A MONETARY EXAMINATION OF SWEDISH BALANCE OF PAYMENTS ADJUSTMENT

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Abstract

The monetary approach to the balance of payments presents an alternative analysis of international imbalance one that highlights and brings to the forefront the role of monetary variables. This open economy macrofinancial theory postulates that external disorders reflect disequilibrium between the demand for and supply of money. The balance of payments is a monetary phenomenon. In this paper both the reserve-flow and exchange market pressure formulations are examined.

The Monetary Theory of the Balance of Payments

1. International Monetarist Doctrine

During the late 1960s and early 1970s monetary economists began their attack on the traditional approaches to the balance of payments. To these economists the dominant limitations of the contemporary theories were their individual and collective exclusion of monetary consequences and their consideration of the current account only.

The most outspoken proponents of these arguments were scholars immersed in the classical economics tradition, most notably Mundell(1968,1971) and Johnson(1972). Their seminal writings initiated the monetary approach.

Within this classical tradition two cornerstones emerge and infiltrate all edicts. The first of these is the concept of a system of world markets. Consequent upon the symbiotic themes of trade, profit maximization and arbitrage, an open, interdependent world economy prevails wherein prices, yields, and production move in tandem. Small industrial nations, as well as developing countries are unable to purify or shelter their domestic markets from international developments (in the long run).

Because it is a prototype of the former economic classification, Sweden was chosen for particular examination.

The second theme proclaimed by the ambassadors of the monetary approach is an indivisible loyalty to the axiom that the balance of payments is a monetary phenomenon.

The dominant contention is that external adjustment is directly traceable to monetary influences. Discourses which sublimate or disregard financial flows are instantaneously dismissed and rebuked; tracts which emphasize real forces are viewed as egregiously misguided.

The preferred methodology is to singularly focus on the official settlements portion of a nation's balance of payments. In addition to their indomitable conviction regarding the primacy of monetary forces, international monetarists also justify this partitioned treatment by appealing to Walras' Law. By this law, the excess demands for goods, bonds, and money must sum to zero. Accordingly, one can simply consider the excess demand for money in lieu of adding the trade

balance (excess demand for goods) and the capital account balance (excess demand for bonds). The capital and current accounts play perforce a secondary role because model building from these accounting segments is deemed too cumbersome and roundabout.(1)

Emanating from this deliberately exclusionary backdrop is their paramount declaration: External imbalances are attributable to money market disequilibrium.

Viewed in this manner there will be an inflow of international reserves whenever domestic demand for goods, services, and nonmonetary assets is less than the corresponding foreign demand. Alternatively, reserves will flow in when domestic agents desire to accumulate more money balances than are currently available in the home economy.

Seen in this framework, the balance of payments is a monetary phenomenon. Payments imbalances spring from disequilibrium in the money market. Although other markets will also be in disequilibrium, monetarists place these in the background and consider the monetary sector and the balance of payments as inseparable. The prime role of monetary policy is to regulate the international flow of reserves.

The demand for and supply of money functions must be specified and examined in order to understand, comprehend, and appreciate external adjustment. Deficits are the aftermath of an excess supply of money in the domestic nation whereby the rate of increase in the money supply exceeds the economy's capacity for real growth. These excess money balances are transferred to a foreign nation where they may be more efficiently utilized. The magnitude of these flows represents the domestic deficit (excess demand for money abroad).

This line of reasoning forms the

marrow or nucleus of the monetary approach. It is further attested that balance of payments amelioration is automatic or self-correcting. Market forces are the catalytic agent of adjustment. Barring central bank intervention any disequilibrium will be remedied by a natural process. Discretionary monetary policy is not needed; the use of policy only postpones, and perhaps aggravates, intrinsic forces.

To this point discussion has been limited to a fixed exchange rate system. The theory applies equally well to the case of flexible exchange rates.

Under a freely flexible system balance of payments disorders are resolved by exchange rate changes. In reference to a managed or "dirty" floating system, the monetary approach postulates that the apparatus of correction will include both changes in reserves and the exchange rate. In the absence of central bank intervention continuous balance of payments disequilibria would not occur.

2. The Theoretical Model

In the small country, open economy model developed by Johnson the demand for money equation takes the general form $M_d = P[f(Y, i)]$. By multiplying by P it is thereby assumed that the demand for money is homogeneous of degree one in the price level.

