JSPS Grants-in-Aid for Scientific Research (S)

Understanding Persistent Deflation in Japan

Working Paper Series

No. 095

March 2017

Extracting fiscal policy expectations from a cross section of daily stock returns

Etsuro Shioji

UTokyo Price Project
702 Faculty of Economics, The University of Tokyo,
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan
Tel: +81-3-5841-5595
E-mail: watlab@e.u-tokyo.ac.jp
http://www.price.e.u-tokyo.ac.jp/english/

Version 2.3

March 31, 2017

Extracting fiscal policy expectations from a cross section of daily stock returns

Etsuro Shioji (Hitotsubashi University)[1,2]

[1]Department of Economics, Hitotsubashi University, 2-1 Naka, Kunitachi, Tokyo, 186-8601, Japan. E-mail: shioji(at) econ.hit-u.ac.jp. Key words: fiscal foresight, public investment, stock returns, factor analysis, target rotation. JEL codes: E62, H54, E44.

[2] This is a part of an ongoing research project with Hiroshi Morita (Hosei University). Research for this paper has been funded by the Grant-in-aid for scientific research (S) 24223003 and Nomura Foundation. I would like to thank participants at the Time Series Workshop on Macro and Financial Economics (May 21, 2016, at Sungkyunkwan University), the Hitotsubashi Summer Institute (August 5, 2016), and CFE2016 (December 11, 2016, at the Universidad de Sevilla) for their helpful suggestions. Previous versions of this paper have been circulated under the title "Extracting fiscal policy expectations from daily stock returns".

Abstract

The "Fiscal foresight problem" poses a challenge to researchers who wish to estimate macroeconomic impacts of fiscal policies. That is, as much of the policies are pre-announced, the traditional identification strategy which relies on the timing and the amount of actual spending changes could be misleading. In Shioji and Morita (2015), we addressed this problem by constructing a daily indicator of surprises about future public investment spending changes for Japan. Our approach combined a detailed analysis of newspaper articles with information from the stock market. The latter was represented by a weighted average of stock returns across companies from the sector deeply involved with public work, namely the construction industry. A potential shortcoming with this approach is that any shock that has an industry-wide consequence, which *happened* to arrive on the same day that a news about policy arrived will be reflected in this average return.

In contrast, in this paper, we propose a new indicator which takes advantage of heterogeneity across firms within the same industry. Degrees of dependence on public procurement differ markedly between construction companies. For some firms, over 80% of their work is government-related. Others essentially do all their work for the private sector. Yet they share many other features, such as large land ownership and a heavy reliance on bank finance. By looking at differences in the reactions of stock returns between those firms, we should be able to come up with a more purified measure of changes in the private agents' expectations about policies. Based on this idea, we propose two new indicators. One is simply the difference in the average excess returns between two groups of firms characterized by different degrees of dependence on public investment. The other one is more elaborate and is based on the "Target Rotation" approach in the factor analysis.

1. Introduction

This paper is a sequel to Shioji and Morita (2015). In that paper, we tried to overcome a common difficulty faced by many researchers who try to estimate macroeconomic effects of fiscal policies, known as the "fiscal foresight" problem. The recognition of the presence and importance of this issue has arguably been one of the most noteworthy developments in the field of empirical studies on fiscal policy in recent years. As Ramey (2011) argues, government spending increases, especially major ones, are typically announced long before the actual spending is made. Forward looking agents would start changing their behaviors based on those expectations as soon as the news comes in. In such a circumstance, if an empirical macroeconomist uses only the conventional indicator of policy, namely the actual amount of spending, she/he is unlikely to be able to capture the entire impact of the policy correctly. This is the reason why we need to know *when* the news about policy changes was perceived by the private sector as well as *how large* the surprise was.

Our research agenda stands at the crossroads between the following two strands of the empirical literature that have tried to overcome the fiscal foresight problem. On the one hand, Fisher and Peters (2010) propose to use information from the stock market to extract the public's expectations about future fiscal policy. Specifically, they identify innovations in excess stock returns of large military contractors in the US as anticipated fiscal policy shocks. As Morita (2014) argues, a potential drawback of this approach is that those excess returns might be influenced by factors other than expectations about future military spending[3]. To overcome this shortcoming, he proposes a new VAR approach based on sign restrictions. That is, only those parts of excess returns that are associated with subsequent increases in actual government spending are identified as anticipated fiscal policy shocks. He utilizes this approach, which produces a series of "purified" anticipated fiscal policy shocks, to study the Japanese data: he uses the average stock returns of the construction industry to measure perceptions about future policies related to public investment.

On the other hand, the "narrative" approach to fiscal policy identifies periods in which major increases in fiscal expenditure were anticipated. Ramey and Shapiro (1997)

[3]Suppose, for example, that stock returns of those contractors are uncorrelated with market returns, i.e., their beta's are zero. Then, by subtracting the overall market returns, the resulting excess returns would be perfectly negatively correlated with the market portfolio.

identify “military build-up dates”, namely three quarters in which large increases in military spending were first expected. Ramey (2011) extends this approach. An interesting recent development along this line of research is represented by Fukuda and Kei (2002), Fukuda (2002) and Fukuda and Yamada (2011). They construct a *daily* series of fiscal news dates for Japan. Based on extensive reading of newspaper articles, around the times when the government enacted major “emergency” fiscal stimulus packages, they determine the dates on which policy makers first announced their intentions, as well as the dates when the amount of spending was adjusted. Using the methodology of event analyses, they study how each of the identified policy surprises has affected both the stock price and the exchange rate in Japan. A drawback is that it is difficult to know the economic significance of each piece of news, i.e., the magnitude of a surprise that each announcement created. Miyazaki (2010) incorporates their fiscal news date dummies (aggregated up to the quarterly frequency) into his VAR model to evaluate effects of a fiscal expansion in Japan.

Our research project seeks to overcome potential shortcomings of the existing approaches by combining the above two approaches. The basic idea is that, on a day when there truly was an important piece of news about an upcoming fiscal stimulus, stocks of those firms that are more dependent on such a measure should react more strongly. Our approach thus consists of the following two parts. In the first part, we identify candidate dates on which important fiscal news might have arrived. In this regard, our approach can be viewed as an extension of that of Fukuda and Kei (2002), Fukuda (2002) and Fukuda and Yamada (2011), though we incorporate much wider varieties of fiscal events compared to theirs. In the second part, we identify firms that are heavily dependent on governmental investment expenditure, and estimate excess returns on their stocks. Here, we follow Morita (2014) and use information on construction firms. As he argues, in Japan, the most important fiscal policy tool for stimulating the economy has almost always been public investment. We expect that an expectation of a future spending increase on public works would be reflected in the share prices of those companies that undertake construction works. We then combine information obtained from the two parts by studying how those excess stock returns behaved on the dates identified as the news dates. An advantage of using daily data is that, as we are focusing on a relatively short interval of time, it is less likely that there were other important developments in the industry in the same period. We can thus expect our measure to be less contaminated by those other factors.

