

Monetary Policy, Wealth Effects, and Exchange Rate Regimes

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## **Abstract**

This paper presents a methodology for estimating wealth effects associated with monetary policy actions under different exchange rate regimes. This methodology was then applied to provide estimates of such wealth effects in several countries. Estimates were made of wealth effects from changes in target and indicator variables associated with monetary actions under different transmission models and exchange rate regimes. Wealth effects, when significant, offer policy makers additional channels through which their monetary actions can influence economic behavior. Preliminary results indicate that there are significant wealth effects in all countries considered when monetary aggregates were used as indicators of monetary actions. When shorter-term interest rates were used to indicate monetary actions, however, the results differed by country and exchange rate regime.

## **Monetary Actions and Wealth Effects**

Estimates of potential wealth changes induced by monetary actions are desirable for several reasons. First, the theoretical importance of wealth has as a constraining influence on individual and institution behavior and to the extent that significant wealth effects exist, they can provide policy makers with additional channels through which their actions can influence economic behavior. Second, disregarding significant monetary policy induced wealth effects, if any, on the behavior of institutions or individuals may result in the neglect of important linkages in the transmission of policy actions to changes in aggregate economic variables. Third, if monetary actions are found to affect wealth significantly, the explicit inclusion of wealth variables in models relating monetary actions to institution and individual behavior should reduce statistical bias and increase the explanatory ability of econometric models.

The long debate in economics regarding the appropriate real-sphere monetary-action transmission models has been necessarily accompanied by the question of the appropriate target and indicator variables (Brunner 69, Friedman 75, Saving 67, Bernanke and Binder 92). In addition, empirically, the ability of many indicator variables to indicate consistently the impact of monetary actions on real-sphere variables has varied over time and between countries.

Suggested transmission models have included Keynesian, New-Keynesian, Monetarist, New-View, Bank-Credit, and Rational-Expectations among others. Proponents of each transmission model have advocated use of various target and indicator variables to indicate, in the shorter run, the thrust of monetary actions so that policy makers can adjust their behavior in order to achieve their longer-term objectives. If, for example, monetary actions in the form of open market purchase of treasury bills are undertaken

and if the federal funds rate is used as an indicator variable and subsequently falls by .25 percent; a serious question faces policy makers: namely, is that enough to increase real output by .5 percent in the next 12 months?

Although no perfect set of target and indicator variables yet exists, suggested variables have included shorter-term interest rates such as the federal funds rate and money market rates. Various measures of monetary aggregates, such as narrow and broad measures of money and the monetary base have also been advocated, as have bank reserves. The current focus on target and indicator variables by some central banks, notably the US Federal Reserve has been on very short-term interest rates, particularly the federal funds rate.

### **Rules vs. Discretion**

Closely related to the choice of target and indicator variables has been the long standing debate of whether monetary authorities should act based upon their discretion or follow some prescribed rule (Taylor 93, 98).

John Taylor recently proposed a simple rule that provides a reaction function for monetary authorities (Taylor 99). This Taylor Rule function purports to indicate by how much the fed should adjust the federal funds rate given desired and actual inflation, and the real output gap. The adequacy of this and similar rules continues to be subject to much discussion.

When monetary actions in open economies are considered, the problem of indicating the impact of monetary actions in the shorter run becomes complicated by the choice of exchange rate regime and the difficulty of distinguishing between real and nominal effects caused by domestic monetary actions vs. those taken by trading partners. Several studies ( Leitemo & Soderstrom 01, Dennis ,01) have considered modifications to the Taylor Rule that incorporate exchange rate changes when setting target interest rates.

Focusing on those variables that influence a particular indicator variable presupposes knowledge of the correct indicator variable or variables. It begs, furthermore, the question of the impact of the choice of indicator variables on the implied channels through which monetary actions affect real-sphere variables. If different indicator variables imply different channels through which monetary actions have their effect, then the choice of indicator variables becomes considerably more important than if no differences in monetary-real-sphere channels are implied by the choice of indicator variables.

The lack of consensus as to the appropriate monetary-real sphere variable linkages has produced numerous empirical studies wherein the maintained hypothesis assumes a particular transmission mechanism, and hence, the comparability of results obtained, when different transmission mechanisms are assumed, is questionable. This problem can, in part, be avoided by using as indicators of policy intent, target variables common to more than one transmission model (e.g. shorter term interest rates and monetary

aggregates). Alternatively, several variables could be used, although not necessarily simultaneously, within a given transmission model. If the estimated coefficient of an appropriate indicator variable is statistically significant, then within a given transmission model, monetary actions could be said to be consistent with non-zero wealth effects.

The lag between monetary actions and wealth changes is also important as the longer-term effect of money supply changes are primarily on prices in most current transmission models. In order to estimate shorter-run wealth changes (i.e. wealth changes abstracting from price level changes) a relatively short lag-in-effect can be postulated in a somewhat ad-hoc manner or the actual lag can be estimated.

