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Bijie Jia and Hyeongwoo Kim

*Auburn University*

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# Government Spending Shocks and Private Activity: The Role of Sentiments

Bijie Jia\* and Hyeonwoo Kim<sup>†</sup>

Auburn University

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## Abstract

This paper studies the dynamic effects of the fiscal policy shock on private activity using an array of vector autoregressive models for the post-war US data. We are particularly interested in the role of consumer sentiment in the transmission of the government spending shock. Our major findings are as follows. Private consumption and investment fail to rise persistently in response to positive spending shocks, while they exhibit persistent and significant increases when the sentiment shock occurs. Employment and real wages in the private sector also respond significantly positively only to the sentiment shock. Consumer sentiment responds negatively to a positive fiscal shock, resulting in subsequent decreases in private activity. That is, our empirical findings imply that the government spending shock generates consumer pessimism, which then weakens the effectiveness of the fiscal policy.

Keywords: Government Spending; Consumer Sentiment; Private Activity; Sentiment Channel; Vector Autoregressive; Expectational VAR

JEL Classification: E32; E62

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\*Department of Economics, Auburn University, 0316 Haley Center, Auburn, AL 36849. Tel: (334) 844-2911. Fax: (334) 844-4615. Email: bzj0006@auburn.edu.

<sup>†</sup>Department of Economics, Auburn University, 0339 Haley Center, Auburn, AL 36849. Tel: (334) 844-2928. Fax: (334) 844-4615. Email: gmmkim@gmail.com.

# 1 Introduction

Observing the sluggish recovery from the recent Great Recession, the economics profession has revived the debate on the effectiveness of the fiscal policy in stimulating economic activity. Can increases in government spending help promote private sector activity? And if so, will key variables of interest such as consumption, investment, employment, and real wages respond persistently positively to expansionary fiscal policy?

There is a large literature on this issue. One group of researchers reports positive responses of consumption, real wages, and output to expansionary fiscal shocks, which are consistent with the New Keynesian macroeconomic model in general. See, among others, Rotemberg and Woodford (1992), Devereux, Head, and Laphan (1996), Fatas and Mihov (2001), Blanchard and Perotti (2002), Perotti (2005), Galí, López-Salido, and Vallés (2007).

On the contrary, many other research works provide strong evidence of negative responses of consumption and real wages to spending shocks. See, for example, Aiyagari, Chiristiano, and Eichenbaum (1992), Hall (1986), Ramey and Shapiro (1998), Edelberg, Eichenbaum, and Fisher (1999), Burnside, Eichenbaum, and Fisher (2004), Cavallo (2005), Mountford and Uhlig (2009), Ramey (2013), and Owyang, Ramey, and Zubairy (2013). As Ramey (2011) explains, these negative responses to an expansionary government spending shock are consistent with a negative wealth effect that often appears in the neoclassical macroeconomic model such as Aiyagari, Christiano, and Eichenbaum(1992) and Baxter and King (1993).<sup>1</sup>

One related literature focuses on the output multiplier of government spending. Empirical evidence is again mixed. For instance, Ramey and Shapiro (1998), Hall (2009), Barro and Redlick (2011), and Ramey (2011) obtained fairly low, say less than one, government spending multiplier estimates, while Hall (2009) and Christiano, Eichenbaum, and Rebelo (2009) show that fiscal multipliers can be high when the nominal interest rate is bounded at zero. Overall, the range of fiscal multiplier estimates in the literature is very wide (Ramey, 2011). Also,

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<sup>1</sup>Increases in government spending may result in a negative wealth effect because government deficits may have to be financed by tax hikes in the future. Rational consumers reduce consumption and increase labor supply in response to spending shocks, resulting in a decrease in the real wage. Note that such responses would occur even when government raises revenues by non-distortionary lump-sum tax.

fiscal multiplier estimates seem to vary greatly across countries depending on key country characteristics such as the exchange rate regime and public indebtedness. See Corsetti, Meier, and Müller (2012) and Ilzetxki, Mendoza, and Vegh (2013) for details.

Another interesting question is whether the government spending shock is more powerful during times of slack. Again, empirical evidence is mixed. For example, Auerbach and Gorodnichenko (2012), Mitnik and Semmler (2012) and Fazzari, Morley, and Panovska (2013) report much higher fiscal multipliers in a regime of a low economic activity than those in a high regime activity, whereas Owyang, Ramey, and Zubairy (2013) and Ramey and Zubairy (2014) find no such evidence.

Observing such mixed empirical evidence on the effectiveness of fiscal stimulus, we study how the government spending shock influence private activity in the US. Finding negligibly weak or even negative responses of private activity to the fiscal spending shock, we introduce and highlight the role of consumer "sentiment" in the propagation of expansionary fiscal shocks to promote economic activity.

We are not the first who discussed the interaction between consumer sentiment and economic activity. Hall (1993) and Blanchard (1993), for example, underline the causal effects of "animal spirit" on economic activity in their explanation of the 1990-1991 recession. On the other hand, Cochrane (1994) points out that close relationship between innovations in consumer confidence and subsequent changes in economic activity appear because consumer confidence shocks reflect "news" about future economic productivity. Beaudry and Portier (2004, 2006) also propose a similar model. Barsky and Sims (2012) evaluate empirical relevance of these factors in explaining innovations in consumer confidence. They showed that confidence innovations are better characterized by the latter, even though animal spirit also has non-negligible contribution. Using a nonlinear VAR framework, Bachman and Sims (2012) report high fiscal multiplier estimates during periods of economic slack. They put an emphasis on the role of confidence, which embodies information of future productivity improvements, following spending shocks during recessions.

We are particularly interested in the role of consumer sentiment in propagation mechanism

of the government spending shock to private activity such as consumption and investment, excluding the government sector component from the total GDP. For this purpose, we employ an array of identification methods for the fiscal shock that includes conventional recursively identified structural VAR models and the expectational VAR model of Ramey (2011) for the post war US data. Our major empirical findings are as follows.

First, the government spending shock doesn't seem to be effective in stimulating private activity. For example, consumption responds positively for less than a year then become negative in longer-term. However, controlling for the timing issue (Ramey, 2011), such initial positive responses disappear. Overall, we were unable to find any persistently positive responses of consumption and investment. Second, we observed solid positive responses of consumption and investment to the sentiment shock that are significant and persistent. Third, consumer sentiment rapidly deteriorate to a negative region since the impact of the fiscal spending shock, leading subsequent decreases in consumption and investment. That is, unexpected increases in the government spending generate consumer pessimism, which may weaken the fiscal policy effect on the private GDP. We demonstrate in a discussion that our empirical findings are consistent with a view that consumer sentiment leads private activity rather than it passively reflects the current state of the economy. Lastly, the fiscal shock seems to be ineffective in improving labor market conditions, while the real wage and private sector jobs show solid positive responses to the sentiment shock.

The remainder of this paper is organized as follows. Section 2 discusses our VAR models with alternative identification methods. We also discuss econometric features of our models as to the robustness of our empirical findings to the Wold ordering issue. In Section 3, we present a data description and our major empirical findings as well as robustness check analyses. We also discuss the role of a sentiment channel in the propagation mechanism of the fiscal spending shock. Section 4 concludes.

## 2 The Econometric Model

Abstracting from deterministic terms, we employ the following vector autoregressive (VAR) model.

$$\mathbf{x}_t = \sum_{j=1}^p \mathbf{A}_j \mathbf{x}_{t-j} + \varepsilon_t, \quad (1)$$

where

$$\mathbf{x}_t = [\mathbf{g}_t \ \mathbf{y}_t \ \text{sent}_t \ \mathbf{z}_t]'$$

$\mathbf{g}_t$  denotes a vector of (or a scalar) government spending variables,  $\mathbf{y}_t$  is a vector (or a scalar) of private activity variables such as consumption ( $\text{comm}_t$ ) and investment ( $\text{inv}_t$ ),  $\text{sent}_t$  is a scalar sentiment variable, and  $\mathbf{z}_t$  is a vector of control variables that includes tax rate ( $\text{tr}_t$ ), the interest rate ( $i_t$ ), and the monetary aggregate M2 ( $m_t$ ). All variables are demeaned and detrended, up to quadratic trend, prior to estimation. We limit our attention to a closed economy VAR model to make the model as simple as possible.<sup>2</sup>

Motivated by Ramey's (2013) work, we employ an array of VAR models based on alternative identification methods for the government spending shock. Our first model, *TG-VAR*, resembles conventional VAR models with the government spending ordered first. Put it differently, we identify the government spending shock by unexpected increases in the total government spending ( $\text{tgov}_t$ ), that is,  $\mathbf{g}_t = \text{tgov}_t$ . For similar models, see, among others, Blanchard and Perotti (2002), Perotti (2005, 2008), and Galí, López-Salido, and Vallés (2007).

We also employ a VAR model with Ramey's (2011) news variable ( $\text{news}_t$ ), which is dubbed the *EVAR* (expectational VAR) approach, that is,  $\mathbf{g}_t = \text{news}_t$ . Ramey (2011) points out that government spending shocks that are identified with standard recursively identified VAR models might not be appropriate because planned changes in fiscal variables such as military spending are likely to be anticipated by market participants before the government actually implements it. In order to deal with this timing issue, she constructed a "news" variable by estimating changes in the expected present value of government spending, utiliz-

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<sup>2</sup>That is, we do not pay much attention to the fiscal policy effect on the net exports. For an open economy model, additional variables such as the exchange rate, foreign incomes, and the domestic and foreign prices should be added to the system.

ing information from Business Week and several other mass media sources. Perotti (2011), however, argues that Ramey's *EVAR* is equivalent to a model with  $\mathbf{g}_t = [fgov_t, tgov_t]'$ , where  $fgov_t$  denotes the federal government (or military) spending. We also employ such a model and denote it the *FG-VAR* model. Following Perotti (2011) and Ramey (2013), we also put  $tgov_t$  next to  $news_t$  for the *EVAR* model. Our empirical models are summarized as follows.

$$TG-VAR : \mathbf{x}_t = [tgov_t \ invt_t \ conmt_t \ sent_t \ tr_t \ i_t \ m_t]' \quad (2)$$

$$FG-VAR : \mathbf{x}_t = [fgov_t \ tgov_t \ invt_t \ conmt_t \ sent_t \ tr_t \ i_t \ m_t]'$$

$$EVAR : \mathbf{x}_t = [news_t \ tgov_t \ invt_t \ conmt_t \ sent_t \ tr_t \ i_t \ m_t]'$$

We plot estimated fiscal spending shocks (residuals) as well as original spending variables from these three alternative VAR models in Figure 1. Ramey's (2011) news variable look quite different from total and fiscal spending variables that are trending upward. However, residuals of these variables, that is, the estimated government spending shock identified from each model, look quite similar each other. That is, all three measures of fiscal shocks seem fairly consistent with each other.

