I. Introduction

Much recent commentary suggests that global liquidity has importantly influenced financial conditions in the major international markets, and that excess liquidity in one financial center can influence financial conditions elsewhere.[2] For example, it has been suggested that ample global liquidity compressed risk premia during the run-up to the 1998 turbulence, and that 'carry trades' are increasingly used to shift liquidity among financial centers.[3] The relationship of liquidity to asset prices has been extensively studied in a domestic context, but it has been little studied in an international context. In a world where capital is increasingly mobile and can be readily deployed internationally, it is important to consider the extent to which changes in monetary conditions in one major country may be associated with changes in monetary and financial conditions elsewhere.

We assess the empirical influence of global liquidity on asset prices, including through cross-country spillovers. We extend existing work in three ways. First, we construct and study three measures of G-7 monetary liquidity, highlighting measurement issues similar to those that are present in a domestic context. Second, we study the influence of G-7 money growth on G-7 interest rates and stock returns. Third, we assess the extent of international 'liquidity spillovers,' e.g. the influence of money growth in one major country on asset returns or money growth in other countries. Our results suggest that an increase in G-7 liquidity growth is consistent with an increase in G-7 real stock returns and a decline in G-7 real interest rates. Moreover, increased liquidity growth in one country is often consistent with an increase in real stock returns and a decline in real interest rates in other countries.

II. Concepts of Liquidity

Previous work identifies two concepts of liquidity.[4] *Market liquidity* is the capacity of financial markets to absorb temporary fluctuations in demand and supply without undue dislocations in prices. It is most often used to describe secondary markets, though it is sometimes applied to primary markets as well; for example, market participants often describe large issues as 'liquid.' *Monetary liquidity,* which is often associated with short-term interest rates or the aggregate quantity of money, is commonly thought of as related to conditions in short-term credit markets. When quantity measures of monetary liquidity are used, they are often measured as a growth rate, or relative to a base like GDP.

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[2] Recent examples include Williams (1999) and Montgomery (1999).

[3] See International Monetary Fund (1999a, 1999b).

[4] See Montgomery (1999) and Bank for International Settlements (1999).

These concepts of liquidity are closely related to one another. Monetary liquidity (broadly speaking) consists of short- to medium-term bank liabilities, which can fund trading and underwriting in securities markets.[5] Ample monetary liquidity can also support market making by lowering the cost of funding. The net new supply of securities would tend to rise during periods of ample monetary and secondary market liquidity, since markets tend to be particularly buoyant and receptive to new issues during such periods. Improved economic prospects might bring general increases in liquidity: an increase in money demand; an increased willingness to take risk among banks and traders; and an increased willingness to take on debt among corporations. Clearly, the relationship among the different types of liquidity suggests an important role for central banks, and hence monetary liquidity, in supporting market liquidity, as noted by Federal Reserve Chairman Alan Greenspan: "Central banks do not respond to gradually declining asset prices. We do not respond to gradually rising asset prices. We do respond to sharply reduced asset prices which will create a seizing up of liquidity."[6]

We focus on monetary liquidity. Given the primacy of money markets in financial markets, and the primacy of central banks and monetary policy in money markets, we believe that a good understanding of the stylized facts about monetary liquidity is fundamental to understanding other types of liquidity. Monetary liquidity also provides an obvious inroad to relevant and interesting macro-level policy issues. Finally, our focus on monetary liquidity allows us to build on previous work.

III. Previous Research

Previous studies of monetary liquidity and asset prices focused primarily on country-level data and found considerable evidence that asset prices are related to money growth. Among the key findings are that real stock returns are positively correlated with money growth (Marshall (1992), Conover, Jensen and Johnson (1999)); nominal stock prices are negatively related to the contemporaneous velocity of money, while real stock prices are positively correlated with the velocity of money three quarters ahead (Friedman (1988)); foreign stock returns are generally higher when U.S. monetary policy is expansionary than when it is restrictive (Conover, Jensen and Johnson (1999)); and an increase in money growth causes temporary declines in both real and nominal interest rates (the 'liquidity effect:' Friedman (1968)).

These findings led to the development of dynamic general equilibrium monetary models that explain the relationship of money growth to asset returns, the term structure of interest rates, and inflation (Day (1984), Stultz (1986), Lee (1992), Marshall (1992), Bakshi

[5] The process of money creation could also be tracked through the asset side of the balance sheet (e.g. in credit creation).

[6] "Wall Street asks Fed questions—and may hold the answers" (1999).

and Chen (1996)). In these models, inflation plays an intermediary role. For example, Marshall (1992) shows that expected excess returns and expected inflation are negatively correlated, with a stronger relationship when inflation stems from output fluctuations rather than monetary fluctuations. Moreover, innovations to inflation generated by monetary shocks induce substitution from money to equities, boosting equity returns.

A related strand of the literature focuses on the policy implications of the relationship between money and asset prices. Against the background of recent episodes of market turbulence, much research has studied whether monetary authorities should respond to fluctuations in asset prices (and if so, how). Bernanke and Gertler (1999) assert that fluctuations in asset prices should concern policy makers if movements in asset prices are unrelated to economic fundamentals, and if 'non-fundamental' changes in asset prices have a potentially significant impact on the real economy. Goodhart (1995) discusses the relationship of asset-price inflation to financial fragility, and goes so far as to state that "monetary authorities, therefore, share responsibility, along with the commercial banks, for the recent asset price/banking cycle" (p. 480). Smets (1997) concludes that the optimal monetary policy response to unexpected changes in asset prices depends on the formation of the central bank's inflation forecast.

Goodhart and Smets also discuss the role of a dynamic inflation index (an index that combines goods and asset prices to measure inflationary pressures) in guiding monetary policy. A number of other studies have examined such indices and the issue of asset-price inflation more generally. Christofferson, Schinasi and Lim (1997) uncover a significant relationship between money growth and a dynamic inflation index in Japan, and find that a dynamic index could have identified the inflationary pressures associated with the 1980s asset-price bubble as early as 1986. Schinasi (1994) discusses the experience with asset-price inflation in several industrial countries and considers the lessons for monetary policy.

IV. The Relationship of Liquidity and Asset Returns

The literature suggests several possible relationships between liquidity and asset prices. First, liquidity could give rise to inflation in asset prices if excess liquidity increases the demand for a fixed supply of assets. Second, an increase in liquidity could coincide with a rise in asset prices, if both stem from improved economic prospects. For example, a cyclical upturn could coincide with an increase in money demand, improved prospects for corporate earnings, and a rise in stock prices.[7] Third, a decline in interest rates driven by an increase in liquidity may lead to an increase in equity prices by reducing the discount factors that price future cashflows (the decline in interest rates could also stimulate demand and imply higher future dividends, which could also lead to an increase in stock prices).

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[7] This is clear for stock prices. It is less clear whether real interest rates ought to rise or fall, since an economic upturn might portend a rise in inflation. In the United States, at least, real interest rates appear to have little cyclical variation (Blanchard and Fischer (1989), pp. 18-19).

These ideas also suggest some channels for international transmission. There are perhaps two such channels, a 'push' channel or a 'pull' channel, each with different empirical implications. First, if rapid money growth in (say) Japan gave rise to capital flows from Japan to foreign asset markets (a 'push' of money overseas), we would expect upward pressure on foreign stock and bond prices (and downward pressure on foreign interest rates). In this case, we would expect a positive correlation between Japanese money growth and foreign stock prices, and a negative correlation between Japanese money growth and foreign interest rates. Such findings could also be consistent with economic spillovers, or "a rising tide that lifts all boats." For example, rapid money growth in Japan (either owing to stimulative policy or an accommodated rise in money demand) might coincide with improved economic prospects in Japan, which would suggest improved prospects for other major countries, raising asset prices in those countries (though as in the domestic context, this is clearer for equity prices than bond prices). Alternatively, spillovers could occur through a 'pull' channel. Rapid money growth in Japan could give rise to asset price inflation in Japan; if foreign investors view the asset-price inflation as real and sustainable, it could attract a reallocation of capital to Japan from abroad and depress foreign asset prices (a 'pull' of capital from overseas into Japan). In that case, we would expect a negative correlation between Japanese money growth and foreign stock prices, and a positive correlation between Japanese money growth and foreign interest rates. In discussing the empirical results, we consider whether our tests are more consistent with the first or second interpretation.

V. Data

We collected quarterly data on money and asset returns for the G-7 countries spanning the fourth quarter of 1971 to the fourth quarter of 1998. The dataset includes narrow money, broad money, long-term and short-term interest rates, the consumer price index, GDP, share prices, and the exchange rate for each country. All the data are seasonally adjusted, except for interest rates and share prices. Narrow and broad money were drawn from a variety of sources (*International Financial Statistics*, Current Economic Indicators, WEFA) and where possible are measured at the end of the quarter. Long and short interest rates are measured by the yield on a 10-year government bond and the yield on 3-month T-bills (or where T-bill rates are not available, interest rates on short-term deposits). The CPI, GDP, share price and market exchange rate data were collected from the *International Financial Statistics* database. A detailed description of the data is available from the authors.

A. Global Money and Asset Returns

We used three methods to compute G-7 money growth. Each method was applied to both narrow and broad money. First, we created a *weighted growth rate series*, in which the growth rate of money for each G-7 country (in domestic currency terms) was weighted by the respective country's GDP in U.S. dollars:

$$\sum_{i=1}^{7} w_{i,t}\left(\frac{m_{i,t}-m_{i,t-1}}{m_{i,t-1}}\right),$$

where $m_{i,t}$ denotes local-currency money of country i in period t and $w_{i,t}$ denotes the share of country i in G-7 GDP (measured in U.S. dollars). These weights are used to create monetary aggregates in the Fund's *World Economic Outlook* studies, and use market exchange rates to convert domestic-currency GDP to U.S. dollars.[8] The weights are annual; weights for each year were applied to all 4 quarters within the year.

Second, we created *simple sum U.S. dollar (USD) aggregates,* dividing domestic-currency aggregates by market exchange rates and summing:

$$\frac{\sum_{i=1}^{7} m_{i,t}/e_{i,t}-\sum_{i=1}^{7} m_{i,t-1}/e_{i,t-1}}{\sum_{i=1}^{7} m_{i,t-1}/e_{i,t-1}},$$

where $e_{i,t}$ denotes the exchange rate of country i in period t (units of local currency per U.S. dollar). A similar method is employed in some exchange-rate studies that calculate 'rest-of-world' monetary aggregates.[9] Using market exchange rates to convert local-currency money undoubtedly imparts some volatility to the global monetary aggregates, and using (say) a moving average would reduce this effect. In practice, deposits and other components of money are converted to U.S. dollars at market exchange rates, and we did not smooth any other asset prices, so we chose not to smooth the exchange-rate data.

Third, we create *Divisia indices* of global money growth. Divisia indices have useful statistical properties (for example, they can closely approximate the economic quantity of interest) and are often used to aggregate assets with differing degrees of 'moneyness' (usefulness in transactions) in studies of domestic money.[10] The percentage change in the Divisia index from period *t-1* to *t* is

$$\sum_{j}\bar{s}_{j,t}\left(\log\left(m_{j,t}/e_{j,t}\right)-\log\left(m_{j,t-1}/e_{j,t-1}\right)\right),$$

where

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[8] See International Monetary Fund (1993).

[9] See Sill and Wrase (1999).

[10] See Barnett (1982) for a discussion of the properties of Divisia indices, and Barnett, Offenbacher and Spindt (1984) for an application to monetary aggregates.

$$\bar{s}_{j,t} = \frac{1}{2}\left(s_{j,t} + s_{j,t-1}\right)$$
$$s_{j,t} = \pi_{j,t}\left(m_{j,t} / e_{j,t}\right) \Big/ \sum_k \pi_{k,t}\left(m_{k,t} / e_{k,t}\right),$$

and $\pi_{j,t}$ is the 'price' of the *j*th component of the money aggregate during period t (in our case, to money in the *j*th country). Note that $s_{j,t}$ is the expenditure share on component j during period t and that the formula (which is a discrete-time approximation to a continuous-time formula) averages current and lagged expenditure shares.

In domestic studies of money, the 'price' of money is its opportunity cost, normally the return on an alternative asset less the return on money. We experimented with several specifications that used the difference between long-term and short-term domestic interest rates as a measure of the opportunity cost for broad money (we assumed that narrow money paid no interest).[11] That is, we assumed that long-term bonds were the alternative asset, and used the short-term interest rate as a proxy for the return on broad money. Since the data span periods when monetary policies have been sharply tightened, there were a number of quarters when the 'opportunity cost' of broad money turned negative if measured this way. To avoid this counterintuitive result, we used the long-term interest rate as the opportunity cost of both broad and narrow money. We believe that long-term interest rates should be positively correlated with the true opportunity cost of money, and we view the long-term interest rate as inversely related to the 'international moneyness' of a particular currency. For example, the wide use and fungibility of a currency in international transactions might be reflected in lower interest rates in that currency, analogous to the way that domestic components of money that have more 'moneyness' pay lower interest than those with less 'moneyness.'[12]

For each of the six series (3 aggregation methods for both narrow and broad money), we constructed excess money growth by subtracting the average growth rate of nominal GDP for the G-7 (weighted by U.S. dollar GDP).[13] We also created G-7 averages for short-term interest rates, long-term interest rates, and stock returns using the U.S. dollar GDP weights from the *World Economic Outlook* database. We calculated real returns by subtracting average G-7 consumer price inflation (also weighted by U.S. dollar GDP) from these indices of nominal returns. We also computed 'ex-country' or rest-of-world (ROW) indexes for the

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[11] Studies of money demand often use the short-term interest rate as the opportunity cost of money, though some note that the long-term interest rate may be a more accurate measure of the return on alternatives to money (see for example Klein (1974)).