The specific version of this equation is:

$$M_d = PY(b')e(-c'i)u \quad (a)$$

where:

M_d = nominal stock of money demanded

P = price index

b' = income elasticity of M_d

c' = interest elasticity of M_d

e = Euler's irrational number

u = stochastic disturbance term

Presentation of the supply side begins with the standard monetary

macroeconomic relationship that the supply of money is equal to the money multiplier, m , times the monetary base, B . The base is purposefully conceived of as the sum of foreign, R , and domestic, D , reserves.

Equation (b) offers a symbolic summary of these ideas:

$$M_s = mB = m(R+D) \quad (b)$$

Since M_s equals M_d in equilibrium:

$$M_d = m(R+D) \quad (c)$$

Combining equations (a) through (c), the condition for equilibrium in the money market is:

$$m(R+D) = PY(b')e(-c'i)u \quad (d)$$

After taking the logarithm of (d), differentiating with respect to time, and making R the dependent variable (in order to focus on reserve changes in a system of fixed exchange rates), the final equation is:

$$R = P + b'Y - c'i + u - m - D \quad (e)$$

All variables are measured in growth rates.

Equation (e) is commonly referred to as a "reserve-flow equation" and is the generic form of the equation used in empirical testing of the monetary theory of the balance of payments.

Under a managed floating system, equation (e) is modified to form a measure of "exchange market pressure." This term refers to the dependent variable in a monetary model developed by Girton and Roper(1977) and amended by Connolly and daSilveira(1979). The genesis of this recent contribution to the monetary approach has the abandonment of the fixed-parity system. Because examples of absolute nonintervention by national monetary authorities are the exception rather than the norm, these authors seek to explain an

extended concept--exchange market pressure. This new variable is defined to be the sum of the rates of change of official reserves and the exchange rate.

While this formulation is particularly pertinent to the study of periods of floating rates with intervention, these writers argue that it would also be a useful tool under any system of international payments.

An Empirical Examination of Sweden

The methodology of empirical testing will be to estimate both reserve-flow and exchange market pressure equations.

1. The Reserve-Flow Monetary Model

Equation (e) is estimated in the following econometric form:

$$RB = aWORLD + bRGDP + cTB + dMM2 + eDB + v$$

The variable $WORLD$ represents the world rate of inflation while $RGDP$ and TB symbolize Swedish real gross domestic product and three-month Treasury bill rates, respectively. RB refers to the flow of international reserves while DB is the abbreviation for the domestic reserve base. The stochastic error term is incorporated by letter v .

The coefficients on DB and $MM2$ (the $M2$ money stock multiplier) reflect domestic monetary policy. The "offset coefficient," e , has an expected value of minus one under a purely fixed exchange rate system, *ceteris paribus*. That is, a change in DB will induce opposite and equal changes in RB . In this particular setting monetary policy would be completely neutralized by the balance of payments.

Similarly, the money multiplier coefficient, as a component of the supply of money equation, is also predicted to be negative and near unity.

The interest rate elasticity parameter, c , is expected to mirror the statistical findings of studies of the demand for money by appearing as a small negative number. Within this context a rise in domestic interest rates increases the opportunity cost of holding money balances and produces an excess supply of money and subsequent external deficit.

Because monetarist doctrine proposes that the demand for money is homogeneous of degree one in the price level, the price elasticity coefficient should be plus one in order to reflect the absence of money illusion.

Finally, the monetary approach argues that an exogenous increase in a nation's real gross domestic product will result in a balance of payments surplus. A given rate of growth in RGDP generates an equivalent increase in money demand which ultimately will be satisfied by a reserve inflow. Previous tests and analyses, such as those reported in Frenkel and Johnson(1976), suggest that the income elasticity of the demand for money, b , should be positive, significant, and near one.

In conducting a monetary analysis of Sweden, the annual data begin with 1951 and end with 1984.(2) The actual number of observations was reduced by two because of the need to calculate growth rates and correct for autocorrelation.

Regression results for the 1953-84 period are given in column (1) of Table 1. As a check on the possible sensitivity of the model to this time frame, column (2) reports tallies for the same model with a one-period lag.

The empirical results are outstanding. All estimated parameters have the "correct" sign and are statistically significant at very high levels. Moreover, despite the fact that the data incorporate more than a decade of floating rates, each coefficient except

DB is within one or two standard errors of its theoretical expectation. The "low" estimate for DB suggests that monetary policy is not perfectly offset by balance of payments factors in a system of flexible rates.