The news indicator proposed in our previous study (Shioji and Morita (2015)) was essentially a weighted average of excess stock returns across companies in the construction industry on the days that important news about future spending arrived. While this approach allowed us to incorporate rich information into the analysis, a potential problem is that, even with the use of daily data, we still face the possibility that the indicator might reflect other types of important news about the industry which *happened* to arrive on the same day which the news about policies appear. For example, during a financial crisis, news about a major bank failure might coincide with news about an introduction of a surprising new stimulus package from the government (which often means, in Japan, building more bridges and roads). As construction firms tend to be dependent on bank lending, both pieces of news could affect their stocks disproportionately. In order to minimize this kind of potential risk, in this paper, I consider a new indicator which takes advantage of heterogeneity across firms within the same industry. Degrees of dependence on public procurement differ markedly between construction companies. For some firms, over 80% of their work is government-related. Others essentially do all their work for the private sector. Yet they share many other features, such as large land ownership and a heavy reliance on bank finance. By looking at differences in the reactions of stock returns between those firms, we should be able to come up with a more purified measure of changes in the private agents' expectations about policies.

Based on this idea, in this paper, I construct two new indicators. The first one, called "News-1" in the paper, is derived by simply taking the difference in the average excess returns between two groups of firms characterized by different degrees of dependence on public investment. The other one is more elaborate and is based on the "Target Rotation" approach in the factor analysis. I incorporate each one of them to VAR models to see if they help predict future changes in public investment. I also study macroeconomic impacts of an anticipated public investment shock, reflected in an innovation in the news indicator.

The rest of the paper is organized as follows. Section 2 explains the three basic ingredients of this paper's approach, namely identification of fiscal news dates, estimation of each construction firm's excess returns, and gauging extent of dependence on public construction work for each one of them. Section 3 discusses construction of the "News-1" indicator. Section 4 discusses "News-2". Sections 5 and 6 study results from some VAR exercises that involve the fiscal news indicators. Section 7 concludes.

2. Construction of the dataset

2.1 Identification of fiscal news dates

As this part of the analysis is completely the same as in Shioji and Morita (2015), its explanation is relegated to Appendix A at the end of the paper.

2.2 Excess stock returns for construction firms

We have collected daily stock price data for construction firms listed on the Tokyo Stock Exchange (TSE). More specifically, our data set consists of 172 companies classified into the construction industry by the TSE, that were listed either in the First Section or the Second Section of the TSE, at some point in time between mid-1974 and early 2014[4].

Those stock prices are the day's closing prices. I drop observations below 20 yen per stock, as they tend to exert disproportionate influences on the overall results. Also, whenever there is a discontinuity in stock prices due, for example, to stock splits, the corresponding observations are treated as missing values. Stock returns are computed as the log differences in the stock prices from the previous business day (or the last day for which the price was recorded).

Excess returns are estimated as residual series from rolling "market beta" regressions, with each firm's stock returns on the left hand side and the market returns (the log difference in the TOPIX, the most popular value-weighted average stock price index in Japan) on the right hand side. The time window for each stage of estimation is 1,500. If the sample size of the regression falls below 500, due to too many missing observations, the corresponding excess returns are treated as missing. I computed excess returns for the period January 4, 1990 till February 5, 2014. The sample starts from 1990 because the construction of the news dates series starts from this year.

2.3 Public-Investment-Dependence by firm

Most firms in the construction industry, in their annual *Securities Report* (typically published in March, at the end of the Japanese fiscal year), the amounts of construction work completed, for the governmental sector and the private sector, respectively. I

[4]A few firms under the same company name have been listed twice under different TSE numerical codes.

compute the share of work done for the public sector in the total amount and regard this as an indicator of public-investment-dependence for each firm. I use the report from March 2000, which is close to the middle of the sample period, whenever it is available. Four firms had disappeared by 2000, and I used the reports from 1995 for them. And for four firms that appeared in the sample after 2000, I used their reports from 2005. Those firms that do not report those numbers are either home builders or plant builders, which work (almost) exclusively for the private sector and/or outside Japan. For those firms, I set their public-investment-dependence to zero.

Figure 1 visualizes the cross sectional distribution of this dependence as a bar graph. Along the horizontal axis, firms are placed in the order of this dependence. The extent of heterogeneity across firms is noteworthy. On the one hand, there are firms for which nearly 90% of their work comes from the government. On the other hand, there are many (typically home builders and plant builders) that do not even bother to report the amount of work they do for the government, as it is such a tiny fraction of their businesses.

2.4 A first look at the data

To get a sense of the nature of the data, Figure 2 shows how those firms' stocks reacted to the Great East Japan Earthquake, which occurred in the afternoon of Friday, March 11, 2011. Those are the sum of excess returns for Monday and Tuesday of the following week, namely March 14 and 15, ordered along the horizontal axis based on their dependence on public procurement (as shown in Figure 1). As scenes of massive destruction generated anticipation for a substantial increase in future public spending, many of those stocks exhibit strongly positive reactions to the news. With a very notable exception of one firm (company #156 in my sample), there is a tendency for a firm with a higher dependence on public investment to respond more strongly, as expected. At the right end of the figure, "high" refers to the average of the "High Group" which consists of firms ranked 1 to 86. And "low" is the average of the "Low Group", which includes firms ranked 87-172 according to their dependence on public investment. Also, note that the actual number of firms included in each of the groups is smaller than 86 at each point in time, due to missing observations. The average excess return is 0.23 for the High Group while it is 0.09 for the Low Group, confirming the above tendency.

The major exception to the general tendency, company #156 (called Nissei-Build), turns out to be a large producer of prefabricated houses. As investors foresaw an increase in

the demand for temporary housings, it is understandable that this firm's stock price rose sharply. Also note that, during the early phase of the recovery efforts, the company did end up doing a lot of work for the public sector.

3. Construction of "News-1"

3.1 Differences in Group Averages

Figure 3 plots evolution of the averages of excess returns for both the "High" and the "Low" Groups over time. Those are *cumulative* returns, starting from the beginning of the sample, namely January 4, 1990, as I find it easier to look at those cumulative ones than the original numbers, for the sake of visual inspection. For the formal statistical analysis, I use non-cumulative returns data. Again, the former group refers to the top half of the companies ranked according to their dependence on public investment, and the latter corresponds to the bottom half. The two series share a common tendency, broadly speaking. This observation suggests that there indeed is an industry specific factor which influences the construction firms' stocks in a similar manner across the two groups. It also suggests that, by examining differences in their behaviors, especially their reactions to policy related news, we could hope to extract useful information about the market's expectations about the future course of the policies which is not contaminated by the movement of the common industry factor.

In Figure 4, I plot historical evolution of the differences in cumulative excess returns between the two groups. Figure 5 plots differences in non-cumulative excess returns. We see, for example, a big jump in March 2011. This coincides with the immediate aftermath of the Great East Japan Earthquake, and the surge in this indicator reflects the fact that stocks of companies which are more heavily dependent on public work gained more during this period.

3.2 "News-1" Variable

By recording the values of the above indicator (not cumulative) on dates on which the news about fiscal policies arrived, I obtain the "News-1" variable. This variable measures how strongly stocks of firms that are more dependent on public contracts reacted, in comparison to those of firms that are less dependent, when news about future public investment policies arrived. Figure 6 plots this variable.