### Figure 1 around here

It is well-known that econometric inferences from recursively identified VAR models might not be robust to alternative VAR orderings. Note that  $\mathbf{g}_t$  is ordered first in all models with an assumption that these spending variables are not contemporaneously influenced by innovations in other variables within one quarter.<sup>3</sup> It is important to realize that the impulse-response functions to the government spending shock are invariant to all alternative orderings of the remaining variables in the system. That is, *all* response functions to the fiscal spending shock are "identical" even if we randomly shuffle the variables after  $\mathbf{g}_t$  in the system. See Kim, Kim, and Stern (2015) for detailed explanation.<sup>4</sup>

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<sup>3</sup>Unlike the monetary policy, fiscal policy actions may not be implemented immediately, because in most cases, congress and the government work together to determine the government budget prior to the fiscal year.

<sup>4</sup>Consider a VAR with  $x_t = [x_{1,t}, x_{2,t}]$ . Let  $x_{1,t}$  be a vector of variables with a known ordering, while

However, response functions to the sentiment shock are *not* invariant to the ordering of the VAR, since  $s_t$  is ordered in the middle of the system. We implemented an array of robustness check analyses putting the sentiment variables in different locations from the first to the last. We obtained qualitatively very similar results, thus we maintain the ordering described in (1) throughout the paper.

### 3 Empirical Findings

#### 3.1 Data Descriptions

We use quarterly frequency data from 1960:I to 2013:IV. We obtained most of our data from the FRED with a few exceptions. The news series ( $news_t$ ) is obtained from Valerie Ramey's website. We obtained the consumer sentiment index ( $sent_t$ ) data from the University of Michigan's Survey of Consumers database. We use "total" government expenditures for government spending variables that include transfer payments as well. All GDP variables ( $tgov_t, fgov_t, conmt_t, invt_t$ ) are divided by the GDP deflator and population, then log-transformed.  $sent_t$  is also expressed in natural logarithm.  $tr_t$  denotes the government tax receipts divided by the GDP. As to the money market control variables,  $i_t$  denotes the three month Treasury Bills yield and  $m_t$  is the nominal M2, expressed in natural logarithm. More detailed information on data is provided in Table 1.

Table 1 around here

#### 3.2 Fiscal Spending Shocks and Private activity

As a preliminary exercise, we estimated fiscal spending effects on the private GDP that excludes the government spending component in the total GDP. Figure 2 reports the response function estimates of the private GDP to the total government spending shock and the news

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the ordering of  $x_{2,t}$  is completely unknown. Kim, Kim, and Stern (2015) demonstrate the impulse-response functions to the shock to one of the variables in  $x_{1,t}$  are unaffected by reshuffling the  $x_{2,t}$  variables.



shock (Ramey, 2011) with and without the sentiment variable in the system. We also report the 95% confidence bands obtained from 500 nonparametric bootstrap simulations.

It should be noted that the fiscal shock has negligible or even negative effects on the private GDP, which is consistent with the findings by Ramey (2013). This implies that any evidence of positive responses of the total GDP to the fiscal shock might be mainly due to an expansion of the public sector. Contrary to the fiscal shock, the sentiment shock yields a persistently positive effect on the private GDP, which is significant at the 5%. We note that this finding is consistent with work by Hall (1993), Blanchard (1993), Cochrane (1994), and Bachman and Sims (2012), for example, who report close relationship between consumer sentiment and economic activity. However, our findings contrast sharply with those of Bachman and Sims (2012) who argue that the government spending shock has a positive effect on consumer confidence during times of slack. In what follows, we show that the government spending shock generates consumer pessimism rather than optimism, which then weakens private activity.

## Figure 2 around here

Next, we report impulse-response function estimates of private consumption and investment as well as the consumer sentiment to fiscal spending shocks in Figure 3.<sup>5</sup>

Investment responses to the fiscal shock turn out to be negligible and insignificant no matter what identification methods are employed. Consumption responds significantly positively only in the short-run (less than a year) when the *TG-VAR* and the *FG-VAR* models are used, while no meaningful responses are observed when the *EVAR* model is employed. Under the *TG-VAR* and the *FG-VAR* schemes, consumer sentiment rapidly falls below zero immediately after the impact of the fiscal spending shock, which might play a key role in explaining why initial positive responses of consumption quickly deteriorate to negative ones. That is, positive fiscal spending shocks may be interpreted as a sign of weak economy, which might make consumers more pessimistic. Such changes in consumer sentiment may weaken the

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<sup>5</sup>Complete response function estimates are reported in the non-for-publication appendix.

effectiveness of the expansionary fiscal policy as consumption and investment fall in response to the fiscal shock.<sup>6</sup>

**Figure 3 around here**

Overall, fiscal policy effects on private activity seem to be weak and short-lived if any. Further, the fiscal spending shock seems to fail to improve, even decrease, consumer sentiment, which may cause decreases in consumption and investment. To investigate such possibility, we report and discuss our impulse-response function estimates of private activity to the sentiment shock in next section.

### **3.3 Consumer Sentiment Shocks and Private activity**

Responses of private activity to the sentiment shock sharply contrast with those to the fiscal shock. As can be seen in Figure 4, both investment and consumption respond positively for a prolonged period of time in response to the sentiment shock in all three models. That is, we obtained robust evidence of persistently positive effects of the sentiment shock on private activity. Especially, consumption responses are highly significant at the 5% level for over three years. Even though investment responses are not significant at the 5% level, its point estimates are substantially skewed to the positive area.

Responses of the government spending to the sentiment shock are overall negative, though either insignificant or marginally significant. This is not surprising because fiscal spending tends to be counter-cyclical. That is, government spending normally falls below the trend when private GDP (consumption and investment) rises during economic booms.

Unlike responses to the fiscal shock, the impulse-response function to the sentiment shock is not invariant to alternative orderings since the sentiment variable is put after the fiscal variable and private spending variables. For robustness check, we implemented the same

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<sup>6</sup>In what follows, we also show that "total" consumption responses in Figure 3 are more closely related with those of nondurable goods and services consumption rather than durable goods consumption. That is, consumption responses to the fiscal shock seem to be mainly driven by temporary changes in nondurable goods consumption.

analysis with the sentiment variable ordered next to  $\mathbf{g}_t$ . We also experimented with the sentiment variable ordered last. All results were qualitatively very similar. That is, our findings on the sentiment effect are quite robust to alternative orderings.<sup>7</sup>

**Figure 4 around here**

### 3.4 Fiscal Shock and the Role of a Sentiment Channel

In a nutshell, all three models imply solid positive effects of the sentiment shock on private spending. We note that these findings may provide some useful insights on the ineffectiveness of the fiscal policy in promoting private activity as reported in the previous section. That is, the fiscal spending shock may not be able to stimulate consumption and investment if it fails to generate consumer (or entrepreneur) optimism as can be seen in Figure 3. In other words, the effectiveness of the fiscal spending shock may critically hinge upon a sentiment channel.

Observing sudden increases in the government deficit, consumers may revise down their economic growth forecasts in the future, interpreting such policy actions as a clear sign of serious economic downturns, which may persist for a while. In this sense, our conjecture is consistent with the "news" effect discussed in Cochrane (1994) and Bachman and Sims (2012) even though Bachman and Sims (2012) are more optimistic on the role of the expansionary fiscal policy.

One may argue against this conjecture by the following logic. Consumption and investment may fall after the spending shock occurs for some unknown reason, and the sentiment passively reflect such decreases in private GDP. We are skeptical to such a possibility for the following reasons.

As we can see in Figure 3, consumption tends to rise for a little less than a year in response to the fiscal shock when the *TG-VAR* and the *FG-VAR* models are employed, whereas consumer sentiment falls almost immediately after the impact. These responses are inconsistent

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<sup>7</sup>All results are available upon request.

with a view that consumer sentiment passively reflects changes in the current private GDP. If that is the case, the sentiment response should have resembled initial positive responses of consumption for about a year since the impact of the fiscal shock. Furthermore, it should be noted that the consumer sentiment is constructed to measure consumers' perception on the current and future economic conditions. Therefore, immediate declines of the sentiment which contrast to short-run increases in consumption imply that consumer sentiment does not passively reflect changes in private activity. Put it differently, our response function estimates overall imply the existence of a sentiment channel where the sentiment plays a leading role in determining private activity.

### 3.5 Additional VAR Analyses

#### 3.5.1 Effects on Private Employment

As Ramey (2013) points out, fiscal spending effects on private jobs may differ depending on the nature of government spending. If fiscal spending occurs mainly through government purchases of private sector goods and services, the fiscal spending shock may increase private employment. On the contrary, increases in government value added that include mainly compensation of public employees may decrease private sector jobs as the public sector employment rises given the labor force, eroding the private sector jobs.

We estimate and report private sector labor market effects of the fiscal shock as well as those of the sentiment shock. For this purpose, we replaced  $inv_t$  and  $conm_t$  in (2) with private jobs ( $pjob_t$ ). Results are reported in Figure 5. We observe that fiscal shocks again fail to increase private employment when the *TG-VAR* and the *FG-VAR* models are employed, while it increases private jobs in the short-run when the *EVAR* model is used. We note that labor market effects become either insignificant or even negative after around 3 years since the impact. On the contrary, the sentiment shock has a solid positive effect on private employment that lasts several years since the shock occurs no matter what identification methods are employed.

In a nutshell, private labor market effects of the fiscal spending shock are weak and over-

all insignificant that contrast sharply with the sentiment effect that results in persistently positive increases in private sector jobs. These findings might explain why increases in fiscal spending fail to reduce unemployment for a prolonged period of time after the Great Recession. That is, falling private spending may weaken job creation effects of the government spending shock as it creates consumer pessimism in the economy.

