Online Appendix for 'Chronicle of a War Foretold: The Macroeconomic Effects of Anticipated Defense Spending Shocks'

Nadav Ben Zeev* Evi Pappa†

September 16, 2015

Abstract

The online appendix contains two parts. First, we provide a detailed narrative of our MFEV shock series relative to the Ramey (2011) series. Second, we present results from several robustness checks we ran to confirm that our benchmark results hold across various modifications and extensions of our benchmark setting.

*Ben-Gurion University of the Negev, Israel. *E-mail:* nadavbz@bgu.ac.il.
†European University Institute, UAB, BGSE, and CEPR. *E-mail:* evi.pappa@eui.eu.

Appendix A Detailed Narrative of MFEV Shock Series Relative to the Ramey Series

In this section we record historical events that can match our MFEV shocks and discuss events for which the sign of the defense shock differs between the MFEV and the Ramey shock series.

According to our MFEV series there was a negative defense news shocks in the second quarter of 1948, while for Ramey a positive shock occurs at the same time. The shock documented by Ramey is based on Truman's forecasts and according to those forecasts the Marshall Plan expenditures were responsible for the increase of national defense from 1948 to 1949 of about $300 Million. Yet, the election of Truman in November 1948 is considered to be the greatest election upset in American history. Virtually every prediction (with or without public opinion polls) indicated that Truman would be defeated by Dewey. In the Republican platform of the election of 1948 it is explicitly mentioned: "The maintenance of armed services for air, land and sea, to a degree which will insure our national security; and the achievement of effective unity in the Department of National Defense so as to insure maximum economy in money and manpower, and maximum effectiveness in case of war." And again the Democratic electoral platform reports: "We pledge our best endeavors to conclude treaties of peace with our former enemies. Already treaties have been made with Italy, Hungary, Bulgaria and Rumania. We shall strive to conclude treaties with the remaining enemy states, based on justice and with guarantees against the revival of aggression, and for the preservation of peace." The quotes from both platforms seem to suggest a negative rather than a positive defense news shock. The negative shock in the last quarter of 1948 also coincides with the election of Truman.

In the second quarter of 1955 we recover a negative defense spending shock that can be associated with the ending of the Geneva Summit between the U.S., U.S.S.R., U.K., and France on July 23rd. The purpose of the summit was to bring together world leaders to begin discussions on peace. During the same trimester the Federal Republic of Germany (West Germany) is also joining the NATO. The negative shock occurring in the third quarter of 1959 coincides with the

opening of the American National Exhibition in Moscow by Vice President Nixon. In 1959, the Soviets and Americans had agreed to hold exhibits in each other's countries as a cultural exchange to promote understanding bewteen the two nations. Our MFEV shock takes a negative value in the 2nd quarter of 1959 implying that the exhibition was signaling more than just a cultural exchange. The MFEV shock in the mid 1960s coincides with the pre-electoral campaign. Both Kennedy and Nixon drew large and enthusiastic crowds throughout the campaign. In August, most polls and political analysts gave Vice-President Nixon a slim lead over Kennedy. Yet, in August in a televised press conference, reporter Mohr asked President Eisenhower if he could give an example of a major idea of Nixon's that he had heeded. Eisenhower responded with the flip comment, "If you give me a week, I might think of one." This seems to have hurt much the campaign of Nixon and acted to the advantage of John F. Kennedy that later in October first suggested the idea for the Peace Corps and on November 8th was elected President of the U.S.. The MFEV shock takes a negative value on the third trimester of 1961, when the Alliance for Progress was founded by U.S. President John F. Kennedy (August 1961). The alliance aimed to establish economic cooperation between the U.S. and Latin America. In April 20 1964 U.S. President Lyndon Johnson in New York, and Soviet Premier Nikita Khrushchev in Moscow, simultaneously announce plans to cut back production of materials for making nuclear weapons. The MFEV assumes a negative value in this trimester. Instead, the positive shock in the third trimester of 1968 coincides with the pre-election period. Nixon was labeled as the front-runner for the presidency and was described as "relaxed and confident," counter to his "unsure" self from 1960. In his campaign he claimed that he had a "secret plan" to end the war.