4. Construction of "News-2"

4.1 Data for Factor Analysis

A possible shortcoming of the pervious approach, which relies on taking differences across groups is that there is no guarantee that this is the best way to eliminate influences of the common industry factor. For example, suppose that the sensitivity to the common factor is higher for the High Group than for the Low Group. Then the difference between the two would be positively correlated with the common factor. To cope with this issue, in this section, I present an alternative. This second approach is more elaborate and makes use of the factor analysis to eliminate the effects of industry common factor and to extract a factor that is correlated with people's expectations about public investment.

A drawback with the factor analysis is that no missing values are allowed. As a result, the sample for this analysis is limited to 76 firms which had data both at the beginning and the end of the sample[5]. With so many variables, it is not easy to determine an appropriate number of relevant factors. After inspecting the "scree plot" in Figure 7, I have decided to limit the number of factors to 5.

4.2 Factor Analysis and Various Type of Factor Rotations

Another problem with the standard factor analysis, based on the eigenvalue decomposition, is that there is no guarantee that the factors estimated from data would allow an easy and intuitively appealing interpretation. On the other hand, factor decomposition is not unique. By "rotating" those factors, while maintaining orthogonality between them (some rotation methods even allow us to weaken the orthogonality assumption), we could come up with multiple representations of the same factor structure. I have tried several better-known rotation methods such as Vartimax Rotation and Quartimax Rotation, but they did yield results that would permit an easy explanation or an appealing labelling, either.

In the case of this study, the nature of a factor that I would like to obtain from the data is relatively clear: basically, I want a factor which is uncorrelated with the common industry factor, and is highly correlated with dependence on public investment. "Target Rotation" allows a researcher to specify a form of the factor loading matrix that is ideal

[5] Even for those firms, most of them had some missing values in the middle of the sample. In such instances, I simply set the value to be equal to zero,

for the purpose of the study. Then a factor rotation is conducted in such a way that the resulting factor loading matrix is as close as possible to the pre-specified one.

Table 1 presents the general idea behind the "target" factor loading matrix that I chose to specify. I first classify all the firms into five groups. Group 1 consists of large general contractors (such as Taisei). Group 2 is the mid-sized contractors (such as Tobishima). Group 3 is the group of home builders (such as Daiwa House). Group 4 is the electricity facility builders (such as Kandenko) and Group 5 is the plant builders (such as Nikki). I set up targets for 5 factors. Factor 1 is the common industry factor. As can be seen from Table 1, all the firms are given equal target (which is 1) for their factor loadings. Factor 2 is the large firm factor and the target is equal to 1 for all large firms and 0 for the rest. Factor 3 is the government dependence factor and is going to be the main focus of the subsequent analysis. The target factor loading is equal to 1 for any firm whose dependence on public investment is above 34% and 0 otherwise. Factor 4 is the factor for electricity facilities builders, and Factor 5 is for plant builders.

Figure 8 plots estimated factor loadings for the first three factors, for each firm. In the figure, the firms are ordered along the horizontal axis according to their dependence on public investment (i.e., the same way as in Figure 1). In panel A, we can see that the loadings for the Common Factor are more or less uniform. In panel B, the Large Firm Factor tends to have higher loading for larger firms. Panel C shows the tendency for the loadings for the Government Dependence Factor to be correlated with the actual dependence of each firm on public investment.

Figure 9 plots the cumulative Government Dependence Factor and Figure 10 is its non-cumulative counterpart.

4.3. "News-2" Variable

By recording the values of the above indicator (not cumulative) on dates on which the news about fiscal policies arrived, I obtain the "News-2" variable. Figure 11 plots this variable.

5. Do our fiscal variables predict future public investment?

If our measures capture the market's expectations about future public investment, and if the private sector's expectation formation has at least some element of rationality, innovations in our measures should help predict future changes in government spending

related to public investment. In this section, we examine if this is indeed the case. For that purpose, we run simple VARs with one of our measures, aggregated up to the quarterly frequency (the results of such aggregation are shown in Figure 12 (A) and (B)), and data on the actual amount of public investment.

The first variable to be included is a leading indicator for public investment. The data source is the *Current Survey on Orders Received for Construction* by the Ministry of Land, Infrastructure, Transport and Tourism. There are two candidate variables to be used. The first is the total amount of "Value of contract" for the "Public Sector". Unfortunately, the series is rather noisy and seasonally adjusted data is not available. That is the reason I decided to use the second series for the "Big 50 constructors", for which a seasonally adjusted data is publicly available. As those series are related to the orders for construction work placed by the government, they are expected to move slightly before the actual investment spending is carried out. This variable will be denoted "BIG50". I also include both Nominal Public Investment and Public Investment Deflator from the National Accounts. The data is the seasonally adjusted series.

For all the VAR results reported below, I always take log first differences of this series prior to the estimation. All the impulse responses presented are cumulative ones. The number of lags is set at 4, and the constant term as well as three dummy variables that correspond to three major earthquakes (the Hanshin-Awaji, the Chuetsu, and the Great East Japan Earthquakes) are included. Our news variables are always placed on top of the Cholesky contemporaneous causal ordering.

Figure 13 shows the estimated impulse responses. Panel A is for News-1 and Panel B is for News-2. It can be seen that all the responses are positive. We can conclude from here that the news measures do serve as leading indicators for future fiscal expansions, and thus can be expected to reflect people's expectations about future policies.

6. Is anticipated public investment expansionary?

Finally in this section, we investigate whether anticipated changed in public investment spending, as captured by our news variables, cause changes in the private sector's economic activities. I focus on the quarterly data and estimate a series of VARs that adds a measure of private economic activities to the previous VAR, one at a time, at the end of the Cholesky ordering. The number of lags and the sample period are the same as

in the previous analysis. The list of the macro variables under consideration are: Nominal GDP, GDP Deflator, Real GDP and Real Private Consumption.

Figure 14 summarizes the results. Again, Panel (A) is for News-1 and (B) is for News-2. It can be seen that both of our news indicators have statistically significant positive impacts on all the variables, with the exception of consumption in (B). The results look generally better for News-1, at least as far as the statistical significance is concerned.

7. Conclusions

In this paper, we have constructed a new daily time series that represents the magnitude of adjustment in market expectations about future public investment, which occurs in reaction to news about future fiscal policy. This has been done by combining the narrative approach about fiscal policy which identifies dates on which major news about future fiscal policy emerged, and the approach based on information about the private sector's expectations that are reflected in the cross section of stock prices between firms that are more dependent on fiscal spending and those that are less dependent. Although we have applied the idea to the Japanese data, we believe a similar idea can be applied to other countries. In the VAR analysis, we have seen that our measure does predict future changes in public investment. Policy changes (or anticipations about them) have significant impacts on major macroeconomic variables such as GDP.

An important course for future research is to conduct empirical analyses of the effects of fiscal anticipation which allows us to exploit the high frequency nature of our fiscal news variable. We intend, for example, to study effects of our news variable on various financial variables.

References

Fisher, J.D.M., Peters, R., 2010. Using stock returns to identify government spending shocks. *Economic Journal* 120(544), 414-436.

Fukuda, S., 2002. Why has the budget deficit increased in Japan? Views from "news" during the 1990s (in Japanese). *Financial Review* 63, 83-106.

