

Paper Published in the April 2007 Journal of Business & Economic Research

# Tight Money and Loose Credit in an Open Economy

Michael Cosgrove, ([mcos@gsm.udallas.edu](mailto:mcos@gsm.udallas.edu)), University of Dallas  
Daniel Marsh, ([dmarsh@gsm.udallas.edu](mailto:dmarsh@gsm.udallas.edu)), University of Dallas

## Abstract

The U.S. Federal Reserve has been following a tight money policy, defined by growth in the quantity of money compared to nominal GDP growth since the first quarter of 2004. The Fed has also increased the federal funds rate 17 times in a row by August 8, 2006. Normally, this degree of tightening would be reflected in a slowing of real economic activity by mid-2006, with subsequent lowering of inflation pressures. Yet evidence of a slowdown only materialized in the second quarter of 2006. The housing sector illustrated signs of softening as the inventory numbers started to rise. Are there different factors influencing the effectiveness of monetary policy in this tightening cycle from prior tightening cycles in the Greenspan era?

Our thesis is that the linkage between money and credit has become weaker in this cycle. Money appeared to be tight over the relevant time period, while credit was loose. Normally the two move in the same direction – when monetary policy tightens, credit conditions also tighten. But that didn't occur until very late in the tightening cycle, as credit remained plentiful. Long term interest rates remained low, compared to prior tightening cycles over the cycle.

This divergence, in the assessment of the authors, is due to three factors: 1) an increase in monetary base velocity, 2) large net inflows of capital into the U.S., in particular from the Far East – Japan and China, and 3) the expansion of the markets for securitized assets. Rising incomes and high saving rates in the Far East combined with a relaxation of international capital controls resulted in a flood of savings washing up on America's shores. The securitization of bank-originated assets—originally home mortgages, but now including auto finance loans and credit card debt—has loosened the link between bank reserves and the level of credit in the economy. These factors combined to explain why credit is loose in the U.S. while money appeared tight. A U.S. economy with these characteristics explains in part why the connection between domestic money policy and credit market conditions has been weakened.

## Theoretical Framework

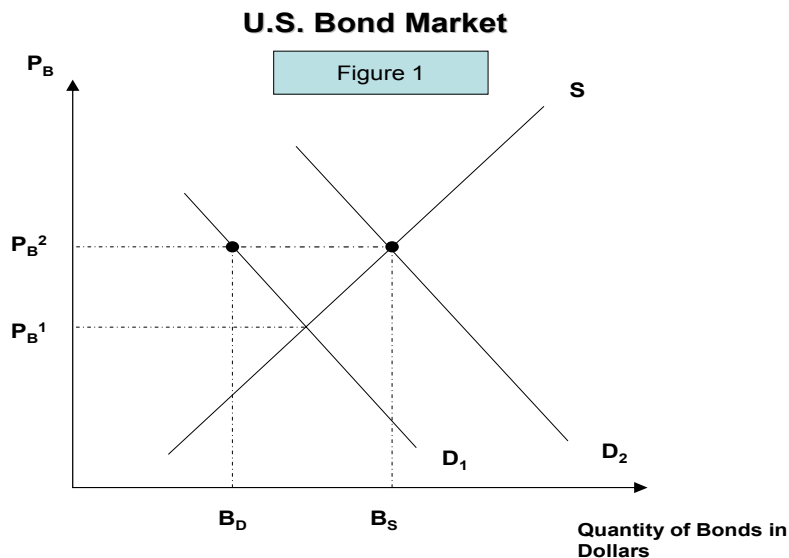
For simplicity consider a closed economy with constant real output. The economy has markets for three types of goods: real commodities,  $Q$ ; bonds,  $B$ ; and money,  $M$ . The price level of real commodities is  $P$ . The price of bonds,  $P_B = 1/r$ , where  $r$  = the nominal interest rate and  $r$  is therefore the price of money. Long run real output is determined by an aggregate production function,  $Q = f(L, K)$ , where inputs  $L$  and  $K$  are assumed constant.

