PRELIMINARY

"WHY ARE U.S. FIRMS HOARDING MONEY?"[1]

Nicoletta Batini* and Joshua Felman**

This version: June 2011

Abstract

U.S. non-farm non-financial corporations are holding almost $2 trillion in liquid assets, and they continue to report impressive earnings. What does this mean for investment? To answer this question, we estimate a model of corporate demand for money, where money is held mainly for transaction purposes. The model fits well, suggesting that much of the recent rise in liquid assets is likely to be spent within the next two years to boost firms' capital expenditure, rather than kept as precautionary balances.

JEL Codes: E22, E41
Keywords: money demand, corporate money demand, money hoarding, buffer stock of money, United States.

[1] We thank Neil Ericsson for many useful discussions. All errors are our own. The views expressed herein are of the authors alone and do not represent the views of the International Monetary Fund or of its Board of Directors.

*Corresponding author. European Department, International Monetary Fund, 700 and 19th Street, NW, Washington D.C., 20431, nbatini@imf.org.

** Research Department, International Monetary Fund, 700 and 19th Street, NW, Washington D.C., 20431, jfelman@imf.org.

A. Introduction

1. **U.S. non-farm non-financial corporations (NFCs) are holding record amounts of liquid assets**. According to the Federal Reserve, NFC holdings of liquid assets amounted to around $1.9 trillion in the first quarter of 2011, equivalent to about one-seventh of GDP and roughly ¼ more than at the beginning of the recession. For some individual firms holdings are extremely high: reports indicate that Microsoft has $43 billion in money and short-term investments; Cisco Systems is holding $39 billion; and Google $33 billion.[2] And as major firms continue to report impressive earnings, the money keeps flowing into their coffers.

2. **There is a lively debate over the causes of such hoarding**. While some argue that firms are not investing because they are uncertain about the future course of consumer spending, others point to a potential "crowding out" of private investment—were interest rates to increase from their historically low levels--as a result of hefty government spending. Still others have argued (based on anecdotal evidence) that much of the money is held overseas. All these interpretations, however, assume that money is held as an alternative to spending, and thus that cash accumulation is bad news for capital expenditure and the U.S. recovery.[3] (Call these the "hoarding" or "precautionary demand" hypotheses.) But it is possible that firms are building up their money balances precisely because they plan to spend it in the future. (The "transactions demand" hypothesis.) In that case, growing money balances should actually be interpreted as a positive sign, as an indication that investment is set to rise sharply over the coming quarters.

3. **This paper tries to understand whether firms' large money holdings are a positive or negative signal for future investment**. It does so by fitting a model of corporate demand for money balances to U.S. data. In the model, the stock of liquid assets held by firms depends on the level of transactions (i.e., investment) and several other standard determinants—but not on uncertainty or other variables that would capture a precautionary demand for money. The model fits remarkably well, suggesting that the current "excess" money holdings are likely to be corrected through a rise in investment within the next 8 quarters or so.

---

[2] See, for example, "Profits on an Overseas Holiday", Business Week, March 21, 2011.

[3] Throughout this paper, money and liquid assets are used interchangeably and refer to the Federal Reserve definition of « total liquid assets ». This includes a wide variety of liquid assets held by corporations, e.g., currency, checking, time and saving deposits at banks, shares of money market funds, and U.S. government securities of various maturities (including maturities above 1 year).

B. Motives for Money Holdings

4. **The build-up of corporate money balances is not a new phenomenon—it follows a trend that began in the 1980s**. The trend has accelerated over the past decade, with holdings rising from around 6 percent of GDP in 1990 to around 11 percent of GDP in the mid-2000s. The build up over the past two years seems broadly in line with this trend, essentially reversing a dip in balances that occurred during the depth of the financial crisis.

