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FINANCIAL INNOVATION, MACROECONOMIC VOLATILITY AND THE GREAT MODERATION

Lorenzo Bencivelli[*] and Andrea Zaghini[**]

Abstract

In the paper we propose an assessment of the role of financial innovation in shaping US macroeconomic dynamics. We extend an existing model by Christiano, Eichenbaum and Evans which studied the transmission of monetary policy impulses to business and corporate sector financing variables just before the Great Moderation period. By investigating the properties of the model over a longer time span we show that in the later period a change in the monetary policy transmission mechanism is likely to have occurred. In particular, we argue that the role of financial innovation has significantly altered the transmission of shocks.

Contents

Key words: Great Moderation, Monetary policy, Financial Innovation

JEL Classification: E32; E52; C32

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1. Introduction[1]

The Great Moderation period in the US has been broadly investigated but it is still a matter of lively discussions. The stylized facts are very simple and clear: the volatility and the persistence of many macroeconomic variables (first of all GDP and inflation) declined significantly since early 1980s. However, the reasons behind this change in business cycle dynamics are still unclear. The economic literature has provided three competing but non mutually excluding hypotheses: the "good luck" hypothesis (the economy was hit from less severe shocks), the "good policy" hypothesis (improved monetary policy management), the "changes in the structure" hypothesis (modifications in the functioning of the economy which have altered the transmission of monetary and other kind of shocks).

Recently a new branch of the literature has suggested that financial innovation may have played and important role in influencing the business cycle dynamics of the US economy. In particular, changes in firms' and consumers' behaviour, induced by significant financial improvements, have allowed private sector agents to better cushion themselves from the impact of interest-rate fluctuations. Within this new framework, our paper analyses the role played by net funds raised by the business sector. We build on an existing model proposed Christiano, Eichenbaum and Evans in 1996 by extending their sample in order to include the whole Great Moderation period. Their model worked well in identifying monetary policy shocks and describing the interaction among real and financial variables over a period which includes only few years of the Great Moderation era. By adding data till 2006 and by adequately splitting the sample we show: 1) that the model is not able to describe the dynamics of US economy over the enlarged period; 2) that the transmission of monetary policy shocks in an early and a late sub-sample differs significantly. In particular, the role of financial variables seems to have changed. Even not including data from the most recent financial crisis, in the second part of the sample financial variables emerge as the channel through which the shocks pass to the real sector of the economy.

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The paper is structured as follows. Section 2 proposes a survey of the literature paying particular attention to the most recent contributions about the role of financial innovation; Section 3 introduces the model by Christiano et al. (1996), Section 4 deals with the estimation results over the two sub-samples; Section 5 provides a robustness analysis; Section 6 concludes.

2. The economic literature

Starting from the late 1990s, a large body of the empirical literature has examined the Great Moderation era in the US. A survey of the early contributions can be already found in Stock and Watson (2002).[2] More recently, this lively literature has witnessed an acceleration due to the employment of new econometric techniques. As already mentioned, there are three main explanations of the declined volatility of US macroeconomic times series: the "good luck", the "good policy" and the "structural changes" hypotheses.

The "good luck" hypothesis is based on the assumption that macroeconomic shocks are drawn from a time-varying distribution. Over the Great Moderation years the US economy was simply hit by less severe shocks and in particular by smaller common international shocks (Stock and Watson 2003; Sims and Zha 2006). The "good policy" explanation of the declined volatility is that the FED changed its monetary policy conduct improving its ability to tackle exogenous disturbances. By systematically responding more decisively to fluctuations in economic conditions, a credible monetary policy has since the early 1980s stabilized inflationary expectations via commitment to a nominal anchor (Lubik Schorfheide 2004; Boivin and Giannoni 2006). Finally, the "structural changes" hypothesis holds that various innovations induced by technological progress or financial innovations, might have altered the transmission mechanism of shocks as well as monetary policy impulses allowing the private sector to better withstand the impact of business cycle fluctuations (Giannone et al 2008; Galì and Gambetti 2009).

[2] See Bernanke and Mihov (1998), Kim and Nelson (1999), McConnel and Perez-Quiros (2000), Clarida et al. (2000), Blanchard and Simon (2001) among the early studies.

Without the pretence of being exhaustive, we report in Table 1 a classification of the empirical contributions on the Great Moderation with respect to the main empirical method employed and the hypothesis backed by the results.

TABLE 1 Empirical literature

	Good luck	**Good policy**	**Structural changes**
Sub-samples	De Blas (09)	Clarida et al (00) Lubik Schorfheide (04) Boivin Giannoni (06)	Boivin et al. (10) Canova Gambetti (10) Gilchrist et al. (09)
Time-varying coefficients	Stock Watson (03) Primiceri (05) Justiniano Primiceri (08)	Cecchetti et al (06)	Canova Gambetti (09) Galì Gambetti (09)
Time-varying regimes	McConnell Perez (00) Sims Zha (06) Korenok Radchenko (06)	Kim et al (04)	Galvao Marcellino (10) Kim Nelson (99)

One of the first and still broadly used methodology by empirical works is the sub-sampling. The properties of the US economy are investigated separately over two distinct periods. Even if the econometric techniques are often different (e.g., IRFs are estimated with VAR/FAVAR or derived from small scale models) the idea is to use the business cycle dynamics over a pre-Moderation sample to test the changes of the Great Moderation period. There is a relatively large consensus on the break having occurred in 1984. The early sample usually starts in mid-late 1950s and ends in late 1983 or in any of the four quarters of 1984. As for the closing date of the Great Moderation period, the latest available data is commonly employed. However, at least as inflation dynamics are concerned, based on a review of econometric estimates of trend inflation and surveys on inflation expectations, Mishkin (2007) argues that the process of disinflation and the re-anchoring of long-term inflation expectations was completed by the end of the 1990s.[3] Recently more sophisticated econometric instruments were employed to assess the causes of the Great Moderation. In particular (structural) time-varying coefficient VAR and time varying regimes modelling are widely used.

[3] For the welfare implication of the declined inflation rate over the Great Moderation period in the US see Calza and Zaghini (2010).

As for the motivations of the declined macroeconomic volatility, from Table 1 we can see that early works tended to support the "good luck" hypothesis while later studies point to the "good policy explanation" of the Great Moderation. Whereas, apart from the pioneering work of Kim and Nelson (1999), the contribution pointing to a structural change in the economic framework are the most recent, regardless of the econometric technique employed.