[12] Portes and Rey (1998) state that the international role of the U.S. dollar reduces real yields on U.S. government bonds by 25-50 basis points.

[13] Schinasi and Hargraves (1993, p. 16) interpret this gap as "potential inflation pressures in markets not captured by national income account measures of output and prices."

money and asset return series: these exclude one of the G-3 countries (for example, an 'ex-US' or 'US ROW' series aggregates the data for Canada, France, Germany, Italy, Japan, and the United Kingdom).

B. Basic Characteristics of the Data

Figures 1-4 show the series for aggregate money and asset returns. The money growth series are fairly volatile, and the Divisia and simple sum series are more volatile than the weighted growth-rate series (probably owing to the influence of exchange-rate changes). The Divisia and simple sum indices are highly correlated with one another, similar to what is found in some domestic studies of money.[14] However, this need not imply that either series is redundant: Divisia indices sometimes outperform simple-sum measures in (e.g.) Granger causality tests between money and income and in fitting money demand functions.[15] We also ran augmented Dickey-Fuller tests for the presence of unit roots in G-7 money growth and excess money growth (the results are omitted to save space). The unit root null was rejected for all the series except one (weighted growth in broad money).

Table 1 presents basic statistics for the monetary aggregates. Divisia and simple-sum money growth are strongly correlated with one another, and are also highly correlated with the weighted growth rate series. Broad and narrow money growth are also highly correlated. All the series grow by around 2 percent per quarter on average. Excess money growth has broadly the same characteristics as money growth.

It is also useful to assess whether money growth rates for the G-7 countries have common components. Table 2 presents two measures of these commonalities: correlations and principal components. The top panel of Table 2 displays the correlation of domestic money growth and ROW money growth; for example, the first entry shows that the correlation between money growth in the United States and money growth in the other G-7 countries (weighted by GDP) is about 66 percent. The correlation of money growth rates for Germany, Japan, and the United States vary from about 10 percent to about 80 percent; the GDP-weighted averages are often more highly correlated across countries than growth rates calculated using simple sum or Divisia methods. The bottom panel of Table 2 shows the results of a principal components analysis of the components of the three aggregate series for money growth. The first (most important) principal component of the component series of the indexes of G-7 money growth generally explains a high proportion of the individual country growth rates.[16] In a number of cases, the loadings on the first principal component

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[14] See Barnett, Offenbacher, and Spindt (1984).

[15] See Barnett, Offenbacher, and Spindt (1984).

[16] Principal components capture the common covariation in a panel of variables (see Greene (1993), pp. 271-273).

are largest for the United States and Japan, suggesting that money growth in those countries strongly influences G-7 money growth (Italy also has a few large loadings, perhaps reflecting volatility in Italian monetary aggregates over the sample period).

VI. Results

A. Relationship of G-7 Money and G-7 Asset Returns

We next examine the relationship between excess money growth and real asset returns at the level of G-7 aggregates. Contemporaneous correlations provide the simplest view on this relationship (Table 3, Panel A). Three interesting facts stand out in these correlations. First, excess money is negatively correlated with interest rates, and positively correlated with stock returns, though only one of the correlations with stock returns is both positive and statistically significant. These are broadly consistent with liquidity effects and asset-price inflation at the G-7 level. Second, simple-sum or Divisia measures of money growth generally have the strongest correlations with real stock returns and real interest rates. Third, real asset returns are generally more strongly correlated with narrow money than with broad money, perhaps because demand deposits may be more readily used to purchase assets than time deposits.

It is also useful to examine correlations at business-cycle frequencies. Most of the high-frequency variation in real asset returns probably stems from influences other than excess money (e.g. economic and financial news). Also, long-term trends in money growth, such as those related to secular changes in financial technology, are probably not strongly reflected in real asset returns. Thus, we might expect to find the strongest correlations between money and real asset returns at intermediate (business-cycle) frequencies.[17]

We applied the Baxter-King (1995) "Burns and Mitchell" filter to excess money growth and real asset returns. This filter isolates components between 6 quarters and 32 quarters in frequency, which Baxter and King describe as business cycle frequencies. Table 3, Panel B displays correlations of G-7 excess money with G-7 real asset returns using data filtered for business-cycle frequencies. These correlations have the same general characteristics as the correlations at all frequencies (in particular, real interest rates are negatively correlated with excess money growth), but are generally stronger than the correlations at all frequencies (there are some negative correlations between stock returns and broad money growth, but none are statistically significant). We considered using the filtered data for the econometric analysis: it would surely have strengthened our results. However, filtering the data costs observations at the beginning and end of the sample, and we did not want to use a shorter sample for the econometric analysis.

[17] We also calculated the correlations using annual data (not shown). The correlations were almost uniformly stronger than the correlations calculated from quarterly data, and sometimes much stronger.

Regressions of G-7 real asset returns on lagged asset returns and excess money growth provide another view of the relationship of asset returns to money at the G-7 level (Table 4). There is some evidence that excess money growth is associated with a rise in real asset returns, as implied by the significant coefficients on money growth. Excess broad money (Panel A) has a statistically significant effect on real long-term interest rates (for all three measures of money), real short-term interest rates (for GDP-weighted money), and real stock returns (all three measures of money). Excess narrow money (Panel B) has a statistically significant effect on real long-term interest rates (for Divisia and simple-sum money), real short-term interest rates (all three measures of money), and real stock returns (GDP-weighted money). As with the contemporaneous correlations, there is some evidence that excess money growth is negatively related to real interest rates (a liquidity effect) and positively related to real stock returns (asset price inflation) at the G-7 level. In addition, comparing results for short-run and long-run coefficients (in the last row of the table), there is more evidence for a short-run effect than for a long-run effect. [18]

B. Monetary Spillovers

We now turn to estimates of cross-country liquidity spillovers. We perform three kinds of tests: direct tests of the effect of domestic money growth on foreign asset returns; indirect tests of the effect of domestic money growth on foreign money growth; and tests for whether volatility in domestic money spills over into volatility in foreign asset returns.

In our direct tests, we test whether excess money growth in one G-3 country (Japan, Germany, or the United States) drives real stock returns and real interest rates in other G-7 countries, even after accounting for the effect of excess money growth in the other G-7 countries. In particular, we regress (say) real stock returns in the G-7 excluding one country—say the United States—on its own lags and six variables: U.S. excess money growth (narrow and broad), excess money growth in the ROW (narrow and broad), and real short-term and long-term interest rates in the ROW. We then test the marginal explanatory power of excess U.S. money growth. We include both narrow and broad money growth for the ROW to provide a particularly stringent test. More formally, tests for spillovers from excess money growth in the United States to real stock returns in the rest of the G-7 focus on the parameters of the lag polynomials *F(L)* and *G(L)* in the regression

$$\begin{aligned} R_{ROW,t} &= A(L)R_{ROW,t} + B(L)XBMG_{ROW,t} + C(L)XNMG_{ROW,t} \\ &+ D(L)RLR_{ROW,t} + E(L)RSR_{ROW,t} \\ &+ F(L)XBMG_{US,t} + G(L)XNMG_{US,t} + \varepsilon_t \end{aligned}$$

[18] The 'LR' coefficients shown in the table show the long-run effect of an increase in money growth, including pass-through effects through the lagged dependent variable (for details underlying the calculation, see Doornik and Hendry (1994)).

where R is real stock return, XBMG is excess broad money growth, XNMG is excess narrow money growth, RLR is the real long term interest rate and RSR is the real short term interest rate. $A(L)$, $B(L)$, $C(L)$, $D(L)$, $E(L)$, $F(L)$, and $G(L)$ are lag polynomials and ε_t is a disturbance term. We run similar regressions using Japan and Germany in place of the United States.

Tables 5 and 6 present the regression results. In view of the large number of independent variables, we sought to minimize the number of lags to keep the number of parameters manageable. A variety of diagnostic tests led us to the specification shown in the tables. Results were qualitatively similar for a variety of other specifications. Table 5 presents the results of regressions with real stock returns. For each country, there is some evidence for spillovers (positive and significant coefficients on excess money growth). Four other features stand out in these regressions. First, the regressions confirm the impression from the G-7 aggregate regressions that excess money growth is correlated with real stock returns in the short run, since many of the coefficients of ROW real stock returns on ROW excess money growth are positive and significant. Second, for all three specifications of money growth (GDP weighted, simple sum, and Divisia), there seems to be stronger evidence for spillovers from Japan and Germany than from the United States. Third, for Japan, the spillover effects of excess money growth on foreign stock returns seem temporary rather than permanent; positive and significant effects at short lags appear to be offset by negative and significant effects at longer lags. This suggests a kind of neutrality of excess money growth with respect to real stock returns, though these models are reduced forms, and we are reluctant to ascribe structural interpretations to the coefficients.[19] Finally, the results appear to be stronger for narrow money than for broad money. This may indicate that e.g. demand deposits are more readily used to purchase assets than time deposits.

Table 6 presents similar results for real short- and long-term interest rates. First consider the short term interest rate. As with stock returns, there is more evidence of spillovers from Japan and Germany than from the United States, and there is more evidence of an effect in narrow money than in broad money. However, the evidence of spillovers is more limited for real short-term interest rates than for stock returns. There is still less evidence for spillovers to long-term interest rates: only one case, narrow money in Japan, shows a significant coefficient.

To summarize our direct tests, there are some indications of spillovers from excess money growth to real interest rates and stock returns across G-7 countries. The evidence is generally stronger for narrow money than broad money, and stronger for stock prices than for interest rates. The signs of these spillovers (generally negative (where significant) for interest

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[19] The implication that Japanese excess money growth spills over to foreign stock prices is curious, in view of the fact that Japanese purchases of foreign securities tend to be concentrated in bills and bonds rather than stocks. The regressions thus suggest some indirect channel.

rates; positive for stock returns) seem consistent with a 'push' channel for spillovers, rather than the 'pull' channel, as discussed in Section IV.

These tests consider the direct effect of domestic money on foreign asset prices. There might be indirect effects as well. Domestic money might affect foreign asset prices through its effect on foreign money, e.g. through 'quantitative spillovers.' For example, U.S. money may spill over to foreign money, which then inflates foreign asset prices. This could explain why our results imply that U.S. money has a limited effect on foreign asset prices. A regression of foreign money on U.S. money would pick up such quantitative spillovers.

To test this idea, we ran Granger causality tests between domestic and rest-of-the-world money. For example, to examine whether broad money growth in the United States Granger-causes broad money growth in other G-7 countries, we tested the hypothesis that $B(L)=0$ in the following vector autoregression:

$$BMG_{ROW,t} = A(L)BMG_{ROW,t} + B(L)BMG_{US,t} + \varepsilon_t,$$
$$BMG_{US,t} = C(L)BMG_{ROW,t} + D(L)BMG_{US,t} + \xi_t.$$

Such tests measure whether a particular series (in this case, growth in domestic broad money) adds marginal explanatory power to a forecast of another series (in this case, growth in broad money in the ROW) from its own lags. We also ran tests of the hypothesis that foreign money does not Granger-cause domestic money ($C(L)=0$).

The results of these tests are displayed in Table 7. There is strong evidence that U.S. broad money growth leads foreign broad money growth for all three measures of aggregate foreign money, controlling for lagged growth in foreign money. There is also strong evidence that Japanese broad money growth leads foreign money growth, but little evidence that German money growth leads foreign money growth, and no evidence that narrow money growth leads foreign narrow money growth for any of the G-3 countries. This evidence for a 'quantitative channel' is particularly interesting in view of the more limited evidence of money spillovers from the United States than from other countries in the asset-return regressions above. The effects of rapid growth in U.S. money on foreign asset returns may be subsumed in the effects of rapid U.S. money growth on foreign money growth.[20]

Finally, we searched for evidence of spillovers from the volatility of domestic money growth to the volatility of foreign asset returns. We fitted a GARCH(2,2) model to the relevant series using maximum likelihood estimation; parameters were constrained to ensure

[20] These results do not necessarily imply latent econometric problems in the regressions of foreign asset returns on domestic and foreign money; econometric (weak) exogeneity does not imply, and is not implied by, Granger noncausality (Davidson and MacKinnon (1993), p. 630).

positive estimates of volatility. To assess spillovers from the volatility of domestic money growth to volatility of ROW stock returns, we ran regressions similar to those shown in Tables 5 and 6, but using volatilities instead of levels. Tables 8 and 9 show the results. Four features stand out. First, contrary to intuition, the results suggest that the volatility of real short-term interest rates and the volatility of stock returns are negatively related (though these effects are only present for the United States and Germany). Second, the volatility of foreign narrow money growth and the volatility of foreign stock returns are positively correlated. Third, there is some evidence (albeit limited) for the United States and Japan that volatility in money growth spills over to volatility in ROW stock returns. Fourth, there is relatively limited evidence for spillovers of volatility in money growth to foreign real interest rates. Also note the high degree of persistence in the volatility of stock returns and interest rates (as evident in the coefficient on the lagged dependent variable), which confirms that the GARCH methodology is appropriate.