5. **A number of authors have concluded that the trend stems from precautionary motives** (see for example Bates, Kahle, and Stulz, 2009; Barnes and Pancost, 2010). However, a rising precautionary demand is difficult to square with the low-shock environment that prevailed before the financial and economic crisis. Moreover, its tenets clash with the strong positive relationship between holdings of liquid assets and capital expenditure observed in the data. Granger causality tests support what the data seems to suggest, namely that liquid assets lead capital expenditure (Table 1). In other words, firms accumulate liquid assets because they plan to spend them in the future—they are driven by transactions demand.

Table 1: Pairwise Granger Causality Tests (c)

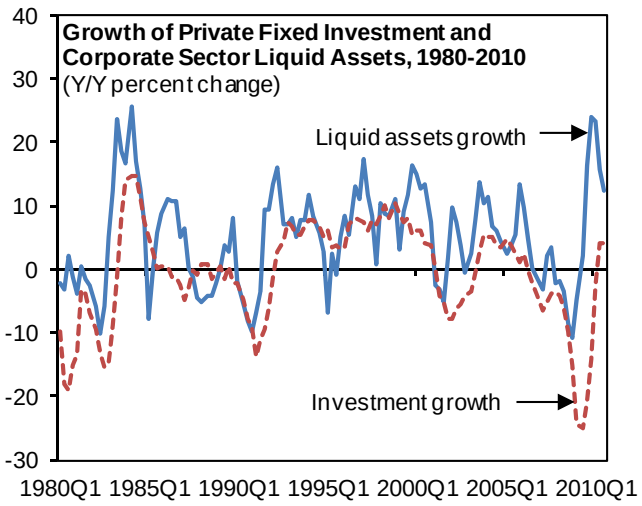
Sample: 1980Q1 2010Q3
Lags: 4

Null Hypothesis:	Prob.
DM (a) does not Granger Cause DI	0.0001
DI (b) does not Granger Cause DM	0.1772

Note:
(a) DM is the first difference of the log of quarterly total liquid assets held by U.S. NFCs deflated by the GDP

(b) DI is the first difference of the log of quarterly private fixed capital investment deflated by the GDP deflator.

(c) The test indicates that we cannot reject the hypothesis that DI does not Granger cause DM, but we do reject the hypothesis that DM does not Granger cause DI. Therefore it appears that Granger causality runs one-way from DM to DI and not the other way.



6. **This explanation may account for the cash build-up of the past several years**. The wake of the crisis has created an exceptionally attractive environment for issuing bonds. As interest rates on government bonds declined to historically low levels, so did rates of corporate bonds, notwithstanding initially elevated spreads. As a result, starting in early 2009, NFCs have decided to issue significantly more debt than they did in the pre-crisis era, even though their spending needs have diminished. Proceeds have been used to buy back equity, but also to build up cash balances. This financing behavior suggests that firms did not just accumulate cash balances "as a residual," because they were earning profits and did not want to spend the funds on investment. Rather, it suggests that they deliberately took steps to

build up their cash holdings, perhaps on the premise that they would need the funds later, for future investment.

C. Money and Investment

7. **To throw light on the ultimate drivers of firms' demand for money we estimate a model of broad money holdings of the NFC sector**.[4] (The Appendix provides details about the econometric methodology and the empirical results.) In line with standard theory, the model postulates that money demand is largely motivated by the need to carry out transactions that is by its command over goods and services. Money is valued for its purchasing power. The implication is that the demand for money is a demand for real money, not the nominal face value. In the corporate sector context, the model thus captures the interactions between money holdings, a relevant measure of corporate transactions, which we identify with investment,[5] and the cost of capital. Consistent with theory, in our set up money demand by corporates also depends on the opportunity cost of holding wealth in the form of money, which we proxy by the relative return between the average yield on liquid assets, adjusted for risk, and the yield on less liquid assets, outside the set of assets that we define as money, also adjusted for risk.[6] Finally, money also acts as a store of wealth, and therefore it depends additionally on a wealth variable that we proxy with real net worth. In this sense, the model abstracts from precautionary motives for money demand, assuming that money demand is largely motivated by the need to carry out transactions.