Among the contributions which suggest that the structural changes witnessed by the US economy are the main cause of the Great Moderation, there are several studies backing the hypothesis that the change in the financial system is the most important one. In particular, this branch of the literature looks at several possible links between the working of financial markets and the real economic activity.

On the one hand, the *financial accelerator* and the pro-cyclicality of the premia on credit are seen as the main theoretical tools to assess the process through which the financial system is supposed to transmit and amplify economic fluctuations.[4] On the other hand, *financial innovation* has been proposed as a possible source of moderation of business cycles. Changes in the way financial market operates have induced structural adjustments in firms' and consumers' behaviour, which in turn let the private sector better cushioning itself from the impact of interest-rate fluctuations and macroeconomic shocks. In particular, the coincidence of the Great Moderation in macroeconomic variables with an increase in the volatility of many financial variables (*financial immoderation*) has pushed the profession looking for possible explanations of the phenomenon. The link proposed goes indeed through the financial innovation. The underlying intuition is that transformations occurred in the financial market (financial innovation) have turned to opportunities for firms and households to smooth their investment and consumption plans, with the result that economic agents exploited more the financial instruments (financial immoderation), but the fluctuations in the main macroeconomic aggregates have moderated considerably (macroeconomic moderation). For instance, a change usually suggested by the literature to support the financial innovation hypothesis is the *democratization of the market* (Dynan et

[4] About the financial accelerator transmission mechanism see, for instance, Gertler and Lown (1999).

al. 2006), i.e. the agents participation to the market trading without intervention of institutional intermediaries brought about by newly developed technologies.[5]

Of particular interest is the empirical approach followed by Jermann and Quadrini (2012), Gilchrist et al (2010) and Fuentes-Albero (2010). They start from the well known DSGE model for the US economy proposed by Smets and Wouters (2007) and introduce some financial market frictions to account for spillovers from the financial system to the real activity. Following the line of research pioneered by Kiyotaki and Moore (1997) and Bernanke et al. (1999) which show that frictions in the credit market introduce a transmission mechanism which magnifies business fluctuations, they try to prove that the process of convergence toward a better functioning and almost frictionless financial market can yield more moderate fluctuations in the real variables, i.e. be the cause of the Great Moderation.[6]

According to Gilchrist et al. (2010), the introduction of a financial accelerator mechanism *à la* Bernanke et al. (1999) in the Smets and Wouters (2007) framework , under the hypothesis that markets are imperfect, drives a wedge between expected return on capital and expected return demanded by the households (the lender). The authors show that over the period 1973-2008 this mechanism affects significantly business cycle fluctuations. In particular, an increase in external finance premium causes significant and protracted decline in investment spending and in output. Furthermore, Gilchrist et al. find the that the financial stress is partly responsible for the sharp drop in output and investments spending in the mid Seventies. Conversely, the financial easing of the late Nineties provided a significant impetus to investments.

Looking at Flow-of-Funds data Jermann and Quadrini (2012) document the increase in volatility of firms financial flows. Specifically, the flows of debt and equity financing in

[5] Other transformations often quoted are the higher efficiency and speed of the spreading of information; the quick expansion of the market for high risk debt that has enlarged the participation to the market; the phasing out of the Regulation Q, which imposed a ceiling on the interest rate on deposits, with the consequence that when market rates were to rise above this level, funds were no longer available for the lenders, reducing the amount of resources for borrowers.

[6] For a different view on the role of the US financial structure see Den Haan and Sterk (2011) who challenge the empirical evidence about financial innovation as a possible explanatory factor of the Great Moderation.

the business sector displayed much greater variability from the second half of the 1980s. Because debt financing is negatively correlated to equity financing, these findings suggest that firms have become more flexible in the choice of the financial structure. In their model the driving forces of business cycles are productivity and credit shocks. The former is the standard productivity shock as in the typical real business cycle model. The latter is a shock that affects the enforcement of debt contracts, and therefore, the borrowing ability of firms (credit shock). Because of financial frictions, credit shocks are transmitted to the real sector of the economy through the effect they have on the production and investment decisions of firms. They show that credit shocks do contribute non-negligibly to the volatility of the major macroeconomic variables in the first sample period (1952-1983). In addition, they find that financial innovations can account for a large decline in real macroeconomic volatility and they can easily account for the full increase in the volatility of the financial structure of firms in the second sample period (1984-2006).

The paper by Fuentes-Albero (2010) tries to reconcile the two empirical facts of the great moderation of macroeconomic variables and the great immoderation of financial variables on the path traced by Jermann and Quadrini (2012) and Gilchrist et al. (2010). The goal being that of quantifying the relative role played by financial factors in shaping macroeconomic volatilities. The baseline model is again the one by Smets and Wouter (2007) enriched with a financial accelerator mechanism (financial frictions). Differently from Gilchrist et al. (2010) the author allows for two different financial shocks, one accounting for the *balance sheet channel*, the other for the *information channel*. The main empirical finding is a reduction in the average level of financial rigidities in the second sample (1984-2006). In particular, the estimated reduction in the size of the financial accelerator has two effects. On the one hand, it allows the model to account for 30% of the slowdown in the volatility of investment and the nominal interest rate. On the other hand, a smaller level of financial rigidity changes the propagation mechanism of financial shocks to the economy.

3. A benchmark model

In order to assess whether a change has occurred in the monetary policy transmission mechanism which is consistent with the Great Moderation timing and, in particular, if it can

be related to some changes in the way private sector reacts to unexpected shocks, we build on the 1996 work by Christiano, Eichenbaum and Evans (CEE henceforth). The CEE paper is a very good starting point for two reasons: 1) it provides an empirical framework which worked well in identifying FED monetary policy impulses; 2) it assesses the implication of a monetary policy shock on business sector variables. In our empirical approach we mostly focus on the analysis of the impulse response functions (IRFs) derived from their model over different periods. We compare the IRFs over different time spans because there are several behavioural patterns that are almost unanimously acknowledged to closely describe the macroeconomic implications of a monetary policy shock. As put by Christiano et al. (1999), every model which deals with the FED monetary policy ought to reproduce these well measured and well accepted effects of US monetary policy shocks. Thus if we find over a given period that the IRFs describe different patterns with respect to standard behaviours, this would suggest that the model is no more able to describe the short- to medium-run dynamics of the US economy. In turn this would suggest a structural change in the fundamental working of the US economy or more simply in a different reaction of the economy to a monetary policy shock.

