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FUNDAMENTAL EQUILIBRIUM EXCHANGE RATES FOR THE G7

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ABSTRACT

Fundamental Equilibrium Exchange Rates for the G7*

The Fundamental Equilibrium Exchange Rate (FEER) is the real exchange rate which produces a current account that is exactly matched by equilibrium medium-term capital flows. This paper sets out a small model to calculate FEERs for the G7 from 1971 to 1988. This model's parameters are either directly estimated or derived from the long-run properties of a larger world econometric model, GEM. Particular attention is paid to feedbacks from the FEER to the NAIRU, and interactions between world output, trade and commodity prices.

JEL classification: 431
Keywords: current account, sustainability, internal balance

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NON-TECHNICAL SUMMARY

Our discussion of Fundamental Equilibrium Exchange Rates (FEERs) is organized around the concept developed by John Williamson. The FEER is the real exchange rate path that produces an equilibrium, or trend, current account of the balance of payments that is exactly matched by 'structural' capital flows. In this paper we provide estimates for FEERs for the G7 over the period 1971-88 using the characteristics embedded in our Global Econometric Model, GEM, and compare them to real exchange paths over that period. Our analysis is 'medium-term', in that we abstract from the dynamics of the real world, but we do not discuss long-run equilibrium, largely because of the rather long time horizon involved in achieving an equilibrium associated with purchasing power parity.

The paper considers the determination of the current account in the medium term and calculates the 'trend' current account that would be associated with any particular exchange rate. The body of our analysis deals with the trade accounts of the G7 countries, using econometric estimates embodied in the National Institute's world model – GEM. We have estimates for income and price elasticities for trade in goods and in services, and we also have relationships determining the influence of world prices on each country's export and import prices. These estimates, along with trends derived from the data for the period 1970-88, are used to produce estimates of the relationship between the balance of payments on goods and services and the real exchange rate. We then consider appropriate assumptions for determining the level of internal balance, allowing in particular for the potential dependence of the NAIRU on the real exchange rate. When we look at the world economy as a whole we take into account interactions between world output, trade, oil and commodity prices. We also analyse the influence of income flows from overseas assets and liabilities on the trend current account.

We do not presume that the only *equilibrium* trend current account is a balanced current account. Structural capital flows (or equivalently, non-speculative flows) may exist for long periods of time, and they will influence the sustainable exchange rate. They may reflect changes in portfolio preference towards holding a higher proportion of total wealth as overseas assets, or differences in the rate of return on real domestic assets relative to overseas returns. In both cases these capital flows will be maintained until a new portfolio equilibrium is attained, and this may take many years. The trend current account relationship produces many possible paths for the real exchange rate, but the FEER is the only one of these which is consistent with the level of structural capital flows that we have assumed will take place in equilibrium. The FEERs vary over time not only because the structural capital flows change, but also because of divergent trends in the trade and output characteristics of the economies involved.

Our sensitivity analysis, concerning alternative assumptions about exogenous variables or possible structural shifts in trade relationships, strongly suggests a wide range of possible values for FEERs. The model suggests the US FEER represents a devaluation of the dollar compared to current (89Q1) levels ranging from 5-15%. However, an even larger range for the dollar may be prudent partly because of the unusually high and unexplained level of US imports over the last three years. The FEER for the Yen represents an appreciation of 5-15%, with the major uncertainty here concerning the structural outflow of Japanese capital. The FEER for the DM is 7-17% above current levels. In the UK a large part of the deficit in mid-1988 represented a problem of excess demand on our assumptions, but the remainder implies a FEER representing a devaluation of sterling of between 0-10%.

1. Introduction

This paper analyses the factors influencing the determination of the exchange rate in the long run. We feel that this is a useful way of approaching exchange rates which may not be at equilibrium, because there are equilibriating forces at work which may push actual exchange rates toward equilibrium. There are, of course, a number of other factors, such as real interest rate differentials, unanticipated shocks and mistaken expectations that may result in large deviations of exchange rates from their equilibrium.

We have organised our discussion around the 'Fundamental Equilibrium' exchange rate (FEER). This is the exchange rate path that produces a current account of the balance of payments that is exactly supported by 'structural' capital flows. The description of the capital flows as 'structural' is clearly crucial here, as the current and capital accounts of the balance of payments always match by definition. The, somewhat imprecise, definition of structural we shall use here are flows that are responding to long term profitability differentials and to underlying portfolio preferences. Hence these structural flows are not generated by interest rate differentials or short term exchange rate expectations. As these two factors are generally acknowledged to have a key role in determining short term exchange rate movements, then the FEER corresponds in some sense to a medium or long run exchange rate path.

The concept of the FEER stems from the writings of John Williamson (e.g. Williamson, 1983). Williamson's concern, widely shared among economists and some policy makers, is that deviations from FEER paths to a considerable extent reflect attempts by governments to export inflation through high domestic interest rates, or speculative bubbles generated by the foreign exchange markets themselves. The example of the US dollar in the early eighties is the polar case. Both types of deviation appear undesirable. However the concept of an exchange rate approaching 'its fundamentals' has been widely used by City forecasters in recent years, and calculations of FEER type numbers have been received with considerable interest in such circles, partly because of their forecasting potential. Needless to say it is also of topical importance for the current UK situation.

In this paper we provide estimates for FEERs for the G7 countries over the period 1971-88. Our estimates are based on deriving a relationship between the current account and the real exchange rate. The observed current account depends upon the actual and past values of the

factors affecting trade in goods and services, such as the real exchange rate, R, world income YW, domestic income Y and real commodity prices RCOMM, as well as upon existing stocks of overseas assets and liabilities which generate income flows. However, we wish to abstract from both the current dynamic effects of past events and from divergencies of actual exchange rates and levels of demand from their sustainable equilibrium values. Hence our analysis depends upon abstracting from these factors and deriving a projected current account based on trend levels of income and commodity prices. For any given real exchange rate we may say that trend incomes etc give us a trend current account (as a per cent of GDP), cbst, where

$$cbst = g(R, YWT, YT, RCOMMT \ldots)$$

where an appended T denotes trend values.

We do not presume that the only *equilibrium* trend current account is a balanced current account. Structural capital flows may exist for long periods of time, and they will influence the sustainable exchange rate. If there is a change in portfolio preference toward holding a higher proportion of total wealth as overseas assets, or if the rate of return on real domestic assets falls relative to overseas returns, the asset holders will not wish to maintain their pre-shift allocation of assets. The shift will generate a sequence of capital flows that will be maintained until a new portfolio equilibrium is attained, and this may take many years. We express the structural capital flow, cbss, as a proportion of nominal GDP, both because this seems natural given that GDP is a good indicator of total wealth, and also because we have chosen to scale our current balance deficit by nominal GDP. Our estimates of cbss are schematic, but they do allow us to produce an estimate of the equilibrium real exchange rate. The balance of payments is in a fundamental equilibrium when the path of the structural capital flows, cbss, is equal to the path of the trend current account, cbst. The exchange rate path, FEER, that produces this equilibrium is our fundamental equilibrium exchange rate. More formally we solve:

$$cbss = g(FEER, YWT, YT, RCOMMT, \ldots.)$$

for FEER given all the other variables. The FEER path clearly depends upon the level of structural capital flows, and hence is not unique.

Our paper produces paths over time for the FEERs which vary not only because the cbss value changes, but also because of divergent trends in the trade and output characteristics of the economies involved. Our calculations also use the historical values of the overseas asset and liability stocks, and hence the equilibrium exchange rate we calculate at each point in time depends upon the history of the actual current account. A history of deficits reduces overseas assets, and hence the income flow from them, reduces the trend current account and hence leads to a devaluation in the FEER. This, along with the use of estimated trade equations, not Purchasing Power Parity (PPP) means that our calculations are medium trem rather than long term. Our FEERs may be described as the exchange rate that would be sustainable if incomes and commodity prices returned to their trend values immediately.[1]

Section 2 of the paper considers the trade accounts of the G7 countries, using econometric estimates embodied in the National Institute's world model - GEM. Section 3 considers appropriate assumptions for the level of internal balance, allowing in particular for the potential endogeneity of the NAIRU to the real exchange rate. This section also considers a set of interrelated decisions about trends for world output, trade, oil and commodity prices. Section 4 considers income flows derived from stocks of overseas assets and liabilities, and various possible estimates of structural capital flows. Section 5 of the paper presents estimates of FEERs based on the preceding three sections. Section 6 offers a brief conclusion.

2. Trade

In this section we explain why we do not use purchasing power parities, and then we set out the structure of GEM's goods and services trade equations. These are then put together to derive an expression for the balance of payments for goods and services.

(a) Purchasing Power Parity

The concept of Purchasing Power Parity (PPP) has been used extensively to

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[1] We do not wish to imply that this is where actual exchange rates 'should be' under these assumptions. Actual exchange rates may differ from FEERs because of interest rate differentials, for example. In addition, given the forward looking nature of exchange rate determination, exchange rates may be heading for a level of the FEER in the future, which may differ from current levels.

calculate long run exchange rate levels. We do not use it here, and we begin by outlining our reasons. Purchasing power parities are the rates of currency conversion that would equalise the purchasing power of different currencies (see OECD Economic Studies 1987). At this rate of exchange a given amount of currency would buy the same bundle of goods in all relevant countries. The idea is that if exchange rates deviate from PPP, agents in one country would then buy their goods from overseas therefore setting up trade flows. These trade flows would, ceteris paribus, return the exchange rate to its PPP level.

The first point to make is that PPP calculations are only relevant to the trade side of the current account; they have nothing to say about income flows from overseas assets (known henceforth as IPD) or structural capital flows. It is still possible to use PPP calculations if they are augmented by models of these other elements.[2] However once we do this, we need estimates of the response of trade flows to deviations of the real exchange rate from PPP;[3] this requires econometric trade equations. Yet these equations also contain an estimate of the level of the real exchange rate consistent with trade balance, an estimate which is likely to differ from PPP. We believe the estimate based on econometric trade equations to be the more useful for medium term analysis. They represent the behaviour of trade flows that actually take place, rather than flows that might hypothetically occur with arbitrage. They may capture the effects of a number of non-price factors (e.g. relative quality or reliability in differentiated products) not considered in PPP calculations. Finally arbitrage itself is limited for consumers (because of travel costs etc), while for producers it involves changing production locations (to seek cheaper labour) which may take some considerable time.

