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Monetary Policy Effects: New Evidence from the Italian Flow of Funds

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Abstract

New evidence on the transmission of monetary policy to the economy is provided through an analysis of the effects of monetary policy shocks on Italian flow of funds over the period 1980-2002. Firms reduce issuance of debt and decrease the acquisition of financial assets; we do not find support for the existence of financial frictions. Households, in the first quarter after the shock, increase short-tem liabilities, diminish the acquisition of liquid assets and of shares. Our results are coherent with the standard theoretical framework without being affected by commonly found empirical puzzles.

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1. Introduction

After Sims (1980) a vast literature assessed the effects of exogenous monetary policy shocks with vector auto-regression models (VAR). The impact of such shocks on the flows of borrowing and lending of the economic agents, such as firms, households and the public sector, has been inspected only partially. Following Christiano, Eichenbaum and Evans (1996), (CEE, 1996, hereinafter), we exploit Italian flow of funds to try to shed light on the behaviour of financing and investment decisions of the sectors of the economy in response to unexpected variations of the policy interest rate.

CEE (1996) studied the effects of U.S. monetary policy with a VAR model applied to the flow-of-funds data from 1961 to 1991. The data set chosen allowed an analysis of the variations of the financial assets and liabilities of each economic sector, and within those two aggregates, of the different classes of financial instruments. Despite the promising start, though, the literature, to our knowledge, did not pursue further this research line, probably because of the absence of historical time series of adequate length, frequency and level of detail.

The recent availability of reconstructed quarterly flow-of-funds time series for Italy from 1980, made possible for the first time to analyse the effects of monetary policy on the choices of financing and investment of the Italian economic sectors (namely non-financial firms, households, general government, financial firms and the foreign sector) with a VAR model, obtaining new empirical evidence on their heterogeneous response to the monetary policy shocks.

Our results for the main macroeconomic aggregates are consistent with the literature and do not seem to be affected by the empirical puzzles that plagued a number of works. Moreover, new features of the transmission of monetary policy shocks are provided. Non-financial firms decrease both acquisition of new financial assets and issuance of liabilities up to a year after the shock; there is no strong evidence in favour of financial frictions which would prevent firms from adjusting their nominal expenditures. Households, in the first quarter after the shock, increase short-tem liabilities, diminish the acquisition of liquid assets and of shares and increase that of securities. The public sector increases net borrowing until almost two years after the shock. All in all, Italian flow of funds seem quite useful in providing further insights into the empirical evaluation of the effects of monetary policy.

The paper is organized as follows. Section 2 recalls the results of the literature which are most relevant for our work. In Section 3 we describe our VAR model and the results for the main macroeconomic aggregates. Section 4 presents the Italian flow of funds. Section 5 reports the new features of the transmission of monetary policy obtained with the analysis of flow funds of the economic sectors. Conclusions are drawn in Section 6.

2. Measures of monetary policy shocks

2.1 Identification

Following CEE (1999) we adopt a recursive VAR (Vector Auto Regression) approach.[1] Our model includes the industrial production index (IP), the consumer

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[1] Details on the model are provided in Appendixes 1 and 2.

price index (P), the import price of raw materials in local currency (PIMP), the nominal exchange rate of the Italian lira vis-à-vis the German mark[2] (EXR), a policy interest rate, namely the repo rate[3] (R), and a monetary aggregate (M2). Variables in the y_t vector are ordered from the most exogenous to the most endogenous:

$$y'_t = (IP, PIMP, P, EXR, R, M2) \qquad (1)$$

All variables, except *EXR* and *R*, are seasonally adjusted.

The ordering in the y_t vector reflects our identifying assumption that policy shocks have only lagged effects on the first four variables in brackets in equation (1). We assume that these variables are in the information set of the central bank at the time the interest rate level is set. The monetary policy reacts contemporaneously to the non-policy variables ordered before our monetary policy measure (the repo rate, *R*). These variables, industrial production, prices, import price of raw materials and the exchange rate, in turn are assumed to react only with a lag to monetary policy. We include the exchange rate in our specification in line with the consideration that Italy can be regarded as a small open economy over the period observed.[4] We consider the money aggregate M2 to be the only policy variable, that is, the only

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[2] The exchange rate since January 1999 is a constant because of the adoption of the single currency.

[3] From 1980 to 1981: average interest rate on fixed term advances; from 1982 to 1998: auction rate on repurchase agreements between the Bank of Italy and credit institutions; from 1999 onwards: interest rate on main refinancing operations of the ECB. This latter interest rate does not present a particular break at the beginning of stage three of EMU with respect to the Italian repo rate, even of course the convergence of interest rates, begun since 1993, accelerated in 1998 (circumstance that we acknowledge with a dummy).

[4] The exchange rate, not the focus of this work, is regarded as a non-policy variable, in line with Neri (2004), because of the difficulties of monetary policy to influence contemporaneously the exchange rate, particularly in the first half of the eighties. We also checked for a treatment of the exchange rate as a policy variable without detecting significant changes in the results (See also note 11).

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variable reacting contemporaneously (i.e. within the same quarter) to monetary policy shock, but to which monetary policy reacts only with a lag.[5]

Our choice of the non-policy variables parallels the one adopted by Kim and Roubini (2000), who study the effects of monetary policy innovations on the G7 countries with a SVAR model and seems to deal successfully with the empirical puzzles that troubled the literature. We chose an interest rate as indicator of monetary policy in line with the approach of Bernanke and Blinder (1992) and with De Arcangelis and Di Giorgio (2001), who argue that interest rate indicators outperform the ones based on money aggregates in identifying Italian monetary policy shocks. In particular, we decided to use the interest rate on repurchase agreements between the Central bank and the credit institutions which, also according to Gaiotti (1999) and Gambacorta and Iannotti (2006), better describes the monetary policy operating procedures adopted by Bank of Italy.[6]

We included four lags in our VAR model driven by the selection criteria reported in Table 1 (LR and Final Prediction Error), in line with most quarterly VARs in the empirical literature. The VAR residuals show no autocorrelation (see LM test results in Table 2). Furthermore, the hypothesis of normality is not rejected at high significance levels for all the variables considered for the single equations of the VAR (see the Jarque-Bera test results in Table 3). Three point dummies were

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[5]　We chose not to perform cointegration analysis, in line with the empirical approach to modelling the effects of unexpected monetary usually employed in the literature. Secondly, according to Sims, Stock and Watson (1990) standard asymptotic tests are still valid if the VAR is estimated in levels, even if the variables are cointegrated.

[6]　We tried to use as alternative monetary policy indicators reserve aggregates in line with CEE (1996). Difficulties in interpretation of these data, particularly at the beginning of the '80s, put us in the same position of other authors who considered the monetary policy in those years to be not well described by a market-based approach, therefore we resorted only to interest rate indicators.

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included in the model, so to obtain white enough residuals in the six estimated equations.[7]

2.2 Assessing monetary policy shock measures

Our measure of exogenous shocks to monetary policy is an orthogonalised shock to the policy interest rate, i.e. the repo rate, R. Figure 1, where the shaded areas correspond to the recessions of the Italian economy as identified by Altissimo, Marchetti and Oneto (2000)[8], shows that the residuals of the interest rate equation fit with the recessions' chronology. The monetary policy is relatively tight in the period before each recession and the stance becomes easier during the recession period[9]. Our measure of monetary policy is also consistent with the period of monetary restriction from 1994 to 1996, during which inflationary pressures arising from the exit of the lira from the EMS exchange rate mechanism in 1992 and the depreciation shock in 1995 were counteracted (see Gaiotti, 1999).

To further check if we have correctly identified monetary policy shocks we control for the response to a one standard deviation increase in the monetary policy interest rate of the macroeconomic variables directly affected by monetary policy; in Figure 2 we report the impulse response functions.[10] The industrial production begins

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[7]   The three dummies are also related to the three more relevant perturbations of the monetary policy in the period observed. The dummy in the third quarter of 1992 accounts for the contraction of monetary policy during the exchange rate crisis of Fall 1992; the second dummy, in the first quarter of 1995, corresponds to the monetary restriction that contrasted inflationary pressures and the exchange rate depreciation; the dummy in the third quarter of 1998 considers the series of interest rate cuts put in place to achieve convergence of the national interest rates to the common level of the new currency area started in 1999.

[8]   The recessions identified are three, respectively between March 1980 and March 1983, March 1992 and July 1993, November 1995 and November 1996.

[9]   With the possible exception of the first period, when the policy rate is highly volatile.

[10]   The responses of the variables to a monetary policy shock were computed with 1000 Monte Carlo simulations over 16 quarters; following Sims and Zha (1999) the confidence bands are one

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to decline, though with initial limited significance, in the quarter following the shock and continues for about two years, then bouncing back to the pre-shock level three years after the shock. This result is consistent with empirical literature on Italy and other G7 countries. Prices, as measured by the consumer price index, decline starting two quarters after the shock so that no "price puzzle" is observed. The exchange rate appreciates (a lower value of EXR means an appreciation of the Italian currency), though with a limited statistical significance, reaching the maximum effect three quarters after the shock.[11] The money aggregate M2 declines immediately, consistently with the presence of a liquidity effect and then bounces back, losing statistical significance after a year; quite interestingly, this is also the period in which the response of the interest rate is significantly different from zero, i.e. the first four quarters following the shock.

In order to provide further evidence on the goodness of our identification of monetary policy shocks, we also examine the responses of the other most relevant macroeconomic aggregates not directly affected by monetary policy and not included in our benchmark VAR specification. As reported in Figure 3, private consumption declines slightly but persistently, reaching the maximum contraction after 5 quarters;

standard error wide, corresponding to a 68 per cent confidence interval, since "[…], for characterising likelihood shape, bands that correspond to 50% or 68% posterior probability are often more useful than 95% or 99% bands, and confidence intervals with such low coverage probabilities do not generally have posterior probabilities close to their coverage probabilities."

[11] This result attenuates the "exchange rate puzzle" documented in Chiades and Gambacorta (2004) and in De Arcangelis and Di Giorgio (2001), possibly due to the circumstance that the period analysed in this work includes also the years before 1984 and those after 1998. Given that we have no evidence of exchange rate puzzle we do not deem necessary to depart from the recursiveness assumption (which we prefer also for preserving comparability with CEE (1996) results) to allow simultaneous causality between the policy rate and the exchange rate as other authors did (see Clarida, Galì and Gertler, 1998, Dornbusch, Favero and Giavazzi , 1998, Gaiotti, 1999 and Smets, 1997) to address the puzzle given by a depreciation after a monetary restriction. Nevertheless, we allowed for simultaneous causality between the two rates adopting an identification scheme a la Kim and Roubini (2000) widely considered adequate to deal with the exchange rate puzzle, without detecting any relevant change in the impulse responses (results available on request).

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collective consumption, on the other hand, does not show a significant reaction, in line with the well-known low cyclicality of this variable in Italy. The decrease in gross fixed investments, probably due to the decrease in expected future profitability, is much more marked than that of private consumption, in line with theoretical priors. The unemployment rate also, as expected, has a small positive reaction to the monetary policy shock in the short-run. Real wages react negatively to the increase in the interest rate, coherently with the fall in production and the rise in unemployment; this result reconciles Italian evidence with the theory and with US stylized facts. The reaction of these macroeconomic variables support our identification of the repo rate as the monetary policy indicator, and strengthens our confidence in a correct identification of the monetary policy shocks.

In Table 4 the forecast error variance decomposition of each variable is reported at different time horizons. Interest rate policy shocks account at the peak for more than 20 per cent of fluctuations in industrial production, while they explain between 5 and 10 per cent of fluctuations in price level, exchange rate and import prices. Observing the results for the other relevant macroeconomic variables we can confirm that monetary policy is an important source of output fluctuations in our framework. Monetary policy shocks account for one third of the 2-years-ahead forecast error of fixed investment, and for about one fifth of private consumption and unemployment rate.

Overall the results are consistent with the theoretical predictions of the effects of unexpected monetary policy shocks and with the empirical literature on VAR models of the economy. Notably the results are not affected by significant "price puzzle", "liquidity puzzle" or "exchange rate puzzle".

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2.3 Robustness

We also explored, looking at the large literature, different specifications of the VAR model, but our main results stayed virtually unchanged as for the qualitative and quantitative responses of the model. In particular, we tried to consider different interest rates as policy rate, such as a short-term (three-month) interest rate, an overnight interest rate and different averages of these rates and of the repo rate. In alternative to industrial production, we also considered GDP measures. We tried also, in place of the money aggregate M2, to use other aggregates such as M1 and M3, with different measures, simple or moving averages, and different definitions of the same aggregate.[12] We explored also alternative measures of inflation (the GDP deflator) and of commodities prices (including oil or not) and, finally, a number of definitions of the exchange rate, effective, vis-à-vis the German Mark, the US Dollar, real or nominal. We tried to control also for the exogeneity of commodity prices, but we detected a worsening in the quality of the response of M2, without observing improvements in the response of the other variables, hence we preferred to assume commodity prices as endogenous. Finally, we also controlled for the exclusion of the last four years of the sample to account for the possible change in the monetary policy regime given by the start of the single currency area, even if we are not concerned with structural parameters, without detecting significant changes in our results.

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[12]   During the period of observation, apart for the major methodological break in 1999, when new monetary aggregates definitions were adopted, M2 witnessed changes in its definition, moreover different definitions of M1 are conceivable. Finally the two aggregates can be considered as evaluated at the end of each period, as averages, simple or moving, and seasonally adjusted or not.

3. Italian Flow of Funds

Flow-of-funds data enable us to examine the links among the financial positions of the different sectors of the economy, allowing to reconcile the identity of saving and real capital formation in any period for the economy as a whole, with the fact that at the same time individual spending units (sectors) have the option of investing (in real assets) more or less than they have saved. For each sector the difference between fixed investment and gross saving results in a change in the net financial position, also called "net lending/net borrowing", towards the rest of the economy (both domestic and foreign sectors). For sector i:

$$I^i - S^i = FL^i - FA^i = \textit{net funds raised} \qquad (1)$$

where S is saving, i.e. the excess of disposable income over consumption, I is tangible investment (fixed capital formation and changes in inventories), FL and FA are the net incurrence of financial liabilities and the net acquisition of financial assets, respectively. Since any financial asset is necessarily a liability to someone else, for the economy as a whole equation (1) reduces to the national accounts identity $S = I$.

We consider the following sectors: (i) households, (ii) non-financial firms, (iii) financial firms, (iv) general government, (v) foreign sector.[13] For each sector, besides net funds raised, we look at asset and liability components, FA and FL. Moreover, in

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[13] In the present work we consider a genuine "consumer" household sector, while in the Italian flow of funds the household sector comprises also "producer" households (small unincorporated firms and sole proprietorships with less than five employees). We prefer to include the latter among non-financial firms, so to include all the producer units in the non financial sector, regardless of firm size or of legal form. The other sectors are consistent with the ESA95 (European System of National Accounts) classification, which is also applied in the Italian flow of funds. Financial firms include banks, money market funds, financial auxiliaries and insurance corporations and pension funds (thus the Bank of Italy is not included). The general government sector includes central government, local

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the case of households and non-financial firms we provide further insight observing the responses of more disaggregate variables. For households, for example, we consider deposits (and cash), short-term securities, long-term securities, equity (both listed and unlisted) on the assets side and, on the liabilities side, we analyse short-term and long-term loans separately. For non-financial firms we focus on liabilities, distinguished between short-term and long-term liabilities, and further splitting this latter into equities and other long-term debts (corporate bonds and long-term loans).

As regards financial assets and liabilities of the various sectors, we take advantage of a recent reconstruction of the flow of funds data for Italy from 1980 done at the Bank of Italy[14]. Figure 4 presents the quarterly flow of funds data for Italy. Each graph shows net funds borrowed (positive values) or lent (negative values) by the sectors from 1980 to 2002. Not surprisingly for the Italian economy, households are net lenders over the whole period; the opposite is true for general government and, with very few exceptions, for non-financial firms.

4. Effects of monetary policy shocks on flow of funds

The use of VAR models to assess the effects of unexpected monetary policy shocks on the economic system has been very intense[15], here we briefly recall the main results of the works more relevant for our analysis.

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government and social security funds. The foreign sector includes all the non-resident units.

[14] In the former dataset time series showed a discontinuity in 1995 because of differences in the compilation methodology, in classification criteria and in the accounting principles introduced with the adoption of the ESA95.

[15] For a review of the literature see, among others, Bagliano and Favero (1998), Bernanke and Mihov (1998), Christiano, Eichenbaum and Evans (1999) (hereafter CEE, 1999), Kim (1999), Rudebusch (1998) and Walsh (2003).

The empirical evaluation of the response of borrowing and lending behaviour of different categories of economic agents to monetary policy shocks was first addressed by CEE (1996), with US flow of funds. One of their main results is that net funds raised by firms in the financial markets increase for about a year after a tightening of monetary policy, and begin to fall later when a recession takes place. The authors explain this finding with the existence of financial frictions, due to contracts in place, which would prevent firms from adjusting immediately their level of inventories to the new (lower) level of demand, as standard monetary business cycle models would predict. A second result is that households do not adjust their financial position to monetary policy shocks for a number of quarters, in line with the predictions of limited participation models that claim a certain degree of rigidity of households in adjusting their financial assets and liabilities. Finally, there appears to be a (surprising) temporary reduction in net lending of the government. The authors themselves deem this latter result to be "puzzling" and point, as a possible explanation for that, to a temporary increase in personal tax receipts, which vanishes after about a year, as the recession takes hold.

With regard to the extension of the CEE's approach to the Italian case, it's also worth recalling, as a benchmark for comparison, the main findings of the VAR models set up to investigate the monetary policy shocks transmission in Italy. Gaiotti (1999) shows that the interest rate on main refinancing operations of the Bank of Italy is a suitable measure of monetary policy in Italy[16] and with a structural VAR model finds that, following an unexpected increase in the policy interest rate, output

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[16] See Gaiotti (1999) also for a detailed description of the transmission of monetary policy in Italy from 1967 to 1997.

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and prices fall consistently with the evidence for other countries. De Arcangelis and Di Giorgio (2001) propose an identification method based on a detailed institutional analysis of the Italian monetary policy procedures (limited to the '90s) leading to choose the overnight interest rate as the most suitable monetary policy indicator. Dedola and Lippi (2005) analyse the monetary transmission mechanism with disaggregated industry data for Italy and other four industrialised countries, following CEE (1999) recursiveness assumption, and detect significant differences across industries. Interestingly for our focus on finance and investment decisions, sectors' output responses to monetary policy shocks are systematically related to the output durability, financing requirements, borrowing capacity and firm size of the different industries. Neri (2004) focuses on the relation between monetary policy and stock prices in the G-7 countries and Spain, with a structural VAR approach using a non recursive identification scheme. As to the study of the reaction of Italian firms to monetary policy shocks, Gaiotti and Generale (2002) estimate the effects of monetary policy on the investment behaviour of Italian firms with a panel data-set, finding that financial variables do actually matter.

Following CEE (1996), our aim is to assess the effects of monetary policy shocks (an unexpected increase of the policy interest rate of one standard deviation, equal to 92 basis points in our case) on the borrowing and lending activities of the sectors of the economy. To this purpose we analyse the flow of funds data to detect the dynamic response of non-financial firms, households, general government, financial firms and foreign sector. In order to achieve this goal we add as the last variable in the VAR the net borrowing (total, or by class of financial instrument) of the five sectors in turn, employing the so-called marginal method: this implies that monetary policy does not react in the short run to changes in the patterns of these

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variables, but that the behaviour of these classes of agents responds to monetary policy shocks within the quarter.