In the second quarter of 1970, Ramey recovers a negative defense news shocks based on reports that suggest that defense spending should be cut between 1970 and 1971, besides the fact that at the same time Nixon announces the invasion of Cambodia. Instead the MFEV shock interprets the invasion as a positive defense news shock. According to the MFEV methodology another positive shock occurs in the third trimester of 1970. This could be related with the Vietnam War. On September 5th the U.S. 101st Airborne Division and the South Vietnamese 1st Infantry

Division initiate a new operation in Thua Thien Province (Operation Jefferson Glenn). In the same trimester of the following year a negative shock occurs that could be associated with the announcement of Nixon of a 90-day freeze on wages, prices and rents the 15th of August. On April 30 1975 the Vietnam War ends as Communist forces take Saigon, resulting in mass evacuations of Americans and South Vietnamese. As Saigon is taken, South Vietnam surrenders unconditionally. The MFEV takes a negative value in this trimester. Yet, a quarter later, on August 20, NASA launches the Viking 1 planetary probe toward Mars and the MFEV shock assumes a positive value. On September 7th 1977, the Torrijos–Carter Treaties are signed. The U.S. agrees to transfer control of the canal to Panama at the end of the 20th century. The positive shock observed in the second quarter of 1978 can be associated with the rescue operations in Zaire. From May 19 through June, the U.S. utilized military transport aircraft to provide logistical support to Belgian and French rescue operations in Zaïre. We identify a positive defense news shocks when on July 3rd 1979 the U.S. President Jimmy Carter signs the first directive for secret aid to the opponents of the pro-Soviet regime in Kabul.

The very large positive shocks of the third and fourth quarters of 1980 occur before the election of Ronald Reagan. In the Republican Party Platform of 1980 it is mentioned: "We believe that the Congressional budget process has failed to control federal spending. Indeed, because of its big spending bias, the budget process has actually contributed to higher levels of social spending, has prevented necessary growth in defense spending, and has been used to frustrate every Republican attempt to lower tax rates to promote economic growth." This statement could square well with the evidence presented in Figure 5 and Table 2 of our paper: Reagan's campaign promises a restoration of the nation's military strength when 60% of Americans according to a poll conducted before the elections felt defense spending was too low. On November 18, 1981, President Reagan proposed renewed arms control negotiations focusing on major reductions in all types of arms, to be called Strategic Arms Reduction Talks (START). Our MFEV series points to a negative defense news shocks occurring at the same period. The negative shock observed in the second quarter of 1987 could be called as the "Tear down this wall!" shock since it coincides with the challenge issued by

U.S. President Ronald Reagan to U.S.S.R leader Mikhail Gorbachev to destroy the Berlin Wall, in a speech at the Brandenburg Gate near the Berlin Wall on June 12, 1987, commemorating the 750th anniversary of Berlin. Reagan challenged Gorbachev, who was then the General Secretary of the Communist Party of the U.S.S.R, to tear it down as an emblem of Gorbachev's desire to increase freedom in the Eastern Bloc through glasnost ("transparency") and perestroika ("restructuring"). Instead, the positive realization in the second quarter of 1988 relates to the instability in Panama between mid-March and April 1988. The U.S. increased pressure on Panamanian head of state General Manuel Noriega to resign, the U.S. sent 1,000 troops to Panama, to "further safeguard the canal, U.S. lives, property and interests in the area." The forces supplemented 10,000 U.S. military personnel already in the Panama Canal Zone.

The positive realization we observe in 1990s is clearly related to the Gulf War. On August 2nd, 1990, Iraq invades Kuwait, eventually leading to the Gulf War. During the pre-election period of 1992 a negative MFEV shock takes place. This squares well with Clinton being the favorite candidate and the Democratic Party platform supporting the defense conversion: "Our economy needs both the people and the funds released from defense at the Cold War's end." Similarly, another negative MFEV realizes in the pre-election period of 1996 with the democrats supporting military cuts and winning the elections on Tuesday, November 5, 1996. In the third quarter of 1999 we observe a negative defense news shocks that could be related with the ending of the Kosovo war. The 30th of September of 1990 KFOR (Kosovo Force) certifies that the KLA (Kosovo liberation Army) has completed demilitarization.

We recover a negative shock in the second quarter of 2001. Interestingly on June 5th 2001 the U.S. Senator Jim Jeffords leaves the Republican Party, an act which changes control of the U.S. Senate from the Republican Party to the Democratic Party. The negative shock in the last trimester of 2001 coincides with the prosecution of Zacarias Moussaoui for involvement in the September 11 attacks. Two day later on December 13th the U.S. President George W. Bush announces the U.S. withdrawal from the 1972 Anti-Ballistic Missile Treaty. Finally, both Ramey and MFEV shocks agree on the defense shock news regarding the Afghanistan war.