We have based our calculations of the relationship between G7 trade flows and levels of the real exchange rate on the trade equations of the National Institute's Global Econometric Model (GEM). (Complete details of the model are given in GEM (1989). A shorter description is contained

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2 See Krugman (1988) and Goldman Sachs (1987) for examples.

3 Under the law of one price, deviation from PPP could potentially lead to extremely large trade flows (i.e. competitiveness elasticities approaching infinity). However this would only apply to trade in homogenous goods, while most trade probably involves differentiated products. PPP might hold when the trade account is not in balance if all supply elasticities were infinite, but we do not consider this a realistic possibility.

in Currie and Wren-Lewis, 1989). The balance of trade in goods and services can be written as:

$$BGS = XG.PXG + XS.PXS - MG.PMG - MS.PMS$$

where XG is exports of goods in 1980 prices, XS are the volume of exports of services, PXG and PXS are price indices (1980=1.0) and similarly for imports.

(b) Trade prices

In GEM traded goods prices (PXG and PMG) are functions of domestic manufacturing prices, world manufacturing prices, world primary commodity prices and the exchange rate. Traded services prices depend only on domestic or world consumer prices and the exchange rate.

Table 1. Trade Price Equations

(a) Exports

GOODS	PXGA	=	$(PCOM/r)^{B1}\ PXG^{(1-B1)}$
MANUFACTURES	PXG	=	$(WPXG/r)^{B2}\ PD^{(1-B2)}$
COMMODITIES	PCOMX	=	$WPO^{d1}WPFDC^{d2}WPFLDC^{d3}WPANF^{d4}WPMM^{d5}$
SERVICES	PXS	=	PC

Where

	US	Japan	Germany	France	UK	Italy	Canada
Share of commodities in exports of goods (B1)	.3	.09	.14	.32	.29	.19	.45
Effect of world prices (B2)	0	.22	.13	44	.32	.32	.27

(b) Imports

GOODS	PMGA	=	$(PCOM/r)^{A1}\ PMG^{(1-A1)}$
MANUFACTURES	PMG	=	$(WPXG/r)^{A2}\ PD^{(1-A2)}$
COMMODITIES	PCOMM	=	$WPO^{b1}WPFDC^{b2}WPFLDC^{b3}WPANF^{b4}WPMM^{b5}$
SERVICES	PMS	=	PCW/r

Where

	US	Japan	Germany	France	UK	Italy	Canada
Share of commodities in imports of goods (A1)	.5	.73	.46	.46	.40	.56	.28
Effect of world prices (A2)	0.4	0.6	0.6	0.8	0.7	0.9	0.9

r: exchange rate

PC. consumer prices, domestic currencies

PCW: world consumer prices, dollars

WPO: oil price, dollars

WPFDC: developed country food prices, dollars

WPFLDC: less developed country food prices, dollars

WPANF: agricultural non food prices, dollars

WPMM: metals and minerals price, dollars

WPXG: world manufacturing export prices, dollars

PD: domestic prices, domestic currency

(c) Shares of commodities in commodity trade

		US	Japan	Germany	France	UK	Italy	Canada
Oil	export d_1	.09	78	.29	.28	.23	.29	.15
	import b_1	.62	.57	41	.50	.22	.44	41
Food	export d_2	.63	.11	.36	.53	.24	.35	.27
	import b_2	.06	.11	.21	.16	.24	.17	.17
LDC	export d_3	0	0	0	0	0	0	0
	import b_3	.10	.05	.07	.06	.08	.05	.11
ANF	export d_4	.17	.11	.07	.06	.04	.06	.24
	import b_4	.06	.12	.09	.09	.10	.13	.07
MM	export d_5	.13	.00	.29	.13	48	.31	.31
	import b_5	16	.15	.22	.19	.36	.20	.25

Parameters B2 are estimated econometrically. As we might expect, the size of the B2 parameter varies with the openness of the economy. The relatively closed economy might also be associated with a value of A2 below unity, but in GEM A2 is less than unity only for the US. This is clearly unrealistic, and so we have imposed alternative parameter values here. The remaining parameters come from an analysis of the commodity composition of G7 trade and are part of GEM.

(c) Trade volumes

The long run structure of the model's trade in goods volume equations are given in Table 2. (For the moment we ignore complications in the case of the US, Japan and the UK due to oil trade.) The volume of exports of goods is related to a country specific measure of world trade that weights each export market by its importance to the exporting country, with an elasticity ($\gamma 2$) at or near one, manufacturing export price competitiveness and in some cases a trend. We have a similar structure for exports of services. Imports are normally related to an activity variable and the ratio of domestic manufacturing prices to a weighted average of competitors manufacturing export prices. This second variable is a convenient measure of the 'real exchange rate'.

Table 2. Trade Volume Equations

(a) Exports

All goods $XGI = \gamma_0 RX^{\gamma 1} S^{\gamma 2} e^{\gamma 3 T}$

(except the UK, where oil is excluded)

Services $XS = \theta_0 RS^{\theta 1} YW^{\theta 2} e^{\theta 3 T}$

Where

RX: export competitivess = WPXG/(r PXG)

RS: real exchange rate for services

S: world trade weighted by importance of markets

YW: world (major 7) GNP

	US	Japan	Germany	France	UK	Italy	Canada
γ_1	0.5	0.8	0.4	0.6	0.5	1.5	1.2
γ_2	1.0	1.0	1.0	1.0	1.0	1.0	0.8
θ_1	0.6	1.4	0.5	0.3	1.0	0.9	0.5
θ_2	1.1	1.5	1.6	1.0	1.1	1.2	1.2

(b) Imports

All goods (except Japan, US and UK where the equation excludes oil)

$$MGI = \delta_0 R^{-\delta 1} Y^{\delta 2} e^{\delta 3 T}$$

Services $MS = \psi_0 RS^{\psi 1} Y^{\psi 2}$

Where $R = WPXG/(r \ PD)$

Y = domestic GDP

	US	Japan	Germany	France	UK	Italy	Canada
δ_1	0.6	0.5	0.3	0.3	0.4	1.2	0.7
δ_2	2.8	1.4	2.1	2.0	2.0	1.5	1.5
ψ_1	0.9	0.8	1.1	1.0	0.5	0.8	1.0
ψ_2	1.0	1.0	1.8	1.8	1.3	1.5	1.2

Table 2 gives the estimated income and competitiveness elasticities from GEM.[4] (An exception is the UK, where elasticities are based on both GEM and the Institute's domestic model; see Wren-Lewis, 1989, for a brief description of the latest version, Model 11.) We could also use these equations to derive estimates of the constants and trends. However for this exercise we have adopted a simpler procedure, where we estimate these coefficients directly for each country over the same data period (1970 to 1988) assuming the values of the activity and competitiveness elasticities given above. We also make no allowance for lags on these effects.[5] The advantage of this somewhat mechanical procedure is that it allows us to change assumptions about, say, competitiveness elasticities easily without at the same time distorting the observed historical trends in import or export behaviour.[6]

Table 3 gives the estimated trends for the G7 trade equations given

[4] Not all of GEM's estimated equations contain directly comparable competitiveness measures. They can all, however, be approximately converted to an equivalent relative price measure.

[5] From cointegration theory it is not clear that we should. Further work might usefully investigate the cointegrating properties (or otherwise) of these regressions.

[6] A far simpler option, which we did not adopt, would be to assume historical levels of trade were on trend, once we had allowed for activity and real exchange rate levels. This option would have had the major disadvantage of producing a highly volatile series for the FEER.

the elasticities from Table 2. (We do not report the constants as they are not intrinsically interesting, although they are crucial in determining the level of the FEER.) These trend terms are crucial in determining movements in the FEER over time. For example the relatively large positive trend in the Japanese export equation, implying that Japan steadily gains export market share, will tend to imply an appreciation in the Japanese FEER over time. The opposite applies to the UK. We will therefore return to these parameter values when we examine the FEER in section 5.

Table 3. Trends in trade volumes

	US	Japan	Germany	UK	France	Italy	Canada
Exports goods	0.0023	0.0065	0.0016	-0.0026*	0.0024	0.0010	-0.00179
services	0.0028	0.0056	0.0004	-0.0040	0.0074	-0.0009	0.0014
Imports							
goods	0.0019*	0.0004*	-0.0001	0.0034*	0.0012	-0.0008	-0.00195
services	0.0009	-0.0013	-0.0011	-0.0028	0.0014	-0.0018	0.0005

* Non-oil

(d) The balance of trade in goods and services

We can put all these equations together to produce an expression involving all the factors we think affect trade in goods and services. This produces an expression for the long run value of the balance on goods and services, and in order to make this comparable both over time and between countries it is useful to scale this variable by nominal GDP.

$$bgs = \frac{BGS}{Y.PY} = \gamma_0 R^{\gamma 1(1-\beta 2)} S^{\gamma 3} e^{\gamma 3T} rcom^{B1} R^{B1} + B2(1-B1)_{PD/(PY.Y)}$$

$$+ \theta_0 (PCW/r.PC)^{\theta 1} YW^{\theta 2} e^{\theta 3T} PC/(PY.Y)$$

$$- \delta_0 R^{-\delta 1} Y^{\delta 2} e^{\delta 3T} rcomm^{A1} R^{A1+A2(1-A1)} PD.Y^{-1}/PY$$

$$- \psi_0 (PCW/r.PC)^{-\psi 1} Y^{\psi 2} e^{\psi 3T} PCW.Y^{-1}/(r.PY)$$

where R = WPXG/(rPD) is our measure of the real exchange rate (note an increase implies a depreciation). We have, for economy of notation

replaced the five real commodity price indices by rcomx = PCOMX/WPXG, for exports, and by rcomm = PCOMM/WPXG for imports.

There are a number of price terms in this equation, but as we are interested in the underlying structure it is possible to reduce them so that we only have world export prices and wholesale prices for each country. We assumed that the domestic indices, PY and PC are related to PD with a time trend:-

$$PY = a_0 PD e^{a1T}$$
$$PC = a_2 PD e^{a3T}$$

and we also assume that world consumer prices are related to world export prices

$$PCW = a_4 WPXG e^{a5T}$$

where PY is the local GDP deflator.