In the work of 1996, Christiano and co-authors use two measures of monetary policy shocks (orthogonalized shock to Fed funds rate and orthogonalized shocks to non-borrowed reserves) in conjunction with Flow-of-Funds data to assess the impact of monetary policy on the borrowing and lending activities of different sectors of the economy. Our first step is to check whether the implications of the CEE model for the business (and corporate) sector are still valid over an enlarged sample which include the whole Great Moderation period.

The CEE benchmark model is made of six variables which enter the VAR in the following order over the period 1960:Q1 – 1992:Q4: GDP, GDP deflator, a commodity price index (PCOM), non-borrowed reserves (NBRD), the Fed Funds rate (FFR), total reserves (TR). When the Fed Funds rate is specified as the monetary policy instrument, the ordering of the variables in the model and the Cholesky decomposition approach imply that the reaction function of the FED is such that when deciding about the optimal interest rate, not only the GDP in the current quarter but also the price levels and the commodity price index can be observed.

The first part of the CEE work is entirely devoted to the assessment of the business cycle properties of the 6-variable VAR. In addition, the authors verify the validity of the model by adding one at time a variable whose reaction to monetary policy has to be tested. The results of the empirical investigation are in line with the expected textbook macroeconomic behaviours: a contractionary shock is associated with a decline in GDP, employment, retail sales, nonfinacial corporate profits and with an increase in unemployment and inventories. The GDP price deflator declines after two years.

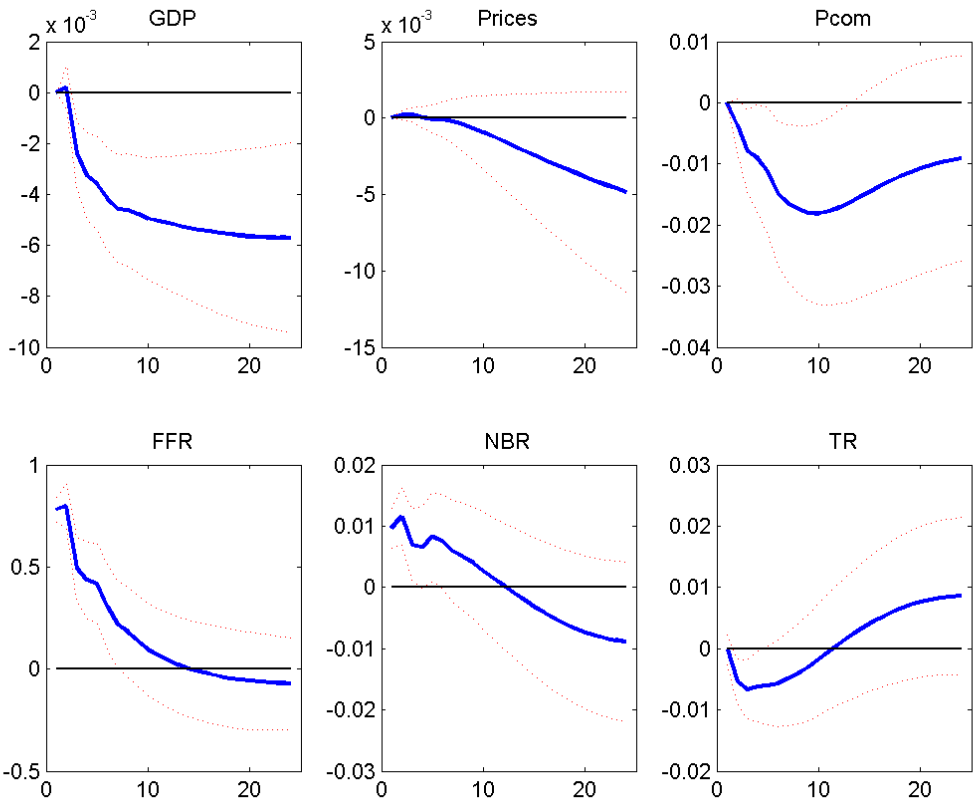
In order to look at different sectors of the economy, in the second part of their work, the authors, following the same methodology, add a seventh variables taken from the FoF accounts to the benchmark VAR. Their main result is that after a contractionary monetary policy shock net funds raised by the business sector rise for one year (2 to 4 quarters). One possible explanation put forward by the authors is that it is difficult for firms to quickly alter their nominal expenditures. Under these circumstances, if a contractionary monetary policy shock leads to a fall in firms' receipts at the beginning of a recession and a fall in net cash flow, say because of a fall in sales and a rise in inventories, then we would expect their net demand for funds to rise. According to this scenario, the observed eventual decline in net funds raised by firms reflects their ability to gradually reduce their nominal expenditures.

As a first step of our empirical investigation, we replicate the CEE model over the original time span (1960-1992) with the current data availability. Given the significant data revisions occurred after the publication of the paper (especially for the Flow-of-Funds data) it is worth checking whether the main conclusions are still valid. We use an increase in the Fed Funds rate as the contractionary monetary policy shock. Consistently with the original results, the shock determines a decline in GDP which reaches the maximum intensity after 7-8 lags, a decrease in the price index, which becomes significant after 2 years, a decline in non-borrowed reserves and a negligible effect at impact on total reserves.[7]

[7] Impulse response functions are reported in Figure A1 in the Appendix. Note that the variable for non-borrowed reserves (NBRD) enters the VAR with a negative sign. We did so for consistency with CEE variables' definition.

We also check the response of net funds raised by the business sector (BNET) and by the corporate sector (CNET) to a monetary policy shock. They are in line with the original model: a rise in the Fed Funds rate leads to an increase in BNET and CNET which is significant for the first 4 quarters. Again the interpretation suggested by Christiano and co-authors is still valid after the data revision.

