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MONETARY POLICY: WHAT CAN BE LEARNED FROM RECENT HISTORY?

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1. Introduction

The financial crisis which began in 2007 in the United States has piqued interest in its causes and consequences for the domestic economy and for the rest of the world as well. Contagion effects are expected to arise not only in the financial markets but also in the fields of goods and services. The ongoing crisis may be worldwide.

Although globalization has long been associated with competitiveness and its resulting lower prices, this crisis has arrived at a moment when inflation has reappeared. Nevertheless, determinants for the return of inflation are not similar to those of the early 1970s where external factors—e.g., the oil shocks—were associated with internal ones—e.g., sharply declining productivity and rising wages. In the mid-2000s, external factors have been prominent determinants of inflation in the so-called rich countries. Despite a recent rising trend, core inflation reflecting domestic factors and therefore corrected for the incidence of volatile prices for items such as raw materials remains at relatively low levels, for example, below 2% per year in the Euro area. Globalization seems to be associated with rising inflation because of the growth of emerging economies and related high overall demand.

In this context of financial crisis and soaring inflation, central bankers are facing a trade-off: should they cushion the crisis at the risk of pushing inflation upwards or of creating another financial bubble; or should they curb inflation at the risk of deepening the crisis? Surely, the trade-off is not so simple. Curbing inflation may retain competitiveness and low interest rates, helping firms and the financial sector to avoid the crisis, whereas cushioning the crisis may remove the threat of depression and boost production above demand, pushing inflation downwards.

The specificity of the current inflation is its external origin, as far as rich countries are concerned. Therefore, central banks' reactions may be useless insofar as they are set unilaterally. Depressing domestic activity with a restrictive monetary stance may not depress the emerging economies' insatiable demands. Central banks should therefore implement coordinated policies that would put an end to inflation pressures worldwide.

However, coordination is not an easy task and central banks are generally left with a single possible strategy: doing it on their own. Nash equilibria, to introduce some economics jargon, are the rule and coordination the exception.

Taking this general—though still debatable—principle as a given, one has to answer the following question: in the present context, what is the best strategy? I will endeavor to address only the cases of the Federal Reserve (Fed) and the European Central Bank (ECB), though the reactions of all other important central banks such as the Bank of Japan, the Bank of England, the Bank of Canada, the Bank of China and the Bank of Switzerland are important in that they may dampen or deepen the crisis through interest rate and exchange rate channels.

Many theories compete as to which policy is optimal given the context. I will briefly mention three, from the old Keynesian-Monetarist controversy to the new Inflation Targeting (IT) framework. It seems rather obvious that the ECB is influenced by Monetarism and its sequel, the so-called New Keynesian framework, whereas the Fed embraces the IT framework. Although not a novelty in itself, it should be kept in mind because it can be used as an anchor for expectations. Ben Bernanke is not only the chairman of the Fed, he is also among the top economists who have long promoted IT. Remembering his academic work should

help forecast his actions. Jean-Claude Trichet, the ECB's chairman, is in a different position as far as predicting his future actions is concerned: he must fulfill the primary objective laid down in the Maastricht Treaty, i.e., price stability. In addition, his institution relies on monetary aggregates, although not exclusively.

Recalling the theoretical backgrounds of US- and euro-area monetary policies has another advantage: the different theories have been assessed empirically, and it is possible to see whether Monetarism and/or IT deliver efficient strategies and to what extent.

2. Some theoretical background

The nomination of Bernanke as the US Fed Chairman has relaunched the debate on the benefit of adopting an official Inflation Targeting (IT) framework in that country, since he was an early promoter of this kind of monetary strategy.

Recently, the US financial turmoil has sparked a debate about the optimal monetary strategy, the sharp decline in the US monetary policy rate being interpreted as a step backward in the struggle against inflation.

Figure 1. Monetary policy stance: US and the euro area



It is straightforward to show (*Figure 1*) that in the recent past, and after intervention rates had risen from a low 1%-level in May, 2004, to a peak of 5.25% in August, 2006, key short-run interest rates, in nominal terms, have sharply decreased in the US between the beginning of the crisis and mid-2008. After a 25-basis-point decrease on April 30, 2008, interest rates in the US have been decreased on the whole by more than 300 basis points, and it has happened over a short horizon of three quarters. In contrast, the key interest rate of the ECB has remained flat.

It is argued that these contrasting strategies stem from contrasting theoretical frameworks regarding the management and efficiency of monetary policy. They are briefly sketched below.

Unsurprisingly, the Monetarist revolution appears as the first important strand in the literature. This is largely due to Monetarism being a historical prerequisite to that which followed. Monetarism arose as a

response to the Keynesian revolution of the mid-nineteenth century, along two different time horizons. In the short run, the Monetarists claimed the dominance of monetary policy over fiscal policy as a stabilization tool, although they admitted that monetary policy was plagued with "long and variable lags." On the question of the reliable monetary policy instrument, they favored monetary aggregates over a short-term nominal interest rate. Therefore, in the long run, they claimed that the Quantity theory was valid.

The Quantity theory is usually presented under the following form:

(1) $M\Delta V=P\Delta Y$

where M is a monetary aggregate (whether M0, M1 or M3), V is money velocity, P is the general price index and Y is GDP at constant price.

