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THE U.K. SECTOR OF THE FEDERAL RESERVE'S MULTICOUNTRY MODEL:
THE EFFECTS OF MONETARY AND FISCAL POLICIES

by

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The U.K. Sector of the Federal Reserve's MultiCountry Model:
The Effects of Monetary and Fiscal Policies

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ABSTRACT:

The purpose of this paper is to describe and to analyse in some detail the U.K. sector of the Federal Reserve's Multicountry Model (MCM). The analysis focuses on the effects of shifts in U.K. monetary and fiscal policies at three levels: 1) within the unlinked U.K. sector, 2) within the linked MCM framework, and 3) within the linked MCM under the assumption that U.K. policy shifts are coordinated with those in other countries. In comparing the unlinked MCM U.K. sector with other U.K. models such as the LBS and National Institute it is found that all the models have similar government expenditure multipliers but the components of GNP respond quite differently. The contrast between linked and unlinked simulation illustrates the importance of international feedback effects.

I. Introduction

In the last decade, policymakers appear to have become more concerned about the interdependence of the world's economies. Events such as the collapse of Bretton Woods, the quadrupling of oil prices in the early 1970's and the more recent problems of repayment of international debt of the 1980's have dramatised the importance of external factors on an individual country's economy. This change in perspective is true not only of European policymakers, but also of those in the United States. It was immediately following the international economic crises of the early 1970's that work was begun to construct the Multicountry Model (MCM), at the Federal Reserve. One of the main purposes of this model, which consists of five single-country macro models (United States, Canada, Japan, Germany and the United Kingdom)^{1/} and an abbreviated rest-of-world (ROW) sector, has been to analyse the effects of international shocks on the U.S. economy.^{2/}

The purpose of this paper is to describe and to analyse in some detail the U.K. sector of the MCM.^{3/} The analysis focuses on the effects of shifts in U.K. monetary and fiscal policies at three levels: 1) within the unlinked U.K. sector, 2) within the linked MCM framework, and 3) within the linked MCM under the assumption that U.K. policy shifts are coordinated with those in other countries.

The plan of the paper is as follows: A brief overview of the purpose and structure of the MCM is presented in Section II. The salient features of the prototype MCM country model are described in Section III. In Section IV simulation results are presented, focusing on the linkages between the U.K. and the rest of the MCM and on the difference between U.K. models and the U.K. section of the MCM. Some concluding remarks are contained in Section V.

II. Development and Structure of the MCM

The aim of the MCM project has been to develop an econometric model which could be used for simulation and forecasting exercises within the Division of International Finance at the Federal Reserve Board. Four objectives governed the project;^{4/} these were as follows:

- (1) To determine endogenously, the international transactions and important exchange rates between the United States and other major countries.
- (2) To analyse and quantify the impacts of changes in foreign economic policies and other shocks (including oil price and asset market shocks) on U.S. international transactions, exchange rates and important domestic variables, such as GNP, inflation, interest rates, and unemployment.
- (3) To analyse and quantify the effects of economic developments in the United States, including policy changes, on foreign countries and to quantify the feedback of these effects on U.S. international transactions, exchange rates, and the domestic economy.
- (4) To analyse the effects of exchange rate market intervention, both by the United States and by foreign countries.

After considerable debate it was decided to build the MCM as a system of quarterly national macroeconomic models at the center of which is a medium-sized model of the U.S. economy. Linked to this U.S. model

and to each other, are four quarterly macroeconomic models for Canada, Germany, Japan and the United Kingdom. The single models vary in size from 180 to 300 behavioural equations and identities. While the international aspects of these country models have been emphasised, each country model is sufficiently developed to be used individually as well as fully linked with other countries in the MCM framework. Also included in the system is an abbreviated sector representing the rest-of-world (ROW). This sector includes the determination of income and prices, trade flows and some OPEC financial flows.

The system has three salient features, all of which relate to the international scope of the MCM. The first is the endogeneity of four bilateral-dollar-exchange rates. In the current version of the model, exchange rates appear as dependent variables in renormalised equations for net-private-capital flows.^{5/} In these equations, exchange rates are expressed as functions of interest rate differentials, and factors affecting exchange-rate expectations (relative prices, inflation rates and cummulated current accounts) and net private capital flows.^{6/} This treatment differs from the original version of the MCM, in which exchange rates were solved for implicitly to clear the balance of payments in each country.

The second noteworthy feature is the use of bilateral trade equations rather than aggregate trade equations. These bilateral import-demand equations are used to explain each country's (and ROW's) imports from each of the other countries. The advantage of using bilateral trade equations is that the effect of a change in any bilateral exchange rate

rate which generates substitution among the competing sources can be handled explicitly. For example, if one country's currency appreciates against another's, it is possible to measure the extent to which trade between the two countries is directly affected.

In the current version of the MCM, an oil sector has been added.^{7/} The MCM now models explicitly the consumption of and trade in oil. Oil also enters the supply side, implicitly, as a factor of production. The price of oil enters as a determinant of domestic prices. In addition, an OPEC wealth (cumulated current account) variable enters into exchange rate equations (inverted asset demand equations), capturing some of the financial effects of an oil price shock.

Overall, the MCM now consists of about 1000 equations; revisions to the system are undertaken on an ongoing basis. For example, the current modelling staff is involved in reevaluating the various sectors of the model, revising the theoretical basis, and reestimating the model. A larger, more enriched rest of world sector is also being developed. The general strength of this model lies in its emphasis of international linkages. Before describing the simulation results, a brief description of the basis prototype model is presented.