---

[4] There is a rather large body of literature that provides empirical results of the non-financial corporations demand for money for the United States, but, at best, it is based on data ending in the early 1990s (see for example Goldfeld, 1973; Jain and Moon, 1994; Butkiewicz and McConnell, 1995). Also none of this uses the rigorous approach by Hendry and Mizon (1993) used here. Empirical evidence on firms' money demand can be found the United Kingdom in Thomas, 1997, and Brigden and Mizen, 2004; for Germany in Read (1996); and more recently, for the euro area in von Landesberger, 2007, and in Martinez-Carrascal and von Landesberger, 2010.

[5] Our measure of investment is total private fixed investment, including residential, instead of business fixed investment or business fixed investment plus inventories. Although it would be interesting to strip out residential investment (which is very depressed and has behaved anomalously over the past cycle) from total investment in the model, procedurally it is more reasonable to use a more comprehensive measure of expenditure when we restrict in the money equation expenditure rather than output (investment rather than GDP) to act as the scale variable for money demand.

[6] Technically, the relative return on risk-adjusted yields inside and outside the total liquid assets aggregate captures not only the opportunity cost of holding wealth in liquid asset form but also captures the term spread. This is not problematic for the interpretation of our results, since a positive and large spread is usually interpreted as a sign that investors see a reasonably good chance of a strong recovery in the not-too-distant future (to a first approximation one can think of the long term rate as reflecting an average of expected future short-term rates. Short-term rates, in turn, tend to reflect the state of the economy: if the economy improves, the Fed will raise short-term rates pushing the long-term rate above the short one). Thus, finding that the demand for liquid assets depend positively on (or also on) the term spread—as we do—is consistent with our interpretation that the demand for money is transactionary rather than precautionary.

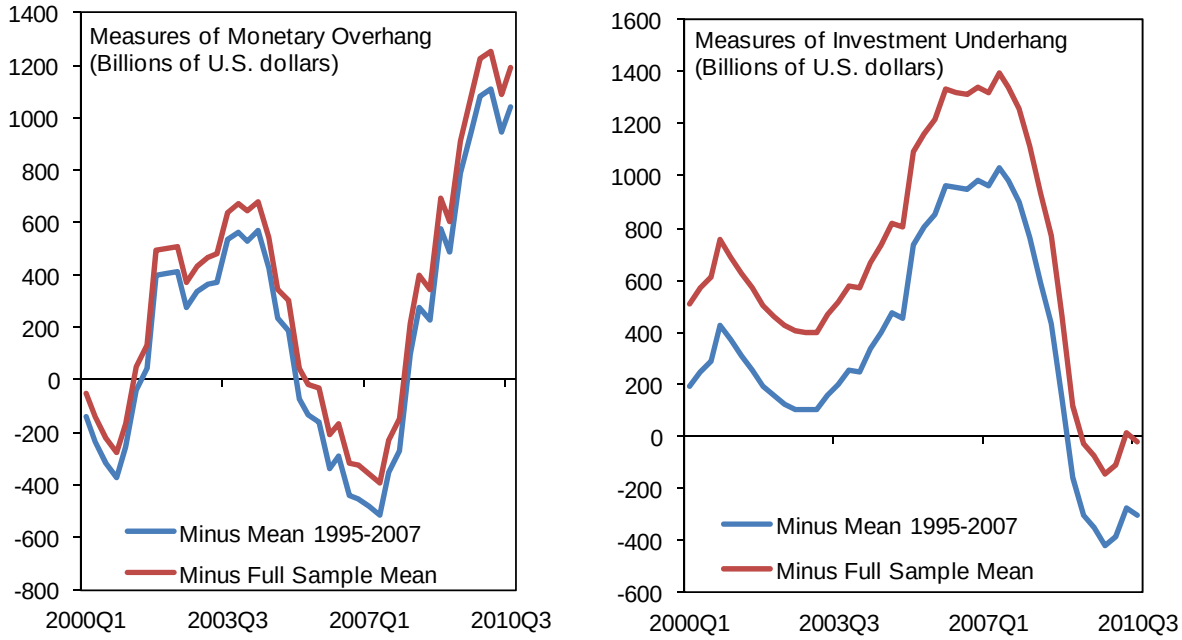
8. **The model has both a short-run and a long-run specification**. As such it can quantify firms' "long-run" demand for real money balances (and investment) and establish whether NFCs are currently holding liquid assets that are above/below their long-run demand level given fundamentals. The model can also tell us how fast will such gap from the long-run level be closed, predicting a path for money balances (and investment) over the next quarters conditional on the existing gap. The model fits the data well—an indication that the pattern of U.S. NFCs' money balances accumulation can be well explained without resorting to precautionary motives. Importantly, the long-run money demand and investment relationships look plausible. Money is held partly as a transactions balance and partly as a store of value by NFCs and is increasing in the relative rate of return on short-term deposits and declining in the real cost of capital.[7] In the second long-run relationship the investment-to-GDP ratio depends on the real cost of capital, but nominal interest rates do not appear to be important in determining investment in the long run. In short, the estimates indicate that firms have both a transactions and a portfolio motive for holding money. Results also suggest the existence of a corporate sector liquidity channel whereby firms' "excess" money balances have a negative impact on the cost of capital and a positive impact on investment spending.