What happens when the monetary authority decreases the money supply in this closed economy? By Say's law, the sum of the excess demands over all goods, in a closed economy, must equal zero. Economic agents will have an excess demand for money as the monetary authority tightens implying that they must have an excess supply of real commodities, or of bonds, or both. To restore their depleted money holdings, they spend less in both the market for commodities and the market for bonds. Excess supply results in both the price of commodities and the price of bonds,  $P_B = 1/r$  to fall, which is equivalent to a rise in the interest rate,  $r$ . This process continues until the real value of money holdings,  $M/P$ , is back to equilibrium levels.

This process of how the money market adjusts to a decrease in supply is essentially the argument that was made of classical economists, along with Patinkin and other modern neo-classical economists. See, for example, Patinkin, 1965, and Pesek and Saving, 1967. If the commodities market does not adjust instantaneously, for informational or other reasons, the decrease in the demand for commodities and the temporary rise in interest rates lead to a recession or sharp slowdown in economic activity. But the key point is that when the money market goes out of equilibrium, then by Say's Law, the other markets also move away from equilibrium.

How does this process work in an economy that is open to international trade in both real commodities and financial assets? Assume again for simplicity that the home country (United States) has a static real output. Also the foreign country (“Asia”, which could be China or Japan) trades real commodities and financial assets with the U.S. under free trade conditions. Assume for the sake of argument in autarky, interest rates are higher in the home country, the U.S., than in Asia. This is consistent with the observation that until recently, the Bank of Japan has maintained a discount rate of zero. Hence the direction of trade in bonds will be that the U.S. exports bonds to Asia, or the U.S. has a net capital inflow from abroad. This approach is similar to that of Mundell, 1971, Johnson, 1972, and Frankel, 1986.

Defining the price of bonds as  $P_B = 1/r$ , the bond market in the U.S. is illustrated in Figure 1 under free trade as opposed to autarky:



$D_1$  = level of demand for bonds in the U.S. in a closed economy.  
 $D_2$  = level of demand for bonds in the U.S. in an open economy.

With free trade and higher interest rates in the U.S. than in Asia, foreign demand for U.S. bonds increases total demand in the bond market to  $D_2 > D_1$ . The higher demand raises the price of bonds to  $P_B^2 > P_B^1$ . Equivalently,  $r_2 < r_1$ , where  $1/r_2 = P_B^2$  and  $1/r_1 = P_B^1$ . So for the U.S., free trade with a region (Asia) that has high rate of savings and low interest rates compared to the U.S., results in a lower equilibrium level of interest rates in the U.S. In the free trade equilibrium, the U.S. exports  $B_S - B_0$  value of bonds to Asia each period.

Assume (as is more or less true) that the U.S. has a flexible exchange rate policy, i.e. the Fed does not buy or sell foreign currencies to defend any particular exchange rate. Define the exchange rate as  $E$  = units of domestic currency needed to buy one unit of the foreign currency. If there is free trade in real commodities but no trade in financial assets between countries, then the exchange rate will be in equilibrium where the current account balance (CA) equals zero. Assume that a higher exchange rate  $E$  causes imports to fall and exports to rise. Then, the current account balance, CA, will be a positive function of the exchange rate, or

$$dCA/dE > 0$$

If free trade in financial assets is allowed, and if as above the U.S. has a capital inflow from Asia due to higher domestic interest rates, then the U.S. will a capital account balance, KA, which is positive or  $KA > 0$ . Assuming the capital account surplus is a function of the interest rate differential between home and foreign interest rates, but is not a function of the level of the exchange rate,  $E$ , then in equilibrium the exchange rate needs to fall by enough to create a current account deficit which exactly offsets the capital account surplus, or

$$CA + KA = 0$$

This implies that with free trade in both real commodities and financial assets, the equilibrium values of the exchange rate,  $E$ , will be lower than it would be with free trade in real commodities alone.

Going back to the original monetary policy set up, let's assume the home country's central bank, the U.S. Federal Reserve, decreases the money supply. What happens in the markets for commodities, bonds, and money, when the economy is open to free trade in both commodities and financial assets?

