

# How Monetary Policy Becomes Ineffective: Channels of Transmission.

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## ABSTRACT

*Monetary policy operates through different channels. Depending upon a nation's financial structure, the effectiveness of monetary policy in achieving policy objectives will differ. When a nation (like Japan) relies on banking lending more than financial markets, the credit channel is the dominant channel through which monetary policy will operate. When a nation (like the United States) relies more on financial markets, there are also asset channels through which monetary policy will operate. This greater number of choices through which monetary policy may operate explains the different experiences the United States and Japan have had with low interest rates.*

## INTRODUCTION

There are some major differences between the experiences of the United States and Japan despite that each has had unusually low nominal and real interest rates over the past few years. In the United States, the economy has been relatively vibrant (compared to Japan), yet monetary policy in each country has been expansionary. What explains the differences in the effectiveness of monetary policy in each of these countries?

The difference in monetary policy effectiveness is due to the effectiveness of the transmission of monetary policy, which is dependent upon the financial structure of the economy. Japan stresses the role of banks in financing businesses and home purchases. The United States has emphasized—relatively more—the role of markets. Markets are used to help finance home purchases through securitization where banks have changed their traditional role of lending into a role of originating and servicing loans to be securitized through public and private agencies. The difference in the financial systems of these two economies is significant.

There are different channels through which monetary policy can affect the real economy (as measured by Gross Domestic Product). Monetary policy can operate through the traditional interest rate effect on investment spending and consumer durable expenditures. Plus, monetary policy operates through other asset price effects, like through the exchange rate effect on net-exports, Tobin's  $q$  theory, and wealth effects. Additionally, monetary policy operates through the credit channels: bank lending, balance sheet channels, cash flow channels, unanticipated price level channels, and household liquidity effects.

Depending upon the relative reliance of countries on markets or institutions for directing financial resource allocation, they will have differential reliance on these alternative channels. For the United States, with a relatively greater reliance than Japan on financial markets, the asset market channel will dominate. For Japan, because of their traditional reliance on banks as lenders, the credit channel dominates the channels of monetary policy. This difference is significant as can be witnessed by the recent experiences of the economies. When interest rates are low, Japanese banks—with their traditional reliance on the government for directing credit—have all but frozen out the household, small and medium-sized business sector from the credit market. With few alternatives for obtaining financial capital, the housing market has suffered, the stock market has lagged, and consumer and investment spending have dried up. When interest rates are low, United States banks increase their cash-and-carry activities and change their functions from traditional lending to loan origination, servicing, and securitizing. Consequently, the household sector and all firms are able to take advantage of the low interest rates, increasing the present value of financial claims.

This difference can be seen in the differences in the housing markets in each country. According to the Economist® housing price index (1996-2001), the United States has experienced an average increase in housing prices in nominal and real terms; whereas, Japan has experienced an average decrease in housing prices in both nominal and real terms. Considering the significant portion of household wealth that homes comprise, it is not surprising that US GDP growth has accelerated past Japanese GDP growth.

The inability of monetary policy to be transmitted through the economy when a country relies on bank lending, and interest rates are low, can be seen in analyzing the demand and supply for bank reserves, which are functions of the interest rate. In the presence of asymmetric information, banks will practice credit rationing. When banks practice credit rationing, as interest rates rise, banks will become reluctant to lend to debtors (especially households), so they will increase their holdings of excess reserves (supply greater reserves into the overnight reserve lending market). A similar event occurs when interest rates fall: when lending interest rates are low, banks may (but necessarily) become more selective to whom they lend as the compensation for the risk is not commensurate with the potential return to the bank. It is this latter phenomenon that can cause monetary policy—that aims to impact the level of reserves—to be ineffective in lowering interest rates. Plus, low interest rates can effectively shut-out households, small, and medium sized businesses from the credit market. Japan is an example of where this has most recently occurred.

