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# Bank liabilities and the monetary transmission mechanism

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## Abstract

Using two sources of data on commercial bank liabilities we examine the behavior of various components of deposits following a monetary tightening (downturn) as well as a nonmonetary downturn equal in magnitude to the monetary downturn in order to better understand the portfolio behavior of commercial banks. We find that the increase in total deposits during a monetary tightening (when output is low and interest rates are high) is attributable to an increase in small time deposits and that large time deposits and demand deposits exhibit a decrease. This suggests that banks are able to, at least partially, offset the potentially adverse effects of a monetary tightening on their balance sheet by borrowing and raising additional small time deposits. Further, non-monetary downturns, when both interest rates and output are low, seem to have little effect on the liability position of banks.

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# 1 Introduction

It is well established that monetary policy shocks affect economic activity.[1] In particular, empirical studies estimated over different time periods and using data from different countries indicate that an unexpected monetary tightening is followed by a (delayed) reduction in real activity.[2] In contrast, our understanding of exactly *how* the transmission occurs from the policy instrument to the real economy is not as straightforward. Furthermore, the importance of the banking system in accentuating this process is a debated issue.

For instance, the Federal Reserve's ability, or inability, to lessen the effects of the recent economic downturn, was directly tied to problems in the financial sector. While the FED reduced interest rates aggressively, in the hopes of stimulating the economy, these efforts were not successful because banks were simply not willing to lend. The huge losses suffered by financial institutions on housing-related bets, led them to hoard liquid assets for precautionary motives. From a bank lending channel perspective, the financial crisis led to a "credit crunch" that made it difficult for many households and firms to obtain the loans they needed to finance their spending, which led to further declines in production and employment. Thus, to better understand the limits of the FED's influence over the economy, it is crucial we understand the limits of the FED's influence over the financial system.

As a first step in building this understanding, we focus on one specific aspect of the central bank-financial system relationship – the link between monetary policy and banks' balance sheets. Empirical evidence on monetary policy shocks and bank lending (uses of funds) is well established.[3] For instance, Den Haan, Sumner, and Yamashiro (2007) use disaggregated loan data from the Call Reports to document evidence of a bank lending channel for consumer and real estate loans, but not for commercial and industrial (C&I) loans. In particular they find that in response to a monetary tightening real estate and consumer loans sharply decrease, while C&I loans increase. They compare these responses to non-monetary shocks in which output declines, but interest rates are basically unchanged. During these non-monetary downturns, C&I loans sharply decrease, while real estate and consumer loans show no substantial response. This substitution out of real estate and consumer loans and into C&I loans is not supported by a demand side explanation of the increase in C&I loans.[4] Den Haan, Sumner, and Yamashiro propose that after a monetary tightening—when interest rates are high and production is low—banks prefer to invest in short-term assets, such as C&I loans that earn a higher interest rate (because short-term interest rates are high) and are relatively safe, than invest in long-term and risky assets such as real estate loans. The substitution behavior makes it possible that the supply of C&I lending could increase even if there is a decline in deposits (that are used to finance the loans).[5]

In this paper, we examine more closely the behavior of the liabilities side (sources of funds) of the bank's balance sheet. In particular we examine how the banks' holdings of

[1] See Bernanke and Gertler (1995) and Christiano, Eichenbaum, and Evans (1999) for detailed discussions on how economic variables respond following a monetary policy shock.

[2] Cecchetti (1999), for example, documents that output decreases in all of the eleven OECD countries considered.

[3] See, for example, Bernanke and Blinder (1992) and Kashyap and Stein (1995, 2000).

[4] Bernanke and Gertler (1995) also find an increase in C&I loans following a monetary tightening, but they point out that the "perverse" response of C&I loans could be consistent with a reduction in the supply of C&I loans, as predicted by the bank-lending channel theory, as long as the demand for C&I loans increases by more than the reduction in the supply.

[5] The reasons given for the change in the desired loan portfolio are related to hedging and safe guarding the capital adequacy ratio.

transactions and nontransactions deposits changes in response to both a monetary tightening and nonmonetary downturn. In ordinary times, we know that banks have access to various sources of funds. Checkable deposits (transactions deposits) used to be an important and low-cost source of funds, however, financial innovation and experiences of high interest rates have diminished the importance of this source of funds. The importance of savings and time deposits (CDs) (nontransactions deposits), as well as borrowing, have grown in importance over the past four decades. Having access to various sources of funds, while not costless, potentially shelters bank loan portfolios when checkable deposits decrease (for example, during a monetary contraction). We seek to answer three questions:

- What is the impact of rising interest rate on the ability of banks to raise additional funds?
- How has the ability of banks to raise additional deposits changed over time?
- What is the FED's role in this process?

The rest of this paper is organized as follows. Section 2 discusses the data used and the empirical methodology. Section 3 documents the behavior of deposit components after an unexpected monetary tightening as well as negative non-monetary shocks. In Section 4 we interpret the results and draw some initial conclusions.

## 2 DATA AND EMPIRICAL METHODOLOGY

Our empirical study uses bank balance sheet data from the Reports of Condition and Income (Call Reports) together with the federal funds rate, the GDP (chain-type) price index, and real GDP. This sample starts in the first quarter of 1977 and ends in the first quarter of 2010. We supplement our results using the Call Report data with monthly (seasonally adjusted) banking data for all domestically-chartered commercial banks obtained from the Federal Reserve System's H8 data release.[6] This sample begins in January of 1973 and ends in September of 2010. This data set also includes the federal funds rate, the consumer price index, and industrial production.[7]

A disadvantage of the H8 data is that they are based on voluntary bank credit reports submitted to the Federal Reserve. Since the reports are voluntary the data are based on only a sample of U.S. banks, and are therefore, ''blown up'' to represent the entire universe. In contrast, since all federally insured banks are required to submit quarterly income statement and balance sheet data one can expect the Call Reports to be of higher quality than the H8 data. A drawback of the Call Reports, however, is that constructing consistent time series is not trivial. The main reason is that these reports are primarily designed for regulatory purposes and as regulation change, variable definitions also change. This poses a major challenge to the effort of constructing consistent time series (e.g. there is no consistent time series for the liability series, bank borrowing).[8] Therefore we choose to supplement the Call Report data with the H8 data. .

### *2.1 Time Series Properties of Deposit Series*

We begin with a brief examination of the time series properties of the liability variables. In Figure 1, we document how the liability shares of the different components have evolved over time . It is clear from the Call Report data (Panel A) that deposits make up the overwhelming, although shrinking, share of bank liabilities, and thus, bank sources of funds. Moreover, the

[6] This particular universe of banks is virtually identical to the set of commercial banks in the Call reports. See Den Haan, Sumner, and Yamashiro (2002) for further details.
[7] The federal funds rate (ffr), real GDP, industrial production, and price index data are all seasonally adjusted and downloaded from http://research.stlouisfed.org. Quarterly observations of the ffr are an average of monthly values.
[8] We should be clear, however, that even though the data are sampled at different frequencies and cover different sample periods, the results for these two data sets are very similar. See Den Haan et al. (2005).

falling deposit share, from nearly 75% to 60%, is primarily due to the declining importance of demand deposits (30% share to less than 10%). Finally, for the entire sample period, time deposits have been the primary source of bank funds.[9] A similar story is told by the H8 data (Panel B). Deposits make up roughly 75% of liabilities, down from nearly 90% in the early 1980s. Other deposits (demand deposits and small time deposits), while declining in importance over time, still makes up the lion's share of liabilities (roughly 65%). The additional insight we are able to glean from the H8 data is that it is small time deposits that are the primary source of bank funds. Lastly, borrowings account for nearly 20% of liabilities (a steady increase was experienced during the 1990s).

Each panel of Figure 2 shows detrended real GDP, the interest rate, and the indicated detrended (Call) liability component. Also, denoted in the diagrams are six episodes in which the interest rate reaches a (local) peak. These include four events in the eighties, one at the beginning of the millennium, and one in 2007. The figure documents that each episode (indicated in the graph with a vertical line) is followed by a period in which real GDP is below its trend value, except for the event in the mid-eighties when GDP stays right at its trend level. The different deposit components behave differently following the interest rate hikes. As shown in Panel A, the cyclical component of total deposits follows the behavior of the cyclical component of real GDP exhibiting leading behavior. Demand deposits are much more volatile (as seen in Panel B), but display a similar pattern to total deposits. The contemporaneous correlation between the cyclical component of real GDP and total deposits is equal to 0.14 (0.44 when total deposits are lagged one year) and with demand deposits it is slightly more, equal to 0.19 (0.29 when demand deposits are lagged one year). The behavior of time deposits is different than the behavior of both total and demand deposits. Time deposits appear to increase following higher interest rates (although with somewhat of a delay). The correlation of the cyclical components of real GDP and time deposits is -0.28 (-0.32 when time deposits are led two quarters). For total liabilities the contemporaneous correlation is -0.16 (-0.43 when total liabilities are led three quarters).