VII. Conclusions

We compiled a variety of evidence on the significance of liquidity (money growth) for asset returns at an international level. We calculated three measures of G-7 money growth and estimated a variety of relationships, from simple correlations to regressions and tests of Granger causality. To summarize our key results, there is evidence that there are important common components to G-7 money growth; that an increase in G-7 excess money growth is consistent with higher G-7 real stock returns and lower G-7 real interest rates; and that an increase in excess money growth in one G-7 country is consistent with higher real stock returns and lower real interest rates in other G-7 countries. We also found evidence that excess money growth in the United States leads (and is led by) excess money growth in Japan, and some evidence (albeit limited) for spillovers from the volatility of money growth to the volatility of real asset returns across countries.

We have also highlighted some measurement issues that may be important for other analyses of liquidity in the international context. Narrow money appears to have a stronger relationship to asset prices than broad money, perhaps indicating that (say) demand deposits are more readily used to purchase assets than time deposits. Also, Divisia and simple-sum measures of liquidity growth generally have a stronger relationship to asset prices than do weighted growth-rate measures.

We have focused on relatively narrow measures of liquidity and simple relationships among the variables of interest in order to keep our results clear. Broader measures of liquidity could include other (non-monetary instruments), including off-balance sheet instruments, to examine these phenomena. Banks—and increasingly, institutional players—can 'create' liquidity by supplying short-term loans and through use of derivatives. The implied positions of the derivative in its underlying instruments could be used as a measure of liquidity in markets where those instruments are traded. Such liquidity is probably highly responsive to market conditions. Also, spillovers in liquidity could easily occur through non-monetary and off-balance-sheet channels. A broader measure of liquidity, one which included off-balance-sheet activities, could yield even stronger results than we find here.

The underlying relationship of domestic liquidity to international financial conditions is undoubtedly complicated, and involves a variety of channels, institutions, and instruments. We believe that our simple analysis sheds some light on this relationship. Tests styled on our Granger-causality tests between domestic and foreign money might be able to build on our analysis. It might also be interesting to experiment with other weighting schemes (such as weights based on market capitalization) for the monetary aggregates. A more sophisticated analysis—including a full exploration of the possible channels that might underly our results (such as off-balance-sheet derivatives transactions and international capital flows)—awaits future research.

Table 1. Basic Characteristics of the G-7 Monetary Aggregates

Panel A: Characteristics of G-7 Monetary Aggregates Series

	Mean	Standard Deviation	First Order Autocorrelation
	(In percent)		
BMG (GDP weights)	2.2	0.9	0.9
BMG (USD simple sum)	2.3	2.4	0.3
BMG (Divisia)	2.3	2.2	0.3
NMG (GDP weights)	1.8	0.8	0.4
NMG (USD simple sum)	2.2	3.0	0.3
NMG (Divisia)	2.0	2.8	0.4
XBMG (GDP weights)	0.2	0.7	0.4
XBMG (USD simple sum)	0.4	2.4	0.2
XBMG (Divisia)	0.4	2.1	0.2
XNMG (GDP weights)	-0.1	0.9	0.4
XNMG (USD simple sum)	0.2	3.0	0.3
XNMG (Divisia)	0.1	2.8	0.3

Panel B: Correlations between G-7 Monetary Aggregates

(In Percent)

	BMG (GDP weights)	BMG (USD simple sum)	BMG (divisia)	NMG (GDP weights)	NMG (USD simple sum)	NMG (divisia)
BMG (GDP weights)	100.0					
BMG (USD simple sum)	38.5	100.0				
BMG (Divisia)	45.5	96.6	100.0			
NMG (GDP weights)	48.9	28.3	29.7	100.0		
NMG (USD simple sum)	17.4	92.6	90.1	39.9	100.0	
NMG (Divisia)	23.0	89.6	92.6	40.1	97.3	100.0

	XBMG (GDP weights)	XBMG (USD simple sum)	XBMG (divisia)	XNMG (GDP weights)	XNMG (USD simple sum)	XNMG (divisia)
XBMG (GDP weights)	100.0%					
XBMG (USD simple sum)	32.3	100.0				
XBMG (Divisia)	40.6	96.4	100.0			
XNMG (GDP weights)	41.2	23.3	25.6	100.0		
XNMG (USD simple sum)	18.9	92.6	91.3	42.4	100.0	
XNMG (Divisia)	23.6	89.6	93.4	41.2	97.4	100.0

Note: Table 1 gives the mean, standard deviation, first order autocorrelation of the various measures of G-7 broad money growth, narrow money growth, excess broad money growth, excess narrow money growth per quarter (abbreviated by BMG, NMG, XBMG and XNMG respectively) and the correlations between them. Excess money growth is defined as money growth minus G-7 GDP growth. Three methods of aggregation are employed: GDP weights, U.S. dollar simple sum, and Divisia index. See section V.A. for details. The sample period for narrow money data is 1969Q1 – 1998Q4 and the sample period for broad money data is 1970Q2 – 1998Q4.

Table 2. Measures of Common Components of Money

(In Percent)

Panel A: Correlation of Domestic Money Growth with Index of Money Growth Rate for Other G-7 Countries

	United States	Japan	Germany
		Broad Money Growth	
BMG (GDP weights)	66.3	35.7	81.4
BMG (USD simple sum)	16.5	27.5	42.7
BMG (Divisia index)	17.9	27.0	48.9
		Narrow Money Growth	
NMG (GDP weights)	9.8	33.9	60.4
NMG (USD simple sum)	21.6	23.7	20.8
NMG (Divisia index)	17.0	21.2	21.3

Panel B: Principal Components Analysis of G7 Broad Monetary Aggregates 1/

	First Principal Component			
	Unweighted BMG series	BMG (GDP weighted)	BMG (USD simple sum)	BMG (Divisia index)
Explanatory power 2/	42%	73%	96%	65%
Breakdown				
United States	0.22	0.94	0.61	0.01
United Kingdom	0.43	0.11	0.11	0.13
France	0.35	0.20	0.07	0.16
Germany	0.15	0.06	0.11	0.19
Italy	0.64	0.14	0.06	0.93
Canada	0.29	0.07	0.04	0.10
Japan	0.35	0.19	0.76	0.16

Note: Table 2 presents two measures of commonalities. Panel A gives the correlation between narrow and broad money for each of the G-3 countries and the corresponding series for the G-7 excluding the country under examination. For example, the first entry shows that the correlation between U.S. broad money growth and GDP weighted broad money growth of the other G-7 countries is 66.3%. This is done for each of the three methods of aggregation: GDP weights, USD simple sum weights and Divisia index (see section IV.A. for details on the various methods). Panel B gives the explanatory power and breakdown of the first principal component among various groups of variables.

1/ Results for narrow money were generally qualitatively similar, except for the case of GDP weighted money, for which U.S. accounted for a higher fraction (and Japan accounted for a lower fraction) of the joint variability of money.
2/ Fraction of the variability accounted for by the first eigenvalue (e.g. size of the first eigenvalue relative to the sum of all eigenvalues).

Table 3. Correlation of G-7 Excess Money with G-7 Real Asset Returns

(In percentage)

Panel A: Correlations

	Real Long Rate	Real Short Rate	Real Stock Returns
XBMG (WEO weighted)	-0.6	0.0	5.7
XBMG (USD simple sum)	-11.7	-16.7	0.0
XBMG (Divisia index)	-14.9	-19.6	0.3
XNMG (WEO weighted)	-9.2	-20.2	31.1
XNMG (USD simple sum)	-18.0	-24.2	6.7
XNMG (Divisia index)	-18.5	-24.1	5.2

Note: Standard error of each entry is $1/\sqrt{T}$, where T is the number of observations. Here the standard error equals approximately 9.4 percent.

Panel B: Correlations at Business Cycle Frequencies

(In Percentage)

	Real Long Rate at Business Cycle Frequencies	Real Short Rate at Business Cycle Frequencies	Real Stock Returns at Business Cycle Frequencies
XBMG (WEO weighted)	16.6	16.3	-3.6
XBMG (USD simple sum)	-8.8	-21.5	-3.4
XBMG (Divisia index)	-9.8	-19.6	-5.6
XNMG (WEO weighted)	-25.9	-30.6	32.5
XNMG (USD simple sum)	-21.9	-29.7	7.8
XNMG (Divisia index)	-23.9	-28.2	5.6

Note: Standard error of each entry is $1/\sqrt{T}$, where T is the number of observations. Here the standard error equals approximately 10.6 percent.

Table 3 presents two measures of correlation between G-7 excess money with G-7 real asset returns. Panel A gives the correlation between the real long rate, real short rate and real stock returns with various measures of G-7 excess broad and narrow money (abbreviated by XBMG and XNMG respectively). Panel B gives the same correlations, except the real long rate, real short rate and real stock returns are filtered using Baxter-King (1995) bandpass filter, removing the very high and low frequencies in the data and isolating business cycle frequencies.

Table 4. G-7 Money and G-7 Asset Returns

Panel A: Broad Money

		Real Long-term Interest Rate			Real Short-term Interest Rate			Real Stock Returns		
		GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		0.002	0.002	0.003	0.003	**0.004**	**0.004**	0.005	0.006	0.006
		(0.867)	(1.148)	(1.285)	(1.561)	(1.685)	(1.706)	(0.952)	(1.139)	(1.108)
Dependent	lag 1	**0.900**	**0.922**	**0.090**	**0.944**	**0.964**	**0.956**	**0.376**	**0.368**	**0.365**
Variable	*t*	(9.435)	(9.795)	(9.575)	(9.723)	(9.916)	(9.813)	(3.912)	(3.807)	(3.776)
	lag 2	0.075	0.044	0.059	0.004	-0.022	-0.015	-0.134	-0.120	-0.119
	t	(0.775)	(0.466)	(0.062)	(0.044)	(-0.221)	(-0.160)	(-1.415)	(-1.251)	(-1.240)
$XBMG_{G-7}$	lag 0	-0.047	**-0.048**	**-0.047**	0.057	-0.045	-0.044	-0.063	-0.019	-0.028
	t	(-0.576)	(-2.170)	(-1.842)	(0.560)	(-1.622)	(-1.367)	(-0.078)	(-0.085)	(-0.107)
	lag 1	0.031	0.024	0.016	0.022	0.049	0.046	**2.004**	**0.459**	**0.536**
	t	(0.382)	(1.018)	(0.607)	(0.214)	(1.654)	(1.376)	(2.526)	(1.909)	(2.003)
	lag 2	**-0.152**	**-0.053**	**-0.061**	**-0.171**	-0.038	-0.047	-0.817	-0.092	-0.059
	t	(-1.941)	(-2.271)	(-2.367)	(-1.708)	(-1.313)	(-1.421)	(-1.028)	(-0.385)	(-0.221)
	sum	-0.168	-0.076	-0.092	-0.093	-0.034	-0.045	1.124	0.348	0.449
	se	(0.094)	(0.034)	(0.039)	(0.120)	(0.044)	(0.050)	(0.927)	(0.348)	(0.390)
	LR	-6.710	-2.256	-2.388	-1.804	-0.060	-0.755	1.483	0.462	0.596
	se	(8.858)	(2.104)	(1.929)	(2.633)	(0.772)	(0.840)	(1.204)	(0.462)	(0.515)
	p 1/	0.160	**0.035**	**0.047**	0.389	0.171	0.249	**0.082**	0.289	0.242
R^2		91%	92%	92%	90%	90%	90%	17%	15%	15%
DW		1.96	2.00	1.99	1.95	1.95	1.95	1.99	1.97	1.98
# of obs.		112	112	112	110	110	110	112	112	112

Note: Table 4 panel A shows the regression results of the G-7 real long-term interest rate, the G-7 real short term interest rate and G-7 real stock return on itself, and G-7 excess broad money growth ($XBMG_{G-7}$). Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard errors are in parentheses.

1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of $XBMG_{G-7}$ are jointly equal to zero.