Appendix B Additional Robustness Checks

This section provides a set of robustness exercises for the main results presented in Section 3 of the paper.

B.1 VAR Lags and the Truncation Horizon

Figure 1a shows the impulse responses obtained with lag lengths, from 3 to 5. As evident, the impulse responses to all of the variables are in general similar both qualitatively and quantitatively. Figure 1b displays the responses for four separate horizons, $H = 10$, 20 (benchmark), 30, and 40. The results are similar for all horizons.

B.2 Adding a Linear Trend to the VAR

Given that various authors have chosen to add a linear trend to VARs with fiscal shocks (e.g., Blanchard and Perotti (2002), Ramey (2011), and Mertens and Ravn (2012)), in this section we present results from estimating a VAR in which a linear trend was added. Figure 2 presents the impulse responses from this robustness exercise: it is clear that the results are unchanged, both qualitatively and quantitatively, with the MFEV news shock continuing to have significant demand effects.

B.3 Testing for Non-Linear Effects to Address the Endogeneity Concern

One might claim that we have gotten the causality wrong, especially because the differences in the economic effects of the defense news shocks concerns a very small part of defense spending, the one not accounted for by Ramey's news. It is conceivable that during crises part of military expenditure be often deferred to good times, because for instance, other expenses are perceived as more urgent. It could be argued that if this is the case, whatever shock increasing GDP on impact, though not arising from defense spending news, may indeed anticipate future defense spending to

some extent, not because expected spending growth stimulates current output, but because of the opposite causality relation. Since the shock anticipates future spending growth, it is included into the Maximum Forecast Error Variance shock (MFEV) and amplifies spuriously the expansionary effects of public spending. As we show in the main text, our identified shock does not suffer from this criticism for two reasons. Yet, it is interesting to examine whether our shock has different effects in recessions versus expansions. Following the work of Owyang et al. (2013), we have employed the local projection method developed by Jorda (2005) in order to estimate whether the MFEVORT shock has different effects in periods of slack relative to periods of economic expansions. The estimation procedure includes MFEVORT, defense spending, and output. Figure 3a shows the impulse responses and 95% confidence intervals in the high unemployment state (solid lines) and in the low unemployment state (circled lines).[1] While the figure demonstrates that we cannot reject linearity, if we calculate the multipliers they do indicate that a higher multiplier is attained if anything during expansions.

Another possibility could be that defense spending news is endogenous to the ideological orientation of governments. According to Blinder and Watson (2014), the U.S. economy has grown faster–and scored higher on many other macroeconomic metrics– when the President of the United States is a Democrat rather than a Republican. The authors show that this is not a result of a systematically more expansionary monetary or fiscal policy under Democrats. Yet, the electoral platforms of the Republicans always include a section in policies about military spending, while this section is usually missing from the electoral platforms of the Democrats. Hence our news shocks could be endogenously related to electoral cycles. In Figure 3b we present responses and 95% confidence bands of output, defense spending and the MFEVORT series when the President is a Democrat (solid lines) and when the President is a Republican (circled lines). The data rejects the presence of non-linear effects of the MFEVORT shock and gives weak support to the idea that Republican governments can stimulate more the economy with anticipated increases in military spending.

[1] A threshold unemployment value of 6.5% is used.

B.4 Relation of MFEVORT to Other Structural Disturbances

Given that MFEVORT, i.e., the component of our identified defense news shocks that is orthogonal to the the shock to the Ramey (2011) news series, is an important driver of the differences in the economic impact of MFEV and Ramey defense news shocks, it is important to show that it is not correlated with plausible candidate shocks that potentially drive the business cycle:[2] the Romer and Romer (2004) monetary policy shock measure, Romer and Romer (2010) exogenous tax shock measure, shock to the real price of oil, the TFP news shock and the unanticipated TFP shock from Barsky and Sims (2011), the innovation to the U.S. economic policy uncertainty index of Baker et al. (2012), and the unanticipated and anticipated tax shocks constructed by Mertens and Ravn (2012).

Figure 4 shows the contemporaneous and lead and lag correlations between MFEVORT and the other seven shocks we consider, together with the corresponding 95% asymptotic confidence intervals. It is apparent that MFEVORT is generally uncorrelated with all leads and lags of the considered shocks: the correlations are small and largely statistically insignificant, all being lower than 23% in absolute terms.[3] That MFEVORT is not correlated with monetary policy shocks is especially important given the strong effect it was found to have on interest rates.