In the rest of this section we describe the empirical evidence we find on the borrowing and lending behaviour of the sectors of the Italian economy after an unexpected monetary policy restriction.

Non-financial firms. - Accumulation of assets decreases significantly in the first two quarters after the monetary shock and then the variation fades away. Total financial liabilities diminish for two years. Shares and other equity (unlisted) decline significantly for only one quarter while the decrease in the bonds and long-term loans is protracted for one year and a half. We do not observe a strong reaction to the monetary policy shock of the net flow of funds of the non-financial firms, as a result of two counterbalancing reactions on the asset and on the liability side respectively (Figure 5).

Following a contractionary monetary policy shock, CEE (1996) observed an increase in both firms' financial assets and liabilities (net borrowing also rises), pointing to some degree of inertia in the firms' level of nominal expenditures as a possible explanation.[17] Our results differ in many respects: except for a slight increase in the same quarter of the shock, the response of net funds raised is never significant. The reduction in firms' issuance of new debt is consistent both with the "money view" (standard IS/LM models) and with the "credit view" (e.g. Bernanke and Blinder, 1988) of the transmission mechanisms of monetary policy, and also

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[17] CEE (1996) found, actually, that in the United States there existed frictions that prevent firms from adjusting immediately their level of inventories to the new lower level of demand, as, on the contrary, standard monetary business cycle models would predict. See also Bernanke and Blinder (1992) and Gertler and Gilchrist (1993).

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with monetary business cycle models (Fuerst, 1994). Thus, we do not find evidence in support of costs' inertia, with the possible exception of a slight, and non significant, increase in short-term liabilities in the first three quarters. The fall we observe in the acquisition of new financial assets by firms, on the other hand, is also in line with standard predictions on the effects of a restrictive monetary policy shock.

Households. - Net funds borrowed by households decline significantly over the first year following the shock, therefore improving their net financial position, as a result of a smaller debt issuance and a larger amount of funds lent to other sectors (acquisition of new financial assets).

The strong evidence on net funds raised is the result of two opposite and weaker effects on the asset and on the liability side (Figure 6). The maximum effect on the flow of new financial liabilities is reached in the second quarter, while financial assets increase significantly only in the first quarter and then the positive effect vanishes. The responses of the flows of assets and liabilities of households were much stronger in CEE (1996). Among financial assets, currency, deposits and shares show a marked decline in the first quarter. The decrease of shares may be connected to the worsened perspectives for economic activity after the shock. Deposits might decrease because of an increase in their opportunity cost[18], if financial corporations do not adjust passive interest rates as quickly as the adjustment of the rates of alternative liquid instruments on the market, such as Treasury's short term securities.[19] Acquisition of short-term securities increases in the first quarter,

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[18]   Although in the Italian financial accounts there is no distinction between deposits and currency (that sum up to M1), we know from monetary statistics that, on average, currency in Italy in the period examined accounted for only one sixth of M1.

[19]   This could reflect some sluggishness in the response of bank deposit rates as found by

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displaying then a marked drop during the second year gradually reabsorbed; bonds, after an initial upsurge, do not react much to the shock. As for the liabilities, short-term loans increase in the first quarter, while long-term loans decrease significantly up to the third quarter.

Other sectors. - The picture of the effects of an unexpected tightening of monetary policy on the net financial flows of the other sectors can be gauged looking at the responses of the total net funds raised by every sector in Figure 7.

General government experiences a deterioration of the net financial position, increasing the financial resources borrowed by the other sectors. This result can be seen as a slight improvement with respect to CEE (1996), who found a decrease in the public deficit following a monetary shock, even if it might be not strong enough to reconcile the evidence with the budget worsening predicted from theory.

The limited relevance of the absolute level of the net funds raised by financial firms, given the globally compensating effects of borrowing and lending flows, and the high volatility shown (see Figure 4) do not allow us to derive clear implications for this sector.

The foreign sector's balance (see Figure 7) does not show a significant response, with the possible exception of a slight deterioration of the financial balance one year after the shock.

5. Conclusions

Gambacorta and Iannotti (2006), especially before the introduction of the Consolidated Law on Banking in 1993.

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From the analysis of the response of the Italian economic system to an unexpected one standard deviation increase of the policy interest rate, we reach the following conclusions.

The results of the VAR analysis for the main macroeconomic aggregates are consistent with the predictions of the theory and with the empirical literature. In the first four quarters industrial production decreases by around 0.40 percentage points, the price level declines by 0.11 per cent, while the money stock drops by 0.34 per cent. Our results are not affected by price, liquidity and exchange rate puzzles.

As far as sectorial responses are concerned, non-financial firms in the first four quarters decrease both financial assets and liabilities. We do not find evidence in favour of financial frictions which would prevent firms from adjusting their nominal expenditures. Firms behave as predicted by standard monetary models, reducing their liabilities after the shock. Households in the first quarter after the shock diminish the acquisition of liquid assets and of shares and increase that of securities. The public sector increases net borrowing until almost two years after the shock due to an increase in the burden of the service of the public debt and to a fall in tax receipts.

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Appendix 1: data description

VAR endogenous variables:

IP: log of seasonally adjusted industrial production index.

P: log of seasonally adjusted consumer price index.

P_IMP: log of seasonally adjusted import price of raw materials (in local currency).

EXR: log of nominal exchange rate (ITL per DM; from 1999 it is a constant).

R: short-term interest rate (from 1980 to 1981: average interest rate on fixed term advances; from 1982 to 1998: auction rate on repurchase agreements between the Bank of Italy and credit institutions; from 1999 onwards: interest rate on main refinancing operations of the ECB).

M2: log of seasonally adjusted monetary aggregate M2.

VAR endogenous variables' graphs
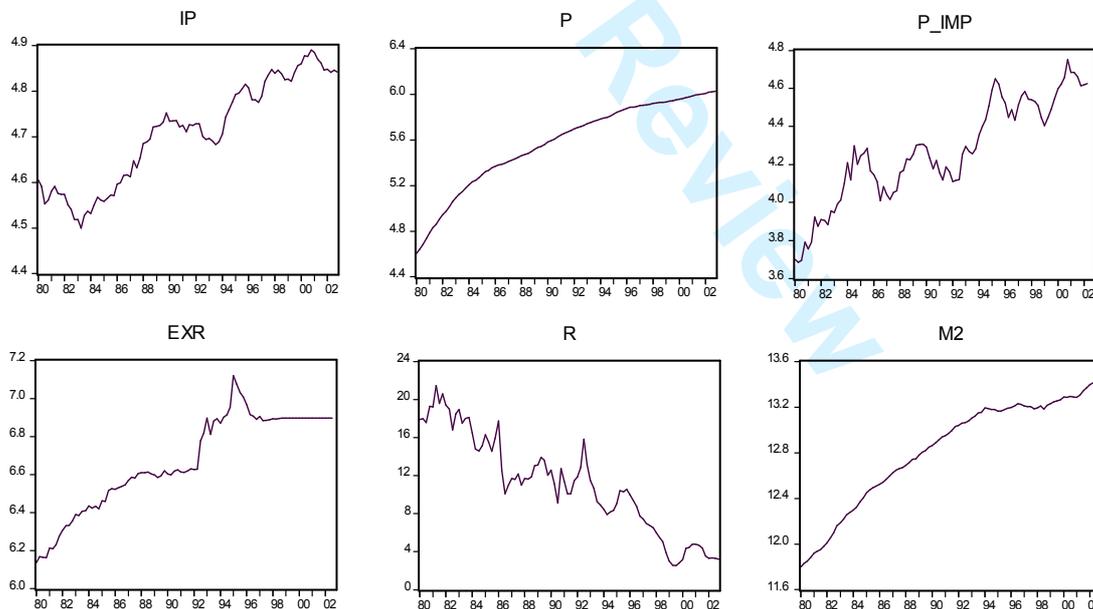
Financial accounts series (converted to billions of 1995 ITL using the gdp deflator, and seasonally adjusted):

- non-financial corporations: net funds raised (NFNET=NFTLI-NFTAS), total financial assets (NFTAS), total financial liabilities (NFTLI), short term liabilities (NFSLI), long-term liabilities (NFLLI=NFELI+NFDLI), shares and other equity (NFELI), other long-term debt (NFDLI), short-term liabilities (NFSLI=NFTLI-NFLLI);

- financial corporations: net funds raised (FCNET=FCTLI-FCTAS), total financial assets (FCTAS), total financial liabilities (FCTLI);

- households: net funds raised (HTNET=HTTLI-HTTAS), total financial assets (HTTAS), currency and deposits (HTDAS), short-term securities (HTSAS), long-term securities (HTBAS), shares and other equity (HTEAS), total financial liabilities (HTTLI), short-term loans (HTSLI), long-term loans (HTLLI);

- general government: net funds raised (GGNET=GGTLI-GGTAS), total financial assets (GGTAS), total financial liabilities (GGTLI);

- rest of the world: net funds raised (RWNET=RWTLI-RWTAS), total financial assets (RWTAS), total financial liabilities (RWTLI).

Appendix 2: methodological issues

We assume the economy to be described by a structural form equation like the following:

$$A(L)y_t = u_t \tag{1}$$

where $A(L)$ is a matrix polynomial in the lag operator L, i.e. $A(L) = A_0 + A_1 L + A_2 L^2 + \ldots$, y_t is an n×1 vector containing the variables of interest, and u_t is an n×1 structural disturbances vector. Let $\Omega = \text{var}(u_t) = E[u_t u_t']$ be the n×n variance-covariance matrix of the *structural disturbances*; since u_t are assumed to be mutually uncorrelated, the matrix Ω is diagonal, the n diagonal elements being the variances of the n structural disturbances.

Writing (1) in reduced form gives the following representation:

$$y_t = B(L)y_t + e_t \tag{2}$$

which can be estimated using OLS equation by equation. $B(L)$ is a matrix polynomial in the lag operator L and the e_t terms in equation (2) are the VAR (reduced-form) *residuals* resulting from the estimation of the n regressions. We call $\Sigma = \text{var}(e_t) = E[e_t e_t']$ the variance-covariance matrix of the residuals.

Stopping for simplicity to a lag polynomial of order 2, eq. (1) is $A_0 y_t = -A_1 y_{t-1} - A_2 y_{t-2} + u_t$, with reduced form $y_t = -\left(A_0^{-1} A_1\right)y_{t-1} - \left(A_0^{-1} A_2\right)y_{t-2} + A_0^{-1} u_t$, that is representation (2) with $B(L) = -\left(A_0^{-1} A_1 L + A_0^{-1} A_2 L^2\right)$; besides, it is straightforward to notice that the structural disturbances u_t and the reduced form residuals e_t are related by:

$$e_t = A_0^{-1} u_t \tag{3}$$

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where the coefficients in the A_0 matrix are those of the contemporaneous relations among the variables in the y_t vector. From eq. (3) and remembering that $\mathrm{var}(e_t) = \Sigma$ and $\mathrm{var}(u_t) = \Omega$, we can easily derive $\mathrm{var}(e_t) = E(e_t e')_t = E(A_0^{-1} u_t u' A_0^{-1'}) = A_0^{-1} E(u_t u_t') A_0^{-1'}$, and thus:

$$\Sigma = A_0^{-1} \Omega A_0^{-1'} \tag{4}$$

The issue is now to recover the parameters in the structural form equations (1) from the coefficients estimated in the reduced form equations (2). Sample estimates of Σ can be used in order to obtain maximum likelihood estimates of Ω and A_0. Given that Σ is a n×n symmetrical matrix, it contains n×(n+1)/2 parameters, which can be estimated via OLS. On the right-hand side of eq. (4), instead, there are n^2 parameters to be estimated in A_0 and n in Ω, that is, a total of n×(n+1) free parameters. This means that we need at least [n×(n+1)– n×(n+1)/2] = n×(n+1)/2 additional restrictions on the right-hand side of eq. (4) in order to achieve identification (n of those restrictions can simply be derived normalising to 1 the diagonal elements of A_0), so that n×(n-1)/2 further restrictions are left.

We make use of a Choleski factorisation in order to orthogonalize the residual covariance matrix Σ. In practice, this corresponds to imposing just n×(n-1)/2 restrictions on the matrix A_0, that is supposed to be lower triangular (all the upper diagonal elements are set to be 0); as a result, the VAR is just identified.

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Appendix 3: Figures and Tables

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Fig. 1 – Estimated interest rate policy shocks
(three-quarters centered moving average)

Fig. 2 – Responses to a contractionary monetary policy shock: VAR variables

Note: estimated impulse responses to a one standard deviation increase in the short term interest rate. The dashed lines are ± 1 standard error bands, computed by means of Monte Carlo integration, following Sims and Zha (1999).

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Fig. 3 – Responses to a contractionary monetary policy shock: other macro variables

Private consumption

Collective consumption

Gross fixed investment

Unemployment rate

Quarters after shock

Wages

Quarters after shock

Note: the estimated impulse responses were estimated from 7-variable VARs in which we added one of the above variables, in turn, to the original 6-variable VAR, placing it in the last position. The dashed lines are ± 1 standard error bands, computed by means of Monte Carlo integration, following Sims and Zha (1999).

Fig. 4 – Flow of funds data: net funds raised by sectors
(converted to billions of 1995 ITL using the gdp deflator and seasonally adjusted)

Fig. 5 – Responses to a contractionary monetary policy shock: non-financial firms

Net funds raised

Total financial assets

Total financial liabilities

Short-term liabilities

Long-term liabilities

Liabilities: shares and other equity

Liabilities: other long-term debt

Quarters after shock

Quarters after shock

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Fig. 6 – Responses to a contractionary monetary policy shock: households

Fig. 7 – Responses of the flow-of-funds data to a contractionary monetary policy shock

Note: the estimated impulse responses were estimated from 7-variable VARs in which we added one of the above variables, in turn, to the original 6-variable VAR, placing it in the last position. Dashed lines are ± 1 Monte Carlo standard error bands.

Table 1

VAR diagnostic tests: lag order selection

Lag	LogL	LR	FPE	AIC
0	325.650	NA	3.33e-11	-7.09766
1	1090.81	1350.27	1.19e-18	-24.2543
2	1128.94	61.9144	1.15e-18	-24.3046
3	1168.47	58.5918	1.11e-18	-24.3875
4	1208.92	54.2555*	1.08e-18*	-24.4923
5	1246.37	44.9327	1.19e-18	-24.5263*

(*) indicates lag order selected by the specific criterion. LR: sequential modified LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion.

Table 2

VAR diagnostic tests: autocorrelation LM test
(H_0: no serial correlation at lag order h)

Lags	LM-Stat	Prob.
1	42.3	0.22
2	36.5	0.45
3	43.1	0.19
4	38.7	0.35
5	23.6	0.94
6	40.0	0.30
7	30.9	0.71
8	31.3	0.69

Probs from chi-square with 36 d.o.f.

Table 3

VAR diagnostic tests: residual descriptive statistics and normality test

Residuals from equation for:	Industrial production	Price level	Import price	Exchange rate	Interest rate	M2
Mean	2.32E-15	-1.25E-15	1.96E-13	3.91E-14	-3.64E-12	-8.03E-15
Median	-0.0007	6.39E-05	0.0013	0.0004	-0.0006	-0.0004
Max	0.0273	0.0083	0.1076	0.0446	2.7194	0.0230
Min	-0.0246	-0.0085	-0.0967	-0.0502	-2.2028	-0.0255
Std. Dev.	0.0090	0.0030	0.0418	0.0177	0.9212	0.0093
Sum	2.00E-13	-1.07E-13	1.69E-11	3.36E-12	-3.13E-10	-6.91E-13
Sum Sq. Dev.	0.0069	0.0007	0.1487	0.0266	72.133	0.0074
Observations	86	86	86	86	86	86
Skewness	0.237	-0.208	0.041	0.063	0.125	0.133
Kurtosis	3.496	3.186	2.821	3.835	3.587	3.469
Jarque-Bera	1.687	0.744	0.139	2.558	1.461	1.046
Probability	0.430	0.689	0.933	0.278	0.482	0.593

Table 4

Forecast error variance decomposition due to monetary policy shocks

Variable name	1 quarter	2 quarters	1 year	2 years	3 years
VAR variables					
Industrial production	0.0 (1.2)	0.4 (1.6)	3.5 (4.3)	21.9 (10.1)	22.9 (10.2)
Price level	0.0 (0.7)	0.4 (1.7)	3.4 (4.4)	5.6 (6.7)	9.3 (8.9)
Import price	0.0 (1.2)	0.6 (1.9)	2.5 (3.9)	10.6 (7.8)	10.3 (7.6)
Exchange rate	0.5 (1.3)	0.4 (1.4)	3.2 (3.7)	5.1 (4.2)	4.0 (5.2)
M2	3.6 (4.2)	4.2 (4.8)	6.5 (7.0)	4.7 (6.5)	3.6 (6.1)
Other aggregates [*]					
Unemployment rate	9.2 (6.0)	9.8 (7.0)	13.0 (7.8)	15.7 (9.1)	17.0 (10.1)
Gross fixed investment	0.1 (1.7)	1.3 (2.5)	8.9 (6.9)	28.6 (12.2)	31.5 (12.6)
Real wages	4.4 (3.9)	5.7 (5.0)	7.6 (6.5)	5.9 (5.8)	7.0 (6.4)
Private consumption	0.1 (1.6)	0.3 (2.0)	8.1 (6.2)	15.5 (9.4)	15.8 (9.8)

[*] Each variable was added as the last one to the original 6 variables VAR.

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Appendix not for publication

We report below the two set of figures with the impulse responses functions obtained with the Choleski (recursive) identification scheme adopted in the paper and with a non recursive identification scheme *a-la* Kim and Roubini (2000). The latter identification scheme allows contemporaneous interaction between the exchange rate and the policy rate in line with the idea that Italian monetary policy reacted to the exchange rate; the over-identifying restrictions are the following:

$$y'_t = (IP, PIMP, P, EXR, R, M2)$$

$$A_0 = \begin{bmatrix} a_{11} & 0 & 0 & 0 & 0 & 0 \\ 0 & a_{22} & 0 & 0 & 0 & 0 \\ a_{31} & 0 & a_{33} & 0 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & a_{44} & a_{45} & a_{a6} \\ 0 & a_{52} & 0 & a_{54} & a_{55} & a_{56} \\ a_{61} & 0 & a_{63} & 0 & a_{65} & a_{66} \end{bmatrix}$$

the coefficients in A_0 being, as usual, those of the contemporaneous relations among the variables in the y_t vector.

Commodity prices are exogenous; the exchange rate reacts contemporaneously to the interest rate as well as to all the other variables accordingly to its forward-looking nature. The money supply equation indicates that the central bank reacts to the exchange rate and to the money demand. In the money demand equation we assume no reaction to commodity prices and exchange rate.

The comparison of the two sets of figures shows that the recursive identification scheme we adopted in the paper (Fig. 1) does not lead to significant differences in the response of the variables with respect to the over-identified scheme that allows for the contemporaneous interaction of the exchange rate and the policy rate (Fig. 2). All in all considering the exchange rate, as non reacting contemporaneously to the policy rate, because of the difficulties of monetary policy to influence the exchange rate, particularly in the first half of the eighties, does not seem to impair our results.