Table 4. G-7 Money and G-7 Asset Returns

Panel B: Narrow Money

		Real Long-term Interest Rate			Real Short-term Interest Rate			Real Stock Returns		
		GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		0.002	0.003	0.003	**0.004**	**0.004**	**0.004**	**0.012**	0.007	0.008
		(0.740)	(1.294)	(1.287)	(2.071)	(1.970)	(1.912)	(2.237)	(1.325)	(1.397)
Dependent Variable	lag 1	**0.799**	**0.880**	**0.877**	**0.811**	**0.941**	**0.937**	**0.308**	**0.360**	**0.360**
	t	(7.917)	(9.322)	(9.233)	(7.855)	(9.708)	(9.617)	(3.200)	(3.709)	(3.715)
	lag 2	**0.170**	0.079	0.080	0.112	-0.009	-0.004	**-0.162**	-0.128	-0.125
	t	(1.659)	(0.828)	(0.843)	(1.088)	(-0.089)	(-0.044)	(-1.713)	(-1.318)	(-1.284)
$XBMG_{G\text{-}7}$	lag 0	-0.089	**-0.035**	-0.030	-0.114	**-0.042**	-0.038	**1.524**	0.101	0.065
	t	(-1.324)	(-1.921)	(-1.523)	(-1.377)	(-1.877)	(-1.558)	(2.457)	(0.542)	(0.324)
	lag 1	-0.077	0.011	0.007	-0.040	0.036	0.034	0.618	0.301	0.344
	t	(-1.240)	(0.575)	(0.333)	(-0.527)	(1.497)	(1.313)	(0.975)	(1.501)	(1.633)
	lag 2	-0.081	**-0.043**	**-0.045**	**-0.191**	**-0.048**	**-0.050**	0.220	-0.033	-0.037
	t	(-1.304)	(-2.313)	(-2.255)	(-2.504)	(-2.077)	(-2.044)	(0.342)	(-0.173)	(-0.186)
	sum	-0.248	-0.067	-0.067	-0.346	-0.054	-0.054	2.361	0.369	0.371
	se	(0.076)	(0.025)	(0.027)	(0.0932)	(0.0318)	(0.034)	(0.745)	(0.253)	(0.267)
	LR	-7.971	-1.612	-1.580	-4.442	-0.7955	-0.805	2.764	0.480	0.486
	se	(7.742)	(1.199)	(1.151)	(1.963)	(0.5154)	(0.541)	(0.821)	(0.328)	(0.347)
	p 1/	**0.016**	**0.030**	**0.056**	**0.002**	**0.059**	0.102	**0.008**	0.308	0.297
R^2		92%	92%	92%	91%	90%	90%	21%	15%	15%
DW		2.01	1.99	1.97	1.97	1.95	1.94	1.96	1.98	1.98
# of obs.		112	112	112	110	110	110	112	112	112

Note: Table 4 panel A shows the regression results of the G-7 real long-term interest rate, the G-7 real short term interest rate and G-7 real stock return on itself, and G-7 excess broad money growth ($XBMG_{G\text{-}7}$). Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard errors are in parentheses.

1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of $XBMG_{G\text{-}7}$ are jointly equal to zero.

Table 5. Money Spillovers and Stock Returns

Panel A: Broad Money

		G7 Real Stock Return excluding United States			G7 Real Stock Return excluding Japan			G7 Real Stock Return excluding Germany		
		GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		**-0.042**	-0.019	-0.020	0.006	-0.020	-0.196	-0.004	-0.011	-0.014
	t	(-1.735)	(-0.788)	(-0.835)	(-0.274)	(-0.915)	(-0.895)	(-0.205)	(-0.527)	(-0.677)
Dependent variable	lag 1	**0.304**	**0.308**	**0.314**	**0.287**	**0.313**	**0.311**	**0.252**	**0.279**	**0.276**
	t	(3.461)	(3.347)	(3.436)	(3.212)	(3.499)	(3.479)	(2.854)	(3.023)	(3.013)
$XBMG_{ROW}$	lag 1	**1.983**	**0.303**	**0.341**	0.440	**0.788**	**0.714**	**1.708**	**0.451**	**0.602**
	t	(2.985)	(2.229)	(2.328)	(0.622)	(2.164)	(2.191)	(2.613)	(1.762)	(2.070)
$XNMG_{ROW}$	lag 0	**1.133**	-0.030	-0.073	**0.976**	-0.283	-0.272	**1.370**	0.101	0.078
	t	(2.165)	(-0.228)	(-0.531)	(1.699)	(-1.308)	(-1.335)	(2.501)	(0.491)	(0.354)
RLR_{ROW}	lag 1	**1.027**	**1.131**	**1.154**	**1.030**	**1.430**	**1.421**	0.644	**0.925**	**0.973**
	t	(2.060)	(2.187)	(2.237)	(1.987)	(2.905)	(2.890)	(1.282)	(1.778)	(1.894)
RSR_{ROW}	lag 0	-0.498	**-0.913**	**-0.914**	**-1.026**	**-1.325**	**-1.323**	-0.548	-0.807	-0.815
	t	(-1.185)	(-2.240)	(-2.252)	(-2.180)	(-2.958)	(-2.962)	(-1.139)	(-1.590)	(-1.629)
$XBMG_X$	lag 0	-0.497	-0.141	-0.105	0.231	0.398	0.398	0.009	0.060	0.073
	t	(-0.892)	(-0.245)	(-0.182)	(0.519)	(0.897)	(0.898)	(0.029)	(0.179)	(0.219)
	lag 1	-0.170	0.042	0.011	**1.302**	**1.219**	**1.235**	-0.344	-0.310	-0.336
	t	(-0.306)	(0.073)	(0.019)	(2.798)	(2.668)	(2.712)	(-1.070)	(-0.911)	(-0.989)
	lag 2	-0.276	-0.166	-0.218	**-1.061**	**-1.265**	**-1.268**	0.052	0.090	0.066
	t	(-0.507)	(-0.291)	(-0.384)	(-2.211)	(-2.622)	(-2.633)	(0.162)	(0.267)	(0.198)
	lag 3	0.840	**1.167**	**1.169**	**-0.908**	**-1.011**	**-0.997**	-0.474	-0.404	-0.383
	t	(1.514)	(1.994)	(2.004)	(-2.007)	(-2.247)	(-2.221)	(-1.543)	(-1.257)	(-1.198)
	lag 4	-0.430	-0.444	-0.448	**0.977**	**0.974**	**0.986**	0.134	0.084	0.117
	t	(-0.787)	(-0.780)	(-0.788)	(2.152)	(2.206)	(2.233)	(0.435)	(0.260)	(0.365)
	LR	-0.765	0.661	0.595	0.759	0.458	0.541	-0.833	-0.665	-0.640
	se	(1.147)	(1.116)	(1.128)	(0.932)	(0.941)	(0.933)	(0.776)	(0.852)	(0.841)
	p 1/	0.612	0.537	0.538	**0.005**	**0.002**	**0.002**	0.642	0.819	0.812
R-square		30%	25%	25%	31%	32%	32%	27%	20%	20%
DW		1.91	2.00	2.00	1.93	1.97	1.97	1.88	1.97	1.98
# of observations		112	112	112	112	112	112	112	112	112

Note: Table 5 panel A shows the regression results of G-7 excluding country *X* real stock return on itself, G-7 excluding country *X* excess broad and narrow money growth ($XBMG_{ROW}$ and $XNMG_{ROW}$), G-7 excluding country *X* real long and short term interest rates (RLR_{ROW} and RSR_{ROW}) and broad money of the country X ($XBMG_X$). Country *X* is either the U.S., Japan or Germany. Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard errors are in parentheses.
1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of $XBMG_X$ are jointly equal to zero.

Table 5. Money Spillovers and Stock Returns

Panel B: Narrow Money

		G-7 Real Stock Return excluding United States			G-7 Real Stock Return excluding Japan			G-7 Real Stock Return excluding Germany		
		GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		0.032	-0.007	0.007	-0.011	-0.024	-0.024	-0.023	-0.025	-0.028
	t	(-1.163)	(-0.268)	(-0.250)	(-0.419)	(-0.933)	(-0.936)	(-1.157)	(-1.204)	(-1.348)
Dependent variable	lag 1	**0.299**	**0.301**	**0.302**	**0.255**	**0.270**	**0.268**	**0.235**	**0.276**	**0.272**
	t	(3.384)	(3.241)	(3.286)	(2.819)	(2.972)	(2.954)	(2.964)	(3.017)	(2.987)
$XBMG_{ROW}$	lag 1	**1.754**	**0.240**	**0.270**	0.819	**0.641**	**0.588**	**1.762**	0.376	**0.515**
	t	(2.797)	(1.752)	(1.839)	(1.138)	(1.744)	(1.776)	(2.794)	(1.523)	(1.835)
$XNMG_{ROW}$	lag 0	**1.031**	-0.034	-0.076	0.816	-0.018	-0.168	**1.258**	0.099	0.099
	t	(1.902)	(-0.248)	(-0.537)	(1.384)	(-0.790)	(-0.794)	(2.395)	(0.504)	(0.469)
RLR_{ROW}	lag 1	**0.982**	**1.159**	**1.169**	**1.176**	**1.458**	**1.455**	0.561	**0.857**	**0.887**
	t	(1.959)	(2.231)	(2.252)	(2.226)	(2.877)	(2.876)	(1.164)	(1.719)	(1.796)
RSR_{ROW}	lag 0	-0.578	**-1.082**	**-1.090**	**-1.102**	**-1.277**	**-1.271**	-0.282	-0.599	-0.586
	t	(-1.298)	(-2.550)	(-2.586)	(-2.115)	(-2.561)	(-2.559)	(-0.587)	(-1.192)	(-1.177)
$XNMG_X$	lag 0	0.222	0.393	0.412	**0.570**	**0.613**	0.619	0.391	0.382	0.371
	t	(0.481)	(0.812)	(0.858)	(2.344)	(2.553)	(2.580)	(1.530)	(1.418)	(1.387)
	lag 1	-0.100	0.011	0.031	-0.146	-0.122	-0.116	-0.237	-0.314	-0.314
	t	(-0.205)	(0.021)	(0.062)	(-0.584)	(-0.497)	(-0.472)	(-0.879)	(-1.108)	(-1.112)
	lag 2	0.055	0.039	0.032	**-0.630**	**-0.602**	**-0.600**	**0.770**	**0.745**	**0.733**
	t	(0.118)	(0.081)	(0.066)	(-2.466)	(-2.365)	(-2.361)	(2.870)	(2.610)	(2.577)
	lag 3	0.600	0.502	0.501	0.137	0.133	0.138	0.051	-0.058	-0.043
	t	(1.246)	(1.004)	(1.005)	(0.551)	(0.532)	(0.554)	(0.192)	(-0.209)	(-0.155)
	lag 4	-0.396	-0.493	-0.463	0.350	0.299	0.302	0.397	0.327	0.354
	t	(-0.887)	(-1.050)	(-0.993)	(1.403)	(1.201)	(1.214)	(1.585)	(1.243)	(1.343)
	LR	0.544	0.644	0.737	0.378	0.441	0.469	1.795	1.494	1.512
	se	(0.737)	(0.829)	(0.810)	(0.721)	(0.699)	(0.694)	(0.737)	(0.815)	(0.806)
	p 1/	0.710	0.664	0.648	**0.082**	**0.082**	**0.079**	**0.051**	0.126	0.121
R-square		30%	24%	24%	26%	26%	26%	32%	25%	25%
DW		1.89	2.02	2.01	1.95	1.97	1.97	1.89	1.96	1.97
# of observations		112	112	112	112	112	112	112	112	112

Note:Table 5 panel B shows the regression results of G-7 excluding country *X* real stock return on itself, G-7 excluding country *X* excess broad and narrow money growth ($XBMG_{ROW}$ and $XNMG_{ROW}$), G-7 excluding country *X* real long and short term interest rates (RLR_{ROW} and RSR_{ROW}) and broad money of the country X ($XNMG_X$). Country *X* is either the U.S., Japan or Germany. Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard errors are in parentheses.
1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of $XNMG_X$ are jointly equal to zero.