## **JAPAN'S EXPERIENCE**

The recent economic experience of Japan has been dismal. Total Bank lending in Japan has declined for 74 consecutive months (Ibison, 2004). Demand for bank loans has dropped and Japan's banks are discovering risky consumer lending as an alternative to their more traditional commercial lending. Unsecured lending to medium sized businesses is also on the increase. Growth has collapsed, deflation is set in, and the financial system is crippled (Hoshi and Kashyap, 2004, p. 3). The Bank for International Settlements (2002, p. 135) has reported that the "depressed state of the economy is hurting the banking system, and the poor health of the banking system is impeding the economic recovery."

Japan has a tradition of making loans on the basis of collateral and pricing them according to the surety offered instead of the relative risk of the borrower (Ibison, 2004). A lot of lending is directed by the government, and this is partially due to the structure of the banking system, with the government competing with private lenders through Japan Post (Hoshi and Kashyap, 2004). When collateral is losing value, banks become reluctant to extend credit to borrowers. Most lending recently has been directed toward propping up existing customers, regardless of the borrower's capacity to repay.

The rash of bank failures, and the expected increase in failures, is forcing private banks in Japan to adopt practices that are more in line with the American tradition of lending on risk. "The pricing of such lending also tends to be more realistic than more conventional loans. A Japanese banker at once of the four main banks said: 'Previously, Japanese banks lent only based on collateral and interest rates didn't even cover the default risk. Now that we can't rely on collateral, we are covering our risk by using interest rates. You could say we have moved to the west.'" (Ibison, 2004).

Because of the structural problems in Japanese bank competition, monetary policy has proved to be ineffective, despite an aggressively expansionary policy by the Bank of Japan (Okina, 1999; Arai and Hoshi, 2003). The effect of the monetary easing has been seen to be ineffective as the Bank of Japan has observed, "Under nearly zero interest rates, the slope of the cash demand curve has become flatter. Therefore, the decrease in deposit rates and change in recognition of risks have shifted a part of funds from deposits to cash, contributing to a big increase in the growth rate of cash, even though each change itself was small" (BOJ, 2002).

Even assuming the counterfactual—that there would be competition—because of informational problems inherent in financial intermediation, monetary policy can be rendered ineffective when interest rates are low. This recent experience and transition in Japanese lending practices affords an opportunity to reevaluate the effectiveness of monetary policy in the presence of credit rationing and to also reassess the Keynesian notion of a "Liquidity Trap."

## **THE LIQUIDITY TRAP**

Keynes' theory of money demand allowed for a "Liquidity Trap," but this is a theoretical phenomenon as he even stated he had never observed this in practice. Work by James Tobin confirms the sensitivity of money demand to the interest rate (Tobin, 1947).

This is an extreme case of ultra-sensitivity of the demand for money to interest rates. In a standard money demand model in which the interest rate is on the ordinate and money is on the abscissa, the money demand curve is depicted as downward sloping with an asymptotic portion as money is increased. In this portion, large changes in

the supply of money bring about small changes in the interest rate, and hence small changes in investment spending and GDP. However, research by Laidler (1966) and Brunner and Meltzer (1963) demonstrated the lack of empirical evidence for a liquidity trap.

The puzzle is to explain the ineffectiveness of monetary policy in bringing about changes in the interest rate on some other basis than liquidity preferences. A theory built on credit rationing, described below, offers a more tenable explanation.

## **SUPPLY OF RESERVES**

Campbell (1987) develops a rational expectations model of equilibrium in the overnight lending market. In this framework, the supply of reserves is assumed to be a policy variable, where the Federal Reserve (or any central bank) supplies reserves to the banking system according to some rule. Under a rational expectations framework, this is assumed to be known. Stein (1998) also makes the assumption that the supply of reserves is a policy variable perfectly controlled by the Federal Reserve; however, this is based on the observation that excess reserves tends to be 1-2% of total reserves (Stein, 1998, p. 477). The supply of reserves is not just a matter of policy, as reserves are held by banks as a matter of their own activities, where they may decide to hold excess reserves, plus there are borrowed reserves which—in the United States—are not completely determined by the central bank.

Banks may borrow money from the central bank through some sort of lending facility. In the United States, this is discount lending. In Japan, this function of lender of last resort is accomplished by extending both collateralized and uncollateralized loans to sound financial institutions when they face a temporary liquidity shortage, or when the “allocation of funds among financial institutions becomes unbalanced due to a disruption in the financial markets” (BOJ, 2004, p. 93).