Using these relationships gives the fundamental equation for the balance of goods and services as a per cent of GDP:-

$$bgs = c_0\ rcom^{C1}{}_R{}^{C2}{}_S{}^{C3}{}_Y{}^{-1} e^{C4T} + C^5{}_R{}^{C6}{}_{YW}{}^{C7}{}_Y{}^{-1} e^{C8T} - C_9\ rcomx^{C10}{}_R{}^{C11}{}_Y{}^{C12} e^{C13T} - C_{20} R^{C21}{}_Y{}^{C22} e^{C23T} \quad (1)$$

where

$$C_0 = \gamma_0/a_0$$
$$C_1 = B1$$
$$C_2 = \gamma_1(1 - B2) + B1 + B2 - B1B2$$
$$C_3 = \gamma_2$$
$$C_4 = \gamma_3 - a_1$$
$$C_5 = \theta_0(a_4/a_2)^{\theta 1} a_2/a_0$$
$$C_6 = \theta_1$$
$$C_7 = \theta_2$$
$$C_8 = \theta_3 + (a_3 - a_1) + \theta_1(a_5 - a_3)$$
$$C_9 = d_0 - a_0$$
$$C_{10} = A1$$
$$C_{11} = A1 + A2 \_ A1A2 - \delta_1$$
$$C_{12} = \delta_2 - 1$$
$$C_{13} = \delta_3 - a_1$$
$$C_{20} = \psi_0(a_4/a_2)^{-\psi 1} a_4/a_0$$
$$C_{21} = 1 - \psi_1$$
$$C_{22} = \psi_2 - 1$$

$C_{23} = \psi_3 + (a_5 - a_1) - \psi_1(a_5 - a_3)$

Some of the more interesting coefficient values are displayed in Table 4. Most of the 'activity' elasticities on the exports of goods equations (c_3) are unity, so the trends (c_4) indicate changes in market share over time for given competitiveness. The fact that the UK has the largest negative trend (about 1% p.a.) is no surprise. More surprising is that the US, rather than Japan, has the highest. This reverses the ordering in Table 3, and is due to the fact that while the US GDP deflator tends to rise less rapidly than the price of manufactures, the opposite is the case in Japan. However the same factor counts against the US, and in favour of Japan, when we consider the trend in the imports share.

Table 4. Selected C Parameters

	US*	Japan	Germany	UK	France	Italy	Canada
Trends (% p.q.)							
XG C_4	0.4	0.2	0.1	-0.2	-0.0	-0.1	-0.1
XS C_8	0.5	0.3	0.1	-0.2	0.7	-0.1	0.3
MG C_{12}	-0.0**	-0.4**	-0.1	0.4**	-0.2	-0.3	-0.1
MS C_{23}	-0.1	-0.4	-0.1	-0.1	0.1	-0.1	-0.2
'Activity'							
XG C_3	1.0	1.0	1.0	1.0*	1.0	1.0	0.8
XS C_7	1.1	1.5	1.6	1.1	1.0	1.2	1.2
MG C_{12}	1.8**	0.4**	1.1	1.0**	1.0	0.5	0.5
MS C_{22}	0.0	0.0	0.8	0.3	0.8	0.5	0.2
Competitiveness***							
XG C_2	0.8	0.9	0.6	0.8*	0.9	1.3	1.5
XS C_6	0.6	1.4	0.5	1.0	0.3	0.9	0.5
MG C_{11}	-0.0**	0.3**	0.5	0.4**	0.6	-0.2	0.2
MS C_{21}	0.1	0.2	-0.1	0.5	0.0	0.2	0.0

* Non-oil only ** C_{12} and C_{22} relate to shares in GDP

*** C_{11} and C_{21} include the terms of trade effect

For imports of goods, we do need to take the trends with their associated activity elasticities. For example, if GDP in Japan grew by 1 per cent per quarter, import volumes would also rise by 1 per cent (1 + 1 x 0.4 - 0.4). If all countries GDP grew at the same rate, then among the

G3 the US import propensity stands out, while Japan appears to have the lowest propensity to import over time. Among European countries the UK has the highest import propensity, followed by Germany and France, with Italy the lowest.

Taken together, the competitiveness parameters give an idea of how far the real exchange rate has to move to alter the current account. Overall German elasticities appear on the low side, while Italian elasticities are fairly large, but differences are not substantial.

Equation (1) can be written more briefly as

$$bgs = f(rcom, R, S, Y, YW, Time) \qquad (2)$$

In the next section we consider how to determine trends for domestic GDP, and 'world' aggregates like world trade and commodity prices. There is, however, one additional feature of our treatment of trade volumes. The GEM model separates out oil imports for the UK, US and Japan, and oil exports for the UK. The structure of the equations is similar to that of our other trade equations, except that we allow for various split time trends to pick up changes in domestic oil production and shifts in oil consumption. The relative price term is the real oil price times the real exchange rate.

The relative price and activity elasticities for imports are given below.

	US	Japan	UK
Real oil price			
a_1	0.6	0.3	0.0
Activity elasticity			
a_2	2.5	1.4	1.6

The US has both a relative high price elasticity and a high income elasticity because imports are small relative to US domestic production, and given the relative protected nature of the US oil market imports are marginal to US oil consumption, and hence take up much of the effects of changes in prices and incomes. In contrast Japan imports most of its oil, and as a consequence both the income and price elasticities are lower. UK exports depends positively on real oil prices with an elasticity of 0.2. We have split the Japanese trend in 1980, the US

trend in 1978 and the UK trend in 1975 and 1983 in an attempt to capture the shifts mentioned above.

3. Internal balance and world trends

In equation (2), we need to endogenise or explain both domestic GNP and a number of world aggregates before we can use this relationship to relate trade balances to the real exchange rate alone. Our initial calculations simply involved fitting exponential trends to all these series, and taking the fitted values from these regressions as the 'trend' values of these variables. For world aggregates, this ignores potentially important interrelationships between, say, world activity and real commodity prices. More seriously, however, such a procedure ignores potential feedback from the real exchange rate to 'trend GNP'.

(a) Internal balance

The concept of trend GNP appropriate to our calculations is one of 'internal balance', or a NAIRU; a level of activity at which inflation is constant. In GEM, as in any model based on imperfectly competitive goods and labour markets, the NAIRU is determined through the interaction of the model's wage and price equations. These can be written in the following stylised form:

$$\text{Price equation: } p = a_3 w + (1 - a_3)m + a_4 Y + a_6 Z_p \qquad (3)$$

$$\text{Wage equation: } w - p = a_1 Y - a_2(m - p) + a_5 Z_w \qquad (4)$$

where w is the log of nominal earnings

p is the log of consumer prices

Y is the log of real GNP

m is the log of import prices

and Z_w and Z_p are vectors of other variables.

In the price equation the mark-up on prime costs may depend on the level of activity. Activity may influence real wages in the wage equation directly, or indirectly through unemployment. The term in real import prices in the wage equation allows for the influence of higher import prices on consumer prices not to be automatically passed on to wages. A large value of a_3 could be interpreted as reflecting employer power in determining the wage bargain. The relationship between output and the real exchange rate can be derived from (3) and (4) is

$$Y = a_7 (m - p) \qquad (5)$$

where $a_7 = (1 - a_3 - a_2a_3)/(a_1a_3 + a_4)$

In general a rise in real import prices (due, for example, to a depreciation) will reduce the non-inflationary level of activity. In simple terms both unions and firms can be thought of as trying to determine the real wage, and the level of activity adjusts to reconcile these two claims. If real import prices rise, workers real wages fall. In general workers will attempt to claw back some of this loss, but there is no reason why firms should accept the consequent decline in profitability. The two claims can only be reconciled (i.e. inflation stabilise) if activity falls.

The sensitivity of the level of non-inflationary activity to real import prices obviously depends on the size of the two pressure of demand effects a_1 and a_4. If real wages are insensitive to demand, for example, quite large changes in activity will be required to restore equilibrium after a change in the real exchange rate. Equally crucial is the parameter a_2. If a_2 is large enough, it may eliminate any relationship between internal balance and the real exchange rate.

Table 5 gives values for these key parameters derived from GEM.

Table 5. NAIRU parameters from GEM

	US	Japan	Germany	France	Italy	Canada
a_1	0.25	1.12	0.56	0.75	1.14	*
a_2	0.11	0.08	0.04	0.00	0.08	*
a_3***	0.92	0.88	0.81	0.80	0.78	*
a_4	0.3	1.3	0.2	1.0**	0.0	*
a	0.0	0.04	0.35	0.16	0.22	0.0

* In the Canadian model, the wage equation is a Phillips curve, as no correctly signed real wage term could be found. As the unemployment/activity relationship is also independent of real wages, then activity is independent of real import prices.

** In this case a parameter was imposed, as its estimated value was implausible.

*** Here we have simply taken one less the share of imports in total

TFE.

A noticable result is the large values of a_2 in the US and Japan, and the low values in Europe. In the Institute's UK model, the value of a_2 is zero, as it was incorrectly signed in estimation. Thus the sensitivity of the level of internal balance to the level of real import prices is small for the US and Japan (even allowing for the relatively minor role for import costs), but much greater for the European countries including the UK. This result it very similar to the findings of Layard and Nickell (1985), in a study of Europe, Japan and the US that paid considerably more attention to other influences on the NAIRU than does GEM.

This analysis allows us to specify a relationship for trend GDP of the following form:

$$Y = Y_0 R^{-Y1} \, rcom^{-Y2} e^{Y4.TIME} \qquad (6)$$

where $Y1 = a_7(A1 + A2 - A2A1)$

$Y2 = a_7 A1$

using the relationship for real import prices given in Table 1. For the US, Japan and Canada, we assume for simplicity that $a_7 = 0$, which seems to be in line with both GEM and other econometric estimates. For the European countries we present estimates based on $a_7 = 0.20$ for each country. Even this apparently small value for the sensitivity of supply to the real exchange rate changes our estimates of FEERs substantially.