The Quantity theory views money as a means of payment and does not give much attention to another prominent money function: savings or reserve of value for intertemporal transactions. Thus, the theory argues that all present transactions, assessed through nominal GDP, must be settled up with money, taking into account its availability and the many transactions for which a given amount of money can pay.

It has been possible to infer an optimal monetary rule from this logical setting. Under the following three assumptions—inflation is costly, V is constant in the long run and Y is at a steady state (i.e., non-voluntary employment has disappeared)—targeting a zero-inflation rate seems optimal. In order to attain such a target, it is necessary to limit money growth gradually until it reaches zero. Differentiating equation (1) leads to the well-known expression:

(2) $\Delta M/M=\Delta P/P$

Finally, a zero-money-growth rate is an optimal monetary rule in so far as inflation is always a monetary phenomenon, a strong assumption in itself as it is also well-known that inflation can be attributable to demand factors, to shocks on productivity and to external determinants like the price of oil.

Beyond this optimal monetary rule, Friedman (1969) also promoted deflation, building upon two different ideas. First, liquidity preference is a costless device, in comparison with the issuance of bonds and stocks which give rise to the payments of yields or dividends. Promoting money demand is crucial in this respect as it minimizes welfare costs. In order to do so, fixing the short-run *nominal* interest rate at zero is optimal. Second, a positive Wicksellian *real* interest rate is also optimal, unless investment is too high and fuels inflation expectations. Using the usual Fisher equation, the consistency between these two ideas makes it necessary that prices always decrease or that a constant deflation occurs in the economy.

These two monetary strategies—declining money growth rates or the achievement of deflation—were complemented by another macroeconomic revolution: the rational expectations (RE). After Phelps (1967) and Friedman (1968) criticized the downward sloping Phillips curve on expectations grounds, the conclusion that no trade-off was possible between inflation and unemployment even in the short run led to the dismissal of economic policies.

After the consecutive re-emergence of general equilibrium in macroeconomics, within the so-called new classical framework, increasing importance has been attributed to stability and expectations, to be opposed with the stabilization issue of the 1950s and 1960s. The necessity of achieving a stable economic environment for firms and households was concomitant to the idea that governments were destabilizing private behaviors, notably because their objectives were alleged to go beyond the steady state (lower unemployment than the NAIRU; higher economic growth than potential growth) for electoral reasons.

The emergence of the notion of stability and the conditions needed for reaching it, led to the emergence of new concepts in the macroeconomic literature: discipline, commitment, credibility, reputation, delegation and conservatism became the master words of the profession. All these words originated in the introduction of RE in all behaviors. As Robert Lucas (1976) stated with regard to control theory: unlike rockets, people try to understand and predict the actions of their controllers. Control theory therefore had to be replaced with time consistency and credibility issues in economics. Tying the hands of governments with rules was advocated as a good solution to the time inconsistency of policy management. Delegating monetary policy to conservative central bankers was another solution.

At least this strand of the literature had in common with the Monetarist revolution the assumption that inflation is costly, whatever the level. Unlike this revolution, however, the optimal instrument of monetary policy is the interest rate rather than a monetary aggregate. It has led to the rise and adoption of an interest rate rule, like the Taylor rule, to monitor key macroeconomic indicators: inflation and growth. The rule generally states that the short-run nominal interest rate is set according to three targets: a long-run real equilibrium interest rate, an inflation target and an output growth target. Central banks would be urged to trade off between the two latter targets, generally giving more weight to inflation than to output. Adopting such a rule would improve the transparency and efficiency of monetary policy, minimizing the biases economic policies might produce in the economy. Such a rule would be "expectable" and would help to dampen the economy but not create shocks to it.

3. Old stories: dealing with Monetarist and Rational Expectations empirical validity

These two monetary revolutions—Monetarism and interest rate rule in an RE environment—have been disputed on many grounds (see Gertler, 1988) and most certainly on empirical grounds.