FIGURE 1 Monetary policy shock (1960-2006) - CEE model



The following step is to run the VAR model over the entire sample 1960-2006. Figure 1 shows that while the response of non-borrowed reserves and total reserves seems to unfold in the expected way, it turns out that a contractionary monetary policy shock has no effect on prices, in addition the negative reaction of GDP appear to be permanent. These two responses clearly suggest that the model is not able to capture the dynamics of US economy over the whole period, in turn this is most likely due to the effect of the Great Moderation. Our point is that with original data till 1992 the model was still functioning reasonably well

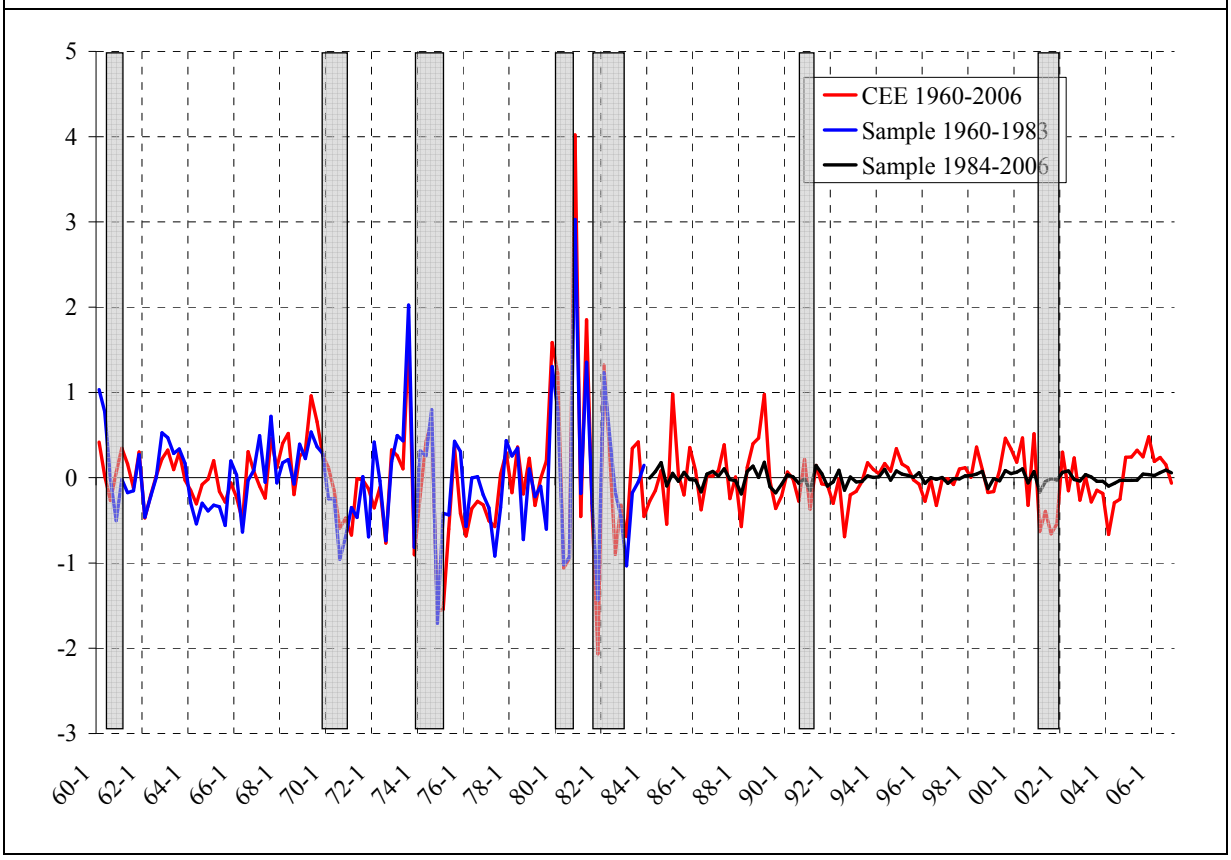
since just a limited number of years within the Great Moderation was covered by the sample. Once the period is enlarged it fails to deliver the same good results.

In order to check whether a change in the monetary policy transmission mechanism has occurred (in particular with reference to the business sector variables), in the next section we split the sample into an early period, which ends before the Great Moderation, and a late period, which includes the whole Great Moderation era.

4. The transmission of shocks over time

In this section we analyse and compare the IRFs derived from the CEE model over two sub-samples. In particular, following the broad consensus in the empirical literature, we set the break date and thus the start of the "late period" in the first quarter of 1984.

FIGURE 2 Monetary policy shock (1960-2006)

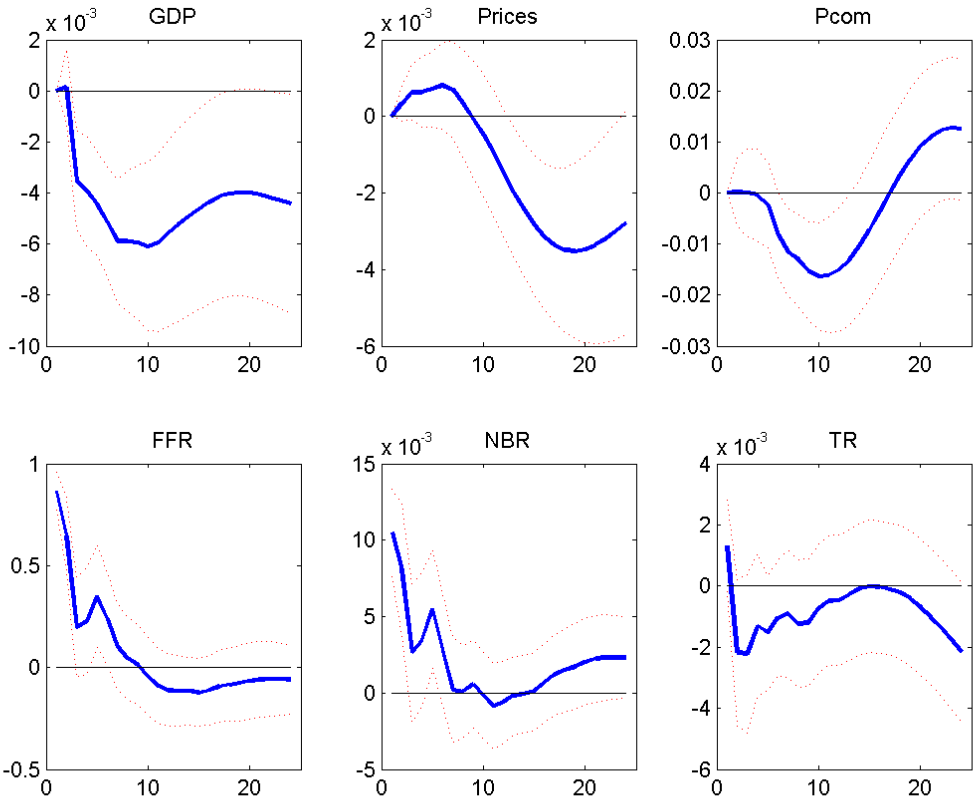


The monetary policy shocks obtained from the model estimated over the whole sample (1960Q1-2006Q4), the early period (1960Q1-1983Q4) and the late period (1984Q1-2006Q4) are reported in Figure 2. While the estimated shocks over the early sample appear to follow

closely the pattern derived from the whole period, those of the late period show a much smaller size and different dynamics, especially during recessions. At first sight it thus seems that the exogenous monetary policy impulses can not be compared within a unique framework