Fukuda, S., 2014. Abenomics: Why was it so successful in changing market expectations? Paper presented at the TCER Conference on Abenomics (March 7, 2014, in Tokyo).

Fukuda., S., and Kei, S., 2002. Impact of fiscal policy in Japan: event studies for the 1990s (in Japanese). *Kinyu Kenkyu* 21(3), 55-100.

Fukuda, S., Yamada, J., 2011. Stock price targeting and fiscal deficit in Japan: Why did the fiscal deficit increase during Japan's lost decades? *Journal of the Japanese and International Economies* 25(4), 447-464.

Miyazaki, T., 2010. The effects of fiscal policy in the 1990s in Japan: A VAR analysis with event studies. *Japan and the World Economy* 22(2), 80-87.

Morita, H., 2014. *Analysis on the macroeconomic effects of fiscal policy and business cycles in Japan*, Ph.D. Thesis (Hitotsubashi University)

Ramey, V.A., 2011. Identifying government spending shocks: It's all in the timing. *Quarterly Journal of Economics* 126(1), 1-50.

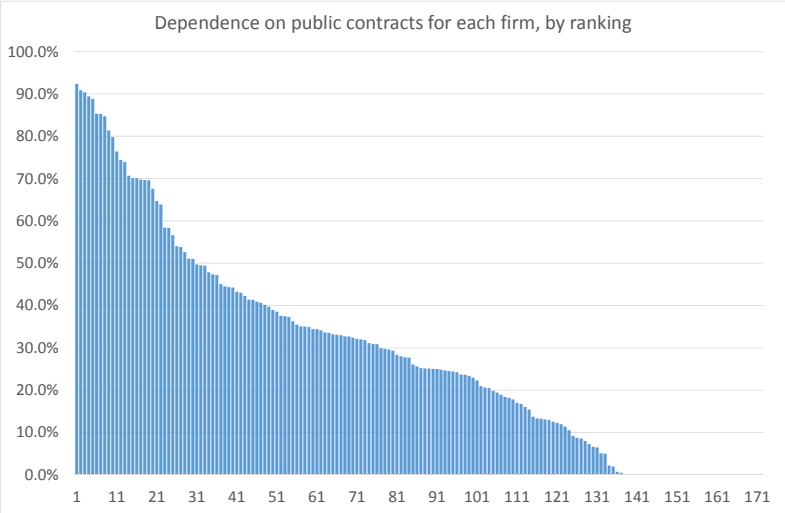
Ramey, V. A., Shapiro, M., 1997. Costly capital reallocation and the effects of government spending. *Carnegie Rochester Conference on Public Policy*.

Shioji, E., Morita, H., 2015. Construction of stock-market based daily index of fiscal news for Japan. Paper presented at the 30th Annual Congress of the European Economic Association, Mannheim, Germany.

Table 1: Setting up the target matrix for the Target Rotation: sketch of the general idea

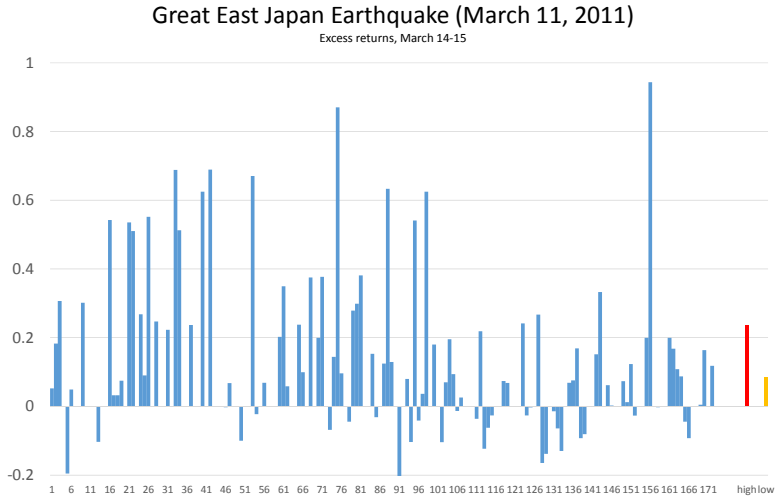
	(1) Industry-wide Factor	(2) Large Firm Factor	(3) G-Factor (Gov. Dependence)	(4) Electric Facilities Builders Factor	(5) Plant Builders Factor
Mid-sized Contractors	1	0	0/1	0	0
Big Four Contractors	1	1	0	0	0
Home Builders (all big)	1	1	0	0	0
Electric Facilities Builders	1	0	0/1	1	0
Plant Builders (some big)	1	0/1	0/1	0	1

Figure 1: Cross sectional distribution of public-investment-dependence across firms



Note: Percentage of completed contracts coming from the governmental sector. Based on each firm's Securities Report, March 2000 (if not available, I used either the version March 1995 or March 2005). If a firm does not report the share, I assigned zero to such a firm.

Figure 2: Excess returns in the aftermath of the Great East Japan Earthquake



Note: Sum of excess returns on the first two trading days after the earthquake, namely March 14 and 15, 2011. The earthquake itself was in the afternoon of Friday, March 11. "High" (or "Low") refers to the average of the high (or low) public-investment dependence group.

Figure 3: Cumulative excess returns, group averages, High vs Low

Note: Simple averages of cumulative excess returns by group. Missing values are simply excluded from the calculation of the averages.

Figure 4: Cumulative excess returns, differences between group averages, High - Low