B.5 Alternative TFP Measure

Although the Fernald (2012) TFP measure arguably represents the state-of-the-art in growth accounting, it still seems worthwhile to confirm that our results are not driven by this particular choice to measure aggregate TFP especially in light of the fact that countries with weak or no newspaper

[2] We have also confirmed that these macroeconomic shocks have no significant effect on defense spending and are uncorrelated with our benchmark MFEV news shock (see Figures 6 and 7 in our paper).

[3] The 23% contemporaneous correlation with respect to the Mertens and Ravn (2012) unanticipated tax shock, the 18% correlation with the Romer and Romer shock, and the 16% correlation with the oil shock are significant. In robustness exercises whose results we do not show here to save on space, we have confirmed that adding the raw Mertens and Ravn (2012) unanticipated tax measure and oil price series to the benchmark VAR and restricting our news shock to be contemporaneously orthogonal to them does not affect the baseline results of the paper. The same is true if we restrict the Romer and Romer series to be orthogonal to our MFEV shock contemporaneously.

archives are unlikely to have reliable high-frequency series for TFP. Therefore, we examine the robustness of our results to using a standard Solow residual which does not account for changes in utilization of factor inputs. The Solow residual we utilize is the one constructed by Fernald (2012) upon which the utilization-adjusted TFP measure is based. Figure 5 shows the impulse responses obtained from estimating our baseline VAR where the Solow residual replaces the Fernald (2012) TFP series. It is clear that results are quantitatively similar to the benchmark ones; note that the positive response of the Solow residual is consistent with the expansionary nature of our shock.

B.6 Removing the Ramey News Component from the Non-Ramey VAR MFEV News Shock

An additional exercise that can shed light on the additional information contained in our shock series is one that looks at the component of the MFEV series obtained from the VAR that excluded the Ramey series that is independent of the Ramey news series. Given that these two shock series have a nontrivial correlation of 0.26, this exercise can provide further information on the difference between our shocks and Ramey's shhock. Figure 6 shows the impulse responses to the residual obtained from projecting the non-Ramey MFEV series on to the Ramey shock. It is apparent this residual (henceforth MFEVORT2) produces a rise in the real aggregates and in inflation and interest rates, and the responses it generates are similar to those produced by MFEVORT. Consistent with this similarity in the responses to these two shocks, the correlation between MFEVORT2 and this residual is very high at 0.73. That is, the results of the exercise of this section confirm that the information contained in the MFEV series and that is not contained in the Ramey news series has important implications for macroeconomic variables.

B.6.1 Relation of MFEV and MFEVORT shocks to Revisions of Spending Forecasts

Another way of checking the informational content of our recovered shock is to investigate how the MFEV and MFEVORT shocks relate with the revisions of federal spending forecasts from the

Survey of Professional Forecasters (SPF). If our recovered shock is really originated by defense spending news, then one would expect a significant response of this revision to our news shock. We construct the revision, between period $t-1$ and t, of expectations of growth in federal spending from period $t-1$ to period $t+3$, which is the longest horizon reported by the SPF. We then project this SPF-based news variable on four of its own lags and current and four lagged values of the MFEV, the MFEVORT and the Ramey news series.[4] Figure 7 shows the response of the SPF-based news series to the two news shocks and the artificial MFEVORT measure. Although differences are not statistically significant, the SPF-based series reacts much stronger on impact to MFEV and MFEVORT shocks, confirming once more the superiority of the MFEV series in terms of informational content relative to Ramey's defense news series.

[4] As explained in Ricco (2014), this type of forecast revision represents expected fiscal changes from period $t-1$ to period $t+3$.

References

Baker, S. R., Bloom, N. and Davis, S. J.: 2012, Policy uncertainty: a new indicator, *CentrePiece - The Magazine for Economic Performance 362*, Centre for Economic Performance, LSE.

Barsky, R. and Sims, E. R.: 2011, News shocks and business cycles, *Journal of Monetary Economics* **58**(3), 235–249.

Blanchard, O. and Perotti, R.: 2002, An empirical characterization of the dynamic effects of changes in government spending and taxes on output, *The Quarterly Journal of Economics* **117**(4), 1329–1368.

Blinder, A. S. and Watson, M. W.: 2014, Presidents and the u.s. economy: An econometric exploration, *Working Paper 20324*, National Bureau of Economic Research.