In principle we could derive trend GDP by using the predicted values from equation (6), in a similar manner to our trade equations. However, unlike the trend equations, (6) can hardly be regarded as a complete model of medium-term GDP. As a result, for the US, Germany, France and Italy we have adjusted the mid-88 level of trend GDP implied by the estimated equation. To ensure that the trend line passes through the mean of the data, we have also made corresponding small adjustments to the trend. Table 6 gives our estimates of trend output growth and the current level of excess (or deficient) output.

Table 6. Trend GDP levels and rates of growth

	US	Japan	Germany	UK	France	Italy	Canada
Trend output growth at an annual rate	2.8	4.2	2.3	1.5	2.4	2.5	3.5
'Excess Output' in 1988Q2	1.0	-0.1	-2.0	2.7	-2.7	-1.3	0.0

Japan appears to be currently at trend, a result which is in fact consistent with estimates of (6). Both the US and the UK are above trend, while we assume that Germany and France currently have spare capacity. This last assumption is partly influenced by our view that the NAIRU in Germany and France will have fallen as a result of the fall in oil prices and the appreciation of the DM.

(b) Endogenising world aggregates

Turning to world aggregates, our assumptions about trends in world (major 7) GNP can clearly be derived from aggregating (6) across the G7. This gives us:

$$YW = YW_0 rcom^{-YW1} e^{YW2\ TIME}$$

where YW_i is derived from a weighted sum of each Y2 parameter. We have ignored the effect of each country's real exchange rate on world activity for simplicity, although in practice the aggregation assumptions required for this to be correct do not hold.

In each country's export equation, we have a country specific world trade measure, to allow for different rates of growth of export markets. In particular Japanese export markets have growth by about 1 per cent more per annum than other countries, reflecting the importance of Far East NICs in Japanese trade. Like world output, world trade is likely to depend on world commodity prices, and in particular world oil prices. To capture this, we set up an equation for each country's export market share variable (S) of the form

$$S = S_0 (YW - Y)^{S1} + \Sigma_i S_i\ rcom_i$$

Export market growth is related to world GDP, excluding the country's own GNP. The parameters S_0 and S_1 were estimated from 1970 to 1988. (An alternative would be to aggregate the D_2 parameters to derive S_1. This should give similar results.) The S_i parameters, where commodities were broken down into four separate categories including oil, were imposed on the basis of GEMs non OECD trade blocs and its 1980 trade matrix. These parameters reflect the effect on exports of a rise in the price of the commodity, and as such are a combination of the effect of the commodity price rise on the imports into the LDCs and of the importance of the particular LDCs to each of the major 7.

Export market growth parameters*

	US	Japan	Germany	UK	France	Italy	Canada
S1(GNP)	1.434	2.137	1.456	1.5008	1.372	1.538	1.33
S2(Oil)	.0888	.148	.0816	.1006	.1077	.139	.0403
S3(LDC Food)	.023	.016	.011	.0121	.025	.012	.0086
S4(ANF)	.0036	.0037	.0048	.0041	.0088	.003	.0029
S5(Metals)	.0064	.0041	.015	0.006	.017	.0057	.0107

* Note S1 is an elasticity whilst S2-S5 are semi-elasticities.

GEM contains equations for all non-oil commodity prices, which in the long run are primarily related to the level of world activity,.

$$rcom_i = rc_{1o}\ YW^{rc11}roil^{rc12}e^{rc13.TIME}$$

Only metal prices are related to real oil prices in the long run. GEM's parameters are discussed in detail in Barrell and Eastwood (1988). As with our trade equations used in the paper, we have estimated the constant and trend terms directly from the data.

All our real non-oil commodity price equations contain negative time trends representing the combined effects of technical progress in commodities production and a declining materials intensity in advanced countries production and consumption structures. In the second quarter of 1988 metals prices were 10 to 15 per cent above trend, whilst developed country food prices were 5 per cent below trend and developing country food prices were 20 per cent below trend. Metals prices surged at the end of 1987, and they had previously been well below trend. Developing country food prices have been weak relative to trend throughout the 1980s, largely because of the overproduction of

substitutes by the US and the EC. The strength of output growth in the major 7 during 1988, along with the US drought, has led to a strengthening of commodity prices, and we estimate that both developed country foods and agricultural non-food prices are now (1989Q1) on trend. Metals prices are probably 15 per cent above trend and developing country foods only 15 per cent below trend.

This leaves real oil prices. Given the importance of oil trade our choice here is likely to be crucial in influencing our results. At one end of a spectrum of possible assumptions would be to simply use historic levels of real oil prices, or a stylised version of them. This would produce a highly discontinuous path for FEERs and at this initial stage it seems sensible to abstract from such movements. At the other extreme we could have fitted a trend through all the historic data, but this would naturally lead to a very high level for trend real oil prices in 1988. Instead we adopted an alternative trend path, which involved real oil prices rising at their trend rate until 1980, and then staying flat (at about $20 barrel in current prices) thereafter. This means that the oil price that goes into our FEER calculation is substantially lower than historic prices from 1974-1986, but above observed levels thereafter. In mid-1988 oil prices were weak, and were over 20 per cent below trend at only 40 per cent of their real 1980 levels. As with other commodities, oil prices have recently strengthened and are currently (end 1989Q1) almost exactly on trend.

4. IPD and Structural Flows

(a) IPD flows

Section 2 derived estimates of the trend balance of payments for goods and services, but for full current account balance we also need to analyse the effects of exchange rate changes on flows of income from overseas assets and liabilities (IPD flows) as well as the net flows of unrequited transfers by persons and goverments (Net Tran). The overall equilibrium current balance to gdp ratio can be written as:

$$cbs = bgs + [(CPID - DIPD) + Net\ Tran]/(PY^{*}Y)$$

where CPID are IPD credits and DIPD are IPD debits.

We can generally assume that all IPD debits are in domestic currency, whilst credits would generally be in foreign currency. (This is not true for the UK and the US where there are large overseas banking

sectors, and we have attempted to make an allowance for this in our calculations.) Changes in the exchange rate will affect the balance on IPD through effects on credits, and we can write the equation:

$$bipd = k + cipd\ (R_{base}/R)$$

where R_{base} is the historical real exchange rate and R is the counterfactual real exchange rate that we use in our FEER calculations.[7] We have decided to treat NetTran as exogenous, and as determined in domestic currency. The addition of endogenous IPD flows to the trade accounts of the G7 ensures in all cases that a devaluation will, in the short to medium run at least, improve the current account.

(b) Structural capital flows

Our concept of a medium term FEER depends crucially on a distinction between 'structural' capital flows, and capital flows that depend on interest rate differentials, which we might label as 'speculative' In a steady state equilibrium, both real interest rates and real exchange rates should be constant, and so speculative capital flows will be zero. However it seems unreasonable, from a medium term perspective, to consider a steady state in which all real returns, including those on fixed capital, are equalised.

Direct investment will take place when profits to be earned abroad are higher than at home. Adjustment costs for real investment are large, and it could take many years of capital flows to produce equivalent real rates of return on direct investment in different countries. Among the major 7 German direct investment outflows have been proportionately the largest, but they still only amounted to 14 per cent of the existing stock of assets. Unfortunately identifying structural capital flows with direct investment alone would be misleading. The timing of direct investment may depend on speculative considerations. Portfolio investment may also depend on longer term profitability consideration. Finally even if portfolio holders are primarily interested in short term gains, their preferences between assets may change gradually over time.

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[7] The World Economy Chapter in the February 1989 *National Institute Economic Review* (by R. Barrell and A. Gurney) contains estimates of the scale of IPD flows and the November 1988 *National Institute Economic Review* World Chapter reports on our research into invisibles.

It should be clear how difficult it is to quantify the notion of a structural capital inflow. The concept is one of flows that would take place in a steady state in which the real exchange rate is on its equilibrium path. These would comprise mainly direct investment, as in the case of Germany, and flows due to shifts in portfolio preferences; as in the case of Japan. Unfortunately empirical work does not exist which can separate these flows from speculative movements. As a result, our decisions here are fairly broad brush, and some sensitivity analysis is clearly required. Table 7 gives our judgements on what we consider to be structural capital flows. There is no requirement that they sum to zero, as structural flows to non-G7 countries may be substantial. In practice our assumptions imply a modest outflow from the G7, which seems plausible.

Table 7. Structural capital flows as % GDP

	US	Japan	Germany	France	Italy	UK	Canada
70Q1-77Q4	0.0	0.0	1.0	0.0	0.0	0.0	0.0
78Q1-78Q4	0.0	0.0	2.0	0.0	0.0	0.0	-1.0
79Q1-81Q4	0.0	0.0	2.0	0.0	0.0	1.0	-1.0
82Q1-85Q4	-1.0	1.0	2.0	0.0	0.0	1.0	-1.0
86Q1-88Q2	-1.0	2.0	2.0	0.0	0.0	0.0	-1.0

We can now write the complete model that we use to determine FEERs. At the world level we have:

$$YW = YW_0 rcom^{-YW1} e^{YW2TIME}$$

$$rcom_1 = rc_{1o} YW^{rc11} roil^{rc12} e^{rc13TIME}$$

roil exogenous

These equations determine trend levels of world activity and world commodity prices including oil. For each G7 country we have:

$$Y = Y_0 R^{-Y1} rcom^{-Y2} e^{Y4TIME}$$

$$S = S_0 (YW - T)^{S1} \Pi_i \, rcom_1^{Si}$$

$$cbs = f(rcom, S, Y, YW, R, TIME) + k + cipd\ (R_{base}/R)$$

In calculating the FEER, cbs is exogenous (= structural capital flow, cbss) and FEER = R.

5. FEERs - Empirical Results

Charts 1-7 give our central estimates of FEERs for each G7 country, together with the actual real exchange rate. Note that a rise implies a depreciation, and that the real exchange rate and the FEER are defined in terms of (mainly) manufacturing prices. Given limitations of space, our discussion will focus on the US, Japan, Germany and the UK.

Chart 1 records the massive real appreciation in the dollar that began in 1980, and continued until 1985 when it was reversed. The FEER only follows the appreciation in 1980 to the extent that we have assumed a change to a structural current account deficit in that year. (We have deliberatly not smoothed this change so that its effect on the FEER, involving an appreciation of about 15 per cent, is transparent.) This apart, changes in the FEER are relatively smooth as we would expect.[8]

The FEER depreciates substantially in the early period, partly as a result of rapid growth in oil imports. Around 1976 this growth in oil imports is reversed, and for a time the FEER appreciates. However, leaving aside the jump in the FEER in 1980 caused by our assumption of a move to structural deficit, this trend appreciation in the FEER gradually becomes a trend depreciation in the 1980s. The reason for this is shown in Chart 8, which gives the recorded balance of US IPD flows. This surplus increased steadily to become almost 2 per cent of GDP by 1980, but after 1982 it has deteriorated substantially following the large US current account deficits.