Table 6. Money Spillovers and Interest Rates

Panel A: Broad Money

		$RSR_{G\text{-}7\ ex\ U.S.}$			$RSR_{G\text{-}7\ ex\ Japan}$			$RSR_{G\text{-}7\ ex\ Germany}$		
		GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		**0.011**	**0.009**	**0.005**	0.003	0.001	0.003	0.003	0.001	0.003
	t	(4.026)	(2.771)	(1.908)	(1.128)	(0.471)	(1.537)	(1.588)	(0.701)	(1.563)
Dependent	lag 1	**0.817**	**0.868**	**0.916**	**0.950**	**0.981**	**0.940**	**0.929**	**0.967**	0.934
Variable	*t*	(19.40)	(18.88)	(22.864)	(29.86)	(37.66)	(28.511)	(28.52)	(33.76)	(27.998)
$XBMG_{ROW}$	lag 0	**0.220**	0.035	-0.017	0.196	-0.038	0.144	-0.018	-0.121	-0.050
	t	(2.072)	(0.353)	(-0.210)	(1.433)	(-0.037)	(1.107)	(-0.016)	(-1.238)	(-0.512)
	lag 1	-0.012	-0.008	0.120	-0.187	-0.013	-0.068	0.066	0.082	0.096
	t	(-0.108)	(-0.076)	(1.478)	(-1.511)	(-0.137)	(-0.529)	(0.573)	(0.882)	(0.989)
	LR	1.135	0.206	1.215	0.184	-2.642	1.271	0.681	-1.220	0.708
	se	(0.744)	(0.942)	(1.184)	(2.402)	(5.937)	(1.873)	(1.601)	(3.095)	(1.640)
	p 1/	0.118	0.940	0.339	0.257	0.847	0.526	0.835	0.451	0.610
$XNMG_{ROW}$	lag 0	**-0.279**	-0.108	-0.009	**-0.314**	-0.098	-0.125	-0.098	-0.034	-0.015
	t	(-3.467)	(-1.486)	(-0.111)	(-2.919)	(-1.190)	(-1.432)	(-1.173)	(-0.480)	(-0.208)
	lag 1	**-0.257**	**-0.161**	-0.121	0.132	-0.071	0.061	-0.090	**-0.120**	-0.044
	t	(-3.080)	(-2.184)	(-1.575)	(1.189)	(-0.846)	(0.696)	(-1.052)	(-1.676)	(-0.583)
	LR	-2.921	-2.025	-1.542	-3.666	-8.820	-1.077	-2.654	-4.715	-0.895
	se	(0.570)	(0.713)	(1.125)	(2.751)	(12.650)	(1.125)	(1.564)	(4.621)	(1.175)
	p 1/	**0.000**	**0.018**	0.275	**0.007**	**0.025**	0.315	0.104	**0.090**	0.721
$XBMG_{X}$	lag 0	0.039	-0.018	0.045	-0.014	0.017	-0.002	0.052	0.025	0.062
	t	(0.494)	(-0.250)	(0.527)	(-0.244)	(0.393)	(-0.039)	(1.228)	(0.719)	(1.469)
	lag 1	0.070	0.070	0.045	0.005	0.015	-0.011	-0.022	-0.008	-0.017
	t	(0.864)	(0.963)	(0.506)	(0.085)	(0.351)	(-0.184)	(-0.515)	(-0.241)	(-0.389)
	lag 2	-0.097	-0.105	-0.108	-0.054	-0.031	-0.052	0.041	0.025	0.024
	t	(-1.273)	(-1.472)	(-1.278)	(-0.927)	(-0.708)	(-0.850)	(0.974)	(0.728)	(0.564)
	lag 3	-0.121	-0.014	-0.118	0.047	-0.007	0.031	-0.027	0.005	-0.033
	t	(-1.541)	(-0.019)	(-1.364)	(0.827)	(-0.169)	(0.527)	(-0.642)	(0.137)	(-0.807)
	lag 4	0.093	0.080	0.110	0.042	-0.016	0.065	**0.076**	0.039	0.083
	t	(1.216)	(1.143)	(1.301)	(0.736)	(-0.374)	(1.118)	(1.909)	(1.158)	(2.109)
	LR	-0.090	0.099	-0.308	0.519	-1.142	0.509	1.701	2.625	1.804
	se	(0.623)	(0.804)	(1.358)	(1.891)	(3.688)	(1.539)	(1.168)	(2.897)	(1.287)
	p 1/	0.279	0.557	0.350	0.838	0.960	0.826	0.298	0.726	0.209
R-square		89%	85%	87%	91%	93%	90%	90%	92%	90%
DW		2.54	2.65	2.26	2.07	1.95	1.79	2.31	2.32	2.14
# of obs.		111	112	112	111	112	112	111	112	112

		$RLR_{G\text{-}7\ ex\ U.S.}$			$RLR_{G\text{-}7\ ex\ Japan}$			$RLR_{G\text{-}7\ ex\ Germany}$		
		GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		**0.009**	**0.007**	**0.006**	0.001	0.003	0.002	0.001	0.002	0.002
	t	(2.771)	(2.092)	(1.798)	(0.471)	(1.176)	(1.155)	(0.701)	(1.074)	(1.017)
Dependent	lag 1	**0.868**	**0.901**	**0.915**	**0.981**	0.965	0.966	**0.967**	**0.959**	**0.961**
Variable	*t*	(18.88)	(20.06)	(20.725)	(37.66)	(35.34)	(35.324)	(33.76)	(33.07)	(32.983)
$XBMG_{ROW}$	lag 0	0.035	-0.025	-0.067	-0.038	0.007	0.009	-0.121	-0.066	-0.108
	t	(0.353)	(-0.424)	(-0.946)	(-0.037)	(0.068)	(0.092)	(-1.238)	(-0.978)	(-1.321)
	lag 1	-0.008	**0.129**	**0.133**	-0.013	0.022	0.030	0.082	0.109	0.099
	t	(-0.076)	(2.222)	(1.918)	(-0.137)	(0.227)	(0.319)	(0.882)	(1.644)	(1.218)
	LR	0.206	1.052	0.776	-2.642	0.841	1.153	-1.220	1.047	-0.230
	se	(0.942)	(0.759)	(1.008)	(5.937)	(2.479)	(2.604)	(3.095)	(2.067)	(2.298)
	p 1/	0.940	**0.086**	0.136	0.847	0.930	0.878	0.451	0.213	0.321
$XNMG_{ROW}$	lag 0	-0.108	-0.002	0.045	-0.098	-0.028	-0.024	-0.034	0.006	0.040
	t	(-1.486)	(-0.038)	(0.666)	(-1.190)	(-0.414)	(-0.360)	(-0.480)	(0.100)	(0.631)
	lag 1	**-0.161**	**-0.133**	**-0.138**	-0.071	-0.027	-0.030	**-0.120**	-0.083	-0.079
	t	(-2.184)	(-2.322)	(-2.100)	(-0.846)	(-0.404)	(-0.046)	(-1.676)	(-1.544)	(-1.268)
	LR	-2.025	-1.363	-1.103	-8.820	-1.570	1.584	-4.715	-1.890	-1.026
	se	(0.713)	(0.772)	(0.956)	(12.650)	(1.761)	(1.850)	(4.621)	(1.844)	(1.735)
	p 1/	**0.018**	**0.072**	0.111	**0.025**	0.466	0.516	**0.090**	0.287	0.451
$XBMG_{X}$	lag 0	-0.018	-0.024	-0.030	0.017	0.004	0.004	0.025	0.028	0.027
	t	(-0.250)	(-0.033)	(-0.405)	(0.393)	(0.095)	(0.091)	(0.719)	(0.802)	(0.765)
	lag 1	0.070	0.046	0.048	0.015	0.012	0.011	-0.008	-0.001	0.001
	t	(0.963)	(0.624)	(0.648)	(0.351)	(0.278)	(0.250)	(-0.241)	(-0.023)	(0.018)
	lag 2	-0.105	-0.115	-0.115	-0.031	-0.025	-0.027	0.025	0.016	0.016
	t	(-1.472)	(-1.586)	(-1.581)	(-0.708)	(-0.542)	(-0.587)	(0.728)	(0.458)	(0.463)
	lag 3	-0.014	-0.014	-0.016	-0.007	-0.013	-0.014	0.005	0.000	-0.001
	t	(-0.019)	(-0.193)	(-0.214)	(-0.169)	(-0.284)	(-0.304)	(0.137)	(-0.007)	(-0.042)
	lag 4	0.080	0.076	0.084	-0.016	-0.014	-0.014	0.039	0.048	0.048
	t	(1.143)	(1.062)	(1.164)	(-0.374)	(-0.319)	(-0.316)	(1.158)	(1.453)	(1.430)
	LR	0.099	-0.318	-0.343	-1.142	-1.570	-1.137	2.625	2.196	2.319
	se	(0.804)	(0.993)	(1.174)	(3.688)	(1.761)	(2.174)	(2.897)	(2.090)	(2.273)
	p 1/	0.557	0.575	0.537	0.960	0.466	0.977	0.726	0.626	0.644
R-square		85%	85%	84%	93%	93%	93%	92%	92%	92%
DW		2.65	2.57	2.56	1.95	1.77	1.75	2.32	2.17	2%
# of obs.		112	112	112	112	112	112	112	112	112

Note: Table 6 Panel A shows the regression results of G-7 excluding country *X* real long and short term interest rates on itself, G-7 excluding country *X* excess broad and narrow money growth ($XBMG_{ROW}$ and $XNMG_{ROW}$), and broad money growth of country *X* ($XBMG_{X}$). Country *X* is either the U.S., Japan or Germany. Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard errors are in parentheses.

1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of the variable under consideration are jointly equal to zero.

Table 6. Money Spillovers and Interest Rates

Panel B: Broad Money

		$RSR_{G\text{-}7\ ex\ U.S.}$			$RSR_{G\text{-}7\ ex\ Japan}$			$RSR_{G\text{-}7\ ex\ Germany}$			$RLR_{G\text{-}7\ ex\ U.S.}$			$RLR_{G\text{-}7\ ex\ Japan}$			$RLR_{G\text{-}7\ ex\ Germany}$		
		GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		**0.013**	**0.010**	0.004	**0.006**	0.003	**0.001**	**0.005**	0.002	**0.005**	**0.010**	**0.008**	**0.006**	0.003	**0.005**	**0.005**	0.002	0.003	0.002
	t	(3.695)	(2.716)	(1.202)	(2.346)	(1.366)	(2.750)	(2.012)	(0.771)	(2.024)	(2.716)	(2.088)	(1.690)	(1.366)	(2.139)	(2.147)	(0.771)	(1.114)	(1.074)
Dependent	lag 1	**0.794**	**0.857**	**0.927**	**0.901**	**0.955**	**0.892**	**0.922**	**0.969**	**0.924**	**0.857**	**0.889**	**0.909**	**0.955**	0.936	**0.936**	**0.969**	**0.960**	**0.963**
Variable	*t*	(15.79)	(17.21)	(19.472)	(23.85)	(33.08)	(23.463)	(26.47)	(33.10)	(25.956)	(17.21)	(17.89)	(18.617)	(33.08)	(32.48)	(32.324)	(33.10)	(32.31)	(32.228)
$XBMG_{ROW}$	lag 0	**0.209**	0.034	-0.009	**0.239**	-0.011	0.155	-0.005	-0.125	0.004	0.034	-0.020	-0.062	-0.011	0.029	0.029	-0.125	-0.052	-0.096
	t	(2.031)	(0.357)	(-0.111)	(1.909)	(-0.116)	(1.229)	(-0.047)	(-1.311)	(0.038)	(0.357)	(-0.344)	(-0.869)	(-0.116)	(0.029)	(0.302)	(-1.311)	(-0.774)	(-1.164)
	lag 1	0.006	0.017	0.124	-0.096	0.001	0.033	0.037	0.080	0.061	0.017	**0.139**	**0.139**	0.001	0.039	0.047	0.080	**0.114**	0.099
	t	(0.058)	(0.176)	(1.510)	(-0.822)	(0.007)	(0.270)	(0.322)	(0.865)	(0.632)	(0.176)	(2.368)	(1.983)	(0.007)	(0.409)	(0.508)	(0.865)	(1.694)	(1.204)
	LR	1.046	0.358	1.565	1.456	-0.234	1.742	0.399	-1.493	0.863	0.358	1.062	0.851	-0.234	1.072	1.181	-1.493	1.548	0.085
	se	(0.622)	(0.805)	(1.447)	(1.070)	(1.829)	(0.993)	(1.436)	(3.369)	(1.443)	(0.805)	(0.687)	(0.960)	(1.829)	(1.225)	(1.231)	(3.369)	(2.263)	(2.409)
	p 1/	0.112	0.903	0.322	0.159	0.990	0.157	0.940	0.416	0.778	0.903	**0.064**	0.127	0.990	0.645	0.586	0.416	0.222	0.374
$XNMG_{ROW}$	lag 0	**-0.302**	-0.117	-0.015	**-0.325**	-0.093	-0.114	-0.110	-0.034	-0.046	-0.117	-0.010	0.038	-0.093	-0.032	-0.028	-0.034	0.001	0.038
	t	(-3.590)	(-1.589)	(-0.189)	(-0.323)	(-1.196)	(-1.326)	(-1.311)	(-0.484)	(-0.609)	(-1.589)	(-0.163)	(0.561)	(-1.196)	(-0.478)	(-0.430)	(-0.484)	(0.018)	(0.593)
	lag 1	**-0.269**	**-0.172**	-0.112	0.115	-0.063	-0.005	-0.042	-0.114	-0.009	**-0.172**	**-0.140**	**-0.140**	-0.063	-0.038	-0.043	-0.114	-0.087	-0.081
	t	(-3.104)	(-2.295)	(-1.426)	(1.095)	(-0.776)	(-0.061)	(-0.486)	(-1.574)	(-0.122)	-2.295	(-2.404)	(-2.089)	(-0.776)	(-0.582)	(-0.670)	(-1.574)	(-1.580)	(-1.261)
	LR	-2.771	-2.017	-1.741	-2.118	-3.445	-1.099	-1.939	-4.846	-0.724	-2.017	-1.341	-1.123	-3.445	-1.090	-1.102	-4.846	-2.175	-1.160
	se	(0.521)	(0.677)	(1.361)	(1.084)	(2.666)	(0.591)	(1.340)	(5.225)	(1.013)	(0.677)	(0.694)	(0.912)	(2.666)	(0.776)	(0.800)	(5.225)	(2.089)	(1.878)
	p 1/	**0.000**	**0.013**	0.341	**0.002**	**0.033**	0.122	0.206	0.119	0.739	**0.013**	**0.059**	0.115	**0.033**	0.254	0.284	0.119	0.259	0.454
$XNMG_X$	lag 0	0.038	-0.010	0.006	0.018	0.003	0.014	-0.032	0.017	-0.038	-0.010	0.004	-0.004	0.003	-0.007	-0.006	0.017	0.018	0.016
	t	(0.561)	(-0.176)	(0.078)	(0.630)	(0.147)	(0.470)	(-0.916)	(0.0591)	(-1.078)	(-0.176)	(0.061)	(-0.061)	(0.147)	(-0.301)	(-0.283)	(0.0591)	(0.626)	(0.535)
	lag 1	0.085	0.055	0.060	-0.018	-0.017	-0.023	**-0.060**	-0.045	-0.057	0.055	0.053	0.048	-0.017	-0.027	-0.027	-0.045	-0.040	-0.040
	t	(1.211)	(0.873)	(0.779)	(-0.630)	(-0.795)	(-0.795)	(-1.670)	(-1.507)	(-1.566)	(0.873)	(0.828)	(0.740)	(-0.795)	(-1.244)	(-1.248)	(-1.507)	(-1.370)	(-1.319)
	lag 2	-0.051	-0.055	-0.087	**-0.085**	**-0.042**	**-0.085**	0.014	0.023	0.001	-0.055	-0.055	-0.058	**-0.042**	**-0.044**	**-0.045**	0.023	0.018	0.017
	t	(-0.77)	(-0.906)	(-1.197)	(-2.904)	(-1.891)	(-2.756)	(0.374)	(0.748)	(0.040)	(-0.906)	(-0.886)	(-0.929)	(-1.891)	(-1.894)	(-1.937)	(0.748)	(0.599)	(0.549)
	lag 3	-0.086	-0.016	-0.089	-0.040	-0.032	-0.044	-0.052	-0.011	**-0.061**	-0.016	-0.014	-0.013	-0.032	-0.033	-0.034	-0.011	-0.015	-0.016
	t	(-1.271)	(-0.258)	(-1.202)	(-1.392)	(-1.467)	(-1.454)	(-1.446)	(-0.378)	(-1.691)	(-0.258)	(-0.216)	(-0.195)	(-1.467)	(-1.472)	(-1.508)	(-0.378)	(-0.510)	(-0.560)
	lag 4	0.055	0.067	0.047	-0.007	0.003	-0.008	0.024	0.003	0.034	0.067	0.060	0.056	0.003	0.002	0.001	0.003	0.006	0.006
	t	(0.870)	(1.158)	(0.679)	(-0.254)	(0.149)	(-0.256)	(0.723)	(0.108)	(1.000)	(1.158)	(1.002)	(0.933)	(0.149)	(0.068)	(0.054)	(0.108)	(0.200)	(0.193)
	LR	0.195	0.284	-0.868	-1.329	-1.859	-1.344	-1.349	-0.409	-1.589	0.284	0.429	0.327	-1.859	-1.697	-1.711	-0.409	-0.304	-0.486
	se	(0.351)	(0.439)	(1.531)	(0.520)	(1.121)	(0.505)	(0.905)	(1.872)	(0.970)	(0.439)	(0.604)	(0.742)	(1.121)	(0.794)	(0.786)	(1.872)	(1.438)	(1.544)
	p 1/	0.435	0.678	0.491	**0.063**	0.246	**0.067**	0.321	0.787	0.212	0.678	0.750	0.805	0.246	0.125	0.110	0.787	0.847	0.853
R-square		89%	85%	87%	91%	94%	91%	90%	92%	90%	85%	84%	85%	94%	94%	93%	92%	92%	92%
DW		2.50	2.63	2.28	2.02	1.96	1.75	2.36	2.29	2.23	2.63	2.53	2.52	1.96	1.83	1.82	2.29	2.15	2.13
# of obs.		111	112	112	111	112	112	111	112	112	112	112	112	112	112	112	112	112	112