Fig. 1

IRFs with the recursive identification scheme
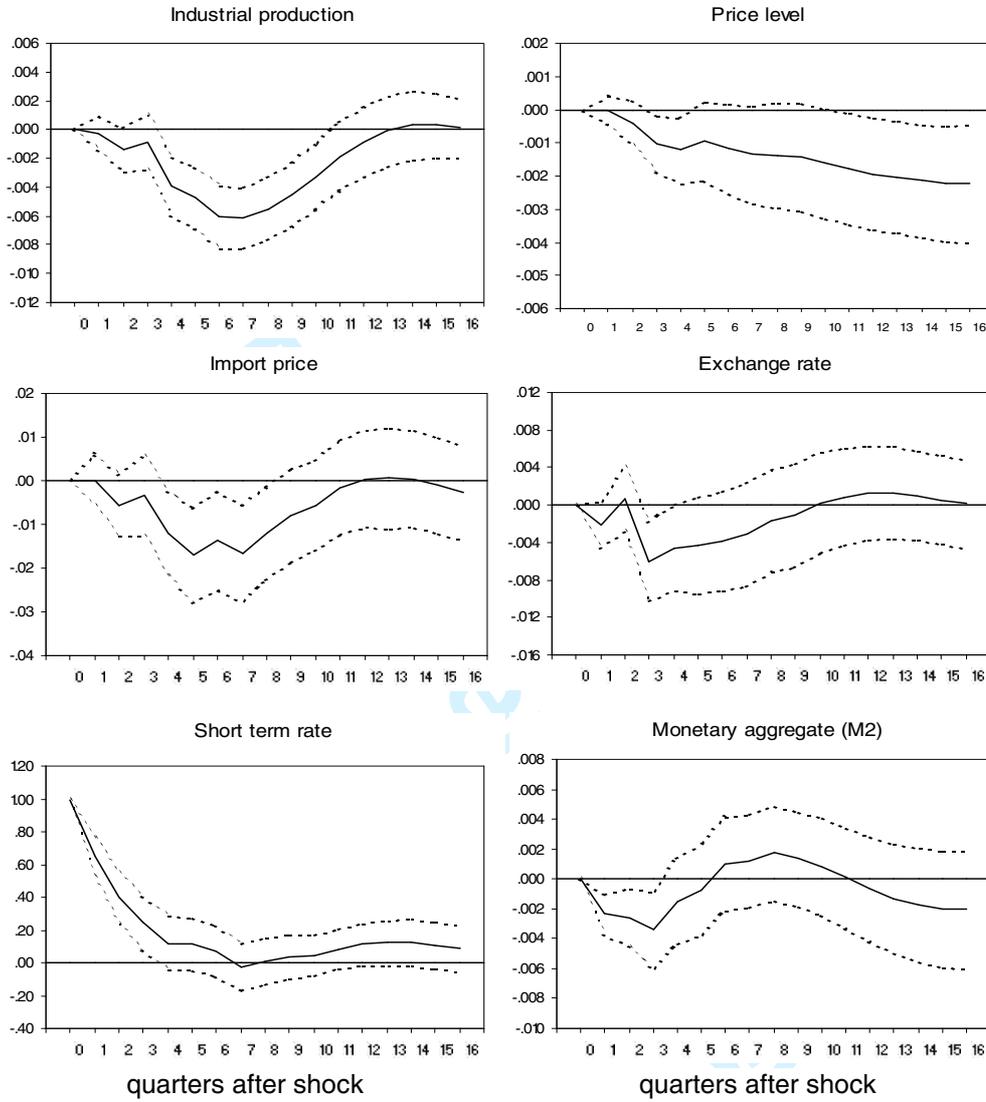
Fig. 2

IRFs with the structural identification
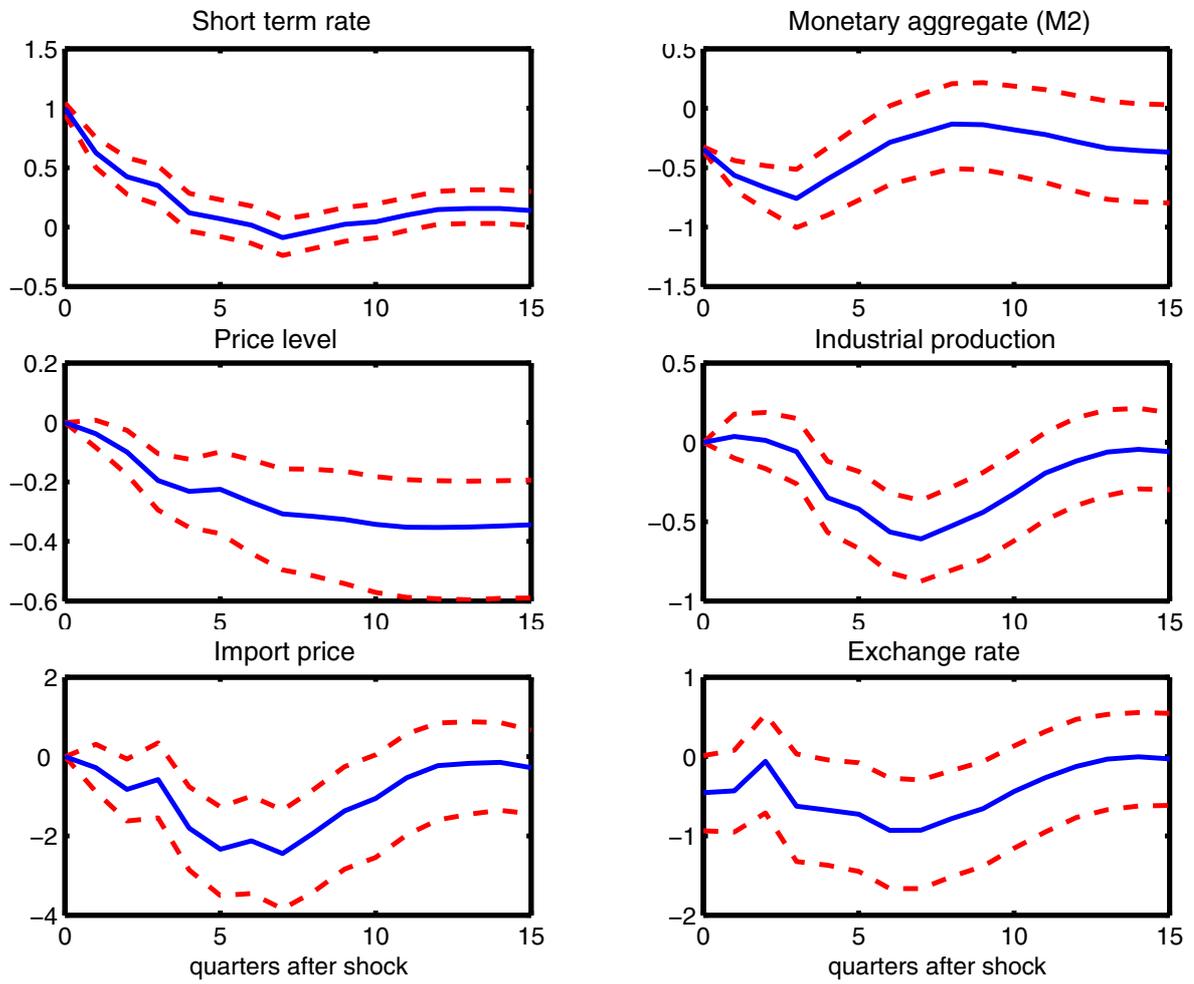
Monetary Policy Effects: New Evidence from the Italian Flow of Funds

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Abstract

New evidence on the transmission of monetary policy to the economy is provided through an analysis of the effects of a restrictive monetary policy shock on Italian flow of funds over the period 1980-2002. Firms reduce issuance of debt and decrease the acquisition of financial assets, providing no support for the existence of strong financial frictions. Following the shock, in the first quarter households increase short-tem liabilities and diminish the acquisition of liquid assets and shares. The public sector increases net borrowing for over the first two years. Financial corporations decrease their borrowing for three quarters while during the same period the foreign sector increases borrowed funds. We claim that our results shed new light on the role of financial decisions of the economic sectors in the transmission mechanism of monetary policy.

JEL classification: E32; E52.
Keywords: flow of funds, monetary policy, VAR.

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1. Introduction

After Sims (1980) a vast literature assessed the effects of exogenous monetary policy shocks with vector auto-regression models (VAR). Nevertheless, the impact of such shocks on the flows of borrowing and lending of the economic agents, such as firms, households and the public sector, has been less investigated, even though Bernanke and Gertler (1989) showed that the condition of borrowers' balance sheets is a potential source of output dynamics and that shocks to borrowers' net worth may initiate fluctuations. This interaction between real and financial factors motivates our analysis of the financial behaviour of economic agents after a monetary policy shock. Moreover, Christiano et al. (2007) have recently showed that the financial frictions, as modelled in Bernanke, Gertler and Gilchrist (1999), have an important role in amplifying the transmission of monetary policy shocks. Hence, following Christiano et al. (1996), we make use of Italian flow-of-funds data to shed light on the behaviour of financing and investment decisions of the sectors of the economy in response to unexpected variations of the policy interest rate.

Christiano et al. (1996) studied the effects of U.S. monetary policy with a VAR model applied to the flow-of-funds data from 1961 to 1991. The data set chosen allowed an analysis of the variations of the financial assets and liabilities of each economic sector, and within those two aggregates, of the different classes of financial instruments. Despite the promising start, though, the literature, to our knowledge, did not pursue further this research line, probably due to the absence of time series of adequate length, frequency and level of detail. The recent availability of reconstructed quarterly flow-of-funds time series for Italy as of 1980, made possible for the first time to analyse the effects of monetary policy on the choices of financing and investment of the economic sectors classified in the Italian flows of

funds (namely non-financial firms, households, general government, financial corporations, plus the foreign sector) with a VAR model. As a result, we find new empirical evidence on the heterogeneous responses of the different sectors to monetary policy shocks.

Our results for the main macroeconomic aggregates (our VAR model also includes variables such as output and the price level) are consistent with the literature and do not seem to be affected by the empirical puzzles that plagued a number of works. Moreover, new features of the transmission of monetary policy shocks are provided through the analysis of the flow of funds responses. Non-financial firms decrease both acquisition of new financial assets and issuance of liabilities up to a year after the shock; there is no strong evidence in favour of financial frictions which would prevent firms from adjusting their nominal expenditures. Households, in the first quarter after the shock, increase short-tem liabilities, diminish the acquisition of liquid assets and shares and increase the amount of securities in their portfolio. The public sector increases net borrowing (in other words, public deficit increases) until almost two years after the shock. Financial corporations decrease the funds borrowed up to three quarters, while during the same period the foreign sector increases the amount of funds borrowed (i.e. the Italian net external position improves). This evidence gathered observing the response of Italian flow of funds to a restrictive monetary shock, in particular that on firms and households, provides new insights into the behaviour of financial variables that may be usefully taken into consideration in the assessment of the effects of monetary policy on the economy.

The paper is organized as follows. Section 2 explains how we measure monetary policy shocks in our VAR model. In section 3 the Italian flow of funds are described. Section 4 reports the new features of the transmission of monetary policy obtained with the present analysis. Conclusions are drawn in Section 5.

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2. Measures of monetary policy shocks

2.1 Identification

To identify monetary policy shocks we adopt a recursive VAR approach, following Christiano et al. (1999).[1] Our model includes the industrial production index (IP), the consumer price index (P), the import price of raw materials[2] (P_IMP), the nominal exchange rate of the Italian lira vis-à-vis the German mark[3] (EXR), a policy interest rate, namely the repo rate[4] (R), and a monetary aggregate (M2). Variables in the y_t vector are ordered from the most exogenous to the most endogenous:

$$y_t' = (IP, P, P\_IMP, EXR, R, M2) \qquad (1)$$

All variables, except *EXR* and *R*, are seasonally adjusted.

The ordering in the y_t vector reflects our identifying assumption that policy shocks have only lagged effects on the first four variables in equation (1).[5] We assume that these variables are in the information set of the central bank at the time the interest rate level is set, so that monetary policy reacts contemporaneously to the non-policy variables ordered before our monetary policy measure (the repo rate, *R*). These variables, industrial production, prices, import price of raw materials and the exchange rate, are assumed in turn to react only with a lag to monetary policy. We include the exchange rate in our specification in line with

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[1]   Details on the model are provided in Appendixes 1 and 2.

[2]   In local currency.

[3]   The exchange rate since January 1999 is a constant because of the adoption of the single currency.

[4]   From 1980 to 1981: average interest rate on fixed term advances; from 1982 to 1998: auction rate on repurchase agreements between the Bank of Italy and credit institutions; from 1999 onwards: interest rate on main refinancing operations of the ECB. This latter interest rate does not present a particular break at the beginning of stage three of EMU with respect to the Italian repo rate, even if the convergence of interest rates, begun since 1993, accelerated in 1998 (circumstance that we acknowledge with a dummy variable).

[5] Christiano et al.(1999) demonstrate that in a VAR the dynamic responses of the variables to a monetary policy shock is invariant to their ordering in the non policy and policy blocks, while the distinction between non policy and policy variables matters.

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the consideration that Italy can be regarded as a small open economy over the period observed. The exchange rate, not the focus of this work, is regarded as a non-policy variable because of the difficulties for monetary policy to influence such variable contemporaneously, particularly in the first half of the Eighties. Moreover, as explained in the next section, we did not find compelling evidence in favour of the inclusion of the exchange rate puzzle among the policy variables.[6] We consider the monetary aggregate M2 to be the only policy variable, that is, the only variable reacting contemporaneously (within the same quarter) to the monetary policy shock to R, but to which monetary policy reacts only with a lag.[7]

Our choice of the non-policy variables parallels that of Kim and Roubini (2000), who study the effects of monetary policy innovations on the G7 countries with a SVAR (structural VAR) model and seem to deal successfully with the empirical puzzles that troubled the literature. We chose an interest rate as indicator of monetary policy in line with the approach of Bernanke and Blinder (1992) and of De Arcangelis and Di Giorgio (2001), who argue that interest rate indicators outperform the ones based on monetary aggregates in identifying Italian monetary policy shocks. In particular, we decided to use the interest rate on repurchase agreements between the Central Bank and the credit institutions which, also

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[6]   We also checked for a treatment of the exchange rate as a policy variable without detecting significant changes in the results (see also note 13 and Neri, 2004).

[7]   Some of the variables in our specification are non stationary (see graphs in Appendix 1), nevertheless we chose not to impose cointegrating relations, in line with the empirical approach to model the effects of unexpected monetary policy shocks of the literature (see for instance Bagliano and Favero, 1998), loosing some efficiency but without impairing the consistency of the estimators or arising issues of misspecification. This approach hinges on Sims, Stock and Watson (1990) who demonstrate that standard asymptotic tests are still valid if the VAR is estimated in levels, even if some the variables display unit roots (see also Hamilton, 1994). Moreover we focus, like the comparable literature, on the short-run dynamic responses and not on the long-run dynamics.

according to Gaiotti (1999) and Gambacorta and Iannotti (2007), better describes the

monetary policy operating procedures at the Bank of Italy.[8]

We included four lags in our VAR model, driven by the selection criteria reported in

Table 1 (LR and Final Prediction Error), in line with most quarterly VARs in the empirical

literature. The VAR residuals show no autocorrelation (see LM test results in Table 2).

Furthermore, the hypothesis of normality is not rejected at high significance levels for all the

variables considered for the single equations of the VAR (see the Jarque-Bera test results in

Table 3). Three point dummies were included in the model, in order to obtain well behaved

residuals in the six estimated equations.[9]

2.2 Assessing monetary policy shock measures

We measure monetary policy shocks with an orthogonalised shock to the policy

interest rate R; the residuals of the interest rate equation fit quite well with the recessions'

chronology (Fig. 1).[10] To further check if we have correctly identified monetary policy

shocks we show the impulse response functions of the macroeconomic variables directly

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[8]   We tried to use as alternative monetary policy indicators like reserve aggregates, in line with Christian et al. (1996). Difficulties in interpretation of these data, particularly at the beginning of the '80s, put us in the same position of De Arcangelis and Di Giorgio (2001) who considered the monetary policy in those years to be not well described by a market-based approach. Therefore we resorted only to interest rate indicators.

[9] The three dummies are also related to the three more relevant perturbations of the monetary policy in the period observed. The dummy in the third quarter of 1992 accounts for the contraction of monetary policy during the exchange rate crisis of Fall 1992; the second dummy, in the first quarter of 1995, corresponds to the monetary restriction that contrasted inflationary pressures and the exchange rate depreciation; the dummy in the third quarter of 1998 considers the series of interest rate cuts put in place to achieve convergence of the national interest rates to the common level of the new currency area started in 1999.

[10] In Figure 1 the shaded areas correspond to the three recessions of the Italian economy as identified by Altissimo, Marchetti and Oneto (2000), respectively between March 1980 and March 1983, March 1992 and July 1993, November 1995 and November 1996. The monetary policy is relatively tight in the period before each recession and the stance becomes looser during the recession period (with the possible exception of the first period, when the policy rate is highly volatile). Our measure of monetary policy is also consistent with the period of monetary restriction from 1994 to 1996, during which inflationary pressures arising from the exit of the lira from the EMS exchange rate mechanism in 1992 and the depreciation shock in 1995 were counteracted (see Gaiotti, 1999).

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affected by monetary policy (Fig. 2).[11] The industrial production declines, prices decline,[12]

the exchange rate appreciates,[13] the monetary aggregate M2 declines immediately.[14] Also the

responses of other relevant macroeconomic aggregates not directly affected by monetary

policy are in line with theoretical priors. After the shock private consumption declines, while

collective consumption does not show a significant reaction and gross fixed investment

declines more remarkably (Fig. 3); the unemployment rate increases, while real wages

decline, reconciling Italian evidence with the theory and with US stylized facts. The reaction

of the macroeconomic variables thus supports our identification of the monetary policy

shocks. The forecast error variance decomposition of each variable at different time horizons

(Table 4) confirms that monetary policy is an important source of output fluctuations in our

model. All in all, these checks confirm that our results are consistent with the theory on the

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[11] The responses of the variables to a monetary policy shock were computed with 1000 Monte Carlo simulations over 16 quarters; following Sims and Zha (1999) the confidence bands are one standard error wide, corresponding to a 68 per cent confidence interval, since "[…], for characterising likelihood shape, bands that correspond to 50% or 68% posterior probability are often more useful than 95% or 99% bands, and confidence intervals with such low coverage probabilities do not generally have posterior probabilities close to their coverage probabilities."

[12] We don't find what is known in the literature as the "price puzzle", that is an increase in the price level (measured by the consumer price index), after a monetary restriction, contrary to the theory that predicts instead a decrease (see Kim and Roubini, 2000). The inclusion of the price of imported raw materials between the endogenous variables has the scope of tackling the price puzzle. This is in line with Christiano et al. (1996) who include the price of commodities, along the conjecture of Sims (1992), to take into account inflation indicators in the reaction function of the central bank that may be missing from the VAR model.

[13] This result allows our results to be exempt from the "exchange rate puzzle" (also excluding from the sample the last four years when the exchange rate is constant), that is an impact depreciation of the currency after a monetary contraction (see Sims, 1992, and for Italy Chiades and Gambacorta, 2004 and De Arcangelis and Di Giorgio, 2001), mainly we believe for the different identification scheme adopted and the inclusion of the price of imported raw material, given that also a restriction of the sample to the years examined in the two quoted works on Italy does not change our results. Since we have no evidence of exchange rate puzzle, though with a limited statistical significance, we did not deem necessary to depart from the recursiveness assumption (which we prefer also for preserving comparability with Christiano et al. (1996) results to allow simultaneous causality between the policy rate and the exchange rate as other authors did to address the puzzle (see Clarida, Galì and Gertler, 1998, Dornbusch, Favero and Giavazzi, 1998, Gaiotti, 1999 and Smets, 1997). Nevertheless for robustness sake we allowed for simultaneous causality between the two rates adopting an identification scheme a la Kim and Roubini (2000) widely considered adequate to deal with the exchange rate puzzle, without detecting any relevant change in the impulse responses (results available on request).