**Figure 5 around here**

### 3.5.2 Effects on Private Wages

Private wages may rise in response to the fiscal shock in either cases of government purchases of private sector goods or increases in government value added. On the other hand, private sector wages may fall if rational consumers, expecting a tax hike in the near future, increase the labor supply sufficiently.

We empirically appraise the effects of the fiscal shock on private wages by replacing  $invt_t$  and  $comm_t$  in (2) with private wages ( $pwag_t$ ). As can be seen in Figure 6, we observe slightly positive effects of the fiscal shock on private wages that are mostly insignificant from all VAR specifications. On the contrary, private wages respond persistently and positively to the sentiment shock for over three years that are significant at the 5% levels. Solid increases in private wages seem to be caused by increases in the demand for labor, because sentiment shocks promote private activity persistently.

**Figure 6 around here**

### 3.5.3 Effects on Durable and Nondurable Goods Consumption

We also estimate the effects of the fiscal and the sentiment shocks on two components of private consumption: consumption of durable goods ( $cond_t$ ) and consumption of non-durable

goods and services ( $conn_t$ ). We replaced  $conn_t$  with either  $cond_t$  or  $conn_t$ , then estimated the system in (2). Impulse-response function estimates are reported in Figures 7 and 8.

We note that response function estimates of total consumption to the fiscal shock shown in Figure 3 resemble those of nondurables consumption in Figure 8 more than durable goods consumption in Figure 7. That is, fiscal shock effects on total consumption are mainly driven by responses of  $conn_t$  instead of those of  $cond_t$ . Since consumers tend to buy more durable goods such as automobiles and home appliances when they are confident that the economy would continue to expand, these findings imply fiscal shocks again fail to generate optimism on economic conditions in near future. Similar evidence can be found from mostly insignificant and negligible responses of durable goods consumption to the fiscal shock.

In contrast, total consumption responses to the sentiment shock are somewhat in between those of durables and nondurables consumption responses. That is, in response to a positive sentiment shock, durable goods consumption also rises significantly and persistently no matter what identification methods are employed.

**Figures 7 and 8 around here**

#### **3.5.4 Effects of the Government Budget Deficit Shock**

For a further robustness check, we estimate fiscal policy effects on private activities through a government budget deficit shock as in Kim and Roubini (2008) for an open economy VAR. For this purpose, we replaced  $\mathbf{g}_t$  with the fiscal budget deficit (spending minus tax receipt) relative to the total GDP and estimate impulse-response functions. Results are reported in Figure 9.

Overall, we obtained results that are consistent with our major findings. Private activity weakly responds to the fiscal shock. Investment responses are negative and highly significant, whereas consumption responses are mostly insignificant even though point estimates are overall positive. Consumption and investment responded again significantly and positively

to the sentiment shock. Negative correlations between the fiscal and the sentiment variables are observed again.

**Figure 9 around here**

### **3.6 Current or Forward Looking Sentiment?**

Bachman and Sims (2012) use the index of consumer expectations that is a sub-index of the consumer sentiment index used in the present paper. Even though their approach has some merits, the forward-looking sentiment data seems quite similar to the other sentiment sub-index, which is based on consumers' perception on the current economic conditions. See Figure 10.

For another robustness check analysis, we estimate similar VAR models replacing the consumer sentiment index ( $sent_t$ ) with its two sub-indices, the index of consumer expectations (Bachman and Sims, 2012) and the index of current economic conditions. Results are reported in Figures 10 and 11. We obtain very similar impulse-response functions as the ones reported in Figure 3.

**Figures 10, 11, and 12**

## **4 Conclusion**

The recent Great Recession accompanied by the slow recovery triggered an active debate on the effectiveness of the fiscal policy in stimulating economic growth. Empirical evidence is at best mixed and the economics profession has failed to reach a conclusion.

This paper takes a different road and attempt to understand what influences the effects of the fiscal policy on the private sector economy. For this purpose, we introduce the role of

consumer sentiment in propagation mechanism for government spending shocks to economic activity in the private sector. As Ramey (2011) points out, statistical inferences may be influenced by alternative identification methods for the spending shock. We employ an array of recursively identified VAR models as well as the expectational VAR model and obtain solid evidence of the existence of a consumer sentiment channel that is robust to alternative identification methods.

Our major findings are as follows. First, our empirical results imply a very weak even negative effect of the government spending shock on private sector spending such as consumption and investment. That is, we confirm the conclusion by Ramey (2013). On the contrary, innovations in the consumer sentiment generate solid positive responses of consumption and investment for a prolonged period of time. Third, consumer sentiment negatively responds to the government spending shock since the impact, while (nondurables and services) consumption show positive responses for a brief period of time, then quickly deteriorate to a negative region. This implies that the fiscal policy may become ineffective in stimulating economic activity because it generates consumer pessimism that results in subsequent decreases in consumption and investment. That is, consumer sentiment channel may be a key in understanding the propagation mechanism of fiscal policy shocks. We also similar evidence in private sector labor market variables. Employment and real wages in the private sector respond significantly positively only to the sentiment shock.



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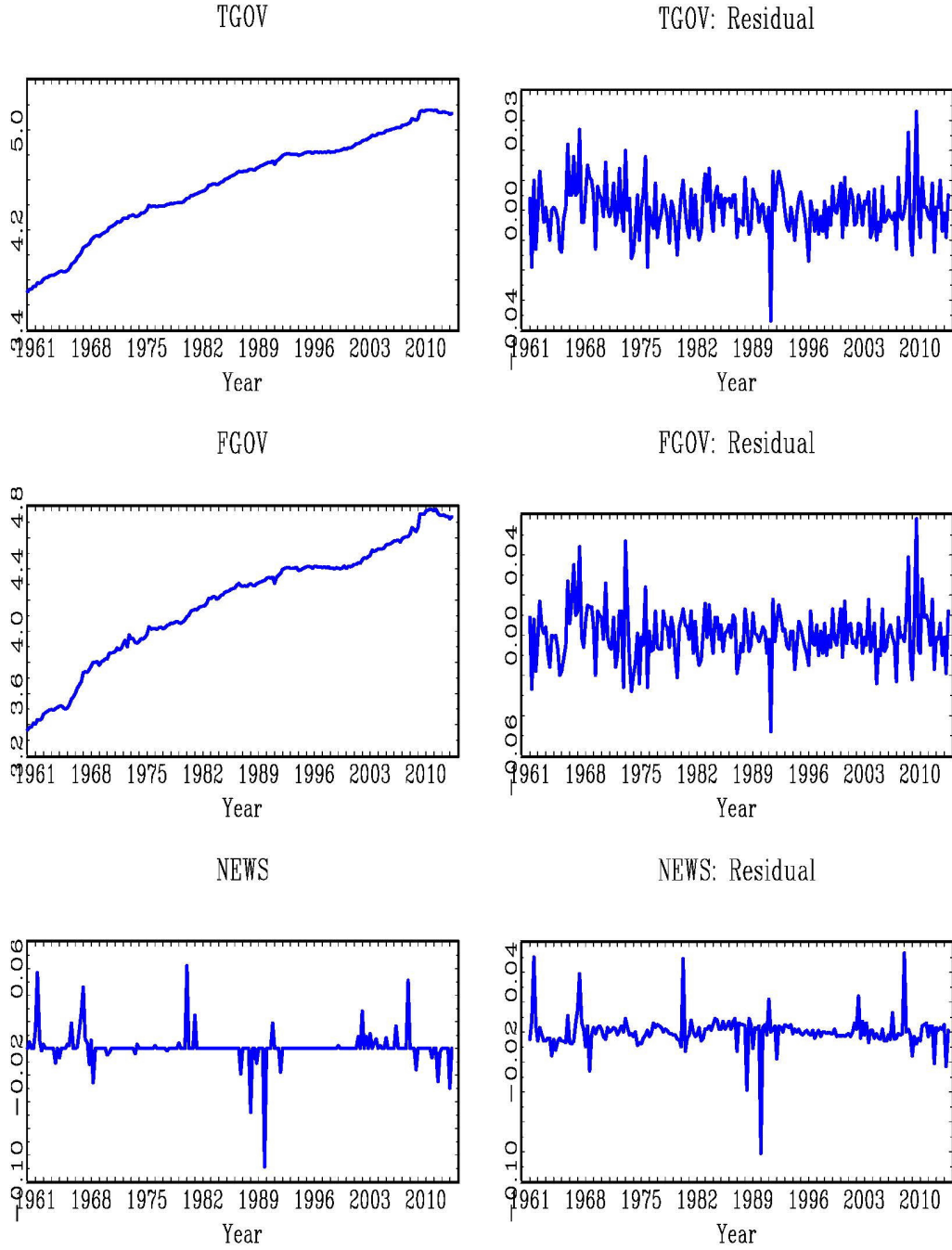
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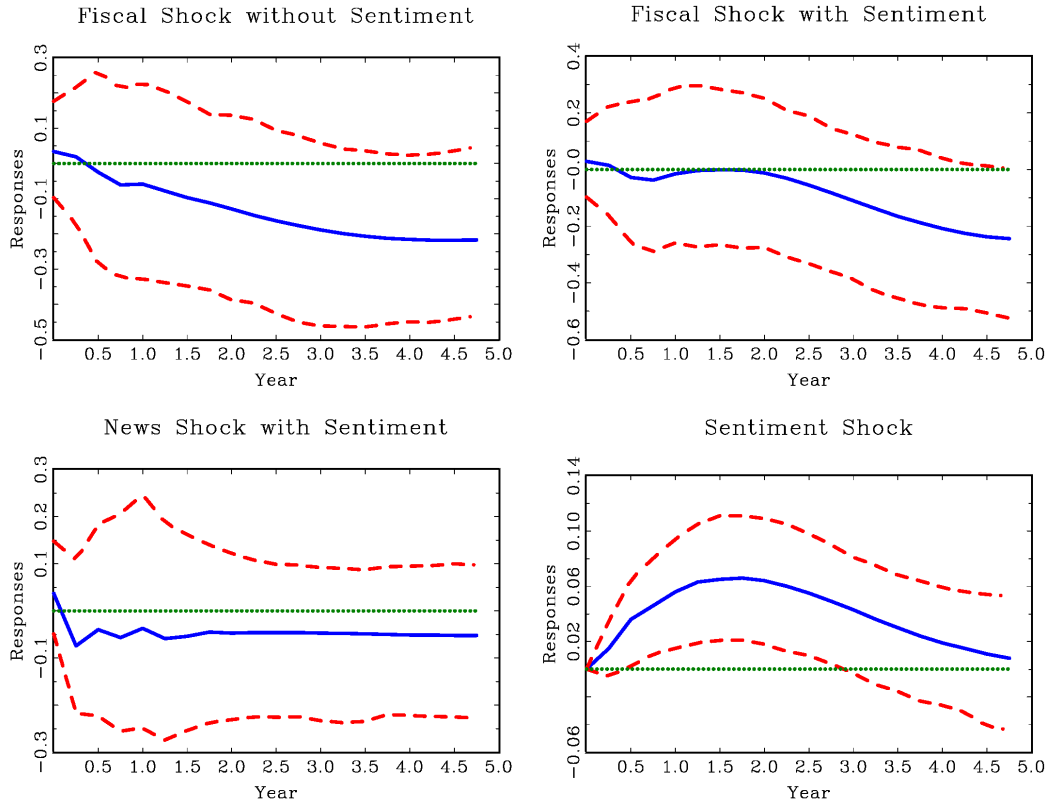
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Figure 1. Raw Data of Government Spendings



