawn for a constant level of United States output (and employment). It shows that, with US output given, an increase in German employment would involve a deterioration in the German terms of trade. The reason is that, with US output given, the US offer curve facing Germany is given, and the increase in German employment – which shifts

the German offer curve outwards – will involve a movement along the US offer curve.

A rise in US output is represented by a shift of the HH curve to $H'H'$. If, at the same time, German employment expanded from g_0 to g_2 the terms of trade would stay constant and the German income real wage would fall from W_0 to W_2. This is the special case of a mutually *balanced expansion*. Another special case is where the German income real wage is rigid. An expansion of US output would then lead to a rise in German employment from g_0 to g_1.

We have assumed that a rise in US output improves the German terms of trade by shifting the US offer curve outwards, and that this, in turn raises the income real wage for given German employment. Hence the HH curve shifts to the right. This result follows from a model where each country is assumed to produce only one product (or, in a multi-product model, where the factor intensities do not differ much). It can be called the assumption of *positive transmission* and will be reconsidered at the end of Part II.

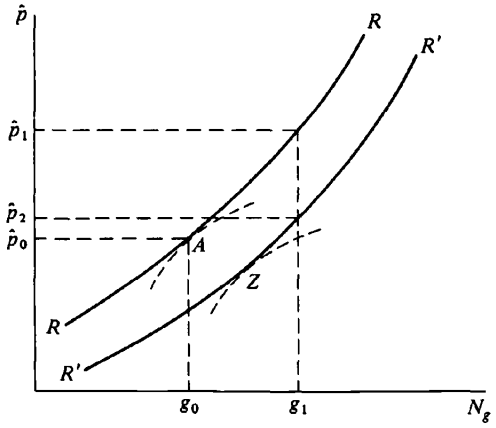
The real wage gap and the Phillips curve

The next step is to derive what is essentially a short-run non-vertical Phillips curve.

The curve VV traces out the target real wage at various levels of employment. For any given level of employment it shows the income real wage at which the labor market is in equilibrium in the special sense that the trade unions (or others who determine wages) are satisfied with the real wage at that level of employment, even though there are potential workers involuntarily unemployed. It represents the target of the unions, not of the government.

For any given level of employment there can be a *real wage gap*, namely a divergence between the target real wage and the actual real wage. The latter is assumed to determine the actual level of employment, the product market always being in equilibrium even though the labor market is not. At employment g_1 the real wage gap with the original level of US output is FE. The increase in US output lowers the real wage gap at that level of employment to FE'.

We now assume that the actual real wage can be brought below the target real wage (at least during the short period concerned) by continuous price inflation above the initial rate of inflation. Price inflation can bring about this real wage gap because of sluggishness of nominal wage adjustment, nominal wages lagging behind prices, the lag increasing with the rate of price inflation. The greater the required real wage gap, the greater price inflation needs to be. In turn, increased inflation is brought about by an

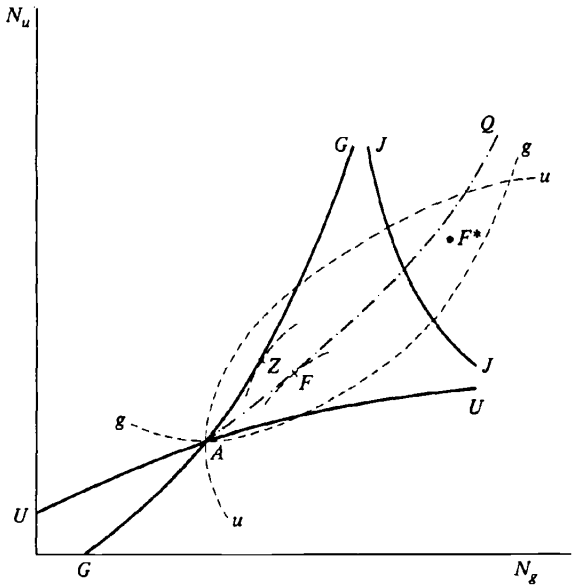


1.2 German policy choices when US expands

increase in the rate of growth of nominal demand (rate of growth of the money supply when velocity is constant).

Obviously this is a short-term analysis, subject to all the limitations of drawing a fixed non-vertical Phillips curve. Let $\hat{p}$ be the rate of German price inflation and $\hat{w}$ the rate of German nominal wage increase. The idea is that a rise in $\hat{p}$ over the period leads to a temporary rise of $\hat{p}$ over $\hat{w}$, so that W_g falls by a given amount over the period; this implies that by the end of the period $\hat{w}$ has caught up with $\hat{p}$.

Figure 1.2 shows the relationship between $\hat{p}$ and N_g. The curve RR is drawn for the initial level of US output. It is a kind of Phillips curve, showing how German employment rises as the rate of German price inflation rises during the period. Inflation $\hat{p}_1$, for example creates a real wage gap FE and so yields employment g_1. The initial rate of inflation $\hat{p}_0$ (perhaps determined by given expectations of nominal demand growth) yielded a zero real wage gap, and hence employment g_0. The rise in US output (and hence improvement in the German terms of trade for given German employment) shifts the RR curve to $R'R'$. German employment g_1 can now be sustained with a lower real wage gap FE' and hence lower rate of inflation $\hat{p}_2$. The next step is to introduce the usual social welfare contours allowing the selection of optimal points on the two 'Phillips curves'. If the original point A was an optimal point, the new one is likely to be south-east of A, say at Z, representing the idea that the gains from US expansion will be taken out in Germany partly by reduced inflation and partly by extra employment. Through this German policy reaction, an increase in US employment thus leads also to a rise in German employment.



1.3 US and German policy reaction curves

The policy reaction curves

In Figure 1.3 *GG* is the German policy reaction curve. It shows the level of German employment, N_g brought about by nominal demand management in Germany for every given level of US employment, N_u. Every point on *GG* represents an optimal point (from the point of view of German policy-makers) on a German short-term Phillips curve. A movement upwards on *GG* (say from *A* to *Z*, equivalent to movements from *A* to *Z* in Figures 1.1 and 1.2) is associated with an improvement in the German terms of trade, a rise in the German income real wage, a fall in the German product real wage, and a fall in the German rate of inflation.

Following exactly the same principles, one can draw a US policy reaction curve *UU*, showing how US employment rises as German employment rises, each point on *UU* being an optimal point on a US Phillips curve, with German employment regarded as given.

Before making use of these reaction curves to analyse the two countries' policy interactions we might note that there are three distinct reasons why the German curve is steeper than the United States one – three factors that ensure (each factor on its own) stability and uniqueness of the Nash equilibrium to be discussed below: (1) diminishing physical returns to extra

employment in each country owing to the fixity of the capital stocks, (2) an increase in the target real wage as employment increases, and (3) a reduction in the rate of price inflation as employment increases. In the absence of all three factors in both countries the two reaction curves would coincide with AQ, one country's expansion eliciting expansion by the other country along the *balanced expansion* (constant terms of trade) *path*. The presence of at least one of these factors in at least one country is sufficient for the analysis to follow.