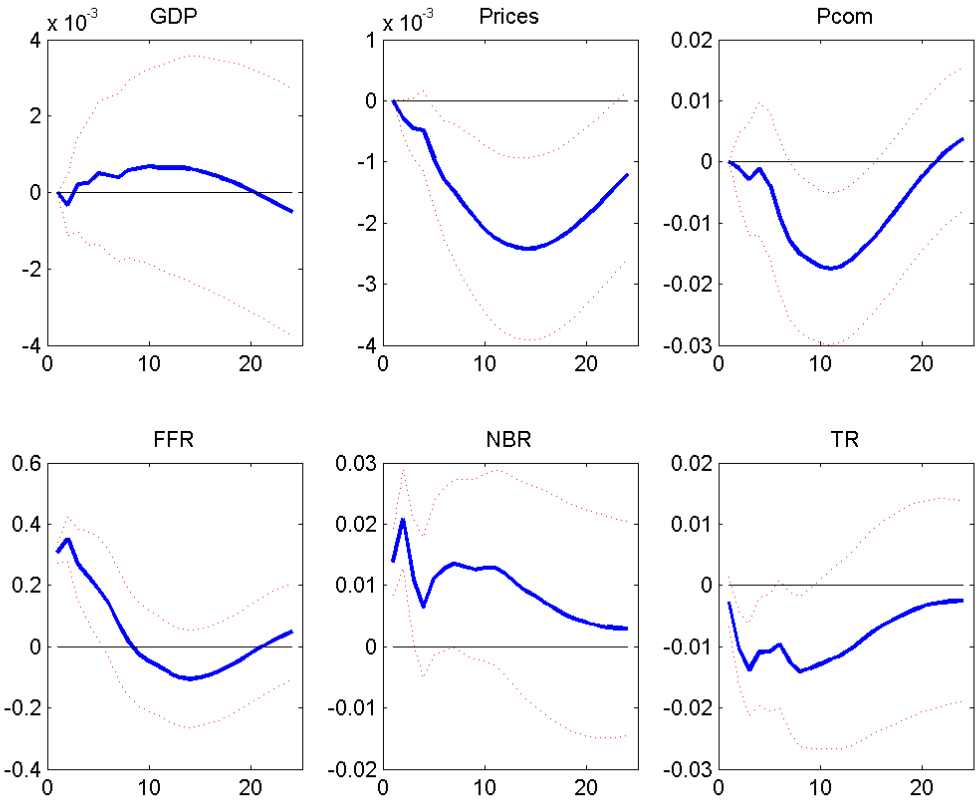
Figure 3 reports the impulse response functions to a contractionary monetary policy shock for the early sample. As expected the dynamics of US economy after an increase in the Fed Funds rate are well described by the 6-variable VAR proposed by Christiano et al. (1996), since just few years are left out with respect to the original sample. The monetary policy shock determines a temporary decrease in GDP, a persistent medium-run decline in prices (even though there is evidence of an initial price-puzzle) a decline in non-borrowed reserves and no effect total reserves.

FIGURE 3 IFRs to a monetary policy shock (1960-1983) - CEE model



We then look at the effect of the shock in the second half of the sample which includes the whole Great Moderation period (Figure 4). The striking result is the absence of a significant response by GDP. Even though the shock is by far smaller in the second sample than in the first one (around one third), the rest of the IRFs are in line with the common knowledge, only GDP dynamics are indeed puzzling. The monetary policy intervention has notwithstanding achieved the alleged target of a decline in inflation. It just seems that the standard Keynesian channel of monetary policy transmission which goes through a decline in GDP (via a crowding out of consumption durables and investment) is completely absent in the most recent period.

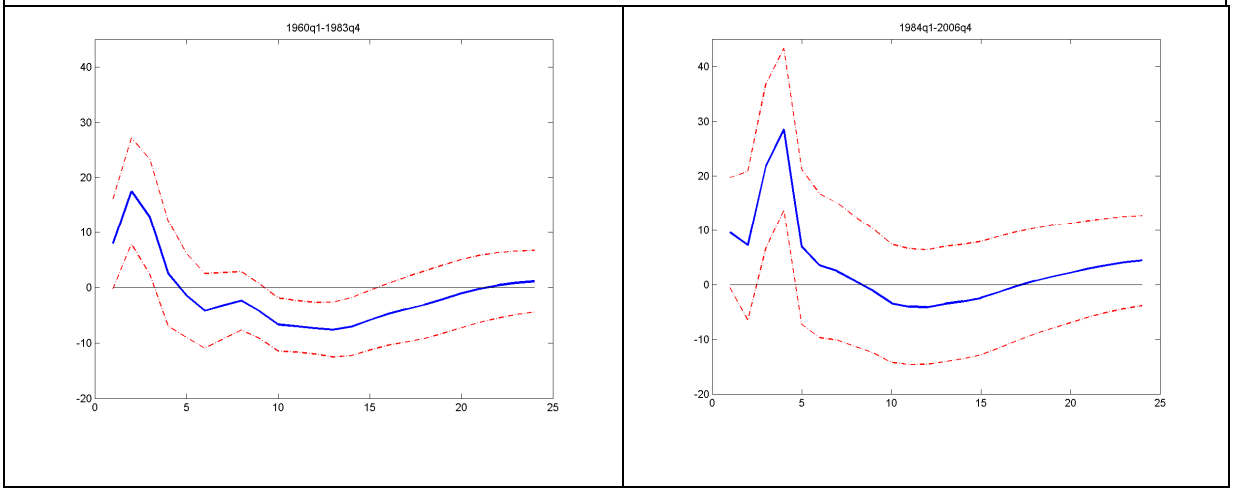
FIGURE 4 IRFs to a monetary policy shock (1984-2006) - CEE model



A possible suggestion of the reason behind this circumstance can be found by the response of BNET (the net funds raised by the business sector) to a Fed Funds rate shocks. In the early period Figure 5 shows that after the initial increase the business variable declines

significantly, while this is not true for the later period. This evidence suggests that a possible "business channel" of the monetary policy transmission that was working in the first part of the sample is not working in the second. In the early sample, an increase in the Fed Funds rate had an impact on firms' financing condition which in turn, together with other channels, affected GDP dynamics. The effect is the one documented by Christiano et al. (1996): after a contractionary monetary policy shock net funds raised by business sector do not immediately decline because it is difficult for firms to quickly adjust nominal expenditure, however after few quarters firms are able to reduce their financing needs by curbing expenditures and thus pushing GDP downwards.