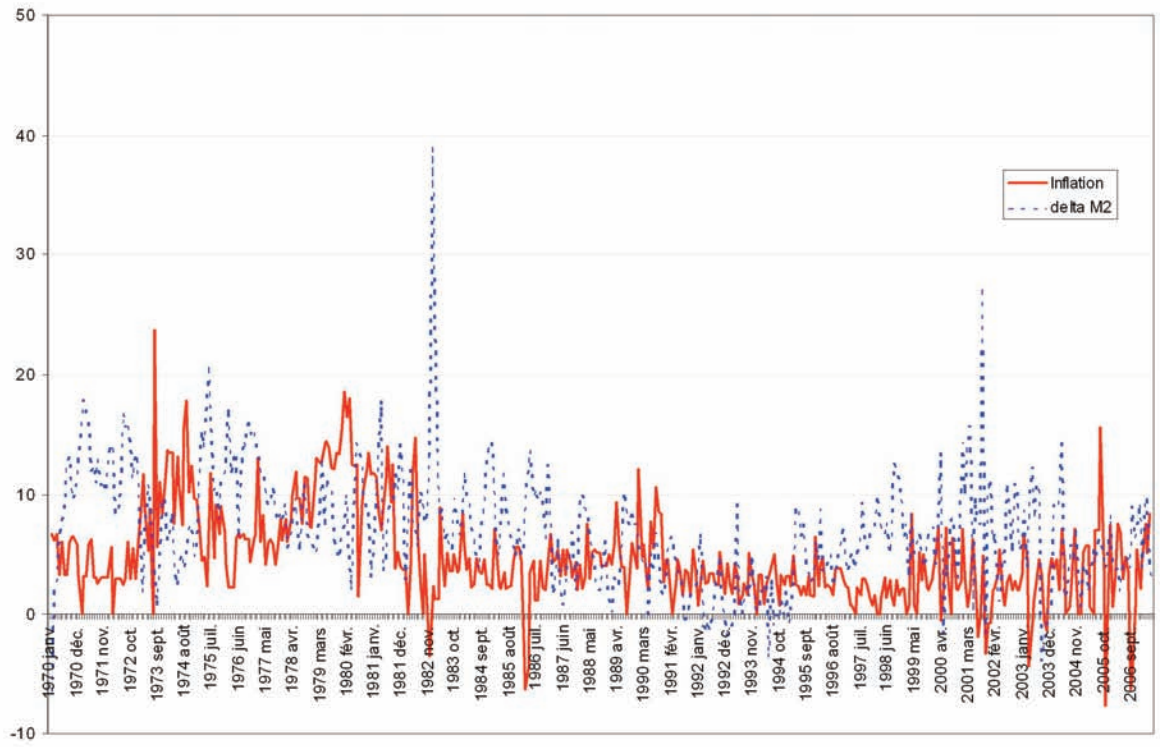
The deflation strategy advocated by Friedman (1969) has been largely weakened since the long and devastating deflation era which Japan has gone through from the late 1990s to the 2000s (see Hamada, 2004). It has always been well-known, on microeconomic grounds, that periods of declining prices are self-fulfilling, in the sense that urgency by consumers to wait for lower prices leads to ever higher discrepancy between supply and demand, until supply stocks disappear. Thus, on macroeconomic grounds, deflation produces disincentives to produce until the whole process reaches an end; hence a long recession is expected to occur.

As for the Quantity theory, although some papers still give credit to its reliability to gauge (future) inflation (see, e.g., Morana and Bagliano, 2007), evidence of proportional relationship and causality between monetary growth and inflation is weak in developed economies where money has been competed against by more sophisticated non-zero-yield financial instruments (see, e.g., De Grauwe and Polan, 2005; Herwartz and Reimers, 2006). A simple plot of inflation and M2 growth rates in the US between 1970 and 2008 *(Figure 2)* shows that there has never been an identity between both rates. Moreover, the correlation between both series is extremely low in the whole sample (.05) and even lower in a shorter sample excluding the years prior to the 1990s (.008). Endorsing a monetary strategy that would largely depend on this theoretical setting is doomed to failure. Notwithstanding the fact that actual inflation is not a purely monetary phenomenon, monetary aggregates may not be a good indicator of future inflation. Thus, money cannot be presented as an anchor for future expectations.

The weak reliance on money as an efficient tool for monetary policy is evidenced by a vector auto-regressive (VAR) model performed on U.S. monthly data in the sample taken from 1970:1-2007:6. The model includes real GDP, core price index and M2. All variables have been first-differenced and therefore the variables included in the VAR model are stationary. Optimal lags are equal to 9 according to the Akaike criterion.

Results *(Figure 3)* show that a shock to monetary growth has absolutely no significant effect on either

Figure 2. The Quantity Theory in the US?

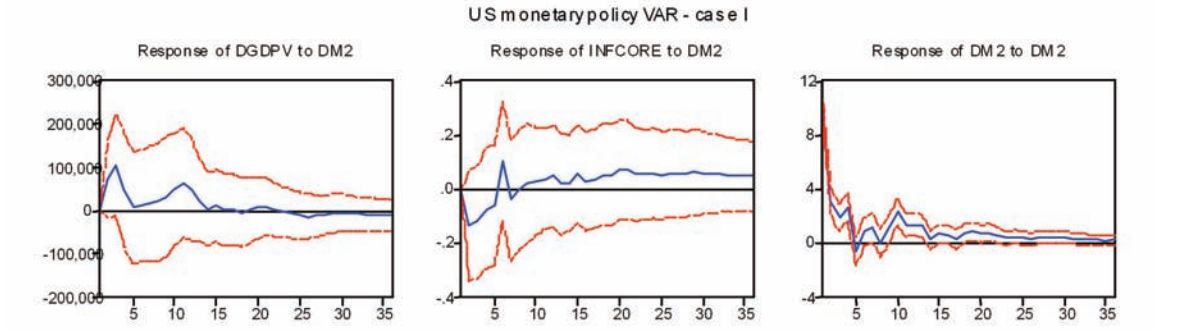


output growth or core inflation. Monetary policy seems rather impotent in this framework, quite at odds with the abundant empirical literature on monetary VARs (see Christiano *et al.*, 2000). Replacing M2 with the fed funds rate gives a different picture where monetary policy is potent (*Figure 4*, optimal lags are equal to 13). Despite a rather usual "price puzzle," it is shown that a shock to the interest rate produces a negative and significant response of output growth at a 6-to-9-month horizon; the response is significantly persistent until two years after the shock.