Note: Table 6 Panel B shows the regression results of G-7 excluding country *X* long and short term interest rates on itself, G-7 excluding country *X* excess broad and narrow money growth ($XBMG_{ROW}$ and $XNMG_{ROW}$) and narrow money growth of country *X* ($XNMG_X$). Country *X* is either the U.S., Japan or Germany. Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard rrors are in parentheses.

1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of the variable under consideration are jointly equal to zero.

Table 7: Granger Causality between Domestic and Rest-of-the-World Money for the G-3 Countries

	United States		Japan		Germany	
	Broad	Narrow	Broad	Narrow	Broad	Narrow
Domestic Causes Foreign						
GDP Weighted	**0.0151**	0.4507	0.2331	0.1010	**0.0198**	0.8132
USD Simple Sum	**0.0090**	0.3523	**0.0010**	0.3716	0.9940	0.5168
Divisia Index	**0.0068**	0.6300	**0.0011**	0.3159	0.9994	0.5401
Foreign Causes Domestic						
GDP Weighted	0.6048	0.3417	0.1082	0.2089	0.1341	0.4838
USD Simple Sum	0.5311	0.6300	**0.0200**	0.8048	0.4030	0.6965
Divisia Index	0.6513	0.6070	**0.0318**	0.8373	0.3820	0.3910

Note: Table 7 reports *p*-values for the hypothesis of non-causality in the Granger sense between domestic and GDP-weighted rest-of-the world (ROW) money for the G-3 countries. The following vector auto-regression is used to examine Granger causality between e.g. broad money growth in the U.S. ($BMG_{US,t}$) and broad money growth in the remaining G-7 countries ($BMG_{ROW,t}$) :

$$BMG_{ROW,t} = A(L)BMG_{ROW,t} + B(L)BMG_{US,t} + \varepsilon_t,$$
$$BMG_{US,t} = C(L)BMG_{ROW,t} + D(L)BMG_{US,t} + \xi_t,$$

where $A(L)$, $B(L)$, $C(L)$ and $D(L)$ are lag polynomials of fourth order. U.S. broad money growth does not Granger cause broad money growth in the remaining G-7 countries, if and only if we cannot reject the hypothesis that $B(L)=0$. For example, the *p*-value that U.S. broad money does not Granger-cause rest of the world GDP-weighted broad money growth is 0.0151. Bold figures indicate significance at the 10 percent level.

Table 8. Volatility Spillovers: Money and Stock Returns

Panel A: Broad Money

		Volatility of G-7 Real Stock Return excluding United States			Volatility of G-7 Real Stock Return excluding Japan			Volatility of G-7 Real Stock Return excluding Germany		
		GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		0.006	0.000	0.001	**0.004**	**0.002**	**0.002**	-0.001	0.001	0.002
	T	(0.396)	(-0.173)	(0.616)	(2.140)	(2.347)	(2.410)	(-0.565)	(0.866)	(1.527)
Dependent variable	Lag 1	**0.471**	**0.528**	**0.513**	0.061	0.061	0.065	**0.381**	**0.416**	**0.404**
	T	(5.457)	(6.237)	(6.017)	(0.635)	(0.623)	(0.666)	(4.399)	(4.700)	(4.556)
$VXBMG_{ROW}$	Lag 1	**17.287**	0.348	0.614	**-49.749**	-2.958	-1.840	3.174	-2.041	0.030
	T	(2.494)	(0.614)	(1.185)	(-1.817)	(-1.276)	(-1.301)	(0.377)	(-0.632)	(0.009)
$VXNMG_{ROW}$	Lag 0	6.700	**0.924**	0.417	11.320	**1.561**	**1.257**	**28.156**	2.415	1.335
	T	(0.750)	(1.726)	(1.122)	(1.308)	(1.889)	(1.796)	(2.868)	(1.089)	(1.254)
$VRLR_{ROW}$	Lag 1	1.001	0.114	0.000	**1.051**	0.845	0.844	0.505	0.399	0.420
	T	(1.101)	(0.130)	(0.000)	(1.812)	(1.475)	(1.473)	(1.144)	(0.881)	(0.930)
$VRSR_{ROW}$	Lag 0	-0.603	-0.127	-0.093	**-1.120**	**-1.345**	**-1.330**	**-1.101**	**-0.918**	**-1.019**
	T	(-0.819)	(-0.181)	(-0.132)	(-1.813)	(-2.050)	(-2.048)	(-2.189)	(-1.782)	(-1.964)
$VXBMG_X$	Lag 0	-2.862	-1.646	-2.322	1.451	-0.235	-0.292	1.127	0.982	0.925
	T	(-0.655)	(-0.371)	(-0.525)	(0.388)	(-0.064)	(-0.080)	(0.848)	(0.714)	(0.673)
	Lag 1	0.510	-1.193	-0.634	6.368	6.439	6.464	0.088	-0.511	-0.592
	T	(0.098)	(-0.225)	(-0.120)	(1.301)	(1.308)	(1.312)	(0.059)	(-0.332)	(-0.387)
	Lag 2	-0.053	1.081	0.401	0.896	0.219	0.189	-0.118	0.025	-0.169
	T	(-0.010)	(0.199)	(0.074)	(0.183)	(0.045)	(0.039)	(-0.080)	(0.015)	(-0.105)
	Lag 3	-2.763	-2.093	-2.119	**8.228**	**9.714**	**9.732**	0.930	1.173	1.060
	T	(-0.533)	(-0.397)	(-0.403)	(1.666)	(1.974)	(1.974)	(0.633)	(0.771)	(0.694)
	Lag 4	0.320	1.331	1.355	-3.786	-5.378	-5.559	-1.517	-1.715	-1.891
	T	(0.074)	(0.305)	(0.310)	(-1.010)	(-1.479)	(-1.528)	(-1.138)	(-1.244)	(-1.390)
	LR	-9.169	-5.340	-6.822	14.020	11.450	11.260	0.824	-0.080	-1.120
	Se	(10.970)	(12.590)	(12.140)	(3.213)	(2.814)	(2.821)	(2.726)	(3.117)	(3.120)
	p 1/	0.956	0.991	0.982	**0.000**	**0.001**	**0.001**	0.691	0.777	0.730
R-square		37%	36%	35%	26%	26%	25%	30%	25%	26%
DW		1.82	1.89	1.88	2.06	2.05	2.04	2.41	2.4	2.4
# of observations		112	112	112	112	112	112	112	112	112

Note: Table 8 panel A shows the regression results of the volatility of G-7 excluding country *X* real stock return on itself, the volatility of G-7 excluding country *X* excess broad and narrow money growth ($VXBMG_{ROW}$ and $VXNMG_{ROW}$), the volatility of G-7 excluding country *X* real long and short term interest rates ($VRLR_{ROW}$ and $VRSR_{ROW}$) and the volatility of broad money of country *X* ($VXBMG_X$). Country *X* is either the U.S., Japan or Germany. Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard errors are in parentheses.

1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of $VXBMG_X$ are jointly equal to zero.

Table 8. Volatility Spillovers: Money and Stock Returns

Panel B: Narrow Money

		Volatility of G-7 Real Stock Return excluding United States			Volatility of G-7 Real Stock Return excluding Japan			Volatility of G-7 Real Stock Return excluding Germany		
		GDP Weights	USD simple Sum	Divisia Index	GDP Weights	USD simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		-0.001	-0.001	0.000	0.001	**0.003**	**0.003**	0.001	0.001	0.001
	T	(-0.476)	(-1.194)	(-0.180)	(0.673)	(1.844)	(1.833)	(-0.752)	(0.778)	(1.361)
Dependent variable	Lag 1	**0.465**	**0.506**	**0.494**	**0.217**	**0.214**	**0.214**	**0.387**	**0.419**	**0.407**
	T	(5.492)	(6.133)	(5.938)	(2.237)	(2.224)	(2.223)	(4.452)	(4.710)	(4.555)
$VXBMG_{ROW}$	Lag 1	**16.441**	0.547	0.701	-1.880	-2.346	-1.446	3.746	-2.508	-0.033
	T	(2.448)	(0.987)	(1.351)	(-0.071)	(-0.903)	(-0.914)	(0.435)	(-0.814)	(-0.010)
$VXNMG_{ROW}$	Lag 0	8.258	**1.234**	**0.672**	7.783	0.731	0.612	**28.885**	2.704	1.369
	T	(0.919)	(2.289)	(1.777)	(0.807)	(0.783)	(0.767)	(2.955)	(1.227)	(1.284)
$VRLR_{ROW}$	Lag 1	0.269	-0.496	-0.675	0.545	0.453	0.458	0.520	0.405	0.424
	T	(0.309)	(-0.593)	(-0.796)	(0.832)	(0.696)	(0.703)	(1.170)	(0.884)	(0.929)
$VRSR_{ROW}$	Lag 0	-0.352	0.171	0.230	-1.229	-1.137	-1.147	**-1.105**	**-0.899**	**-0.978**
	T	(-0.486)	(0.256)	(0.341)	(-1.548)	(-1.422)	(-1.444)	(-2.186)	(-1.739)	(-1.879)
$VXNMG_X$	Lag 0	0.866	-0.103	-0.211	-0.228	-0.223	-0.224	0.653	0.479	0.479
	T	(0.454)	(-0.053)	(-0.108)	(-0.017)	(-0.167)	(-0.167)	(0.787)	(0.551)	(0.549)
	Lag 1	-2.103	**-3.589**	-3.452	0.271	-0.048	-0.050	0.101	0.010	-0.167
	T	(-1.032)	(-1.713)	(-1.627)	(0.178)	(-0.032)	(-0.033)	(0.095)	(0.009)	(-0.153)
	Lag 2	-1.168	-1.804	-1.852	0.945	0.891	0.896	-0.050	-0.045	-0.082
	T	(-0.560)	(-0.859)	(-0.883)	(0.617)	(0.582)	(0.586)	(-0.047)	(-0.041)	(-0.074)
	Lag 3	2.283	2.401	2.041	0.884	0.854	0.833	0.036	0.138	0.063
	T	(1.107)	(1.171)	(0.988)	(0.568)	(0.548)	(0.535)	(0.035)	(0.128)	(0.059)
	Lag 4	3.126	3.072	**3.230**	0.693	0.521	0.513	-0.303	-0.354	-0.398
	T	(1.624)	(1.607)	(1.683)	(0.498)	(0.367)	(0.360)	(-0.365)	(-0.415)	(-0.466)
	LR	5.612	-0.048	-0.485	3.274	2.539	2.505	0.713	0.392	-0.177
	Se	(4.480)	(4.977)	(4.956)	(2.590)	(2.577)	(2.582)	(1.416)	(1.555)	(1.610)
	p 1/	0.243	**0.095**	0.110	0.125	0.876	0.881	0.891	0.969	0.972
R-square		41%	41%	40%	9%	10%	9%	29%	24%	25%
DW		1.89	1.96	1.95	2.19	2.19	2.19	2.43	2.43	2.42
# of observations		112	112	112	112	112	112	112	112	112

Note: Table 8 panel B shows the regression results of the volatility of G-7 excluding country *X* real stock return on itself, the volatility of G-7 excluding country *X* excess broad and narrow money growth ($VXBMG_{ROW}$ and $VXNMG_{ROW}$), the volatility of G-7 excluding country *X* real long and short term interest rates ($VRLR_{ROW}$ and $VRSR_{ROW}$) and the volatility of narrow money of country *X* ($VXNMG_X$). Country *X* is either the U.S., Japan or Germany. Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard errors are in parentheses.