Non-cooperative equilibria

If there were indeed non-cooperative behaviour based on the myopic assumption that the other country's output would stay fixed, the Nash equilibrium at A would be attained. The USA would always move vertically towards UU and Germany would move horizontally towards GG. Each country would have its target, UU and GG, and its proximate instrument, N_u and N_g – in turn determined by adjusting nominal demand via monetary and fiscal policies. The assignment of instrument to target would be stable.

The levels of social welfare attained are indicated by the two indifference curves through A, uu tracing out equal social welfare for the USA (any curve to the right representing an improvement), and gg tracing out constant social welfare for Germany, (higher curves representing an improvement). It is apparent that a move to any point on these curves up to C, or within the area enclosed by uu and gg, would be a Pareto-improvement. Thus, while the Nash equilibrium is stable, it is not Pareto efficient. The Nash equilibrium has a contractionary bias, in the sense that both countries could be better off if, within limits, they both expanded beyond that equilibrium.

Alternatively, a non-cooperative equilibrium might be attained through policy leadership by one country. Germany might react to US policy by taking US output as given, so staying on GG, while the United States adjusted its policy so as to attain the optimal point for it on GG. This would yield the Stackelberg equilibrium at Z. This is Pareto-superior to A, but still has some contractionary bias, because mutual expansion from Z could lead to Pareto-improvements.

Special note might be taken of the balanced expansion path AQ along which the terms of trade stay constant. Along this path neither country can be compensated by a terms of trade improvement for the adverse movement in its product real wage resulting from expansion, so that the two income real wages must fall. Along this path neither country is 'beggaring its neighbour' for the sake of restraining domestic price inflation. A non-cooperative equilibrium might be attained through policy

leadership where the reactive country, Germany, aims to keep the terms of trade constant, while the USA chooses an optimal point given this reaction. AQ then becomes Germany's reaction curve and the USA will choose point F.

It cannot, of course, be assumed that non-cooperative behaviour would lead to any of the results just discussed. In particular, the Nash equilibrium implies myopia. The question then is whether there are any general rules to constrain non-cooperative behaviour that are likely to have favorable results. One might be called the *unilateral expansion rule* and seems, at first sight, plausible. Wherever countries find themselves initially, they may expand, but may not contract. The point is that one country's contraction always has an adverse effect on the other, so this rule ensures that any *voluntary* change is a Pareto improvement. A country will expand only if this would benefit itself, and such expansion must also benefit the other country. This rule would limit equilibria to somewhere on or within *the cone GAU* (above A). Such a rule might need to be supplemented by an agreement for coordinated contraction when both desire this.

Policy coordination

The scope for policy coordination is obvious. In Figure 1.3 JJ traces out points of tangency of the indifference curves. This is the *Pareto-efficiency locus*. It divides *the cone GAU* referred to above into an upper and a lower part. If the countries are not on this locus they can, by mutual arrangement, always achieve a Pareto-improvement. This could be brought about by both expanding (if they start in the lower part of the cone), both contracting (starting in the upper part), or one expanding and the other contracting (possibly required if starting outside the cone).

Starting at A it is apparent that there is much scope for a joint expansion that yields a Pareto improvement. In fact, a movement to any point enclosed by the two indifference curves through A will make them both better off. As long as they are not on JJ there is always scope for a Pareto-improvement.

Conceivably the starting point might be at a point such as F^*, a case of mutual over-expansion. Joint contraction can then bring about improvements for both. Contraction by one country will always have an adverse effect on the other country, but the losses for the other country are in this case outweighed by the gains from its own contraction. The common view, also stated earlier in this paper, that non-coordination is likely to lead to a contractionary bias, implies that coordination to obtain a Pareto-improvement calls for mutual expansion. The implicit assumption is that, in the absence of coordination, the Nash or Stackelberg equilibria would be reached. But once this assumption is removed, coordination to

attain a Pareto improvement may require contraction by one or both countries.

II Intertemporal effects

It has been assumed that one country, say the USA, balances the favorable current output effects of an expansion against the unfavorable inflation effects. But the transmission to the other country, Germany, is purely through the output effect, which, if the transmission is positive, is favorable for Germany. US inflation has no effect on Germany, which can insulate itself from foreign inflation with a flexible exchange rate. Put another way, a US expansion has a favorable real and an unfavorable nominal effect, and only the real effect is transmitted to Germany. Thus it is in the interests of each country that the other country expands as much as possible irrespective of the inflationary effects in the other country, and, from a world point of view, each should expand more than if it considered only its own interest. This sums up the 'locomotive argument' for coordination, which has been formalised in this paper. But there is a difficulty in this approach.

Adverse future effects of foreign inflation

There is no reason why a country should regard an increase in its rate of inflation as adverse if this is never expected to have any real effects. Presumably an increase in current inflation (or in future inflation stimulated perhaps by an increase in inflationary expectations now) is thought adverse because it is expected to have adverse *real* effects of some kind. An increase in inflation may be thought to lead to accelerating inflationary expectations, requiring increased inflation to maintain employment; and increasing inflation may have adverse effects on productivity for given employment. In addition, to prevent inflation getting out of hand, employment may eventually have to be reduced for some time. But these *future* real effects in the USA of a rise in current US inflation would spill over to Germany in the usual way through the terms of trade. Hence, Germany should expect to lose later from current US expansion.

Current welfare and future welfare

It is thus necessary to introduce an explicitly intertemporal analysis. As before, we begin with the case of Germany, the analysis being completely symmetrical.

First we set out an equation for current German welfare, Z_c and then for expected future German welfare, Z_f. This refers to 'welfare' as perceived by the German authorities. We assume that Z_c depends not only

on current German employment, N_g but also on the terms of trade for given employment, an improvement in the terms of trade raising German real incomes. An increase in US employment, N_u improves the German terms of trade (by shifting the US offer curve outwards), and so raises German welfare. Hence

$$Z_c = Z_c(N_g, N_u) \quad Z_{c1} > 0, Z_{c2} > 0 \tag{1}$$

Note that the current German rate of inflation does not have any direct effect on current German welfare. Furthermore, we are ruling out immiserizing growth. This would mean that an increase in German employment, and hence output, would worsen the terms of trade sufficiently for German welfare to decline.