Say's Law will still hold true at the level of individual economic agents. That is, if the Fed sucks money out of the pockets of all the agents, everyone will have an excess demand for money. As before, they will attempt to remedy this disequilibrium situation by supplying more of both commodities and bonds than they demand. An incipient excess supply of both bonds and commodities will appear in those two markets.

What if, though bonds are freely traded internationally, and what if the U.S. bond market is small relative to the world market? In that case, in Figure 1, the demand curve,  $D_1$ , representing domestic demand for bonds shifts to the left. But the price of bonds remains at  $P_B^2$  because foreign demand for U.S. remains infinitely elastic at that price. The interest rate in the U.S. remains at  $r_2$ , but U.S. exports of bonds,  $B_S - B_D$  increases, or equivalently the capital account surplus  $KA = B_S - B_D$  increases. In order to maintain equilibrium in the overall balance of payments, the U.S. current account balance must go more negative. To accomplish that, the exchange rate,  $E$ , must drop to a lower level.

This result is consistent with economic agents having an excess supply in the market for real commodities, and also with purchasing power parity, PPP. When agents have an excess demand for money, they decrease their spending on both domestically produced and imported commodities. The decreased demand for imports drives down the demand for foreign exchange which lowers  $E$  by enough to keep the domestic currency price of imports equal to that of domestically produced goods. The domestic price level,  $P$ , and the exchange rate and the exchange rate,  $E$ , both fall until the real value of agents' money holdings,  $M/P$ , is restored to equilibrium.

What if, more realistically, the U.S. is not a small country in world financial markets? In that case, the decrease in the money supply that causes an excess supply of bonds will lead to decrease in the price of bonds, or equivalently, an increase in interest rates. However, as long as the foreign demand for bonds has some non-zero elasticity, the rise in interest rates will be less than what it would be in autarky. As long as free trade in bonds holds, though, interest rates will be the same in both countries.

What implications does this have for the conduct of monetary policy in the real world? First, the link between money market conditions and credit market conditions will be weakened, if not broken. Thus, money may be tight, while credit is loose. In the limiting case of a small country, the usefulness of monetary policy working through the interest rate channel will be entirely absent. Even in a large country the effectiveness of monetary policy working through the interest rate channel to impact the credit markets will be more limited and/or have a longer time lag.

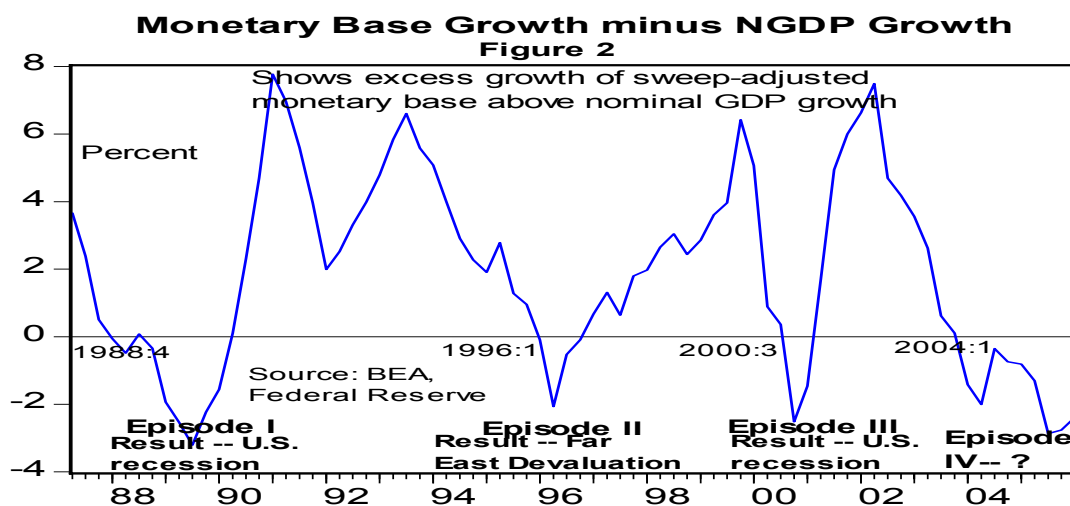
Secondly, it suggests contractions in real output caused by monetary tightening are likely to milder and shorter in duration than would in a closed economy. Plus the time lags of changes in monetary policy can be expected to be more uncertain. Not only is the interest rate mechanism weakened, the direct effect of a shortage of money on demand for real commodities is likely to be less potent than in a closed economy. If the exchange rate  $E$  is readily flexible downward, lower prices for imports are likely to force domestic commodity prices downward at a faster rate. As a lower price level  $P$  increases the real value of money,  $M/P$ , this would restore equilibrium in the demand for money more quickly, shortening the duration of any recession. Finally, changes in the income velocity of money also may work to weaken and/or strengthen the tie between changes in the quantity of money and real output as in Irving Fisher's equation of exchange. It is well known that the velocity of money is not permanently fixed. Increases in velocity may work to offset reductions in the quantity of money.