Of particular interest is, of course, the relationship between the FEER and the actual real exchange rate. As the US deficit in mid 1988 was about 2½ per cent of GNP, compared to a target of 1 per cent, it would appear as if the FEER must represent a devaluation of the dollar compared to current levels. However this abstracts from possible differences between the recorded current account and what we term the trend current account; that is, the predicted value of cbs from our model treating the real exchange rate as given. It is difference between the

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[8] Erratic movements are largely due to our use of IPD data, which has only been averaged over the past year to compute the trend current account. We could have smoothed IPD flows over a longer period, but if this was done using past data it would have made our FEERs too backward looking, while if a centred moving average was used then we would require an IPD forecast to compute current FEERs.

trend current account and the structural current account which represents the gap that is left over for the real exchange rate to close to get to the FEER. (There is a fairly steady relationship between this current account gap and the difference between actual real exchange rates and the FEER for each country.) Chart 9 plots this trend current account for the US, and it gives a significantly smaller deficit in 1988 than that actually recorded.

Essentially the actual and trend current accounts may differ for the following reasons:

i) domestic output differs from trend

ii) world trade differs from trend

iii) oil prices differ from trend

iv) non-oil commodity prices differ from trend

v) unexplained deviations (residuals) from the model's relationships for trade

We assumed in Section 3 (Table 6) that US GNP was currently 1 per cent above trend. Returning GDP to its trend value will lower imports, reduce the current account and thereby lessen the need for the FEER to involve a depreciation of the dollar. An additional factor which is particularly important to the US are food prices, particularly grains. Our assumption that trend food prices were above levels observed in the last few years helps the US here.

The fifth source of differences between the trend and actual current account stem from changes in trade volumes and prices not explained by our equations. As these equations are medium term in nature, we would not expect them to track actual developments quarter to quarter, but any discrepancies should be temporary. Indeed, by assumption (given our treatment of trends in these equations) they will be temporary over the past. However there is always a danger that recent discrepancies represent a long term shift in structure, rather than temporary errors.

A clear example of this involves the volume of US non-oil imports. Chart 10 plots deviations of observed US imports of non-oil goods from our trend relationship. Imports are substantially below trend in the early eighties, and substantially above trend since 1986. We would expect a pattern of this kind, because the trend relationship ignores lags before relative price changes influence imports which econometric evidence suggests are important for the US. However even the dynamic error-correction model of imports on which this trend relationship is based shows steady underprediction over the last few years.

If US non-oil imports do not return over time to our assumed trend, our projections for the FEER are too high (i.e. the true FEER may involve a larger dollar devaluation). However the risk is not all in one direction. The trend non-oil imports equation embodies a relative price elasticity of about 0.6, which comes from an equation estimated from 1975. If we estimate the same equation from 1965, we get a larger elasticity of around 0.9, together with a small reduction in the income elasticity. As this equation attributes more of the rise in imports in the 1980s to the lagged effects of the dollar's appreciation, it involves a smaller positive trend. Using this alternative equation produces a FEER only 3 per cent away from actual levels in mid-88, compared to the 8 per cent gap shown in the main case. The behaviour of US non-oil imports is the main area of uncertainty involved in calculating the US FEER, and until we understand recent events better it would be foolish to suggest more than that the US FEER involves a devaluation of the dollar from current (1989Q1) levels of somewhere between 5-15 per cent.

Chart 2 gives the FEER for Japan. It involves a steady appreciation, punctuated by the two periods when we have assumed a shift to a larger structural surplus. The trend to appreciation reflects the tendency for the real trade balance in Japan to improve over time because of secular gains in export market share and a relatively low propensity to import. Over most of the period the Yen appears to have been undervalued, and by mid 1988 this undervaluation is about 11 per cent. This in turn reflects Japanese surpluses recorded for most years since 1975, which we have assumed are generally greater than the structural surplus. However, our estimates of this structural surplus must be the main area of uncertainty surrounding the Japanese FEER. For example, if the structural surplus was now 3 per cent of GNP rather than the 2 per cent we have assumed above, the FEER would involve an appreciation in the real value of the Yen of only 2 per cent.

Chart 11 plots deviations from our trend relationship for Japanese goods exports and (non-oil) imports. In the last year or two exports are below trend and imports above. It has been suggested that the latter represents a structural shift to a more open Japanese economy. If this is the case, we may be overstating the undervaluation of the Yen. However it is clear from the chart that deviations of this size are not unusual, and in the past they have proved temporary.

Chart 3 reveals that the DM also appears currently undervalued in relation to the FEER by about 6%. Once again this reflects a current

balance surplus substantially in excess of our assumed structural balance. However the German 'trend' surplus is a little lower than the actual surplus because of our assumption that GDP is below trend.[9] The extent to which the DM is currently undervalued is reduced considerably because we have allowed trend GDP to rise with an appreciation in the DM. The FEER itself is much smoother, because differences between the 'trend' current account and the recorded surplus are absorbed by the real exchange rate and GDP. Thus the 6% appreciation implied by the FEER is accompanied by a rise in GDP of nearly 1%.

The UK FEER, shown in chart 4, is once again substantially smoother over time than the actual real exchange rate. This may seem surprising, given the growth in oil trade over this period. However at trend real oil prices, the real oil balance improved fairly steadily from the mid-seventies to the mid-eighties, and this tendency for the FEER to appreciate has been largely (but not completely) offset by a trend decline in the manufactured trade balance noted in Section 2. In the last few years this steady improvement in the oil trade balance has come to an end, but this has been replaced to some extent by an improvement in net IPD flows.

By mid-1988, the UK FEER represents a depreciation of sterling of about 8 per cent. Chart 12 plots the trend current account compared to the actual recorded deficit. The recorded deficit in mid-1988 is over 2½ per cent of GNP, whereas the trend deficit is only half this size. This is largely a result of trend GDP being some 2¾ per cent below mid-1988 levels. In other words about half the UK deficit in mid-1988 represents an excess demand problem, with about half due to 'overvaluation'

Taking the G7 countries as a whole, we can make a number of general points. Firstly we have not imposed any explicit consistency across countries, in part because our analysis excludes all non-G7 countries where average exchange rates with the G7 may well vary. However our results do appear to be consistent across the G7, in the sense that recorded deviations from the FEER in any period for one country or group of countries is roughly matched (after appropriate weighting) by the opposite deviation for another country or group of countries. Secondly

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[9] Although we have assumed that German GDP was 2% below trend in 1988Q2, if real oil prices were at their trend level trend GDP would fall by ¾ %, leaving only a 1.3% 'demand gap'

results are sensitive to plausible variations in assumptions, particularly on structural capital flows, and so there is an inevitable degree of uncertainty associated with these calculations. Thirdly the FEER for a particular country can vary considerably through time, because of structural trends in trade and changing net asset positions for example.

6. Conclusions

The paper has set out a model for the medium-term relationship between a country's current account and its real exchange rate, conditional on various assumptions about internal balance, world output and real commodity prices. We have derived parameters for this relationship for each G7 country from the Institute's world macro model GEM. The model allows for interactions between world output, world trade and real commodity prices, as well as the potential endogeneity of the NAIRU to real exchange rate movements.

By making stylised assumptions about structural capital flows, we have used the model to determine paths for equilibrium exchange rates (FEERs) over the period 1971-88. Our sensitivity analysis, concerning alternative assumptions about exogenous variables or possible structural shifts in trade relationships, strongly suggests a wide range of possible values for FEERs. The model suggest the US FEER represents a devaluation of the dollar compared to current (89Q1) levels ranging from 5-15%. However, an even larger range for the dollar may be prudent partly because of the unusually high, and unexplained level of US imports over the last three years. The FEER for the Yen represents an appreciation of 5-15%, with the major uncertainty here concerning the structural outflow of Japanese capital. The FEER for the DM is also between 7-17% above current levels. In the UK a large part of the deficit in mid-88 represented a problem of excess demand on our assumptions, but the remainder implied a FEER representing a devaluation of sterling of between 0-10%.

Given our present state of knowledge about the determinants of trade flows, internal balance and structural capital flows, we think it unlikely that empirical analysis would enable these ranges to be narrowed. (Indeed, it would be quite easy to combine quite reasonable assumptions to take FEERs outside the ranges presented here.) It is beyond our scope in this paper to ask whether these ranges are narrow enough to justify using the real exchange rate as a policy target.,

However, it may cast some light on why exchange rates movements appear to be so susceptible to changes in sentiment.