FIGURE 5 Effect on BNET of a monetary policy shock - CEE model

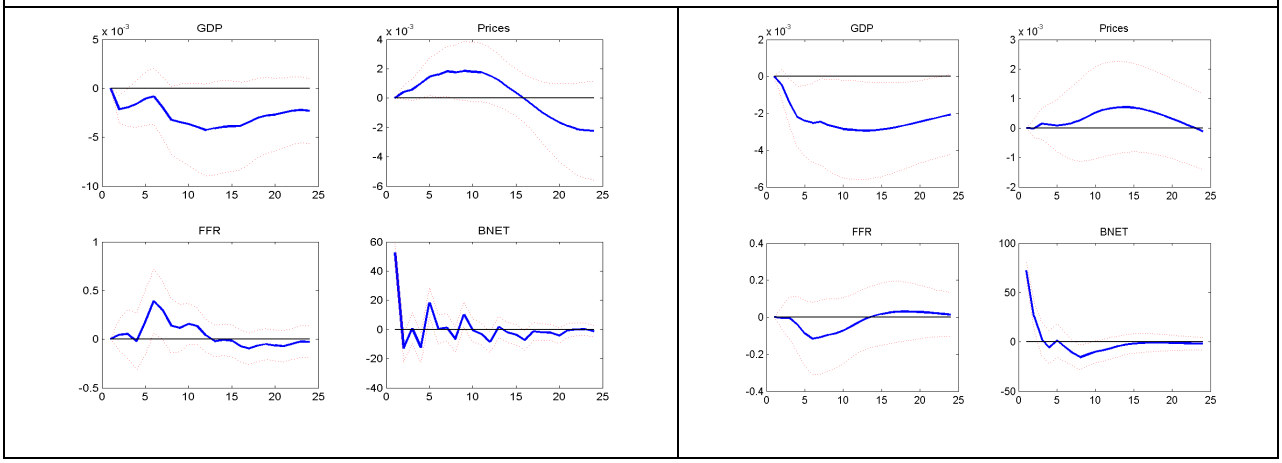


In the most recent sample this channel seems to have disappeared. The finding is consistent with the branch of empirical literature which suggests that financial innovation has induced a structural break able to mitigate business cycle fluctuations in a way coherent with the Great Moderation evidence. Changes in the business sector behaviour, induced by the sustained financial innovation of the last two/three decades, have allowed the private sector to insulate itself from the impact of interest rate fluctuations.

We also investigate the possibility that a change has happened in the transmission of the financial shock. Figure 6 shows in the left hand side panel that in the early period a shock to the business sector variable has no effects on real economy: GDP is unchanged, as well as prices. Also the interest rate does not react, suggesting that financial variables were not a target of the FED policy. The scenario changes in the second sub-sample (right hand side

panel). In fact, in the most recent period there is a negative effects of the financial shock on real GDP, the reaction being statistically significant and persistent.

FIGURE 6 Responses to a financial shock - CEE model



The existence of a channel through which a financial shock hits the real economy is even more relevant given that we did not include in our sample the latest financial crisis (one in which the propagation of financial turmoil to the real economy is commonly agreed to have been extremely strong). While firms are able to adjust to an interest rate shock so that the monetary policy impulse is not transmitted to the real economy, a shock on the financing condition has a direct effect on GDP.

5. Model analysis and robustness

In this section we propose an analysis of the contribution of monetary and financial shocks to the volatility of GDP and prices. In addition we also present a robustness check of the results of the previous section.

Table 2 shows the contribution of a monetary policy shock to the volatility of GDP and prices over the two samples. In the early sample (upper panel), the percentage of the forecast-error variance attributed to the Fed Funds shock reaches 20 per cent after 2 years and henceforth is stable around that share. The value is slightly smaller than the 29 percent after 24 quarters reported by CEE, and in line with the findings of the empirical literature (Jang and Ogaki, 2004; Uhlig 2005; Canova and Gambetti, 2009). When the model is estimated from 1984 to 2006 (lower panel), the contribution of the Fed Funds shock however falls to zero at any horizon, thus confirming that monetary policy has practically no effect on

real GDP in the late sample. Even though stronger in the later sample, the contribution of the monetary policy shock to prices' volatility is instead comparable in the two periods.

TABLE 2 Monetary policy shock contribution to volatility of GDP and prices

	Early sample					
	4	8	12	16	20	24
GDP	11.67	19.43	20.21	19.68	19.38	19.39
	6.53	8.13	9.01	9.52	9.76	9.89
GDPDEF	4.88	5.23	10.18	14.77	17.24	17.97
	4.49	5.90	9.12	11.46	12.33	12.53
	Late sample					
	4	8	12	16	20	24
GDP	0.15	0.12	0.10	0.12	0.13	0.12
	2.09	3.73	4.63	5.16	5.64	6.02
GDPDEF	1.98	9.03	16.87	23.00	26.57	27.89
	3.21	7.71	10.87	12.32	12.73	12.57

The evidence is reversed when we look at the percentage of the forecast-error variance attributed to the financial shock (Table 3). The most important contribution is found in the later sample (lower panel), in which the share of the volatility attributable to the shock is 10 per cent after two years and grows to 19 per cent after 24 quarters. There is instead a limited impact on the volatility of prices in both samples.

In order to test the robustness of our results, we employ a model specification different from that of Christiano et al. (1996) used in Section 3 and 4. In particular, we rely on a VAR model which includes the monetary aggregate M2 but not non-borrowed and total reserves. We thus introduce explicitly a money supply and a money demand relation in the model.[8] The ordering of the variables in the VAR is the following: GDP, GDP_def, PCOM, FFR, M2.

[8] There is a broad literature supporting the introduction of a monetary aggregate in the VAR identification scheme; see for instance Kim (1999), Leeper et al. (1996), Sims and Zha (2006), Boivin et al. (2010).