1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of $VXNMG_X$ are jointly equal to zero.

Table 9. Volatility Spillovers: Money and Interest Rates

Panel A: Broad Money

		$VRSR_{G\text{-}7\ ex\ U.S.}$ GDP Weights	$VRSR_{G\text{-}7\ ex\ U.S.}$ USD Simple Sum	$VRSR_{G\text{-}7\ ex\ U.S.}$ Divisia Index	$VRSR_{G\text{-}7\ ex\ Japan}$ GDP Weights	$VRSR_{G\text{-}7\ ex\ Japan}$ USD Simple sum	$VRSR_{G\text{-}7\ ex\ Japan}$ Divisia Index	$VRSR_{G\text{-}7\ ex\ Germany}$ GDP Weights	$VRSR_{G\text{-}7\ ex\ Germany}$ USD Simple Sum	$VRSR_{G\text{-}7\ ex\ Germany}$ Divisia Index
Constant		0.000	5.980	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	t	(0.881)	(0.549)	(0.748)	(0.822)	(-0.664)	(-0.032)	(0.188)	(0.224)	(0.160)
Dependent Variable	lag 1	**0.916**	**0.946**	**0.948**	**0.890**	**0.864**	**0.866**	**0.844**	**0.847**	**0.844**
	t	(22.052)	(23.783)	(24.062)	(17.026)	(17.521)	(17.494)	(15.278)	(15.778)	(15.448)
$VXBMG_{ROW}$	lag 0	0.127	0.099	**0.131**	-2.655	-0.386	**-0.370**	0.382	0.309	-0.019
	t	(0.228)	(1.587)	(2.178)	(-0.578)	(-1.278)	(-1.794)	(0.168)	(0.513)	(-0.028)
	lag 1	-0.805	0.016	-0.011	-0.267	0.592	**0.399**	-0.655	-0.058	0.398
	t	(-1.447)	(0.252)	(-0.202)	(-0.066)	(2.021)	(1.972)	(-0.325)	(-0.108)	(0.576)
	LR	-8.042	2.133	2.313	-26.440	1.511	0.215	-1.751	1.645	2.418
	se	(6.861)	(2.035)	(2.220)	(35.920)	(2.384)	(1.510)	(8.626)	(4.598)	(4.569)
	p 1/	0.293	0.222	**0.094**	0.663	0.127	0.101	0.935	0.876	0.805
$VXNMG_{ROW}$	lag 0	0.930	-0.048	-0.060	0.734	**0.410**	**0.383**	1.107	-0.044	0.189
	t	(1.288)	(-0.844)	(-1.506)	(0.593)	(2.765)	(2.953)	(0.588)	(-0.084)	(0.671)
	lag 1	0.619	-0.041	-0.025	-0.130	**-0.316**	**-0.283**	0.003	-0.006	-0.207
	t	(0.847)	(-0.072)	(-0.628)	(-0.105)	(-2.122)	(-2.165)	(0.002)	(-0.013)	(-0.742)
	LR	18.370	-1.668	-1.645	5.471	0.692	0.745	7.117	-0.329	-0.116
	se	(10.550)	(1.807)	(1.645)	(8.946)	(0.689)	(0.643)	(9.476)	(2.737)	(1.354)
	p 1/	0.128	0.507	0.287	0.764	**0.025**	**0.015**	0.709	0.993	0.745
$VXBMG_X$	lag 0	-0.248	-0.145	-0.113	0.013	-0.106	-0.114	0.042	0.041	0.044
	t	(-0.651)	(-0.375)	(-0.294)	(0.035)	(-0.301)	(-0.324)	(0.229)	(0.225)	(0.244)
	lag 1	-0.303	-0.313	-0.291	0.512	0.587	0.591	-0.224	-0.282	-0.273
	t	(-0.751)	(-0.764)	(-0.719)	(1.029)	(1.237)	(1.244)	(-1.095)	(-1.333)	(-1.264)
	lag 2	0.435	0.468	0.439	-0.704	-0.729	-0.699	0.066	0.068	0.037
	t	(1.095)	(1.160)	(1.104)	(-1.386)	(-1.537)	(-1.471)	(0.323)	(0.318)	(0.168)
	lag 3	-0.375	-0.357	-0.329	**0.943**	**0.904**	**0.874**	0.051	0.045	0.018
	t	(-0.965)	(-0.910)	(-0.846)	(1.829)	(1.903)	(1.840)	(0.250)	(0.218)	(0.086)
	lag 4	-0.115	-0.223	-0.236	**-0.668**	-0.657	**-0.649**	-0.115	-0.110	-0.121
	t	(-0.356)	(-0.688)	(-0.732)	(-1.758)	(-1.846)	(-1.827)	(-0.627)	(-0.595)	(-0.667)
	LR	-7.192	-10.610	-10.290	0.878	-0.010	0.028	-1.157	-1.570	-1.888
	se	(6.900)	(12.670)	(13.000)	(2.891)	(1.855)	(1.879)	(1.450)	(1.634)	(1.701)
	p 1/	0.511	0.512	0.554	0.354	0.335	0.355	0.891	0.787	0.775
R-square		86%	86%	86%	77%	79%	79%	73%	73%	74%
DW		1.68	1.54	1.56	1.80	1.97	1.95	2.25	2.24	2.28
# of obs.		111	111	111	111	111	111	111	111	111

		$VRLR_{G\text{-}7\ ex\ U.S.}$ GDP Weights	$VRLR_{G\text{-}7\ ex\ U.S.}$ USD Simple Sum	$VRLR_{G\text{-}7\ ex\ U.S.}$ Divisia Index	$VRLR_{G\text{-}7\ ex\ Japan}$ GDP Weights	$VRLR_{G\text{-}7\ ex\ Japan}$ USD Simple Sum	$VRLR_{G\text{-}7\ ex\ Japan}$ Divisia Index	$VRLR_{G\text{-}7\ ex\ Germany}$ GDP Weights	$VRLR_{G\text{-}7\ ex\ Germany}$ USD Simple Sum	$VRLR_{G\text{-}7\ ex\ Germany}$ Divisia Index
Constant		0.000	0.000	-5.969	0.000	0.000	0.000	0.000	0.000	**0.000**
	t	(-0.343)	(-0.124)	(-0.068)	(-0.258)	(-1.244)	(-1.012)	(-0.948)	(-0.202)	(0.191)
Dependent Variable	lag 1	**0.858**	**0.885**	**0.884**	**0.937**	**0.918**	**0.917**	**0.934**	**0.935**	**0.927**
	t	(15.420)	(16.600)	(16.534)	(26.317)	(27.127)	(26.996)	(27.791)	(27.496)	(26.809)
$VXBMG_{ROW}$	lag 0	-0.582	0.068	0.091	2.010	-0.043	-0.076	1.173	-0.051	-0.035
	t	(-0.940)	(0.997)	(1.381)	(0.720)	(-0.190)	(-0.487)	(0.988)	(-0.122)	(-0.072)
	lag 1	-0.081	-0.057	-0.090	-1.803	0.052	-0.028	-0.768	-0.208	-0.213
	t	(-0.131)	(-0.850)	(-1.464)	(-0.638)	(0.235)	(-0.179)	(-0.649)	(-0.549)	(-0.440)
	LR	-4.683	0.097	0.008	3.287	0.113	-1.258	6.149	-4.008	-3.409
	se	(4.168)	(0.706)	(0.674)	(36.350)	(2.818)	(1.802)	(12.860)	(7.372)	(6.390)
	p 1/	0.503	0.513	0.200	0.755	0.969	0.779	0.611	0.826	0.856
$VXNMG_{ROW}$	lag 0	0.658	0.020	-0.007	-0.267	0.056	0.066	0.144	0.216	0.108
	t	(0.837)	(0.316)	(-0.170)	(-0.284)	(0.498)	(0.665)	(0.109)	(0.584)	(0.551)
	lag 1	0.175	-0.006	0.030	0.855	0.116	0.106	1.415	0.063	0.104
	t	(0.224)	(-0.102)	(0.691)	(0.914)	(1.017)	(1.067)	(1.086)	(0.192)	(0.524)
	LR	5.881	0.115	0.194	9.375	2.086	2.081	23.650	4.310	2.908
	se	(5.894)	(0.722)	(0.543)	(12.690)	(1.072)	(1.021)	(19.430)	(4.663)	(2.103)
	p 1/	0.546	0.949	0.768	0.584	**0.067**	**0.043**	0.262	0.633	**0.363**
$VXBMG_X$	lag 0	0.060	0.180	0.199	-0.006	0.000	-0.004	-0.021	-0.019	-0.034
	t	(0.165)	(0.500)	(0.557)	(-0.021)	(0.000)	(-0.015)	(-0.169)	(-0.148)	(-0.267)
	lag 1	0.123	-0.049	-0.039	0.142	0.146	0.142	-0.046	-0.068	-0.072
	t	(0.288)	(-0.115)	(-0.092)	(0.378)	(0.405)	(0.391)	(-0.327)	(-0.457)	(-0.479)
	lag 2	0.249	0.353	0.258	-0.226	-0.269	-0.259	0.099	0.107	0.110
	t	(0.572)	(0.810)	(0.599)	(-0.589)	(-0.744)	(-0.713)	(0.694)	(0.718)	(0.726)
	lag 3	-0.212	-0.244	-0.172	0.134	0.176	0.177	0.033	0.035	0.041
	t	(-0.499)	(-0.578)	(-0.409)	(0.347)	(0.487)	(0.486)	(0.235)	(0.242)	(0.279)
	lag 4	-0.079	-0.190	-0.221	-0.058	-0.039	-0.037	-0.163	-0.145	-0.164
	t	(-0.222)	(-0.543)	(-0.635)	(-0.201)	(-0.144)	(-0.138)	(-1.274)	(-1.112)	(-1.293)
	LR	0.995	0.436	0.215	-0.210	0.179	0.225	-1.495	-1.394	-1.643
	se	(3.252)	(4.091)	(4.058)	(3.751)	(2.384)	(2.381)	(2.397)	(2.689)	(2.527)
	p 1/	0.923	0.840	0.883	0.995	0.989	0.990	0.858	0.891	0.832
R-square		76%	76%	76%	89%	90%	90%	89%	89%	89%
DW		2.53	2.51	2.51	1.48	1.52	1.52	1.49	1.45	1.45
# of obs.		112	112	112	112	112	112	112	112	112

Note: Table 9 Panel A shows the regression results of the volatility of G-7 excluding country *X* long (VRLR) and short (VRSR) term interest rates on itself, volatility of G-7 excluding country X excess broad and narrow money growth ($VXBMG_{ROW}$ and $VXNMG_{ROW}$), and the volatility of broad money of country *X* ($VXBMG_X$). Country *X* is either the U.S., Japan or Germany. Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard errors are in parentheses.

1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of the variable under consideration are jointly equal to zero.