Fernald, J.: 2012, A quarterly utilization-adjusted series on total factor productivity, *Technical report*, Federal Reserve Bank of San Francisco.

Hall, P.: 1992, *The Bootstrap and Edgeworth Expansion*, Springer-Verlag.

Jorda, O.: 2005, Estimation and inference of impulse responses by local projections, *American Economic Review* **95**(1), 161–182.

Mertens, K. and Ravn, M. O.: 2012, Empirical evidence on the aggregate effects of anticipated and unanticipated us tax policy shocks, *American Economic Journal: Economic Policy* **4**(2), 145–81.

Owyang, M. T., Ramey, V. A. and Zubairy, S.: 2013, Are government spending multipliers greater during periods of slack? evidence from 20th century historical data, *American Economic Review, Papers and Proceedings* **103**(3), 129–134.

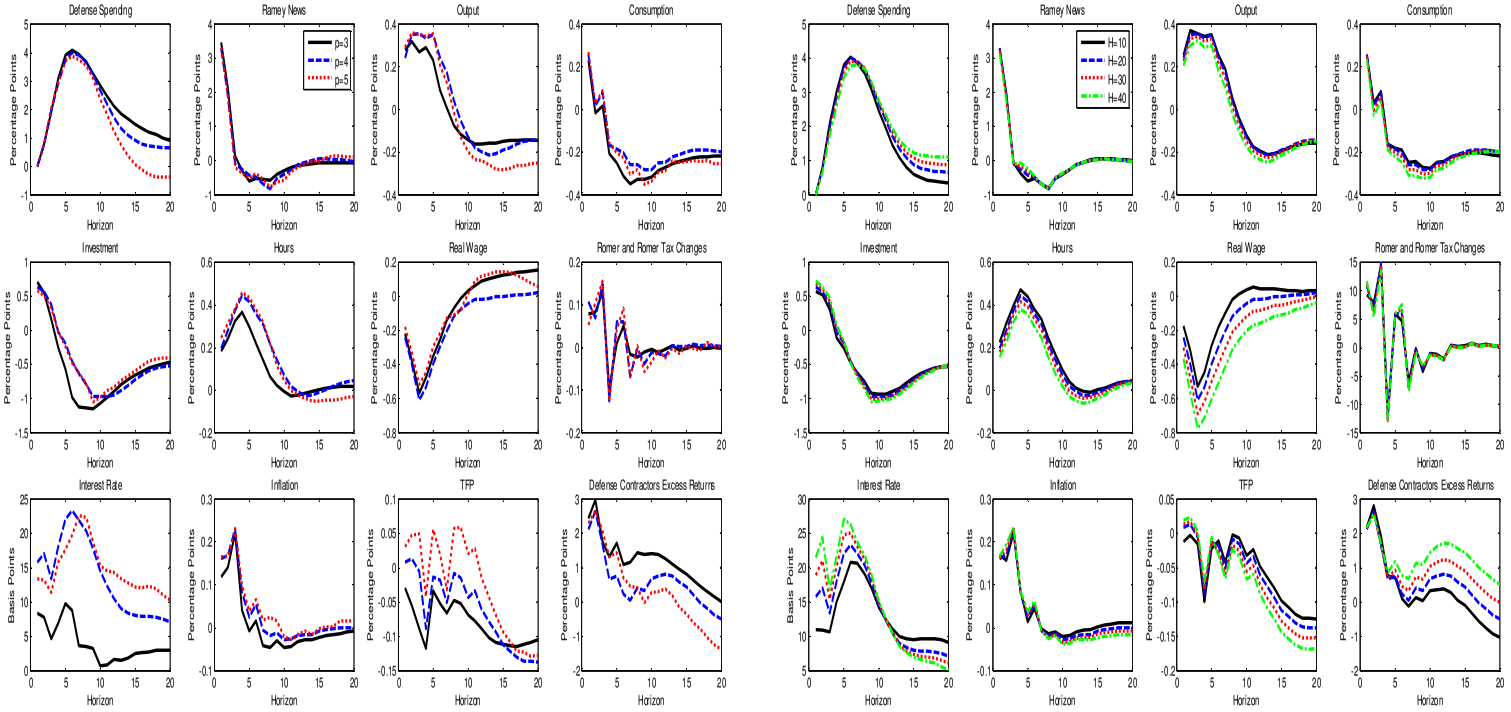
Ramey, V. A.: 2011, Identifying government spending shocks: It's all in the timing, *The Quarterly Journal of Economics* **126**(1), 1–50.