[14] Consistently with the presence of a liquidity effect we have no evidence of the "liquidity puzzle" previously found in the literature, i.e. when monetary policy shocks are identified as innovations in monetary aggregates and innovations appear to be associated with increases rather than decreases in nominal interest

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effects of unexpected monetary policy shocks and with the empirical literature[15] without being affected by significant empirical puzzles.

2.3 Robustness

We also explored, inspired by the vast literature, different specifications of the VAR model, but our main results stayed virtually unchanged as for the qualitative and quantitative responses of the model. In particular, we tried to consider different interest rates as policy rate, such as the three-month interest rate, the overnight interest rate and different averages of these rates and of the repo rate. In alternative to industrial production, we also considered GDP measures. We tried also, in place of M2, to use other monetary aggregates such as M1 and M3, both raw data and moving averages, and using different definitions of each aggregate.[16] We explored also alternative measures of inflation (the GDP deflator) and of commodities prices (including oil or not) and a number of definitions of the exchange rate, effective, vis-à-vis the German Mark, the US Dollar, real or nominal. We tried to control also for the exogeneity of commodity prices, but we detected a worsening in the quality of the response of the monetary aggregate, without observing improvements in the response of the other variables; hence we preferred to assume commodity prices as endogenous. Finally, even though we are not concerned with structural parameters at this stage, we also controlled for the exclusion of the last four years of the sample, to account for a possible change in the

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rates. The inclusion as a policy variable of the monetary aggregate M2, following among others the suggestion of Leeper and Roush (2003) has precisely the role of avoiding the insurgence of the liquidity puzzle.

[15] Notably for Italy, Gaiotti (1999) describes in detail the transmission of monetary policy from 1967 to 1997.

[16] During the period of observation, apart for the major methodological break in 1999 when new monetary aggregates definitions were adopted, M2 witnessed changes in its definition; moreover different definitions of M1 are conceivable. Finally the two monetary aggregates can be considered as evaluated at the end of each period, as (simple or moving) averages, and seasonally adjusted or not.

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monetary policy regime given by the start of the single currency area, without detecting

significant changes in our results[17].

3. Italian Flow of Funds

Flow-of-funds data enable us to examine the links among the financial positions of the

different sectors of the economy, allowing to reconcile the identity of saving and real capital

formation in any period for the economy as a whole, with the fact that at the same time

individual spending units (sectors) have the option of investing (in real assets) more or less

than they have saved. For each sector the difference between fixed investment and gross

saving results in a change in the net financial position, also called "net lending/net

borrowing", towards the rest of the economy (both domestic and foreign sectors). For sector i:

$$I^i - S^i = FL^i - FA^i = \textit{net funds raised} \qquad (1)$$

where S is saving, i.e. the excess of disposable income over consumption, I is tangible

investment (fixed capital formation and changes in inventories), FL and FA are the net

incurrence of financial liabilities and the net acquisition of financial assets, respectively.

Since any financial asset is necessarily a liability to someone else, for the economy as a

whole equation (1) reduces to the national accounts identity $S = I$ [18].

We consider the following sectors: (i) households, (ii) non-financial firms, (iii)

financial corporations, (iv) general government, (v) foreign sector.[19] For each sector, besides

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[17] This fact may be due to the average small size of the estimated policy interest rate shock in the four years considered relative to that in the previous part of the sample.

[18] The presence of the foreign sector characterizes Italy as an open economy.

[19] In the present work we consider a genuine "consumer" household sector, while in the Italian flow of funds the household sector comprises also "producer" households (small unincorporated firms and sole proprietorships with less than five employees). We prefer to include the latter among non-financial firms, so to include all the producer units in the non financial sector, regardless of firm size or of legal form. The other

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net funds raised, we look at assets and liabilities components, *FA* and *FL*. Moreover, in the case of households and non-financial firms we provide further insight observing the responses of financial transactions at a more disaggregated level. For households we consider deposits (and cash), short-term securities, long-term securities, equity (both listed and unlisted) on the asset side; short-term and long-term loans separately on the liability side. In the case of non-financial firms we focus mainly on liabilities, distinguishing between short-term and long-term debt, and further splitting the latter into equity and other long-term debt (corporate bonds and long-term loans).

Our dataset exploits a recent reconstruction of quarterly flow-of-funds data for Italy from 1980, done at the Bank of Italy[20]. These data are reported in Figure 4, where each graph shows net funds borrowed (positive values) or lent (negative values) by the different sectors over the period 1980-2002. Not surprisingly for the Italian economy, households are net lenders over the whole period; the opposite happens for the general government and also, with very few exceptions, for non-financial firms.

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sectors are consistent with the ESA95 (European System of National Accounts) classification, which is also applied in the Italian flow of funds. Financial firms include banks, money market funds, financial auxiliaries and insurance corporations and pension funds (the Bank of Italy is excluded). The general government sector includes central government, local government and social security funds. The foreign sector includes all the non-resident units.

[20] In the former dataset time series showed a discontinuity in 1995 because of differences in the compilation methodology, in classification criteria and in the accounting principles introduced with the adoption of the ESA95.

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4. Effects of monetary policy shocks on flow of funds

The use of VAR models to assess the effects of unexpected monetary policy shocks on the economic system has been very intense[21], here we briefly recall the main results of the works more relevant for our analysis.

Christiano et al. (1996) addressed the empirical evaluation of the response of borrowing and lending behaviour of different categories of economic agents to monetary policy shocks using US flow of funds. One of their main results is that net funds raised by firms in the financial markets increase for about a year after a tightening of monetary policy, and begin to fall later when a recession takes place. The authors explain this finding with the existence of financial frictions, due to contracts in place, which would prevent firms from adjusting immediately their level of inventories to the new (lower) level of demand, as standard monetary business cycle models would predict. A second result is that households do not adjust their financial position to monetary policy shocks for a number of quarters, in line with the predictions of limited participation models that claim a certain degree of rigidity of households in adapting their financial choices. Finally, there appears to be a (surprising) temporary reduction in net borrowing of the government[22]. The authors themselves deem this latter result to be "puzzling" and point, as a possible explanation for that, to a temporary increase in personal tax receipts, which vanishes after about a year, as the recession takes hold.

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[21] For a review of the literature see, among others, Bagliano and Favero (1998), Bernanke and Mihov (1998), Christiano et al. (1999), Kim (1999), Rudebusch (1998) and Walsh (2003).

[22] One would expect an increase in government deficit due to higher interest payments on the public outstanding debt.

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Our work aims to extend the analysis of the monetary policy shocks transmission in Italy bringing into the picture the investigation of flow of funds variables[23]. Following Christiano et al. (1996), we assess the effects of monetary policy shocks (an unexpected increase of the policy interest rate of one standard deviation, equal to 92 basis points in our case) on the borrowing and lending activities of the sectors of the economy. To this purpose we analyse the flow of funds data to detect the dynamic response of non-financial firms, households, general government, financial corporations and foreign sector. In order to achieve this goal we add as the last variable in the VAR the net borrowing (total, or by class of financial instrument) of each of the five sectors in turn, employing the so-called "marginal method". This implies that monetary policy does not react in the short run to changes in the patterns of these variables, but that such financial transactions respond to monetary policy shocks within the same quarter it has occurred. In the rest of this section we describe our results on the borrowing and lending behaviour of the sectors of the Italian economy after an unexpected monetary policy restriction.

Non-financial firms. − The accumulation of assets decreases significantly in the first two quarters after the monetary shock. Afterwards the variation fades away. Also total financial liabilities diminish, but for a longer time (two years). Among the latter, shares and other equity (unlisted) decline significantly for only one quarter, while the decrease in bonds issued and long-term loans is protracted for one year and a half. At the same time we do not observe a strong reaction to the monetary policy shock of the net funds raised by non-

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[23] Quite interestingly for our focus on financing and investment decisions, Dedola and Lippi (2005) found that output responses to monetary policy shocks differ among different industry sectors, and are systematically related to the output durability, financing requirements, borrowing capacity and firm size, both in Italy and in other industrialized countries. Gaiotti and Generale (2002) estimated the effects of monetary policy on the investment behaviour of Italian firms with a panel data-set, finding that financial variables do actually matter.

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financial firms, as a result of the two counterbalancing reactions on the asset and on the liability side just mentioned (Figure 5).

Following a contractionary monetary policy shock, Christiano et al. (1996) observed an increase in both firms' financial assets and liabilities, but in their case the two effects do not completely offset, so that net borrowing also rises. The authors point to some degree of inertia in the firms' level of nominal expenditures as a possible explanation for that.[24] Our results look different in some respects: except for a slight increase occurring in the same quarter of the shock, the response of net funds raised is never significant in our model. The reduction in the firms' issuance of new debt looks more consistent both with the "money view" (standard IS/LM models) and with the "credit view" (e.g. Bernanke and Blinder, 1988) of the transmission mechanisms of monetary policy, and also with monetary business cycle models (Fuerst, 1994). We do not find evidence pointing to the existence of cost inertia, with the possible exception of a small (and non significant) increase in short-term liabilities in the first three quarters following the shock. The fall we observe in the firms' acquisition of new financial assets, on the other hand, also appears to be in line with standard predictions on the effects of a restrictive monetary policy shock. Our findings as to smaller financial frictions on the asset and liability side of the firms' balance sheets compared to those found by Christiano et al. (1996), may be due to the differences between the Italian and the US economies, but also to the diverse time span examined. The sample used by Christiano et al. (1996), covering the years from 1961 to 1992, includes the pre-"great moderation" years, (namely the '70s), when the financial variables displayed a lot of volatility and market mechanisms experienced a substantial deal of frictions (Justiniano and Primiceri, forthcoming, Smets and Wouters, 2005 and 2007). Our sample, on the other hand,

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is centered around the '90s when, thanks to financial and institutional innovations, the frictions observed in the previous years[25] were eased (see Gaiotti, 1999, and De Arcangelis and Di Giorgio, 2001). Additionally, the circumstance that in Christiano et al. (1996) the reduction in the firms' incurrence of new debt is concentrated in the short-term component, while it regards more the long-term component in our findings, may in fact be due to the role of the above mentioned financial frictions (typically affecting the shorter term response to the restrictive shock) in the Christiano et al. (1996) sample and to the different firms' expectations as to the long-term interest rates pattern following the restrictive shock.

Households. - Net funds borrowed by households decline significantly over the first year following the contractionary shock, therefore improving their net financial position, as a result of a smaller debt issuance and a larger amount of funds lent to other sectors (Figure 6).

The strong evidence on net funds raised is the result of two opposite (and weaker) effects observed on the asset and on the liability side. The maximum negative effect on the flow of new financial liabilities is reached in the second quarter, while financial assets increase significantly only in the first quarter and then the positive effect vanishes[26]. Among financial assets, currency, deposits and shares show a marked decline in the first quarter. Decrease in deposits might be due to an increase in their opportunity cost,[27] in case financial corporations do not adjust passive interest rates as quickly as it happens for the rates paid by

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[24] See also Bernanke and Blinder (1992) and Gertler and Gilchrist (1993).

[25] In Italy, during the '70s, financial aggregates were subject to quantitative constraints and market mechanisms operated weakly due to a number of real and nominal rigidities

[26] The responses of the flows of assets and liabilities of households were much stronger in Christiano et al. (1996).

[27] Although in the Italian financial accounts there is no distinction between deposits and currency (that sum up to M1), we know from monetary statistics that, on average, currency in Italy in the period examined accounted for only one sixth of M1.

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alternative liquid instruments on the market, such as Treasury's short term securities.[28] Accordingly, acquisition of short-term securities increases in the first quarter benefiting from the temporary increase in the interest rate differential with the demand deposits, while the following reduction in the acquisition up to the second year after the shock may reflect the return to the pre-shock level of the interest rate differential with demand deposits. Acquisition of bonds, after an initial upsurge, does not react much to the shock, in line with an effect of the interest rate shock only on the short term part of the interest rate curve as it is normally believed to be the case. The decrease in the acquisition of shares may be connected to the worsened perspectives for economic activity perceived by households after the restrictive shock. As for liabilities, short-term loans taken by households increase in the first quarter, pointing to some tensions in their need for cash, that nevertheless do not impair the overall result of a decrease in the net funds borrowed after the shock. Long-term loans (mainly mortgages), on the other hand, decrease significantly up to the third quarter.

Other sectors. – We complete the analysis of the overall effects of an unexpected restrictive monetary policy shock on the net financial flows of the Italian economy sectors looking at the responses of the total net funds raised by financial corporations, Government and foreign sector in Figure 7.

We find that contemporaneously to the initial decrease in the funds borrowed by non-financial firms and by households, funds borrowed by the public sector and by the foreign sector increase, as well those borrowed by financial corporations.

General government experiences a deterioration of the net financial position, increasing the financial resources borrowed by the other sectors in line with what expected

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[28] This could reflect some sluggishness in the response of bank deposit rates as found by Gambacorta and

during a slowdown of the economy. Our result is different with respect to Christiano et al. (1996), who found a decrease in the public deficit following a monetary shock possibly due to the structure of the US tax system.

After the impact increase, financial corporations decrease net funds borrowed up to three quarters after the shock. Nevertheless, due to the low statistical significance of the responses both on the asset and on the liability side, and taking into consideration the high volatility of the time series involved (see Figure 4), we prefer to downplay this result.

The foreign sector increases the amount of funds borrowed until the third quarter after the shock[29] (see Figure 7) and then the variation fades away. The increase in the liabilities in the first year after the shock might be attributed to the fact that the contraction of the Italian economy induced by the restrictive shock might reduce the domestic demand for funds, so that the increase in funds offered by households is addressed towards the acquisition of financial assets issued abroad since the request of funds from the foreign sector, not affected by the shock, would increase.[30]

5.   Conclusions

From the analysis of the response of the Italian economic system to an unexpected one standard deviation increase of the policy interest rate, we reach the following conclusions.

As far as the responses of the sectors are concerned, non-financial firms in the first four quarters decrease both financial assets and liabilities. We do not find evidence in favour of strong financial frictions which would prevent firms from adjusting their nominal

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Iannotti (2007), especially before the introduction of the Consolidated Law on Banking in 1993.

expenditures promptly. Firms behave as predicted by standard monetary models, reducing their liabilities after the shock. Households in the first quarter after the shock diminish the acquisition of liquid assets and of shares and increase that of securities. The public sector increases net borrowing until almost two years after the shock due to an increase in the burden of the service of the public debt and to a fall in tax receipts. Financial corporations decrease the funds borrowed up to three quarters after the shock while the foreign sector increases the amount of funds borrowed until the third quarter after the shock.

The results of the VAR analysis for the main macroeconomic aggregates are consistent with the predictions of the theory and with the empirical literature. In the first four quarters industrial production decreases by around 0.40 percentage points, the price level declines by 0.11 per cent, while the money stock drops by 0.34 per cent. Our results are not affected by price, liquidity and exchange rate puzzles.

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[29] The slight decrease observed in the first quarter after the shock is not statistically significant.

[30] This could be the case particularly for the restriction in Italian monetary policy between 1994 and 1996.

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Acknowledgements

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Appendix 1: data description

VAR endogenous variables:

IP: log of seasonally adjusted industrial production index (Source: OECD, Units: base 1980:1 = 100).

P: log of seasonally adjusted consumer price index (Source: IMF, International Financial Statistics, base 1980:1 = 100).

P_IMP: log of seasonally adjusted import price of raw materials (Source: OECD, index number, in local currency).

EXR: log of nominal exchange rate (ITL per DM; from 1999 it is a constant) (Source: Banca d'Italia).

R: short-term interest rate (from 1980 to 1981: average interest rate on fixed term advances; from 1982 to 1998: auction rate on repurchase agreements between the Bank of Italy and credit institutions; from 1999 onwards: interest rate on main refinancing operations of the ECB) (Source: own calculations on Banca d'Italia and ECB data).

M2: log of seasonally adjusted monetary aggregate M2 (Source: Banca d'Italia).

VAR endogenous variables' graphs
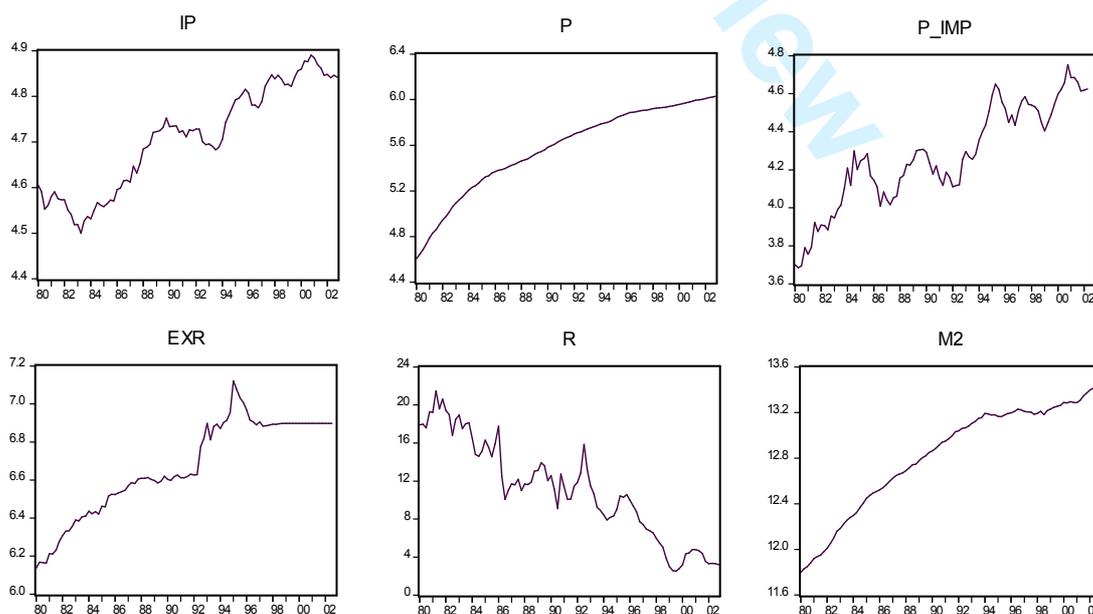
Financial accounts series (converted to billions of 1995 ITL using the gdp deflator, and seasonally adjusted):

- non-financial corporations: total financial assets (NFTAS), total financial liabilities (NFTLI), net funds raised (NFNET=NFTLI-NFTAS), short term liabilities (NFSLI), shares and other equity (NFELI), other long-term debt (NFDLI), long-term liabilities (NFLLI=NFELI+NFDLI);

- financial corporations: total financial assets (FCTAS), total financial liabilities (FCTLI); net funds raised (FCNET=FCTLI-FCTAS);

- households: total financial assets (HTTAS), total financial liabilities (HTTLI), net funds raised (HTNET=HTTLI-HTTAS), currency and deposits (HTDAS), short-term securities (HTSAS), long-term securities (HTBAS), shares and other equity (HTEAS), short-term loans (HTSLI), long-term loans (HTLLI);

- general government: total financial assets (GGTAS), total financial liabilities (GGTLI); net funds raised (GGNET=GGTLI-GGTAS),

- rest of the world:, total financial assets (RWTAS), total financial liabilities (RWTLI), net funds raised (RWNET=RWTLI-RWTAS)

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Appendix 2: methodological issues

We assume the economy to be described by a structural form equation like the following:

$$A(L)y_t = u_t \tag{1}$$

where $A(L)$ is a matrix polynomial in the lag operator L, y_t is an n×1 vector containing the variables of interest, and u_t is an n×1 structural disturbances vector. Let Ω be the n×n variance-covariance matrix of the *structural disturbances*; since u_t are assumed to be mutually uncorrelated, the matrix Ω is diagonal, the n diagonal elements being the variances of the n structural disturbances.