### **Estimated Model**

This study focuses on the impact of changes in indicator variables and thereby monetary actions on wealth under different exchange rate regimes. If significant wealth effects are associated with changes in indicator variables then future estimation of the impact of changes in wealth on economic behavior may improve our understanding of the channels whereby monetary actions impact real-sphere variables. Such improved understanding could result in improved models and ultimately improved monetary policy.

Two types of variables were used in this paper to indicate the thrust of monetary policy – monetary aggregates and shorter-term interest rates. Broad indexes of stock prices were used as market perceived indicators of private sector wealth. The general formulation tested was

$$W = f (M, r)$$

where  $W$  is a broad index of stock prices,  $M$  is a measure of a monetary aggregate, and  $r$  is a measure of shorter-term interest rates. Broader and narrower definitions of monetary aggregates and of shorter term interest rates both within and among countries may yield different estimates, however, consistency of definition should, at a minimum, be improved by using data from UN and US Federal Reserve databases.

Changes in wealth variables, particularly stock price indices, can result from actions other than those associated with monetary actions. Furthermore, indicator variables such as interest rates are influenced by non-monetary variables such as time preference, capital productivity, and inflationary expectations as well as by changes in monetary variables themselves. A basic assumption underlying a target and indicator variable, however, is that changes in the variable are sufficiently closely correlated to monetary actions to indicate the thrust of monetary policy intent. This assumption permits estimation of monetary action induced wealth effects via rather simple reduced form equations. Reduced-form equations, moreover, avoid intuitional differences between countries and focus attention on the key policy relation between indicator variables and wealth variables.

In order to examine the robustness of this formulation across various exchange rate regimes, estimated wealth effects from monetary actions were made for four countries operating under different exchange rate regimes. Data for each country was selected based upon periods wherein for a particular country the exchange rate regime was unchanged or underwent a well-defined change during that period.

For those exchange rate regimes in which monetary policies do not have significant estimated wealth effects, such effects could presumably be ignored in subsequent analysis of the monetary policy real-sphere linkages. For those exchange rate regimes whose wealth appears to be impacted significantly by monetary actions, the future formulation of behavioral models with wealth variables included may yield greater explanatory ability than existing models.

The ability to conduct independent monetary policy is constrained by the choice of exchange rate regimes. The greatest independence in conducting monetary policy is usually associated with freely adjusting exchange rates, while the least is usually associated with exchange rates pegged to the currency of trading partners. The ability of a given set of indicator variables to successfully represent monetary actions in the shorter-run can be expected to differ with the choice of exchange rate regimes. If a set of target and variables were able, however, to indicate consistently the direction of monetary actions across a variety of exchange rate regimes, international comparisons of monetary policy actions could be considerably simplified.

Because of the lack of consensus regarding the appropriate shorter-term interest rate or monetary aggregate variable to use as target variables, wealth effects were estimated from both real and nominal variables

## **Data**

Data for the US, Brazil, Chile, Mexico, and Australia were used because different exchange rate regimes were found in these countries for the time periods under consideration. In spite of the significant trade flows among many of these countries there does not exist a set off exchange rate relations such as found among countries in the European Union. This suggests a greater degree of relative independence for monetary authorities than would occur under a set of mutually stabilized exchange rates.

Monthly interest rate and monetary aggregates data for the US were taken from the Federal Reserve and the DRI-WEFA Basic Economics database. Interest rates and monetary aggregates data for Brazil and Mexico came from the UN Statistics Division Common Database and from the IMF as did the data for monetary aggregates and consumer prices for Chile. The Central Bank of Chile supplied interest rates. Stock price indices for all countries were from Reuters as found on Yahoo Finance.

Monthly data for the US ranged from 80:1 through 2001:4, thereby including both periods when monetary aggregates and federal funds rates were used as indicators of monetary actions. For Chile, data ranged from 85:1 through 99:8, a period characterized

by managed floating exchange rates. Data for Mexico and Brazil ranged from 91:11 through 99:12, and from 94:7 through 99:12, respectively. During these periods, Mexico changed exchange rate regimes after 94:12, as did Brazil after 99:1. The effect of this change from a pegged or managed float to a more freely adjusting exchange rate regime in both of these countries was estimated using dummy variables. US exchange rates were relatively free to adjust during the entire period.

Common stock prices were used as measures of market perceived wealth. Several studies have attempted to estimate the effect of changes in monetary variables on stock prices (Sprinkel 64, Rozeff 74, Hamburger 72). The majority of these studies, however, did not consider the relationship between policy intent and wealth effects attendant to monetary actions. Given that the present value or wealth of an institution depends on the discounted expected income stream produced by that institution, any change in stock prices can be viewed as changes in the market perceived wealth of institutions. Monetary actions can be a source of such wealth changes via their impact on applied discount rates.