Table 9. Volatility Spillovers: Money and Interest Rates

Panel B: Narrow Money

		$VRSR_{G\text{-}7\ ex\ U.S.}$			$VRSR_{G\text{-}7\ ex\ Japan}$			$VRSR_{G\text{-}7\ ex\ Germany}$			$VRLR_{G\text{-}7\ ex\ U.S.}$			$VRLR_{G\text{-}7\ ex\ Japan}$			$VRLR_{G\text{-}7\ ex\ Germany}$		
		GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index	GDP Weights	USD Simple Sum	Divisia Index
Constant		0.000	0.000	0.000	0.000	**0.000**	**0.000**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	**0.000**	**0.000**	0.000	0.000	0.000
	t	(-0.964)	(0.101)	(0.131)	(-0.968)	(-2.325)	(-2.204)	(-0.123)	(0.349)	(0.330)	(-0.964)	(0.062)	(-0.376)	(-1.655)	(-3.194)	(-3.106)	(-1.333)	(-0.262)	(0.167)
Dependent	lag 1	**0.904**	**0.936**	**0.939**	**0.833**	**0.824**	**0.828**	**0.845**	**0.848**	**0.843**	**0.861**	**0.892**	**0.893**	**0.936**	**0.920**	**0.921**	**0.938**	**0.937**	**0.929**
Variable	*t*	(22.275)	(24.291)	(24.634)	(16.217)	(16.292)	(16.335)	(15.382)	(15.719)	(15.378)	(16.470)	(17.808)	(17.615)	(29.132)	(28.521)	(28.438)	(28.058)	(27.554)	(26.944)
$VXBMG_{ROW}$	lag 0	0.108	0.093	**0.130**	-1.210	-0.486	**-0.380**	0.797	0.038	-0.446	-0.261	0.090	0.106	1.858	0.015	-0.011	1.056	-0.073	-0.152
	t	(0.190)	(1.452)	(2.103)	(-0.294)	(-1.615)	(-1.848)	(0.346)	(0.066)	(-0.620)	(-0.426)	(1.329)	(1.601)	(0.740)	(0.068)	(-0.072)	(0.879)	(-0.183)	(-0.309)
	lag 1	-0.795	0.039	0.016	-1.402	**0.553**	**0.351**	-0.847	-0.083	0.518	-0.395	-0.059	-0.087	-2.528	0.043	-0.030	-0.622	-0.269	-0.188
	t	(-1.394)	(0.638)	(0.290)	(-0.379)	(1.848)	(1.716)	(-0.417)	(-0.159)	(0.748)	(-0.644)	(-0.923)	(-1.453)	(-1.004)	(0.193)	(-0.198)	(-0.519)	(-0.741)	(-0.393)
	LR	-7.153	2.068	2.388	-15.650	0.380	-0.169	-0.327	-0.290	0.459	-4.735	0.282	0.182	-10.520	0.729	-0.521	6.994	-5.465	-4.812
	se	(5.833)	(1.692)	(1.906)	(17.810)	(1.714)	(1.119)	(8.739)	(4.145)	(4.063)	(4.115)	(0.758)	(0.743)	(30.780)	(2.861)	(1.803)	(13.970)	(7.040)	(6.081)
	p 1/	0.300	0.201	**0.084**	0.606	0.139	0.134	0.917	0.987	0.739	0.533	0.352	0.156	0.606	0.964	0.958	0.669	0.687	0.743
$VXNMG_{ROW}$	lag 0	1.176	-0.053	-0.070	0.573	**0.296**	**0.285**	1.430	0.130	0.308	1.239	0.002	-0.011	-0.360	-0.020	-0.008	0.427	0.259	0.151
	t	(1.579)	(-0.868)	(-1.649)	(0.481)	(1.922)	(2.127)	(0.768)	(0.246)	(1.075)	(1.575)	(0.034)	(-0.248)	(-0.404)	(-0.175)	(-0.076)	(0.330)	(0.710)	(0.764)
	lag 1	0.397	-0.057	-0.046	0.606	-0.187	-0.182	-0.160	-0.075	-0.251	-0.123	-0.046	-0.003	1.107	0.144	0.129	1.235	0.057	0.079
	t	(0.536)	(-0.929)	(-1.082)	(0.506)	(-1.220)	(-1.366)	(-0.068)	(-0.160)	(-0.903)	(-0.016)	(-0.723)	(-0.064)	(1.245)	(1.268)	(1.308)	(0.955)	(0.176)	(0.407)
	LR	16.390	-1.711	-1.891	7.068	0.617	0.601	8.171	0.362	0.363	8.051	-0.409	-0.132	11.730	1.551	1.526	26.740	5.041	3.258
	se	(8.590)	(1.631)	(1.551)	(5.701)	(0.539)	(0.512)	(9.557)	(2.650)	(1.258)	(6.020)	(0.883)	(0.664)	(11.930)	(0.967)	(0.921)	(21.450)	(4.787)	(2.151)
	p 1/	0.109	0.458	0.189	0.439	0.143	0.101	0.610	0.970	0.556	0.226	0.769	0.970	0.371	0.177	0.155	0.241	0.533	0.265
$VXNMG_{X}$	lag 0	-0.079	-0.111	-0.087	-0.041	-0.066	-0.060	0.042	-0.020	-0.010	0.160	0.213	0.213	0.112	0.111	0.111	-0.024	-0.036	-0.038
	t	(-0.528)	(-0.718)	(-0.566)	(-0.348)	(-0.569)	(-0.519)	(0.229)	(-0.169)	(-0.090)	(1.008)	(1.317)	(1.308)	(1.272)	(1.277)	(1.275)	(-0.307)	(-0.451)	(-0.476)
	lag 1	-0.023	-0.003	0.026	0.138	0.187	0.166	-0.224	-0.017	-0.016	-0.118	-0.176	-0.169	0.008	0.036	0.033	0.036	0.046	0.042
	t	(-0.146)	(-0.016)	(0.162)	(1.028)	(1.404)	(1.256)	(-1.095)	(-0.117)	(-1.080)	(-0.706)	(-1.033)	(-0.983)	(0.083)	(0.359)	(0.336)	(0.359)	(0.447)	(0.405)
	lag 2	**0.316**	**0.320**	**0.316**	0.153	0.117	0.128	0.066	0.034	0.032	**0.354**	**0.392**	**0.337**	0.014	0.001	-0.001	0.039	0.036	0.038
	t	(2.007)	(1.984)	(1.954)	(1.131)	(0.882)	(0.972)	(0.323)	(0.236)	(0.224)	(2.102)	(2.309)	(1.964)	(0.138)	(0.006)	(-0.007)	(0.395)	(0.359)	(0.360)
	lag 3	-0.165	-0.125	-0.123	0.214	0.133	0.133	0.051	-0.021	-0.029	-0.271	-0.235	-0.235	0.045	0.031	0.038	-0.013	-0.004	-0.005
	t	(-1.047)	(-0.797)	(-0.079)	(1.592)	(0.986)	(0.982)	(0.250)	(-0.143)	(-0.205)	(-1.593)	(-1.416)	(-1.405)	(0.446)	(0.312)	(0.373)	(-0.129)	(-0.043)	(-0.046)
	lag 4	-0.105	-0.126	-0.104	0.067	0.034	0.031	-0.115	-0.046	-0.043	0.149	0.122	0.152	**0.220**	**0.164**	**0.164**	-0.051	-0.053	-0.061
	t	(-0.708)	(-0.870)	(-0.717)	(0.551)	(0.277)	(0.257)	(-0.627)	(-0.399)	(-0.373)	(0.933)	(0.803)	(0.986)	(2.503)	(1.846)	(1.835)	(-0.650)	(-0.659)	(-0.733)
	LR	-0.582	-0.698	0.451	3.179	2.311	2.321	-1.157	-0.459	-0.422	1.969	-2.922	2.779	6.250	4.301	4.360	-0.209	-0.192	-0.345
	se	(1.973)	(3.374)	(3.473)	(1.220)	(1.002)	(1.029)	(1.450)	(0.785)	(0.762)	(1.491)	(2.310)	(2.422)	(3.726)	(2.326)	(2.381)	(1.318)	(1.325)	(1.273)
	p 1/	0.442	0.447	0.474	**0.009**	**0.079**	**0.085**	0.891	0.990	0.991	0.169	0.113	0.184	**0.020**	0.106	0.107	0.931	0.931	0.916
R-square		86%	86%	86%	79%	80%	80%	73%	73%	73%	77%	77%	77%	90%	91%	91%	89%	89%	89%
DW		1.68	1.54	1.56	1.93	1.97	1.97	2.25	2.25	2.25	2.44	2.41	2.42	1.61	1.59	1.59	1.50	1.46	1.47
# of obs.		111	111	111	111	111	111	111	111	111	112	112	112	112	112	112	112	112	112

Note: Table 9 Panel B shows the regression results of the volatility of G-7 excluding country *X* long (VRLR) and short (VRSR) term interest rates on itself, volatility of G-7 excluding country X excess broad and narrow money growth ($VXBMG_{ROW}$ and $VXNMG_{ROW}$), and the volatility of narrow money of country *X* ($VXNMG_{X}$). Country *X* is either the U.S., Japan or Germany. Bold figures indicate significance at the 10 percent level. LR is the long run effect of the variable under consideration. DW is the Durbin-Watson statistic. *t*-values or standard errors are in parentheses.

1/ p-value for the hypothesis that the contemporaneous and lagged coefficients of the variable under consideration are jointly equal to zero.

Figure 1 - GDP weighted G-7 money growth

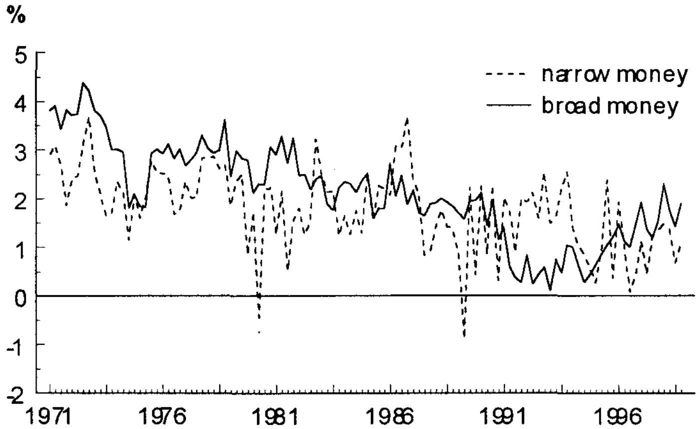

Figure 2 - USD simple sum money growth

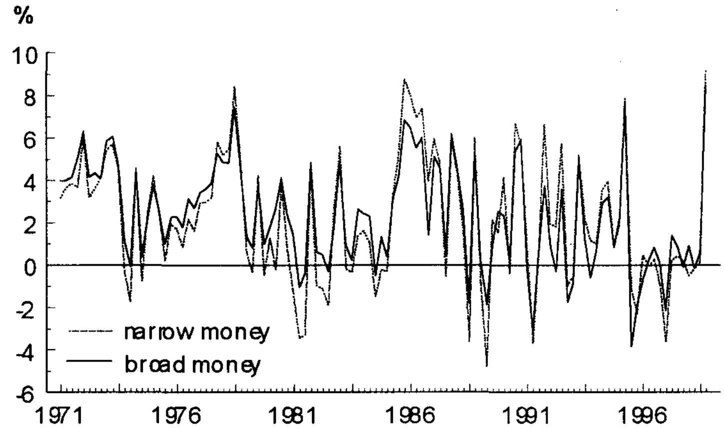

Figure 3 - Divisia index of money growth

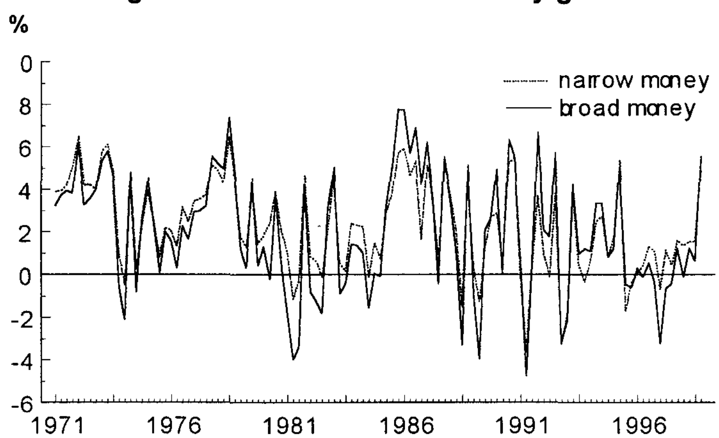

Figure 4 - Indices of G-7 real asset returns: Panel A

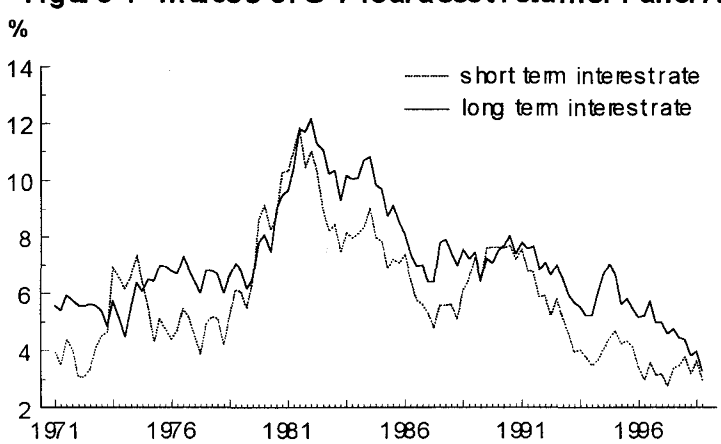

Figure 4 - Indices of G-7 real asset returns: Panel