Writing (1) in reduced form gives the following representation:

$$y_t = B(L)y_t + e_t \tag{2}$$

which can be estimated using OLS equation by equation. $B(L)$ is a matrix polynomial in the lag operator L and the e_t terms in equation (2) are the VAR (reduced-form) *residuals* resulting from the estimation of the n regressions. We call Σ the variance-covariance matrix of the residuals.

The structural disturbances u_t and the reduced form residuals e_t are related by:

$$e_t = A_0^{-1}u_t \tag{3}$$

where the coefficients in the A_0 matrix are those of the contemporaneous relations among the variables in the y_t vector. From eq. (3) and remembering that $var(e_t) = \Sigma$ and $var(u_t) = \Omega$:

$$\Sigma = A_0^{-1}\Omega A_0^{-1'} \tag{4}$$

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To recover the parameters in the structural form equations (1) from the coefficients estimated in the reduced form equations (2) sample estimates of Σ can be used in order to obtain maximum likelihood estimates of Ω and A_0. We make use of a Choleski factorisation in order to orthogonalize the residual covariance matrix Σ. In practice, this corresponds to imposing just $n \times (n-1)/2$ restrictions on the matrix A_0, that is supposed to be lower triangular (all the upper diagonal elements are set to be 0); as a result, the VAR is just identified.

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Appendix 3: Figures and Tables

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Fig. 1 – Estimated interest rate policy shocks
(three-quarters centered moving average)

Fig. 2 – Responses to a contractionary monetary policy shock: VAR variables

Note: estimated impulse responses to a one standard deviation increase in the short term interest rate. The dashed lines are ± 1 standard error bands, computed by means of Monte Carlo integration, following Sims and Zha (1999).

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Fig. 3 – Responses to a contractionary monetary policy shock: other macro variables

Private consumption

Collective consumption

Gross fixed investment

Unemployment rate

Quarters after shock

Wages

Quarters after shock

Note: the estimated impulse responses were estimated from 7-variable VARs in which we added one of the above variables, in turn, to the original 6-variable VAR, placing it in the last position. The dashed lines are ± 1 standard error bands, computed by means of Monte Carlo integration, following Sims and Zha (1999).

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Fig. 4 – Flow of funds data: net funds raised by sectors
(converted to billions of 1995 ITL using the gdp deflator and seasonally adjusted)

Households

Non financial firms

Financial corporations

General government

Foreign

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Fig. 5 – Responses to a contractionary monetary policy shock: non-financial firms

Net funds raised

Total financial assets

Total financial liabilities

Short-term liabilities

Long-term liabilities

Liabilities: shares and other equity

Quarters after shock

Liabilities: other long-term debt

Quarters after shock

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Fig. 6 – Responses to a contractionary monetary policy shock: households

Net funds raised

Total financial assets

Total financial liabilities

Assets: currency and deposits

Assets: short-term securities

Assets: long-term securities

Assets: shares and other equity

Liabilities: short-term loans

Liabilities: long-term loans

Quarters after shock

Quarters after shock

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Fig. 7 – Responses of the flow-of-funds data to a contractionary monetary policy shock

Net funds raised	Total financial assets	Total financial liabilities

Quarters after shock · Quarters after shock · Quarters after shock

Non-financial firms · Households · Financial corporations · General government · Rest of the world

Note: the estimated impulse responses were estimated from 7-variable VARs in which we added one of the above variables, in turn, to the original 6-variable VAR, placing it in the last position. Dashed lines are ± 1 Monte Carlo standard error bands.

Table 1

VAR diagnostic tests: lag order selection

Lag	LogL	LR	FPE	AIC
0	325.650	NA	3.33e-11	-7.09766
1	1090.81	1350.27	1.19e-18	-24.2543
2	1128.94	61.9144	1.15e-18	-24.3046
3	1168.47	58.5918	1.11e-18	-24.3875
4	1208.92	54.2555*	1.08e-18*	-24.4923
5	1246.37	44.9327	1.19e-18	-24.5263*

(*) indicates lag order selected by the specific criterion. LR: sequential modified
LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike
information criterion.

Table 2

VAR diagnostic tests: autocorrelation LM test
(H_0: no serial correlation at lag order h)

Lags	LM-Stat	Prob.
1	42.3	0.22
2	36.5	0.45
3	43.1	0.19
4	38.7	0.35
5	23.6	0.94
6	40.0	0.30
7	30.9	0.71
8	31.3	0.69

Probs from chi-square with 36 d.o.f.

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Table 3

VAR diagnostic tests: residual descriptive statistics and normality test

Residuals from equation for:	Industrial production	Price level	Import price	Exchange rate	Interest rate	M2
Mean	2.32E-15	-1.25E-15	1.96E-13	3.91E-14	-3.64E-12	-8.03E-15
Median	-0.0007	6.39E-05	0.0013	0.0004	-0.0006	-0.0004
Max	0.0273	0.0083	0.1076	0.0446	2.7194	0.0230
Min	-0.0246	-0.0085	-0.0967	-0.0502	-2.2028	-0.0255
Std. Dev.	0.0090	0.0030	0.0418	0.0177	0.9212	0.0093
Sum	2.00E-13	-1.07E-13	1.69E-11	3.36E-12	-3.13E-10	-6.91E-13
Sum Sq. Dev.	0.0069	0.0007	0.1487	0.0266	72.133	0.0074
Observations	86	86	86	86	86	86
Skewness	0.237	-0.208	0.041	0.063	0.125	0.133
Kurtosis	3.496	3.186	2.821	3.835	3.587	3.469
Jarque-Bera	1.687	0.744	0.139	2.558	1.461	1.046
Probability	0.430	0.689	0.933	0.278	0.482	0.593

Table 4

Forecast error variance decomposition due to monetary policy shocks

Variable name	1 quarter	2 quarters	1 year	2 years	3 years
VAR variables					
Industrial production	0.0 (1.2)	0.4 (1.6)	3.5 (4.3)	21.9 (10.1)	22.9 (10.2)
Price level	0.0 (0.7)	0.4 (1.7)	3.4 (4.4)	5.6 (6.7)	9.3 (8.9)
Import price	0.0 (1.2)	0.6 (1.9)	2.5 (3.9)	10.6 (7.8)	10.3 (7.6)
Exchange rate	0.5 (1.3)	0.4 (1.4)	3.2 (3.7)	5.1 (4.2)	4.0 (5.2)
M2	3.6 (4.2)	4.2 (4.8)	6.5 (7.0)	4.7 (6.5)	3.6 (6.1)
Other aggregates [*]					
Unemployment rate	9.2 (6.0)	9.8 (7.0)	13.0 (7.8)	15.7 (9.1)	17.0 (10.1)
Gross fixed investment	0.1 (1.7)	1.3 (2.5)	8.9 (6.9)	28.6 (12.2)	31.5 (12.6)
Real wages	4.4 (3.9)	5.7 (5.0)	7.6 (6.5)	5.9 (5.8)	7.0 (6.4)
Private consumption	0.1 (1.6)	0.3 (2.0)	8.1 (6.2)	15.5 (9.4)	15.8 (9.8)

(*) Each variable was added as the last one to the original 6 variables VAR.

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33

APPENDIX to REPLY TO REFEREE REPORT ON "MONETARY POLICY EFFECTS: NEW EVIDENCE FROM THE ITALIAN FLOWS OF FUNDS"

Unit root tests on the VAR variables and on the Financial accounts variables

LOG(IPI)
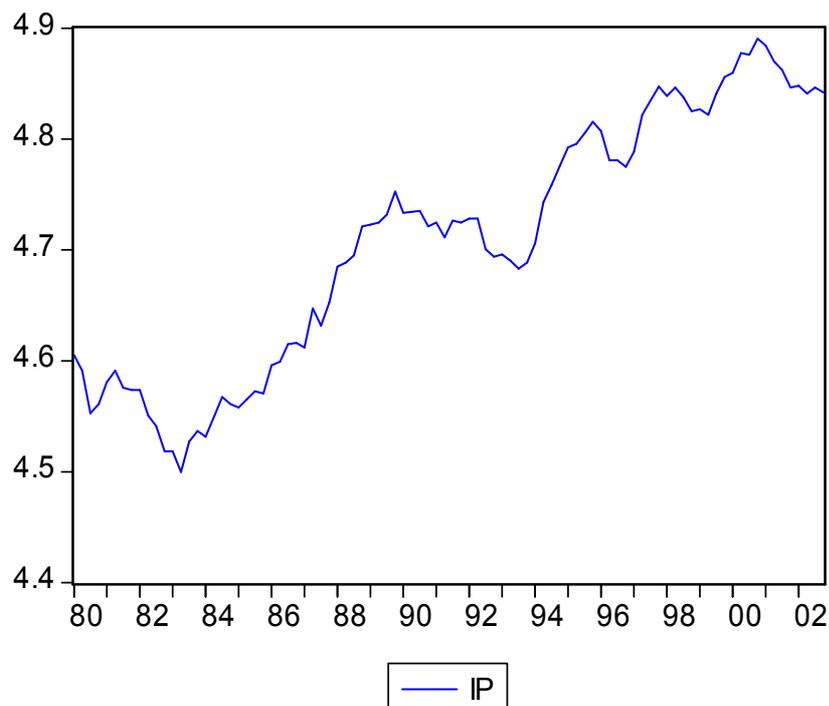
Null Hypothesis: IP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2. 462646	0.3457
Test critical values:	1% level	-4.062040	
	5% level	-3.459950	
	10% level	-3.156109	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IP)
Method: Least Squares
Date: 05/24/07   Time: 12:41
Sample (adjusted): 1980Q2 2002Q4
Included observations: 91 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IP(-1)	-0.105846	0.042981	-2.462646	0.0157
C	0.479849	0.194237	2.470427	0.0154
@TREND(1980Q1)	0.000455	0.000185	2.462924	0.0157

R-squared	0.065997	Mean dependent var	0.002601
Adjusted R-squared	0.044769	S.D. dependent var	0.014671
S.E. of regression	0.014338	Akaike info criterion	-5.619344
Sum squared resid	0.018092	Schwarz criterion	-5.536568
Log likelihood	258.6801	F-statistic	3.109038
Durbin-Watson stat	1.600781	Prob(F-statistic)	0.049583

First differences
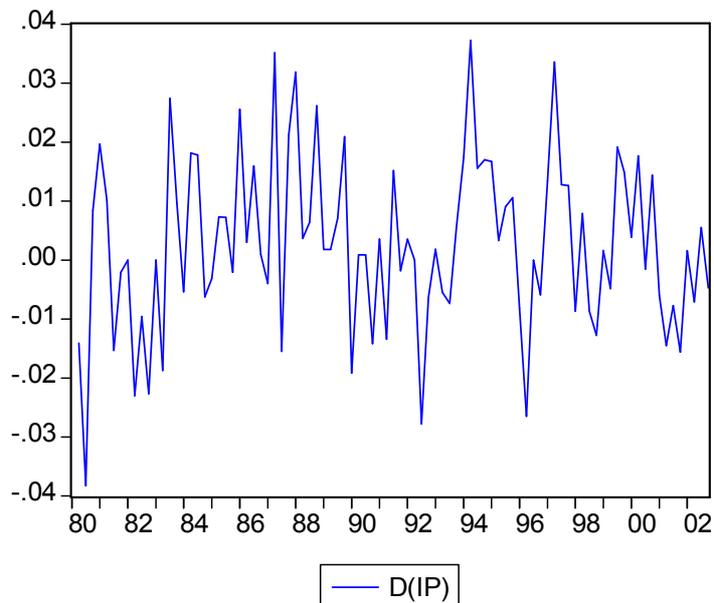
Null Hypothesis: D(IP) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.821406	0.0000
Test critical values:	1% level	-2.590910	
	5% level	-1.944445	
	10% level	-1.614392	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(IP,2)
Method: Least Squares
Date: 05/24/07   Time: 14:18
Sample (adjusted): 1980Q3 2002Q4
Included observations: 90 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IP(-1))	-0.810268	0.103596	-7.821406	0.0000

R-squared	0.407338	Mean dependent var	0.000104
Adjusted R-squared	0.407338	S.D. dependent var	0.019013
S.E. of regression	0.014637	Akaike info criterion	-5.599444
Sum squared resid	0.019068	Schwarz criterion	-5.571669
Log likelihood	252.9750	Durbin-Watson stat	2.034134

LOG(CPI)
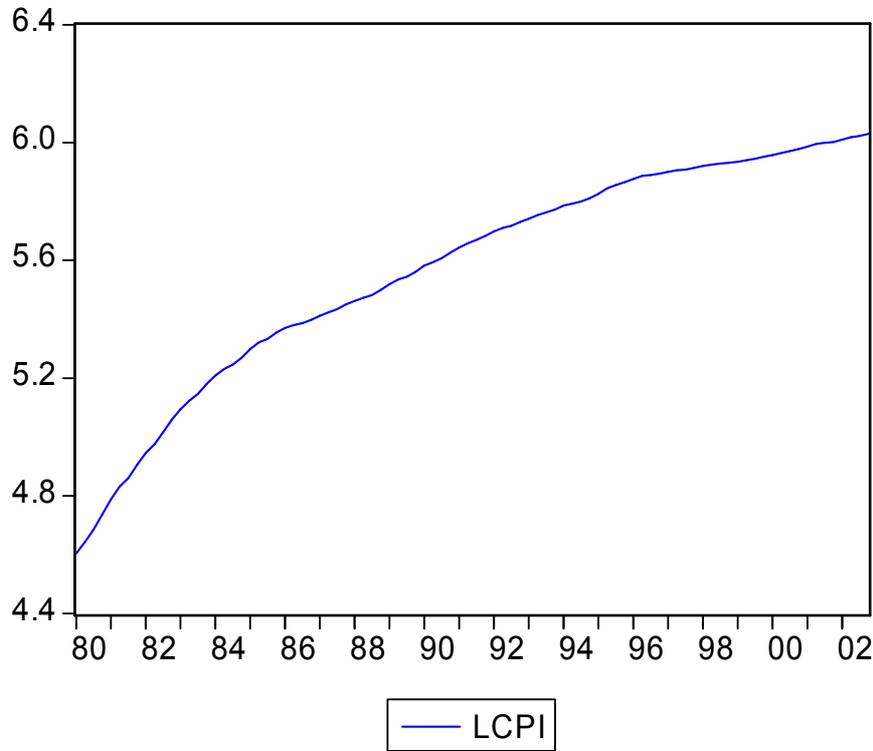
Null Hypothesis: LCPI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.876280	0.6582
Test critical values:	1% level	-4.068290	
	5% level	-3.462912	
	10% level	-3.157836	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LCPI)
Method: Least Squares
Date: 05/24/07   Time: 14:31
Sample (adjusted): 1981Q3 2002Q4
Included observations: 86 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCPI(-1)	-0.015754	0.008396	-1.876280	0.0644
D(LCPI(-1))	0.350057	0.109737	3.189957	0.0021

D(LCPI(-2))	-0.152364	0.106206	-1.434611	0.1554
D(LCPI(-3))	0.119644	0.105583	1.133176	0.2606
D(LCPI(-4))	0.401430	0.104712	3.833666	0.0003
D(LCPI(-5))	-0.117117	0.100479	-1.165593	0.2473
C	0.088244	0.045035	1.959464	0.0536
@TREND(1980Q1)	0.000105	7.99E-05	1.313280	0.1929

R-squared	0.860819	Mean dependent var	0.013927
Adjusted R-squared	0.848328	S.D. dependent var	0.009785
S.E. of regression	0.003811	Akaike info criterion	-8.213586
Sum squared resid	0.001133	Schwarz criterion	-7.985274
Log likelihood	361.1842	F-statistic	68.91728
Durbin-Watson stat	1.859766	Prob(F-statistic)	0.000000

First differences
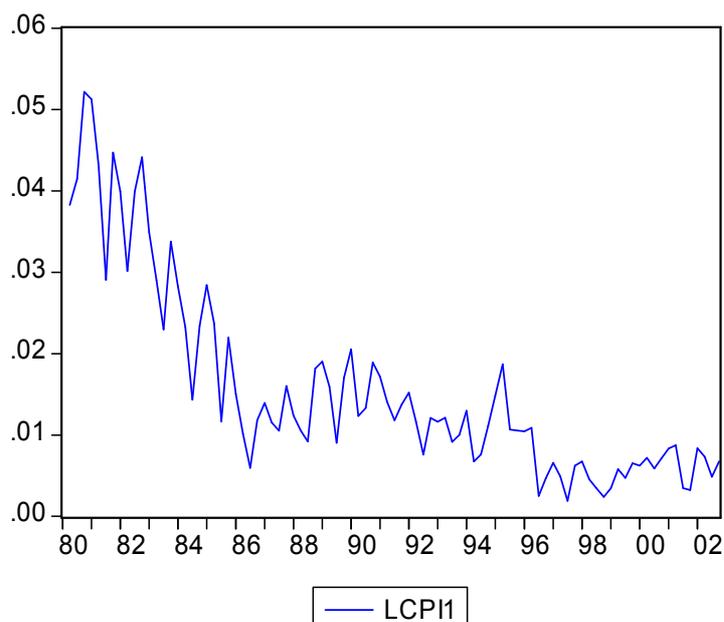
LCPI1

Null Hypothesis: LCPI1 has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.583526	0.2888
Test critical values:	1% level	-4.066981	
	5% level	-3.462292	
	10% level	-3.157475	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LCPI1)
Method: Least Squares
Date: 05/24/07   Time: 14:37
Sample (adjusted): 1981Q2 2002Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCPI1(-1)	-0.188902	0.073118	-2.583526	0.0116
D(LCPI1(-1))	-0.432905	0.105326	-4.110144	0.0001
D(LCPI1(-2))	-0.548153	0.090262	-6.072900	0.0000
D(LCPI1(-3))	-0.369267	0.093412	-3.953122	0.0002
C	0.002704	0.002591	1.043723	0.2997
@TREND(1980Q1)	-2.09E-05	3.18E-05	-0.656039	0.5137

R-squared	0.492884	Mean dependent var	-0.000511
Adjusted R-squared	0.461581	S.D. dependent var	0.005327
S.E. of regression	0.003909	Akaike info criterion	-8.184669
Sum squared resid	0.001238	Schwarz criterion	-8.014607
Log likelihood	362.0331	F-statistic	15.74535
Durbin-Watson stat	1.967116	Prob(F-statistic)	0.000000

Second differences
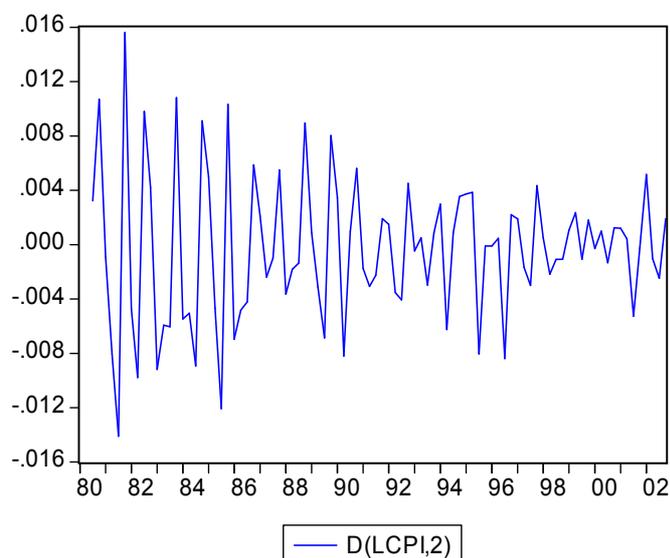
Null Hypothesis: D(LCPI1) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=11)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-12.04685	0.0000

