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Peter Nyberg

CAPITAL IMPORTS, MONETARY POLICY AND THE DEMAND FOR REAL ASSETS

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Suomen Pankin
Valuuttapolitiikan osasto

Bank of Finland
Exchange Policy Department

Peter Nyberg

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An exploratory study

CONTENTS

1. INTRODUCTION

An adequate explanation of international net capital movements is important for several reasons. In the first place it furnishes information on the determinants and ultimate level of a country's foreign indebtedness.[1)] Secondly, it is necessary in order to predict changes in exchange reserves in a country, which may be of interest to authorities concerned with the degree of international liquidity. Also, it indicates the degree to which the money stock in a country can be autonomously determined and to which degree domestic monetary policy will be negated by induced foreign capital flows. Finally, it may highlight the similarities and differences in the financial markets of various countries.

Several well-tried approaches to the determination of capital flows exist. Define the national income and low-of-funds identities:

$$S - I \equiv B \equiv \Delta E + \Delta A_F$$

where

- S = total savings, i.e. incremental total wealth,
- I = total investment, i.e. incremental holdings of real assets
- B = current account balance,
- E = foreign exchange reserves,
- A_F = foreign net asset holdings of the public.

It will then be possible to explain capital movements ΔA_F as a result of primarily either real or monetary developments.

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1. For a description of the relationship between foreign indebtedness and capital imports, see TANSKANEN (1975). The implications of the present study for the long-run foreign indebtedness of a country are detailed in appendix 2.

The "real" explanation of capital flows concentrates on determining the domestic "savings gap" S-I which explains the change in net foreign indebtedness. The distribution of assets between reserves and other financial assets is often left unexplained, possibly because a "keynesian" monetary policy implicitly is assumed. Exports and imports may have a direct bearing on net foreign assets, since a large part of the short-term capital movements relate to trade flows.

If one assumes that changes in the amount of foreign reserves have an impact on the supply of money, the domestic rate of interest cannot be assumed exogenous. This means that the distribution of total financial assets between domestic and foreign ones must be considered simultaneously with the determination of reserve movements. These monetary interrelationships have been the starting-point for numerous studies of capital movements in the latter part of the 1970's.

However, this approach is not fully satisfactory either, since decisions on total financial wealth are taken as given. Changes in real investment and savings as a result of monetary variations are given little attention in comparison with the questions relating to the allocation of given stocks of financial wealth. The connections between the national income accounts and the flow-of-funds accounts are unnecessarily broken.

The point of departure in this study is the identification of total savings with the total[1)] gross increase in wealth. Investment represents gross additions to real capital, while

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1. Changes in valuation as well as depreciation are ignored. Actually they can be expected to correlate with total income, changes in interest rates and inflation which all are included as exogenous or endogenous variables in the model.

the balance on current account measures the aggregate addition to financial net wealth. Clearly, the distribution of asset demands between financial and real assets has at least as important an impact on capital flows as the distribution between domestic and foreign financial assets. The demand for money is determined both by the demand for foreign assets and the demand for real capital. Since both net capital imports and investment show a negative correlation with the current account balance, a theory ignoring investment will produce a spuriously high correlation between the capital and current accounts.

The run of the study may be illustrated with a simplified version of the arguments developed in more detail below. The basic version of a monetary-type model identifies reserve money supply M^S with the actual reserve money stock M, which in equilibrium should equal the demand for reserve money M^D. This implies

$$\Delta E = \Delta M^D - \Delta NDA$$

where NDA is the net domestic assets of the central bank. Clearly, as long as ΔNDA and M^S are considered exogenously determined the only functional relationship in the equation is the demand for money. If, additionally, the current account balance is exogenous and capital imports are demand determined:

$$TC = \Delta M^D - \Delta NDA - CAB$$

where TC is the total value of capital imports. What is tested, then, is simply the demand function for reserve money, as has often been pointed out.

If it is assumed that the supply of money is determined by partly endogenous economic considerations we have

$$\Delta NDA^e = \Delta M^s - TC - CAB$$

and accordingly in money market equilibrium

$$TC = \Delta M^D - \Delta NDA^e - CAB$$

The change in net domestic assets should now be considered (partly) endogenous to the model. Such relations between net capital imports and monetary policy have been the basis of some recent studies with good results.

However, in a model where asset demands play an important role it is reasonable to assume that total savings rather than the current balance is exogenously determined. Thus:

$$CAB = S - I^D$$

and the equation determining capital imports will be

$$TC = \Delta M^D - \Delta NDA - S + I^D.$$

This type of model which has received scant, if any, attention so far, is a logical development of the previous ones. All asset demands are (at least partly) endogenous while decisions to accumulate realistically are assumed to be determined outside the partial model. It is, of course, not difficult to construct a more comprehensive model in which monetary, financial and real variables are simultaneously determined.[1)]

By combining the two assumptions of endogenous monetary policy and demand for real assets, the main hypothesis of this study is derived:

$$TC = \Delta M^D - \Delta NDA^e + I^D - S.$$

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1. The standard Keynesian model of an open economy would serve very well in this respect. This question, however, falls outside the scope of this study.

The following section resounts the simple version of a portfolio-type theory of the balance of payments. It is modified to allow for imperfections in the domestic capital market, after which savings and endogenous investment are incorporated in the analysis. The role of trade credits (a special case of capital market imperfection) and the important assumption of an exogenous monetary policy are thereafter discussed. Finally, the models are tested empirically.

2. THEORETICAL MODELS OF CAPITAL IMPORTS

2.1. The basic model

If money markets function well within a country, the rate of interest will be simultaneously determined with other endogenous variables like income, current account balance and investment. Capital moves freely from one sector to the other, which means that different sources of funds are good substitutes for each other in all parts of the economy. Monetary policy or monetary disturbances have no sectoral effects of their own.

Such models have been analysed by i.a. KOURI-PORTER (1974) and PORTER (1974), see also the contributions in FRENKEL-JOHNSON (1976). Assume that all asset demands are stock demands of the type:

$$(1) \qquad \frac{A_i}{W_F} = \alpha_{i1} R + \alpha_{i2} + \alpha_{i3} Z_i$$

where

$$(2) \qquad W_F = \sum_i A_i$$

and

A_i = value of asset i,
W_F = total financial wealth,
R = domestic interest rate,
Z_i = other factors determining the demand for asset i.

This can be simplified to

$$(3) \qquad \Delta A_i = a_{i1}\Delta R + a_{i2}\Delta W_F + a_{i3}\Delta Z_i$$

and

$$(4) \qquad 1 = \sum_i a_{i2}$$

The demand for reserve money is then:[1)]

$$(5) \qquad \Delta A_M = -a_{M1}\Delta R + a_{M2}\Delta W_F + a_{M3}\Delta Z_M \; ; \quad a_{Mi} > 0,$$

while the demand for foreign net assets (exclusive of foreign currency) is[2)]

$$(6) \qquad \Delta A_F = -a_{F1}\Delta R + a_{F2}\Delta W_F + a_{F3}\Delta Z_F \; ; \quad a_{Fi} > 0.$$

The supply of reserve money equals the sum of net foreign assets and net domestic assets of the central bank:

$$(7) \qquad \Delta M = \Delta NFA + \Delta NDA.$$

The change in net foreign assets equals the current account balance (CAB) and the imports of foreign capital, which equals the negative of the increase in foreign net assets:

$$(8) \qquad \Delta NFA = CAB - \Delta A_F$$

The change in net domestic assets is assumed to be exogenous. To facilitate notation net capital imports are designated:

$$(9) \qquad TC \equiv -\Delta A_F$$

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1. A separate transactions demand component for money was not included, since the correlations between wealth and income is a very close one within the period relevant for the model. See, however, section 3.5.