Next, we set out an equation for expected future German welfare, Z_f. Firstly, it depends negatively on current German inflation $\hat{p}_g$. Secondly, it depends negatively on current US inflation, $\hat{p}_u$. The mechanism of the latter relationship is that current US inflation is expected to reduce US output and employment in the future, hence shift the US offer curve inwards, and so – assuming positive transmission – lower German welfare in the future.

$$Z_f = Z_f(\hat{p}_g, \hat{p}_u) \quad Z_{f1} < 0, Z_{f2} < 0 \tag{2}$$

The next step is to bring in the German Phillips curve equation. Current German employment, N_g is related positively to current German inflation, $\hat{p}_g$, an increase in both being brought about by nominal demand expansion, and to US employment (which determines the US offer curve). We no longer assume automatically that a rise in US employment must inevitably lead to a policy response in Germany that raises German employment. It will be shown below that a rational policy response could lead to negative employment transmission.

$$N_g = N_g(\hat{p}_g, N_u) \quad N_{g1} > 0, N_{g2} \gtrless 0 \tag{3}$$

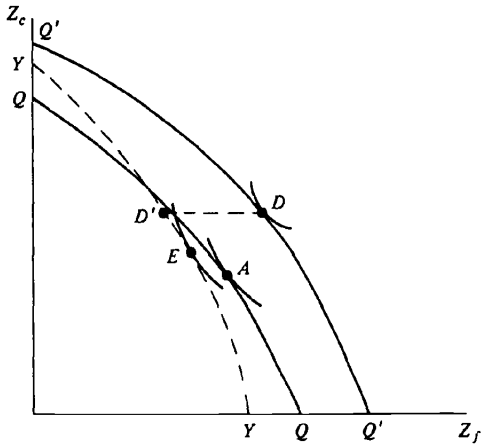
Finally, we bring in an equation for total welfare, Z which depends positively on the 'welfares' in the two periods.

$$Z = Z(Z_c, Z_f) \quad Z_1 > 0, Z_2 > 0 \tag{4}$$

How US expansion affects German welfare: positive and negative total transmission

Let us first represent the system for the special case of Part I of this paper where $Z_{f2} = 0$ (i.e. future German welfare does *not* depend on current US inflation).

In Figure 1.4 QQ is drawn for the initial level of US employment, N_u.



1.4 A case of negative total transmission

It represents the German Phillips curve, a movement along it to the left being brought about by nominal demand expansion in Germany which raises German employment (hence raising current welfare, Z_c) and raises German inflation (hence lowering future welfare, Z_f). The starting point is A, assumed to be the optimal point.

A rise in US employment, N_u, shifts the curve outwards to $Q'Q'$ by raising Z_c for any given Z_f (i.e. for any given $\hat{p}_g$). Assuming that the gain in welfare possibilities is taken out partly in the form of a rise in future welfare, $\hat{p}_g$ will have to fall (this being the only way in which future welfare can be raised at this stage) and equilibrium will be at a point such as D. At this stage there is clearly a rise in total welfare (move to a higher indifference curve) so we can say that there has been *positive total transmission* of US expansion.

The rise in US employment, N_u will be associated with a rise in US inflation, $\hat{p}_u$, We assume now that the USA has moved along its Phillips curve for given German employment, and we introduce the new element in the story: the rise in $\hat{p}_u$ has an adverse effect on expected future welfare in Germany, i.e. $Z_{f2} < 0$. This is represented by a movement to the left of the $Q'Q'$ curve to YY. For any given level of Z_c, there is a fall in Z_f.

If N_g and $\hat{p}_g$ stayed at the level that had yielded D, the point D' on YY would be reached (i.e. there would be no change in current welfare since N_g would not change). But the optimal point on YY could be above or below D'. This optimal point in Figure 1.4 is at E, and is the result of an income effect, which has reduced Z_c and Z_f below the level at D, and a substitution effect, which has shifted welfare towards Z_c. Compared with

D, Z_f must fall, while Z_c could rise or fall. Compared with A, the initial equilibrium, Z_c and Z_f could have risen or fallen.

The move from A to D raised total welfare, Z and the further move to E lowered it. In Figure 1.4 the net result has been to lower it (the indifference curve through E being below that through A), so that there is *negative total transmission*, in the sense that an increase in employment in the USA has lowered total welfare of Germany once the expected adverse effect on Germany of the rise in US inflation is taken into account. It is thus in Germany's interest to discourage US expansion.

There could, of course, be positive total transmission, and this seems much more probable. The less Germany expects her terms of trade to be affected by changes in future US productivity or employment, and the more Germany discounts the future, the more likely is positive total transmission.

Negative employment transmission

The effect of a rise in N_u on German welfare is distinct from the effect on German employment. It is just conceivable that German employment N_g declines when N_u rises. This is *negative employment transmission*. There are two reasons why this is possible.

(1) The rise in N_u raises current German welfare, Z_c for given German employment. While it also lowers $\hat{p}_g$ for given German employment, and so raises Z_f, it may be desired to shift more of the welfare gain into the future, so that there would be a movement along the Phillips curve designed to lower $\hat{p}_g$ further, and so lower German employment. Thus at D in Figure 1.4 N_g could have fallen relative to A.

(2) If the optimal point E on YY is below D' (as in Figure 1.4) the adverse future effect of the rise in $\hat{p}_u$ will have induced a movement along the German Phillips curve designed to shift some of this adverse effect into the present by lowering N_g and $\hat{p}_g$. The essential argument is that the expected future adverse effect of US inflation would be partially offset by a reduction in current German inflation, this bringing about a fall in German employment. Going right back to Figure 1.2, this means that the optimal point Z on the new Phillips curve $R'R'$ could be to the left of Ag_0.

Effects on two-country interaction

The question now is how these intertemporal considerations affect the two-country interaction model represented by Figure 1.3.

This model was based on two assumptions. (1) There was positive total transmission, expansion by one country always raising the welfare of the other, assuming the latter has made an optimal adjustment. This meant that welfare of both countries could be improved by movements upwards

and to the right of A; in other words, a cooperative solution designed to yield a Pareto-improvement would involve mutual expansion relative to the Nash solution. (2) There was positive employment transmission, employment expansion by one country leading to employment expansion by the other along its reaction curve. Hence both reaction curves were positively sloped, and for reasons specified, the non-cooperative Nash solution was stable.

We have seen that, once intertemporal effects are introduced, there may still be both positive total transmission and positive employment transmission. In that case the interaction model of Part I, and with it Figure 1.3, are fully applicable.

It remains to allow for (1) negative total transmission and (2) negative employment transmission. We shall consider here only each on its own, always assuming the other is positive, and that negative transmission between countries goes in both directions. Mixed cases can be easily worked out.