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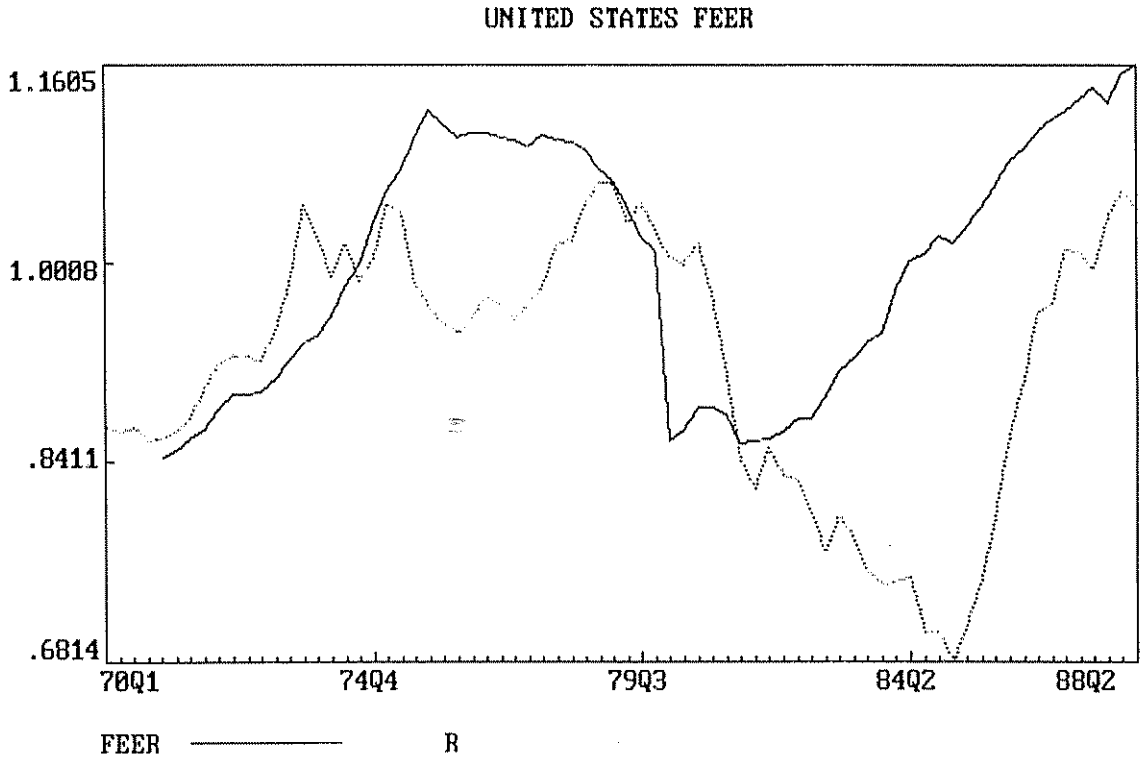
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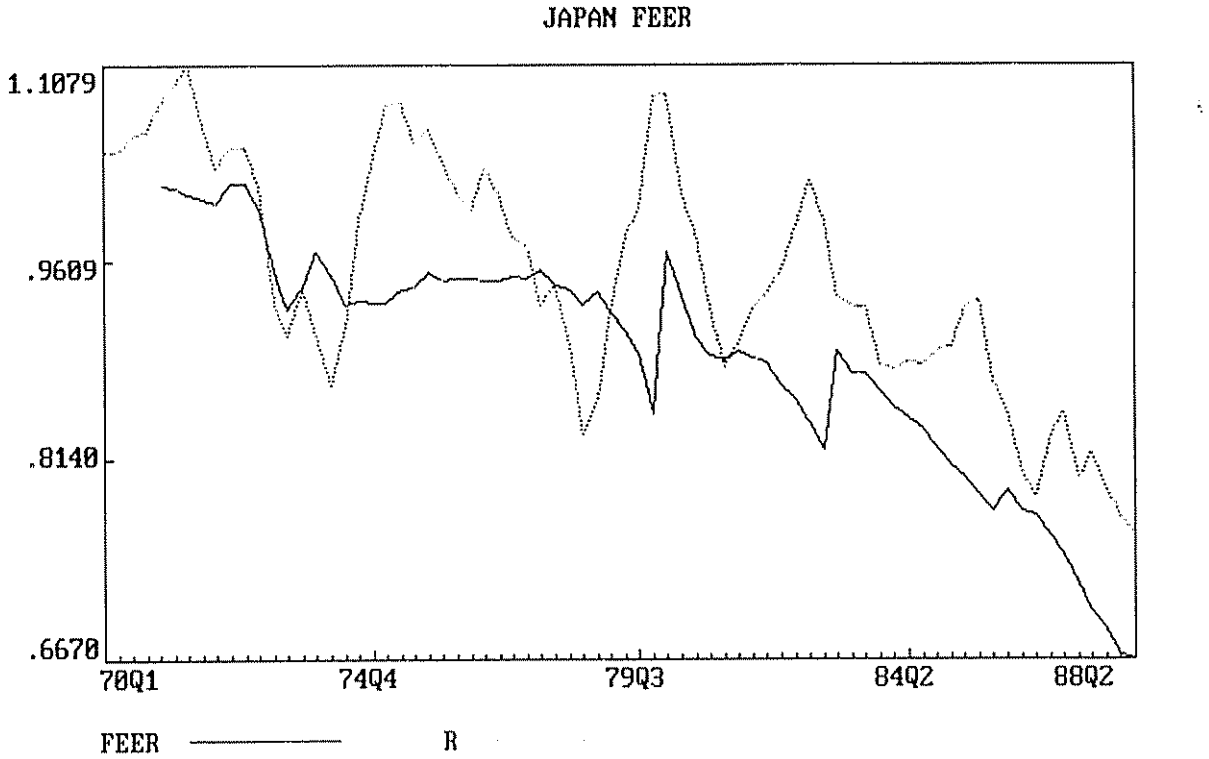
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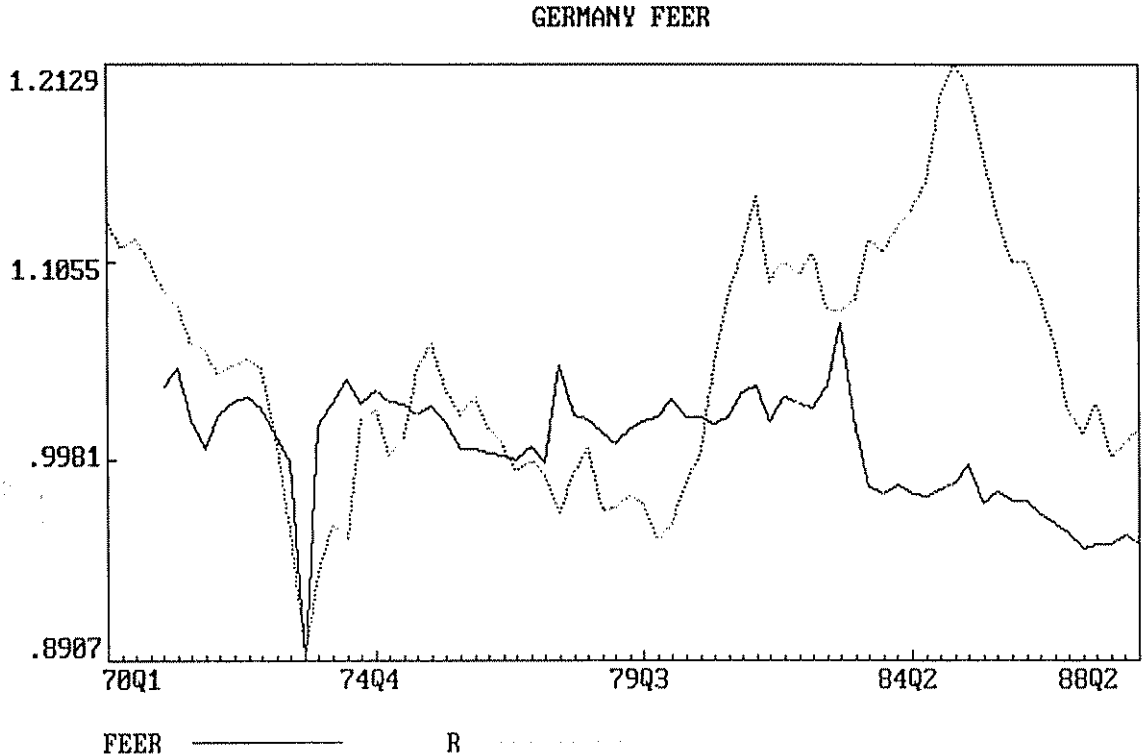
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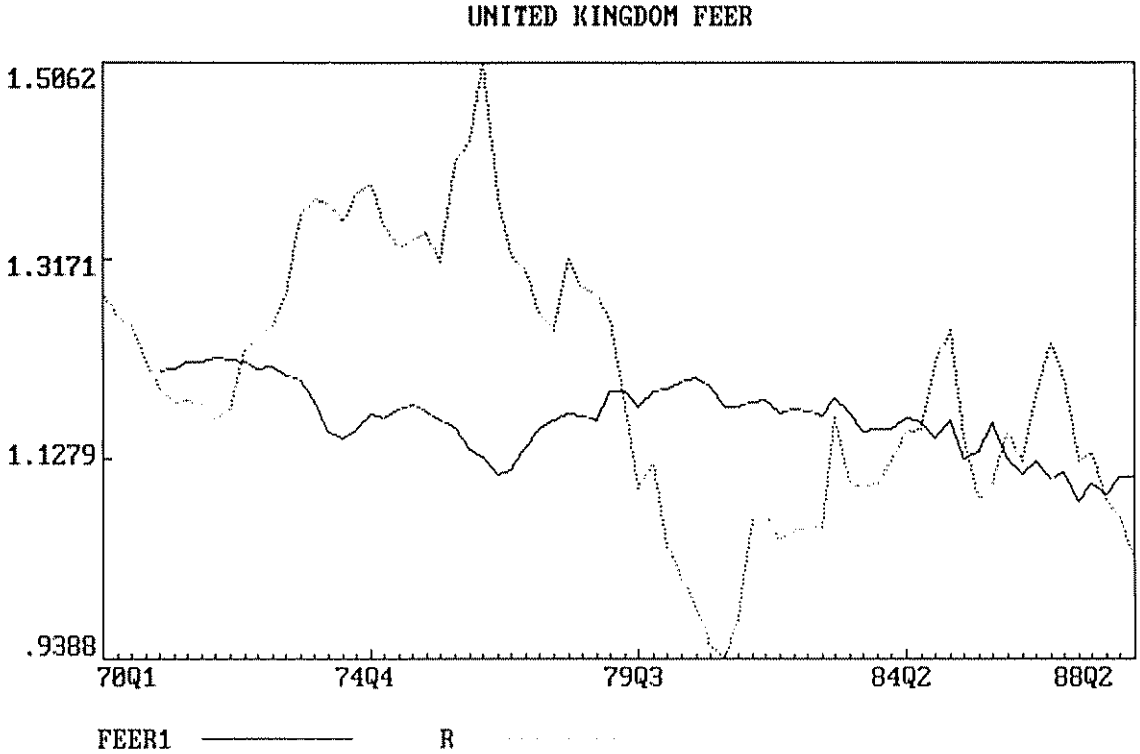