Test critical values:	1% level	-4.066981
	5% level	-3.462292
	10% level	-3.157475

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LCPI1,2)
Method: Least Squares
Date: 05/24/07   Time: 14:38
Sample (adjusted): 1981Q2 2002Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LCPI1(-1))	-2.601878	0.215980	-12.04685	0.0000
D(LCPI1(-1),2)	1.051250	0.147443	7.129871	0.0000
D(LCPI1(-2),2)	0.415619	0.094791	4.384573	0.0000
C	-0.003535	0.000970	-3.642847	0.0005
@TREND(1980Q1)	4.86E-05	1.76E-05	2.760269	0.0071

R-squared	0.772041	Mean dependent var	3.25E-05
Adjusted R-squared	0.760921	S.D. dependent var	0.008266
S.E. of regression	0.004042	Akaike info criterion	-8.128475
Sum squared resid	0.001340	Schwarz criterion	-7.986756
Log likelihood	358.5886	F-statistic	69.42847
Durbin-Watson stat	1.944313	Prob(F-statistic)	0.000000
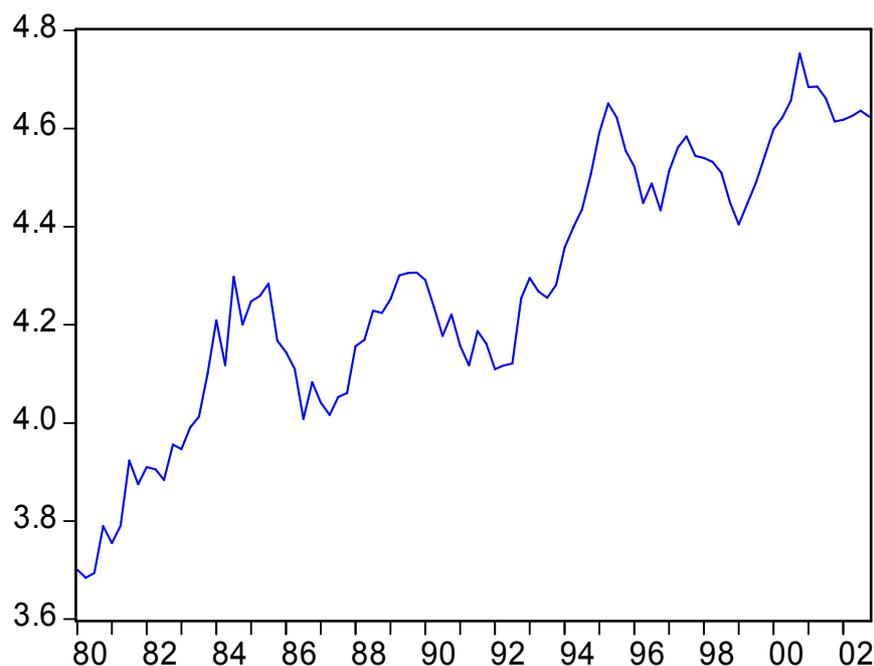
LOG(P_RAW_IMP)

Null Hypothesis: P_IMP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.771133	0.2118
Test critical values:	1% level	-4.062040	
	5% level	-3.459950	
	10% level	-3.156109	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(P_IMP)
Method: Least Squares
Date: 05/24/07   Time: 14:44
Sample (adjusted): 1980Q2 2002Q4
Included observations: 91 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
P_IMP(-1)	-0.150118	0.054172	-2.771133	0.0068
C	0.594895	0.208587	2.852023	0.0054
@TREND(1980Q1)	0.001228	0.000548	2.241443	0.0275

R-squared	0.085792	Mean dependent var	0.010145

Adjusted R-squared	0.065014	S.D. dependent var	0.056341
S.E. of regression	0.054479	Akaike info criterion	-2.949595
Sum squared resid	0.261180	Schwarz criterion	-2.866819
Log likelihood	137.2066	F-statistic	4.129080
Durbin-Watson stat	2.045876	Prob(F-statistic)	0.019319

First differences
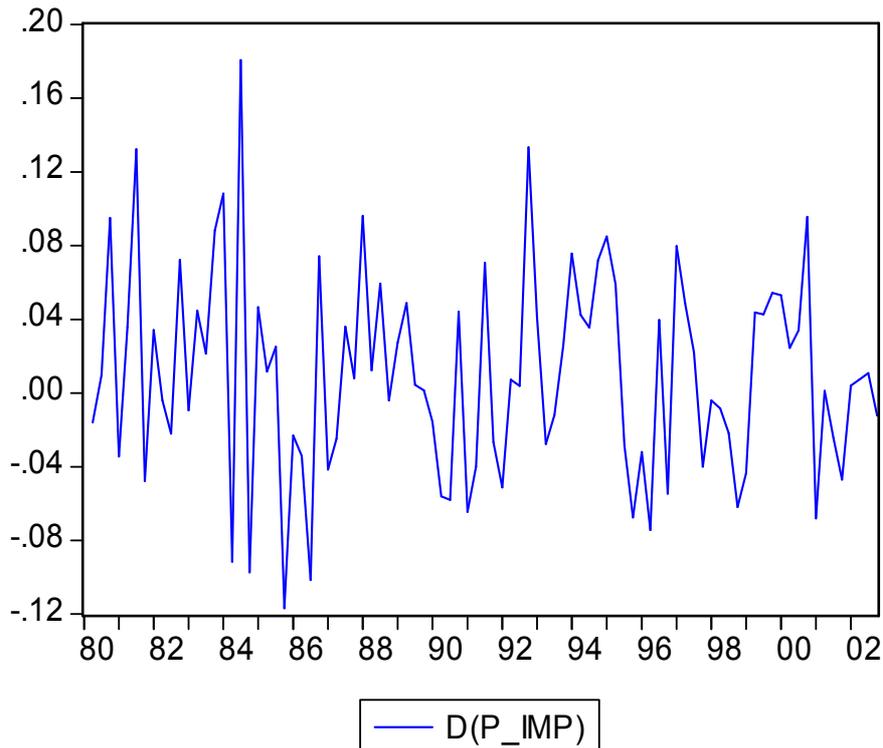
D(P_IMP)

Null Hypothesis: D(P_IMP) has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.483795	0.0000
Test critical values:	1% level	-2.591204	
	5% level	-1.944487	
	10% level	-1.614367	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(P_IMP,2)
Method: Least Squares

Date: 05/24/07   Time: 14:45
Sample (adjusted): 1980Q4 2002Q4
Included observations: 89 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(P_IMP(-1))	-0.834628	0.152199	-5.483795	0.0000
D(P_IMP(-1),2)	-0.207274	0.104868	-1.976528	0.0513

R-squared	0.546743	Mean dependent var		-0.000249
Adjusted R-squared	0.541533	S.D. dependent var		0.083972
S.E. of regression	0.056857	Akaike info criterion		-2.874328
Sum squared resid	0.281250	Schwarz criterion		-2.818404
Log likelihood	129.9076	Durbin-Watson stat		2.031062

LOG(EXR_LM)

TASSO DI CAMBIO LIRA-MARCO TED
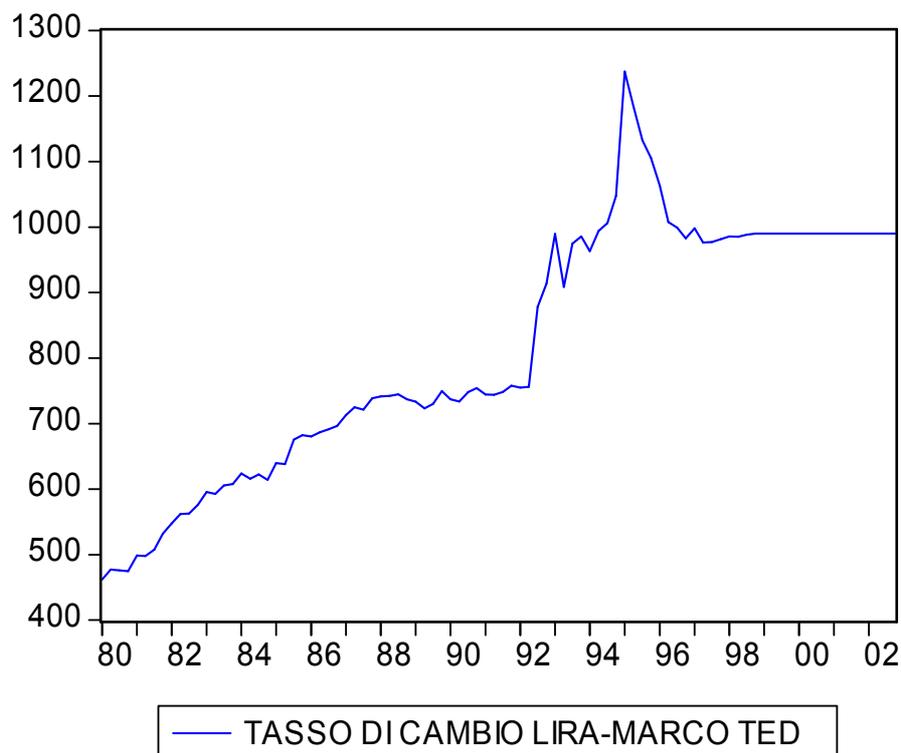
Null Hypothesis: LEXR has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.512021	0.8185
Test critical values:	1% level	-4.062040	
	5% level	-3.459950	
	10% level	-3.156109	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LEXR)
Method: Least Squares
Date: 05/24/07   Time: 14:49
Sample (adjusted): 1980Q2 2002Q4
Included observations: 91 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXR(-1)	-0.055102	0.036443	-1.512021	0.1341
C	0.364085	0.228475	1.593549	0.1146

@TREND(1980Q1)	0.000256	0.000344	0.743610	0.4591

R-squared	0.057627	Mean dependent var	0.008367
Adjusted R-squared	0.036209	S.D. dependent var	0.032844
S.E. of regression	0.032244	Akaike info criterion	-3.998574
Sum squared resid	0.091490	Schwarz criterion	-3.915799
Log likelihood	184.9351	F-statistic	2.690641
Durbin-Watson stat	2.010733	Prob(F-statistic)	0.073418

First differences
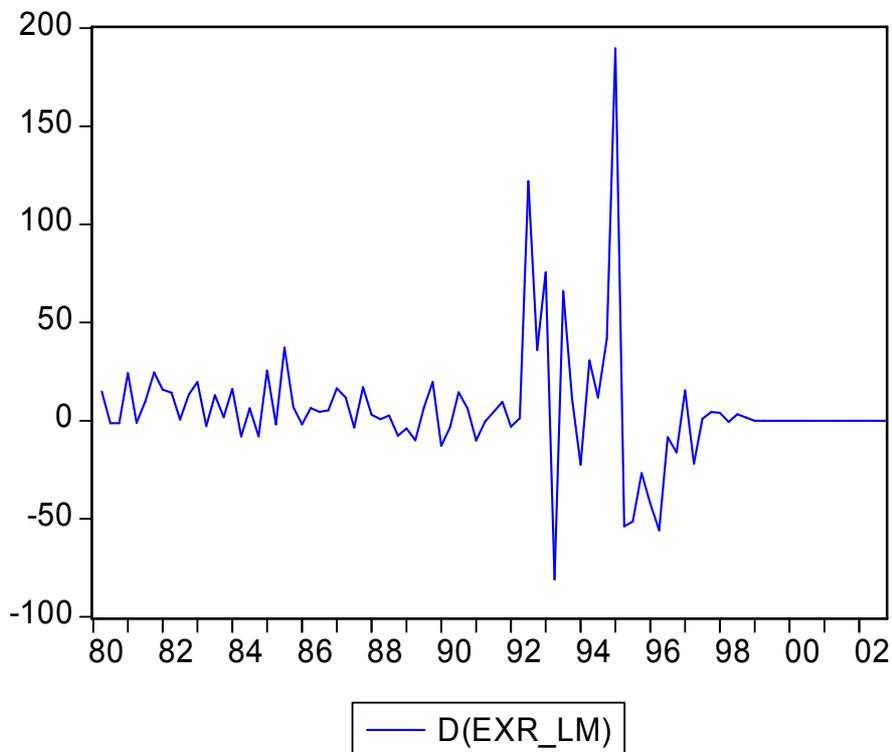
D(EXR_LM)

Null Hypothesis: D(EXR_LM) has a unit root
Exogenous: None
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.168649	0.0000
Test critical values:	1% level	-2.590910	
	5% level	-1.944445	
	10% level	-1.614392	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXR_LM,2)
Method: Least Squares
Date: 05/24/07   Time: 14:48
Sample (adjusted): 1980Q3 2002Q4
Included observations: 90 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXR_LM(-1))	-0.970274	0.105825	-9.168649	0.0000

R-squared	0.485733	Mean dependent var	-0.165111
Adjusted R-squared	0.485733	S.D. dependent var	44.69367
S.E. of regression	32.05092	Akaike info criterion	9.783578
Sum squared resid	91426.25	Schwarz criterion	9.811353
Log likelihood	-439.2610	Durbin-Watson stat	2.005162

INT_POLICY
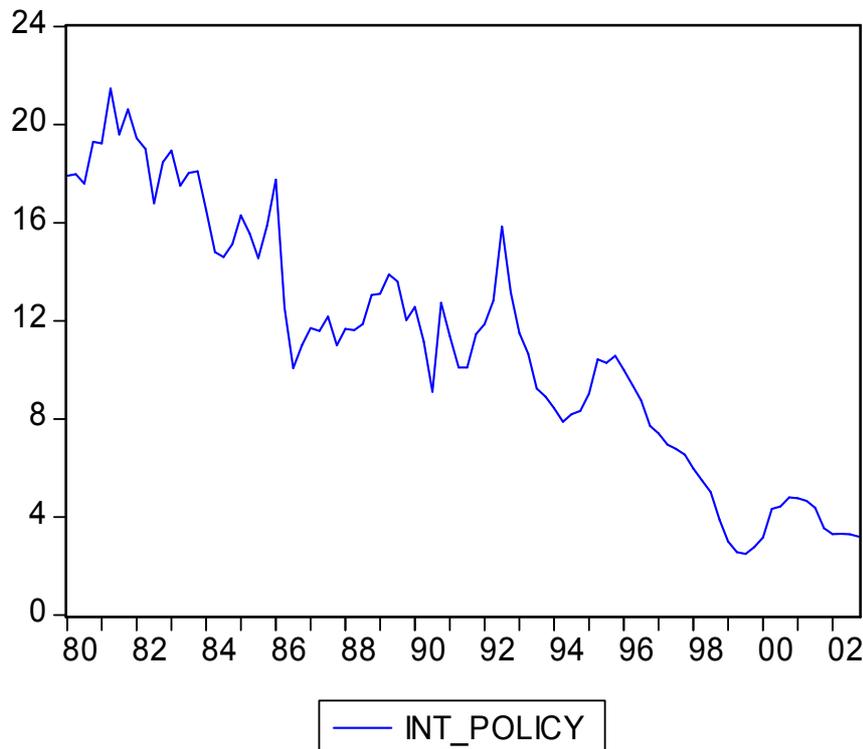
Null Hypothesis: INT_POLICY has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.791975	0.0214
Test critical values: 1% level	-4.062040	
5% level	-3.459950	
10% level	-3.156109	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INT_POLICY)
Method: Least Squares
Date: 05/24/07   Time: 14:51
Sample (adjusted): 1980Q2 2002Q4
Included observations: 91 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INT_POLICY(-1)	-0.276619	0.072948	-3.791975	0.0003
C	5.291464	1.449366	3.650883	0.0004
@TREND(1980Q1)	-0.051368	0.014116	-3.638920	0.0005

R-squared	0.140688	Mean dependent var	-0.161615
Adjusted R-squared	0.121158	S.D. dependent var	1.232993
S.E. of regression	1.155888	Akaike info criterion	3.160026
Sum squared resid	117.5748	Schwarz criterion	3.242802
Log likelihood	-140.7812	F-statistic	7.203761
Durbin-Watson stat	1.868905	Prob(F-statistic)	0.001267

First differences

Null Hypothesis: D(INT_POLICY) has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.746788	0.0000
Test critical values:	1% level	-2.591204	
	5% level	-1.944487	
	10% level	-1.614367	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INT_POLICY,2)
Method: Least Squares
Date: 05/24/07   Time: 14:55
Sample (adjusted): 1980Q4 2002Q4

Included observations: 89 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INT_POLICY(-1))	-1.184951	0.152960	-7.746788	0.0000
D(INT_POLICY(-1),2)	0.140406	0.106097	1.323375	0.1892

R-squared	0.529230	Mean dependent var	0.003112
Adjusted R-squared	0.523819	S.D. dependent var	1.812539
S.E. of regression	1.250758	Akaike info criterion	3.307592
Sum squared resid	136.1024	Schwarz criterion	3.363516
Log likelihood	-145.1878	Durbin-Watson stat	1.958739

LOG(M2_SA)
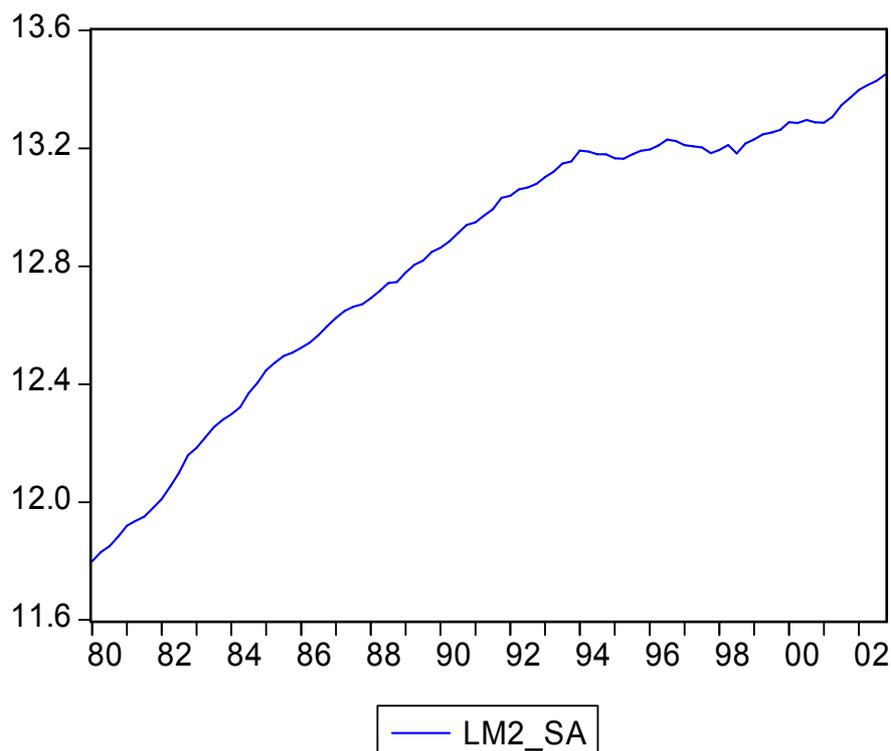
Null Hypothesis: LM2_SA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