(1) If there is negative total transmission the reaction curves will have the same slopes and characteristics as before (because employment transmission is still positive). But the indifference curves in Figure 1.3 will be bowed the opposite way and welfare will rise with movements *down GG* and *UU*. The Pareto-efficiency curve, JJ' will be below A, so that Pareto-improvements can result from mutual *contraction* when the Nash equilibrium is the starting point.

(2) If there is negative employment transmission the reaction curves will be negatively sloped. Furthermore, the Nash equilibrium could be unstable. But, given that positive total transmission remains, Pareto-improvements relative to the Nash equilibrium would still be obtainable from coordinated mutual *expansion*.

Positive and negative transmission again

At the beginning of this paper it was noted that the assumption of *positive transmission* was being made, namely that expansion by one country not only improved the other's terms of trade but also that this raised the other's income real wage for any given level of employment. This assumption was summed up in Figure 1.1 by the movement to the right of the HH curve (to $H'H'$) as a result of US expansion. We have also made the assumption that such positive transmission is expected to apply in the future – i.e. that a productivity decline in the USA would worsen Germany's terms of trade and shift its HH curve adversely.

Here two observations must be made. The first is that such positive transmission in each separate period can still be compatible both with negative *total* transmission and with negative *employment* transmission. In

fact, in the cases that have just been discussed, this has been so. Positive transmission in the future has accounted for the inward movement of the *YY* curve in Figure 1.4 which – if it goes far enough (i.e. the adverse productivity effect of a rise in $\hat{p}_u$ is high and positive transmission is high) – may lead to negative total transmission. In addition, we have represented the case where more than the whole of a favourable effect from US expansion (movement to the right of the *HH* curve in Figure 1.1 or of *RR* in Figure 1.2) is taken out in lower inflation, with employment actually declining.

The second observation is that the assumption of positive transmission in each period cannot be taken for granted. It is conceivable that a US expansion shifts the *HH* curve in Figure 1.1 to the left. Such a possibility of *negative transmission* has been analysed in detail in Corden and Turnovsky (1983).

Either a US expansion might worsen the German terms of trade (if the US expansion is sufficiently anti-trade biased) or an improvement of the German terms of trade might shift the *HH* curve to the left because Germany exports products which are non-labor intensive. (A better example is an improvement in the Australian terms of trade, which raises food prices and so lowers the income real wage for given employment). In these cases the purely static model of Part I would yield negative employment transmission. On the other hand, if there is negative transmission in the future, then in the intertemporal model Germany would expect to gain in the future from a rise in current US inflation, provided the latter is expected to have an adverse effect on US productivity or employment.

III Beyond the model

Let us now briefly consider three matters that go beyond the particular short-term two-country model presented here.

A world of many countries

In a two-country setting, the Nash and Stackelberg equilibria imply either policy rigidities or some kind of myopia. The actual solutions must be regarded as indeterminate until further considerations from game theory are introduced. While presented here in a two-country framework, the analysis actually seems to be more relevant for a many-country model. The various countries must not be 'small' in the formal sense – i.e. they must be able to affect their terms of trade by their own economic expansion. But they must not be so large that they expect policy reactions from other countries. Such a world would then lead to a multi-country

Nash equilibrium. The Nash equilibrium is thus interesting because it may come close to describing the non-coordination outcome in a world of many countries. Alternatively, all countries other than the United States might be regarded as ignoring reactions, in which case the Stackelberg equilibrium is a reasonable representation of the non-coordination outcome.

Limitations of short-term approach

The short-term nature of the whole approach should not be forgotten. The Phillips curve is not vertical in the model, and it is not even expectations-augmented. Because the analysis is short-term – and seeks to represent ideas that have come from short-term macro-economic policy discussion – one may be justified in assuming that one country does not expect a reaction from the other country when making its own policy decisions. But probably one would not be justified in building a structure of sophisticated game theory on top of the simple model. In fact, it is to be questioned whether a time-consuming international coordination process could possibly be justified when the underlying variables – notably the Phillips curve – are likely to be rapidly shifting. Futhermore, these very shifts may be influenced by the extensive policy discussions which are bound to precede successful international co-operation.

At this point one should consider more precisely the implications of the Phillips curve gradually becoming vertical as expectations adjust – i.e. as nominal wages cease to lag behind prices. Macroeconomic demand policy will lose its efficacy, and unions will attain their target real wages (stay on VV in Figure 1.1). Assuming positive transmission through the terms of trade, in each country employment will increase when the other country expands (as a result of a fall in the target real wage or as a result of a productivity improvement). Thus there will still be two positively-sloped reaction curves in Figure 1.3, and the interaction between the trade unions in the two countries will establish the Nash equilibrium. But it will be beyond the power of governments, whether acting independently or in coordination, to alter this.

Capital market interaction

It is an obvious limitation of the model that it has ruled out any capital market interaction. I shall now spell out informally how this could be introduced. Let us assume that each country manages its aggregate demand policy in the light of the considerations discussed in the paper so far. But a given level of aggregate demand can be obtained by various mixes of monetary and fiscal policy. We shall now hold aggregate demand in each country for its domestic products constant, but vary the policy mix so as to attain various interest rate outcomes.

Since the interest rate will be determined in the world capital market, the effects of a change in the US policy mix will depend also on the German policy mix reaction. Hence a change in what will be called here an 'interest rate policy' in one country is really a change in its net demand for tradeable bonds – i.e. a shift in a net demand curve. Let us now suppose that the USA shifts the mix towards fiscal expansion (and hence monetary contraction, to maintain aggregate demand constant). This reduces its net demand for bonds (or raises its supply) and then brings about reactions in Germany both from the private sector and through a possible change in government policy. We can assume that each government has a reaction function of some kind. One might expect that an increase in the US supply of bonds (tending to raise the world interest rate with a given German budget deficit) would lead to a reduction in the German budget deficit as borrowing becomes more expensive (i.e. there is a movement down the German government's bond supply curve). In this way a non-coordination equilibrium could, in principle, be attained as each country makes some assumption about the other's policy, one case being the special assumption that the other's policy stays unchanged, leading to a Nash equilibrium.[3]

The next step is to look at the sign of *total transmission*. Does a shift to the right of the US supply curve of bonds (brought about, for example, by a US fiscal expansion) benefit or harm Germany? Suppose it is perceived to harm Germany. Then it will be in Germany's interest to induce the USA to engage in some fiscal contraction, always associated with monetary expansion. If it were true that each country is harmed by a policy shift in the other country that tends to raise the interest rate, then coordination designed to yield a Pareto improvement would involve both countries engaging in fiscal contraction and monetary expansion. The Nash equilibrium would yield too high a world interest rate from a world Pareto-efficiency point of view.

But this leaves open the question whether Germany is benefited or harmed by a high interest rate policy in the USA. The answer is not obvious. It must depend, among other things, on whether Germany is a net creditor or debtor. Yet the answer is crucial in determining the direction in which a Pareto-improving co-ordination arrangement would shift the system.