The collateralized loans as extended at the official discount rate, with qualifying collateral being such items as bills and Japanese government securities. Uncollateralized loans are extended at interest rates, according to procedures, set by the Policy Board, to cover unanticipated, temporary shortages, or to promote financial stability of the financial system. The amount and process of discount lending is intended to avert systemic risk.

The extension of credit by the BOJ is more under direct control of the central bank than it is in the United States. The four principles for discount lending, according to Article 38 of the Bank of Japan Law are:

- 1) There must be a strong likelihood that systemic risk may materialize.
- 2) There must be no alternative to the provision of central bank money.
- 3) All responsible parties are required to take clear responsibility to avoid moral hazard.
- 4) The financial soundness of the Bank of Japan itself must not be impaired.

Due to these provisions of the Bank of Japan Law, the supply of reserves by the BOJ can be thought of as almost vertical.

There are other sources of reserves from the banking system itself. This is a consequence of asymmetric information (Bernanke, 1993). Some alternatives to commercial, mortgage, or consumer lending is inter-institutional lending in the market for reserves itself. As asymmetric information becomes more prevalent, then it is expected that there would be a greater supply of reserves in that market. Adding the idea of asymmetric information to the market for reserves is analogous to the “credit view” of monetary transmission. Bernanke (1993) observes that the presence of credit rationing is consistent with the credit channel, and it is useful for explaining published loan rates; however, credit rationing is not necessary for the credit channel to operate. The credit channel operates through a reduction in lending by banks, which precipitates a reduction in investment spending and, hence, aggregate demand.

If it was the case that the central bank opted for a policy of targeting the overnight borrowing rate, then it would be necessary for the supply of bank reserves to be perfectly elastic at the targeted interest rate. This is similar to a fixed exchange rate regime where a nation stands willing to buy and sell a currency at a specified exchange rate. In the case of an interest rate target it is more complicated as the central bank does not directly operate in the overnight lending market, but rather indirectly they affect this market through their open market operations, providing and draining reserves as necessary, or through operating their discount lending facility. It is this lack of direct intervention in the overnight lending market that renders monetary policy imperfectly capable of accomplishing specific monetary goals.

Given that bank system reserves fluctuate with every cash deposit, withdrawal, receipt, or expenditure, as observed by Hamilton (1996), it is unlikely that the central bank can arbitrarily set the level of reserves in a financial system. Operationally, in the United States, a bank can regain reserves (vault cash plus deposits at the central bank) by selling an asset, obtaining a discount loan, or purchasing federal funds. This overnight lending market acts as a market in which banks can acquire needed reserves or earn interest on excess reserves (Hamilton, 1996, p. 29). In the United States, small rural banks are generally the suppliers of overnight lending. Large urban banks tend to be purchasers of federal funds. Federal funds are unsecured, but overnight. To limit risk, banks typically extend lines of credit to those they already have a relationship with, so this market is not perfectly anonymous.

Hamilton (1996) hypothesizes that the lending banks in the overnight lending market will do so as long as the overnight lending rate exceeds the marginal liquidity yield plus transaction costs (p. 51). Thus, if liquidity yields and transaction costs are constant, then we can expect a monotonically increasing supply curve; however, if marginal liquidity yields are not constant (as may be the case under risk aversion), then the supply curve of reserves will not be a simple monotonic function.

Other sources of reserves in the financial system would come from the banks themselves, and this is typically ignored in developing a partial equilibrium model of the overnight lending market. There may be perverse behavior in the supply curve for reserves in the presence of credit rationing. When banks are not willing to extend credit to the household sector, they may attempt to hold more reserves to lend them to other commercial banks. Thus, the supply curve for reserves could have a point of inflection.

#### **DEMAND FOR RESERVES**

Campbell (1987) outlines a rational expectations model of reserve demand under a lagged accounting system. Demand for reserves is taken to be related to the federal funds rate in the United States (the overnight borrowing rate between banks), with the federal funds rate as a measure of the opportunity cost of holding reserves. There are additional reasons for holding reserves that are relevant: there may be an inventory motive to finance stochastic inflows to and outflows from a bank's reserve account.