Figure 3 plots detrended industrial production, the interest rate, and the indicated detrended (H8) liability component. Further, as in figure 2, in each diagram we denote seven episodes in which the interest rate reaches a (local) peak.[10] Although the frequency of the data differs, the results for total deposits are similar, with the correlation between the cyclical component of industrial production and total deposits lagged one year equal to 0.34. Large time deposits (Panel B) behave quite differently, roughly moving counter to industrial production (contemporaneous correlation equal to -0.11 and -0.38 when large time deposits are lagged 6 months). In contrast, with the exception of a few episodes, other deposits closely follow industrial production. In fact, the cyclical component of other deposits almost appears to lead movements in industrial production. The correlation between the industrial production and other deposits lagged one year is 0.43. Bank borrowings are clearly the most volatile of the liability components, with wild swings in borrowing in early 1970s, late 1970s, early 1980s, and most recently in 2009. Interestingly all of these times were marked by strong economic uncertainty. The correlation between the cyclical component of industrial production and bank borrowings is 0.05. Finally, similar to the Call data, the correlation of total liabilities with industrial production

[9] Note that these liability shares are not "exact" measurements. While the component series only include data held by banks domestically, the total liabilities series includes liabilities held both domestically and internationally. Domestic-only data are not available in the Call Reports.

[10] Because the sample for the H8 data is longer, there is one additional period of high interest rates in 1974.

is -0.10.

### *2.2 Empirical Methodology*

We follow the following procedure to estimate the behavior of the variables following a monetary shock. The standard procedure to study the impact of monetary policy on economic variables is to estimate a structural VAR using a limited set of variables.

Consider the following VAR:[11]

$$Z_t = B_1 Z_{t-1} + \cdots + B_q Z_{t-q} + u_t \tag{1}$$

where $Z_t = [X'_{1t}, r_t, X'_{2t}]$, $X'_{it}$ is a ($k_1$ x 1) vector with elements whose contemporaneous values are in the information set of the central bank, $r_t$ is the federal funds rate, and $X'_{2t}$ is a ($k_2$ x 1) vector with elements whose contemporaneous values are not in the information set of the central bank, and $u_t$ is a ($k$ x 1) vector of residual terms with $k = k_1 + 1 + k_2$. All lagged values are assumed to be in the information set of the central bank. In order to proceed, one has to assume that there is a relationship between the reduced-form error terms, $u_t$ and the fundamental or structural shocks to the economy, $\varepsilon_t$. This relationship is assumed to be given by:

$$u_t = \bar{A}\varepsilon_t \tag{2}$$

where $\bar{A}$ is a ($k$ x $k$) matrix of coefficients and $\varepsilon_t$. is a ($k$ x 1) vector of fundamental uncorrelated shocks, each with a unit standard deviation. Thus,

$$E[u_t u'_t] = \bar{A}\bar{A}' \tag{3}$$

When $E[u_t u'_t]$ is replaced by its sample analogue, one obtains $k(k+1)/2$ conditions on the coefficients in $\bar{A}$. Since $\bar{A}$ has $k^2$ elements, $k(k-1)/2$ additional restrictions are needed to estimate all elements of $\bar{A}$. A standard practice is to obtain the additional restrictions by assuming that $\bar{A}$ is a lower-triangular matrix. Christiano, Eichenbaum, and Evans (1999), however, show that to determine the effects of a monetary policy shock one can work with the less-restrictive assumption that $\bar{A}$ has the following *block*-triangular structure:

$$\bar{A} = \begin{bmatrix} \bar{A}_{11} & 0_{k_1 x 1} & 0_{k_1 x k_2} \\ \bar{A}_{21} & \bar{A}_{22} & 0_{1 x k_2} \\ \bar{A}_{31} & \bar{A}_{32} & \bar{A}_{33} \end{bmatrix} \tag{4}$$

where $\bar{A}_{11}$ is a ($k_1$ x $k_1$) matrix, $\bar{A}_{21}$ is a (1 x $k_1$) matrix, $\bar{A}_{31}$ is a ($k_2$ x $k_1$) matrix, $\bar{A}_{22}$ is a (1 x 1) matrix, $\bar{A}_{32}$ is a ($k_2$ x 1) matrix, $\bar{A}_{33}$ is a ($k_2$ x $k_2$) matrix, and $0_{ixj}$ is a ($i$ $x$ $j$) matrix with zero elements. Note that this structure is consistent with assumption made above about the information set of the central bank.

Our benchmark specification is based on the assumption that $X_{2t}$ is empty and that all other elements are, thus, in $X_{1t}$. *Intuitively,* $X_{2t}$ being empty means that the central bank responds to contemporaneous innovations in all of the variables of the system. It also means that none of the variables can respond contemporaneously to monetary policy.[12]

In this paper, we compare the behavior of variables after an unexpected monetary tightening with the behavior after an unexpected negative non-monetary or "output" shock. The

[11] To simplify the expression we do not display constants, trend terms, or seasonal dummies that are included in the empirical implementation.
[12] The results are similar under the alternative assumption that the monetary authority does not respond to contemporaneous innovations of the other variables in the system.

monetary downturn examined in the paper not only reflects the direct responses of the variables to an increase in the interest rate, but also the indirect responses to changes in the other variables, and, in particular, to the decline in real activity. To parse out the indirect effects of real activity on bank variables, we compare the behavior of the bank variables during a monetary downturn with their behavior during a non-monetary downturn of equal magnitude. While the monetary downturn is caused by an unexpected increase in the interest rate, a non-monetary downturn is caused by one or more output shocks. In particular, the non-monetary downturn is caused by a sequence of output shocks such that output follows the exact same path as it does during a monetary downturn. We construct the shock(s) in this way to cleanly differentiate the indirect effects of real activity on the bank variables. The key difference, then, between the two downturns is the behavior of the interest rate. The advantage of this approach is that the interpretations of the impulses are not complicated by real activity behaving differently across the downturns. Thus, the difference between the impulse response functions for the bank variables of the monetary and non-monetary downturn can be interpreted as the effect of the increase in the interest rate holding real activity constant. That is, by comparing the behavior of the bank components during a monetary and non-monetary downturn, we filter out the changes in demand and supply that are caused by the reduction in output.

### *2.3 Specification of the VARs and Standard Errors*

Each VAR includes one year of lagged variables, a constant, a linear trend, and seasonal dummies to adjust the data for any seasonality. The coefficients are estimated with ordinary least squares (OLS) and the significance levels are established using a Monte Carlo procedure with 5,000 replications in which data are generated by bootstrapping the estimated residuals. To avoid clutter we do not report confidence bands in the graphs, but instead use open and solid squares to indicate that an estimate is significant at the 10% and 5% level, respectively.[13]

## 3 Results

We begin by examining the behavior of the variables in a VAR that includes total deposits (the largest component of liabilities) in response to a monetary tightening. Other variables included in each specification of the VAR are a real activity measure, a price level measure, and the federal funds rate. Note we follow the assumption that the FED does respond contemporaneously to innovations in the other variables of the system, but that the other variables do not respond contemporaneously to innovations in monetary policy.

### *3.1 Responses of Total Deposits*

The next two figures plot the responses of the variables in the system to a one-standard deviation shock to the federal funds rate for both the Call data (Figure 4) and the H8 data (Figure 5). Panel A displays the response of the real activity measure (real GDP and industrial production, respectively) to the shock. As can be seen, the results correspond to those found in the literature. Output exhibits a significant drop for almost two years (the drop in industrial production is larger than the decline in real gdp) and takes several years to return to the baseline. The price level responses are shown in Panel B, and, in the case of the H8 dataset, display evidence of a price puzzle.[14] Panel D documents the behavior of the federal funds rate following the shock. The initial response is an increase in the federal funds rate of approximately 80 basis points for the Call dataset and 60 basis points for the H8 dataset. It gradually returns to zero but

[13] Significance levels are for one-sided tests.