One aspect – but only one aspect – is the terms of trade effect. This must be superimposed on the terms of trade effects of changes in aggregate demand which are central to the main analysis in this paper. It is likely that a shift to a high interest rate policy in the USA would worsen the German terms of trade, at least for the period of time during which this policy gives rise to additional capital flows from Germany to the USA. This German terms of trade deterioration would be part of the mechanism

by which a German current account surplus (equal to the capital account deficit) is generated. It is a cost of the 'transfer'.

In the main model of this paper the terms of trade were the only mechanism of transmission between countries. Any US policy that worsened the German terms of trade was then definitely adverse in its effect on German welfare. But, once capital flows and stocks of international debts are allowed for, this is no longer so. For example, if Germany is a net creditor at a floating interest rate, she will gain on that account from a US high interest rate policy.

NOTES

* This paper is closely related to a earlier paper, namely Corden (1983b). Part I is a summary of the earlier paper and some passages there and elsewhere are taken verbatim from this paper. The main addition here is the detailed argument of Part II. In the preparation of the earlier paper and revisions of it I have benefited from comments by John Black, Peter Kenen and Ben Smith.

1 There is a modest literature in this general area. All the interdependence issues are surveyed in Cooper (1984), which contains many references. On the international transmission process through the terms of trade under flexible exchange rates, see especially Hamada and Sakurai (1978), Mussa (1979) and Corden and Turnovsky (1983).

2 Canzoneri and Gray (1983), Sachs (1983) and Cooper (1984, sec. 5) deal with the flexible exchange rate two-country interaction case along somewhat similar lines as the present paper (as represented by Figures 1.3), though the microfoundations differ. Note that international capital movements are introduced in Part III of the present paper.

3 This type of argument, that there is an international laissez-faire system where governments are actors (and possibly are interest-rate responsive), and that variations in the interest rate help to attain equilibrium, is set out more fully in Corden (1983a).

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COMMENT DALE W. HENDERSON

I Introduction

It is very appropriate to have Max Corden's paper as the first paper in the volume. First, Corden uses static game theory to analyze the strategy of macroeconomic policymaking in a two-country world economy under flexible exchange rates. His analysis is illustrative of the approach that has been adopted by several authors over the last fifteen years. Then, he introduces intertemporal effects into his analysis. By conveying to the reader the reasons for his obvious impatience with the limitations of static analysis, Corden sets the stage for the more elaborate dynamic analyses that appear later in the volume.

The remainder of this comment is divided into two parts. The first part is an attempt to formalize Corden's graphical analysis. The second contains some general comments on Corden's paper.

II A formalization of Corden's analysis

This part of the comment contains a mathematical analysis of macroeconomic policymaking in a two-country world economy that is very similar to Corden's graphical analysis. The two countries are called the home country and the foreign country. Variables with asterisks are foreign country variables.

Each country is specialized in producing one good. According to the production functions, (logarithms of) outputs (y, y^*) are increasing functions of (logarithms of) employments (n, n^*) and productivity disturbances (x, x^*):

$$y = k_1 + \alpha n + x \quad 0 < \alpha < 1 \tag{1}$$

$$y^* = k_1^* + \alpha^* n^* + x^* \quad 0 < \alpha^* < 1 \tag{2}$$

It is assumed that the productivity disturbances and the other disturbance terms introduced below have zero means and are identically and independently distributed.

Labor is employed up to the point at which (logarithms of) real wages are equal to (logarithms of) marginal products of labor:

$$w-s = k_2-(1-\alpha)n+x \tag{3}$$

$$w^*-s^* = k_2^*-(1-\alpha^*)n^*+x^* \tag{4}$$

Real wages are equal to (logarithms of) nominal wages (w, w^*) minus (logarithms of) product prices (s, s^*). Marginal products are decreasing functions of employments and increasing functions of productivity disturbances.

Before markets meet each period, workers and firms enter into contracts that specify nominal wages and employment rules. Each period the monetary authorities announce (logarithms of) money supplies that they will make available if all disturbances are zero ($\bar{m}$, $\bar{m}^*$). Using this information, workers and firms set nominal wages at the values ($\bar{w}$, $\bar{w}^*$) that will be consistent with 'full employment' levels of employment ($\bar{n}$, $\bar{n}^*$) if all disturbances are zero:

$$w = \bar{w} \tag{5}$$

$$w^* = \bar{w}^* \tag{6}$$

Workers agree to supply whatever quantity of labor firms want at the realized real wage.

The market for home goods is in equilibrium when the supply of the home good is equal to world demand:

$$y = k_3+\gamma y+\lambda y^*+\delta q+u \quad 0<\gamma<1 \tag{7}$$

World demand for the home good depends positively on home income, (the logarithm of) foreign income, (the logarithm of) the relative price of the foreign good (q), and a goods demand disturbance (u). The relative price of the foreign good (the terms of trade) is given by

$$q = e+s^*-s, \tag{8}$$

where e is (the logarithm of) the exchange rate expressed as the home currency price of foreign currency.

It is assumed that there is no capital mobility. Therefore, income must be identically equal to spending in each country, and world income must always be identical to world spending. Consequently, equilibrium in the home goods market implies equilibrium in the foreign goods market.

Consumer price indices or CPIs (p, p^*) are weighted averages of the prices of home and foreign goods:

$$\beta s+(1-\beta)(e+s^*)=p=s+(1-\beta)q \tag{9}$$

$$\beta^*(s-e)+(1-\beta^*)s^*=p^*=s^*-\beta^*q \tag{10}$$

The money market equilibrium conditions are simple quantity theory equations:

$$m+v=s+y \tag{11}$$

$$m^*+v^*=s^*+y^* \tag{12}$$

It is assumed that (logarithms of) velocities (v, v^*) are disturbance terms with the same properties as the other disturbance terms. Closing the model with equations (11) and (12) is in the spirit of Corden's analysis. He never mentions interest rates in the discussion based on his model.