III. Basic Features of the Prototype Model in the MCM

This section describes the prototype MCM model and notes how the U.K. sector differs. Prices and quantities are determined in the typical model by the behaviour of four classes of economic agents: the monetary authorities, the government, commercial banks and private non-bank sector (firms and households). The action of these agents are modelled in the goods market, the labour market, and the asset market. Each country is assumed to produce a composite consumption-investment commodity. By assumption, goods produced in the different countries are imperfect substitutes.

Aggregate demand (GNP) is broken down into six major components: personal consumption, fixed investment, inventory investment, government spending, exports and imports. Standard economic theories are used to develop these equations. Consumption depends upon private disposable income and net worth following the life cycle hypothesis. Fixed investment is based on neo-classical theory. It is positively related to current and lagged changes in income and negatively to current and lagged changes in user cost of capital. In general, the investment functions through the user cost of capital are a crucial link between the real and monetary sector in each economy. Inventories act as a buffer stock and absorb any remaining discrepancy between production and sales. Real government spending is assumed to be exogenous. Import and export of goods and services are broken down into merchandised trade, investment income, and other services. The import-demand equations are modelled bilaterally and play a key role in transmitting external influence to a given country model.

The supply side of the prototype country model, treats potential GNP as a function of the capital stock and labour force in the context of a Cobb-Douglas production function. Capacity utilisation is identified by the ratio of actual GDP to potential GDP. The labour market is assumed not to clear completely in any one period and allows for the existence of labour unions and minimum wage laws. The wage equation (expressed as a four-quarter percentage change) follows the familiar Phillips-Lipsey-Friedman approach. The change in wages is then a function of unemployment and the expected inflation rate. The expected inflation rate is represented by a distributed lag on past price changes. Prices, themselves, are determined by a markup over average costs which include wage costs adjusted for changes in labour productivity, and cost of imported imports including oil.

In the prototype model, the money market focuses on the role of reserves in the system. For a given level of unborrowed base, short-term interest rates adjust to clear the various demands for base money. To incorporate institutional differences the original MCM model builders altered the U.K. specification of the domestic financial sector. The money market is not modelled explicitly in the U.K. model.^{8/} Rather, interest rates are determined in part by the Bank of England's exogenous Minimum Lending Rate and in part by pressures in the government bond market. The main reason historically for the U.K. model to deviate so much from the prototype model is because the analysis of reserve behavior in the U.K. was complicated by the presence of two reserve ratios. In a paper by David Howard (1982) it is argued that if one added vault cash (as excess reserves) to bank deposits, that a U.K. financial sector more along the prototype model could have been developed.^{9/}

IV. Simulations

Two types of policy shocks are considered in this section: fiscal and monetary. The instruments which are used to initiate these policies are changes in the level of real government spending and changes in central bank discount rate--in the U.K. case, the Minimum Lending Rate (MLR). It is recognised that the Bank of England has implemented changes in monetary policy through instruments other than MLR. However, given the scope of the model, I shall focus on this instrument in the analysis of the effects of changes in U.K. monetary policy. Furthermore, it is assumed that the government deficit is financed by changes in the stock of sterling-denominated bonds.

The general simulation properties of the model are the product of the cyclical state of the economy as well as the model's structure. That is, when the economy is operating with slack, the response of activity and prices to an expansionary fiscal policy will differ from those that occur when the economy is at full employment. To overcome this problem one could repeat the stimuli in various time periods with different degrees of slack to derive different multiplier. Some experimentation of this was done for the fiscal shock, but the results were quite similar such that I only report one set of results.

In conducting the experiments, base-line paths are generated using actual values for all the exogenous variables. Historical simulations are used to examine the MCM because it eliminates complications introduced when forecasting exogenous variables. The residuals of the behavioural equations are added back to make the

endogenous variables follow their actual historical paths in the base-line. The model is then run to consider each policy action and compared with the base-line paths. Three simulations for each policy shock are considered. The first simulation for each policy action considers the U.K. separately and is referred to as the unlinked simulation. This type of simulation enables one to compare the MCM U.K. sector to other U.K. models. Next the U.K. sector is considered as part of the MCM and that the policy action is only undertaken by the U.K., a linked simulation. Lastly, I consider a linked simulation where all countries coordinate their policies.

The first shock considered is the autonomous increase in U.K. government expenditures. Real government expenditure is increased by approximately 10% in the second quarter of 1977. This increase which is equivalent to 2.2% of real GNP in 1977Q1, (a value of £1.36 billion based in 1972 terms) is sustained over the next five years. It is assumed that the government deficit is financed by the sale of gilts to the public. Monetary policy is assumed to be accomodating.

Table 1 reports that an increase in government spending tends to have an immediate and sustained positive effect on income. Initially, both consumption and investment increase, however, over time the long-term interest rate increases significantly because of the need to finance the government deficit. Investment falls or is crowded out as a result of these higher rates. The trade balance as well as the current account are adversely affected by the rise in government spending. Even with higher interest rates, capital inflows do not reverse the negative effects of a current account deficit. The bilateral dollar-pound

exchange rate depreciates. In general, prices tend to increase along with the higher activity while unemployment tends to decline. In this version of the MCM, fiscal policy is not completely crowded out as GNP does increase by more than government spending. There is a real balance effect in the consumption function, but because it depends in part on £M3 , private consumption is not completely crowded out. On the other hand non-residential investment is highly interest rate sensitive and the higher PSBR which leads to higher interest rates eventually chokes investment off. As noted above the exchange rate falls which crowds out U.K. net exports.