2. The demand for domestic bonds and securities (ΔA_B) is determined as a residual.

The equations above imply, see HUNT-VALENTINE (1978), that total (financial) wealth increases only through a current balance surplus:

$$(10) \qquad \Delta W_F = CAB.$$

In this model domestic monetary operations do not influence total financial wealth, only its distribution. Equilibrium in the money market requires:

$$(11) \qquad \Delta A_M = \Delta M.$$

The equations 5, 6, 7 and 11 contain the four endogenous variables ΔA_M, ΔR, ΔA_F and ΔM. Solving the equilibrium condition for the money market gives

$$(12) \qquad -a_{M1}\Delta R + a_{M2}\Delta W_F + a_{M3}\Delta Z_M = CAB + TC + \Delta NDA$$

where

$$\Delta R = \frac{1}{a_{F1}} (TC + a_{F2}\Delta W_F + a_{F3}\Delta Z_F).$$

Combining and inserting $\Delta W_F = CAB$ finally gives:

$$(13) \qquad TC = -\alpha_1^o \Delta NDA - \alpha_2^o CAB + \Delta Z_1 \quad ; \alpha_1^o > 0.$$

where

$$\alpha_1^o = a_{F1}/(a_{F1} + a_{M1})$$

$$\alpha_2^o = (a_{F1} + a_{M1}a_{F2} - a_{M2}a_{F1})/(a_{F1} + a_{M1})$$

$$\Delta Z_1 = (a_{F1} + a_{M1})^{-1} [a_{M3}a_{F1}\Delta Z_M - a_{M1}a_{F3}\Delta Z_F]$$

Capital imports will vary negatively with changes in the net domestic assets of the central bank[1)] and probably also with the current account balance. Exogenous changes in the demand for reserve money will show a positive correlation with capital imports.

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1. As generally recognized, the model implies a negative unitary correlation between changes in reserves and net domestic assets. The share of capital imports in the change of foreign capital imports depends on the domestic rate of interest.

2.2. Imperfections in the capital market

It is by no means obvious that all types of expenditure may be financed equally well from domestic or foreign sources. Even though the domestic capital market functions well, the rate of interest may be very sensitive to fluctuations in the demand for money. The high marginal rate of interest may then cause investors (in real capital) to seek supplementary financing from abroad. One may also, cf. MURRAY (1978), picture the flows on the capital market as quite slow, giving rise to unsatisfied demands in various sectors.

In this case the demand for foreign finance will be

$$(14) \qquad -TC = -a_{F1}\Delta R + a_{F2}\Delta W + a_{F3}\Delta Z_F - a_i I$$

where I is private demand for real capital goods. It is now assumed that financial and real investment decisions are interdependent, total wealth influencing the demand for all asset stocks. Since total wealth W now can change both as a consequence of financial and real accumulation:

$$(15) \qquad \Delta W = CAB + I.$$

Capital imports will then be (changing W_F to W also in equation 5):

$$(16) \qquad TC = -\beta_1^o \Delta NDA - \beta_2^o CAB + \beta_3^o I + \Delta Z_2 \quad ; \ \beta_i^o > 0,$$

where the a_{ij}:s now reflect reactions to total wealth and:

$$\beta_1^o = a_{F1}/(a_{F1} + a_{M1})$$

$$\beta_2^o = (a_{F1} + a_{M1}a_{F2} - a_{M2}a_{F1})/(a_{F1} + a_{M1})$$

$$\beta_3^o = (a_i a_{M1} - a_{M1}a_{F2} + a_{M2}a_{F1})/(a_{F1} + a_{M1})$$

$$\Delta Z_2 = (a_{F1} + a_{M1})^{-1} \left[a_{M3}a_{F1}\Delta Z_M - a_{F3}a_{M1}\Delta Z_F\right]$$

If capital imports are influenced enough by investment, this term will show a positive correlation with total capital

imports. At the same time the correlation with the current balance will remain negative.[1)]

It should be noted that this formulation of the basic model assumes that savings as well as investment are exogenously determined. As noted by FRENKEL-GYLAFSON-HELLIWELL (1980) this assumption is very unlikely to hold in any but the shortest of time periods, since expenditure, production and monetary developments are interrelated in the context of a more comprehensive model. Indeed, as the change in reserves can be derived both as an excess demand for goods and an excess demand for money, monetary as well as real factors must influence reserve (and capital) movements simultaneously as a matter of logic.[2)] While assumption of an exogenous current account balance may be warranted for short periods (in connection with short-term capital movements) they thus seem decidedly odd in other circumstances. One would expect savings and investment to respond to both monetary and real factors at least over several quarters. Investment should also, at least in case of imperfect capital markets, depend on total savings as well as on their distribution.[3)] This requires that the current balance be made explicitly endogenous in the model.

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1. An alternative formulation would be

$$TC = -\beta_1^{o}\Delta NDA - \beta_2^{o}(CAB + I) + \frac{(a_1 a_{M1} + a_{F1})I}{a_{F1} + a_{M1}} .$$

However, in this case it would be necessary to assume that the accumulation of total wealth (rather than financial wealth) is exogenous, see equation 25.

2. As noted already by JOHNSON (1972).

3. Cf. FELDSTEIN-HORIOKA (1980).

2.3. Endogenous current account balance

As mentioned above, the current account balance determines the increase in net financial wealth. This is natural, since the current account balance equals the difference between total savings (total increments to wealth) and total real investment (the part of the wealth increment used for increasing real capital wealth). The current account balance therefore should depend on the factors influencing the choice between real and financial assets.

The gross increase of total wealth is identical to gross savings. Savings depend on total incomes as well as on their ditribution between households and firms:

$$(17) \qquad S = s_1 Y + s_2 P = \Delta W \quad ; \; 1 > s_1, s_2 > 0,$$

where

Y = gross national product,

P = non-household private income.

The demand for real capital assets must, analogously with other asset demands, be determined in the same manner as financial demands:

$$(18) \qquad \frac{W - W_F}{W} = -\alpha_{K1} R + \alpha_{K2} + \alpha_{K3} Z_K + \alpha_{K4} \frac{P}{W} + \alpha_{K5} \frac{Y}{W}$$

The next to last term is intended to measure the rate of return on real capital[1] and affects demand positively. The

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1. Actually:

$$\frac{W-W_F}{W} = \frac{\alpha_{Ki} X_i}{1-\alpha_{K4} \frac{P}{W}} \approx \alpha'_{Ki} X_i + \alpha'_{K4} \frac{P}{W} \quad ,$$

since the relevant average profitability measure is

$$\frac{P}{W-W_F} \equiv \frac{P}{W} \cdot \frac{W-W_F}{W} \quad .$$

The same goes for the "wealth-income" -ratio W/Y. Note that holdings of domestic financial assets still are determined as a residual.