[14] As noted in the literature, Christiano, Eichenbaum, and Evans (1999) find that adding an index for sensitive commodity prices solves the price puzzle in their sample. Barth and Ramey (2001) and Gaiotti and Secchi (2004) argue that, through a cost channel, increases in the interest rate could actually lead to an increase in the price level.

is still significantly different from zero after one year. Panel C plots the behavior of total deposits in response to the monetary tightening. Interestingly, the results are slightly different. In Figure 4, total deposits, shows a delayed but significant persistent increase. In Figure 5, total deposits, after an initial decrease, displays a significant (10% level) increase. While there are slight differences in the responses, the general conclusions drawn from the diagrams would be the same.[15]

Also shown in the diagrams are the responses to the non-monetary shock described in section 2. The results are consistent with the results found in Den Haan, Sumner, and Yamashiro (2007). Recall, the behavior of the output variable has been designed to follow an identical path of its response during the monetary downturn. As seen in panel D, the federal funds rate displays a slight decrease as would be expected if the FED was following some type of Taylor rule. In panel C, we can see that total deposits do not respond much to the non-monetary downturn when we use the Call dataset and exhibit a delayed positive response after one year when the H8 dataset is used. Therefore, it appears that it is the change in interest rates and not the change in real activity that is driving the response of total deposits.

***3.2 Responses of Deposit Components***

As shown in Den Haan, Sumner, and Yamashiro (2007), it is often useful to disaggregate data to better understand the underlying behavior of an aggregated variable. In particular, they show that while total loans show an inconsistent response to monetary policy, the components of total loans exhibit significant and robust responses that differ across the loan components. As a result we examine a VAR that includes the individual components of liabilities.

Figures 6 and 7 plot the responses of the liability components.[16] Figure 6 plots the responses of the Call liability components. As can be seen the figures, the responses of these two components are very different. In particular, demand deposits (Panel A) display a mild decline in response to the monetary tightening that reaches a maximum in approximately a year. Time deposits (Panel B) on the other hand after a delay of approximately one year, show a significant and larger increase following the monetary tightening that reaches a peak after approximately three years. This suggests that the (delayed) increase evident in total deposits should be attributed to an increase in time deposits. In fact it appears that banks are able to offset the decline in demand deposits by raising time deposits. Once again, the deposit components show very little movement during the nonmonetary downturn when interest rates show very little movement.

As an additional exercise, we look at how the H8 liability components respond in the benchmark VAR. In particular, Figure 7 plots the behavior of large time deposits (Panel A), other deposits (Panel B), and bank borrowing (Panel C). These results are of interest because the difference in the breakdown of the components of liabilities, between the Call and H8 data, provides additional insights into how banks adjust the liability side of their balance sheets in response to interest rate changes. For instance, Panel A reveals that the observed increase in time deposits during a monetary downturn is driven by small time deposits. We infer this from the fact that although time deposits significantly increase during a monetary downturn (Figure 6, Panel B), large time deposits, aside from a small initial increase, significantly declines in response to a negative monetary policy shock. Other deposits (Panel B), exhibit a small decrease

[15] Results are robust to changing the assumption of the information that the FED has in making decisions regarding monetary policy.

[16] Because the responses of output, the price level, and the federal funds rate, are similar to what we found in the VAR model that only included total deposits we do not include those results here.

but then return to baseline. It can be inferred that the decrease is driven by a decline in demand deposits and savings accounts (based on results from Figure 6 (Panel A) and that small time deposits must be increasing). Finally, panel C of figure 7 displays the response of the bank borrowings variable. There is an initial positive response following the monetary tightening, while during a nonmonetary downturn the series displays a significant decline, bottoming out nearly three years after the shock.

## 4. Interpretation and Conclusions

Understanding what happens during the monetary transmission mechanism is a difficult question. This paper has attempted to document more closely the behavior of the sources of bank funds following a monetary tightening using two datasets. By looking at the components of liabilities we can see that the small decline in total deposits is attributable to the decline in demand deposits. Additionally, there appears to be evidence of a substitution out of demand deposits and into time deposits. This is most likely caused by the desire of banks to continue to offer loans but being unable to issue the same level of demand deposits due to the increased cost of these deposits.

Black, Hancock, and Passmore (2007) examine the importance of bank deposits in mitigating the effects of monetary policy using a bank level approach. They find that there is a subset of "traditional" banks[17] that lend less than the core deposits that they take in. Therefore, when a monetary policy shock hits, they are able to buffer their loan portfolio from the decrease in deposits. For these banks there is no bank lending channel. Likewise banks that already have a high proportion of managed liabilities, do not suffer from the adjustment from insured to managed liabilities and therefore also do not suffer from a bank lending channel. The banks that are most effected by monetary policy are those that have a high degree of relationship lending and do not have excess core deposits. Drawing off of these results, it would be nice to examine measures of core deposits in response to monetary tightening perhaps across states or regions to see if differing effects are found.

As Woodford (2010) points out, however, how important these changes in bank liabilities are to real activity depend on a number of factors. Do banks have alternative sources of funds to deposits? And, if so, how does this affect the sensitivity of bank lending to changes in bank liabilities? Perhaps, most importantly, how important are banks as a source of funds for firms? Clearly, the answers to these questions 10 years ago are very different to the answers today. Thus, how much of the severity of the recent downturn can be attributed to the financial crisis' impact on bank liabilities?

The question we sought to answer in this paper was much more specific, and modest. We examine how banks adjust the liability side of their balance sheets in response to monetary policy shocks. We find that during monetary downturns, when output is low and interest rates are high, banks are able to, at least partially, offset the potentially adverse effects on their balance sheet by borrowing and raising additional small time deposits. Further, non-monetary downturns, when both interest rates and output are low, seem to have little effect on the liability position of banks. Taken together, this implies that changes in interest rates, not real activity, influence the composition of bank liabilities. This provides evidence that the FED, while perhaps not being able to strongly impact the level of liabilities, has the ability to influence the composition. The real question, as we mention above, is what kind of impact, if any, do these changes have on lending? That is a question we hope to address in future work.

[17] Banks that focus on relationship lending (most likely have bank-dependent borrowers).

## References

Barth, Marvin J. and Valerie A. Ramey (2001) “The Cost Channel of Monetary Transmission” *NBER Macroeconomics Annual* **16**, 199-239.

Bernanke, Ben S. and Alan S. Blinder (1992) “The Federal Funds Rate and the Channels of Monetary Transmission” *American Economic Review* **82 (4)**, 901-21.

Bernanke, Ben S. and Mark Gertler (1995) “Inside the Black Box: The Credit Channel of Monetary Policy Transmission” *Journal of Economic Perspectives* **9 (4)**, 27-48.

Black, Lamont, Diana Hancock, and Wayne Passmore (2007) “Bank Core Deposits and the Mitigation of Monetary Policy” *Finance and Economic Discussion Series #65*, Federal Reserve Board.

Cecchetti, Stephen G. (1999) “Legal Structure, Financial Structure, and the Monetary Policy Transmission Mechanism” *Federal Reserve Bank of New York Economic Policy Review* **5 (2)**, 9-28.

Christiano, Lawrence J., Martin Eichenbaum and Charles L. Evans (1999) “Monetary Policy Shocks: What Have We Learned and to What End?” in *Handbook of Macroeconomics* by John B. Taylor and Michael Woodford, Eds., North Holland: Amsterdam.

Den Haan, Wouter J., Steven W. Sumner, Guy M. Yamashiro (2002) “Construction of Aggregate and Regional Bank Data using the Call Reports: Data Manual”, manuscript.

Den Haan, Wouter J., Steven W. Sumner, Guy M. Yamashiro (2007) “Bank Loan Portfolios and the Monetary Transmission Mechanism” *Journal of Monetary Economics* **54**, 904-924.

Gaiotti, Eugenio and Alessandro Secchi (2004) “Is there a Cost Channel of Monetary Policy Transmission? An Investigation into the Pricing Behavior of 2,000 firms” *Banca D'Italia Temi di Discussione* #525.

Kashyap, Anil K. and Jeremy C. Stein (1995) “The Impact of Monetary Policy on Bank Balance Sheets” *Carnegie-Rochester Series on Public Policy* **42**, 151-95.