Table 2 presents a brief summary of similar fiscal simulations on the National Institute (NIESR) model and the London Business School model (LBS) provided by the Warwick Modelling Bureau. Note that both of these models are simulated over forecast periods (1985Q1-1988Q4) but a 10% increase in government expenditures is applied. The table concentrates on the components of GNP. All three models share the common feature that their intermediate government expenditure multiplier is greater than one. The GNP pattern differs between the models. The NIESR and the LBS are similar, both show smaller impact effects than the MCM, but growing over time. The change in consumption between the models is similar. Differences show up in investment and the international trade sectors. The MCM shows fixed investment responding quite a bit to the change in government spending due to changes in interest rates while the other two models do not. Likewise the MCM has a stronger import leakage effect than the other two models. This result might be due to the slightly different monetary assumptions used in the simulations. In all

three models monetary policy accommodates the growth in government spending however, in the other two U.K. models there are auxiliary assumptions about fixed nominal interest rates (LBS) and fixed real rates (NIESR).

Table 3 reports the results of an increase in U.K. Government spending when the U.K. sector is now linked to the rest of the MCM. This simulation is of interest because it allows for third party effects to feed through. This feature of linked simulation is unique; most other U.K. models cannot provide such simulations since they concentrate on the U.K. only. Table 3 shows the general pattern of the results is quite similar for the linked and the unlinked simulations. In graphs 1-5 I plot for comparison the results of GNP, prices, exchange rates, interest rates and current account. It is clear from these graphs that allowing for feedback effects in the linked simulation does alter the magnitudes of the results. Initially the path of GNP is the same, but after a few quarters the more rapid increase in interest rates in the linked simulation lowers investment which in turn lowers income. The exchange rate depreciates, which further chokes off demand. Prices are lower in the linked model than the unlinked in part due to the exchange rate. The exchange rate depreciates throughout the simulation which reflects the deficit in the trade balance. In fact, the trade balance deficit is quite a bit larger when we allow for feedback effects in the model. This result indicates that allowing for feedback effects leads to more balance of payments difficulties than is expected by the unlinked simulation. An important result, surely, for the policy maker.

An additional fiscal policy simulation is considered. In this scenario it is assumed that all the MCM countries coordinate their fiscal policies such that each country increases their government spending by 2.2% of the value of real GNP in the first quarter of 1977. Table 4 shows the effects of coordinated fiscal policy. When all the countries reflate together the effect on U.K. GNP is greater than if it had expanded in isolation. Prices rise in all countries under a coordinated expansionary policy. The increase in U.K. prices and aggregate demand is reinforced by a relatively greater depreciation of the pound. The dollar appreciates bilaterally against the pound and other MCM currencies because of a relatively larger increase in U.S. interest rates. Because the pound depreciates by so much and all countries have increased their demand for U.K. goods the trade balance deficit is smaller in the joint expansion than in the single country case. This result seems to indicate that the U.K. in terms of their income and balance of payments goals are much better off when all countries reflate together.

The second type of shock considered is the effect of the increase in the general level of interest rates caused by an increase in the minimum lending rate. The minimum lending rate is increased by 300 basis points in the second quarter of 1977 and sustained for five years until the fourth quarter of 1982. This simulation is not presented as a realistic policy experiment. The main concern is to show as clearly as possible, the various routes through which monetary policy operated in the U.K. sector of the MCM model.

The main channel through which monetary policy influences the U.K. sector of the model is through the effects of interest rates on the

components of real expenditures. In the MCM both residential and non-residential investments are functions of user-cost of capital which are themselves functions of the interest rates. Consumption is not directly affected by interest rates, only through the real balance effect. In the MCM the exchange rate is quite interest rate sensitive. A rise in the U.K. treasury-bill rate causes sterling to appreciate. This in turn exerts influences on several parts of the model, most importantly on the trade sector.

Table 5 reports the simulation results of the U.K. monetary policy shock on the U.K. sector alone (unlinked). Increased interest rates and the resulting appreciation of the home currency work to decrease demand and output. Consumption rises slightly in the first two quarters, partly because higher interest rates raise household interest receipts initially resulting in higher disposable income and partly by wealth effects. Wealth is proxied by both net worth which falls and by sterling M3, which rises throughout the period.^{10/} As a consequence of the decline in output, prices are lower and unemployment is up slightly. Short-term interest rates remain rather high because income and prices do not feed directly back into the financial market to moderate the rise in interest rates. Furthermore, short-term rates do not fully or rapidly feed through onto long-term rates. This dampened, somewhat, the decline in investment and output. Another noteworthy feature is the improvement in the current account. For this particular shock, the trade balance improves because the decline in demand reduces imports by more than the sterling appreciation depresses net exports.

I now turn to the linked simulations for monetary policy. These simulations are of interest because they permit us to illustrate the international financial transmission mechanisms. These simulations also allow us to assess when a number of countries synchronise their financial policies whether the effect on a country is markedly different from what policy-makers might expect on the basis of a single-country model result. Table 6 presents the single linked simulation results and Table 7 gives the coordinated policy shock. The main difference in the unlinked and the single linked shock is in the external sector of the model. Both the exchange rate movement and the current account movements are dampened in the linked model because of feedback effects of the other countries. However, the rise in interest rates still leads to a steady appreciation of the sterling exchange rate.

Prices, as shown in Table 6, do not fall by as much in the linked case as in the unlinked case because the exchange rate does not appreciate by as much. In general, a major change in just U.K. monetary policy does not have large real consequences in the other MCM countries because it does not affect U.K. income very much or influence monetary developments abroad. The U.K. result is more representative of a small country effect. An equivalent change in U.S. monetary policy, on the other hand, cause larger feedback effects both real and monetary in other countries.

Table 7 shows that a coordinated interest rate change results in a greater decline in U.K. income and prices than in the linked single-country shock. This result can be explained by the fact that monetary contractions in other countries depress world income and prices more.