domestic rate of return on financial capital affects the demand for real capital negatively. Taking differences:

$$\Delta(W - W_F) = -a_{K1}\Delta R + a_{K2}\Delta W + a_{K3}\Delta Z_K + a_{K4}\Delta P + a_{K5}\Delta Y$$

from which incidentally

$$(19) \qquad \Delta W_F = a_{K1}\Delta R + (1 - a_{K2})\Delta W - a_{K3}\Delta Z_K - a_{K4}\Delta P - a_{K5}\Delta Y$$

where, of course

$$\Delta W_F = CAB.$$

The equation system is now (assuming that asset demands are related to total instead of merely financial wealth):

$$(14) \qquad -TC = -a_{F1}\Delta R + a_{F2}\Delta W + a_{F3}\Delta Z_F - a_i I$$

$$(12) \qquad I + TC + \Delta NDA = -a_{M1}\Delta R + (1 - a_{M2})\Delta W + a_{M3}\Delta Z_M$$

$$(19) \qquad I = -a_{K1}\Delta R + a_{K2}\Delta W + a_{K3}\Delta Z_K$$

where

$$(17) \qquad \Delta W = s_1 Y + s_2 P.$$

$$\Delta Z_K = \Delta Z_K^o - a_{K3}^{-1}(a_{K4}\Delta P + a_{K5}\Delta Y)$$

The equation system 12, 14 and 19 has the following solution for capital imports[1]:

$$(20) \qquad TC = -\gamma_1^o \Delta NDA + \gamma_2^o \Delta W + \Delta Z_3 \quad ; \quad \gamma_i^o > 0.$$

which, taking account of equation 17 also can be written

$$TC = -\gamma_1 \Delta NDA + \gamma_2 Y + \gamma_3 P - \gamma_4 \Delta Y - \gamma_5 \Delta P - \Delta Z_3^o$$

Current income and profits raise savings and lower capital imports. Changes in income and profits, which increase the demand for real capital, raise the need for capital imports. Foreign interest rates (not shown) show negative dependence with capital imports.

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1. See appendix 1.

2.4. Trade credits

In economies where capital markets are less than perfectly competitive, changes in total net capital imports may partly be explained by changes in the trade balance, see LYBECK (1975), HÄMÄLÄINEN (1979), NYBERG (1981). In this case

$$(21) \qquad TC \equiv (TC - TC_T) + TC_T$$

where

TC_T = capital imports connected with the export and imports of goods.

Since changes in the trade balance usually are major determinants of the variations in the current account balance:

$$(22) \qquad TC_T \approx T(\Delta CAB).$$

As long as the trade balance is stable, total net trade credits also remain stable[1]. If the trade balance surplus increases, however, total assets will show less influence on net capital imports.

2.5. Endogenous monetary policy

In the various formulations of the basic model used above the net domestic assets NDA are included as an exogenous influence in the economy. Monetary policy is, of course, discretionary but may exhibit long periods of accomodating behavior, neutralizing movements in net foreign assets in order to avoid changes in domestic monetary conditions. In such a case NDA is clearly an endogenous variable.[2]

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1. Provided average payment periods are stable and identical for both exports and imports.
2. Simultaneity requires that monetary policy is conditioned by current endogenous variables or by variables serially correlated with them. DARBE (1980) indicates that assuming an exogenous domestic credit policy makes the monetary models seriously mis-specified and devoid of empirical support.

The nature of this interdependence between monetary policy and economic development may be formalized with a policy reaction function for the central bank. The weights of the function will depend on the weights given to both the instrument and the goals to be achieved.[1] The choice of appropriate policy ex ante goals is always tricky. The reaction function may have following arguments:

$$(23) \qquad \Delta NDA = H\ (\underset{+}{CAB},\ \underset{-}{\Delta\hat{Y}_R},\ \underset{-}{TC},\ \underset{-}{\Delta\hat{Q}}) - (CAB + TC)$$

Money supply is assumed to tighten in response to balance-of-payments deficits, increases in the rate of growth ($\Delta\hat{Y}_R$), increases in the rate of inflation ($\Delta\hat{Q}$) or an increase in the foreign debt (TC). Numerous alternatives, however, suggest themselves, see MURRAY (1978), LYBECK (1975).

2.6. The models to be tested

Obviously, different specifications for the models discussed may be appropriate in different countries and for different unit periods. Five alternatives will be considered.

The first model assumes that the decision to accumulate financial assets is exogenously given and independent of the investment decision.

$$(24) \qquad TC = -\alpha_1^o CAB - \alpha_2^o \Delta NDA - \alpha_3^o \Delta R_F \quad ; \quad \alpha_i^o > 0,$$

where R_F is the foreign rate of interest and monetary policy is assumed exogenous.

The second model assumes imperfections in the capital market but, still, exogenous decisions to accumulate real and financial wealth. Monetary policy is exogenous:

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1. See THEIL (1964) for a general discussion and LYBECK (1975) for a practical application.

$$(25) \qquad TC = -\beta_1^o(CAB + I) - \beta_2^o\Delta NDA - \beta_3^o\Delta R_F + \beta_4^o I \quad ; \ \beta_i^o > 0.$$

Letting monetary policy be endogenously determined (but assuming that trade flows do not directly influence the capital balance) gives the simultaneous system:

$$(26) \qquad TC = -\gamma_1^o(CAB + I) - \gamma_2^o\Delta NDA - \gamma_3^o\Delta R_F + \gamma_4^o I \quad ; \ \gamma_i^o > 0,$$

$$\Delta NDA = -\eta_1 CAB - \eta_2\Delta\hat{Y}_R - \eta_3\Delta\hat{Q} - \eta_4 TC + \Delta NDA_o.$$

Assuming the accumulation of total wealth to be exogenously determined while letting investments be partly endogenous gives the fourth model:

$$(27) \qquad TC = -\gamma_1^o(CAB + I) - \gamma_2^o\Delta NDA - \gamma_3^o\Delta R_F + \gamma_4^o I,$$

$$\Delta NDA = -\eta_1 CAB - \eta_2\Delta\hat{Y}_R - \eta_3\Delta\hat{Q} - \eta_4 TC + \Delta NDA_o,$$

$$I = -K_1 TC + K_2(CAB + I) - K_3\Delta R_F + K_4\Delta Y + K_5\Delta P + I_o$$

where ΔP is given by equation 28. The reduced form of the model is equivalent to equations 20 (with ΔNDA endogenously determined).

Both the change in net domestic assets and the amount investment are then endogenously determined.

As profits data is not easily and generally available, it was decided to use the proxy relationship:

$$(28) \qquad \frac{P}{Y} = p_o + p_1\hat{Y}_R + p_2\Delta\hat{Y}_R \quad ; \quad p_o, \ p_1 > 0, \ p_2 \gtrless 0.$$

or

$$\Delta P = p_o'\Delta Y + p_1'\Delta\hat{Y}_R + p_2'\Delta\Delta\hat{Y}_R.$$

This relationship between the income distribution and the real rate of growth should be viewed as a reduced-form equation derived from one of several possible theories of cyclical behavior.[1] The profits relationship may reflect the existence of implicit contracts in the labor markets as argued by OKUN (1980). It can also be explained by cyclical variations in prices and wages as argued by GOODWIN (1972), DESAI (1973) and POHJOLA (1979). The values of the parameters p_i then depend on the dynamic adjustment characteristics of the whole economy, which from the point of view of the balance of payments (static) theory may be taken as exogenously given. In particular it may be noted that the sign of p_2 determines whether the profit share reaches its extreme values before or after total production reaches its extreme points.

Finally, the variables determining savings as well as investment may be explicitly introduced into the model. The fifth model is then:

$$(29) \qquad TC = \gamma_1 Y - \gamma_2 \Delta NDA - \gamma_3 \Delta R_F + \gamma_4 \hat{Y}_R - \gamma_5 \Delta Y - \gamma_6 \Delta \hat{Y}_R - \gamma_7 \Delta\Delta \hat{Y}_R \quad ; \quad \gamma_i > 0.$$

$$\Delta NDA = -\eta_1 CAB - \eta_2 \Delta \hat{Y}_R - \eta_3 \Delta \hat{Q} - \eta_4 TC + \Delta NDA_o.$$

where CAB is given by equation 19.