It is convenient to express the model in terms of deviations of variables from their full-employment values which are also their expected values.[1] Variables with circumflexes over them stand for deviations. Mathematical representations of relationships similar to those graphed by Corden can be distilled from the model:

$$\hat{p}=(1-\alpha)\hat{n}+(1-\beta)\hat{q}-x, \tag{13}$$

$$\hat{p}^*=(1-\alpha^*)\hat{n}^*-\beta^*\hat{q}-x^* \tag{14}$$

$$0=(\gamma-1)\alpha\hat{n}+\lambda\alpha^*\hat{n}^*+\delta\hat{q}+(\gamma-1)x+\lambda x^*+u \tag{15}$$

$$\hat{m}+v=\hat{n} \tag{16}$$

$$\hat{m}^*+v^*=\hat{n}^* \tag{17}$$

Equations (13) and (14) are 'Phillips curves.' Equation (13) can be obtained by combining equations (3), (5), and the right-hand equality of (9), all in deviation form; equation (14) can be obtained in an analogous way. With the terms of trade unchanged ($\hat{q}=0$), positive deviations in home employment ($\hat{n}>0$) must be accompanied by positive deviations in the home product price ($\hat{s}>0$) and, therefore, positive deviations in the home CPI ($\hat{p}>0$). With home employment and, therefore, the home product price unchanged, positive deviations in the terms of trade (relative price of the foreign good) cause positive deviations in the home CPI. Positive productivity disturbances generate negative CPI deviations. The Phillips curves of equations (13) and (14) relate CPI deviations to employment deviations. Given Corden's definition of $\hat{p}$ as the rate of inflation of the home CPI and his labeling of Figure 1.2, it might appear that he has a different kind of Phillips curve in mind. However, his verbal derivation of the Phillips curve is consistent with equations (13) and (14).

Equation (15) is the condition for equilibrium in the home goods market. It is obtained by combining equations (1), (2), and (7) in deviation

form. Positive deviations in home employment and positive home productivity disturbances create excess supply; positive deviations in foreign employment and in the terms of trade as well as positive foreign productivity disturbances and goods demand disturbances create excess demand.

Equations (16) and (17) state that sums of money supply deviations and velocity disturbances determine employment deviations. Equation (16) can be obtained by combining equations (1), (3), and (11) in deviation form; equation (17) can be obtained in an analogous way. It is clear from equations (16) and (17) that fiscal policy changes cannot affect employment. The qualitative effects of balanced budget increases in home government spending would be identical to those of positive goods demand disturbances. Corden says that fiscal policy as well as monetary policy can be used to affect employment. He probably has in mind a model different from the one used here.

It is assumed that the monetary authorities act on the basis of full information about the disturbances. Under this assumption, the monetary authorities in each country can control the employment deviation in their country. Therefore, equations (16) and (17) can be dropped and employment deviations can be taken to be the instruments of the monetary authorities. Nothing is lost by ignoring velocity disturbances. The authorities in each country can offset the effect of these disturbances on employment in their country without affecting the CPI in their country or employment or the CPI in the other country.[2]

The utility functions of the monetary authorities are given by

$$U = -(1/2)(\hat{n}^2 + \sigma\hat{p}^2), \tag{18}$$

$$U^* = -(1/2)(\hat{n}^{*2} + \sigma^*\hat{p}^{*2}) \tag{19}$$

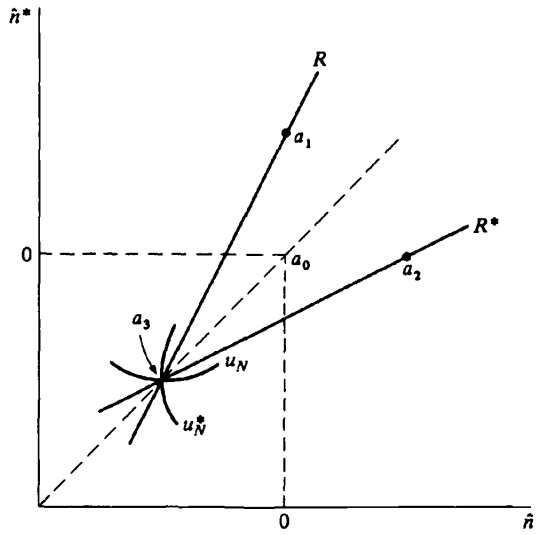
where σ and σ^* measure the costs of squared deviations in CPIs relative to squared deviations in employments. The monetary authorities in each country maximize their utility with respect to their own employment deviation taking the employment deviation of the monetary authorities in the other country as given.

In order to simplify the analysis it is assumed that the two countries are mirror images ($\bar{y} = \bar{q} + \bar{y}^*$, $\alpha = \alpha^*$, $1-\gamma = \lambda$, $1-\beta = \beta^*$) and that the productivity disturbances in the two countries are the same ($x = x^*$). Under these assumptions the reduced forms for the CPI deviations are

$$\hat{p} = [(1-\alpha)+\epsilon]\hat{n} - \epsilon\hat{n}^* - x - \psi u, \tag{20}$$

$$\hat{p}^* = -\epsilon\hat{n} + [(1-\alpha)+\epsilon]\hat{n}^* - x + \psi u, \tag{21}$$

where $\epsilon = \lambda\alpha\psi$ and $\psi = (1-\beta)/\delta$. Positive home employment deviations



1A.1 Noncooperative equilibrium following a world productivity disturbance

lead to positive home CPI deviations both directly and indirectly through induced rises in q. Negative world productivity disturbances cause positive home CPI deviations directly. They have no indirect effects through q under the mirror image assumption. Negative foreign employment deviations and goods demand disturbances generate positive CPI deviations by raising q. The signs on the coefficients in equation (21) can be explained in an analogous way. It is also assumed that the monetary authorities in the two countries have identical tastes ($\sigma = \sigma^*$).

It is clear from inspection of equations (20) and (21) that if there are no disturbances, then there is no policy conflict. If $x = u = 0$, setting $\hat{n} = \hat{n}^* = 0$ yields $\hat{p} = \hat{p}^* = 0$, so both sets of monetary authorities can attain bliss. According to the model of this comment, a policy conflict of the kind depicted in Corden's Figure 1.3 would not arise unless the model were subjected to some kind of disturbance. Corden does not say what kind of disturbance if any is required to generate his policy conflict.

There is a disturbance that gives rise to a policy conflict like Corden's in the model of this comment. It is a negative world productivity disturbance ($\hat{x} < 0$). The effects of this disturbance are shown in Figure 1A.1. In the absence of the productivity disturbance, bliss for both sets of monetary authorities is at point a_0. Following a negative productivity disturbance, bliss for the home authorities is at point a_1. They still want a zero home employment deviation but now they want a positive foreign employment deviation. A positive foreign employment deviation

would generate an appreciation of the home currency that would wipe out the positive CPI deviation caused by the productivity disturbance. For analogous reasons bliss for the foreign authorities is at point a_2.