The pound exchange rate appreciates somewhat more in the coordinated simulation than in the single linked simulation because U.K. interest rates rise by more because of increases in U.S. interest rates. However, the unlinked simulation shows more appreciation of the pound than the single linked case because the feedback effects tend to dampen exchange rate movements. Note that the results in the other four countries vary somewhat from each other. This feature is similar to the findings of OECD study by Larsen, Llewellyn and Porter (1983), where they also consider the effects of coordinated monetary policy within the OECD.

V. Conclusion

The purpose of this paper is to describe and to analyse in some detail the U.K. sector of the MCM. The analysis focuses on the effects of shifts in U.K. monetary and fiscal policies at three levels: 1) within the unlinked U.K. sector, 2) within the linked MCM framework, and 3) within the linked MCM under the assumption that U.K. policy shifts are coordinated with those in other countries. It is difficult to appraise the simulation results described in the paper because large macro models are complex and often difficult to decipher. In most respects, but not all, the properties of the MCM model accord closely with the analytical properties of a standard IS-LM framework.

I would like to draw attention to two features of the results which have been illustrated in the experiments.

The first feature is that monetary policy has a significant impact on investment in the U.K. sector, largely in the non-residential component. This is somewhat different from the results reported in Bladen-Hovell, et.al. (1982) using the National Institute model and the Treasury model and those I have reported using the National Institute and London Business School models. It reflects the MCM's specification of the two investment functions and their interest-rate responsiveness.

Secondly, the contrast between the unlinked simulation and the linked simulation especially for a fiscal policy shock, is marked. Allowing for feedback effects from the other MCM countries, illustrates an additional feature of the MCM. For the fiscal policy simulation, for example, the income stimulus in the linked simulation is substantially lower because of further increases in interest rates. Moreover, the MCM provides an interesting vehicle for considering coordinated policy action.

Table 1

UK Fiscal Policy - Single Country
Sustained Increase in Real Govt. Spending
Equal to 2.2% of 1977 Q1 GNP (1.36)

	CONS	INV	NR	IHP	IIV	TBAL	GNP	T-Rate	Loc At Rate	Bond Rate	M3	M1	CURBAL	In Rate	Prices		GNP
															%	%	
1977																	
Q2	.19			.27	-.34	1.62			.03	.14	.17	.17	-1.91	-.06		-.14	2.62
Q3	.35	.27		.54	-.44	1.81			.06	.25	.61	.33	-2.46	-.11	.01	-.22	2.91
Q4	.44	.31		.53	-.50	1.89				.37	.95	.45	-2.90	-.17	.03	-.32	2.99
1978																	
Q1	.44	.29		.55	-.59	1.79			.08	.45	.95	.46	-3.55	-.21	.07	-.46	2.86
Q2	.54	.33		.51	-.61	1.85			.08	.56	.99	.47	-3.94	-.25	.11	-.62	2.85
Q3	.60	.31		.44	-.60	1.85			.08	.68	1.05	.50	-4.00	-.26	.16	-.75	2.89
Q4	.65	.31		.33	-.59	1.79			.08	.80	1.14	.53	-4.16	-.27	.21	-.89	2.79
1979																	
Q1	.59	.29		.30	-.58	1.73			.08	.91	1.15	.53	-4.47	-.28	.26	-1.05	2.73
Q2	.70	.30		.22	-.56	1.73			.09	1.06	1.22	.53	-4.70	-.27	.32	-1.21	2.62
Q3	.80	.27		.11	-.50	1.78			.09	1.21	1.30	.58	-4.60	-.26	.39	-1.33	2.70
Q4	.86	.30		.07	-.50	1.81			.09	1.37	1.44	.63	-4.77	-.25	.46	-1.51	2.78
1980																	
Q1	.65	.26		.12	-.47	1.71			.10	1.54	1.49	.62	-5.11	-.25	.53	-1.68	2.66
Q2	.65	.25		.06	-.39	1.67			.11	1.74	1.64	.64	-4.53	-.24	.60	-1.79	2.62
Q3	.68	.21		.05	-.27	1.66			.12	1.95	1.80	.66	-3.43	-.24	.69	-1.86	2.65
Q4	.72	.19		.13	-.24	1.65			.12	2.17	2.05	.73	-2.88	-.23	.77	-1.97	2.62
1981																	
Q1	.63	.16		.13	-.18	1.62			.14	2.37	2.12	.76	-2.20	-.23	.84	-2.05	2.56
Q2	.76	.16		.17	-.18	1.67			.15	2.61	2.37	.82	-2.23	-.23	.90	-2.17	2.70
Q3	.74	.15		.12	-.17	1.71			.17	2.85	2.62	.86	-2.26	-.23	.97	-2.29	2.76
Q4	.67	.13		.08	-.14	1.70			.18	3.13	3.12	.97	-1.87	-.23	1.04	-2.35	2.68
1982																	
Q1	.50	.08		.05	-.09	1.58			.21	3.39	3.27	.95	-1.54	-.22	1.11	-2.43	2.50
Q2	.61	.05		.13	-.07	1.54			.21	3.68	3.55	.95	-1.30	-.22	1.17	-2.51	2.43
Q3	.72	.03		.19	-.04	1.56			.22	4.00	3.78	1.00	-.80	-.21	1.24	-2.57	2.45
Q4	.96	.09		.26	-.04	1.62			.22	4.30	4.05	1.10	-.34	-.21	1.30	-2.61	2.48
Annual																	
1977	.25	.19		.34	-.32	1.33			.02	.19	.41	.24	-1.82	-.08	.01	-.17	2.14
1978	.56	.31		.46	-.60	1.82			.08	.62	1.03	.49	-3.91	-.25	.14	-.68	2.85
1979	.74	.29		.18	-.54	1.76			.09	1.14	1.28	.57	-4.64	-.26	.36	-1.28	2.71
1980	.68	.23			-.34	1.67			.11	1.85	1.74	.66	-3.99	-.24	.65	-1.83	2.64
1981	.70	.15		.12	-.16	1.68			.16	2.74	2.56	.86	-2.14	-.23	.94	-2.21	2.67
1982	.70			.16	-.06	1.58			.21	3.84	3.66	1.00	-.99	-.22	1.21	-2.52	2.46