### **Monetary Policy -- Quantity of Money**

In this section we evaluate the degree of monetary ease or tightness by means of the growth of the sweep-adjusted monetary base, compared to growth in nominal GDP. We do this during the term of Chairman Greenspan – mid-1987 to early 2006. The quantity of money increasing faster than growth in nominal GDP results in economic agents holding an excess supply of money. Eventually that excess supply will be spent on commodities and/or bonds

resulting in higher nominal GDP which can be reflected as higher prices and/or real output if at less than full employment. In comparison when quantity of money growth is less than growth in nominal GDP, economic agents have an excess demand for money and eventually an excess supply of both commodities and bonds develops in those two markets.

Figure 2 illustrates growth of the sweep-adjusted monetary base compared to growth in nominal GDP. Note Cosgrove and Marsh (2005) for more detail on this relationship.



### Episodes

Two of the first three episodes in which money supply growth was less than nominal GDP resulted in downturns in U.S. real output, while the other resulted in a stronger dollar which contributed to the economic disruption in Far East economies.

- **Episode I**

The difference between the growth of high-powered money and nominal GDP growth fell to approximately zero in 1988:4 and went negative for six quarters thereafter. The U.S. recession started in July 1990 – 16 months later.

- **Episode II**

Episode two: in 1996:1 differential growth was essentially zero and only remained negative for four quarters. An excess demand for money led to a pronounced rise in the price-adjusted broad dollar index of 24.8 percent from July 1995 to August 1998. The sharp increase in the dollar index created an environment in which Thailand, Indonesia and South Korea found it necessary to float their currencies in the latter part of 1997. In August 1998 the Russian government defaulted on its debt commitments. The adjustment to the excess demand for money occurred outside the U.S. through the dollar channel.

- **Episode III**

By the third quarter of 2000 the differential growth was approximately zero and it only remained negative for two quarters. The recession start date was March 2001, less than one-year later. Other adverse events such as the negative shock of a \$9 trillion wealth loss and a capital spending bust also adversely impacted real output.