Kashyap, Anil K. and Jeremy C. Stein (2000) “What Do a Million Banks Have to Say About the Transmission of Monetary Policy” *American Economic Review* **90 (3)**, 407-28.

Woodford, Michael (2010) “Financial Intermediation and Macroeconomic Analysis” *Journal of Economic Perspectives* **24 (4)**, 3-20.

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**Figure 1: Deposit Variables Share of Total Liabilities—Call Report and H8 Data**

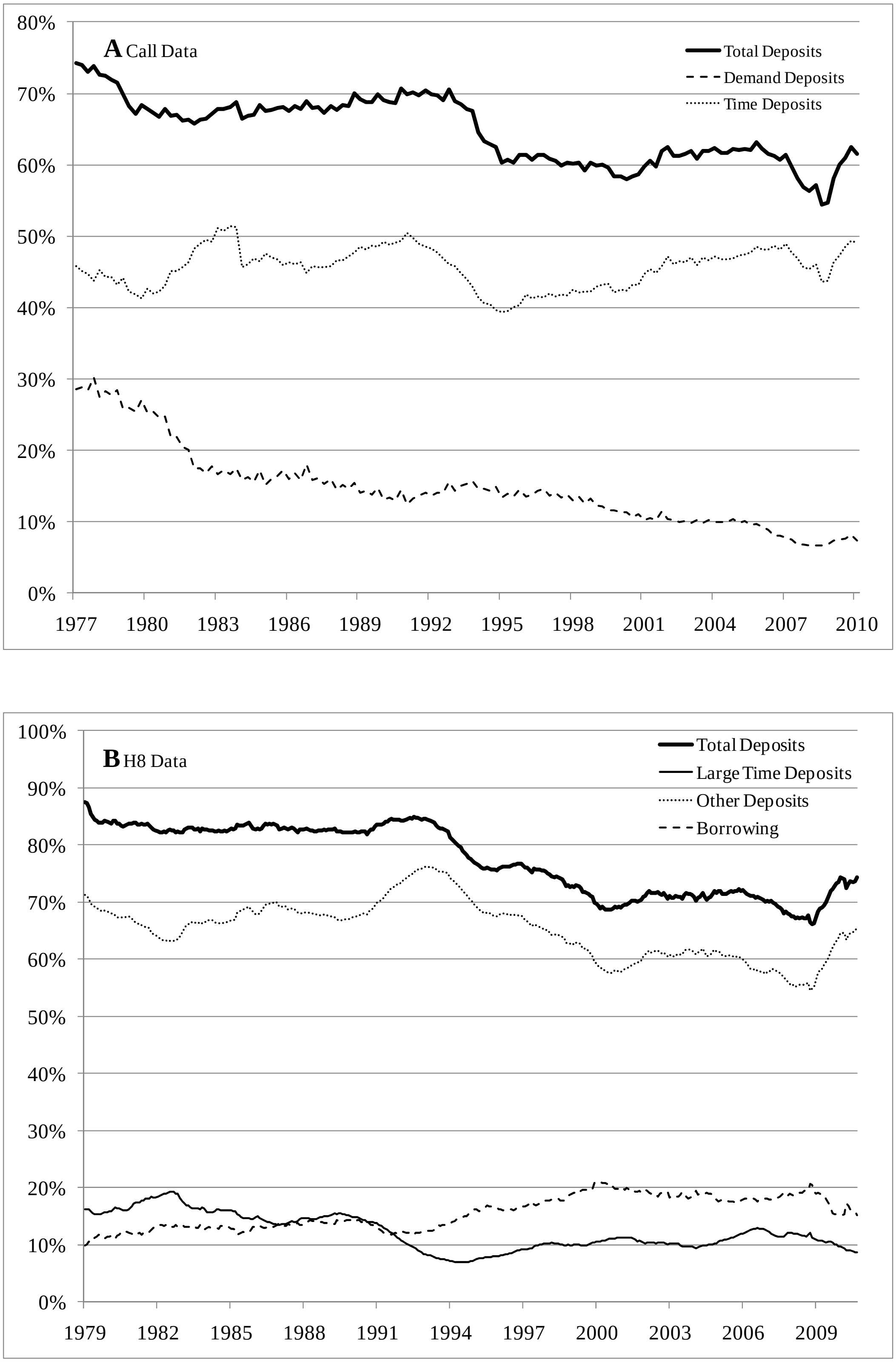
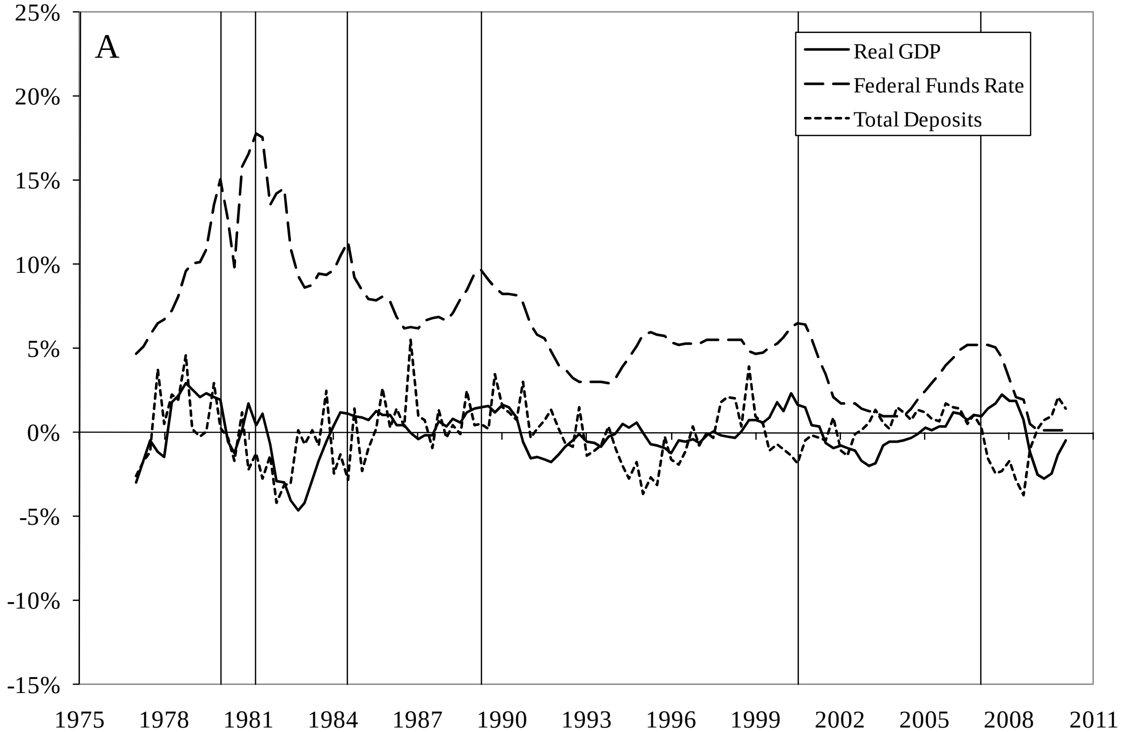
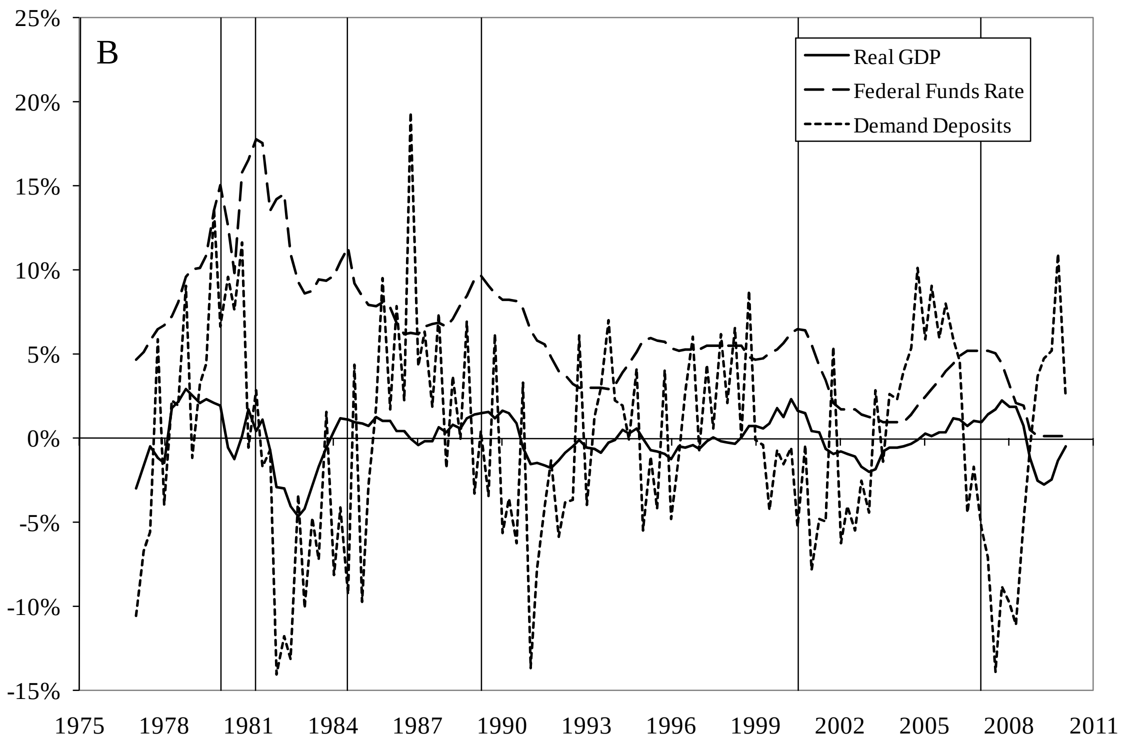
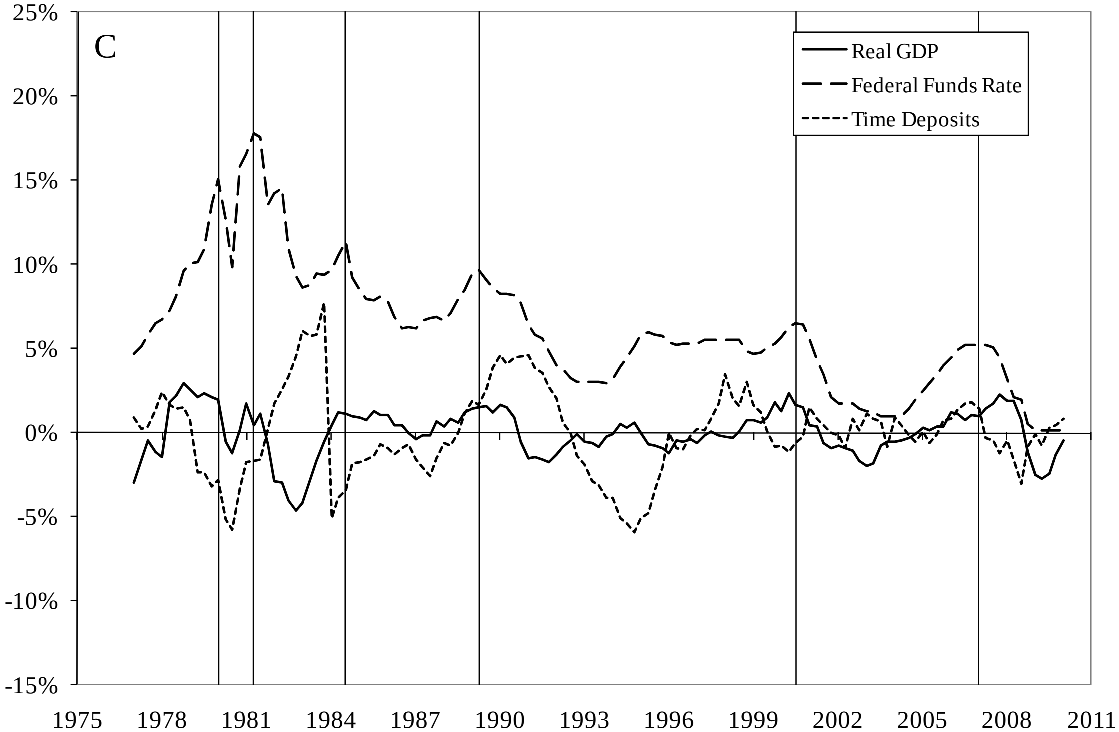