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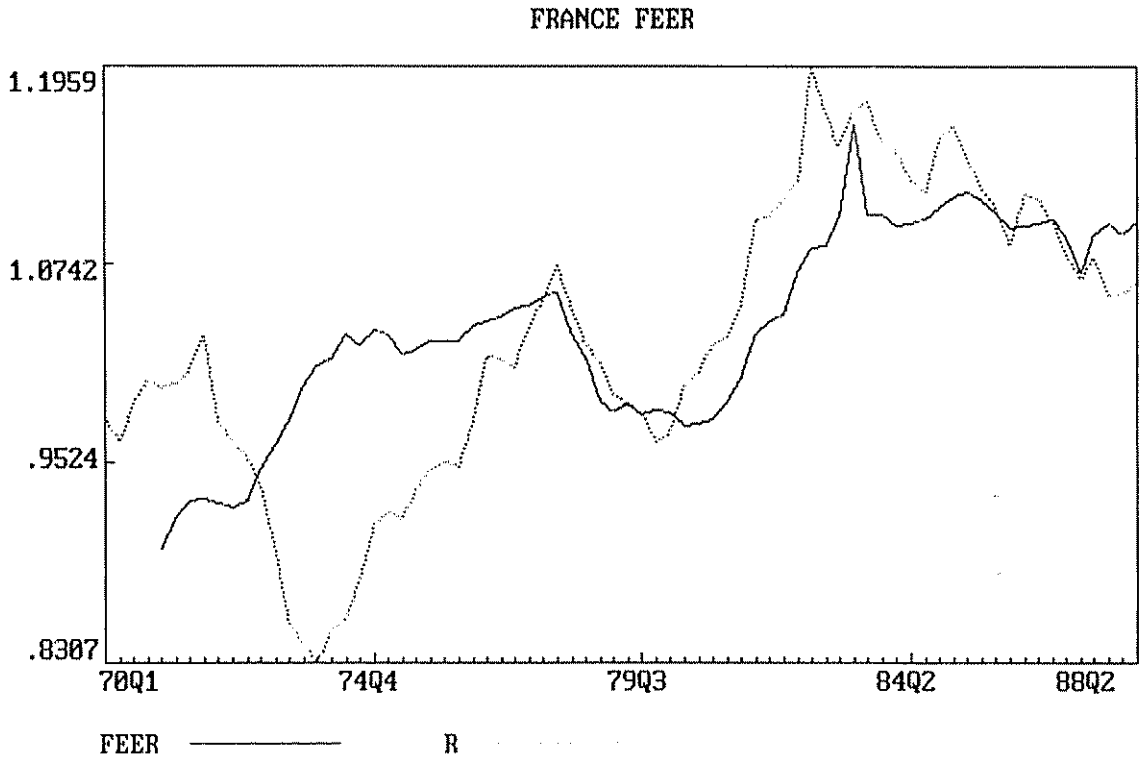
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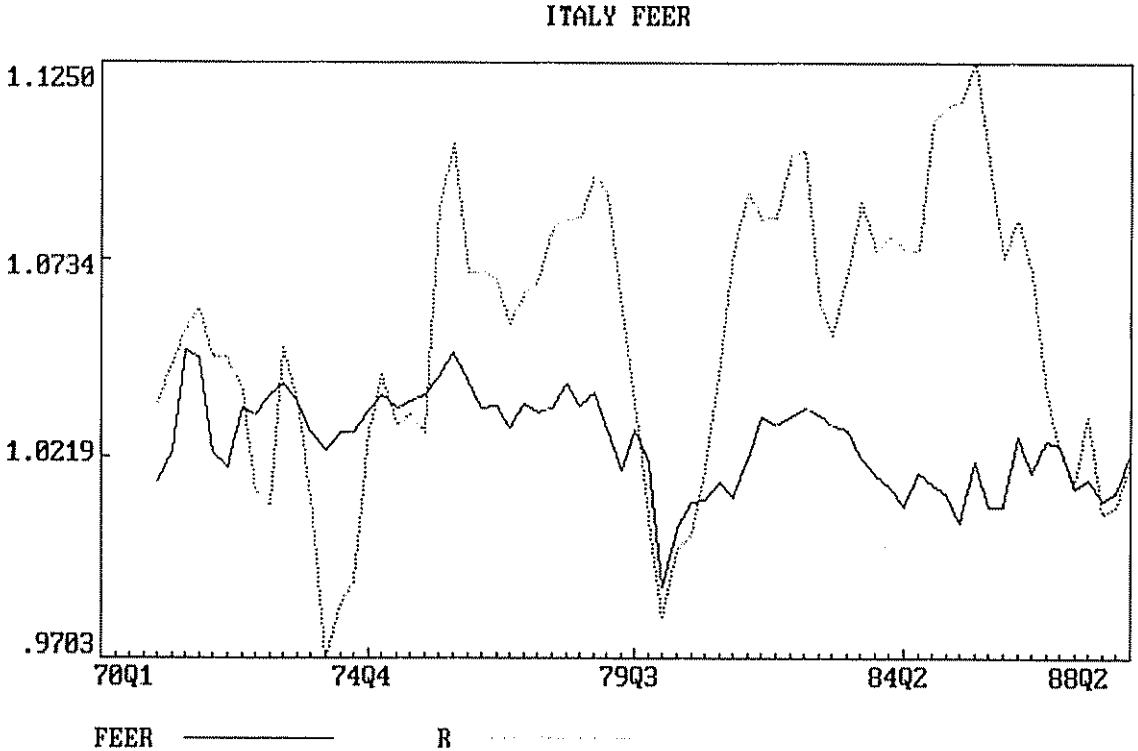
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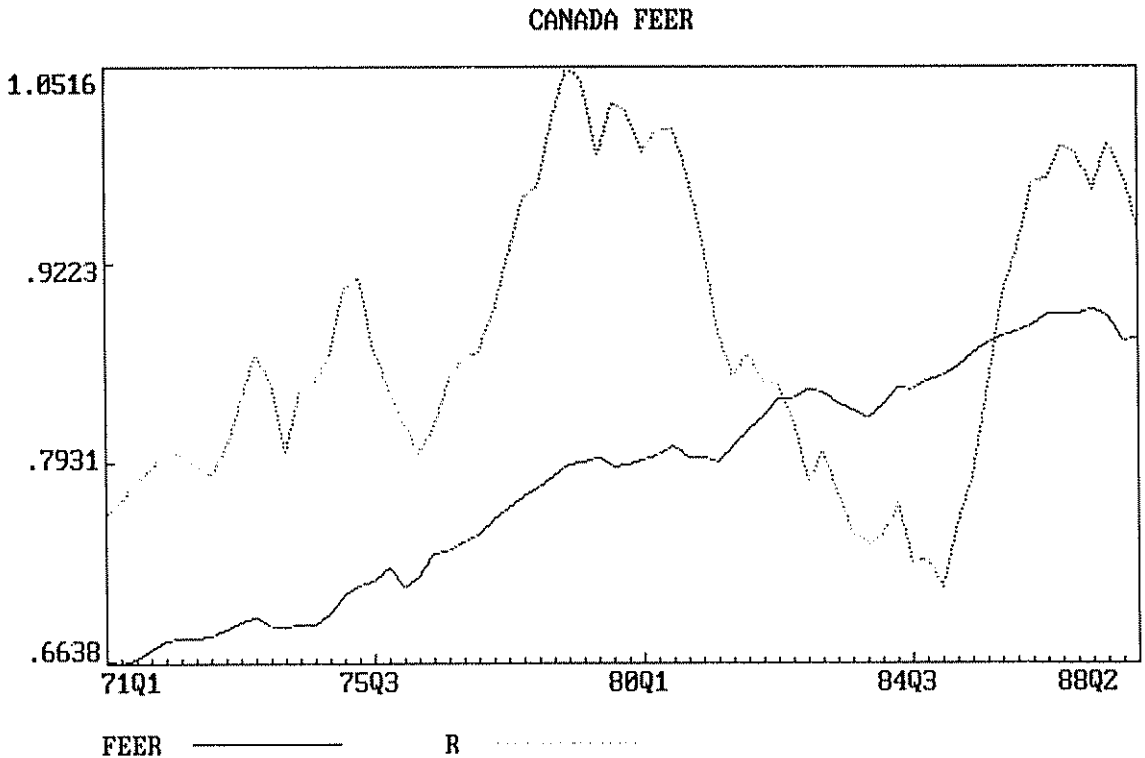
7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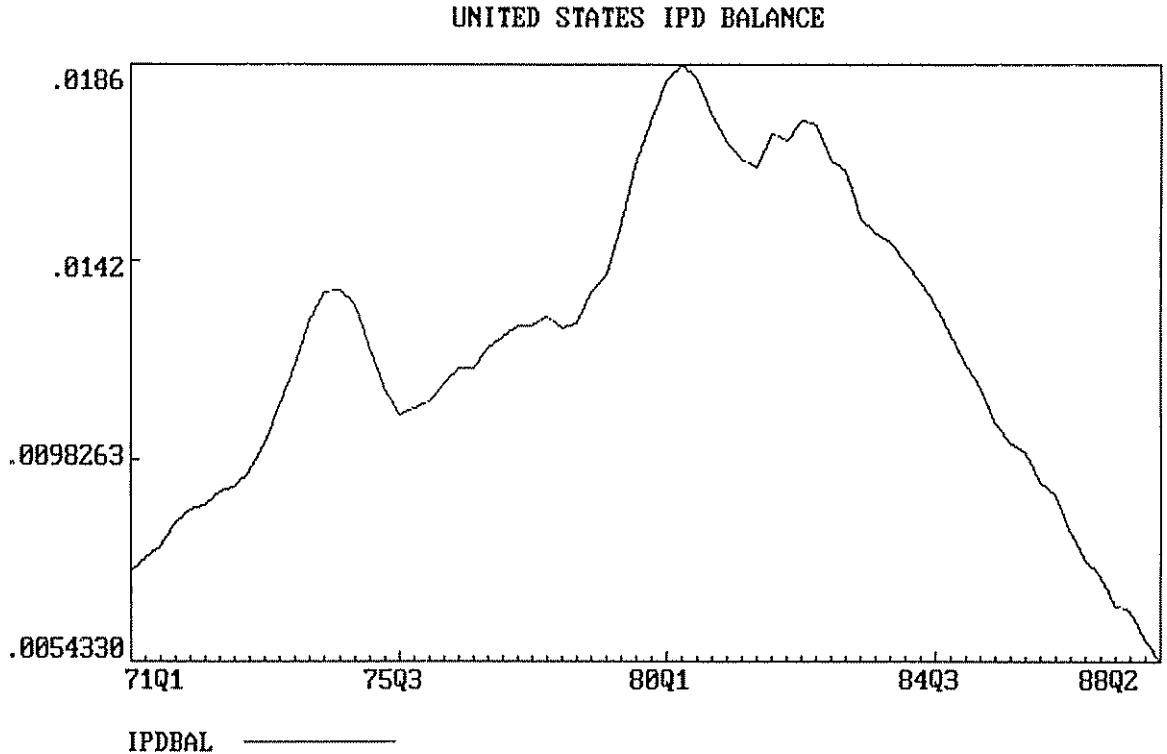
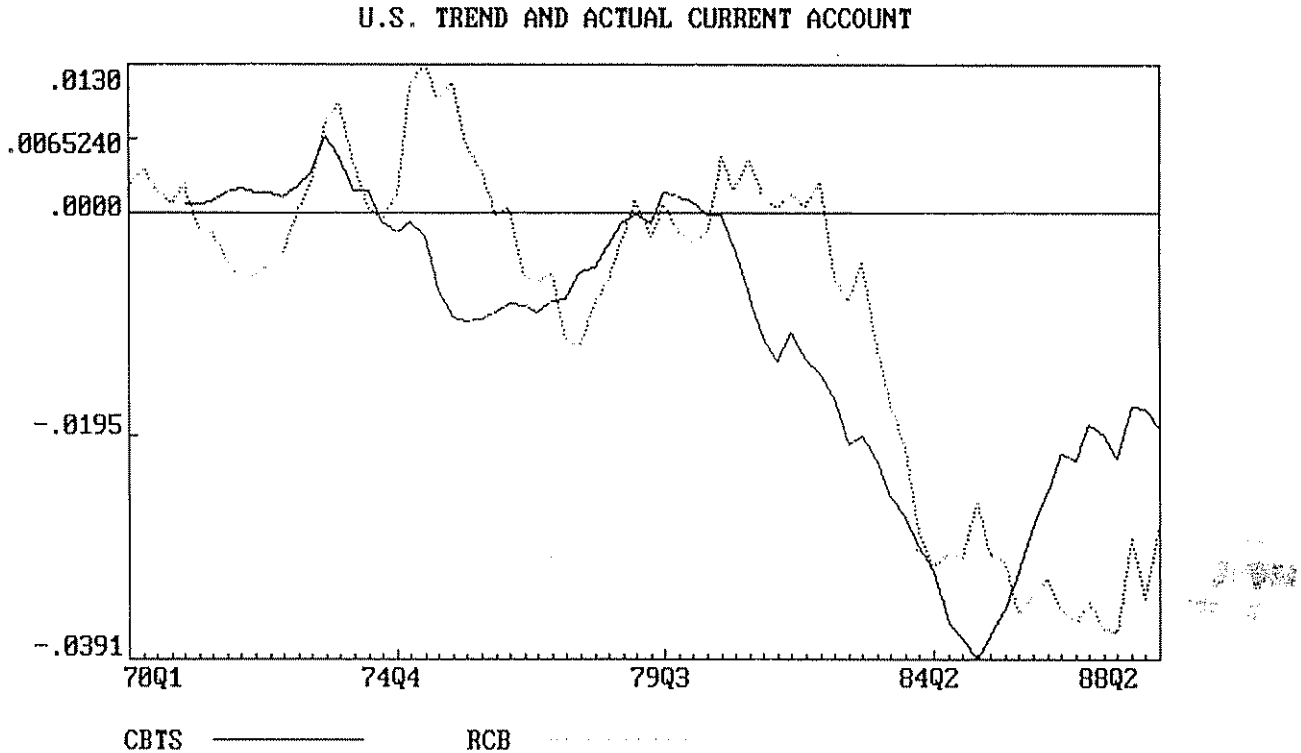
R