- **Episode IV**

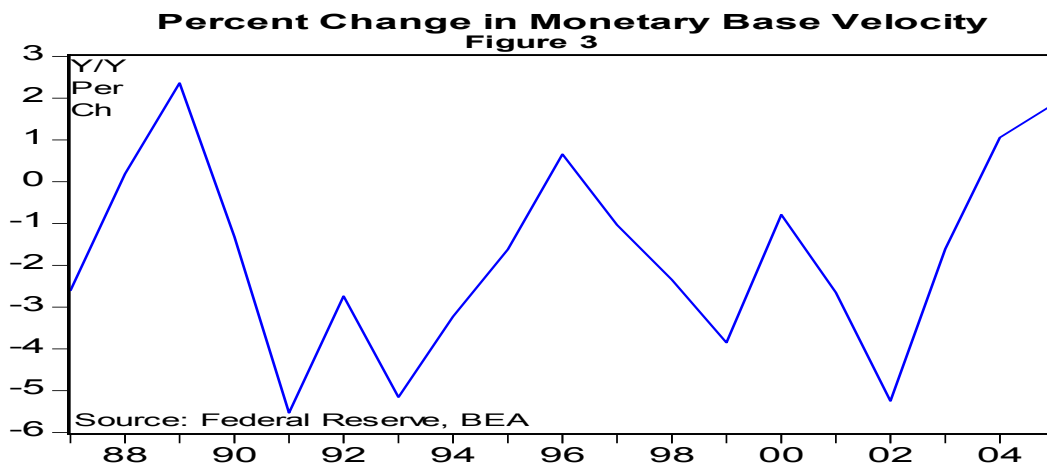
The difference between the sweep-adjusted monetary base and nominal gross domestic product was approximately zero in 2003:4 and has been negative since 2004:1 -- nine quarters through the first quarter of 2006. The past three times this relationship occurred during the Greenspan era the result has been unfavorable for real output either in the

U.S. or in other countries. In two of those episodes a U.S. recession followed while the third time, the mid-1990s, that episode helped create an environment for economic financial dislocation outside the U.S. It is evident that the relationship has changed in Episode IV from prior ones. One reason for this changed relationship is an increase in velocity.

### Velocity

Figure 3 illustrates percent growth in velocity of the sweep-adjusted monetary base. Money turnover increased during Episode IV which is part of the reason that the link between monetary policy and credit appears weaker than in prior Episodes. Monetary base turnover, however, also increased during a portion of Episode II before it started to slow.

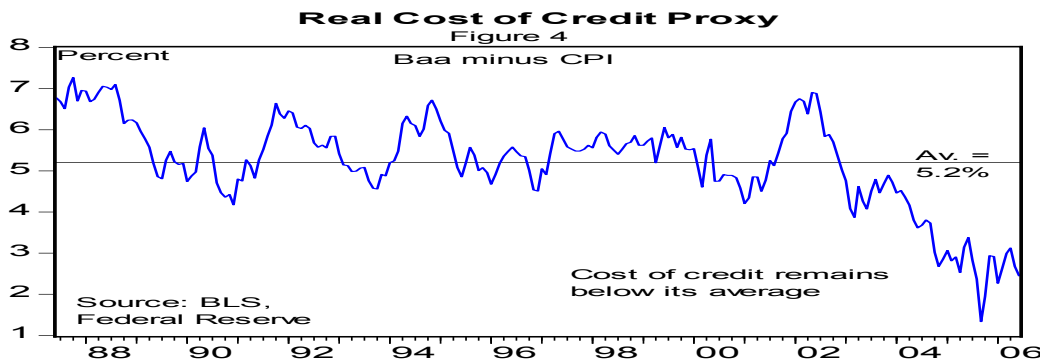
In Episodes I and III, in which recessions occurred, velocity was slowing fairly rapidly before the downturn in economic activity. Implication: whenever monetary base growth was less than nominal GDP growth and velocity was slowing, an adverse effect on economic growth occurred either in the U.S. or in the case of Episode II, outside the U.S.



In Episode IV only one of the two conditions was met. Growth in velocity is one reason why the impact of a tight monetary policy as measured in Figure 2 has not had its expected effect. Short-term interest rates remained low during part of the velocity upturn. During that time, theory suggests agents would have been expected to hold higher cash balances, resulting in stable or decreasing velocity. Once short-term rates started to rise in June 2004, velocity would be expected to rise as agents start to economize on the use of cash. However, real interest rates remained low for much of this time so perhaps it is a little surprising that velocity rose as rapidly as it did.