The balance on current account has now disappeared from view as it, of course, should do in a comprehensive portfolio adjustment frameqork. Combining the two equations will not change the signs of the coefficients in the equations explaining TC. This model will not be empirically tested at this stage of the study, however, since it sould be based on a more comprehensive set of equations (including lags).

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1. For a short review of such theories, see NYBERG (1982).

2. These alternative explanation do not, of course, exclude but rather complement each other.

3. TESTING THE MODELS

3.1. Purpose of the empirical tests

In the theoretical part of the study a number of alternative models explaining net capital movements were developed. All models assumed that changes in actual, marginal interest rates equilibrate the domestic money market within the chosen period. The models also abstracted from detailing the interaction between the large number of actual markets existing within each country and abstained from discussing the possible effects of lags and expectations.

The models may thus in principle be augmented with a large number of additional variables, measuring disequilibrium phenomena in various markets, expectational mechanisms and other market imperfections. This may, indeed, be necessary in the case of models portraying flows of capital in the short term. However, if the period is somewhat longer, the relative importance of various frictions in the market will lessen and the simple models above may have some explanatory power.

The purpose of the empirical tests in therefore simply to check the extent to which the models developed can be reconciled with reality. In order to ascertain their relevance a test over several countries of different size and with differing institutional characteristics is indicated. If the models are unable to explain the capital movements for all or some countries, it is to be taken as an indication of either (a) that the model is irrelevant for the countries in question or (b) that important explanatory variables have been left out. In this case it may be of interest to see if the general structure of the model can be retained while only moderately increasing the number of explanatory variables.

3.2. Method and overview

The four models 24, 25, 26 and 27 were estimated using annual data from the International Financial Statistics.[1] Estimation was carried out using first differences in order to lessen multicollinearity in the nominal time series, which all were given in dollar terms. The equations were estimated using OLS and in the case of the two last equations TSLS. When using TSLS, the exogenous variables were, in line with equation 27, assumed to be the growth rate of industrial production and consumer prices during the current and three previous years.[2]

At this stage of the study only a limited number of countries was included. The Federal Republic of Germany, the United Kingdom and Australia were included as representatives of countries with relatively liberal rules for capital movements in the 1970's. Finland, Sweden and France were included as examples of countries with more restrictive rules. It was expected that the models developed above would hold for all of them, but that the explanatory power would be less for the first group of countries, where expectations are more free to influence capital transactions. It was also expected that short-run interest rates would be more relevant for this group, as capital imports in at least the Scandinavian countries tends to be quite closely tied to investment financing needs. The importance of the foreign interest rate was also expected to be limited for smaller countries, where even single, large investment projects may represent too large a risk for domestic banks - thus forcing the investor abroad for supplementary financing regardless of (minor) changes in financial costs.

In general the models worked quite well in the case of Finland, Sweden, Australia and France. The capital movements of

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1. See appendix 2 for details.

2. An implicit specification for investment similar to that in NYBERG (1982) did not materially affect the estimates for equation (27). This alternative specification of the investment function is thus reconcilable with the present study.

Germany and the United Kigdom were not successfully captured by these models. It seems intuitively possible that the money and capital markets of these two countries are integrated with the international markets to such an extent that other factors (interest rate and exchange rate expectations, for instance) are more important than those referred to in the models. Inclusion of an exchange rate variable in the case of Germany proved successful. Only the United Kingdom, then, could not with ease be fitted into the theoretical framework developed.

The results of the estimates (in millions of current US dollars) are presented in appendix 4.

3.3. Primary estimation results

Australia

All the equations for Australia explain about 70 % of the variation of changes in capital imports in 1966 - 1980. A rather high Durbin-Watson statistic indicates the prescense of autocorrelation. Nevertheless, coefficients are quite stable in the various equations.

The coefficients have the expected sign with the exception of the long-term foreign interest rate. Replacing it with the short-term interest rate gives the rate its expected negative sign without causing other major changes in the coefficients. No interest term is statistically significant, possibly indicating that adjustment to interest rate changes is rapid.

Taking account of the simultaneous determination of capital imports and changes in net domestic assets clearly lessens the effect of domestic reserve money creation on capital

imports. As increase in domestic net assets is offset to 40 % by decreased capital imports, indicating a fair degree of substitutability between domestic and foreign assets.

Increases in domestic saving lead to almost equivalent decreases in net capital imports. This indicates a high preference for foreign net assets among the population compared with holding money or real capital. Given this interpretation, the coefficient for the effect of total wealth really seems excessively high.

In the Australian data investment has a powerful influence on capital imports, indicating either a volatile domestic marginal rate of interest or a high degree of imperfection in the capital market. According to the estimates an increase of gross real investment would lead to an increase of capital imports of 70 - 80 % of its total value. The noticable change of parameters caused by including investment among the endogenous variables indicates that investment well may be partly endogenous.

The Federal Republic of Germany

The estimation results for the Federal Republic of Germany explain at best some 40 % of the capital movements. The best equation was estimated assuming that domestic monetary policy was endogenous while investment was considered exogenous. Even here, however, the coefficient for total wealth was positive, contrary to expectations.

Changes in domestic net assets affect net capital imports somewhat less than in Australia or about 30 %. The effect of investment is neligible and statistically insignificant, indicating that investors are not induced or forced to use foreign finance. Long-term interest rates have the expected

sign but are not statistically significant. All in all the models developed did not work well in this case, and it seems likely that one or several important explanatory variables have been left out.

In order to test this a variable designed to measure exchange rate expectations (V^E) was introduced into equation 26.[1] The resulting equation (G1) shows a significant exchange rate effect and all signs are as expected. The explanatory power increased markedly to 71 %. The equation indicates a rather low substitutability between domestic and foreign assets as well as a low demand for foreign assets and a low dependence on foreign sources for investment finance. Only the effects of exchange rates and investment on capital movements are statistically significant, however.

Finland

All the models explain capital imports to Finland equally well, accounting for well over 90 % of the variation. When assuming domestic monetary policy or investment to be endogenous, the coefficients of the variables did not change to any significant extent. This indicates that other variables than those included in the models account for most of the changes in the supply of money and in investment.

The impact of net domestic assets on capital imports is larger than in the two previous cases, indicating a significant willingness to substitute domestic and foreign financial assets.[2] At the same time the wealth effect on capital

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1. The variable was the current DM-dollar rate divided by its moving average value for three previous years. A rise in V^E thus indicates a relative strengthening of the dollar and leads to a capital outflow if expectations are extrapolative. Given the exchange rate history of the DM, this seems a reasonable assumption to make.

2. The effect may also be explained by looking on capital imports as a way of circumventing domestic excess demand for credit. As the money and credit supply expands, the need for alternative (foreign) financing decreases markedly.

imports shows that the willingness to hold domestic assets is markedly larger than in the earlier cases.[1] An increase in the current account deficit influences reserves quite substantially, since only half of the incremental deficit is financed by foreign credits.

Increases in investment expenditure are to almost 75 % financed by increased capital imports. This is partly explained by the small size of the domestic capital market, but probably also by the existence of widespread credit rationing. As the supply of credit is rationed, investors are forced abroad (while savers are happy to use their funds for easing their own rationing at home rather than invest them abroad).