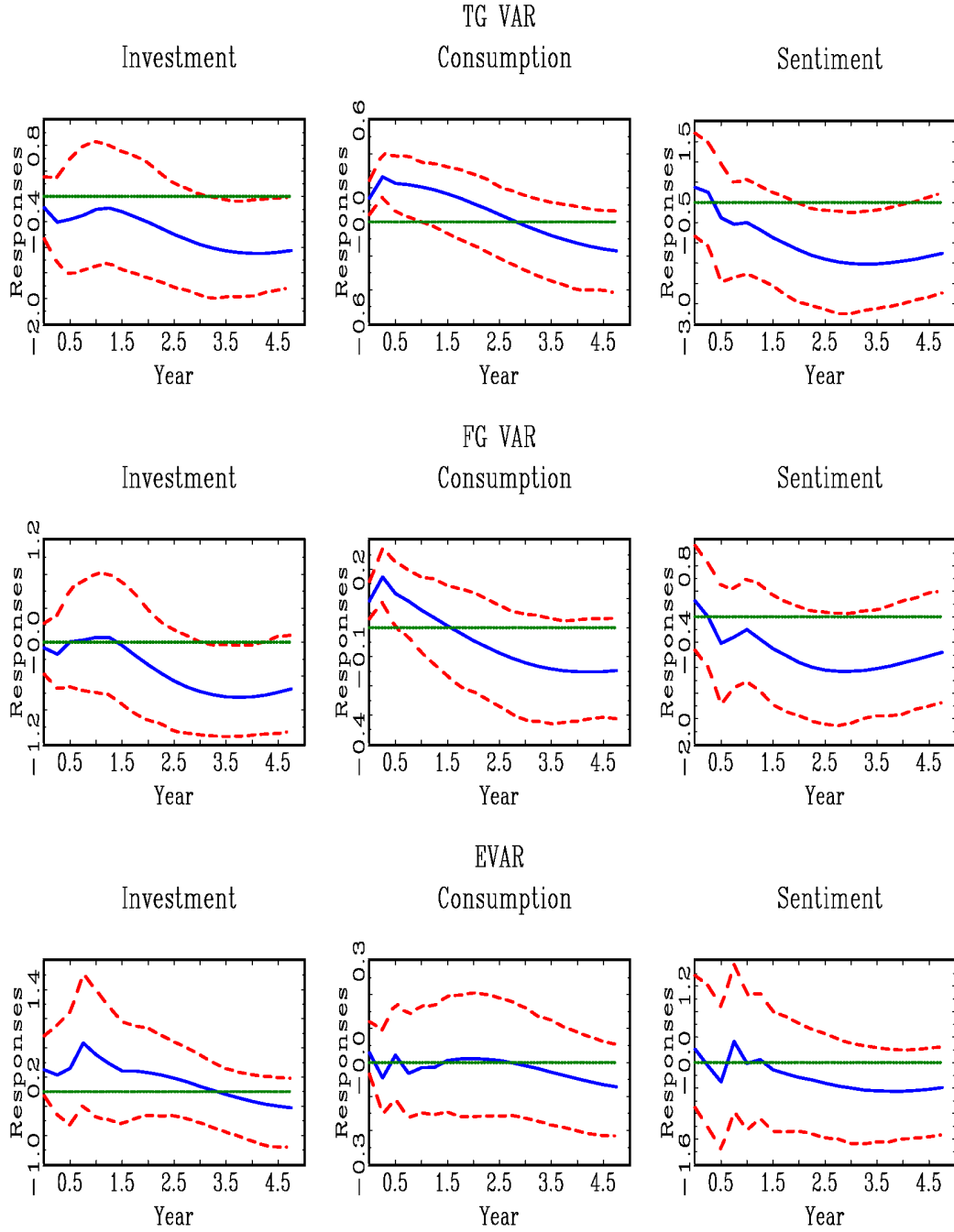
Note: TGOV, FGOV, and NEWS denote total government spending, federal government spending, and Ramey's (2011) news variables, expressed in natural logarithm. Residuals are obtained from VAR models shown in (2).

**Figure 2. Private GDP Responses**



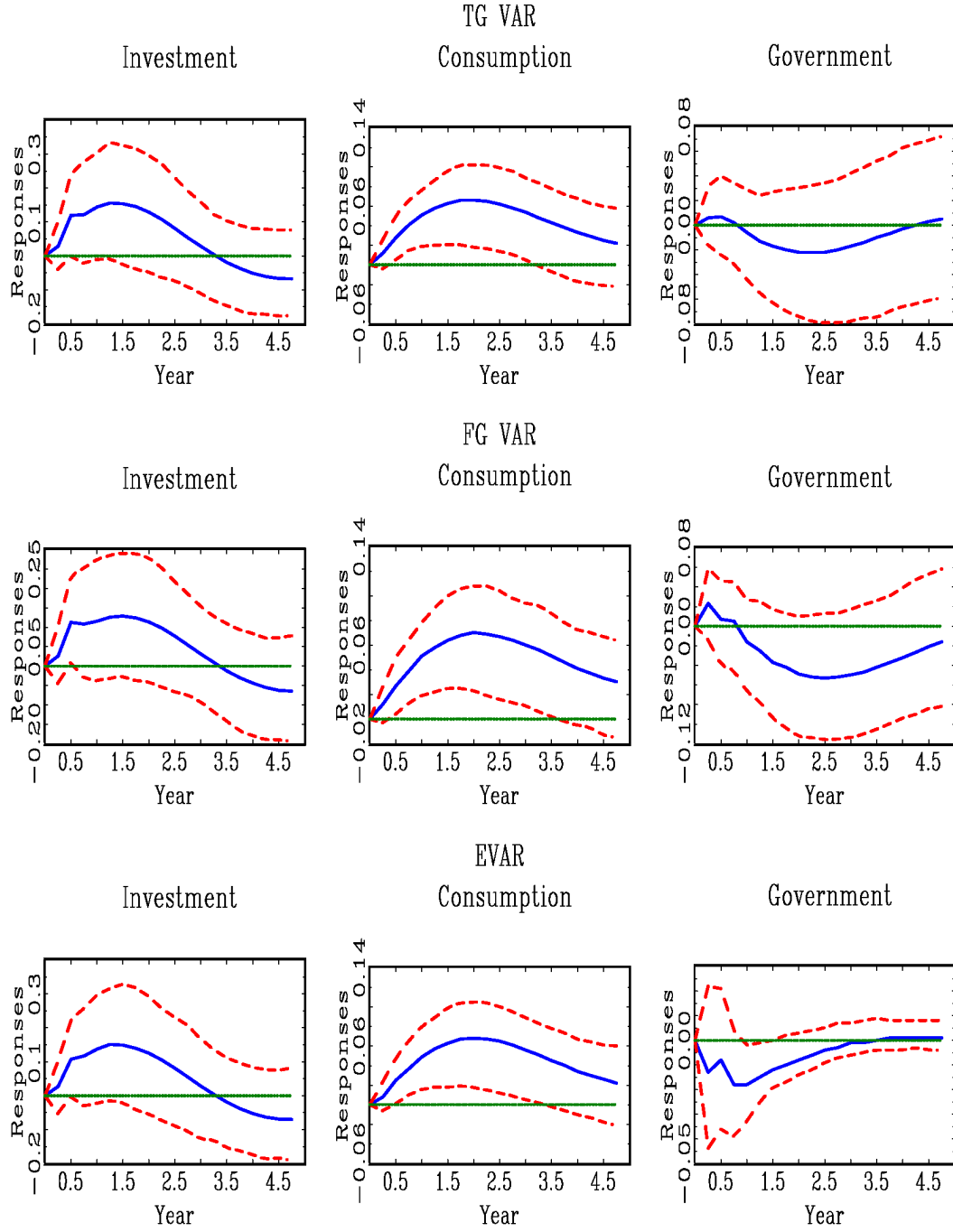
Note: Private GDP is obtained by subtracting the government spending from the total GDP. Responses of private GDP are obtained from a VAR model with the government spending variable ordered first. Dashed lines are the 95% confidence band of the response function from 500 nonparametric bootstrap simulations.

Figure 3. Responses to the Fiscal Shock



Note: Dashed lines are the 95% confidence band of the response function from 500 nonparametric bootstrap simulations.