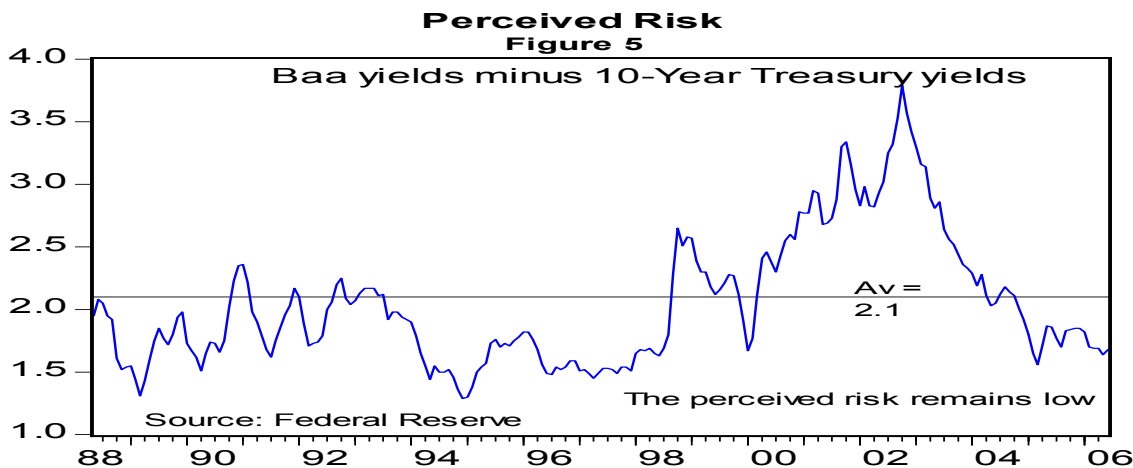
### Credit

Another reason the link between the quantity of money and real output was weaker in Episode IV is the easy and cheap credit compared to prior tightening cycles, Figure 4.



The real cost has increased from its low in this cycle but remains well below the average and is very atypical at this stage of prior tightening cycles. Warnock and Warnock (2005) suggested that the large net foreign accumulation of bonds may have resulted in bond yields being in approximately 100 to 150 basis points lower than they otherwise would be. The upper limit would result in bond yields being much closer to their long run average real yield of 5.2 percent instead of the real 3.0 percent level in the first half of 2006. An additional 150 basis points on bond yields may mean that the money and credit relationships would be more typical of past monetary policy tightening cycles.

The perceived credit risk is also below its average, probably reflecting the low cost of credit at this stage, Figure 5.



The low perceived risk and the low cost of credit relative to prior cycles appears to reflect the weakened interest rate transmission channel resulting from large net inflows of foreign capital into the U.S. The absolute net inflow from 1994 to 2006 was \$8.5 trillion.

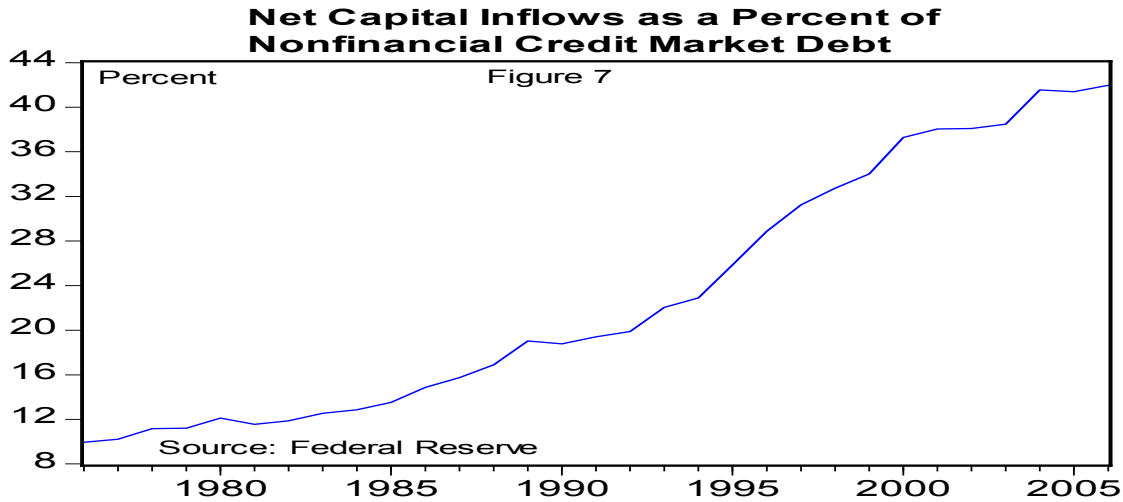
Net foreign holdings of Treasuries and Agencies increased by nearly \$2.5 trillion while corporate bonds increased by approximately \$1.9 trillion over the same time frame. The U.S. has exported a net \$4.4 trillion of Treasury and corporate bonds since 1994.