Interest rate changes are statistically significant in the case of Finland, indicating that a one percentage point change in the (US) long-term rate of interest causes a variation in net capital imports of about 150 million dollars.

France

Because of data shortages, the estimation for France covered only the period 1969 - 1980. The estimated equations are quite satisfactory, explaining almost 90 % of the variation. All variables, again with the exception of the long-term interest rate, had coefficients with expected signs. Using the short-erm interest rate instead changed the sign of the coefficient, but unfortunately not its statistical significance.

In France domestic net assets are obviously endogenously determined but investment even less so than in the Federal Republic

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1. The lower coefficient can also be looked upon as an indicatio that changes in total savings do not depress domestic rates of interest to the same extent as in the two previous countries.

of Germany. The wealth effect is large, indicating that changes in savings to almost 90 % are offset by changes in capital imports. Investment has a decided influence on the capital account, being financed to almost 70 % by foreign credits. Changes in the current account balance influence foreign exchange reserves only marginally, since almost 90 % of a deficit is financed by foreign net credits.

Interest rates remained statistically insignificant. This way, as already mentioned, indicate a rapid adjustment to new rates.

Sweden

The estimates for Sweden (1969 - 1980) are quite close to those of Finland. Interest rate changes were, however, not significant.

Somewhat less than one half of the change in net domestic assets is reflected in changing capital imports. The equations do not give any strong evidence of an endognous monetary policy or of endogenous investments, at least not with the specificatio used in this study. An increase in wealth (savings) will decrease net foreign capital imports by almost 70 % of the increase, showing a willingness to hold both domestic and foreign assets. Foreign assets are, however, more important in Sweden than in Finland, probably owing to the fact that Sweden has a larger share of internationally active and multinational enterprises.

Investment expenditure gives rise to capital imports to the same extent as in Finland. The reasons for this are also partly similar.

The Durbin-Watson statistic for the Swedish models is the highest in the whole study. The coefficients should therefore be interpreted with even more care than those for the other countries.

The United Kingdom

The estimation results for the United Kingdom were discouraging. Most coefficients recieved signs opposite those expected. At the same time only a few of the coefficients were statistically significant. It seems as if the models constructed fit the English economy even worse than the German one.

An effort to fit an equation like G1 for Germany did not succeed. The exchange rate effect was of the expected direction, but statistically not significant.

As the equations work quite well at least for economies with continuous excess demand for funds, the disappointing results for the UK may well depend on the lack of a variable measuring interest rate expectations. Such a variable (R^E) was constructed measuring the difference between the current UK long term interest rate and its three-year moving average for the previous year. Depending on whether expectations are extrapolative or regressive the coefficient may be positive or negative.

The hypothesis was tested under the assumption that monetary policy was endogenous and capital mobile. The results were moderately successful:

$$\Delta TC = \underset{(1.9)}{-0.788}\Delta\Delta NDA - \underset{(1.6)}{0.635}\Delta(CAB+I) + \underset{(1.4)}{5138.483}\Delta\Delta R_F - \underset{(0.8)}{1199.974}\Delta\Delta R^E + \underset{(0.7)}{1738.591}$$

$R^2 = 0.48$
$DW = 2.17$
$SE = 6730.4$

Even in this equation foreign interest rates have a sign opposite that expected. The equation indicates regressive interest rate expectations, but the coefficient is not statistically significant. The previous assumptions of imperfect capital markets were clearly not warranted in the case of the UK.

3.4. Change of time periods

In order to check the stability of the coefficients, equation 25 was estimated for the shorter period 1973 - 1980. This period was characterized by very large changes in both economic conditions and monetary policy. Sizable changes in coefficients are therefore possible. As economic risks increased everywhere and exchange rates were subject to wide fluctuations, the public in various countries should show less inclination for capital imports. On the other hand, the wide-spread need to raise supplementary financing for growing oil bills might work in the opposite direction. Thus, no clear expected trend in the coefficients could be assumed.

The new equations (73-80) in appendix 4 should be compared with equations 25. In both cases it was assumed that domestic monetary policy and investment were exogenous. While this in some cases may be factually unlikely, a comparison with equation 27 was made difficult by the small number of observations in this test.

The coefficient for $\Delta\Delta$NDA increased in absolute value for all countries. This can be interpreted as a higher sensitivity for changes in domestic monetary conditions in the demand function for foreign assets. The substitutability between foreign and domestic assets seems to have increased between the two periods. This may simply reflect the large and rapid growth of knowledge about foreign finance in the 1970's made necessary by developments in connection with the oil crises.

No general trend in the effect of wealth on foreign asset demand can be detected. The effect seemed to increase in France, Germany and the United Kingdom, stay constant in Australia and Sweden and decrease in Finland. Almost the same pattern can be seen as regards the effect of investment expenditure on capital imports. Thus the impact of both savings and investment on capital imports changed in the same direction, indicating general changes in the reliance on foreign finance, rather than "structural" changes. It is quite likely that this reflects general public and policy attitudes to financing or absorbing the income loss caused by the rising price of oil.

The effect of changes in the foreign rate of interest has increased in absolute terms in all countries. This reflects, of course, the generally higher level of nominal values in the latter period, but may also be taken as the result of increased sophistication in matters of foreign finance (see the comment on $\Delta\Delta$NDA).

In general there were quite a large number of changes in the coefficients when the period of estimation changed. Still, in view of the substantially different environment during the 1970's and the late 1960's, the changes do not necessarily indicate unstable coefficients per ce, but the existence of exogenous shocks in behavior. However, in view of the small change of period for France, that country may well be an exception and show truly unstable coefficients.

3.5. Including a transactions demand for money

As mentioned above in section 2.1. it was decided that a transactions demand for money would be unnecessary as the correlation with changes in wealth would be great. This was controlled by including an income variable ($\Delta Y - \Delta Y_{-1} = \Delta\Delta Y$) in equation 27. The resulting equation (TD) is presented together with equation 27 on the final page of appendix 4.

The new income variable is statistically significant only in Germany and Sweden. In Finland it has received an improbable coefficient. For all other countries the coefficients are statistically insignificant but have the expected sign.

For some of these latter countries, the inclusion of the variable seems to change the character of the estimated equation quite much. The prime example is Germany, where the coefficients, however, were not significant to begin with. Also in the equations for Australia and Finland some coefficients receive a different first decimal.

The inclusion of a transactions demand variable seems to improve decisively the general quality of the equation for Germany only. However, also the quality of the Australia and the Swedish equations improve to some extent. It is therefore not obvious that the transactions demand for money can be left aside when estimating capital imports equations. Nevertheless, the variable does not seem to be generally necessary either.

4. SUMMARY

4.1. Results of the study

The theory developed to explain net capital imports was based on portfolio considerations and the assumption of equilibrium in the domestic market for reserve money. The domestic market for domestic bonds was assumed to be a residual, implying that authorities vary the supply of bonds to match their endogenous demand. Foreign interest rates as well as total domestic income were assumed exogenous throughout the study. This reflects an implicit assumption of a "small" country in a financial-market sense as well as an assumption of a limited short-run impact on real variables and prices from changes in monetary conditions.

The study explicitly recognized two potentially important transmission mechanisms in the financial markets which so far have remained largely unelaborated in the literature known to the author. In the first place it was recognized that asset demands should depend on total wealth rather than on financial wealth as often assumed in portfolio-approach studies. Secondly, as a consequence of this investment expenditure should at least in part be treated in a manner analogous to the demand for financial assets.