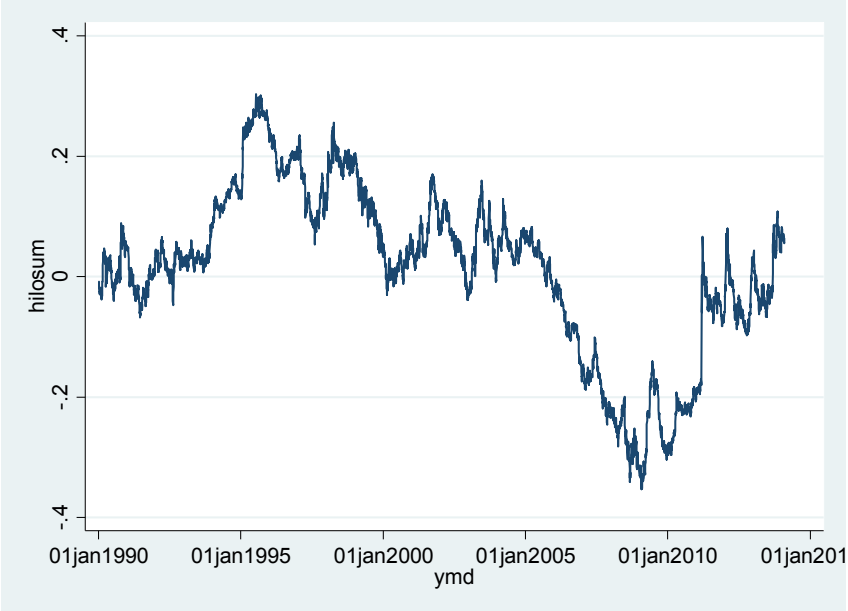


Figure 5: Excess returns (NOT cumulative), High – Low

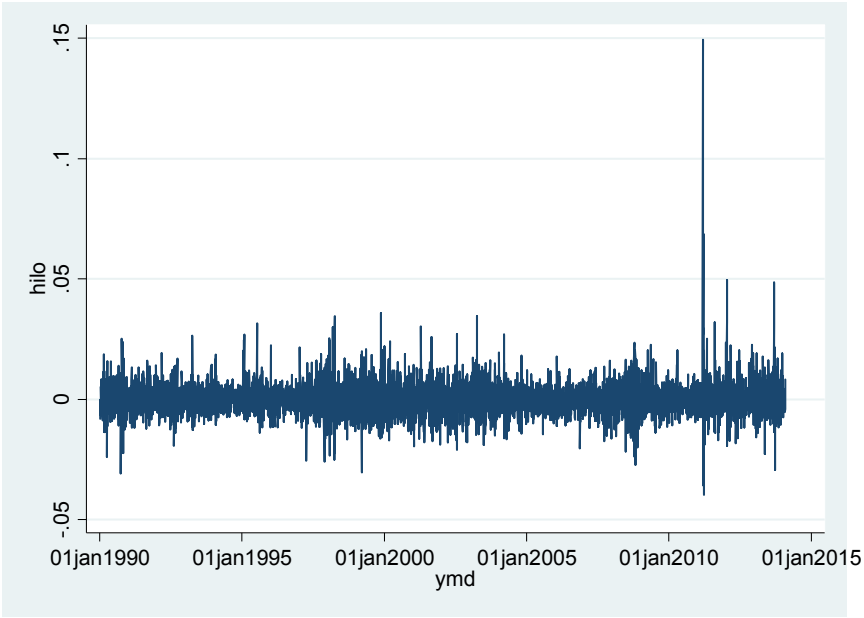


Figure 6: "News-1" variable

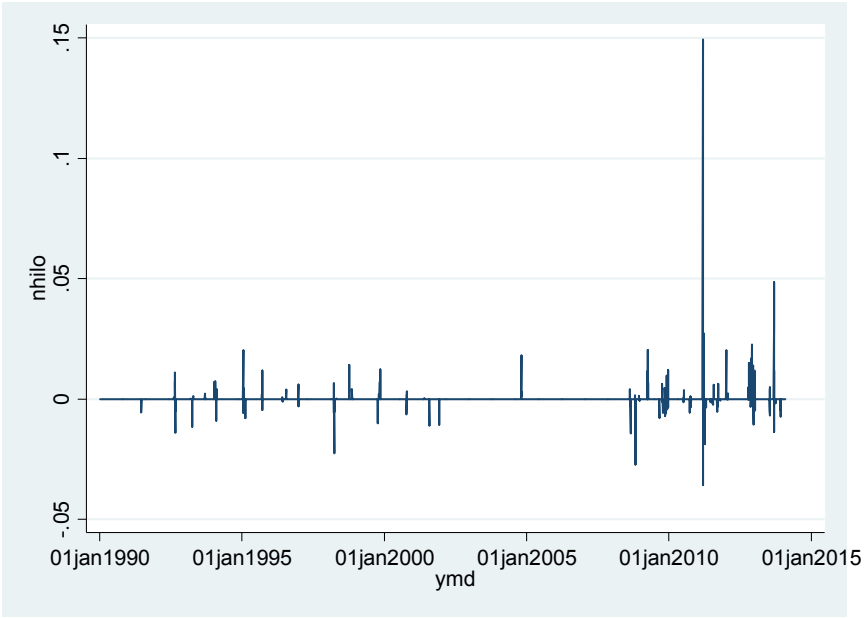


Figure 7: Choice of number of factors

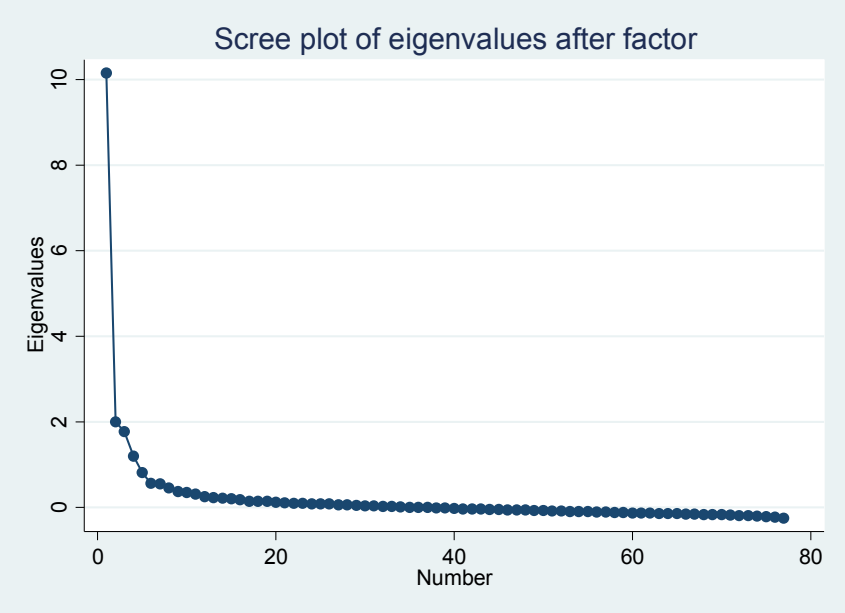
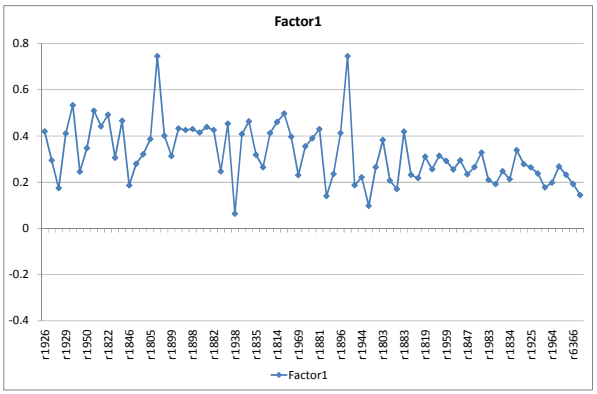
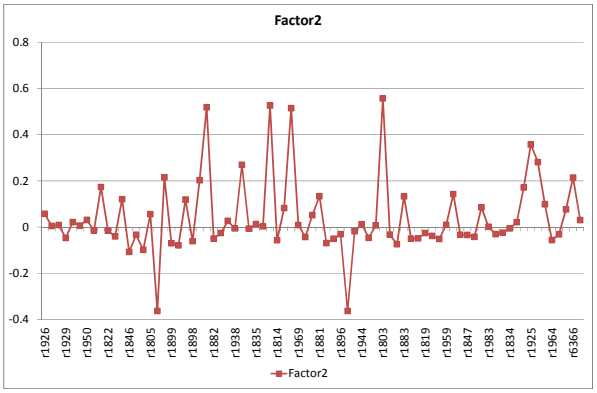


Figure 8 Factor Loadings for the first three factors
(firms are ordered in the same way as in Figure 1)