**Figure 2: Time Series Properties of Deposit Series-Call Data**




C
Real GDP
Federal Funds Rate
Time Deposits
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
1975
1978
1981
1984
1987
1990
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2002
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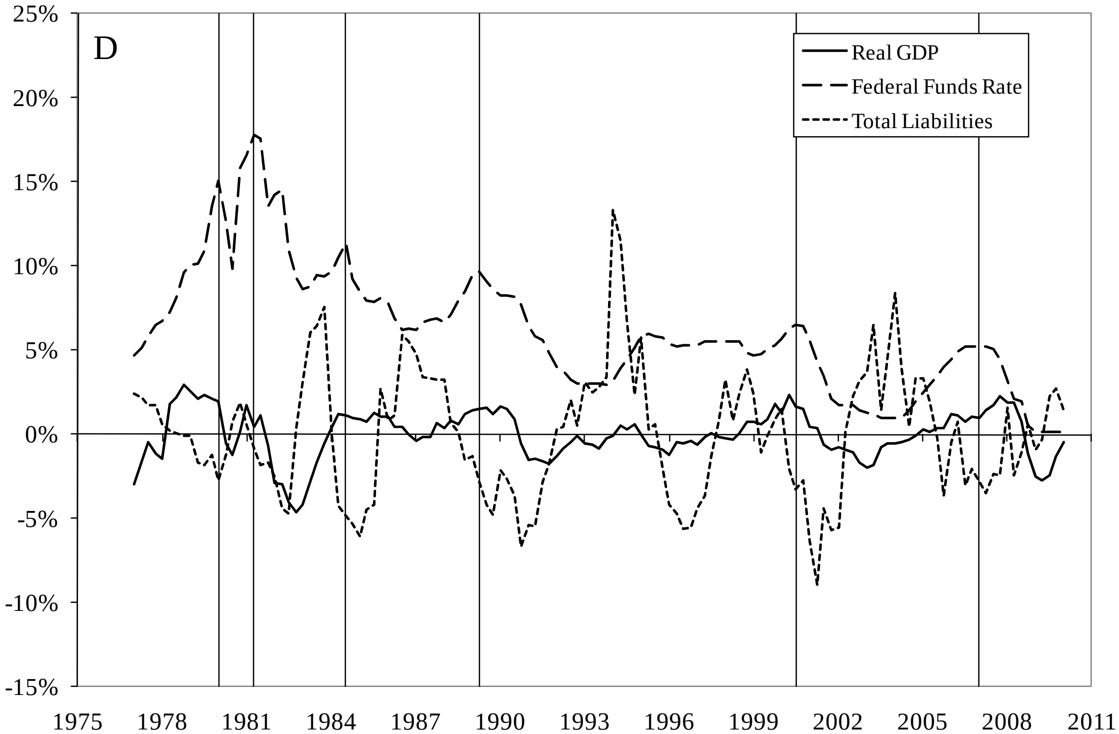
2008
2011