The empirical tests used annual data for six industrial countries with widely differing characteristics and covered the period 1966 - 1980 (in two cases 1969 - 1980). The amount of auxiliary ad hoc exogenous variables was kept to a minimum. This put rather severe demands on the various hypotheses advanced.

Using different wealth specifications (together with an assumpiton of imperfect capital mobility) did not greatly influence the explanatory power of the regression equations.[1)] Where changes were most obvious (Finland and Germany) they showed improvement; in no case did use of the more comprehensive wealth variable worsen the fit of the equation. The use of total wealth was, together with the assumption of imperfect capital mobility, no worse and possibly better than the use of financial wealth only. The choice of variables in this respect has sizable structural implications and is therefore important.

Assuming an endogenous monetary policy (determined by i.a. the history of growth in production and prices) improved only the fit of the equation for France. In the case of

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1. Using the total wealth specification alone reduced the explanatory power of the equations and the wealth variable generally received the wrong sign. This was taken as a sign that the investment component dominated the variable, i.e. that frictions in the capital markets were important. The UK, with its well-developed capital markets, actually benefited when investment was ignored.

Australia there were especially large changes in the coefficients, but also other countries showed changes in coefficients. In these other countries, however, evidence for a strongly endogenous monetary policy was not found using the background variables mentioned. This somewhat surprising result may depend either on unsuitable assumptions regarding targets for monetary policy or on a strong dependence between monetary policy, investment and savings (or the current account balance). However, the assumption of a partly endogenous monetary policy should be retained in view of the coefficient changes observed.

Additionally assuming a (partly) endogenous demand for real assets did not, in general, change the fit of the equations. Germany was an exception, showing a very much worse result than before. However, changes in coefficients were common and large for most countries (Finland, Germany, Australia, France). As may be expected, the changes generally indicated less influence for total wealth and investment while interest rate changes accounted for more of the variation. This may be taken as an indication that investments are interest-rate sensitive, but not to any great extent. At the same time the results indicate that ignoring this dependence may result in coefficients significantly different from the "true" ones.

The capital movements of Germany and the UK were not as well explained by the models as those of other countries. In the case of Germnay this apparently depended on the lack of an exchange rate expectation variable. The equations for the UK remained weak even though several exchange rate expectations variables were tried, but improved from an ad hoc specification of interest rate expectations.

The original equation (exogenous monetary policy and investment) was also run using a different period (1973 - 1980) to test

the robustness of the coefficients. In general, explanatory power was higher in the shorter period. Changes in coefficients were common and quite sizable in the cases of France and Germany, while moderate for Australia and Finland. This indicates either that the coefficients per se are unstable or that the economic environment changed enough to make behavior truly different in the 1970's. At least the latter cause is likely, but does not exclude the former.

Finally, the effect of including a transactions demand for money in the equations was studied. The effect was in the expected direction and improved the quality of some of the regressions. Only in Germany did the effect seem decisive, however.

Generally speaking the empirical tests support the theoretical models developed. However, it also seems clear that the models pay too little attention to institutional specifics of various countries. In the view of the regression results the same assumptions do not work nearly equally well in different countries. It seems that the models worked best for countries with continuous excess demand for capital and worse for countries with well-functioning domestic capital markets. This is by itself an important provisional result, since much theoretical work on international financial relations tends to abstract from such matters.

4.2. Implications for future work

The consequences of the study for future research seems rather clear. In view of the difficulty to fit interest rates, the models should be constructed for shorter periods than one year. This also makes it necessary to consider explicitly the determination of fixed investment on the one hand and changes in stocks on the other. Possibly only the latter should be considered responsive to changes in interest rates in the short run.

Explicit recognition of various imperfections in the market mechanism also seems necessary. Trade credits may be determined more by habit than relative interest rates. The possibility of portfolio shifts may vary widely between countries. Models recognizing disequilibrium situations explicitly should be tested. Finally, it is quite clear that the knowledge of how international capital markets work has increased in all countries during the 1970's, which must have had a profound impact on behavior as well. Also this must be accounted for.

Finally, the reaction functions of the authorities in various countries are not likely to be as similar as assumed hare. This is obvious from even casual inspection of central bank policies in different countries in the 1970's. Future work must clearly take account of several potential functions in view of the results obtained in this study. The same goes for the determinants of investment, even though some tests here indicated that the results were rather robust in respect of the investment function (implicitly) chosen.

Appendix 1: Deriving equation (20).

Eliminating ΔR from the first two equations gives

$$(A1) \qquad (a_{F1} + a_{M1})TC + a_{F1}\Delta NDA + [a_{M1}a_{F2} - a_{F1}(1 - a_{M2})]\,\Delta W =$$

$$- a_{F3}a_{M1}\Delta Z_F + a_{F1}a_{M3}\Delta Z_M - (a_{F1} - a_i a_{M1})I$$

This function for capital movements is identical to that in equation 16 when taking account of the fact that both financial and non-financial investment is interrelated through the common decision to accumulate wealth.

Doing the same for equations 14 and 19 gives

$$(A2) \qquad a_{K1}TC = (a_{F1}a_{K2} - a_{K1}a_{F2})\Delta W - (a_{F1} - a_{K1}a_i)I -$$

$$- a_{K1}a_{F3}\Delta Z_F + a_{F1}a_{K3}\Delta Z_K$$

Capital imports are here explained only by changes in total wealth and investment.

Finally, assuming that investment decisions, too, are partly endogenously determined gives the quite general type of equation determining capital imports. Eliminating investment I from equations A1 and A2 gives

$$(A3) \qquad TC = -\gamma_1^o\Delta NDA - \gamma_2^o\Delta W + \Delta Z_3$$

where

$$\gamma_1^o = \varepsilon a_{F1}(a_{F1} - a_i a_{K1})$$

$$\gamma_2^o = \varepsilon\{(a_{F1} - a_i a_{K1})\,[a_{M1}a_{F2} + a_{F1}(1 - a_{M2})] +$$

$$+ a_{K1}a_{F2}(a_{F1} + a_i a_{M1}) - a_{K2}a_{F1}(a_{F1} + a_i a_{M1})\}$$

$$\varepsilon = [(a_{M1} + a_{F1} + a_{K1})(a_{F1} - a_i a_{K1}) + a_{K1} a_i (a_{F1} + a_{M1})]^{-1}$$

$$\Delta Z_3 = \varepsilon\{- [a_{M1}(a_{F1} - a_i a_{K1}) + a_{K1}(a_{F1} + a_i a_{M1})] a_{F3} \Delta Z_F +$$

$$+ a_{F1}(a_{F1} - a_i a_{K1}) a_{M3} \Delta Z_M + a_{F1}(a_{F1} + a_i a_{M1}) a_{K3} \Delta Z_K$$

Capital imports will vary negatively with the change of net domestic assets of the country (i.e. the supply of domestic money). Domestic savings (ΔW) will lessen capital imports unless the wealth effect on real investment a_{K2} is quite large in relation to the other parameters.

The coefficient of ΔZ_F is negative, which means that an increase in the rate of interest abroad will lower capital imports. Changes in income and profits will, by increasing investment, lead to greater foreign financing needs. Current income and profits will raise total savings and wealth, thus depressing capital imports.