A: Common Factor



B: Large Firm Factor



C: Government Dependence Factor

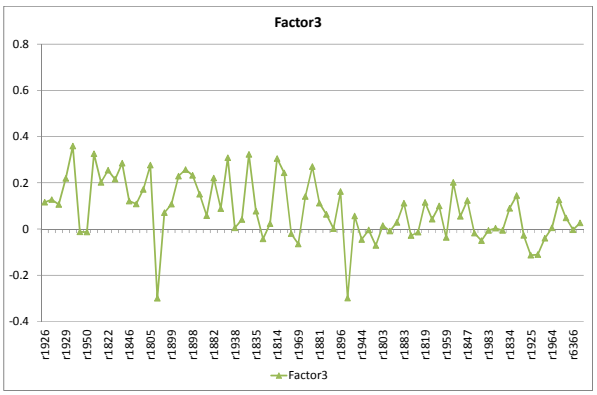


Figure 9 Government Dependence Factor, cumulative

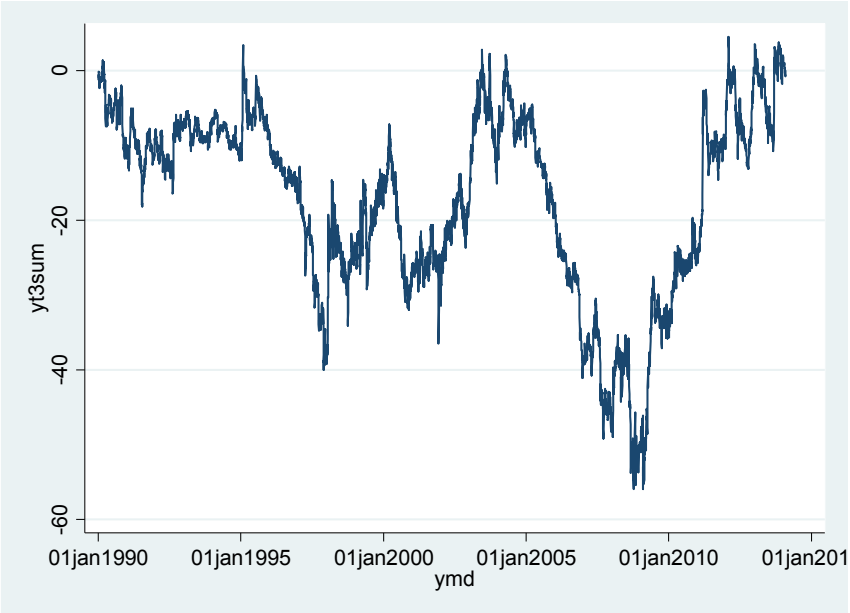


Figure 10 Government Dependence Factor, non-cumulative

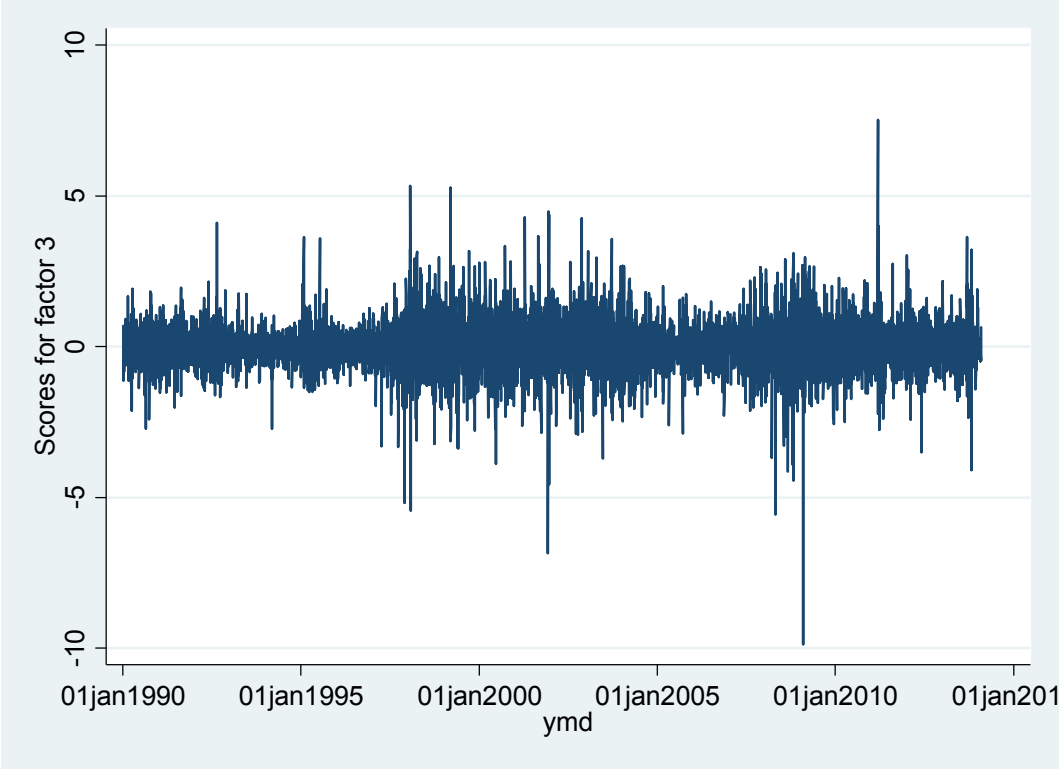


Figure 11 News-2

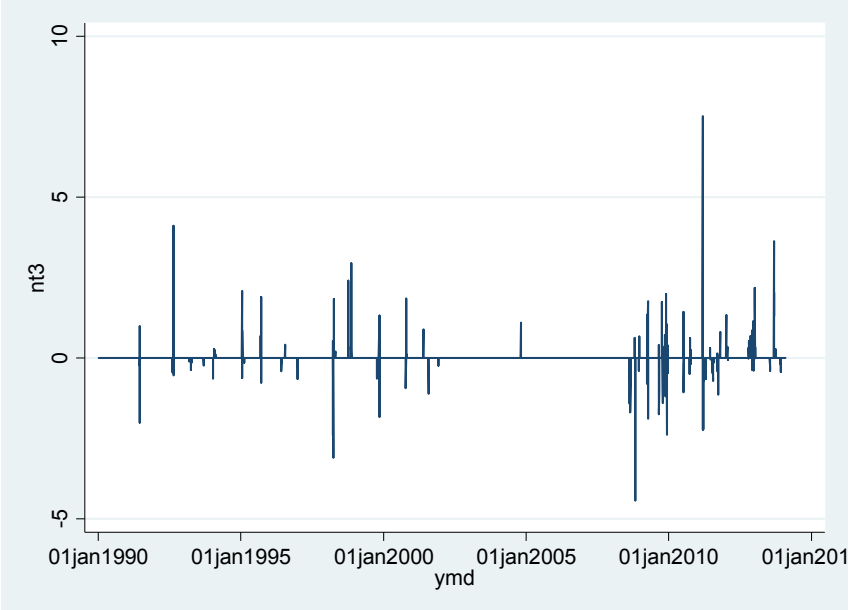
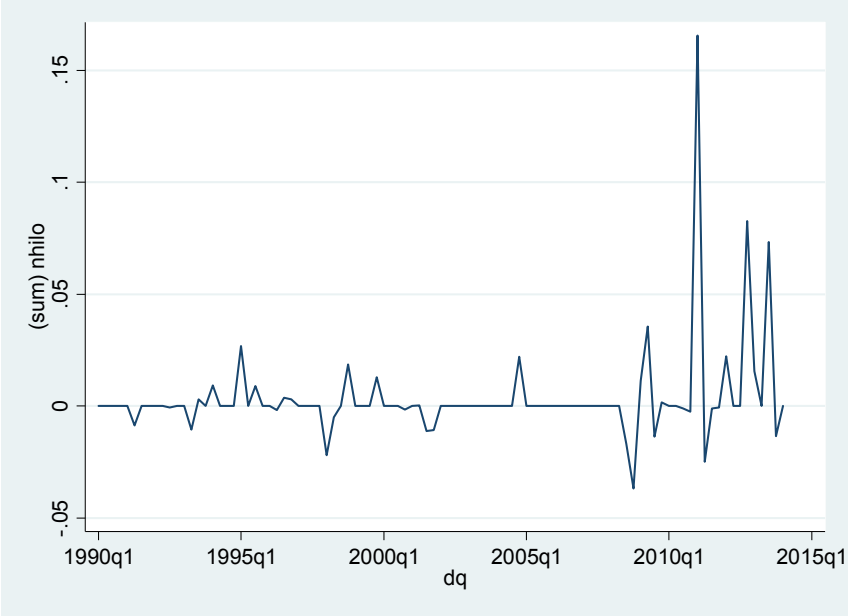