D
Real GDP
Federal Funds Rate
Total Liabilities
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
1975
1978
1981
1984
1987
1990
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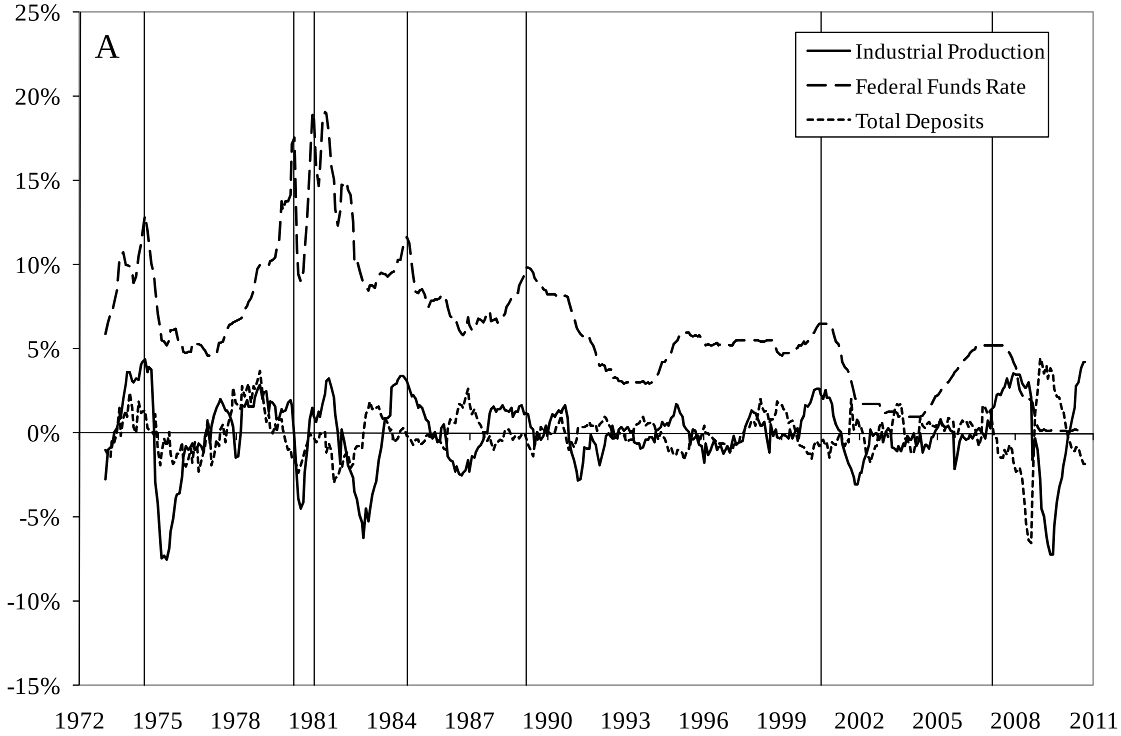
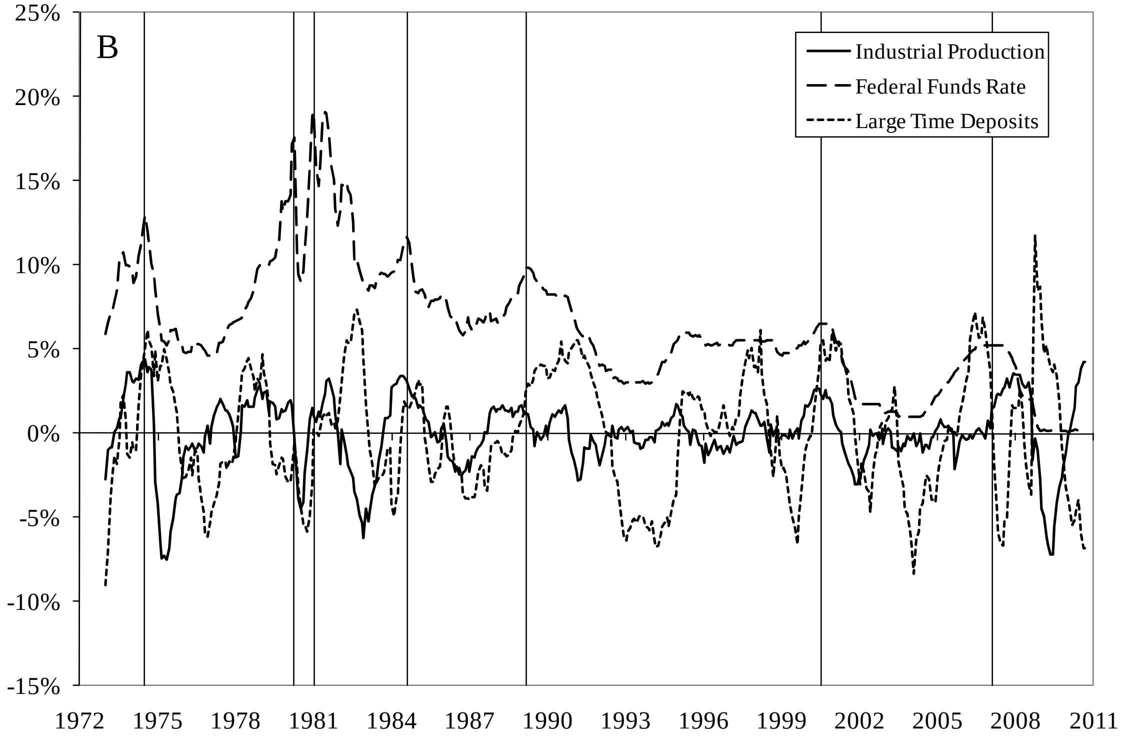
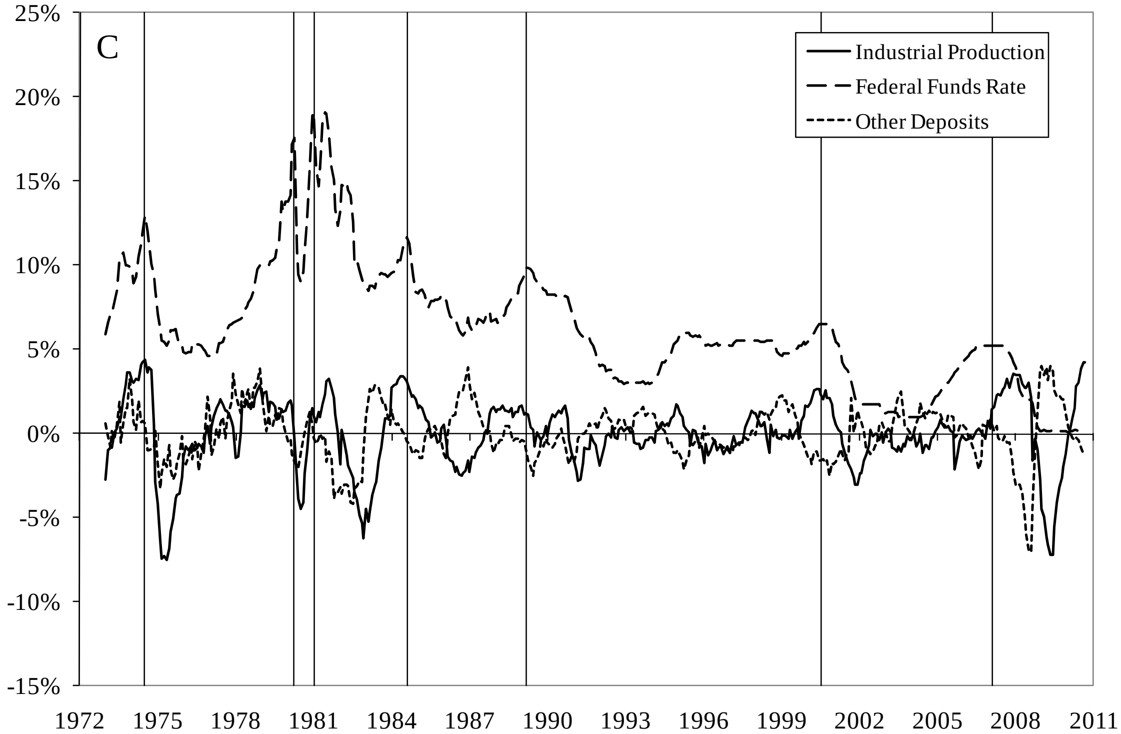
1996
1999
2002
2005
2008
2011