Appendix 2: Determinants of international indebtedness

The total net foreign debt of a country (exclusive of reserves) equals the cumulated value of net capital imports. In relation to income it gives a measure of the relative indebtedness of the country. This relationship is

$$(B1) \qquad d = \sum_{0}^{t} - TC_{\tau}/Y_{\tau}.$$

In the long run real growth, inflation and interest rates will stay constant. Monetary policy will be fully endognous, implying that the effect of real growth on the capital balance is unclear while inflation raises capital imports. Growth, inflation and the foreign rate of interest will attain their equilibrium values:

$$\hat{Y}_R = y, \ \hat{Q} = q \quad , \quad R_F = r.$$

Inserting this into equation 26 and 27 gives

$$(B2) \qquad \sum_{0}^{t} TC_{\tau} = \gamma_1 \sum_{0}^{t} Y_{\tau} + \gamma_2 y + \gamma_3 q + \gamma_4 r + \gamma_5 \Sigma \ (p_0 + p_1 y) Y_{\tau} -$$

$$- \gamma_6 Y_t - \gamma_7 (p_0 + p_1 y) Y_t$$

where

$$\sum_{0}^{t} (1+y)^{\tau} Y_0 = Y_t/(y+q)(1+y+q)$$

and γ_i are the parameters of equation 27 when ΔNDA is inserted into the relation for TC.

Writing[1)]

$$\gamma_i \rightarrow \gamma_i' \ Y_t \qquad i = 2, 3, 4$$

relation B1 may after insertion of equation B2 be written

$$(B3) \qquad d = (\gamma_6 + \gamma_7 p_0) + (\gamma_7 p_1 - \gamma_2')y - \gamma_3' q - \gamma_4' r -$$

$$- \frac{\gamma_1 + \gamma_5 p_0 + \gamma_5 p_1 y}{(y + q)(1 + y + q)}$$

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1. Cf. the derivation of the asset demand equations in Section 2.1

Domestic inflation lowers the indebtedness ratio partly as a trivial pure index effect, partly because of resulting domestic monetary restraint by the central bank. Low foreign interest rates raise foreign indebtedness as domestic assets get that more probitable. As a higher domestic real rate of growth raises both the level of savings and the amount of investment, it may increase or decrease foreign indebtedness. However, unless γ_2' is very large in relation to γ_7 and γ_5, increased growth will raise indebtedness.

Appendix 3: Definition of data series

The regressions obtained are based on annual data from International Financial Statistics. The data was made available on tapes and the computations were run on the Bank of Finland DEC-20 computer using a program library developed by the Institut für Höhere Studien in Vienna.

The variables used in the regressions are in millions of current US dollars and defined as follows (line numbers refer to IFS yearbook entries):

CAB = trade balance plus other goods and services net balance plus total unrequited transfers (lines 77a.d + 77and + + 77aed + 77afd),

I = gross fixed capital formation plus change in stocks (lines 93e + 93i),

NDA = reserve money less net foreign assets (lines 14 - 11 + + 16c); this measure does not always tally exactly with the measure derived from balance-of-payments data, see Balance of Payments Yearbook for details,

Q = consumer prices (line 64),

R_{F1} = US long-term bond yield (line 61 for US),

R_{F2} = US Federal Funds rate (line 60b for US),

TC = import of capital other than reserves plus net errors and omissions (lines 77b.d + 77d.d),

Y = GDP in nominal terms (line 99b),

Y_R = industrial production (line 66..c).

AUSTRALIA (1966 - 1980) APPENDIX 4

Variable / Equation	ΔΔNDA	ΔCAB	Δ(CAB+I)	ΔI	$\Delta\Delta RF_1$	$\Delta\Delta RF_2$	CONSTANT	R^2	DW	SE	METHOD
(24)	-0.566	-0.591			+93.332		+84.043	0.67	2.90	1048.2	OLS
	(2.4)	(2.4)			(0.2)		(0.3)				
	-0.519	-0.632				-52.130	+97.512	0.68	2.89	1036.9	OLS
	(2.3)	(2.7)				(0.5)	(0.4)				
(25)	-0.532		-0.840	+0.680	+248.291		+292.552	0.70	2.81	1050.0	OLS
	(2.2)		(2.4)	(2.6)	(0.6)		(0.8)				
	-0.483		-0.820	+0.706		-27.545	+257.995	0.69	2.83	1061.9	OLS
	(2.0)		(2.3)	(2.7)		(0.3)	(0.7)				
(26)	-0.481		-0.873	+0.709	+219.587		+302.384	0.70	2.74	1052.3	TSLS
	(1.8)		(2.4)	(2.6)	(0.5)		(0.9)				
	-0.385		-0.888	+0.759		-33.345	+278.292	0.69	2.68	1070.9	TSLS
	(1.5)		(2.4)	(2.8)		(0.3)	(0.8)				
(27)	-0.475		-0.949	+0.771	+214.826		+311.406	0.70	2.65	1056.4	TSLS
	(1.8)		(2.0)	(2.1)	(0.5)		(0.9)				
	-0.384		-0.909	+0.776		-33.103	+281.124	0.69	2.66	1071.5	TSLS
	(1.4)		(2.0)	(2.2)		(0.3)	(0.8)				
(73-80)	-0.600		-0.842	+0.625	+769.543		+238.615	0.75	2.85	1710.2	OLS
	(1.2)		(1.2)	(1.1)	(0.7)		(0.3)				

FEDERAL REPUBLIC OF GERMANY (1966 - 1980)

Equation	Variable ΔΔNDA	ΔCAB	Δ(CAB+I)	ΔI	$\Delta\Delta RF_1$	$\Delta\Delta RF_2$	$\Delta(V^E \cdot Y_{-1})$	CONSTANT	R^2	DW	SE	METHOD
(24)	-0.335	-0.075			-508.072			43.823	0.39	1.96	1793.8	OLS
	(2.2)	(0.9)			(0.8)			(0.1)				
	-0.361	-0.102				+210.909		-66.783	0.44	1.56	1714.6	OLS
	(2.5)	(1.2)				(1.3)		(0.2)				
(25)	-0.340		+0.007	+0.058	-968.769			-551.836	0.48	2.08	1735.7	OLS
	(2.4)		(0.1)	(0.7)	(1.3)			(0.9)				
(26)	-0.299		+0.002	+0.062	-940.442			-563.435	0.48	2.11	1743.0	TSLS
	(1.9)		(0.0)	(0.7)	(1.3)			(0.9)				
(27)	-0.122		+0.138	-0.063	-989.771			-582.769	0.21	2.54	2143.6	TSLS
	(0.6)		(0.9)	(0.5)	(1.1)			(0.7)				
(G1)	-0.206		-0.170	+0.234	-501.179		-0.030	-445.780	0.71	2.63	1376.8	TSLS
	(1.6)		(1.6)	(2.5)	(0.8)		(2.7)	(0.7)				
(73-80)	-0.689		+0.130	+0.004	-2635.249			-1288.242	0.67	2.24	2330.3	OLS
	(2.0)		(0.8)	(0.0)	(1.7)			(1.0)				

FINLAND (1966 - 1980)