9. Two key messages emerge from the analysis:

- Investment by firms is below the level suggested by our model and holdings of liquid assets are considerably above their long-run demand level. In 2010 Q3 the amount of "excess liquidity" held by firms was around 60–70 percent of their total holdings of liquid assets (Figure 1). Such "overhang" is accompanied by an investment shortfall—in the same quarter, our estimates suggest that firms' investment was below its fitted level at this time in the cycle by 1 to 18 percent (depending on the sub-sample used to represent a "normal" period). The estimates also show that firms reduced their liquid assets below the fitted level prior to the crisis—a sign of excess leveraging—and started rebuilding these holdings as the crisis erupted, as their transactions demand came to a halt with the precipitous drop in consumer spending.

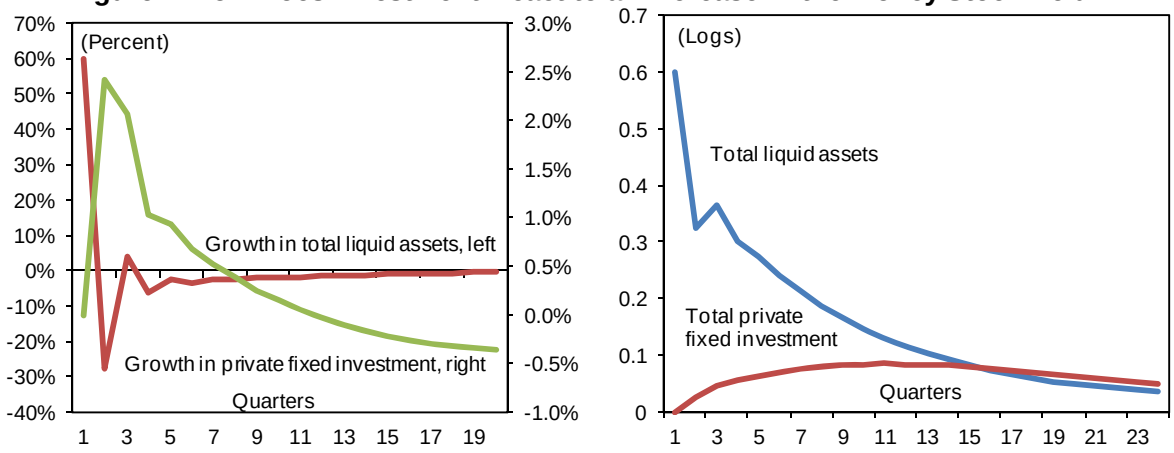
[7] Which is in effect the alternative rate of return on real assets. For example, a high cost of capital may be reflecting an undervalued stock market, which might induce firms to spend deposits in acquiring undervalued firms. Thus the cost of capital is effectively proxying the incentives for firms to engage in M&A activity.