**Figure 3: Time Series Properties of Deposit Series-H8 Data**




C
Industrial Production
Federal Funds Rate
Other Deposits
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
1972
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1978
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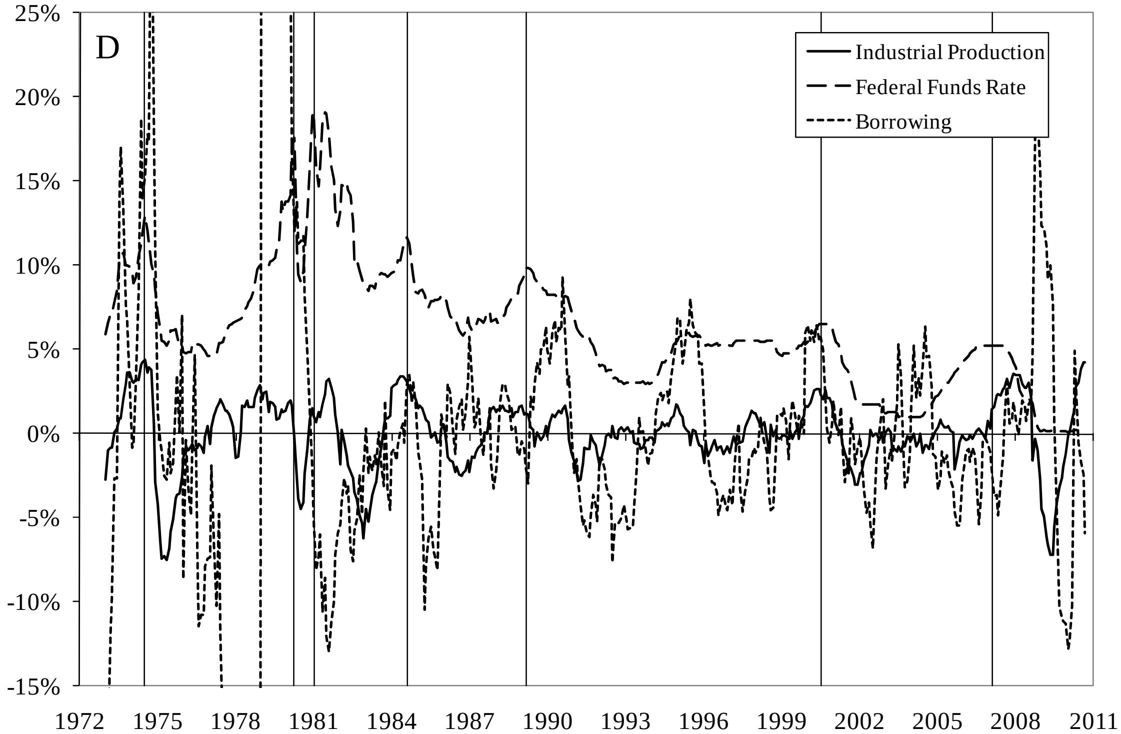
2008
2011


D
Industrial Production
Federal Funds Rate
Borrowing
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011

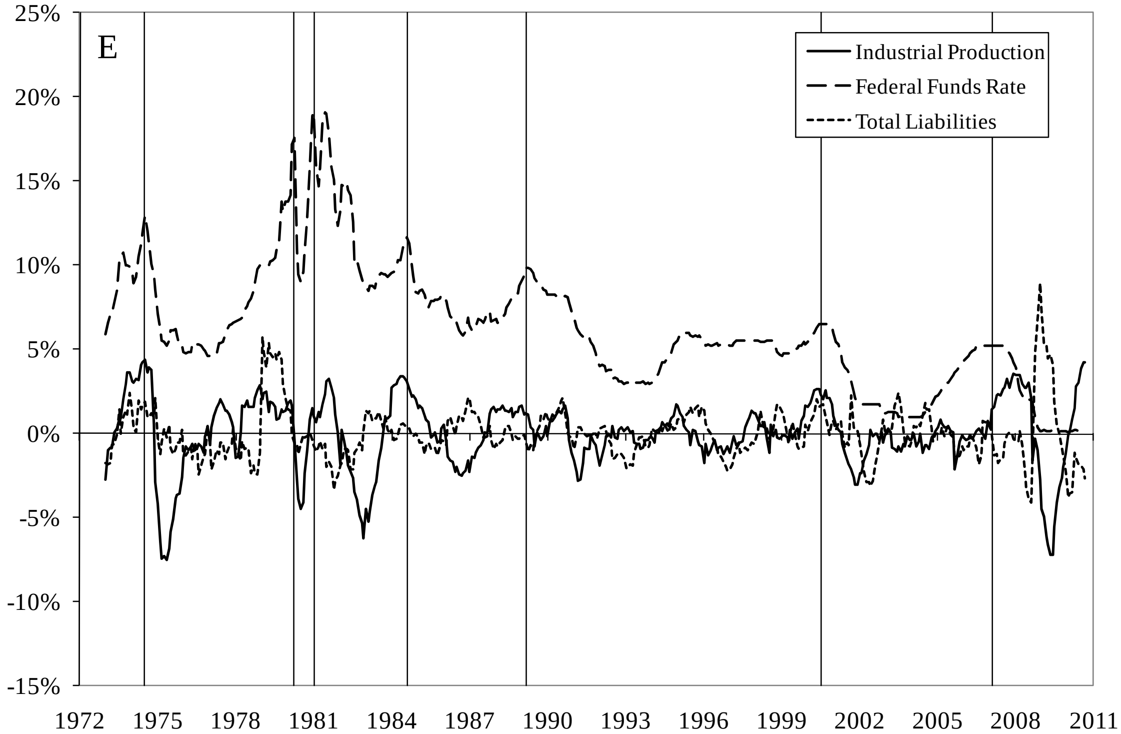

E
Industrial Production
Federal Funds Rate
Total Liabilities
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
1972
1975
1978
1981
1984
1987
1990
1993
1996
1999
2002
2005
2008
2011

**Figure 4: Responses during a monetary and non-monetary tightening (Benchmark) Total Deposits-Call Data**

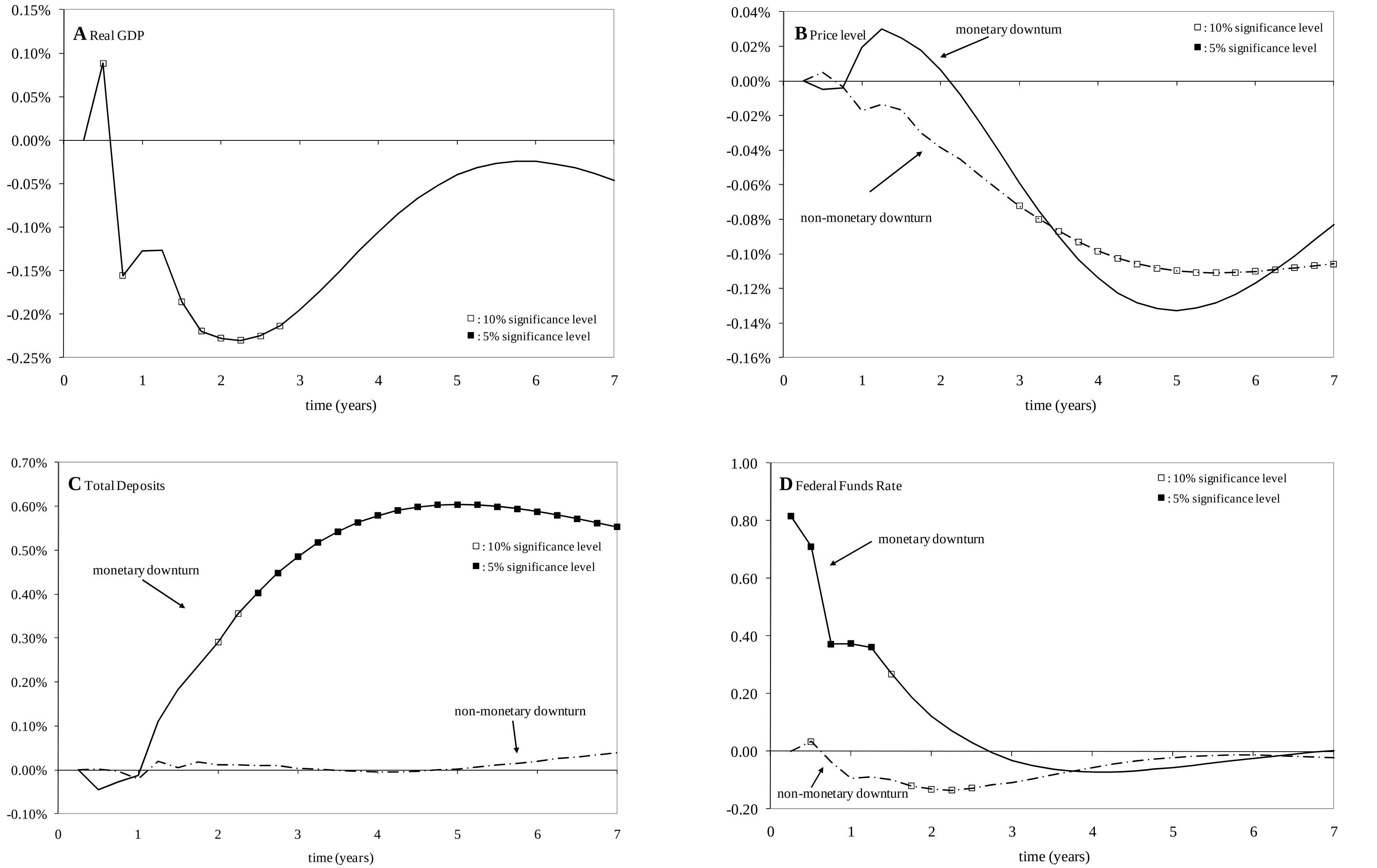



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**Figure 5: Responses during a monetary and non-monetary tightening (Benchmark) Total Deposits-H8 Data**