**Figure 6**  
**Foreign Balances in U.S. Financial Markets**  
(Billions of dollars) (end of period)

	2006:1Q	1998	1994
Total Balance	\$11,426	5,162	2,910
Treasuries*	3,213	1,394	758
Corporate Bonds	2,202	608	311
Equities	2,506	1,250	398
Other	1,622	990	825
FDI	1,883	920	618

\* Includes agencies -- that number in 2006Q1 -- \$972 bil. Foreign central banks hold 63% of Treasuries. Source: Flow of Funds

The real cost of long-term credit has risen in this cycle but less than it would have due to large net inflow of foreign capital. The theory suggests that the rise in interest rates would be less when bonds are freely traded internationally than under conditions of no trade as long as foreign demand for bonds has some non-zero elasticity. Net inflows of foreign capital comprised approximately 42 percent of domestic nonfinancial debt, figure 7.



The increase in nominal GDP from 1994:1 to 2006:1 was approximately 89 percent while the net increase in the combined holdings of Treasuries, Agencies and corporate bonds was over 400 percent. This large net inflow of foreign buying power for fixed income instruments appears to be a major reason for the weakened interest rate transmission linkage between the quantity of money and credit market conditions. Bernanke (2005) suggests that a large savings glut in foreign countries, reflecting their high propensities to save, worked to inflate U.S. equity values in the latter 1990s and boost U.S. home values post-2000. That could occur through lower bond yields due to the large net inflows of capital.

### Treasury bond holders

The top ten foreign countries hold 76 percent of the Treasury securities held by foreign countries, Figure 8. Japan, alone, holding approximately 31 percent of all Treasury securities held by foreigners. China, in second place, holds 16 percent of Treasury securities held by foreigners. Of the Treasury securities held by foreigners, foreign central banks hold approximately 62 percent.

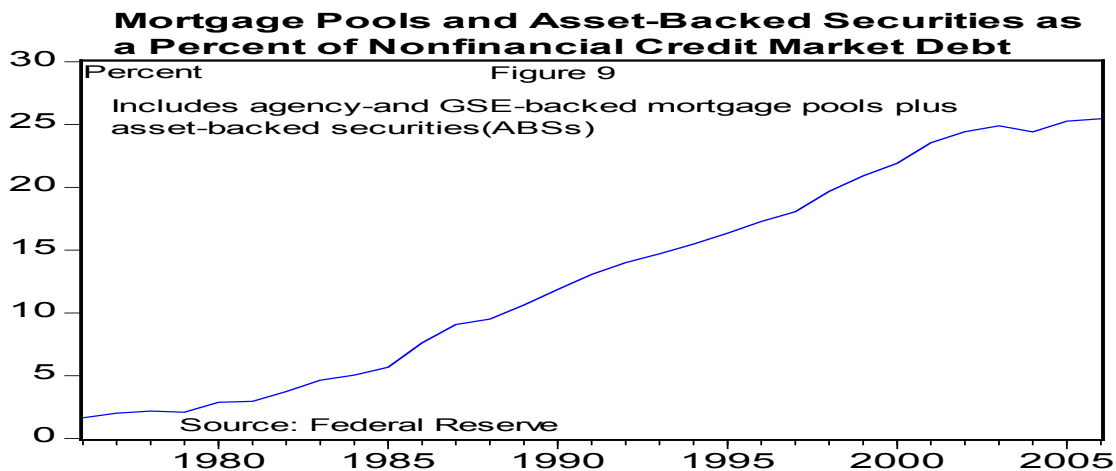
Foreign country holdings of Treasuries are only a very rough approximation as the country only represents where the transaction occurred and not necessarily where the holder of the bonds actually resides.