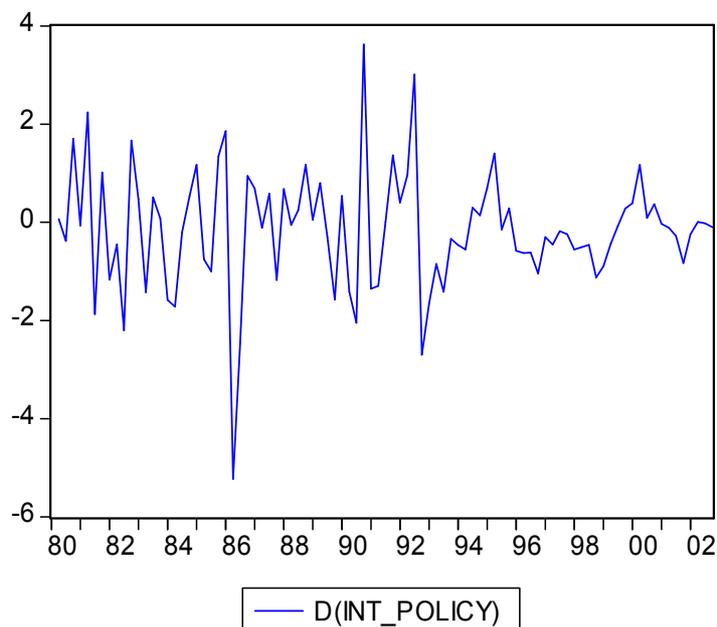|		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.009940	0.5879
Test critical values:	1% level	-4.062040	
	5% level	-3.459950	
	10% level	-3.156109	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LM2_SA)
Method: Least Squares
Date: 05/24/07   Time: 14:56
Sample (adjusted): 1980Q2 2002Q4
Included observations: 91 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LM2_SA(-1)	-0.021044	0.010470	-2.009940	0.0475
C	0.285203	0.126111	2.261525	0.0262
@TREND(1980Q1)	5.93E-05	0.000185	0.320610	0.7493
R-squared	0.288934	Mean dependent var		0.018137

Adjusted R-squared	0.272773	S.D. dependent var	0.015485
S.E. of regression	0.013206	Akaike info criterion	-5.783932
Sum squared resid	0.015346	Schwarz criterion	-5.701157
Log likelihood	266.1689	F-statistic	17.87891
Durbin-Watson stat	1.536425	Prob(F-statistic)	0.000000

First differences
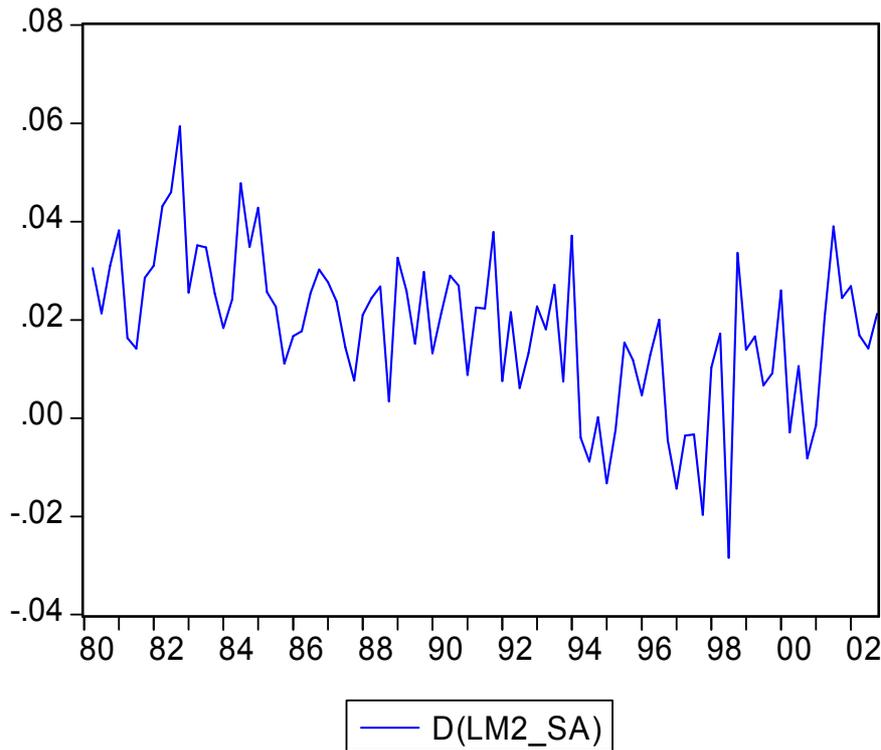
D(LM2_SA)

Null Hypothesis: D(LM2_SA) has a unit root
Exogenous: None
Lag Length: 2 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.732414	0.0789
Test critical values:	1% level	-2.591505	
	5% level	-1.944530	
	10% level	-1.614341	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LM2_SA,2)
Method: Least Squares
Date: 05/24/07   Time: 14:58
Sample (adjusted): 1981Q1 2002Q4

Included observations: 88 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LM2_SA(-1))	-0.117678	0.067927	-1.732414	0.0868
D(LM2_SA(-1),2)	-0.533849	0.111604	-4.783427	0.0000
D(LM2_SA(-2),2)	-0.235091	0.104650	-2.246453	0.0273

R-squared	0.311303	Mean dependent var	-0.000111
Adjusted R-squared	0.295098	S.D. dependent var	0.016573
S.E. of regression	0.013915	Akaike info criterion	-5.678242
Sum squared resid	0.016458	Schwarz criterion	-5.593787
Log likelihood	252.8426	Durbin-Watson stat	2.027195

Second differences
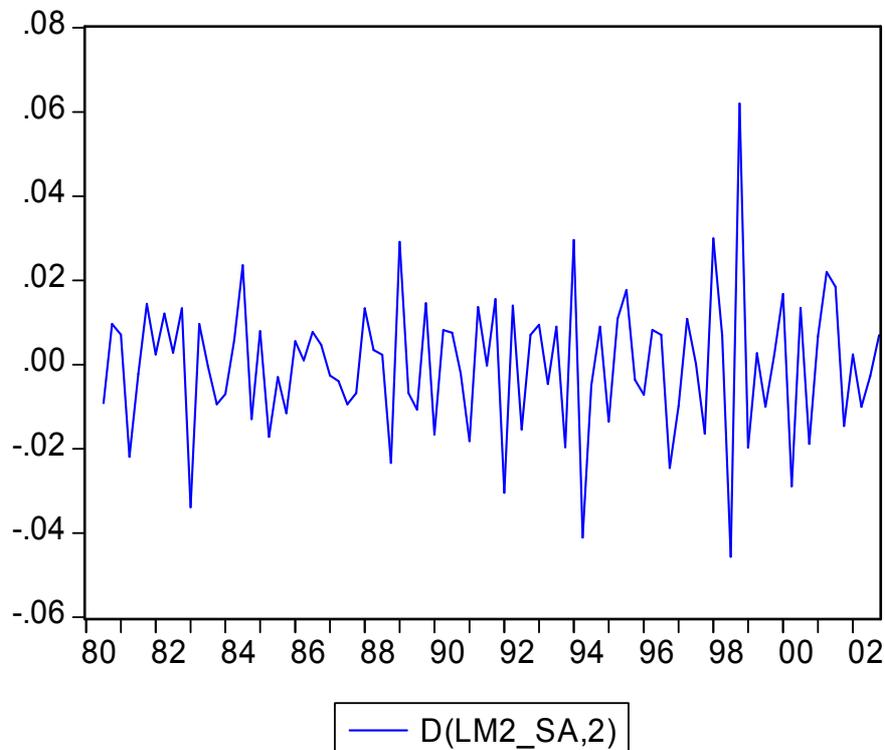
D(LM2_SA,2)

Null Hypothesis: D(LM2_SA,2) has a unit root
Exogenous: None
Lag Length: 1 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.55043	0.0000
Test critical values:	1% level	-2.591505	
	5% level	-1.944530	
	10% level	-1.614341	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LM2_SA,3)
Method: Least Squares
Date: 05/24/07   Time: 16:26
Sample (adjusted): 1981Q1 2002Q4
Included observations: 88 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LM2_SA(-1),2)	-1.882474	0.178426	-10.55043	0.0000
D(LM2_SA(-1),3)	0.272426	0.103591	2.629812	0.0101
R-squared	0.759227	Mean dependent var		-2.99E-05
Adjusted R-squared	0.756428	S.D. dependent var		0.028520
S.E. of regression	0.014076	Akaike info criterion		-5.666269
Sum squared resid	0.017039	Schwarz criterion		-5.609966
Log likelihood	251.3159	Durbin-Watson stat		2.045121

NFNET = Net lending / net borrowing of Non-financial firms (seasonally adjusted and deflated)
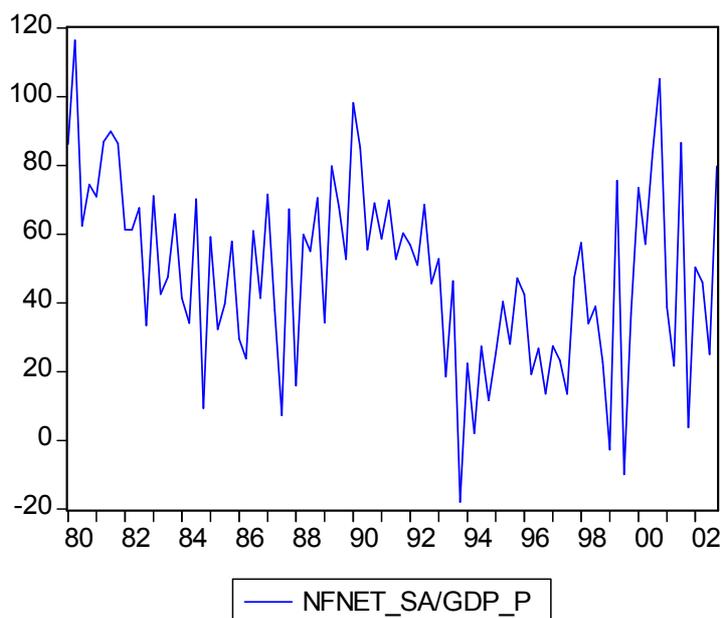
NFNET_SA/GDP_P

Null Hypothesis: NFNET_SA/GDP_P has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.746695	0.2210
Test critical values:	1% level	-4.064453	
	5% level	-3.461094	
	10% level	-3.156776	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NFNET_SA/GDP_P)
Method: Least Squares
Date: 01/10/08   Time: 22:13
Sample (adjusted): 1980Q4 2002Q4
Included observations: 89 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
NFNET_SA(-1)/GDP_P(-1)	-0.371680	0.135319	-2.746695	0.0074
D(NFNET_SA(-1)/GDP_P(-1))	-0.665676	0.130098	-5.116740	0.0000
D(NFNET_SA(-2)/GDP_P(-2))	-0.344506	0.101322	-3.400124	0.0010
C	18.73706	9.825167	1.907047	0.0599
@TREND(1980Q1)	-0.041407	0.100612	-0.411550	0.6817

R-squared	0.556294	Mean dependent var	0.193748
Adjusted R-squared	0.535166	S.D. dependent var	32.01668
S.E. of regression	21.82858	Akaike info criterion	9.058857
Sum squared resid	40024.89	Schwarz criterion	9.198668
Log likelihood	-398.1191	F-statistic	26.32868
Durbin-Watson stat	1.855082	Prob(F-statistic)	0.000000

First differences

D(NFNET_SA/GDP_P)

Null Hypothesis: D(NFNET_SA/GDP_P) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic based on SIC, MAXLAG=11)

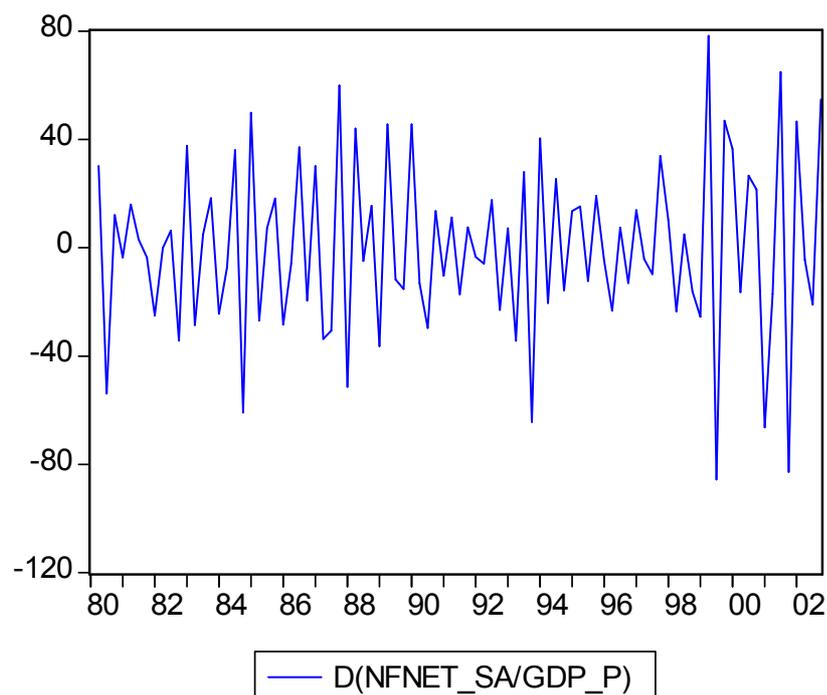|		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.46817	0.0000
Test critical values:	1% level	-4.064453	
	5% level	-3.461094	
	10% level	-3.156776	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(NFNET_SA/GDP_P,2)
Method: Least Squares
Date: 01/10/08   Time: 22:20
Sample (adjusted): 1980Q4 2002Q4

Included observations: 89 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(NFNET_SA(-1)/GDP_P(-1))	-2.364786	0.175583	-13.46817	0.0000
D(NFNET_SA(-1)/GDP_P(-1),2)	0.451566	0.097058	4.652543	0.0000
C	-4.750074	5.021558	-0.945936	0.3469
@TREND(1980Q1)	0.080906	0.093629	0.864106	0.3900

R-squared	0.851098	Mean dependent var	1.219984
Adjusted R-squared	0.845843	S.D. dependent var	57.69653
S.E. of regression	22.65331	Akaike info criterion	9.122392
Sum squared resid	43619.67	Schwarz criterion	9.234241
Log likelihood	-401.9464	F-statistic	161.9485
Durbin-Watson stat	1.910318	Prob(F-statistic)	0.000000

FCNET = Net lending / net borrowing of Financial corporations (seasonally adjusted and deflated)

Null Hypothesis: FCNET_SA/GDP_P has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 6 (Automatic based on SIC, MAXLAG=11)

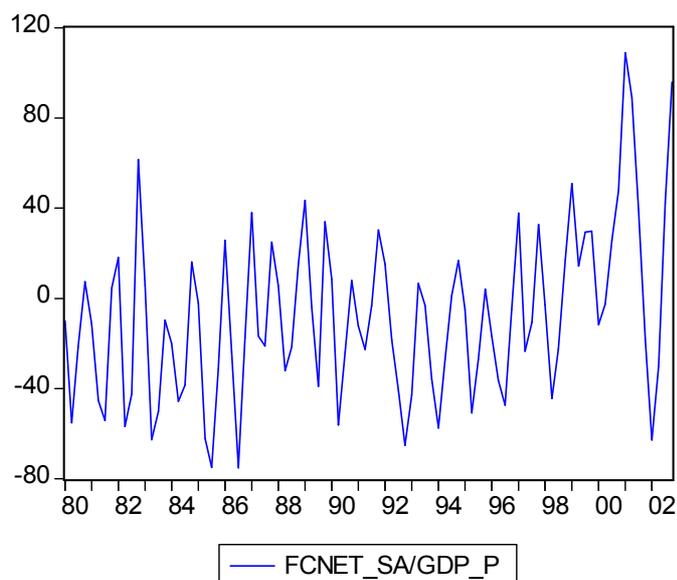|		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.020774	0.5815
Test critical values:	1% level	-4.069631	
	5% level	-3.463547	
	10% level	-3.158207	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FCNET_SA/GDP_P)
Method: Least Squares
Date: 01/10/08   Time: 22:23
Sample (adjusted): 1981Q4 2002Q4
Included observations: 85 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FCNET_SA(-1)/GDP_P(-1)	-0.399970	0.197929	-2.020774	0.0468
D(FCNET_SA(-1)/GDP_P(-1))	0.316190	0.184306	1.715573	0.0903
D(FCNET_SA(-2)/GDP_P(-2))	-0.748375	0.182255	-4.106191	0.0001
D(FCNET_SA(-3)/GDP_P(-3))	0.063402	0.168452	0.376382	0.7077
D(FCNET_SA(-4)/GDP_P(-4))	-0.604701	0.167519	-3.609752	0.0005
D(FCNET_SA(-5)/GDP_P(-5))	-0.061779	0.111899	-0.552094	0.5825
D(FCNET_SA(-6)/GDP_P(-6))	-0.458402	0.114178	-4.014818	0.0001
C	-12.91565	8.603614	-1.501188	0.1375
@TREND(1980Q1)	0.238625	0.142084	1.679468	0.0972

R-squared	0.674145	Mean dependent var	1.764460
Adjusted R-squared	0.639845	S.D. dependent var	40.27592
S.E. of regression	24.17076	Akaike info criterion	9.308011
Sum squared resid	44401.16	Schwarz criterion	9.566645
Log likelihood	-386.5905	F-statistic	19.65409
Durbin-Watson stat	2.124017	Prob(F-statistic)	0.000000

First differences

D(FCNET_SA/GDP_P)

Null Hypothesis: D(FCNET_SA/GDP_P) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic based on SIC, MAXLAG=11)

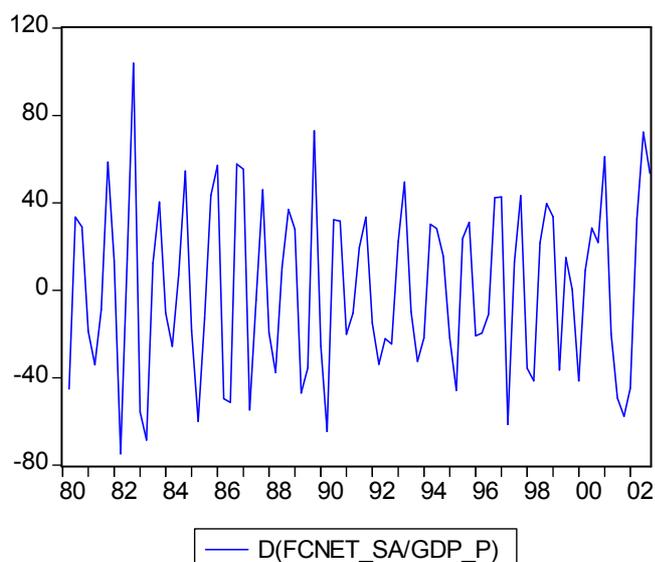|			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-9.037594	0.0000
Test critical values:	1% level		-4.069631	
	5% level		-3.463547	
	10% level		-3.158207	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(FCNET_SA/GDP_P,2)
Method: Least Squares
Date: 01/10/08   Time: 22:24
Sample (adjusted): 1981Q4 2002Q4
Included observations: 85 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(FCNET_SA(-1)/GDP_P(-1))	-3.718542	0.411453	-9.037594	0.0000
D(FCNET_SA(-1)/GDP_P(-1),2)	2.720080	0.363952	7.473737	0.0000
D(FCNET_SA(-2)/GDP_P(-2),2)	1.661636	0.316740	5.246051	0.0000
D(FCNET_SA(-3)/GDP_P(-3),2)	1.514381	0.249374	6.072730	0.0000
D(FCNET_SA(-4)/GDP_P(-4),2)	0.707966	0.150950	4.690079	0.0000
D(FCNET_SA(-5)/GDP_P(-5),2)	0.548225	0.107255	5.111411	0.0000
C	-0.193254	5.980138	-0.032316	0.9743
@TREND(1980Q1)	0.050036	0.109260	0.457953	0.6483