Figure 12 News Variables, aggregated up to the quarterly frequency

(A) News-1



(B) News-2

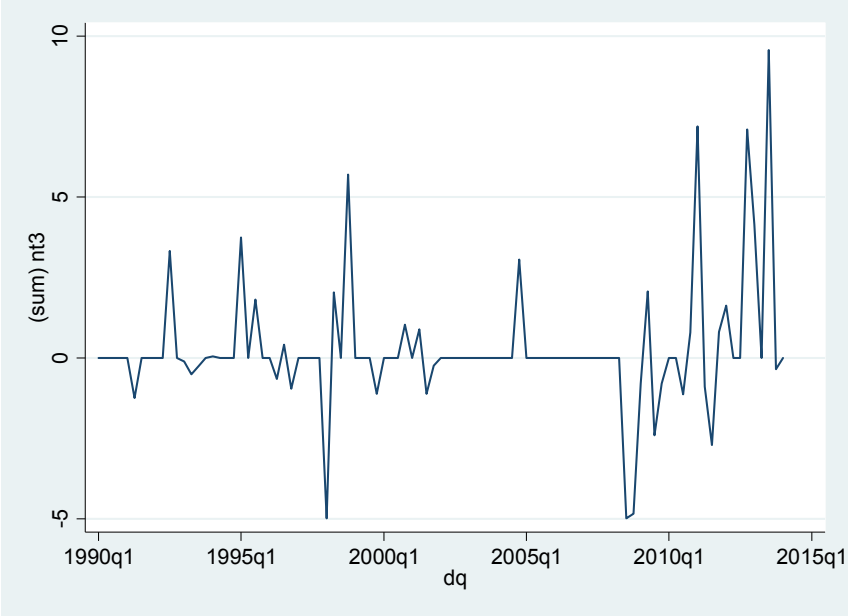
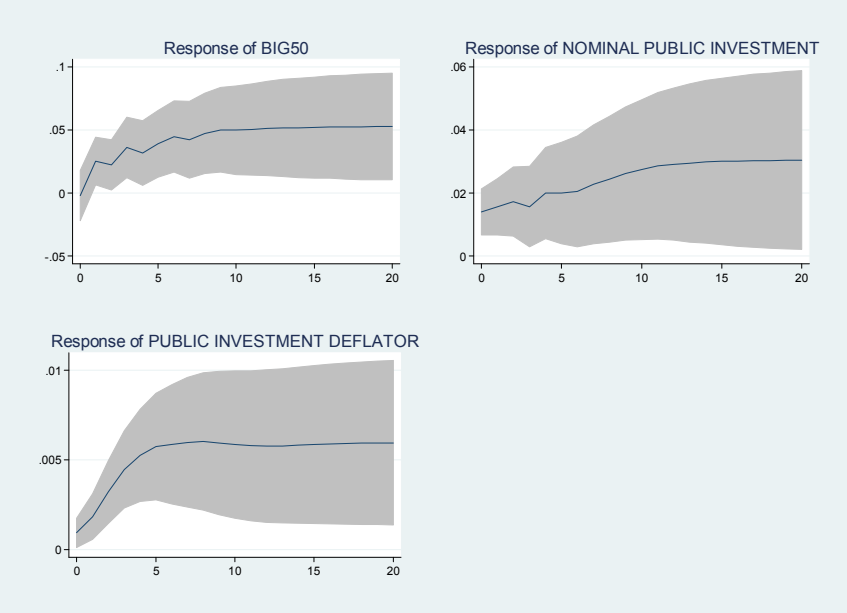


Figure 13: VAR analysis: Impulse responses to of public-investment-related variables

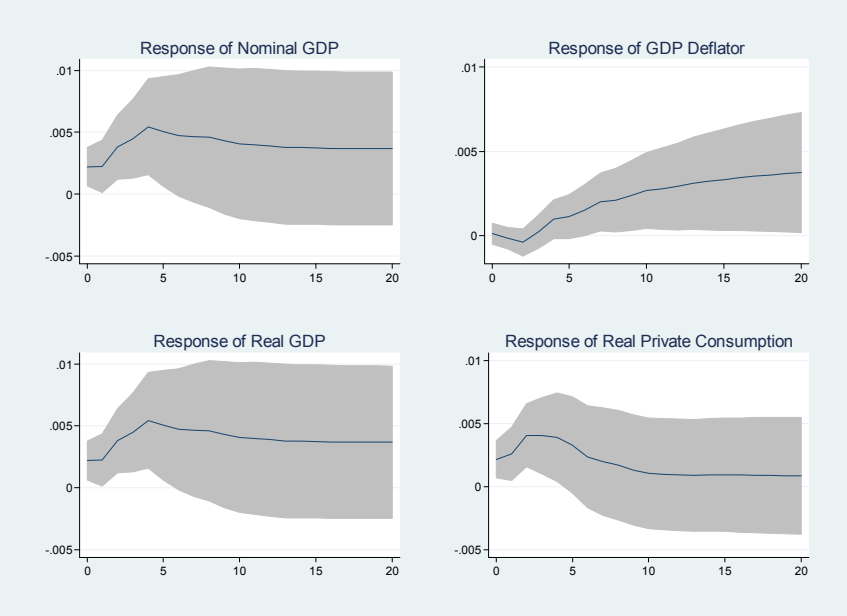
A: Responses to News-1



B: Reponses to News-2

Figure 14: VAR analysis: Impulse responses of macro variables

A: Responses to News-1



B: Reponses News-2

Appendix A: Identification of news dates

As stated in the main text of the paper, we follow and extend the approach taken by Fukuda and Kei (2002), Fukuda (2002) and Fukuda and Yamada (2011) to identify dates on which news about future public investment arrived. The common characteristic of those studies is that they look at a specific type of fiscal events, namely emergency fiscal stimulus measures, that are often enacted as responses to sharp economic downturns. Fukuda and Kei (2002) and Fukuda (2002) identify eight such episodes during the 1990s. For example, "Emergency Economic Measures" on March 31, 1992 (proposed by the cabinet of Kiichi Miyazawa), which was first of those, was a measure to counter the asset bubble collapse of the early 1990s. Fukuda and Yamada (2011) add seven more, one in 2000 and the others in between August 2008 and October 2010.