Holding everything else constant, as the market interest rate falls, the amount of required reserves will stay constant (assuming deposits in the banking system do not change in quantity or composition). Most central banks require their financial institutions to hold a certain percentage of their deposits (liabilities) in the form of vault cash or as deposits at the central bank. Both the Federal Reserve and the Bank of Japan require financial institutions<sup>1</sup> to hold a certain fraction of their deposits and other liabilities as reserves in the form of deposits at the central bank. As such, there will be a certain demand for reserves just to maintain the required reserve ratio. The rest of the demand for reserves comes from banks wanting to hold excess reserves. Following Tobin and Keynes, banks may want to hold excess reserves for transaction, precautionary, and speculative motives. Regardless, as market rates fall, the quantity of excess reserves will tend to rise.

The demand curve for reserves may be asymptotic (where reserves approach the level of deposits) and convex to the origin as banks practice credit rationing due to asymmetric information, or if they practice cash-and-carry where they borrow short to lend long to take advantage of the curvature of the yield curve. This causes a flat portion of the demand curve at low interest rates, but there may be also a flat portion at higher interest rates as the adverse-selection problem makes banks unwilling to extend credit even at higher interest rates and as the cash-and-carry practice may not be as profitable at higher rates.

#### **THE IMPACT OF MONETARY POLICY**

Open market purchases of government securities provide additional reserves. However, if the beginning equilibrium is along the relatively flat portion of the demand curve for reserves, no extent of monetary easing will result in lower interest rates. Similarly, if the central bank increases discount lending, the reserves (the policy component of the supply curve) increases, but again, this monetary easing will not affect interest rates.

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<sup>1</sup> "Financial Institutions subject to the reserve requirement system include city banks, regional banks, regional banks II, trust banks, foreign banks (branches in Japan), long-term credit banks, shinkin banks (those with deposits of over 160 billion yen), and Norinchukin Bank," (BOJ, 2004, p. 51, footnote 9).

Stein (1998) provides a model in which information problems can affect monetary policy. The case Stein studies, investigates a Federal Reserve induced reduction in reserves, which tightens banks' financing constraints. With adverse-selection, this leads to a cutback in the supply of intermediated lending and increase in bond-market interest rates.

There is an additional problem beyond the difficulty of banks raising funds through anything other than insured deposits. Lowering required reserves will result in a lowering of interest rates, but not below the asymptotic level where banks may refuse to directly extend credit to households and smaller businesses. In the United States, banks shift their role from lender to originator and securitizer.

### TESTING THE CHANNELS OF TRANSMISSION

In order to test the hypothesis that the asset channel is more important in the United States and the credit channel is more important in Japan, a vector autoregression model should be used. The asset channel primarily operates through monetary policy effects on equity prices and foreign exchange rates. The credit channel primarily operates through monetary policy effects on equity prices, interest rates, and bank lending.

The general model is as follows:

$$(1.1) \quad Y = Y(P_e(M, Z), FX(M, Z), i(M, Z), l(M, Z), M, Z)$$

Where  $Y$  is disposable income,  $P_e$  is the SP500,  $FX$  is the trade weighted dollar exchange rate,  $i$  is the federal funds rate,  $l$  is the total amount of bank lending,  $M$  is some measure of money, and  $Z$  is a vector of other explanatory variables.

In light of the strong autocorrelation of the variables in (1.1), requires first differencing. In order to test the effect of monetary policy through alternate channels, a simultaneous system is estimated with all contemporaneous variables endogenous and lag, order four, predetermined variables.

The analysis was done for the United States, due to data availability. Information was available from January 1973 to December 2003 monthly on the following variables: disposable income, loans at all US financial institutions, SP500, federal funds rate, trade-weighted exchange rate, the monetary base, M1, M2, and M3 (the monetary base was the most significant, so that model will be reported). All variables were transformed by taking differences. A multivariate, general linear model was fit with lags one through three used as explanatory variables. The analysis indicates that monetary policy is operative through both the credit and the asset channels, but only through equity prices and the lending activities of banks. The empirical results are summarized in table 1.