The home (authorities') reaction function (R) passes through a_1, and the foreign (authorities') reaction function (R^*) passes through a_2. The reaction functions for the two sets of authorities are

$$\hat{n}^* = [(1+\sigma\mu^2)/\sigma\epsilon\mu]\,\hat{n} - (1/\epsilon)\,x - (\psi/\epsilon)\,u \qquad (22) \quad \text{(home)}$$

$$\hat{n}^* = [\sigma\epsilon\mu/(1+\sigma\mu^2)]\,\hat{n} + [\sigma\mu/(1+\sigma\mu^2)]\,x - [\sigma\psi\mu/(1+\sigma\mu^2)]\,u \qquad (23) \quad \text{(foreign)}$$

where $\mu = [(1-\alpha)+\epsilon]$. Both reaction functions have positive slopes, and the slopes are the reciprocals of one another. The home reaction function has a slope greater than one since $\mu > \epsilon$. This result is intuitively appealing. Starting at the bliss point for the home authorities, a positive $\hat{n}^*$ lowers utility by creating a negative $\hat{p}$. The negative $\hat{p}$ could be wiped out by a positive $\hat{n}$ smaller than the original positive $\hat{n}^*$ because $\hat{n}$ has a bigger effect on $\hat{p}$. However, the home authorities would not increase $\hat{n}$ by enough to restore $\hat{p}$ to its bliss value because increasing $\hat{n}$ has negative direct effect on utility.

The noncooperative equilibrium is at point a_3 where R and R^* intersect. The noncooperative employment deviations ($\hat{n}_N$, $\hat{n}_N^*$) are given by

$$\hat{n}_N = \hat{n}_N^* = (\sigma\mu x/\Delta)\,[(1+\sigma\mu^2)+\sigma\epsilon\mu] \qquad (24)$$

where $\Delta = (1+\sigma\mu^2)^2 - (\sigma\epsilon\mu)^2 > 0$. Therefore, the two identical employment deviations have the same sign as the productivity disturbance. Since the home reaction function was derived by setting the partial derivative of the home authorities' utility function with respect to the home employment deviation equal to zero ($\partial U/\partial\hat{n} = 0$), it cuts home indifference curves at points at which their slopes are zero. The home indifference curve that passes through a_3 is U_N. By an analogous argument, the foreign reaction function cuts foreign indifference curves at points at which their slopes are infinite. The foreign indifference curve that passes through a_3 is U_N^*. It is apparent that the welfare of both countries would be improved if they both expanded. In mathematical terms, at a_3

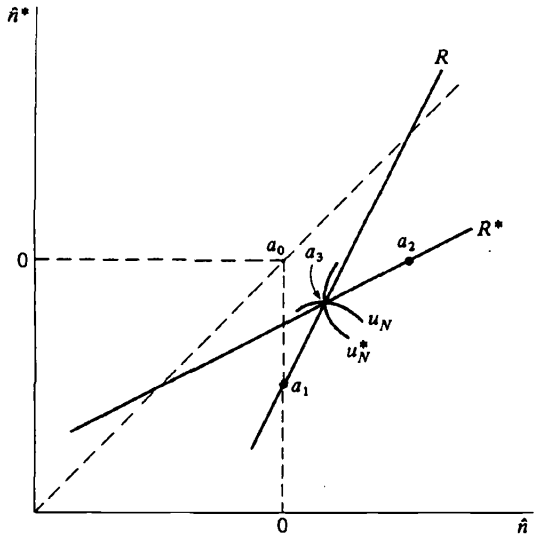
$$\partial U/\partial\hat{n} = \partial U^*/\partial\hat{n}^* = 0 \qquad (26)$$

but

$$\partial U/\partial\hat{n}^* = \partial U^*/\partial\hat{n} = -(\sigma\epsilon x/\Delta)\,[\sigma\epsilon\mu + (1+\sigma\mu^2)],$$

which is opposite in sign to the productivity disturbance. Thus, in the case of a negative world productivity disturbance, the noncooperative solution has a contractionary bias just like the noncooperative solution to the policy conflict of Corden's Figure 1.3.

However, in the case of a positive goods demand disturbance the



1A.2 Noncooperative equilibrium following a goods demand disturbance

situation is somewhat different as shown in Figure 1A.2. Following the disturbance, the bliss points for the home and foreign authorities are a_1 and a_2 respectively. The home authorities want a negative foreign employment deviation to prevent a negative home CPI deviation, and the foreign authorities want a positive home employment deviation to prevent a positive foreign CPI deviation. The noncooperative equilibrium is at point a_3. It is apparent that the welfare of both countries would be improved if the home authorities expanded and the foreign authorities contracted. Thus, in the case of a positive goods demand disturbance, the noncooperative solution has a contractionary bias for the home country and an expansionary bias for the foreign country. Whether or not the noncooperative solution has a contractionary bias for either or both of the two countries depends on the type of disturbance.

III Some general comments

In the model of this comment variations in today's money supply have no intertemporal effects because nominal wages are only fixed for one period, and all other variables are flexible. Of course, in a more complicated model, for example one with multiperiod contracts, today's policy actions would have intertemporal effects. Corden implements one possible approach to incorporating such effects. He assumes that some of today's target variables affect the utility that the authorities expect to experience

tomorrow as well as the utility they experience today. This approach is certainly unconventional and is probably not the best way to proceed. The conventional approach is to specify the utility that the authorities experience in each period as a function of that period's target variables and to take account of intertemporal effects in the equations relating each period's target variables to current, past, and expected future instrument variables. Corden makes a number of interesting observations in implementing his approach. However, he offers no convincing reasons for using his approach instead of the more conventional one, which is employed in the other dynamic analyses in the volume.

Corden concedes that the assumption of zero capital mobility limits the applicability of his analysis. He then suggests a way of introducing capital mobility. His approach involves adding fiscal policy to the list of policy instruments. It is certainly possible to introduce capital mobility into the analysis of macroeconomic policymaking in interdependent economies without adding fiscal policy as shown by Canzoneri and Gray (1983). Introducing capital mobility complicates the analysis substantially. In the model of this comment, an increase in the home money supply has no effect on foreign employment and lowers the foreign CPI. In a model in which home currency and foreign currency securities are perfect substitutes, an increase in the home money supply may increase or decrease both foreign employment and the foreign CPI. Adding fiscal policy to a two-country model with capital mobility complicates the analysis further. Counting fiscal policy, each group of national authorities has two instruments. If each group of national authorities also has only two target variables, for example unemployment and inflation, it can use its two instruments to attain bliss. Policy conflicts can arise when each group of authorities has three target variables as shown by Sachs and Oudiz (1984), who assume that each group of authorities has as target variables unemployment, inflation, and the current account. Introducing capital mobility and adding fiscal policy are both worthwhile objectives, but there are advantages to pursuing them in sequence rather than simultaneously.

NOTES

1 The deviation forms of equations (1) through (12) are obtained by subtracting each equation with the disturbances set equal to zero from the same equation with the disturbances free to take on any value.
2 Rogoff (1983) points out this implication of the assumption that the monetary authorities have full information.