R-squared	0.816522	Mean dependent var	0.732592
Adjusted R-squared	0.799843	S.D. dependent var	55.09735
S.E. of regression	24.64998	Akaike info criterion	9.336819
Sum squared resid	46786.86	Schwarz criterion	9.566715
Log likelihood	-388.8148	F-statistic	48.95280
Durbin-Watson stat	2.216168	Prob(F-statistic)	0.000000

HTNET = Net lending / net borrowing of Households (seasonally adjusted and deflated)
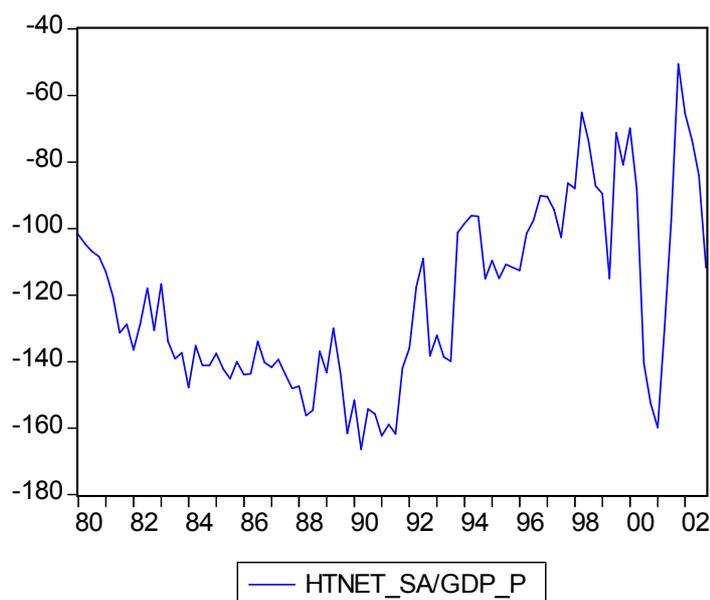
Null Hypothesis: HTNET_SA/GDP_P has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 8 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.051654	0.5645
Test critical values:	1% level	-4.072415	
	5% level	-3.464865	
	10% level	-3.158974	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HTNET_SA/GDP_P)
Method: Least Squares
Date: 01/10/08   Time: 22:27
Sample (adjusted): 1982Q2 2002Q4
Included observations: 83 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HTNET_SA(-1)/GDP_P(-1)	-0.139740	0.068111	-2.051654	0.0438
D(HTNET_SA(-1)/GDP_P(-1))	0.008679	0.105180	0.082513	0.9345
D(HTNET_SA(-2)/GDP_P(-2))	0.506843	0.107402	4.719118	0.0000
D(HTNET_SA(-3)/GDP_P(-3))	0.046211	0.112552	0.410570	0.6826
D(HTNET_SA(-4)/GDP_P(-4))	-1.025896	0.112933	-9.084109	0.0000
D(HTNET_SA(-5)/GDP_P(-5))	0.046840	0.106759	0.438751	0.6622
D(HTNET_SA(-6)/GDP_P(-6))	0.477361	0.116750	4.088754	0.0001
D(HTNET_SA(-7)/GDP_P(-7))	0.107742	0.117831	0.914377	0.3636

D(HTNET_SA(-8)/GDP_P(-8))	-0.571860	0.116992	-4.888033	0.0000
C	-24.03768	10.86503	-2.212389	0.0301
@TREND(1980Q1)	0.149354	0.061855	2.414600	0.0183

R-squared	0.680232	Mean dependent var	0.295884
Adjusted R-squared	0.635819	S.D. dependent var	15.41138
S.E. of regression	9.300366	Akaike info criterion	7.420870
Sum squared resid	6227.770	Schwarz criterion	7.741440
Log likelihood	-296.9661	F-statistic	15.31630
Durbin-Watson stat	1.975917	Prob(F-statistic)	0.000000

first differences

Null Hypothesis: D(HTNET_SA/GDP_P) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic based on SIC, MAXLAG=11)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.891225	0.0008
Test critical values:	1% level	-4.072415	
	5% level	-3.464865	
	10% level	-3.158974	

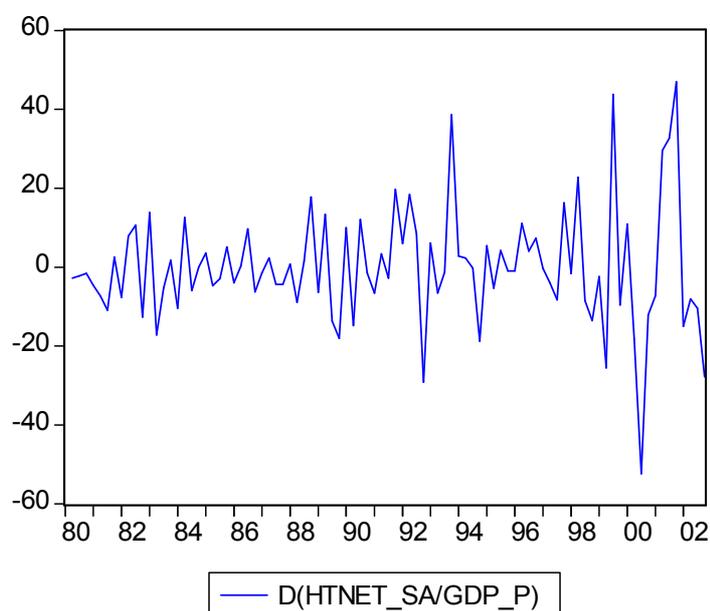*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(HTNET_SA/GDP_P,2)
Method: Least Squares
Date: 01/10/08   Time: 22:30
Sample (adjusted): 1982Q2 2002Q4
Included observations: 83 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(HTNET_SA(-1)/GDP_P(-1))	-1.864724	0.381239	-4.891225	0.0000
D(HTNET_SA(-1)/GDP_P(-1),2)	0.794014	0.365410	2.172937	0.0330
D(HTNET_SA(-2)/GDP_P(-2),2)	1.224668	0.333417	3.673087	0.0005
D(HTNET_SA(-3)/GDP_P(-3),2)	1.174114	0.281325	4.173517	0.0001
D(HTNET_SA(-4)/GDP_P(-4),2)	0.058898	0.229247	0.256918	0.7980
D(HTNET_SA(-5)/GDP_P(-5),2)	0.086573	0.214776	0.403087	0.6881
D(HTNET_SA(-6)/GDP_P(-6),2)	0.544679	0.187857	2.899435	0.0049
D(HTNET_SA(-7)/GDP_P(-7),2)	0.611789	0.117870	5.190358	0.0000
C	-2.301253	2.461469	-0.934910	0.3529
@TREND(1980Q1)	0.060101	0.044927	1.337731	0.1851

R-squared	0.826011	Mean dependent var	-0.242727
Adjusted R-squared	0.804561	S.D. dependent var	21.49495
S.E. of regression	9.502602	Akaike info criterion	7.453591
Sum squared resid	6591.860	Schwarz criterion	7.745018
Log likelihood	-299.3240	F-statistic	38.50747
Durbin-Watson stat	1.982406	Prob(F-statistic)	0.000000

GGNET = Net lending / net borrowing of General government (seasonally adjusted and deflated)
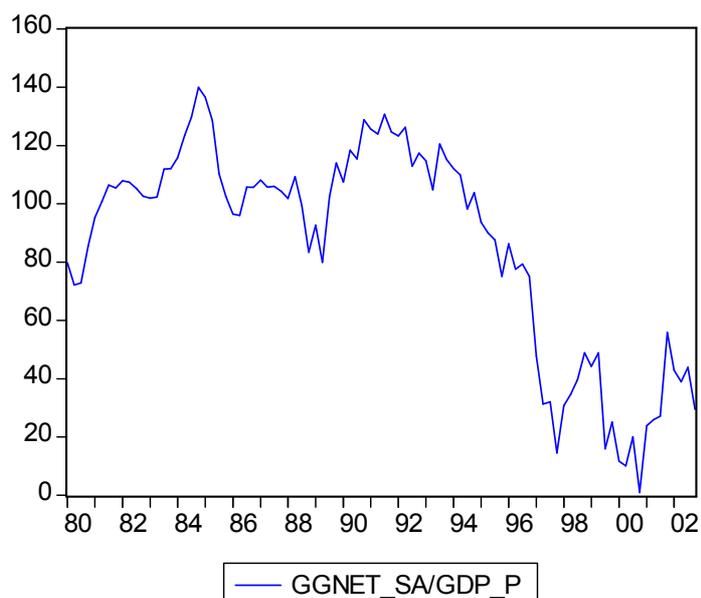
GGNET_SA/GDP_P

Null Hypothesis: GGNET_SA/GDP_P has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic based on SIC, MAXLAG=11)

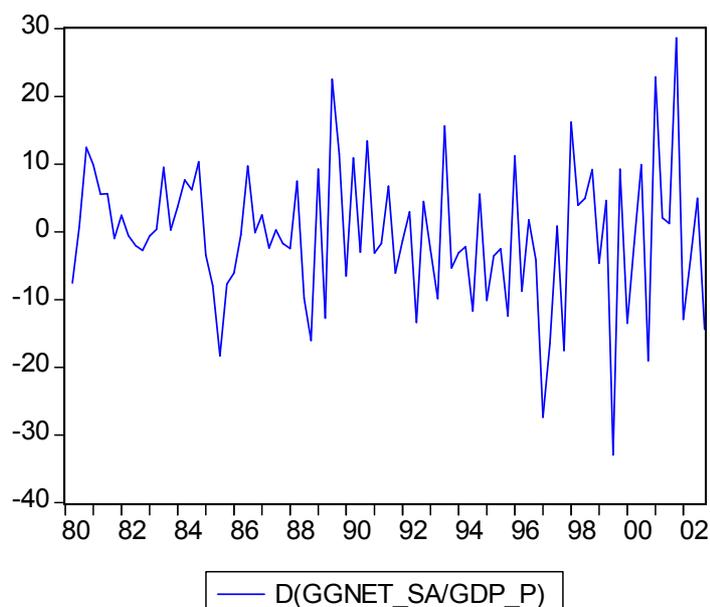|		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.890212	0.6511
Test critical values:	1% level	-4.066981	
	5% level	-3.462292	
	10% level	-3.157475	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GGNET_SA/GDP_P)
Method: Least Squares
Date: 01/10/08   Time: 22:39
Sample (adjusted): 1981Q2 2002Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GGNET_SA(-1)/GDP_P(-1)	-0.073922	0.039108	-1.890212	0.0624
D(GGNET_SA(-1)/GDP_P(-1))	-0.071459	0.092525	-0.772321	0.4422
D(GGNET_SA(-2)/GDP_P(-2))	0.312547	0.090664	3.447314	0.0009
D(GGNET_SA(-3)/GDP_P(-3))	0.208312	0.091943	2.265661	0.0262
D(GGNET_SA(-4)/GDP_P(-4))	-0.480968	0.094523	-5.088365	0.0000
C	11.09597	5.728103	1.937110	0.0563
@TREND(1980Q1)	-0.112357	0.054697	-2.054192	0.0432

R-squared	0.410963	Mean dependent var	-0.755589
Adjusted R-squared	0.366785	S.D. dependent var	10.40045
S.E. of regression	8.276136	Akaike info criterion	7.141667
Sum squared resid	5479.554	Schwarz criterion	7.340074
Log likelihood	-303.6625	F-statistic	9.302477
Durbin-Watson stat	1.913497	Prob(F-statistic)	0.000000

— D(GGNET_SA/GDP_P)

Null Hypothesis: D(GGNET_SA/GDP_P) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on SIC, MAXLAG=11)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-6.336750	0.0000
Test critical values:	1% level		-4.066981	
	5% level		-3.462292	
	10% level		-3.157475	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GGNET_SA/GDP_P,2)
Method: Least Squares
Date: 01/10/08   Time: 22:33
Sample (adjusted): 1981Q2 2002Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(GGNET_SA(-1)/GDP_P(-1))	-1.128472	0.178084	-6.336750	0.0000
D(GGNET_SA(-1)/GDP_P(-1),2)	0.040997	0.165734	0.247368	0.8052
D(GGNET_SA(-2)/GDP_P(-2),2)	0.343773	0.143499	2.395647	0.0189
D(GGNET_SA(-3)/GDP_P(-3),2)	0.522380	0.093398	5.593043	0.0000
C	0.907359	1.968833	0.460861	0.6461
@TREND(1980Q1)	-0.034785	0.036729	-0.947057	0.3464

R-squared	0.741101	Mean dependent var	-0.278748
Adjusted R-squared	0.725120	S.D. dependent var	16.03416
S.E. of regression	8.406551	Akaike info criterion	7.162372
Sum squared resid	5724.277	Schwarz criterion	7.332434
Log likelihood	-305.5632	F-statistic	46.37273
Durbin-Watson stat	1.938194	Prob(F-statistic)	0.000000

RWNET = Net lending / net borrowing of the Foreign sector (seasonally adjusted and deflated)
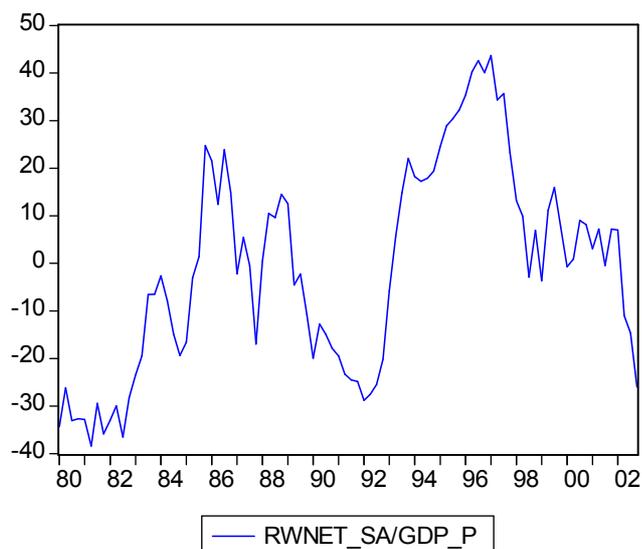
— RWNET_SA/GDP_P

Null Hypothesis: RWNET_SA/GDP_P has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)

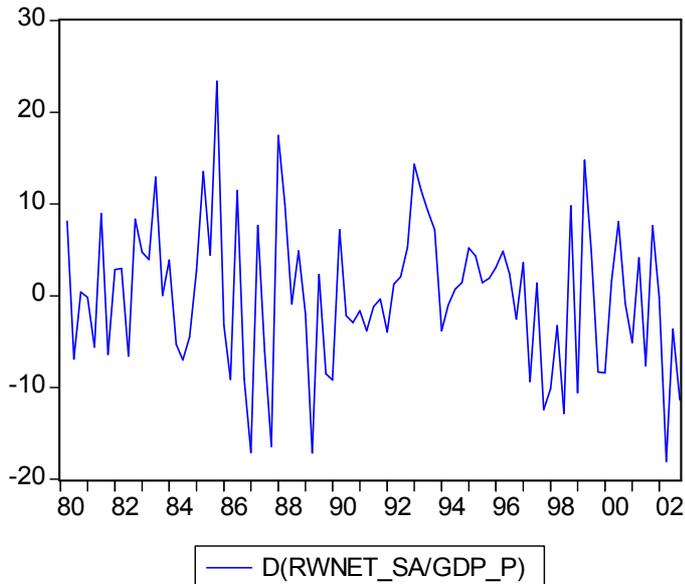|		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.440337	0.8424
Test critical values:	1% level	-4.062040	
	5% level	-3.459950	
	10% level	-3.156109	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RWNET_SA/GDP_P)
Method: Least Squares
Date: 01/10/08   Time: 22:37
Sample (adjusted): 1980Q2 2002Q4
Included observations: 91 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RWNET_SA(-1)/GDP_P(-1)	-0.067673	0.046984	-1.440337	0.1533
C	0.602231	1.968434	0.305944	0.7604
@TREND(1980Q1)	-0.012072	0.038352	-0.314759	0.7537

R-squared	0.042211	Mean dependent var	0.091438
Adjusted R-squared	0.020444	S.D. dependent var	8.068713

S.E. of regression	7.985811	Akaike info criterion	7.025621
Sum squared resid	5612.039	Schwarz criterion	7.108397
Log likelihood	-316.6658	F-statistic	1.939158
Durbin-Watson stat	1.893174	Prob(F-statistic)	0.149922

First differences

Null Hypothesis: D(RWNET_SA/GDP_P) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic based on SIC, MAXLAG=11)

			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.907758	0.0007
Test critical values:	1% level		-4.066981	
	5% level		-3.462292	
	10% level		-3.157475	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RWNET_SA/GDP_P,2)
Method: Least Squares
Date: 01/10/08   Time: 22:38
Sample (adjusted): 1981Q2 2002Q4
Included observations: 87 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(RWNET_SA(-1)/GDP_P(-1))	-0.948888	0.193344	-4.907758	0.0000
D(RWNET_SA(-1)/GDP_P(-1),2)	0.039064	0.180484	0.216439	0.8292
D(RWNET_SA(-2)/GDP_P(-2),2)	0.089528	0.150255	0.595842	0.5529
D(RWNET_SA(-3)/GDP_P(-3),2)	0.349828	0.106903	3.272387	0.0016
C	2.320984	1.777187	1.305988	0.1953
@TREND(1980Q1)	-0.045964	0.032743	-1.403803	0.1642

R-squared	0.582922	Mean dependent var	-0.128516
Adjusted R-squared	0.557176	S.D. dependent var	11.35204
S.E. of regression	7.554213	Akaike info criterion	6.948560
Sum squared resid	4622.357	Schwarz criterion	7.118623
Log likelihood	-296.2624	F-statistic	22.64165
Durbin-Watson stat	2.096722	Prob(F-statistic)	0.000000

IRF of the VAR in the paper with a different ordering of non-policy variables (i)

smpl 1980:1 2002:4
var var37.LS 1 4 LOG(EXR_LM) LOG(IPI) LOG(CPI) LOG(P_RAW_IMP) INT_POLICY LOG(M2_SA) @ C
D_92_3 D_95_1 D_98_3

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of LOG(EXR_LM) to INT_POLICY

Response of LOG(IPI) to INT_POLICY

Response of LOG(CPI) to INT_POLICY

Response of LOG(P_RAW_IMP) to INT_POLICY

Response of INT_POLICY to INT_POLICY

Response of LOG(M2_SA) to INT_POLICY

IRF of the VAR in the paper with a different ordering of non-policy variables (ii)

smpl 1980:1 2002:4
var var38.LS 1 4 LOG(CPI) LOG(EXR_LM) LOG(P_RAW_IMP) LOG(IPI) INT_POLICY LOG(M2_SA) @ C
D_92_3 D_95_1 D_98_3

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of LOG(CPI) to INT_POLICY	Response of LOG(EXR_LM) to INT_POLICY	Response of LOG(P_RAW_IMP) to INT_POLICY
Response of LOG(IPI) to INT_POLICY	Response of INT_POLICY to INT_POLICY	Response of LOG(M2_SA) to INT_POLICY