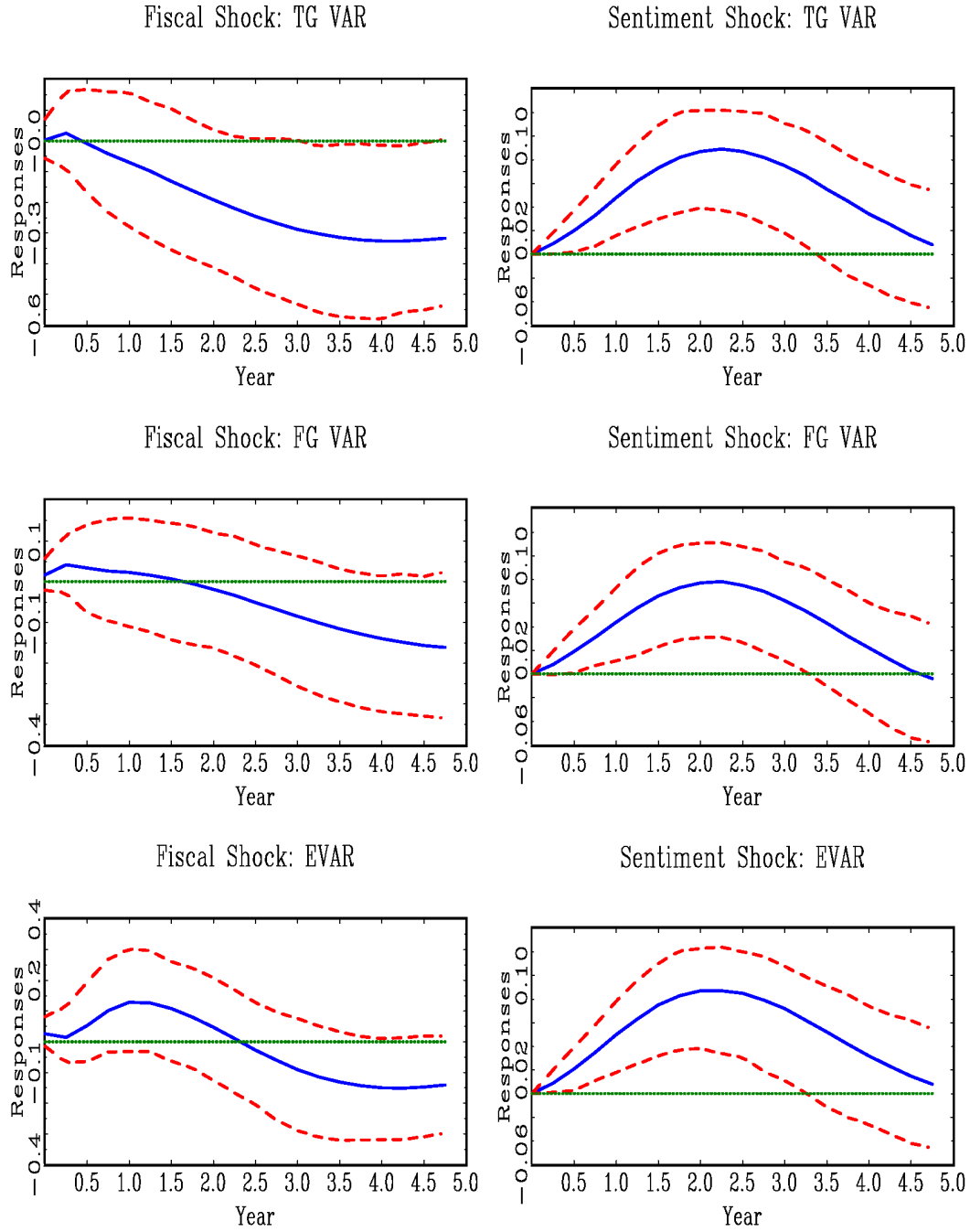
Figure 4. Responses to the Sentiment Shock



Note: Dashed lines are the 95% confidence band of the response function from 500 nonparametric bootstrap simulations.

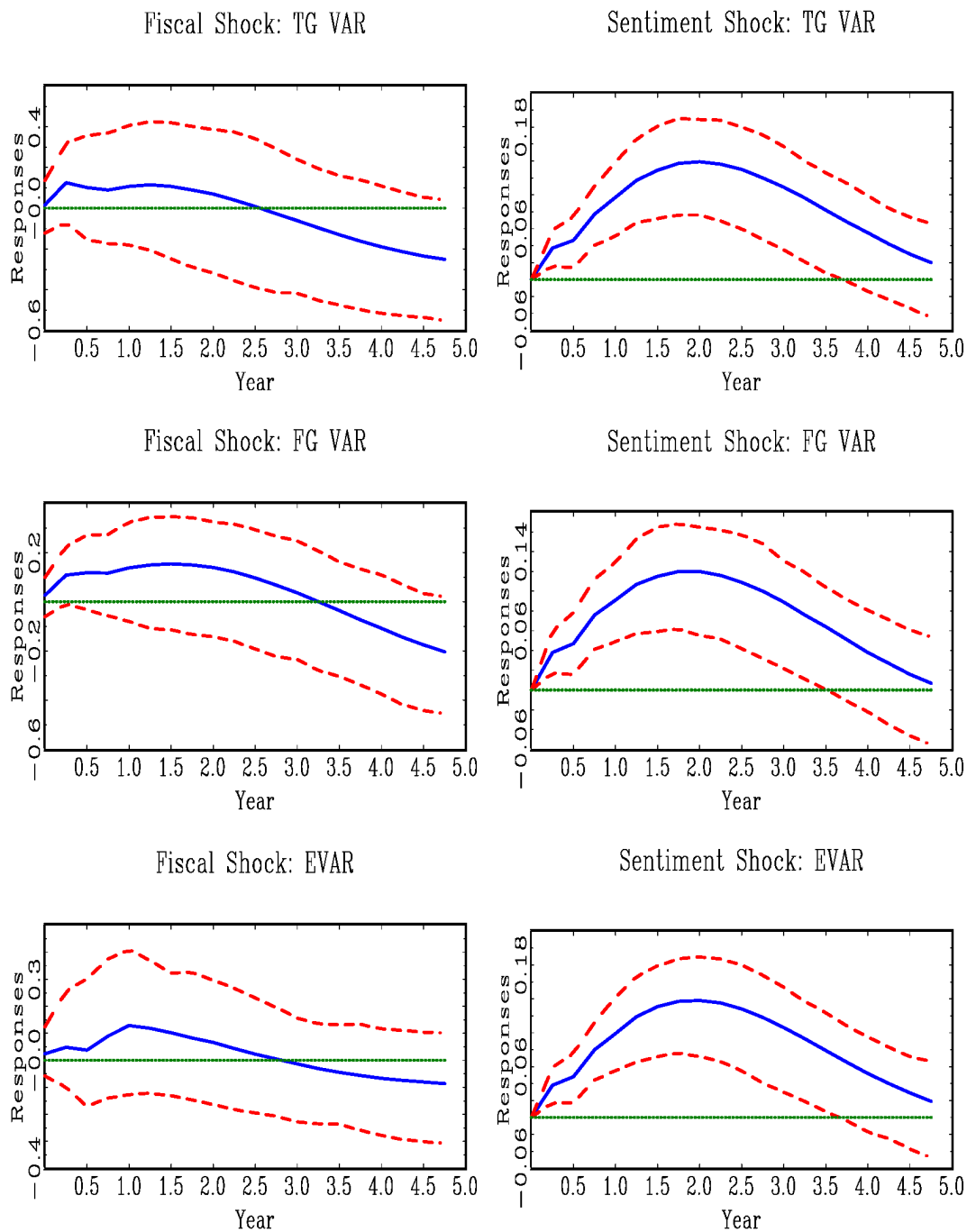


Figure 5. Effects on Private Job



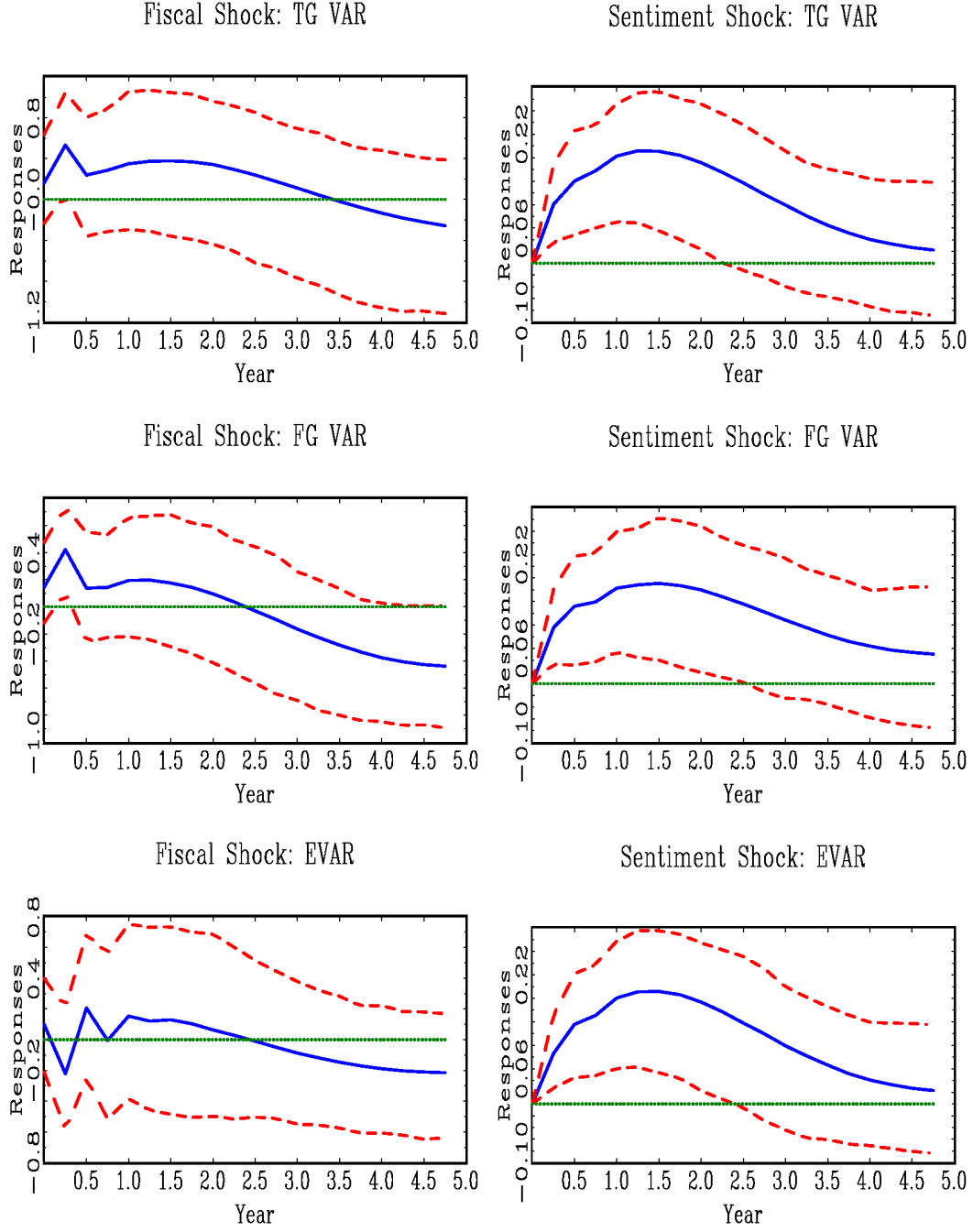
Note: Dashed lines are the 95% confidence band of the response function from 500 nonparametric bootstrap simulations.