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COMMENT GEORGES DE MÉNIL

This is a very good paper with which to start this conference because it puts the basic issues on the table in a condensed and powerful way. My remarks will fall into three parts:

(1) a discussion of the basic framework of Corden's study.

(2) comments on the key points of his analysis and conclusions; and

(3) a remark on some of the interesting uses to which one might put this model.

I Framework

This is essentially a two-country model of the short-run determination of income and output in a world in which prices and particularly wages adjust with lags. Output is essentially demand determined, but supply considerations imply a short-run Phillips-like relationship in each country between employment and the rate of inflation. There are three transmission mechanisms operating between countries – the traditional Keynesian trade multiplier, 'relative price' effects on the trade balance, and inflation spillovers from one country to another. Corden's view of the effects that inflation in one country has on another are interesting and provocative, and I shall have something specifically to say about that. We are in a pure floating regime and trade is assumed to be in balance at all times. There are – and this is an important point – no capital flows between the two countries. Monetary and fiscal policy act on output and inflation in each country but interest rates are completely decoupled.

Corden presents this as a limitation of the analysis and discusses how the model can be extended to cover this lacuna. But I would like to turn

this aspect of the model to good advantage by arguing that, as it stands, the model is a useful representation of the coordination problem in Europe, particularly on the Continent. As we know, extensive capital controls significantly limit capital flows in and out of France and Italy in the short run. In thinking of coordination between these two countries and the Deutsch Mark zone, it may be a useful first approximation to think of their interdependence as operating primarily through the trade account and inflation effects. In what follows, I shall therefore use Germany and France rather than Germany and the United States as prototypes of two countries exploring the possibility of economic cooperation.

II Analysis and Conclusions

Part I

I shall treat, in sucession, the first and second parts of the paper. Corden starts with a simple, short-run static model which was first presented as a seminar paper of the Stockholm Institute of International Economic Studies. In this first half of the paper, he carefully dissects the nature of the transmission mechanisms which operate through trade flows, paying particular attention to terms of trade effects. He argues that under normal conditions there will be a *positive transmission* of employment increases in one country to employment increases in another. The channel for this to which he pays the most attention operates in the following manner: expansion of employment and output in one country (say Germany) tends to improve the terms of trade in the other (say France) and thus, by raising real incomes, reduce the gap between the aspiration real wage of employees and the actual real wage. Reduction of this gap reduces inflationary pressures, and makes it possible for the French authorities to achieve any given level of employment at a lesser inflationary cost. The government actually takes the gains from this improvement in the short-run Phillips-like trade-off between inflation and unemployment partly in lower inflation and partly in more employment. Therefore employment rises in France. It is important to note, and Corden is the first to point this out, that it is not inevitable that expansion in Germany improve the terms of trade in France. In the presence of homothetic indifference curves, equiproportional expansion in the vector of outputs, would, for instance, leave the terms of trade unchanged. If the terms of trade go the other way, as they might but are unlikely to, that positive transmission mechanism would become a negative transmission mechanism.

It seems to me that, since Corden is not in a full employment world,

he could also have appealed to the traditional international trade multiplier as an additional important factor tending to produce positive transmission.

Whether the transmission is positive or negative is, of course, extremely important. It determines the nature of the loss from uncooperative behavior and the qualitative direction of the action cooperation calls for. If transmission is positive in nature, if the structure presents what Canzoneri and Gray (1983) have earlier called a 'locomotive' configuration (Corden uses the same term), then uncooperative behavior will have a deflationary bias. If, on the other hand, the transmission is negative, or the structure is what Canzoneri and Gray have called 'beggar thy neighbor', then non-cooperative behavior can have an inflationary bias. In his conclusions to this section, Corden suggests some rules that could, short of full coordination, bring France and Germany closer to their contract curve. One of these is his interesting 'unilateral expansion rule'. It is fair to point out, that, if the transmission mechanism turned out to be negative, this rule would have an inflationary bias, and would thus *not* be a Pareto improvement.

Part II

Economists frequently include the rate of inflation in government preference functions without thinking twice about it. In this part of his paper, Corden addresses the relation between inflation and welfare in an interdependent world in a provocative way.

In part I, inflation played no direct role in the architecture of transmission, because flexible exchange rates and purchasing power parity were assumed to insulate Germany's inflation from France's inflation and vice versa.

In part II, Corden argues that inflation can only be a 'good' or 'bad' if it has real effects. If inflation is an argument of government welfare functions, it must be because governments believe that an increase in inflation today reduces output in the future. The link may operate through efficiency considerations, or through the unsustainability of high inflation, but, in either case, the argument is essentially an intertemporal one about the relationship between output and employment in the present and future.

Corden therefore proceeds to formulate the relation between present and future employment, and present and future welfare within each country. He demonstrates that this new intertemporal structure can generate negative transmission mechanisms.

Personally, I would rather put the rate of inflation directly in the government preference functions. Static models such as this one are simplified representations of the world of uncertainty in which we live. In this real world, an increase in the rate of inflation generates a degree of

additional uncertainty about real incomes and their distribution which may weigh on welfare, and therefore be of concern to governments, independently of considerations of efficiency and loss of future output.

If one retains inflation in the government's preference function, and further drops the assumption of purchasing power parity, thus allowing for direct price effects, one obtains a price transmission mechanism similar to the one in Canzoneri and Gray and similar analyses. Such models can easily produce scenarios dominated by negative transmission. The 'beggar thy neighbor' aspects of real exchange rate appreciation in such models are well known.

In short, this complicated construct in the second part of Corden's paper is not required to produce Corden's result.

III Ramifications

Corden makes a number of thought provoking suggestions at the end of this paper about the broad implications of the model and possibilities for extending it. He observes that the Nash solution is particularly myopic when there are only two players. It is relatively simple in such circumstances for the players to improve on the outcome. The gains from cooperation are harder to achieve, and therefore more needing of analysis, in a multi-country context. Corden says that the relevance of his model lies, therefore, more in the light that it throws on the more complex question of multilateral cooperation than in its direct applicability to two-country relations. One example which comes to mind is that of the European Community and the continuing tensions within it over efforts to coalesce.

Corden also warns the reader about the hazards of fine-tuning. He suggests that if the Phillips curves become vertical, cooperation may be limited by the irreconcilable real wage claims of unions in the two countries.

In his discussion of possible further developments, Corden makes one surprising omission. The microeconomic structure which Corden has imbedded in his model is particularly suited for analysis of the interrelationships between money and budgets, on the one hand, and trade and tariffs, on the other. In many instances, notably within the European Community, bargaining cuts across the boundaries between macroeconomic and microeconomic policies. A deficit country may, for instance, threaten trade obstructions in an effort to persuade a surplus partner to reflate. One can hope that in further work Corden will take advantage of the fertile ground that he has already prepared for exploring such trade-offs and bargains.

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