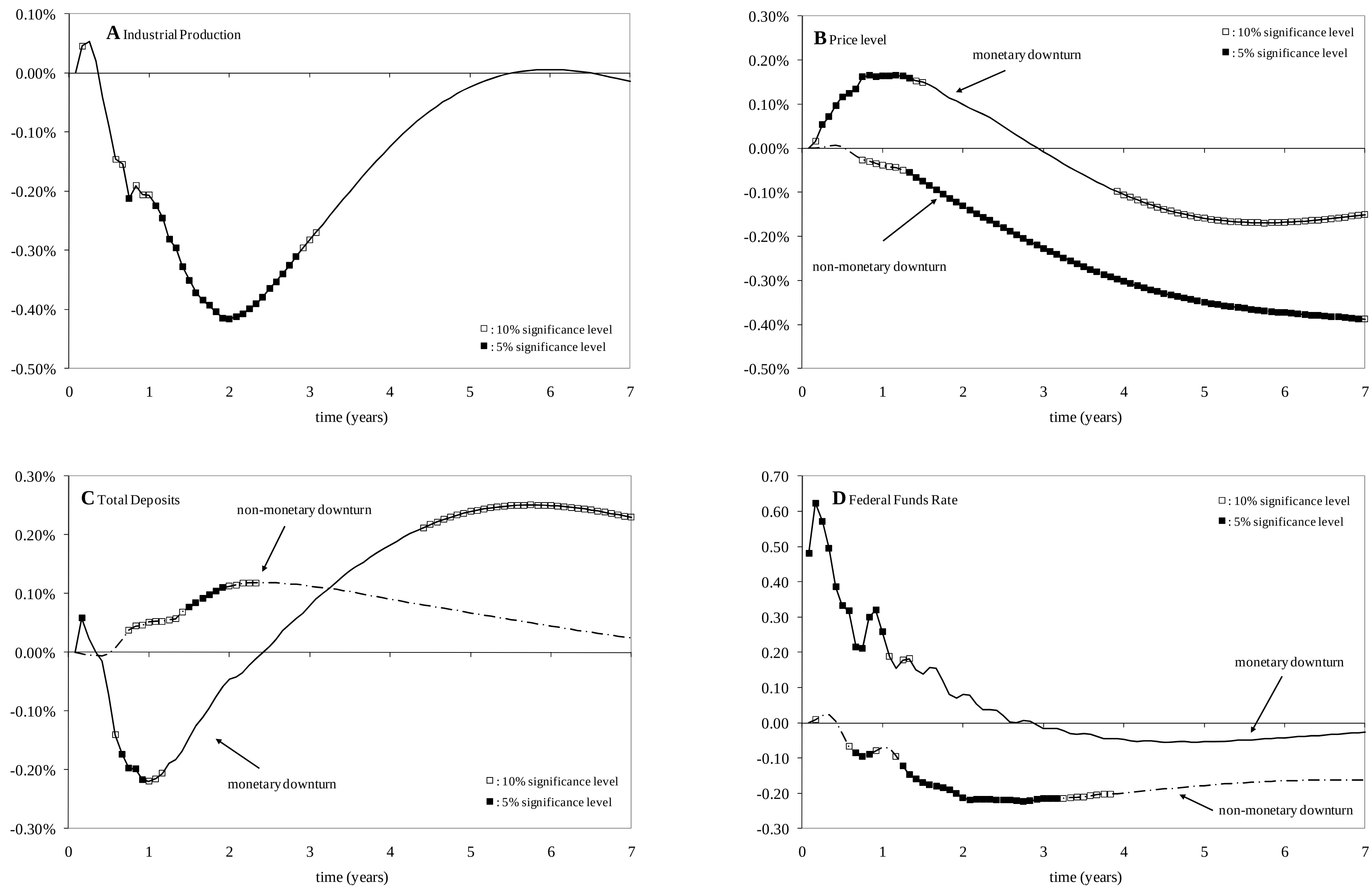


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**Figure 6: Responses during a monetary and non-monetary (Components VAR) Call Data**

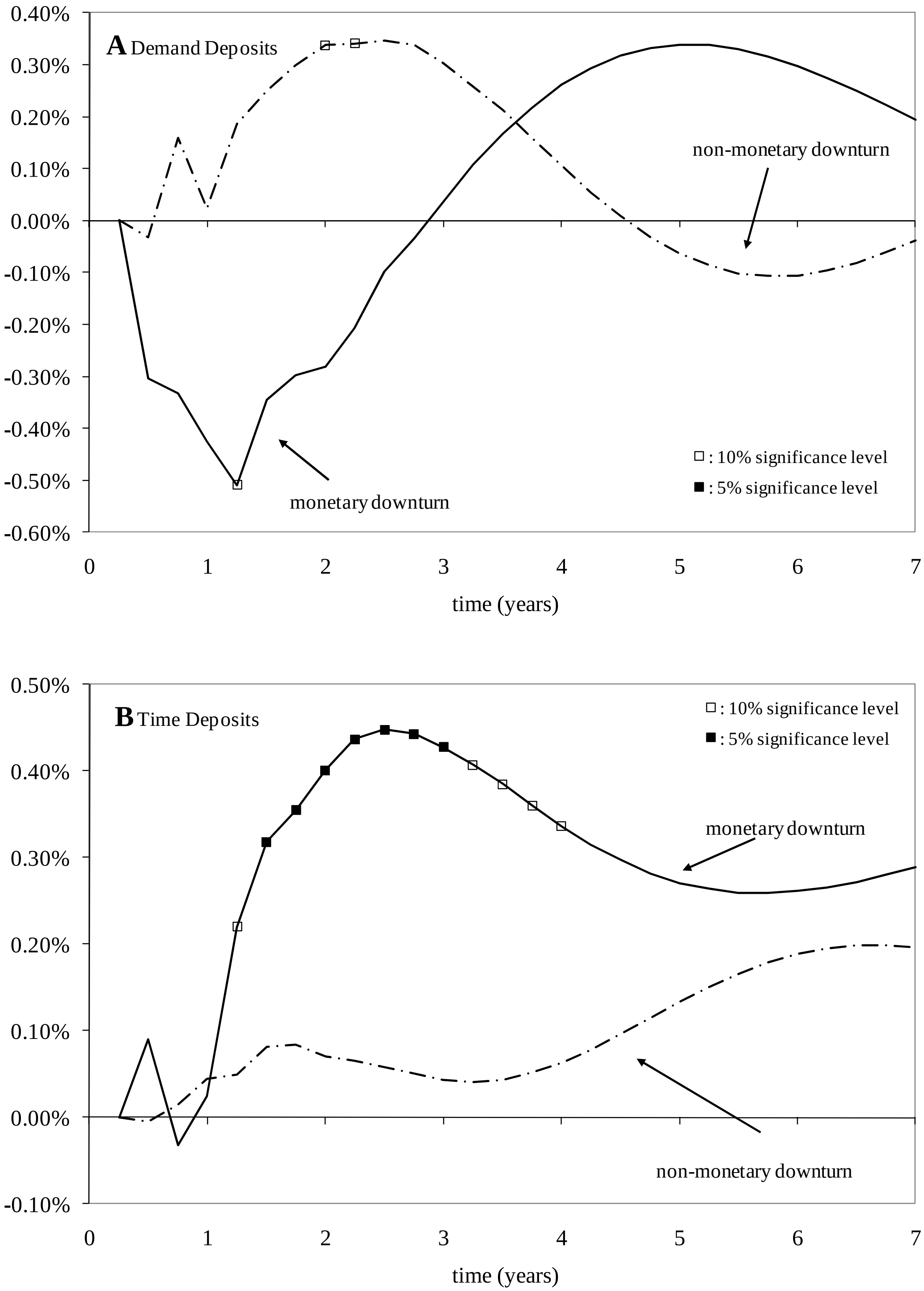

**Figure 7: Responses during a monetary and non-monetary (Components VAR) H8 Data**