The most notable feature of their study is that, for each of those policy events (15 in total), they pick not just one but 2 to 8 dates on which important news appeared in major newspapers in Japan. As they demonstrate, in the Japanese political system, those emergency expenditures often go through a series of negotiations (most typically between politicians and the Ministry of Finance) and the budgetary size is revised a few times, usually upwards. Their fiscal dates capture not only the news about the first proposal made by the government but also the news about those revisions (picked up by their careful reading of the newspapers) as well as the final outcome[6].

Our identification of fiscal dates extends their approach in significant ways. Most notably, as our interest is not confined to the effects of those emergency policy measures, we consider a much broader, more heterogeneous, set of fiscal-policy-related events. Those events, together with the specific dates on which we think there were important fiscal policy events, are summarized in Table A1 (along with a short description of the significance of each date). Note that, in the empirical analysis, we incorporate a dummy variable *separately* for *each* of those news dates (unless two news happen to fall onto the same day, in which case we can introduce just one dummy that corresponds to both pieces of news). Thus, all together, we create as many as 159 dummy variables. This number, however, is still much smaller than the total sample size of 5930 days. Below, we shall briefly summarize characteristics of those events, grouped into six major

[6]Another novelty of their study is that they examine *intraday* responses of stock prices to those fiscal news. In that respect, the current study is more limited, as we look at stock price changes between days, using only the day's closing prices.

categories.

(1) *Emergency fiscal stimulus packages*, as utilized by Fukuda and Kei (2002), Fukuda (2002) and Fukuda and Yamada (2011). For the period 1990-2010, we simply employ the dates listed in Table 3 and Table 4 of Fukuda and Yamada (2011). We extend the sample period to the end of 2013. This adds three more stimulus packages to our sample. The first of such measures was introduced in November 2012 by the soon-to-be outgoing government of the Democratic Party of Japan, led by Prime Minister Noda. The second was enacted less than two months later by the cabinet of Prime Minister Abe, as a part of the "Second Arrow" of the so-called "Abenomics", in January 2013. The last one was recently introduced as a measure to counter expected negative impact of the consumption tax hikes (in April 2014) whose decision came in December 2013. For each of those measures, we identify 4 to 7 news dates, based on our reading of the electronic version of *Nikkei* Newspapers[7].

(2) *Reconstruction budget in response to the Great East Japan Earthquake (March 11, 2011)*: During the year of 2011, three supplementary budgets were introduced by the government under the Democratic Party (DP), and the long-term plan for the reconstruction spending was unveiled. Also, in January 2012, the government under the Liberal Democratic Party (LDP) of Prime Minister Abe significantly expanded the overall size of this extra budget. We include dummies that capture news about those events.

(3) *Important election dates that represented major shifts in power*: The idea is similar to that appears in Fukuda (2014) who studies the impact of the general election outcome of December, 2012 (in which Abe's LDP scored a landslide victory), on the stock market. It is only recent that Japanese elections started to have important implications for the future course of fiscal policies. The tendency became clear only when the DP ran an election campaign on an anti-public-investment platform[8] and won a big majority in the general election on August 30, 2009. We introduce dummy variables that correspond to Lower House and Upper House elections, starting from

[7]Nikkei is a popular newspaper in Japan specialized in economic issues. Fukuda and Yamada (2011)'s reading of the newspaper articles is more extensive in the sense that they read three major newspapers (including Nikkei), not just one. On the other hand, an advantage of using the electronic version is that we know clearly at what time the news was distributed, and thus we know, for example, if it came in before the day's closing of Tokyo Stock Exchange.

[8]Their biggest campaign slogan was "From Concrete to People".

the aforementioned ones; those dummies correspond to each of the two days before the election and two days afterwards (elections are usually held on Sundays when the market is closed). In addition, we introduce a set of dummies for when the then-Prime Minister Noda suddenly announced dissolution of the Lower House in the middle of a parliamentary session on November 14, 2012 which led to the election mentioned above. For this event, we include dummies for three days starting the day of the surprise announcement.

(4) *Disasters*: Natural disasters such as major earthquakes are undoubtedly tragic.At the same time, they induce people to expect large increases in public investment expenditure in the near future. We pick three such events: the Hanshin-Awaji Earthquake of January 17, 1995 which devastated Kobe, Chuetsu Earthquake on October 23, 2004, which killed 68 people, and the Great East Japan Earthquake of March 11, 2011. In addition, we also look at the ceiling collapse of the Sasako Tunnel which occurred on December 2, 2012; this major accident, which resulted in 9 deaths, made people aware of the depreciated state of the nation's public infrastructure, and called for a thorough overhaul of its public infrastructure. For each of those four disaster events, we introduce a dummy which corresponds to the day of the event (unless it falls on a holiday), and three dummies that correspond to each of three business days that follow. We also include dummies for the dates on which the first official estimates for the pecuniary damages from the Hanshin-Awaji Earthquake and the Great East Japan Earthquake were published. This is because those estimates seem to have much to do with the sizes of the reconstruction budgets, that are to be introduced later.

(5) *Winning the right to host major sports events*: Large sports events such as the Olympics Games and the FIFA World Cup soccer games are big public investment projects. Those large expenditures are mostly anticipated in advance, when the announcement is made that such an event will take place[9]. We pick three such events. The first is the announcement that Nagano, a Japanese city, would hold the Winter Olympics Games of 1998. The news came on June 15, 1991. The second is the announcement on May 31, 1996, that Korea and Japan would co-host the 2002 FIFA World Cup. The third is the decision on September 7, 2013 by the IOC to hold the Summer Olympics Games of 2020 in Tokyo. For each of those events, we include a set of three dummies that correspond to three business days following the

[9]We owe this valuable insight to Tran Lam Anh Duong.

announcement (all of those announcements came on non-business days).

(6) *Negative Fiscal Events*: So far, all the events cited have been associated with potential increases in fiscal expenditure[10]. There have been some important turning points in the Japanese fiscal policy which have driven the policy stance toward austerity. We believe the following three events have been the most significant: (a) Fiscal Reform under the Cabinet of Ryutaro Hashimoto in 1996, (b) the Koizumi Reform which started in 2001, and (c) Major cutbacks in public investment expenditure which occurred soon after the DP took over the government in 2009 (the Maehara shock and the "Shiwake" shock). We introduce dummies for dates on which important policy announcements were made, based on our key-word based search and reading of the Nikkei Newspapers (stored electronically in *Nikkei Telecon*).

[10]It is however important to note that some news about spending increases may be regarded by the market as a disappointment. This happens when the announced increase falls short of the market expectation. Such news should also be considered to be a negative fiscal shock. An advantage of our methodology is that, by letting the market reaction determine the nature of each shock, we can correctly identify such a shock as a negative one.