The strongest relationship is the monetary base acting through equity prices (asset and credit channel) and loans (credit channel only). Given the similar venue through which monetary policy may operate (i.e., through equity prices), it is impossible to discern between the two channels in the United States.

### CONCLUSION

Central bank policy affects bank assets and liabilities. From a microeconomic perspective, in which there are asymmetries in information, the response of banks in credit rationing affects both the supply and demand for bank reserves. This can lead to the ineffectiveness of monetary policy when interest rates are either high or low if central bankers are relying on the traditional interest rate channel or credit channel for transmitting policy changes. With well developed financial markets, monetary policy is more effective as it may act through an asset channel as well as the credit channel.

The Keynes' liquidity trap can be reinterpreted as a reserves phenomenon, arising from asymmetric information in the credit market. The recent Japanese experience corroborates this idea and it may offer an alternative, more plausible, explanation instead of relying solely on household demand for money. As Stein (1998) has said, "banks, unlike households, have a well-defined demand for non-interest-bearing 'money,' namely reserves. For it is only by holding reserves that banks can issue insured deposits and thereby overcome adverse-selection problems. By exploiting this induced demand for reserves on the part of banks, the Fed can manipulate bond-market rates" (p. 467). This allows for an interesting comparison between the Japanese and the US experience, at least theoretically. Monetary policy in the United States has many more channels through which to operate, so even in the presence of credit rationing, monetary policy does not become ineffective; whereas, in Japan, because of their

relative reliance on bank financing, monetary policy may become impotent. As Japan's financial system adapts to the crisis with their financial institutions, monetary policy should become more effective in achieving policy goals.

**Table 1 GLM using MB**

Dependent Variable Coefficient (Significance level)	Disposable Income	SP500	FX	FED	Loans
CONSTANT	11.081 (.000)	-2.824 (.735)	.190 (.030)	-.012 (.848)	.840 (.124)
MB	1.481 (.004)	2.283 (.112)	-.017 (.253)	.004 (.707)	.279 (.003)
LAG MB	-.285 (.601)	-2.897 (.057)	-.001 (.965)	-.016 (.157)	.019 (.845)
LAG(2) MB	1.316 (.015)	-.572 (.704)	.012 (.462)	.003 (.798)	.226 (.022)
LAG(3) MB	-.030 (.954)	2.580 (.075)	-.017 (.264)	-.005 (.622)	.069 (.463)
LAG SP500	.041 (.034)	-.041 (.449)	.000 (.385)	.000 (.839)	-.010 (.005)
LAG(2) SP500	.038 (.057)	-.033 (.544)	.001 (.011)	.001 (.195)	-.008 (.028)
LAG(3) SP500	.052 (.011)	.087 (.128)	.000 (.632)	.000 (.510)	-.004 (.241)
LAG FX	1.011 (.591)	4.609 (.380)	.384 (.000)	-.023 (.543)	-.374 (.276)
LAG(2) FX	-.311 (.876)	-4.655 (.402)	-.080 (.170)	-.012 (.762)	-.124 (.734)
LAG(3) FX	.543 (.771)	3.665 (.480)	.002 (.968)	-.034 (.364)	-.105 (.757)
LAG FED	.870 (.743)	-2.592 (.726)	.044 (.566)	.440 (.000)	.328 (.498)
LAG(2) FED	-.716 (.802)	.324 (.968)	-.078 (.351)	-.164 (.005)	-.274 (.599)
LAG(3) FED	1.025 (.697)	-.660 (.928)	-.029 (.706)	-.063 (.242)	.010 (.984)
LAG LOANS	.193 (.515)	1.162 (.159)	-.009 (.279)	.011 (.062)	.555 (.000)
LAG(2) LOANS	.500 (.140)	.214 (.821)	.010 (.296)	-.004 (.555)	.069 (.268)
LAG(3) LOANS	-.319 (.316)	-.424 (.632)	-.002 (.816)	-.004 (.570)	.209 (.000)
R-SQUARED	.090	.055	.168	.208	.607

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