Equation	ΔΔNDA	ΔCAB	Δ(CAB+I)	ΔI	$\Delta\Delta RF_1$	$\Delta\Delta RF_2$	CONSTANT	R^2	DW	SE	METHOD
(24)	-0.316	-0.868			-40.751		43.088	0.94	2.33	166.6	OLS
	(3.4)	(12.7)			(0.7)		(1.0)				
	-0.292	-0.843				-7.974	40.417	0.93	2.48	168.5	OLS
	(3.0)	(9.4)				(0.4)	(0.9)				
(25)	-0.429		-0.562	+0.749	-149.556		-59.126	0.96	1.97	137.6	OLS
	(4.8)		(4.1)	(10.1)	(2.2)		(1.1)				
(26)	-0.418		-0.567	+0.750	-146.090		-56.819	0.96	1.99	137.6	TSLS
	(4.4)		(4.1)	(10.1)	(2.1)		(1.0)				
(27)	-0.422		-0.493	+0.705	-161.347		-70.617	0.96	1.90	140.1	TSLS
	(4.4)		(2.6)	(6.4)	(2.1)		(1.2)				
(73-80)	-0.496		-0.312	+0.657	-247.819		-209.174	0.99	2.04	133.9	OLS
	(4.3)		(1.6)	(7.5)	(2.2)		(1.9)				

FRANCE (1969 - 1980)

Equation	Variable ΔΔNDA	ΔCAB	Δ(CAB+I)	ΔI	ΔΔRF$_1$	ΔΔRF$_2$	CONSTANT	R^2	DW	SE	METHOD
(24)	-0.211	-0.869			+89.081		+309.152	0.76	2.40	2708.1	OLS
	(2.7)	(4.7)			(0.1)		(0.4)				
(25)	-0.146		-0.650	+0.389	+1565.120		+2556.912	0.70	2.21	3249.7	OLS
	(1.8)		(2.8)	(1.3)	(1.0)		(1.5)				
(26)	-0.249		-0.973	+0.708	+1416.326		+2612.581	0.88	1.68	2055.8	TSLS
	(3.6)		(6.5)	(4.7)	(1.5)		(2.4)				
(27)	-0.257		-0.918	+0.624	+1630.995		+2883.577	0.88	1.57	2086.6	TSLS
	(3.6)		(5.4)	(3.5)	(1.7)		(2.6)				
	-0.233		-0.898	+0.707		-24.951	2152.546	0.84	1.86	2429.4	TSLS
	(1.7)		(4.4)	(3.4)		(0.1)	(1.3)				
(73-80)	-0.289		-1.002	+0.699	+2239.024		+2607.999	0.90	1.19	2802.6	OLS
	(3.0)		(4.9)	(3.1)	(1.4)		(1.3)				

SWEDEN (1969 - 1980)

Equation	Variable ΔΔNDA	ΔCAB	Δ(CAB+I)	ΔI	ΔΔRF$_1$	ΔΔRF$_2$	CONSTANT	R^2	DW	SE	METHOD
(24)	-0.452	-0.731			-230.226		+103.146	0.88	3.35	613.1	OLS
	(5.4)	(5.5)			(1.0)		(0.6)				
	-0.408	-0.715			- 55.053		+ 86.017	0.87	3.42	620.4	OLS
	(4.6)	(5.3)			(0.9)		(0.5)				
(25)	-0.448		-0.698	+0.729	-237.236		+ 66.793	0.88	3.31	652.3	OLS
	(5.0)		(3.7)	(5.2)	(0.9)		(0.3)				
(26)	-0.431		-0.692	+0.727	-229.412		+ 64.006	0.88	3.40	654.1	TSLS
	(4.6)		(3.6)	(5.1)	(1.0)		(0.3)				
(27)	-0.457		-0.694	+0.724	-241.598 (1.0)		+ 70.559	0.88	3.28	652.9	TSLS
	(5.0)		(3.6)	(5.1)			(0.3)				
(73-80)	-0.458		-0.662	+0.686	-406.406		+205.685	0.88	3.29	948.0	OLS
	(3.5)		(2.3)	(3.1)	(0.9)		(0.4)				

UNITED KINGDOM (1966 - 1980)

Equation	Variable ΔΔNDA	ΔCAB	Δ(CAB+I)	ΔI	ΔΔRF$_1$	ΔΔRF$_2$	CONSTANT	R^2	DW	SE	METHOD
(24)	-0.801	+0.475			+1761.439		-1106.977	0.33	1.83	7201.3	OLS
	(2.2)	(0.8)			(0.6)		(0.6)				
(25)	-1.053		+0.060	-0.991	+5464.484		+2608.797	0.60	1.93	5822.8	OLS
	(3.3)		(0.1)	(2.0)	(2.0)		(1.2)				
(26)	-0.969		+0.075	-0.977	+5086.407		+2536.435	0.60	1.99	5843.5	TSLS
	(3.0)		(0.2)	(1.9)	(1.8)		(1.2)				
(27)	-1.450		+0.776	-1.956	+7586.268		+3597.131	0.58	1.67	7088.2	TSLS
	(2.5)		(0.8)	(1.9)	(1.9)		(1.3)				
(73-80)	-1.678		-0.138	-1.571	+11567.972		+6978.949	0.95	2.66	3514.8	OLS
	(6.2)		(0.4)	(4.7)	(5.1)		(3.1)				

		ΔΔNDA	Δ(CAB+I)	ΔI	$\Delta\Delta RF_1$	ΔΔY	CONSTANT	R^2	DW	SE
AUSTRALIA	(27)	-0.475	-0.949	+0.771	+214.826		+311.406	0.70	2.54	1071.5
		(1.8)	(2.0)	(2.1)	(0.5)		(0.9)			
	(TD)	-0.512	-0.902	+0.588	-2.713	+0.068	+505.171	0.76	2.30	997.5
		(2.0)	(2.5)	(2.0)	(0.0)	(1.4)	(1.4)			
GERMANY	(27)	-0.122	+0.138	-0.063	-989.771		-582.769	0.21	2.54	2143.6
		(0.6)	(0.9)	(0.5)	(1.1)		(0.7)			
	(TD)	-0.099	-0.140	+0.135	-620.358	+0.043	-120.130	0.65	2.66	1539.1
		(0.6)	(1.0)	(1.2)	(0.9)	(2.1)	(0.2)			
FINLAND	(27)	-0.422	-0.493	+0.705	-161.347		-70.617	0.96	1.90	140.1
		(4.4)	(2.6)	(6.4)	(2.1)		(1.2)			
	(TD)	-0.473	-0.539	+0.718	-181.868	31.962	-62.931	0.96	2.07	141.0
		(3.6)	(2.9)	(6.4)	(2.0)	(0.7)	(1.0)			
FRANCE[1)]	(27)	-0.257	-0.918	+0.624	+1630.995		+2883.577	0.88	1.57	2086.6
		(3.6)	(5.4)	(3.5)	(1.7)		(2.6)			
	(TD)	-0.269	-1.089	+0.790	+1400.606	+0.014	+2745.480	0.89	1.68	2172.4
		(3.2)	(1.8)	(1.4)	(1.1)	(0.2)	(2.4)			
SWEDEN[1)]	(27)	-0.457	-0.694	+0.724	-241.598		+70.559	0.88	3.28	652.9
		(5.0)	(3.6)	(5.1)	(1.0)		(0.3)			
	(TD)	-0.483	-1.266	+1.048	-345.992	+0.159	+239.143	0.96	1.67	435.66
		(8.0)	(6.3)	(8.0)	(2.0)	(3.7)	(1.4)			
UK	(27)	-1.450	+0.776	-1.956	+7586.268		+3597.131	0.58	1.67	7088.2
		(2.5)	(0.8)	(1.9)	(1.9)		(1.3)			
	(TD)	-1.387	+0.535	-1.770	+7236.205	+0.000	+3418.242	0.59	1.69	7055.8
		(2.5)	(0.7)	(1.8)	(1.8)	(0.0)	(1.3)			

1. $\hat{Q}_{-3}$ was left out of the list of predetermined variables.

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