Components of GNP are in changes of billions of pounds AR
Interest Rates changes in '00 Basis Points, Current Account in Billions \$US, AR

Table 2: Comparative U.K. Model Properties
Government Expenditure Simulation
10% Increase in Government Expenditure

Year	MCM	LBS	NIESR	MCM	LBS	NIESR
	<u>Difference GNP</u>			<u>Difference Consumption</u>		
1	1.89	1.22	1.45	.44	.32	.49
2	1.79	1.49	1.65	.65	.56	.83
3	1.81	1.73	1.68	.86	.64	.75
4	1.65	1.95	1.77	.72	.62	.75
	<u>Difference Investment</u>			<u>Difference Inventories</u>		
1	.31	.07	.08	.53	.023	.28
2	.31	.07	.032	.33	.049	.11
3	.30	.06	.014	.07	.070	.05
4	.19	.03	.09	-18	.080	.04

Table 5

UK Monetary Policy - Single Country
300 Basis Point Increase in Discount Rate

	CONS	INV	NR	IHF	IIV	TBAL	GNP	T-Rate	Loc At Rate	Bond Rate	M3	M1	CURBAL	In Rate	Prices		GNP
															%	%	
1977																	
Q2	.08	-.06	.01	-.03	-.03	-.03	-.06	2.86	3.60	1.00	.69	-.41	.38	.	.67	-.10	
Q3	.04	-.09	-.01	-.02	-.07	-.07	-.13	2.86	3.32	.94	1.05	-.68	.08	.	-.01	-.21	
Q4	-.04	-.12	-.03	-.02	-.05	-.05	-.21	2.86	3.12	.89	.79	-.99	.15	.01	-.05	-.36	
1978																	
Q1	-.01	-.12	-.05	-.07	-.04	-.04	-.26	2.86	2.90	.81	.65	-1.12	.28	.01	-.11	-.41	
Q2	-.01	-.15	-.07	-.10	-.04	-.04	-.32	2.86	2.79	.80	.54	-1.19	.28	.02	-.16	-.49	
Q3	-.03	-.18	-.08	-.11	-.04	-.04	-.38	2.86	2.82	.82	.38	-1.36	.31	.03	-.19	-.59	
Q4	-.04	-.19	-.08	-.12	-.01	-.01	-.37	2.86	2.84	.84	.25	-1.51	.44	.03	-.23	-.58	
1979																	
Q1	-.01	-.19	-.07	-.12	-.01	-.01	-.35	2.86	2.84	.87	.25	-1.56	.60	.04	-.27	-.56	
Q2	-.01	-.24	-.05	-.10	-.02	-.02	-.36	2.86	2.83	.89	.16	-1.67	.66	.04	-.30	-.55	
Q3	-.01	-.25	-.04	-.09	-.02	-.02	-.37	2.86	2.83	.92	.09	-1.77	.66	.04	-.34	-.56	
Q4	.	-.27	-.02	-.09	.	.	-.33	2.86	2.83	.94	.09	-1.82	.89	.04	-.38	-.50	
1980																	
Q1	.04	-.26	.02	-.07	.02	.02	-.26	2.86	2.82	.97	.24	-1.72	1.00	.03	-.41	-.40	
Q2	.05	-.30	.03	-.05	-.03	-.03	-.27	2.86	2.83	1.00	.34	-1.64	.74	.03	-.44	-.42	
Q3	.05	-.31	.03	-.02	-.05	-.05	-.26	2.86	2.84	1.03	.48	-1.55	.38	.03	-.48	-.41	
Q4	.03	-.35	.03	.	-.04	-.04	-.29	2.86	2.85	1.06	.48	-1.58	.36	.02	-.52	-.45	
1981																	
Q1	.03	-.33	.03	.01	-.07	-.07	-.29	2.86	2.85	1.10	.48	-1.63	.07	.02	-.55	-.46	
Q2	.02	-.39	.01	.	-.06	-.06	-.38	2.86	2.84	1.14	.39	-1.72	.25	.03	-.57	-.61	
Q3	.01	-.44	.01	-.04	-.05	-.05	-.44	2.86	2.82	1.17	.42	-1.72	.52	.03	-.60	-.71	
Q4	-.01	-.49	.	-.08	.	.	-.51	2.86	2.80	1.20	.21	-1.91	.85	.03	-.63	-.80	
1982																	
Q1	.02	-.51	.	-.11	.01	.01	-.53	2.86	2.76	1.26	.14	-1.95	1.10	.04	-.66	-.84	
Q2	-.02	-.61	-.01	-.14	.05	.05	-.64	2.86	2.74	1.30	.02	-2.03	1.44	.05	-.69	-1.00	
Q3	-.06	-.69	-.01	-.16	.06	.06	-.75	2.86	2.72	1.35	-.23	-2.24	1.53	.05	-.73	-1.18	
Q4	-.11	-.76	-.02	-.18	.11	.11	-.83	2.86	2.67	1.40	-.63	-2.56	1.76	.06	-.76	-1.27	
Annual																	
1977	.02	-.07	-.01	-.02	-.04	-.04	-.10	2.14	2.51	.71	.63	-.52	.15	.02	-.02	-.17	
1978	-.02	-.16	-.07	-.10	-.03	-.03	-.33	2.86	2.84	.82	.45	-1.30	.33	.02	-.17	-.52	
1979	-.01	-.24	-.05	-.10	-.01	-.01	-.35	2.86	2.83	.91	.15	-1.70	.70	.04	-.32	-.54	
1980	.04	-.30	.02	-.03	-.03	-.03	-.27	2.86	2.84	1.02	.39	-1.62	.62	.03	-.47	-.42	
1981	.01	-.41	.01	-.03	-.04	-.04	-.44	2.86	2.83	1.15	.38	-1.74	.42	.03	-.59	-.65	
1982	-.05	-.64	-.01	-.15	.06	.06	-.69	2.86	2.72	1.33	-.18	-2.19	1.46	.05	-.71	-1.07	