Recapping, the monetary approach stands tall when applied to Sweden. Even the nontraditional implications that economic growth and rising prices generate reserve inflows and surpluses find empirical support.(3)

Perhaps the most noteworthy and enlightening observation is that while international monetarism was developed during, and immediately applied to, a world of fixed exchange rates, it apparently also has analytical validity for a system of managed floating where many currencies remain pegged to those of other nations.

Rather than being stale and anachronistic, the model evidences new vigor. Despite the end of the Bretton Woods era its theoretical value continues unabated.

2. Reserve Flow Sterilization

By offering equation (e) as a reduced-form expression for reserve flows, international monetarists implicitly assert that domestic credit is exogenous with respect to international reserves. Critics of the monetary approach have questioned the direction of causation of the reserve flow: domestic credit association. They contend that the inverse relationship results from central bank sterilization of autonomous reserve flows. Regarding Sweden the argument would be that the Riksbank reacts to such flows by contracting domestic credit by the same amount in order to prevent the resultant balance of payments surplus from concomitantly affecting the stock of money.

This possibility of a simultaneous relationship needs to be explored. The key point is that the coefficient on RB

TABLE 1: REGRESSIONS OF THE MONETARY APPROACH

	(1)	(2)
DB	-0.70* (-10.70) [0.07]	-0.70* (-11.00) [0.06]
MM2	-1.20* (-5.40) [0.22]	-1.27* (-5.67) [0.22]
RGDP	1.40** (2.34) [0.60]	1.25** (2.03) [0.61]
WORLD	1.29* (4.65) [0.27]	1.30* (4.59) [0.28]
TB	-0.03* (-5.05) [0.006]	-0.03* (-5.21) [0.006]
Adjusted R-Squared	.90	.90
Observations	32	31
Standard Error	.067	.067
Durbin-Watson Statistic	1.83	1.85
F-Statistic	66.9	68.9
Rho Coefficient	.39	.43

Values in parentheses are t-statistics; values in brackets are standard errors.

* Significant at the 1% level

** Significant at the 5% level

is biased if the Riksbank engages in reserve flow sterilization. Hence the reverse causation issue needs to be modeled. A second equation must be added.

This central bank reaction function will be specified as follows: $DB = f(RB, DA)$. DA refers to the domestic assets of the Riksbank. This format hypothesizes that monetary policy, as measured by open market operations, is dictated by two considerations: (a) domestic goals, and (b) the desire to offset international flows.

This two-equation system embodies the simultaneity controversy. Table 2

modifies column (1) of Table 1 by presenting two-stage least squares estimates. As was true earlier, all coefficients are significant and have the expected sign. The coefficients of determination, standard errors, and F-statistics are very similar in both tables. No individual regression parameter is meaningfully different.

The resultant implication is that the issue of Swedish reserve sterilization is not of prime importance. Different estimation techniques generate roughly identical information.

3. Exchange Market Pressure

TABLE 2: TWO STAGE LEAST SQUARES

DB	-0.72* (-8.60)
MM2	-1.26* (-4.87)
RGDP	1.46** (2.37)
WORLD	1.27* (4.61)
TB	-0.03* (-4.57)

RB	-0.51* (-4.00)
DA	1.01* (9.03)
Adjusted R-Squared	.89
Observations	32
Standard Error	.067
Durbin-Watson Statistic	1.81
F-Statistic	66.5
Rho Coefficient	.40

Values in parentheses are t-statistics

* Significant at the 1% level

** Significant at the 5% level

The exchange market pressure framework is, in essence, a monetary model of a managed float. An excess supply of money is relieved by changes in reserves and/or the exchange rate. The initial application of this extension was a study of Canada by Girton and Roper. They selected four independent variables: the growth rates of the domestic and world monetary base and domestic and world real output. United States data were used as surrogates for the world variables.

While granting that their econometric fit was good, Sargen(1975) questioned whether the model could be successfully generalized to other nations. He engaged in a study of five industrial economies: Canada, Australia,

West Germany, Japan, and the United Kingdom. Only the Canadian results were uniformly positive.(4)

Sensitive to the findings of Sargen, Connolly and daSilveira return to a more traditional monetarist presentation by choosing a vector of predictors which differ from those espoused by Girton and Roper. They resurrect WORLD and RGDP while combining DB and MM2 into a single entity. However, the disturbing omission of an interest rate variable in their model is unaccounted for.