8

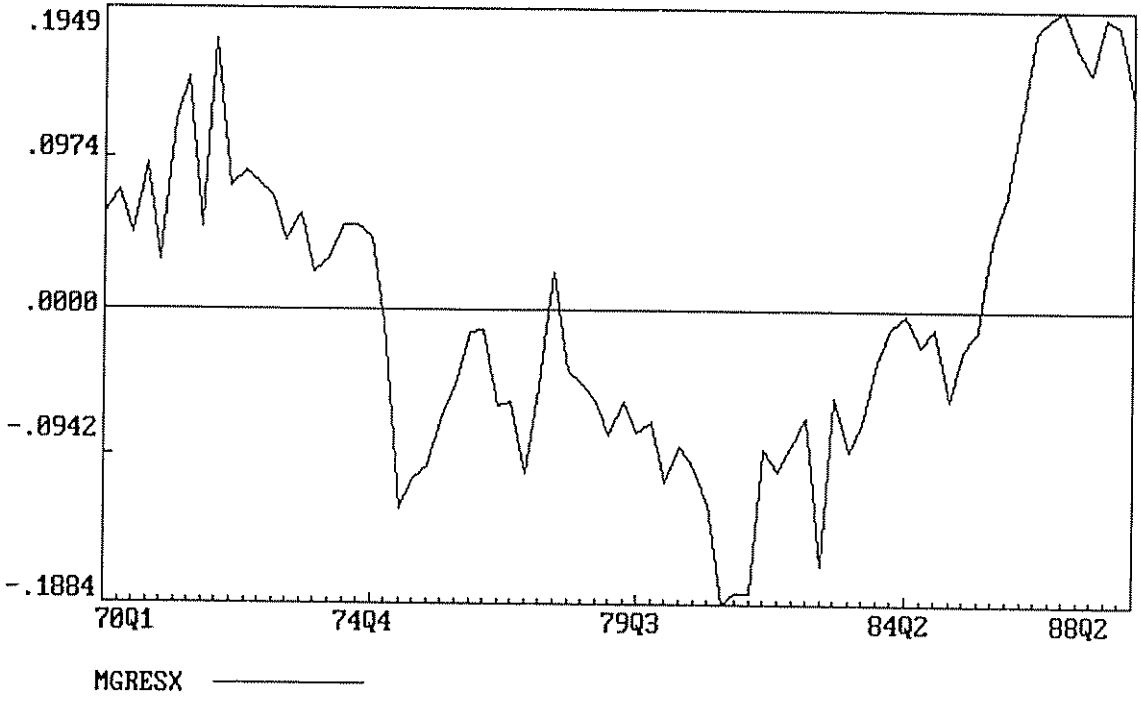

UNITED STATES IPD BALANCE
.0186
.0142
.0098263
.0054330
71Q1
75Q3
80Q1
84Q3
88Q2
IPDBAL

9

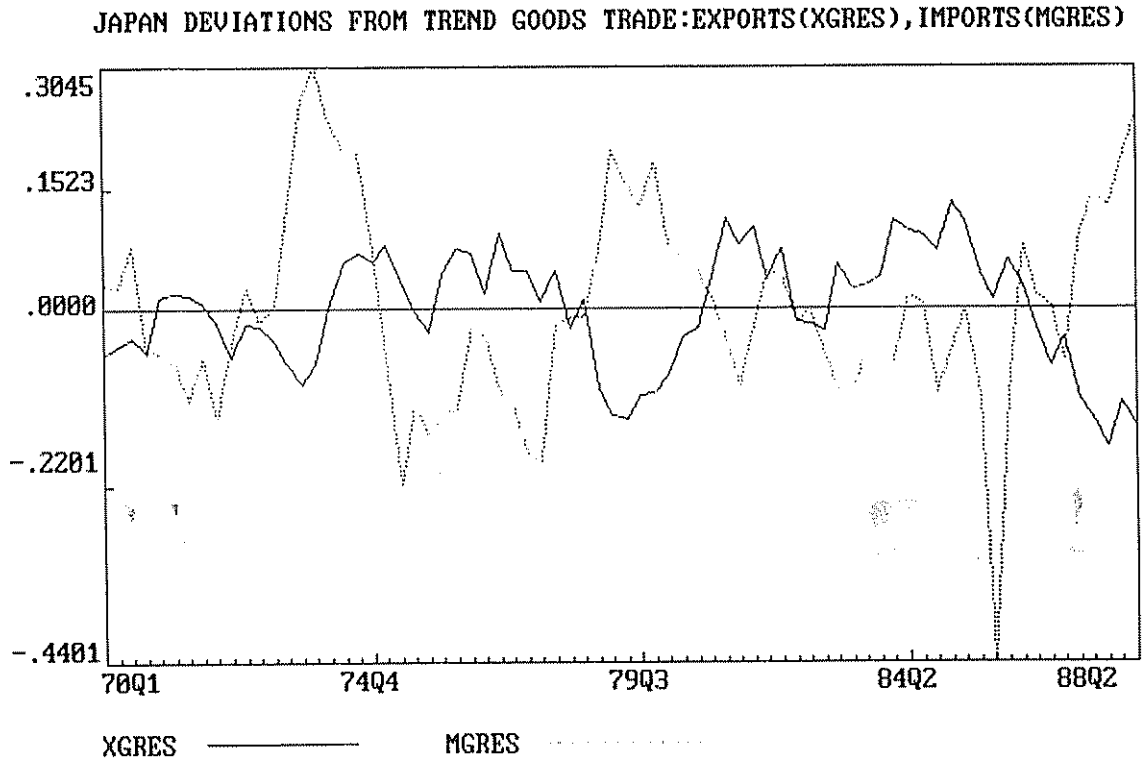

U.S. TREND AND ACTUAL CURRENT ACCOUNT
.0130
.0065240
.0000
-.0195
-.0391
70Q1
74Q4
79Q3
84Q2
88Q2
CBTS
RCB

10

U.S. IMPORTS OF GOODS VOLUME DEVIATION FROM TREND



11


JAPAN DEVIATIONS FROM TREND GOODS TRADE:EXPORTS(XGRES),IMPORTS(MGRES)
.3045
.1523
.0000
-.2201
-.4401
70Q1
74Q4
79Q3
84Q2
88Q2
XGRES
MGRES

12

U.K. TREND AND ACTUAL CURRENT ACCOUNT