**Figure 6. Effects on Private Wages**



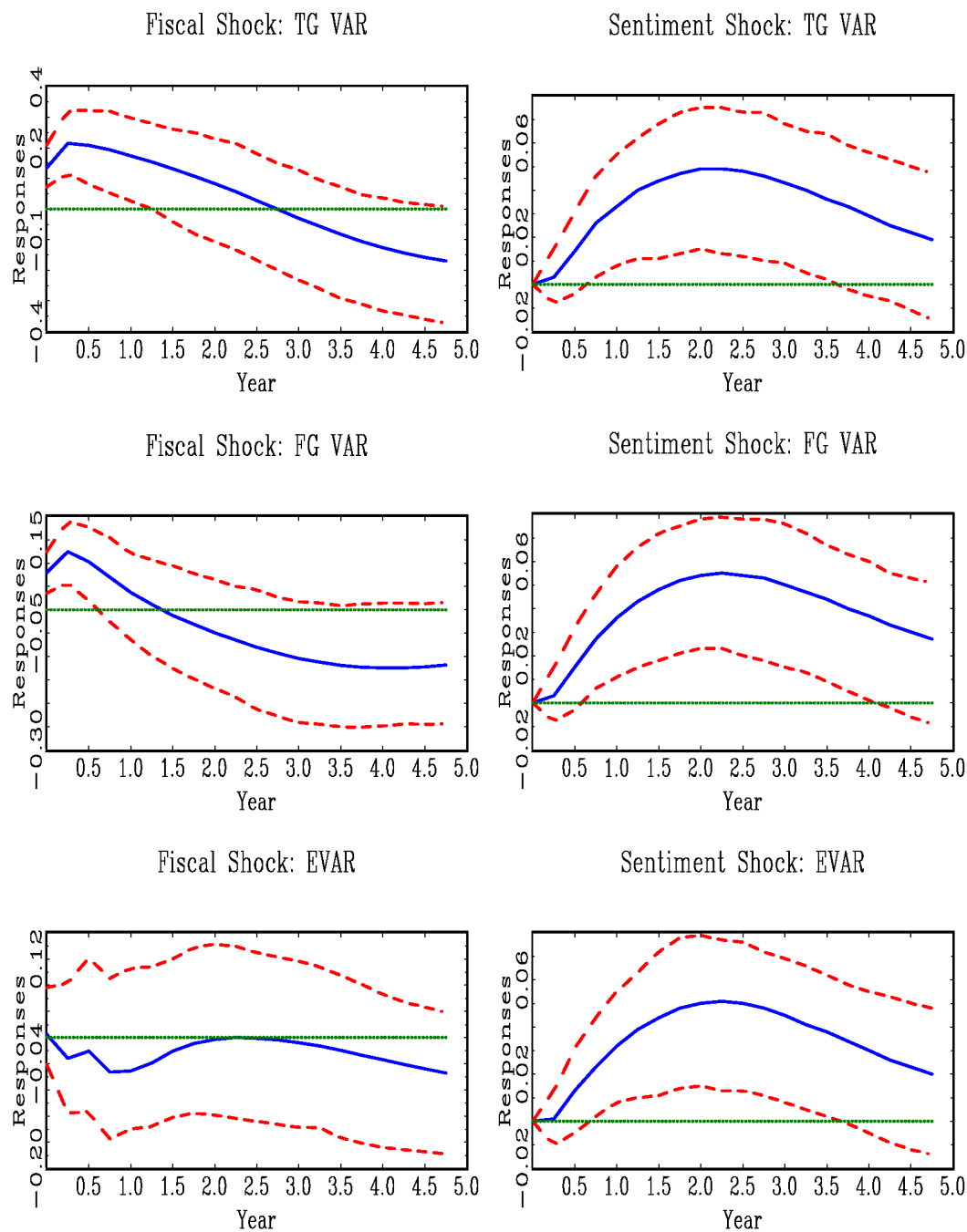
Note: Dashed lines are the 95% confidence band of the response function from 500 nonparametric bootstrap simulations.

**Figure 7. Responses of Durable Goods Consumption**



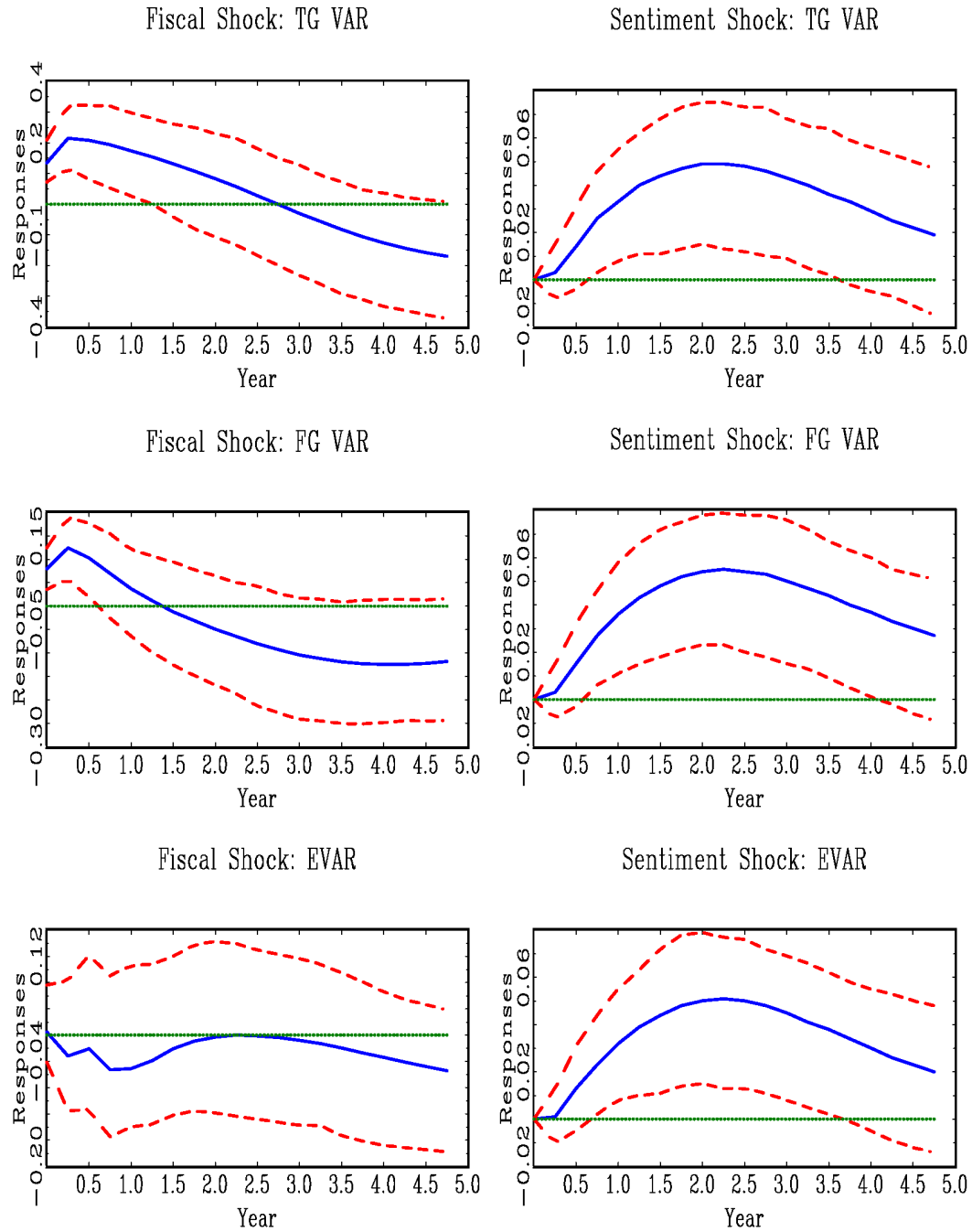
Note: Dashed lines are the 95% confidence band of the response function from 500 nonparametric bootstrap simulations.

**Figure 8. Responses of Nondurables Good and Services Consumption**



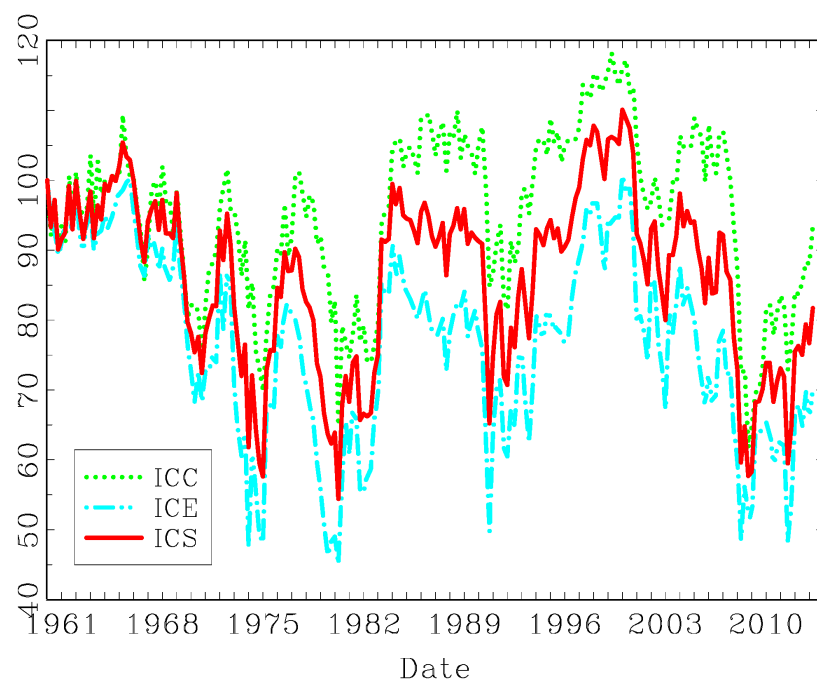
Note: Dashed lines are the 95% confidence band of the response function from 500 nonparametric bootstrap simulations.