Figure 1. Money Holdings and Investment Deviations from Desired Values



- However, the large "overhang" of liquid assets is a good omen for future investment. Model estimates suggest that a positive shock to firms' money holdings is associated with an increase in firms' capital expenditure. When the shock is calibrated to mimic the recent excess growth in money holdings (i.e. +60 percent—red line, LHS, left panel), investment (green line, RHS, left panel) accelerates with a lag of 2–3 quarters and investment growth remains persistently above baseline for around 10 quarters (Figure 2). This indicates that investment could increase substantially over the next year or two.

Figure 2. How Does Investment React to an Increase in the Money Stock Held?



REFERENCES

Barnes, M. L. and N. A. Pancost, 2010, "Internal Sources of Finance and the Great Recession", Federal Reserve Bank of Boston WP No. 10–15.

Bates, T. W. and K. M. Kahle and R. Stulz, 2009, "Why Do U.S. Firms Hold so Much More Cash than They Used to?", *Journal of Finance*, 64(5): 1985–2021.

Boswijk, H P (1995), 'Efficient inference on cointegration parameters in structural error correction models', *Journal of Econometrics*, 69(1): 133–158.

Brigden, A, and P. Mizen, 2004, "Interactions between Money, Lending and Investment in the UK Private Non-Financial Corporate Sector", *The Manchester School*, 72(1): 72–99.

Butkiewicz, J. and M.M. McConnell. (1995). "The Stability of the Demand for Money and M1 Velocity: Evidence from the Sectoral Data", *Quarterly Review of Economics and Finance*, 35(3): 233–243

Goldfeld, S. (1973). "The Demand for Money Revisited", *Brookings Papers on Economic Activity* 1973, Vol. 4, p. 577–646.

Jain, P. and C-G Moon (1994). "Sectoral money demand: A cointegration approach", Review of Economics and Statistics Vol. 76, No 1, p. 196–202.Martinez-Carrascal and von Landesberger, 2010

Johansen, S. (1988), 'Statistical analysis of cointegrating vectors', *Journal of Economics, Dynamics and Control*, pages 231–54.

Hendry D F and Mizon G E (1993), 'Evaluating dynamic models by encompassing the VAR', in *Models, methods and applications of econometrics* (ed. P Phillips) Basil Blackwell.

Read, V. (1996). "Sectoral Disaggregation of German M3", Discussion Paper 1/96, Deutsche Bundesbank.

Thomas, R (1997). "The Demand for M4: A Sectoral Analysis Part 2-The Corporate Sector", Working Paper, No 62, Bank of England.

von Landesberger, J. (2007). "Sectoral money demand models for the euro area based on a common set of determinants", Working Paper, No. 741, European Central Bank.

Martinez-Carrascal, C. and J. von landesberger, 2010, "Explaining the Money Demand of Non-Financial Corporations in the Euro Area: A Macro and A Micro View" ECB Working Paper Series No 1257.

Urbain, J-P (1992), 'On weak exogeneity in error correction models', *Oxford Bulletin of Economics and Statistics*, 54: 187–208.

APPENDIX: METHODOLOGY AND DATA

1. *Methodology and Data Description*

To measure companies' long-run level of cash holdings, we estimate a model of broad money holdings of the U.S. non-financial corporate sector. The model stylizes the behavior of companies demand for money holdings jointly with that of other real and financial variables. To this end we estimate a three-equation vector error correction model of money, investment and the cost of capital. It uses the encompassing VAR approach of Hendry and Mizon (1993) to derive structural models from a congruent statistical representation of the data.