These latter results are at odds not only with the Monetarist revolution, but also with the RE monetary policy recommendations. Shocks to monetary policy are not rapidly embedded in future expectations, provoking only marginal short-run fluctuations to economic activity: they produce long-lasting changes to growth. Thus, monetary policy remains potent.

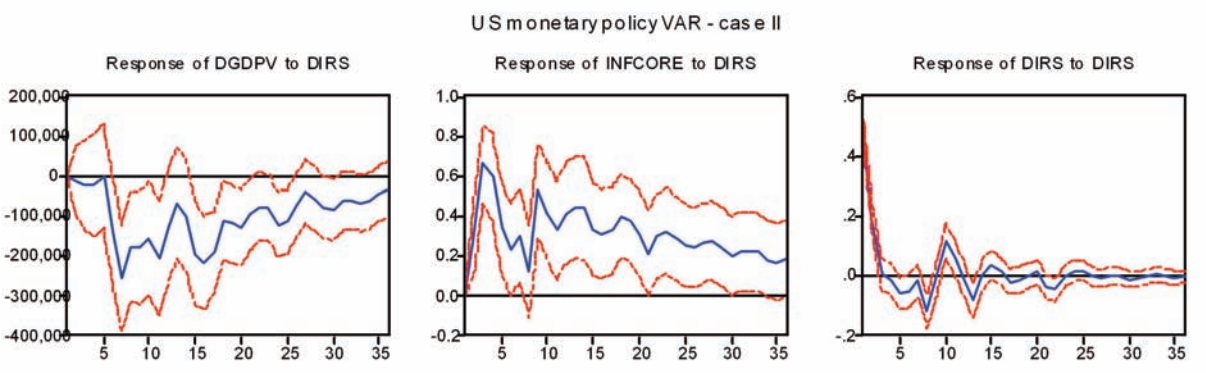
The interest rate rules which have developed along the RE recommendations, within the "rules vs. discretion" debate launched by Kydland and Prescott (1977), have also revealed their limits. First, the

Figure 3. US monetary policy, VAR 1



N.B.: GDPV is GDP at constant prices, INFCORE is core inflation, IRS (or FFR in the following) is the fed funds rate, INF is CPI inflation, LOAN_R is the interest rate on bank loans; variables preceded by "D" are stated in first-difference.

Figure 4. US monetary policy, VAR 2



constant-coefficient specification is cumbersome: it cannot respond to shocks if the rule is applied in a mechanical way, without leaving much leeway for compensating unexpected economic conditions.

Second, the rule is very sensitive to the assemsment of theoutput gap which remains an open issue in a world of rapid technological progress which is likely to modify the production frontier. Moreover, in the short run, potential output depends on the degree to which tensions between actual and maximum use of inputs are accommodated by agents. High inflation aversion, i.e., a low degree of accommodation, may lead to underestimating potential output.

Third, the performance of a Taylor rule in the U.S. economy is poor. Qin and Enders (2008) have recently shown that the out-of-sample forecasting performance of the rule was better than univariate (AR) models only before 1979, though Taylor rules have long been said to characterize the post-1980s rather than the 1970s (see Clarida *et al.*, 2000). Thus the relevance of the Taylor rule for anchoring monetary expectations is disputable.

4. Inflation targeting

A great deal of attention has been paid to Inflation Targeting (IT) in the recent literature devoted to monetary policy. In the words of its promoters, e.g., Bernanke *et al.* (1999), (flexible) inflation targeting should be viewed as a "framework" rather than as a recommendation for the adoption of mechanical rules like the Taylor rule. As such, it goes well beyond the monetary recommendations embedded in the two above-mentioned revolutions: in fact, this relatively recent strand of the literature has advocated a general framing of monetary policymaking, encompassing clear targets, accountable policymakers and a flexible strategy.

The essence of IT lies somewhere between rules and discretion, and has been labelled: "constrained discretion." In the words of its promoters: "*Inflation targeting is a framework for monetary policy characterized by the public announcement of official quantitative targets (…) for the inflation rate (…); by explicit acknowledgment that low, stable inflation is monetary policy's primary long-run goal; (…) (by) vigorous efforts to communicate with the public about the plans and objectives of the monetary authorities, and (…) mechanisms that strengthen the central bank's accountability for attaining those objectives*" (Bernanke *et al.*, 1999, p.4). Later they add: "*By imposing a conceptual framework and its inherent discipline on the central bank, but without eliminating all flexibility, IT combines some of the advantages traditionally ascribed to rules with those ascribed to discretion*" (Bernanke *et al.*, 1999, p.4).

The IT framework can be related to discipline in that it anchors expectations thanks to the publicly announced inflation target range, but it permits some flexibility: deviations from the target do not incur a loss of credibility and reputation provided the reasons for the deviations are explained to the people. This flexibility gives some leeway to monetary policy and gives the IT framework a specific feature that the Taylor rule, for example, cannot fully retain.