TABLE 3 Financial shock contribution to volatility of GDP and prices

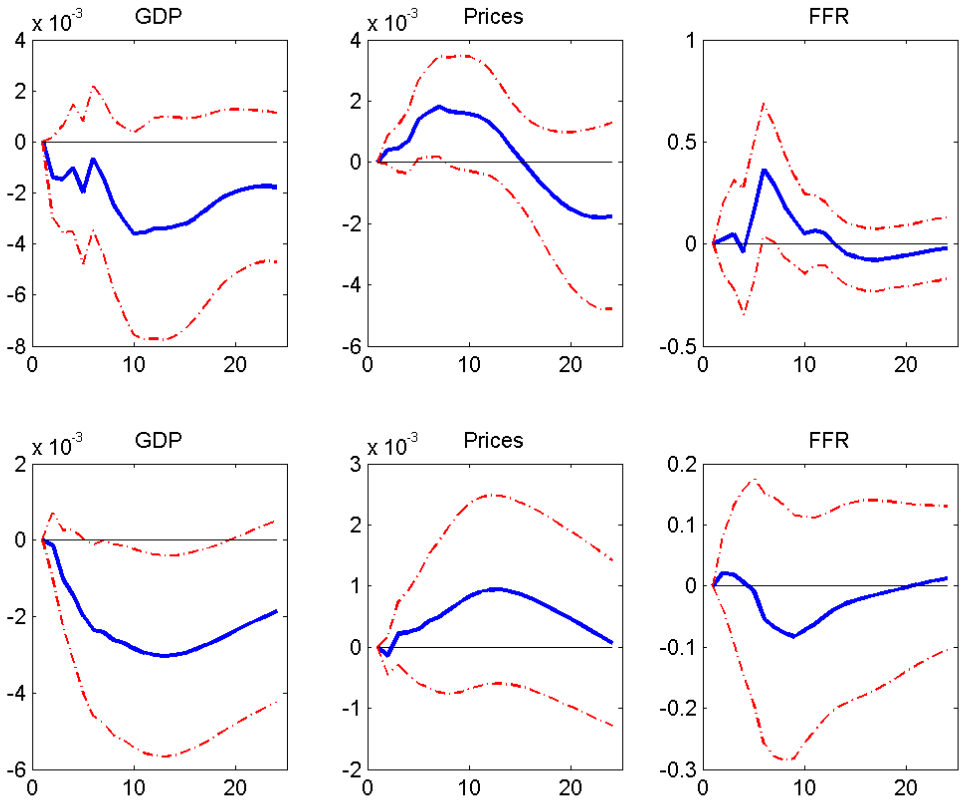
	Early sample					
	4	8	12	16	20	24
GDP	1.57	2.14	1.66	5.87	10.96	11.64
	2.91	3.71	3.36	5.27	6.78	7.03
GDPDEF	1.60	7.94	14.47	15.28	9.86	8.97
	2.77	7.55	11.30	11.85	10.06	9.28
	Late sample					
	4	8	12	16	20	24
GDP	5.39	10.59	13.45	15.98	17.89	18.95
	5.29	9.18	10.74	11.36	11.59	11.55
GDPDEF	0.13	0.17	0.89	1.60	1.74	1.61
	1.94	3.75	5.64	6.52	6.74	6.65

The IRFs for the sample before the Great Moderation (1960Q1-1983Q4) and for the sample including the Great Moderation (1984Q1-2006Q4) show that an exogenous increase in the Fed Funds rate determines the expected reaction in all macroeconomic variables, including a decline in M2, only in the early sample. In the late period GDP seems again to be non affected by the monetary policy shock.[9] A persistent reduction in inflation is achieved, but not through a GDP decline.

As in the previous section we then focus on the effects of a financial shock: the differences in the two periods are again significant (Figure 7). A financial shock has no effect on GDP in the early sample (upper panel) whereas it directly affects GDP in the most recent period (lower panel). Thus the possibility that financial innovation has contributed to a change in the transmission of both monetary and financial shocks is confirmed also when looking at a different specification of the US economy.

[9] For the 24-period ahead IRFs see Figure A2 and A3 in the Appendix.

FIGURE 7 Financial shock (model 2): upper panel 1960-1983, lower panel 1984-2006



6. Conclusion

The paper has provided evidence of a change in the reaction of the US macroeconomic variables to monetary and financial shocks. Our findings are consistent with a broad literature suggesting that financial innovation is at least an important contributor to the smoothed business cycle fluctuations in the Eighties and Nineties, period labeled as the Great Moderation.

We started from an existing model by Christiano et al. (1996) and we show that their model which was functioning relatively well over a period up to 1992, is not able to deliver the same good results over a longer time span which include all the Great Moderation period. We then analyse separately the responses to monetary and financial shocks into two sub-samples: one ending before the presumed start of the Great Moderation, and one including the whole Great Moderation era.

Our findings can be summarized as follows. First, monetary policy impulses have had in the later period a much weaker effect on GDP dynamics. In particular, a possible "business channel" of the monetary policy transmission mechanism that was working in the period before the Great Moderation has stopped working in the most recent period. The vigorous financial innovation of the last few decades has most likely induced a change in the business sector behaviour, allowing households and firms to insulate themselves from the impact of interest-rate fluctuations.

Second, we documented a change also in the transmission of a financial shock. In the early period the financial shock was not transmitted to the real side of the economy, while it significantly affects GDP dynamics in the later sample. This evidence is even more relevant given that our sample ends in 2006 thus not including the financial turmoil started in the summer 2007 which had severe spillovers on the real economy.