**Figure 9. Effects of Deficit Shock and Sentiment shock on Private Activity**



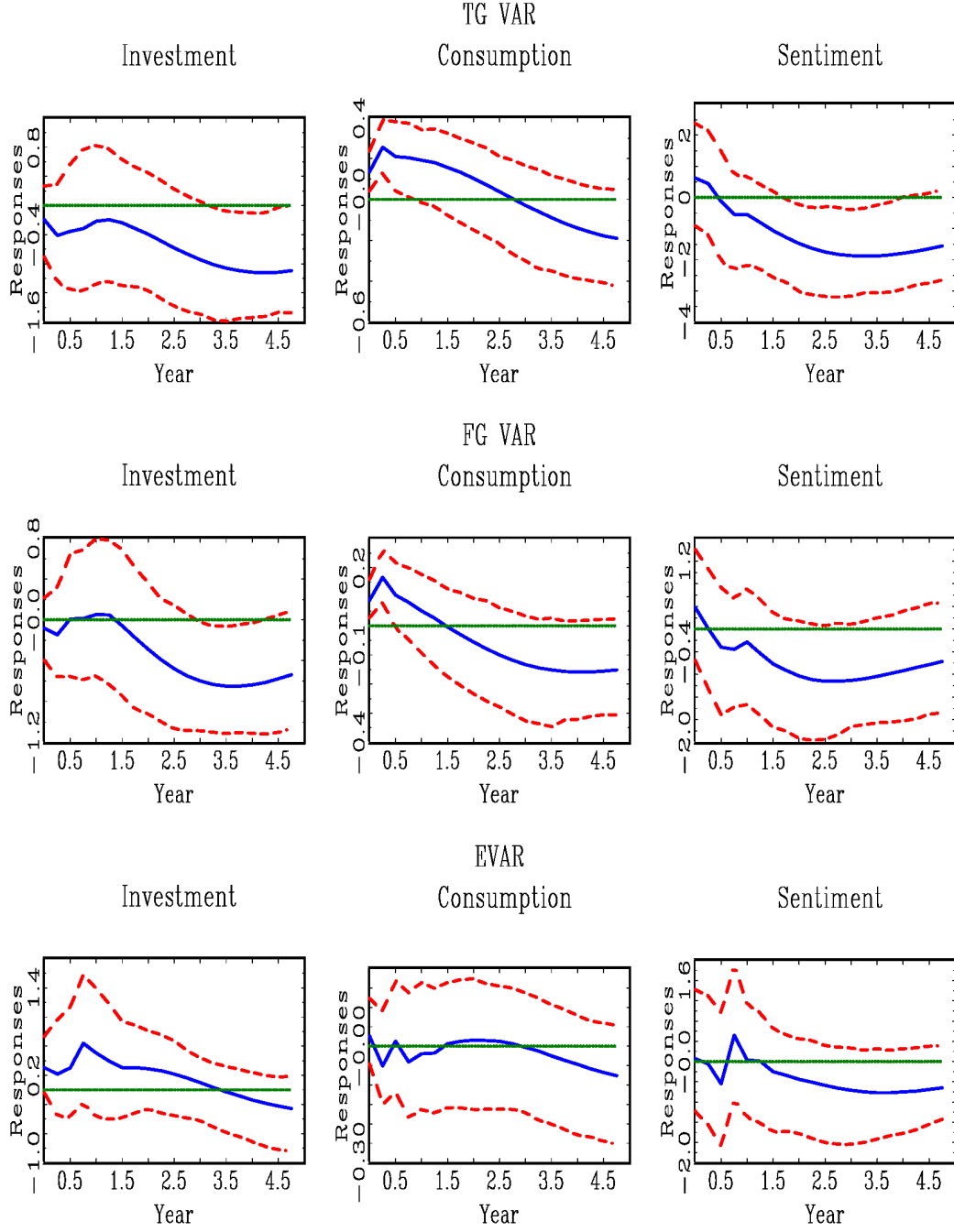
Notes: Dashed lines are the 95% confidence band of the response function from 500 nonparametric bootstrap simulations.

**Figure 10. Consumer Sentiment Index (ICS) and Sub-Indices (ICC and ICE)**



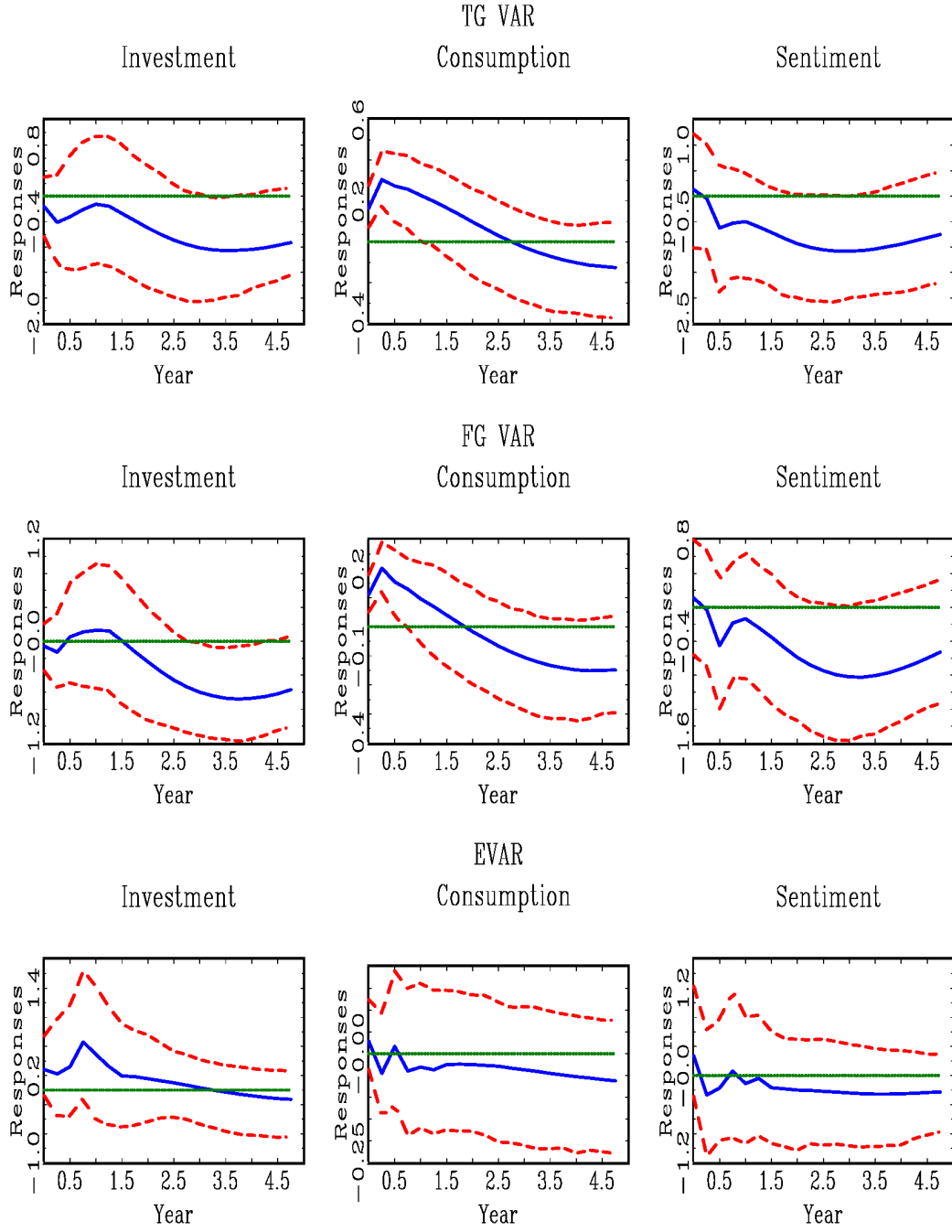
Notes: ICC and ICE denote the index of current economic conditions and the index of consumer expectations, respectively. All indices are normalized to be 100 in 1960Q1.

Figure 11. Responses to the Fiscal Shock with ICE



Notes: ICE denotes the index of consumer expectations.

**Figure 12. Responses to the Fiscal Shock with ICC**



Notes: ICC denotes the index of current economic conditions.



**Table 1. Data Descriptions**

Data ID	Description
GDP	Gross Domestic Product
PCE	Personal Consumption Expenditures
PCEDG	Personal Consumption Expenditures: Durable Goods
PCEND	Personal Consumption Expenditures: Nondurable Goods
PCES	Personal Consumption Expenditures: Services
GPDI	Gross Private Domestic Investment
W068RCQ027SBEA	Government total expenditures
W019RCQ027SBEA	Federal government total expenditures
GDPDEF	Gross Domestic Product: Implicit Price Deflator, Index 2009=100
W006RC1Q027SBEA	Federal government current tax receipts
POP	Total Population: All Ages including Armed Forces Overseas
TB3MS	3-Month Treasury Bill: Secondary Market Rate
M2	M2 Money Stock
USPRIV	All Employees: Total Private Industries
A132RC1Q027SBEA	Compensation of employees: Wages and salaries, Private industries
UMCSENT	Consumer Sentiment: Survey of University of Michigan

Note: We obtained most data from the Fred. UMCSENT is from the Surveys of Consumers website at the University of Michigan. "News" variable is from Valerie Ramey's website.