### **Estimation Procedures**

Potential wealth effects from monetary actions were estimated using ordinary least squares for the reduced form equation specified above. Stock price indices were used as endogenous wealth variables. Exogenous indicator variables used were real and nominal shorter-term interest rates and real and nominal narrow and broader definitions of monetary aggregates. Dummy variables were used to account for changes in exchange rate regimes.

### **Results**

Empirical results are given in the table below.

Significant wealth effects associated with monetary actions were found for all countries as measured by the relationship between indicators of monetary actions and stock prices. These results obtained whether real or nominal monetary aggregates were used as indicator variables except in the case of the US where changes in real narrowly defined money had no significant effect on wealth.

When shorter-term interest rates were used to indicate the thrust of monetary policy, the results were less consistent across countries. In particular, when nominal monetary aggregates were combined with nominal or real shorter-term interest rates, the estimated wealth effects differed significant among countries and were often inconsistent with theory when statistically significant. When broader monetary aggregates in real terms (M2/P) were used in combination with nominal or real interest rates, significant wealth effects were obtained for all countries.

**Empirical Results: Wealth = f (monetary aggregate, interest rate)**

	US		Chile		Brazil		Mexico	
	Coefficients	P-value	Coefficients	P-value	Coefficients	P-value	Coefficients	P-value
r	36.979	0.000	-125.574	0.291	0.132	0.132	-2.687	0.466
M1	1.535	0.000	0.000	0.000	0.000	0.000	0.000	0.000
r	41.916	0.000	-400.113	0.004	0.139	0.174	-17.175	0.000
M2	0.504	0.000	0.000	0.000	0.000	0.000	0.000	0.000
real r	38.396	0.000	-388.315	0.001	0.133	0.132	-2.911	0.467
M1	1.543	0.000	0.000	0.000	0.000	0.000	0.000	0.000
real r	43.602	0.000	-628.089	0.000	0.139	0.173	-18.458	0.000
M2	0.505	0.000	0.000	0.000	0.000	0.000	0.000	0.000
r	-94.290	0.000	-15.529	0.905	-38.679	0.028	-48.825	0.000
real M1	-30.495	0.552	384.163	0.000	24017.190	0.000	3097.502	0.000
r	-17.659	0.046	-527.681	0.000	-70.859	0.000	-55.318	0.000
real M2	145.079	0.000	59.204	0.000	4611.006	0.008	1167.971	0.000
real r	-100.239	0.000	-306.915	0.007	-40.362	0.026	-51.418	0.000
real M1	-43.913	0.395	356.174	0.000	24123.260	0.000	3036.555	0.000
real r	-16.310	0.070	57.931	0.000	4757.543	0.006	1161.709	0.000
real M2	145.486	0.000	-660.658	0.000	-73.160	0.000	-58.389	0.000

**Conclusion and Implications**

Significant wealth changes appear to be associated with monetary actions across a variety of exchange rate regimes when nominal monetary aggregates were used to indicate the thrust of monetary policy. The magnitudes of these effects, however, were relatively small for all countries when compared to the estimated wealth effects when real monetary aggregates were used. When shorter-term nominal interest rates were used simultaneously with nominal monetary aggregates as indicator variables, the significances of monetary actions on wealth varied by country and by exchange rate regime. Wealth effects associated with shorter-term interest rates (in real or nominal terms), in particular, were inconsistent and often insignificant when combined with nominal narrowly defined money for Mexico and Brazil. When real broader monetary

aggregates were used in conjunction with real or nominal shorter-term interest rates, both indicator variables implied significant wealth effects for all countries.

These preliminary findings should be supplemented with additional investigations including using other than monthly data. Estimates based on lagged variables and shorter-term data may also prove fruitful. The effect of wealth on economic behavior also requires further investigation.

The likelihood that significant wealth effect changes are associated with monetary actions differs with the chosen indicator variables. Given the current attraction of nominal shorter-term interest rates as the preferred indicator of monetary actions, significant wealth effects associated with monetary actions should not be assumed; and when estimated, can be expected to differ significantly between countries and among exchange rate regimes.

This last conclusion would likely not be observed if real broader monetary aggregates were used to indicate the thrust of monetary policy. A combination of more broadly defined money and either real or nominal shorter-term interest rates provides consistently significant wealth effects associated with monetary policy actions for all countries considered. However, the choice of target and indicator variables should not, in general, be governed by the quest for consistent results across exchange rate regimes but rather by their ability to reflect accurately the thrust of monetary actions in a useful and timely manner. The answer implied by these results to the question, "Are there significant wealth effects emanating from monetary policy?" at this point must be, "Perhaps - it depends on how monetary policy actions are measured."

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