Ricco, G.: 2014, A new identification of fiscal shocks based on the information flow, *Working paper*, London Business School.

Romer, C. and Romer, D.: 2004, A new measure of monetary shocks: Derivation and implications, *American Economic Review* **94**(4), 1055–1084.

Romer, C. and Romer, D.: 2010, The macroeconomic effects of tax changes: Estimates based on a new measure of fiscal shocks, *American Economic Review* **100**(3), 763–801.

Figure 1: **Robustness: (a) VAR Lags; (b) Truncation Horizon**.

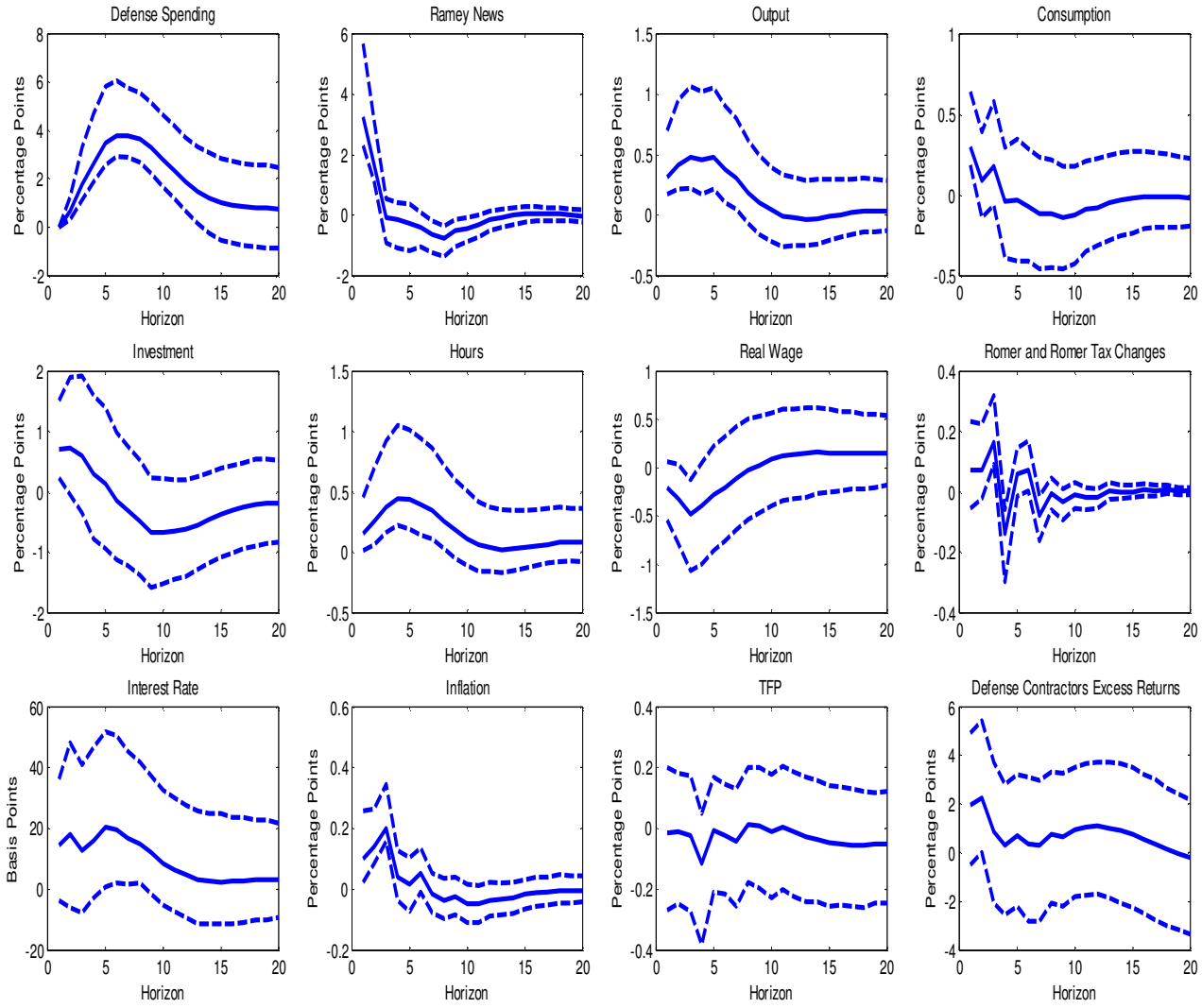


(a) Impulse Responses to a One Standard Deviation Defense News Shock: Robustness to Different Lag Structures.