In light of the heretofore continual statistical significance of TB, the work of Connolly and daSilveira was refashioned by including this component

in the regression analysis reported in Table 3. The time period studied is that of the original reserve flow presentation. Lagging the sample period by one had no interesting effect.

The data show clearly that the incremental addition of TB was meaningful. All regression coefficients have the expected theoretical sign and are highly significant.(5)

In conclusion, the empirical testing of both the reserve-flow and exchange market pressure hypotheses bear witness to their admirable econometric synthesis of Sweden's balance of payments over the past three decades. The monetary approach enriches our understanding of international economic events.(6)

Summary and Conclusions

The monetary approach to the balance of payments seeks and provides leadership for a return to preKeynesian

international monetary theory. Its monetarist decrees are preached with missionary assurance. No academic detente or merger with competing opinions is solicited.

Surpluses are the derivative of an excess demand for money in the home country; deficits are ascribed to unwarranted rises in a nation's money stock. Thus, the responsive fluidity of money both inaugurates disturbances and eventually restores foreign sector balance. The supply of money adjusts to the demand for it.

These precepts are formalized in a system of equations. A behavioral demand for money function is constructed, specifying prices, real output, and the return on financial instruments as predictors. The supply of money is defined as the product of the money multiplier and the monetary base--domestic plus foreign. Underpinning this distinction is the commentary that monetary policy controls the volume of

TABLE 3: EXCHANGE MARKET PRESSURE

DB	-0.70* (-10.50)
MM2	-1.29* (-5.68)
RGDP	0.98** (1.98)
WORLD	1.79* (8.69)
TB	-0.03* (-5.22)
Adjusted R-Squared	.91
Observations	32
Standard Error	.065
Durbin-Watson Statistic	1.77
F-Statistic	80.5
Rho Coefficient	.14

Values in parentheses are t-statistics

* Significant at the 1% level

** Significant at the 5% level

domestic credit, not the money supply.

Following algebraic redistribution the growth rate of international base money is rendered as the dependent variable. This reserve-flow equation pertains to a fixed exchange rate system. Under a managed float the percentage change in the exchange rate is added to form a composite regressand. This term is a measure of exchange market pressure.

Each representation was carefully cross-examined and dissected for the Swedish case. The empirical results vindicated the monetary approach. Using summary statistics as the acid test of performance, testimony was offered denoting that a considerable portion of the systematic factors were captured. To wit: All coefficients had the expected sign and were statistically significant. Moreover, the novel implications that inflation and economic growth were associated with surpluses survived unscathed.

The possibility that the sculpture of the system was flawed because of its failure to account for reserve sterilization was acknowledged by authoring a central bank reaction function. Simultaneous estimation unearthed no intrinsic diversity.

In conclusion, the monetary approach to the balance of payments, as applied to Sweden, receives widespread confirmation. It has been shown that there is a confluence between its theoretical postulates and their subsequent statistical verification.

FOOTNOTES

1. Monetarists assert that the solitary focus on one account lessens the requirements for empirical study and, in this vein, is superior to more exhaustive models.

2. Given that the data under study fall logically into two groups--fixed and

flexible exchange rate regimes--a natural question arises as to whether or not these differing financial payment systems are subject to the same economic process. The possibility of structural differences in the coefficients was addressed via a Chow test. Following the lead of McKinnon and Tan, 1970 was identified as the genesis of the transition from fixed to fluctuating rates. (See Ronald McKinnon and Kong-Yam Tan, "Currency Substitution and Instability in the World Dollar Standard: Reply," *American Economic Review* 73 (June 1983):474.) The proposition of joint parametric similarity was accepted easily. A decomposition of the sample based upon prevailing international monetary systems does not appear warranted. The hypothesis of a divergent structure is not supported.

3. The only operational difference between the present study and others is one of variable definition. Previous researchers resorted to the use of American inflation and interest rates or domestic discount rates--administered prices--rather than world inflation and a market-determined rate of interest. These proxies were mandated by data collection difficulties. This writer benefitted from the publication of a world consumer price index by the International Monetary Fund and the willingness of professional staff at the Riksbank in Stockholm to forward historical Swedish Treasury bill data. Because of these factors the exact formulation of the monetary model was tested. No surrogates were sought or required.

4. The apparent lack of generality of the Girton-Roper specification was supported further by preliminary Swedish estimates.

5. The issue of reserve sterilization was also reprised. The striking similarity of the ordinary and two-stage least squares estimates implied that reverse causation was not a serious concern.

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