Figure 8  
Major Foreign Holders of  
Treasury Securities  
July 2006

<u>Country</u>	<u>\$(billions)</u>
Japan	636.6
China	332.7
U.K.	190.3
Oil Exporters	103.1
Caribbean	68.9
Korea	68.4
Taiwan	66.7
Germany	49.8
Hong Kong	48.9
Mexico	45.7
All Other	491.1
Total	2102.2
Foreign Central Bank Holdings	1280.3

## Markets for Bank-Originated Asset-Backed Securities

A third reason for the breakdown of the link between money and credit conditions (tight or loose) is the emergence, over the past few decades, of the market for bank originated asset-backed securities and agency-and GSE-backed mortgage pools. For an analysis of asset securitization in the banking industry, see Kane and Muzere (2006). Originally conceived as an instrument for stimulating the housing industry, and largely promoted by the government sponsored enterprises Fannie Mae and Freddie Mac, the market for mortgage backed securities was the first of this type. Once banks realized they could earn greater profits from the fees they collected as loan originators, rather than by passively holding long term assets, these markets took off. As seen in Figure 9, this market has grown from insignificance to rank as major financial markets over the past 25 years. By allowing banks and public agencies to throw off their assets into securities markets, the link between monetary policy and credit market conditions has been weakened.



## Summary

Growth in sweep-adjusted monetary base compared to growth in nominal economic activity was negative from the first quarter of 2004 through the first quarter of 2006, indicative of a tight money policy. Previous intervals of monetary tightening measured the same way during the Greenspan era resulted in adverse impacts on economic activity. In the current episode, the effect has been markedly less. Three reasons explain the changed behavior during this cycle.

One is that the velocity of money has increased during this tightening cycle offsetting, in part, the slow growth in the quantity of money compared to nominal GDP. Second, the large increases in net capital inflows into the U.S. relative to the size of credit market debt. And third, the large market for asset backed securities compared to the size of credit market debt. The latter two reasons have resulted in an impairment of the usual linkage between money market and credit market conditions. In particular the degree of monetary tightness isn't transmitted through the interest rate channel to the credit market.

## References

Cosgrove, Michael and Daniel Marsh (2005). "Money Matters – But Which Measure Matters Most?" *American Society of Business and Behavior Proceedings*, Volume 12, Number 1, 2060-2069.

Bernanke, Ben S. (2005). "The Global Saving Glut and the U.S. Current Account Deficit." *The Federal Reserve Board*, March 10 remarks.

Frankel, Jacob A. (1986) "International Capital Mobility and Crowding Out in the U.S. Economy: Imperfect Integration of Financial Markets or Goods Markets?" in R.W. Hafer, ed., *How Open is the U.S. Economy?* Lexington, MA: Lexington Books, 1986.

Johnson, Harry G. (1972) "The Monetary Approach to the Balance of Payments Theory." *Journal of Financial and Quantitative Analysis*. March, 1972

Kane, Stephen A., and Muzere, Mark L. (2006) "Implications of the Risk-Based Capital Requirements of Implicit Recourse in Asset Securitizations in the Banking Industry." Working Paper. 2006.

Mundell, Robert (1971) *Monetary Theory: Inflation, Interest and Growth in the World Economy*. Pacific Palisades, CA: Goodyear, 1971

Patinkin, Don. (1965) *Money, Interest, and Prices*. New York: Harper and Row, 1965

Pesek, Boris, and Thomas R Saving (1967) *Money, Wealth, and Economic Theory*. New York: Macmillan, 1967.

Warnock, Francis E. and Warnock, Veronica C. (2005). "International Capital Flows and U.S. Interest Rates." *Board of Governors of the Federal Reserve System, International Finance Discussion Papers*, no. 840, September.