(b) Impulse Responses to a One Standard Deviation Defense news shock: Robustness to Different Truncation Horizons.

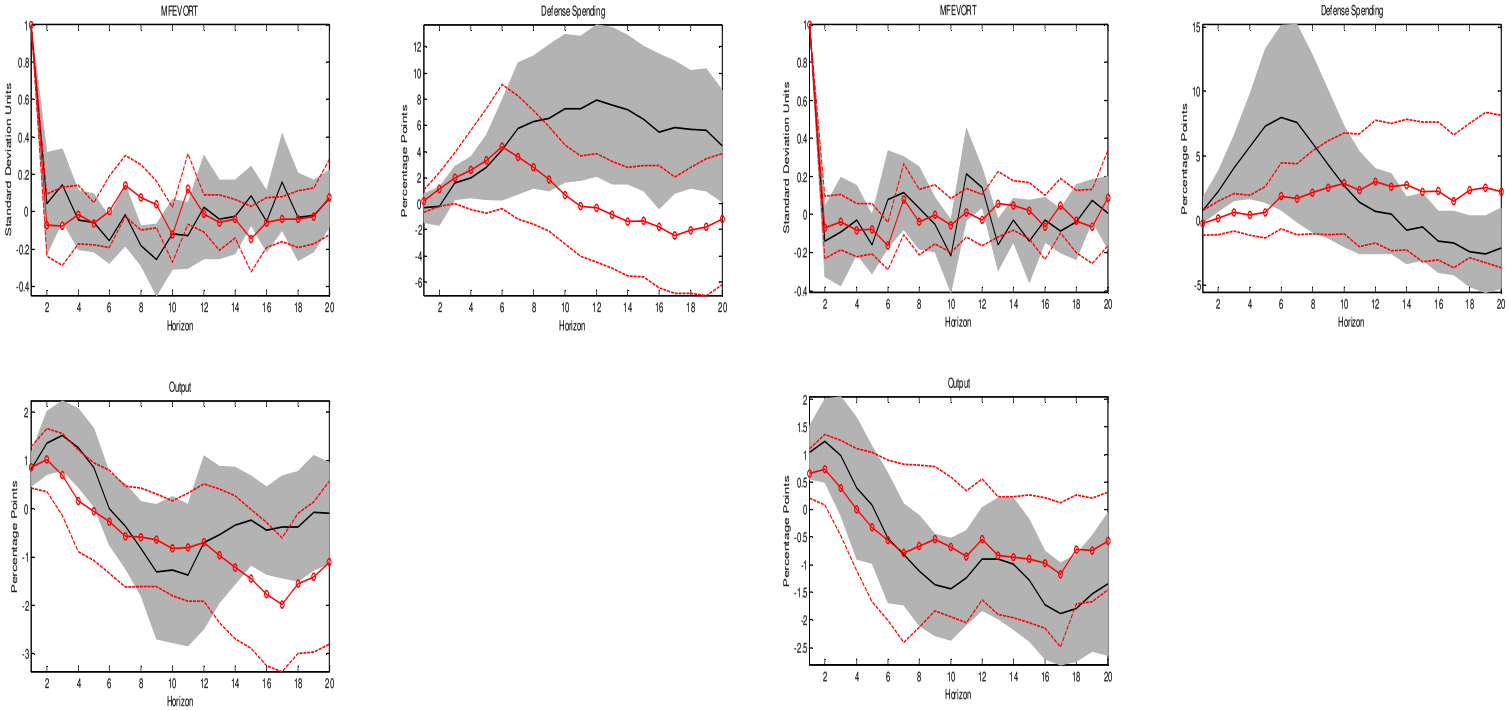
Notes: Panel (a): The solid, dashed, dotted and dash-dotted lines are the estimated impulse responses to the defense news shock from a VAR with 3, 4, 5, and 6 lags, respectively. Panel (b): The solid, dashed, dotted and dash-dotted lines are the estimated impulse responses to the defense news shock from a VAR with a truncation horizon, H, equal to 10, 20, 30, and 40 periods, respectively.

Figure 2: **VAR With a Linear Time Trend: Impulse Responses to a One Standard Deviation Defense News Shock (Solid Lines)**.