In the recent past, some OECD countries turned formally to an IT regime: between New Zealand, which did so in 1990, and Spain, which did so in 1995, five others, including Canada, Sweden and the UK, took part. These institutional regime shifts raised questions about their direct incidence on the optimality of implemented monetary policy: for example, have (expected) interest and inflation rates been lower there than in non-IT countries?

Empirical literature has been mixed so far, mainly because non-inflation-targeting countries have endorsed relatively similar policies to inflation-targeting countries or have benefited from the overall "Great Moderation" era. Inflation-targeting promoters generally argue that this framework is conducive to low inflation and low inflation expectations, although worldwide inflation has been decreasing since the mid-1980s. They also make a point on the small pass-through in the inflation rate from shocks to the price level in IT countries, although other countries decided to curb inflation and to disinflate in order to gain competitiveness, irrespective of a pure IT framework (e.g., the EMU, where the ECB does not target inflation in the sense given by Bernanke *et al.*, 1999). Promoters finally point out that IT is a transparent nominal anchor, likely to improve policy effectiveness regardless of the fact that other possible transparent anchors exist in non-targeting countries: monetary aggregates in the case of the ECB or the nominal exchange rate in the cases of China, Norway, Japan, etc.

In order to disentangle the monetary effects which are specific to IT countries from those pertaining also to non-IT countries, Angeriz and Arestis (2008) use an Unobserved Component Model in the vein of Harvey (1989) to assess the lock-in effects in IT OECD countries in comparison with the US and the EMU which are chosen as the control group. Their conclusion is that non-IT central banks have been as successful as IT central banks in locking in inflation expectations.

Creel and Hubert (2008) use a Markov-Switching VAR in the vein of Hamilton (1989) to gauge regime switches in major IT countries. They escape the control group problem and conclude that switching to an IT regime has permitted countries to improve the effectiveness of monetary policy: better predictability of policy responses and higher monetary leeway, under the form of low real interest rates, are among the characteristics of an IT regime.

Both approaches are complementary. As a matter of fact, conclusions from a mix of these two papers are twofold. On the one hand, according to Angeriz and Arestis (2007), viewing the US as a non-IT country leads to the conclusion that it has succeeded as well as IT countries in curbing inflation and future expectations. This conclusion would apply to the ECB as well. Thus, the Fed and the ECB would be comparable. On the other hand, according to Creel and Hubert (2008), the effectiveness of monetary policy in IT countries is strong and should help to promote its generalization around the world. In this respect, however, the Fed and the ECB are not comparable: the Fed is governed by a promoter of IT, which makes the above-mentioned generalization to the US likely, and the objectives of US monetary policy embed inflation and growth; hence, they pertain to discipline and flexibility. On the contrary, the ECB has a superior objective: price stability, hence, it gives a heavy weight to discipline. Moreover, officials at the ECB have regularly refused to follow an IT strategy, making it unlikely that they change their minds in the near future.

All in all, the closeness of the Fed's monetary strategy with an IT strategy facilitates expectations by the public on the actual and future monetary reactions decided upon at the Federal Open Market Committee (FOMC) as the public knows the overall framework the FOMC is likely to follow. The Monetarist/New Keynesian with RE framework that the ECB is following is also well known to the public. The main difference between the two central banks however is in the empirical potency of their underlying models: whereas IT has proved efficient, the Monetarist world with RE has proved inefficient in that it was unable to reproduce the data *(see Figures 3 and 4)*.

5. Beyond IT: the credit channel

Beyond IT, Bernanke also improved knowledge on the links between monetary policy and banks. In two papers with A. Blinder (Bernanke and Blinder, 1988, 1992), he showed that bank reserves and therefore reserve requirements not only impinge on bank deposits, i.e., money, but also on bank loans; hence, bank credit impinges on aggregate demand and monetary policy has real effects.

This view is based on the assumption that bank loans and bonds are not perfect substitutes, at odds with the perfect substitution assumption in the usual IS/LM model. Thus, private agents have to trade off between bonds and credit for financing their investments. During a monetary contraction, the financing composition is changing towards more bonds, at the expense of bank credit. However, smaller firms are more badly hurt than bigger ones because they remain more sensitive to bank credit than to bonds; stated differently, their reliance on bond financing is small.

In this respect, monetary policy is highly potent: through the credit channel, it can produce real effects, either contracting or expansionary. Tight money in this conceptual framework would have more negative effects on the output than in the IS/LM model.

In the following, we have assessed the credit channel in the US. We show that integrating the interest rate on loans in a VAR comprising GDP, inflation and the federal funds rate improves the overall interpretation of the model.

The sample runs from the fourth quarter of 1982 to the second quarter of 2007. Studies dedicated to monetary policy rules usually show that a change in the conduct of US monetary policy occurred under Paul Volcker's chairmanship (see Clarida *et al.*, 2000). Volcker was appointed in 1979. However, Boivin (2006) reports a break in the conduct of monetary policy in October, 1982, and recalls that the fed funds rates between 1979:10 and 1982:10 were not a good measure of monetary policy stance, being replaced during that period by non-borrowed reserves. Clarida *et al.* (2000) also mentions this breakpoint. Therefore, our sample begins right after the fed funds rate started being a good measure of the monetary stance. By limiting the sample to the second quarter of 2007, we escape the noise introduced by the management of the "subprime" financial turmoil.