Components of GNP are in changes of billions of pounds AR
Interest Rates Changes in '00 Basis Points, Current Account in Billions \$US, AP

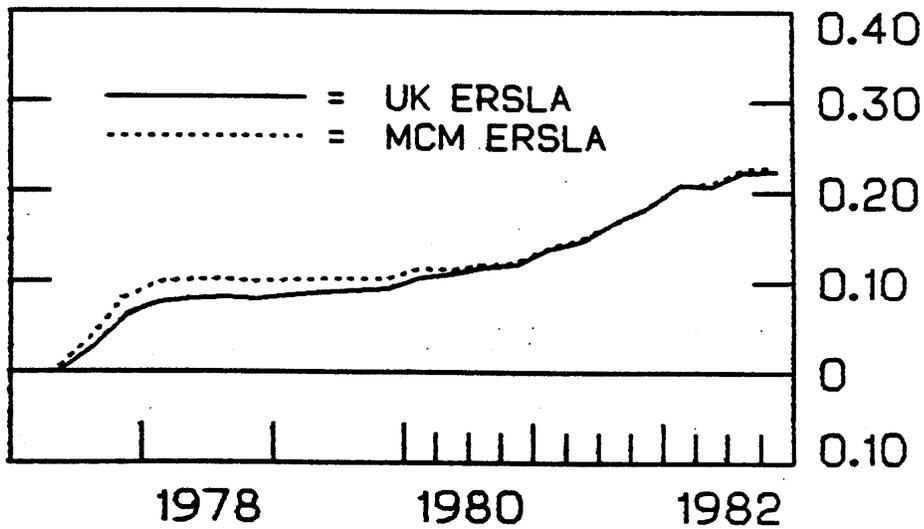
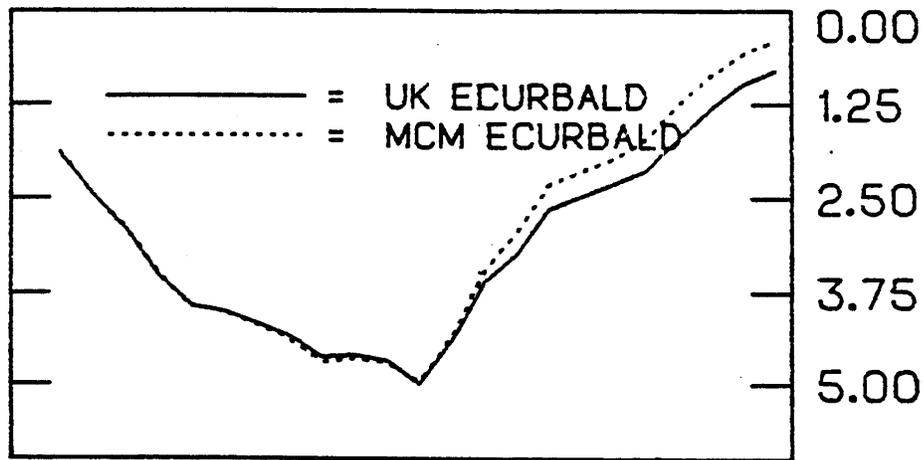
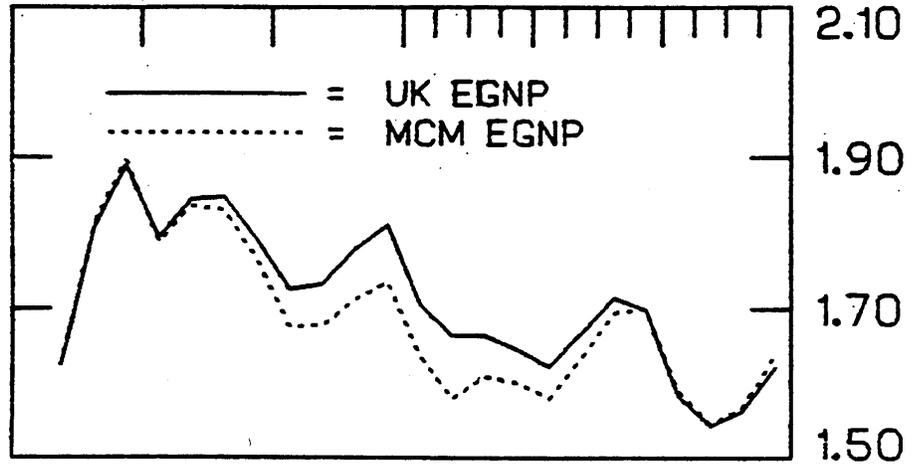
Table 7

5-Country Monetary Shock
Sustained 300 Point Basis Point Increase in Discount Rate