Appendix

FIGURE A1: Monetary policy shock (1960-1992) - CEE model

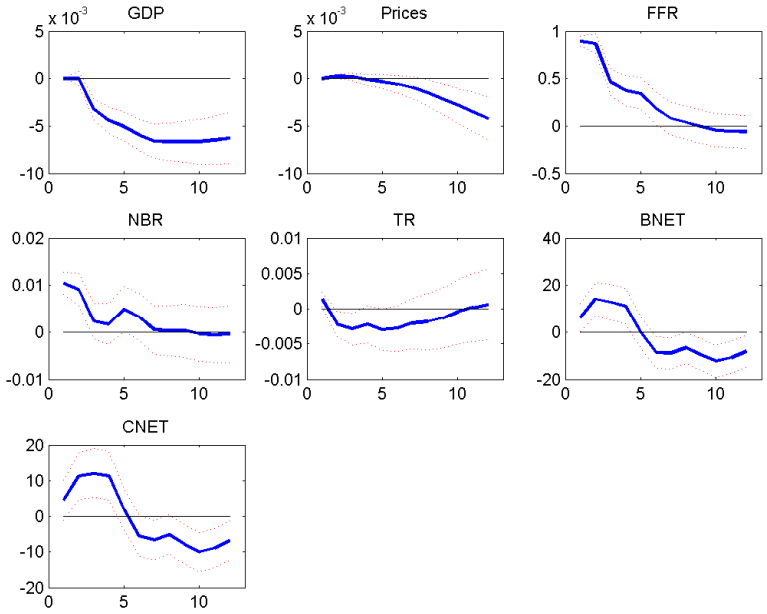


FIGURE A2: Monetary policy shock (1960-1983) – model 2

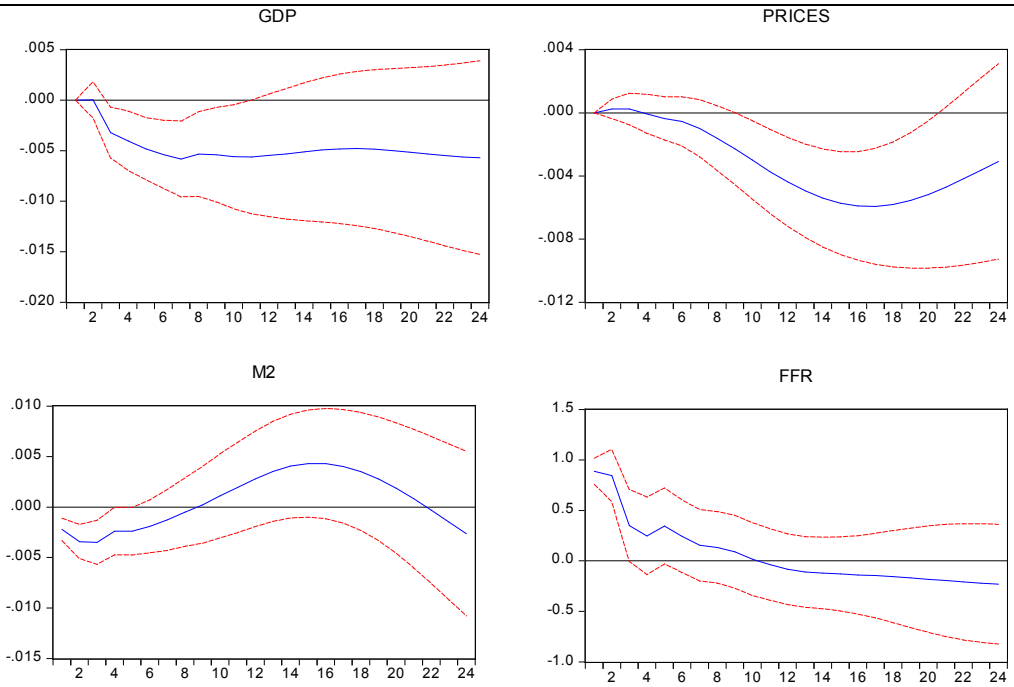
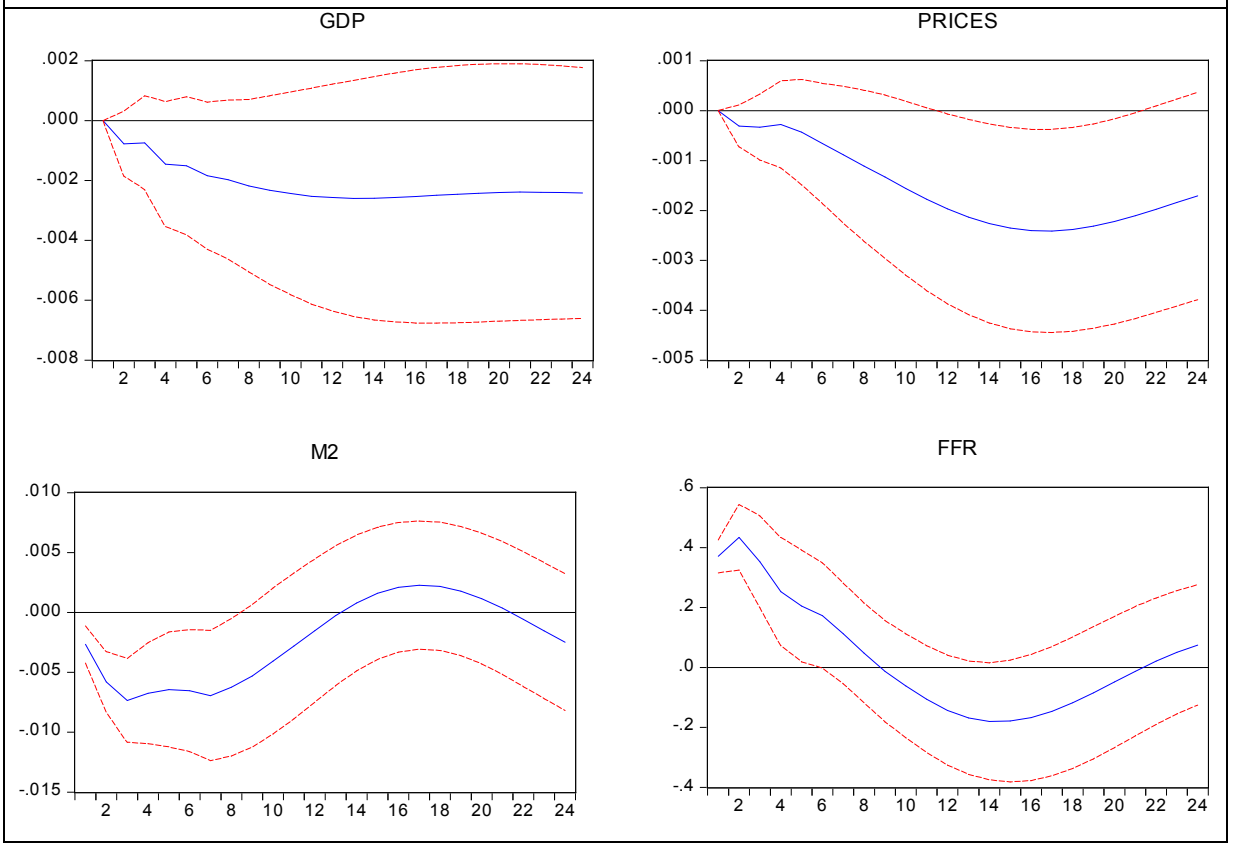


FIGURE A3: Monetary policy shock (1984- 2006) – model 2



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