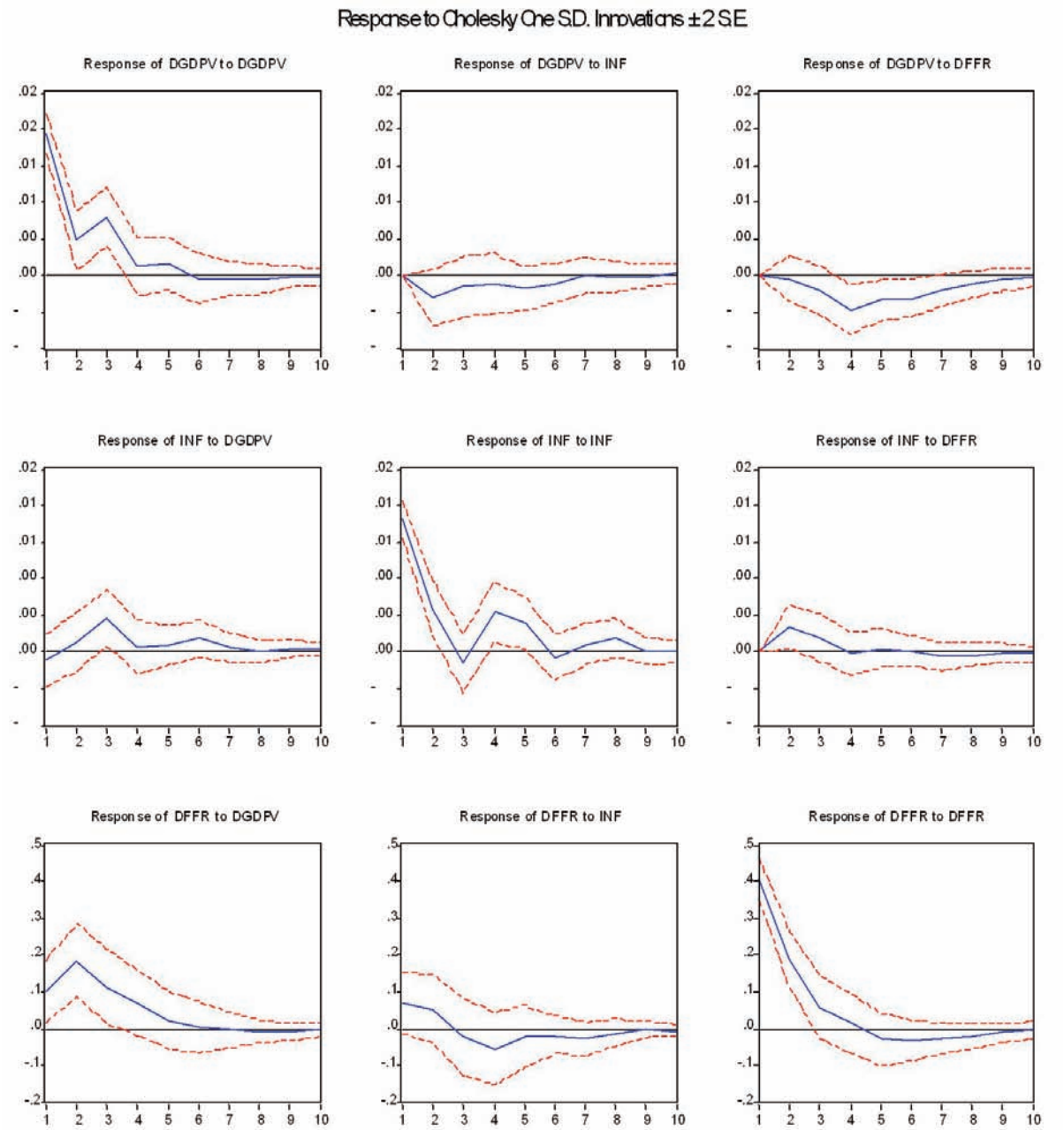
All quarterly data come from the Federal Reserve website except GDP, which comes from the OECD database. Unit-root tests have been performed. All data are I(1). They have been transformed in first-difference before being introduced in the VAR models.

Three models have been assessed. First, a three-variable VAR was studied, comprising GDP, inflation and the federal funds rate. Using the LM estimator, three lags have been chosen. Responses of the fed funds rate to a shock to production and inflation have the usual features in the short run *(Figure 5)*. However, the fed funds rate decreases three-quarters after the shock to inflation, although not significantly. This decrease can be linked to the decrease in production.

It is also noteworthy that the response of the fed funds rate to a production shock is more substantial and long-lasting than to an inflation shock. It is in contrast with all the above-mentioned literature on US monetary policy rules and points to the fact that the Fed has been able to trade off between its three objectives—low unemployment, low inflation and low long-term interest rates—to the benefit of the former. It remains to be said that the Fed's response to GDP deviations is in sharp contrast with the strategy generally attributed to the ECB.