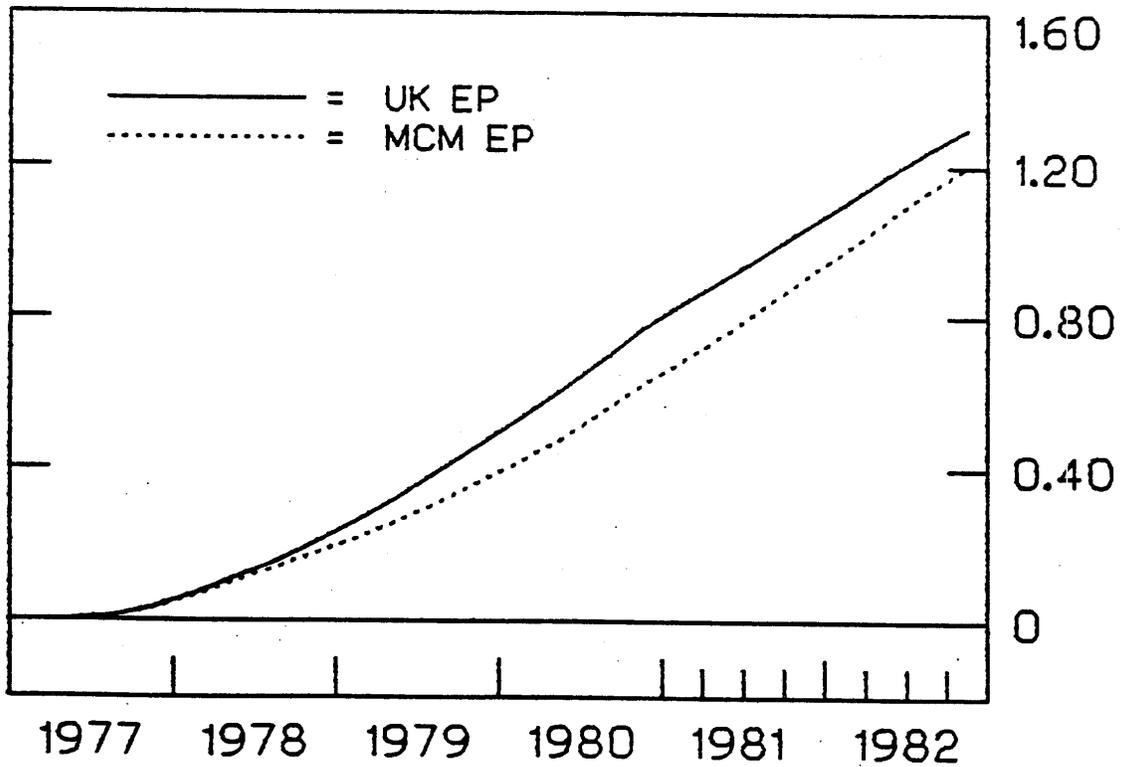
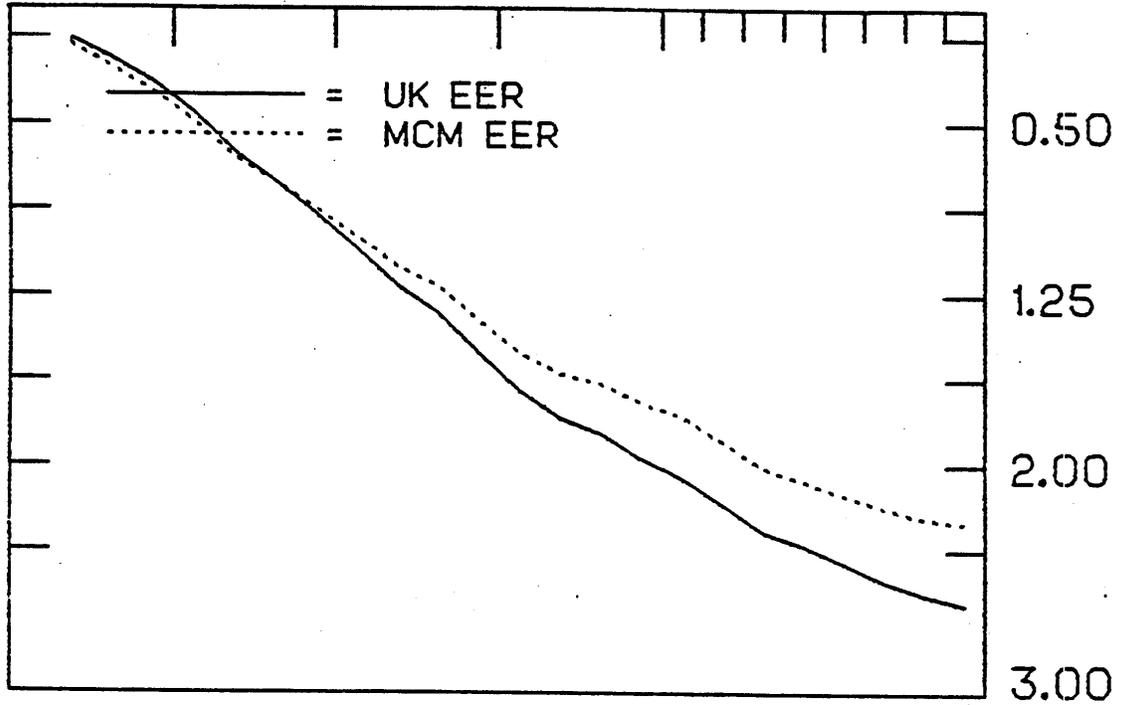
	Annual																			
	1977			1978			1979			1980			1981			1982				
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Canada																				
GNP(%)	-.16	-.18	-.28	-.43	-.56	-.67	-.75	-.79	-.65	-.45	-.51	-.79	-.71	-.50	-.47					
CPI(%)	-.01	-.02	-.04	-.06	-.10	-.15	-.20	-.46	-.65	-.70	-.66	-.36	-.59	-.69	-.68					
Interest Rate	1.90	1.51	1.18	1.03	1.05	.98	.86	.73	.70	.83	.92	.79	.71	.78	.93					
Exch. Rate(%)	-.08	-.12	-.14	-.17	-.24	-.29	-.32	-.28	-.09	-.10	-.12	-.31	-.16	.05	-.01					
Trade Balance	.07	.02	-.11	-.16	-.19	-.10	-.02	.28	.42	.55	.42	.17	.35	.54	.45					
Cur Ac Balance	-.25	-.21	-.31	-.38	-.40	-.32	-.22	.01	.02	-.26	-.81	-.07	.02	-.06	-.66					
Germany																				
GNP(%)	-.09	-.18	-.32	-.45	-.52	-.59	-.68	-.70	-.51	-.11	-.10	-.70	-.60	-.25	-.04					
CPI(%)	-.01	-.02	-.05	-.08	-.11	-.13	-.15	-.25	-.39	-.49	-.47	-.21	-.34	-.47	-.49					
Interest Rate	2.57	2.42	2.37	2.31	2.26	2.26	2.24	2.23	2.27	2.28	2.28	2.21	2.24	2.27	2.27					
Exch. Rate(%)	.06	.21	.47	.60	.59	.61	.61	.57	.99	1.16	.71	.51	.80	1.14	.89					
Trade Balance	-.08	-.18	-.23	-.24	-.15	-.13	-.13	.37	.44	-.57	-1.30	-.25	.47	-.08	-1.02					
Cur Ac Balance	.28	.29	.18	.12	.04	.06	-.09	-.05	.05	-.96	-1.81	.04	.13	-.40	-1.44					
Japan																				
GNP(%)	-.09	-.40	-.87	-1.11	-1.26	-1.59	-1.86	-2.02	-1.97	-2.02	-2.25	-2.00	-2.04	-2.00	-2.19					
CPI(%)	-.04	-.09	-.12	-.16	-.19	-.22	-.27	-.46	-.66	-.80	-.92	-.39	-.59	-.74	-.87					
Interest Rate	4.00	4.00	3.98	3.98	3.97	3.97	3.94	3.94	3.93	3.91	3.89	3.95	3.95	3.93	3.92					
Exch. Rate(%)	.41	.63	.89	1.03	1.04	1.06	1.14	1.51	2.31	2.74	2.99	1.33	2.03	2.62	2.91					
Trade Balance	-.05	-.10	-.06	-.09	-.29	-.28	-.01	.81	-.27	-.16	-.04	-.59	.73	.01	-.04					
Cur Ac Balance	-.70	-.22	-.34	-.34	.31	.63	.86	1.50	1.60	.45	.44	1.24	1.55	.78	.62					
U.K.																				
GNP(%)	-.08	-.18	-.42	-.52	-.66	-.80	-.82	-.76	-.72	-1.18	-1.94	-.79	-.67	-.93	-1.62					
CPI(%)	.09	.38	.54	.68	.77	.83	.88	1.04	1.43	1.87	2.38	.93	1.27	1.69	2.16					