Historically corporate sector money holdings have been more volatile than households' money holdings and thus they have been difficult to model. This is mainly due to the fact that the types of liquid assets which the corporate sector typically holds can be close substitutes of other real and financial assets and that changes in the rate of return expected on these assets may trigger large changes in firms' money holdings. Crucially, a large variety of real and financial assets can act as a store of value. Bearing this in mind we start by estimating a closed system of nine variables (plus a dummy) of which 3 endogenous and 6 exogenous:

Endogenous Variables:

- Real money holdings by NFCs (m_t),
- Real gross fixed capital formation (i_t),
- A measure of the real cost of capital ($wacc_t$, an indicator of the desirability of expanding capital which should also act as an alternative rate of return on money over and above its role in explaining investment). This is measured by combining the cost of debt (proxied by the rate on triple-A corporate debt) and the cost of equity (proxied by the formula: 1/(p/e) + expected future growth, where p/e indicates the price-to-equity ratio from S&P and expected future growth is proxied by historic long-term growth. For example, if S&P P/E is 19, 1.3 percent—gets 1/19+1.3percent = 6.6 percent) using time-varying weights that reflect the share of NFC's liabilities in equity and debt at each point in time. (Weights are around 0.7 on equity finance and 0.3 on debt finance, respectively over the sample).

Exogenous Variables:

- Real GDP (y_t), measuring general real business cycle conditions that affect the demand for investment goods and the demand for money;

- A measure of the differential between the average yield on corporate liquid assets (proxied here by the rate on 3-month certificates of deposits) and the return on triple-A corporate bonds –a proxy for outside money--both adjusted for risk (rw_t). Adjustment for risk entails subtracting from the first yield the LIBOR rate; and the 20-year U.S. Treasury bill rate from the second yield.

- NFCs' net worth (w_t)

- A measure of the utilization of the capital stock ($capu_t$)

- A term capturing firms' perceived adequacy of inventories (invt, proxied via the Institute for Supply Management inventory diffusion index, 'PMI')—essentially a measure of unwanted stocks and has the advantage that it does not rely on some arbitrary means of extracting the trend in stocks evident in U.S. data. The ISM survey is treated as a 'barometer' of confidence in prevailing economic conditions relating to the cycle since it record the extent to which firms consider themselves overstocked and therefore less likely to embark in more investment in fixed capital.

- Inflation (first difference in the GDP deflator)

- A dummy to capture the transition between Burns and Volker (a period of rapid disinflation). The dummy took the values of 1 in 1980Q4-1982Q1 respectively, followed by -1 in the subsequent quarter, marking the break in U.S. monetary policy that accompanied the well-known transition in price stability implicit objectives and Fed's reaction function between Chairman Burns and Chairman Volcker.

Sample: 1980Q1–2010Q3, all variables are seasonally adjusted, and are expressed in natural logs apart from rates of return which are expressed in percent

2. *The Estimated Long-run Relationships*

To determine the number of long-run relationships among the variables we applied the co-integration analysis developed by Johansen (1988). We begin by testing the variables for stationarity. Univariate unit root tests suggested that some of the variables, notably capital stock utilization and the ISM inventory diffusion index were either stationary or close to being stationary. Inflation in the GDP deflator was also found to be borderline stationary. We thus estimated a closed VAR model with all variables endogenous but these three (and the

1981 dummy).[8] A lag length for the VAR of 2 was chosen on the basis that there appeared to be no residual autocorrelation. This was confirmed by Akaike and Schwarz information criterion tests. Additionally a constant was added. Results of a co-integration test with both a restricted and unrestricted constant (the dummy variable, capital stock utilization, inflation and ISM inventory diffusion index are treated as unrestricted in both cases) suggested at least two but possibly three co-integrating vectors. We proceed on the basis that there are three co-integrating vectors.