Following Bernanke and Blinder (1992), it can be argued that the responses of the fed funds rate to inflation and GDP deviations show that the Fed follows a reaction function. Finally, Figure 5 shows that

Figure 5. Impulse response functions, 3-variable model, no exogenous variable



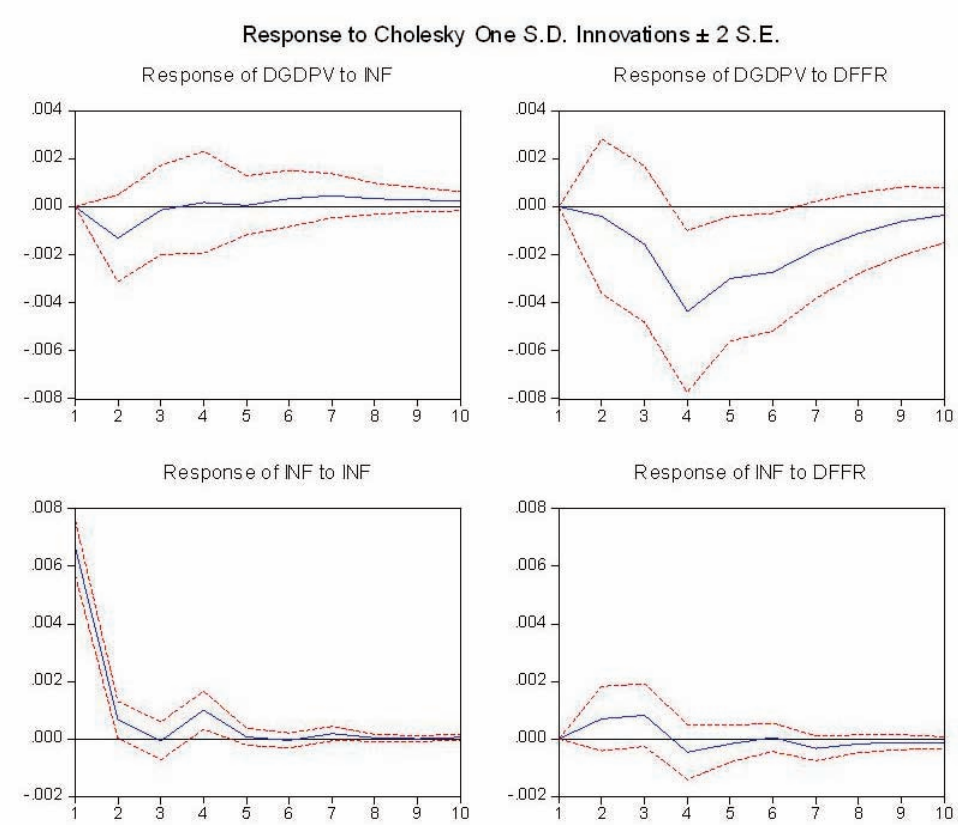
N.B.: name of the variables given below figure 3; DGDPV and INF are expressed in percent.

a shock to the fed funds rate produces the expected GDP decrease in the mid-run; however, it produces an increase in the inflation rate, hence a so-called "price puzzle."

In the second model *(Figure 6)*, we use the commodity prices as an exogenous variable and the "price puzzle" is no longer statistically significant: consumer prices no longer catch future expectations which are now embedded in commodity prices. The pass-through argument is also confirmed because a shock to prices does not lead to a sharp move in the inflation rate: the inflation rate has returned to its before-shock level five quarters after the shock.

In a third model, we have introduced the bank prime loan rate among the endogenous variables of the model. Results are striking *(Figure 7)*. A shock to the fed funds rate has no significant effect on GDP;

Figure 6. Impulse response functions, 3-variable model, commodity price inflation as an exogenous variable



rather, it produces a significant rise in the interest rate on loans, hence a "credit channel." Moreover, a shock to the bank prime loan rate accompanied by an increase in the fed funds rate produces a GDP decrease in the mid-run, without any effect on the inflation rate that remains at its before-shock level. The assertion that a shock to the bank prime loan rate is "accompanied" by an increase in the fed funds rate is not an assumption: a Granger-causality test leads to the conclusion that causality goes from the fed funds rate to the bank prime rate *(Table 1)*.

This empirical investigation has had two main outcomes. First, it has shown that monetary policy is potent *(model 2)* in that it has had real and stabilizing effects: the fed funds increase if GDP increases; and a rise in the fed funds rate reduces GDP. Second, within an expanded model incorporating a bank rate, it has shown that the real impact of monetary policy is indirect, in that it has gone through the bank lending rate. Therefore, it can be concluded that the potency of monetary policy in the US is enhanced if the monetary policy stance gives way to a shock to the interest rate on loans.

6. Conclusion

The Monetarist and RE revolutions led to viewing monetary policy as having a bigger impact on expectations than on actual variables. This view is now shared by the New Keynesian framework. In this paper, we have shown that the ability of well-known monetary rules pertaining to these frameworks and meant to anchor expectations, was weak: the Friedman rule and the Taylor rule have weak out-of-sample forecasting properties.

There are other means of anchoring expectations, and in this paper we have endeavoured to go back to Bernanke's papers. We have found evidence that US monetary policy has been consistent with the views he has expressed in various papers and communications. We have also found evidence that US monetary policy has been potent. Therefore, we claim that reading Bernanke's papers helps not only to understand his past actions but also to forecast his future decisions.