Interest Rate	4.09	3.71	3.40	3.13	3.00	3.03	3.01	2.95	2.96	2.93	2.76	2.97	2.94	2.96	2.84					
Exch. Rate(%)	.21	.38	.54	.68	.77	.83	.88	1.04	1.43	1.87	2.38	.93	1.27	1.69	2.16					
Trade Balance	.20	.20	.30	.51	.60	.73	.90	1.93	1.80	2.36	3.25	1.48	1.99	1.83	2.93					
Cur Ac Balance	-.38	-.27	-.32	-.44	.54	.61	.80	1.91	1.86	2.58	4.03	1.42	2.00	1.99	3.54					
U.S.																				
GNP(%)	-.03	-.16	-.50	-.78	-.89	-.91	-.88	-.67	-.36	.14	.14	-.72	-.51	-.02	-.18					
CPI(%)	1.90	1.51	1.18	1.03	1.05	.98	.86	.73	.70	.83	.92	.79	.71	.78	.93					
Interest Rate	-.15	-.30	-.48	-.59	-.60	-.61	-.64	-.75	-1.21	-1.50	-1.46	-.66	-1.03	-1.42	-1.48					
Trade Balance	-.04	-.07	-.75	1.56	2.07	2.16	2.11	1.70	1.18	-.08	.13	1.72	1.39	-.39	-.12					
Cur Ac Balance	-.88	-1.38	-.98	-.40	-.06	-.08	-.41	-.53	.02	-1.37	-1.39	-.61	-.03	-.63	-1.49					

Interest Rates changes in '00 Basis Points,
Trade and Current Account Balances in Billions of \$US AR

COMPARISON OF UK AND MCM GOV'T POL SHOCK UNLINKED VS LINKED MODEL



COMPARISON OF UK AND MCM GOV'T POL SHOCK UNLINKED VS LINKED MODEL



Footnotes

1. Germany pertains to West Germany.
2. For a complete description of the original version of the MCM, see Stevens, et.al., (1984).
3. For a more recent update to the equations used in this paper, see Federal Reserve Board (1983).
4. These initial goals were first outlined in Berner, et.al., (1976).
5. For a complete description of how exchange rates are treated in the model, see Hooper, et.al., (1982).
6. For comparison to other U.K. models, see Andrews and Barr (1985).
7. The changes to the MCM that this entailed are explained in Tryon (1982).
8. In appendix G of Stevens, et.al., the features of the U.K. financial sector and its development are described in more detail.
9. Preliminary research along these lines are currently being considered for the MCM model.
10. Current research is being undertaken to revise this consumption equation and will be replaced shortly.

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