# Not-for-Publication Appendix

Figure A1. Private GDP VAR

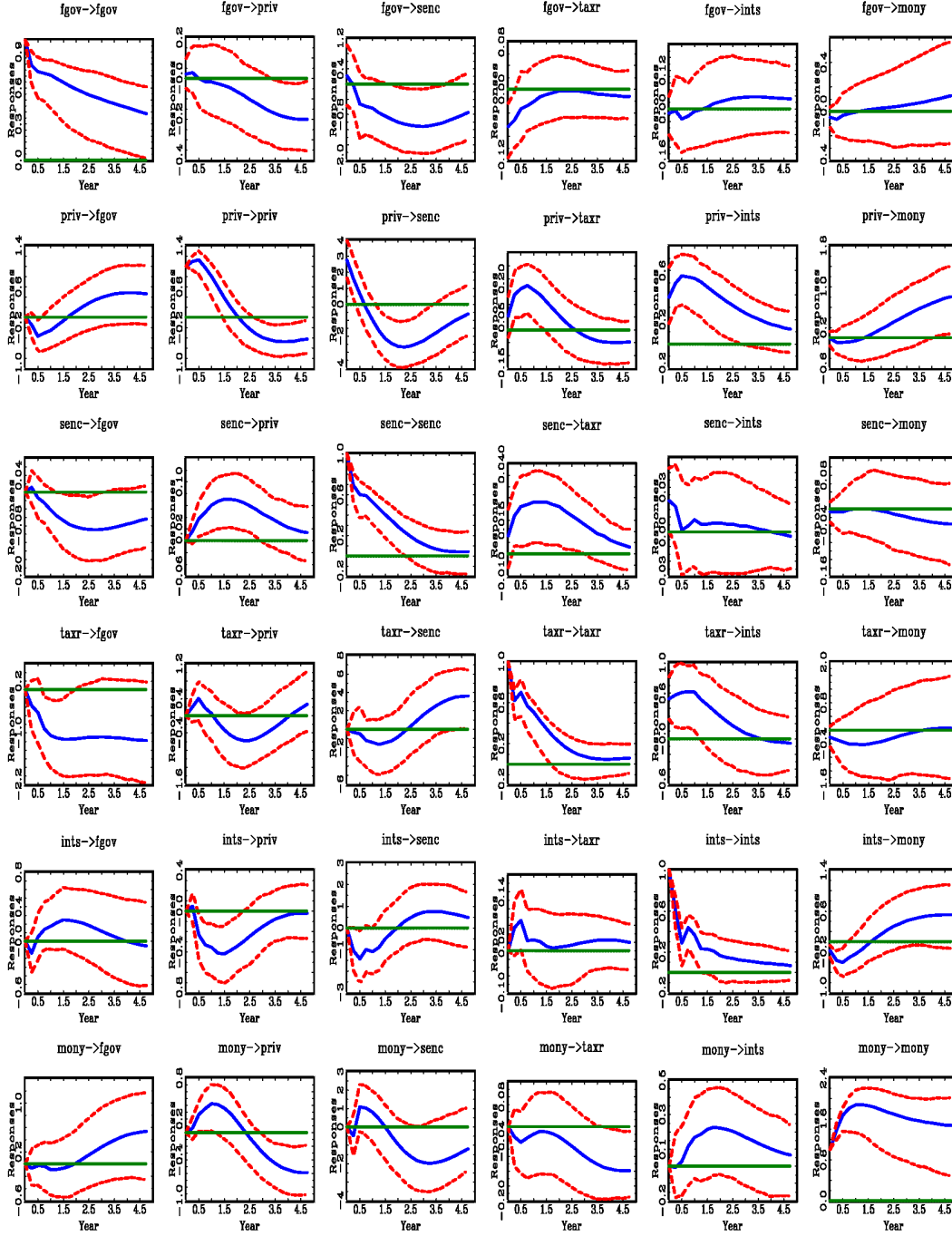


Figure A2. TG VAR

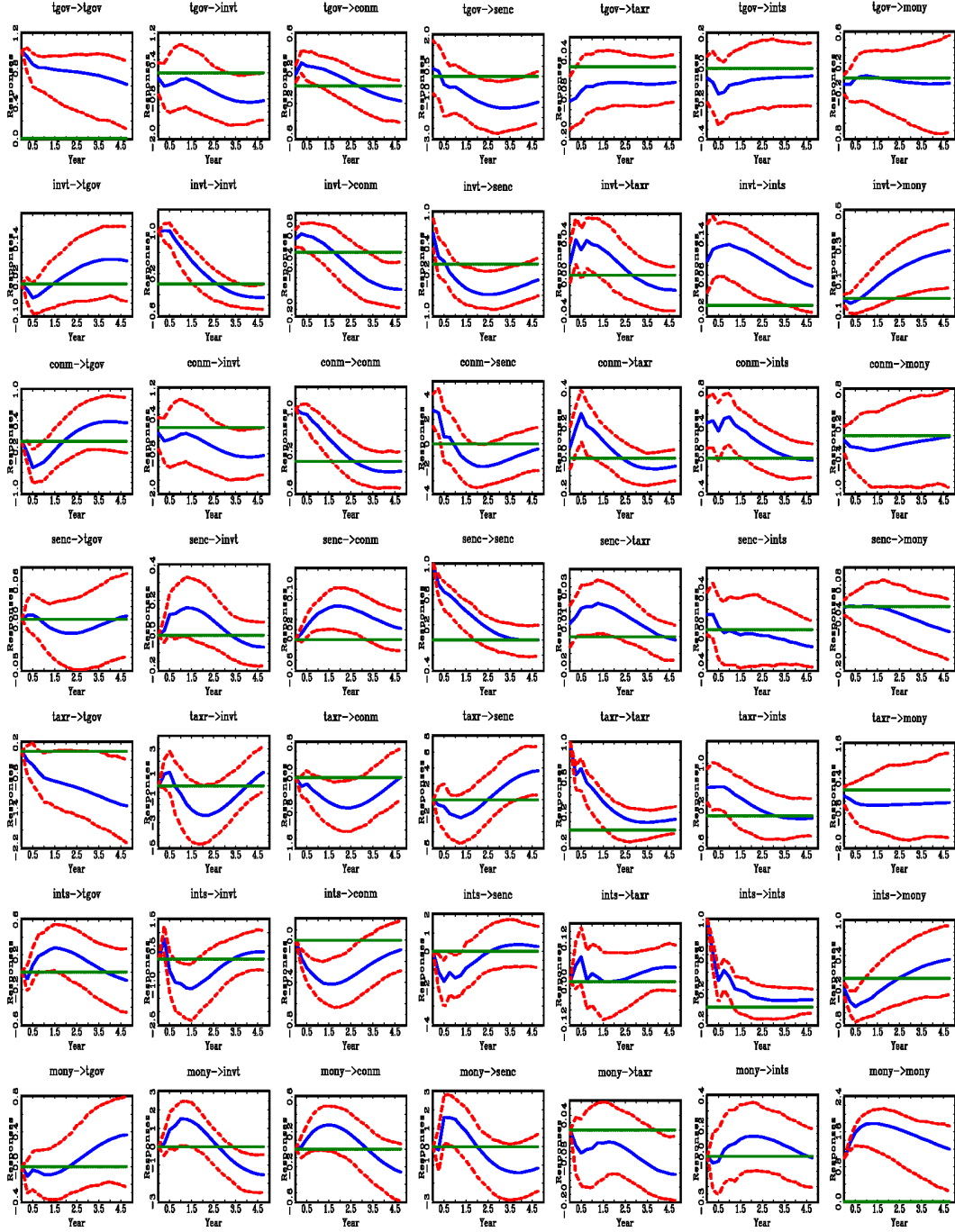


Figure A3. FG VAR

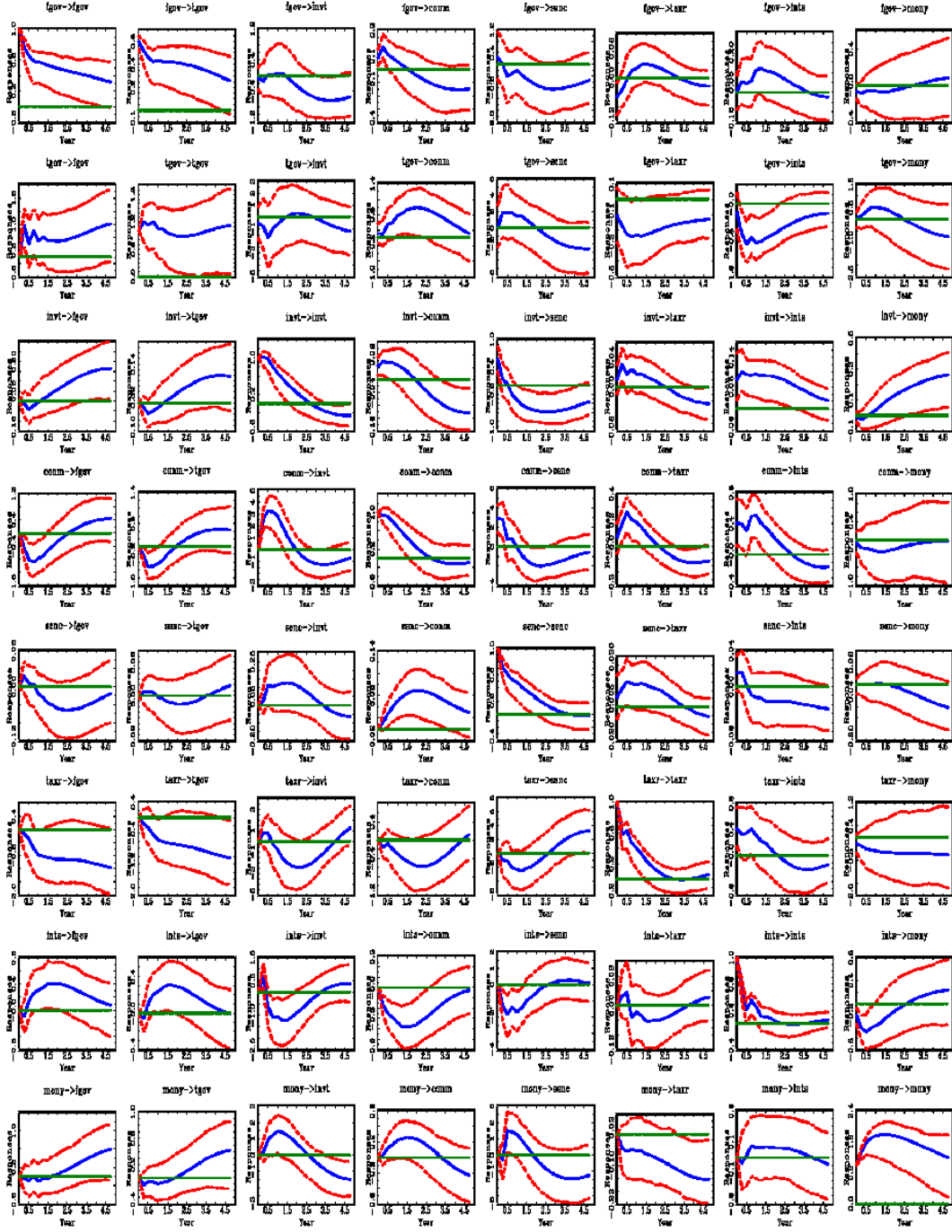


Figure A4. EVAR