Figure 7. Impulse response functions, 4-variable model, commodity price inflation as an exogenous variable

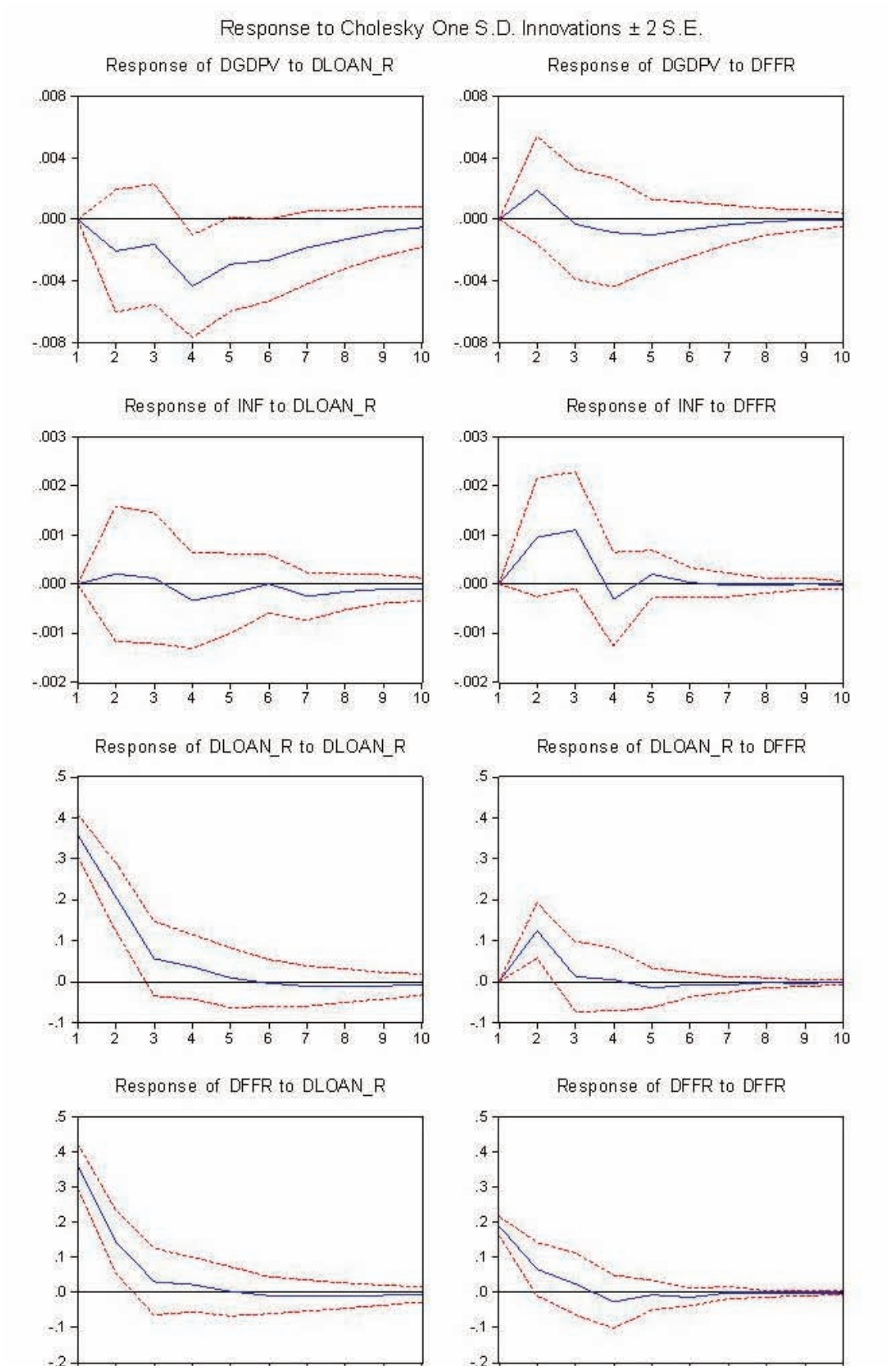


Table 1. Granger causality tests

Pairwise Granger Causality Tests
Sample: 1982Q4 2007Q2
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
LOAN_R does not Granger Cause FFR	99	0.54327	0.58266
FFR does not Granger Cause LOAN_R		20.7103	3.5E-08

In contrast, the cautious ECB has stuck to a monetary strategy whose main arguments are related to Monetarism and its sequels. Although this strategy is easily predictable, its efficiency is debatable. The Quantity theory has been shown to be invalid. Moreover, since the beginning of the "subprime" crisis, the ECB has not made a move on the interest rate, remaining tough on inflation, although it has flooded financial markets with easy money. Therefore, long-term interest rates have moved upward, and the ECB has taken the risk of increasing further the risk premium. In the meantime the Fed has tried to lead bank rates downward. A monetary strategy consisting in indirectly modifying interest rates on loans has been shown to have real and stabilizing effects. Fed funds rates increase when GDP is above its before-shock level, and the ensuing increase in the interest rate on loans dampens GDP fluctuations. A symmetric move is expected to produce symmetric effects.

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