To identify the long-run relationships we partitioned the six I(1) variables into endogenous variables and exogenous variables and then assumed as in Boswijk (1995) that there are the same number of endogenous variables as co-integrating vectors, as this simplifies the identification of both the short and long-run structure. Hence we partitioned the original vector in line with results from the closed VAR that suggested that money, investment and the real cost of capital should be treated as endogenous. Identifying restrictions based on theory were then made on the co-integrating vectors. These are shown in Table 2. Conceptually the interpretation of the restrictions is as follow:

9 just-identifying restrictions (in bold): We imposed 3 "normalizing" restrictions; then: (i) in the money demand equation investment rather than GDP is restricted to act as a scale variable; (ii) the risk-adjusted relative return on total liquid assets was excluded from the investment equation leaving a simple investment ratio dependent on weighted cost of capital; (iii) in the investment equation, the level of real money balances is restricted so as not to affect the long-run relationship for investment; (iv) investment is restricted to be homogenous of degree one in output; (v) and (vi) in the cost of capital, neither real balances or investment affect the cost of capital in the long run.

2 over-identifying restrictions (in italics): (i) the coefficients on investment and (ii) wealth in the money demand equation are restricted to be close to their estimated value (-0.1 and -0.9, respectively). This allows us to interpret the relationship as consisting of both an error correction in velocity and an integral control in the wealth-income ratio.

The likelihood ratio test shows that the two over-identifying restrictions could not be rejected even at the 10 percent level. The signs and size of the freely estimated parameters are a further indication of how suitable these identifying restrictions are. The resulting over-identified co-integrating vectors for money and investment were given as follows:

Looking at Table 1, the long-run money demand and investment relationships look plausible. Money is held partly as a transactions balance and partly as a store of value by NFCs and is

[8] *rw*, the wedge between the risk-adjusted own-rate of return on NFCs' money stock and the risk-adjusted return on alternative assets outside the total liquid assets aggregate, is stationary too.

increasing in the relative rate of return on liquid assets and declining in the real cost of capital (which is in effect the alternative rate of return on real assets. For example a high cost of capital may be reflecting an undervalued stock market, which might induce firms to spend deposits in acquiring undervalued firms. Thus the cost of capital is effectively proxying the incentives for firms to engage in M&A activity.) In the second long-run relationship the investment-to-GDP ratio depends on the real cost of capital, but nominal interest rates do not appear to be important in determining investment in the long run.

Table 2. Test of Identifying Restrictions on the Co-integrating Vectors

Identified Co-integrating Vectors			
	β_1	β_2	β_3
m	**1.00**	**0.00**	**0.00**
i	-0.10	**1.00**	**0.00**
wacc	0.77	0.73	**1.00**
y	**0.00**	**-1.00**	0.43
rw	-0.16	**0.00**	-0.06
w	-0.90	1.33	0.02

Over-identifying restrictions imposed (two over-identifying restrictions):

$\beta_{12} = -0.1$; $\beta_{16} = -0.9$;

LR test of restrictions: $\chi^2(2) = 0.10894$ [0.9470]

Together these relationships imply a general portfolio model of firms' behavior. A higher cost of capital induces NFCs to reduce investment in fixed capital and increase their purchases of other financial assets, which is likely to imply higher M&A activity. They become net purchasers of equity rather than net issuers. Part of the purchase of equity is financed through the running down of firms' other financial assets which implies a fall in the asset demand for money. The fall in investment spending will also reduce the transactions demand for money by NFCs.

3. *The simplified conditional VAR*

The next step is to map the conditional VAR into I(0) space and analyze the conditional VECM (Vector Error-Correction Mechanism). To this end we first defined three error correction terms m_t - *m**, i_t - *i** and the level of *wacc*. Employing tests suggested in Urbain (1992) we found that weak exogeneity assumptions seem legitimate and we could proceed with an analysis of a conditional VECM. We thus simplified the conditional VECM by excluding some of the variables that are jointly insignificant. Fitted values (against actual) from the resulting parsimonious VECM are shown in Figure 3 below, bottom panel. (Dlm1 indicates qoq growth in total liquid assets held by NFCs; DLI is the qoq growth in investment and DWACC indicates changes one quarter to another in the weighted cost of capital).

Figure 3. Fitted Versus Actual Values of the I(I) and I(0) Representations