Notes: The impulse responses were obtained from applying the MFEV method explained in section 2 of our paper on a VAR that includes a linear time trend. Dashed lines represent 2.5th and 97.5th percentile Hall (1992) confidence bands generated from a residual based bootstrap procedure repeated 2000 times. Horizon is in quarters.

Figure 3: **State-Dependent Impulse Responses to MFEVORT: (a) Business Cycle Regime Model; (b) Electoral Cycle Regime Model.**

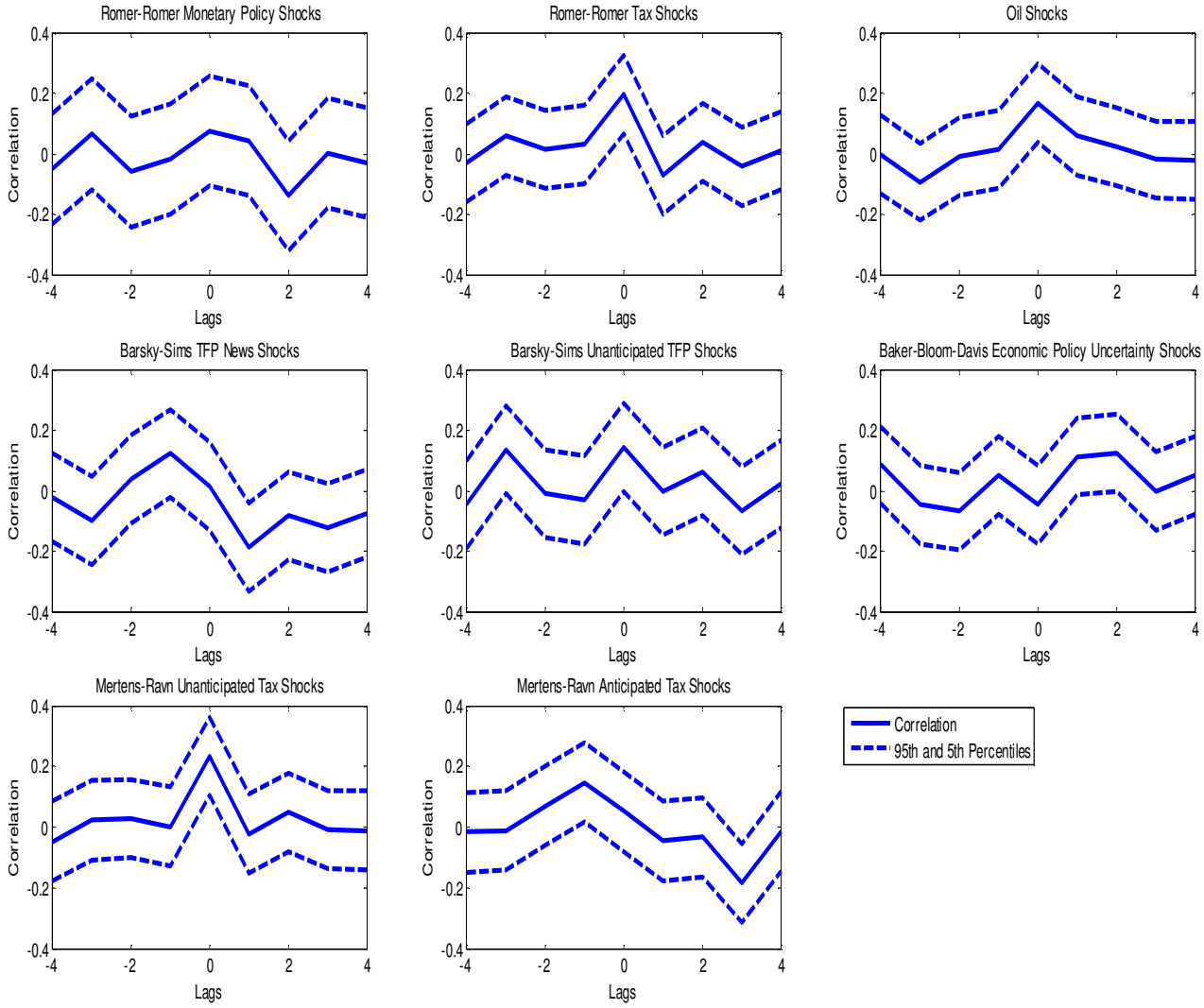


(a) Impulse responses to a one standard deviation MFEVORT Shock (Business Cycle Regime Model).

(b) Impulse responses to a one standard deviation MFEVORT Shock (Electoral Cycle Regime Model).

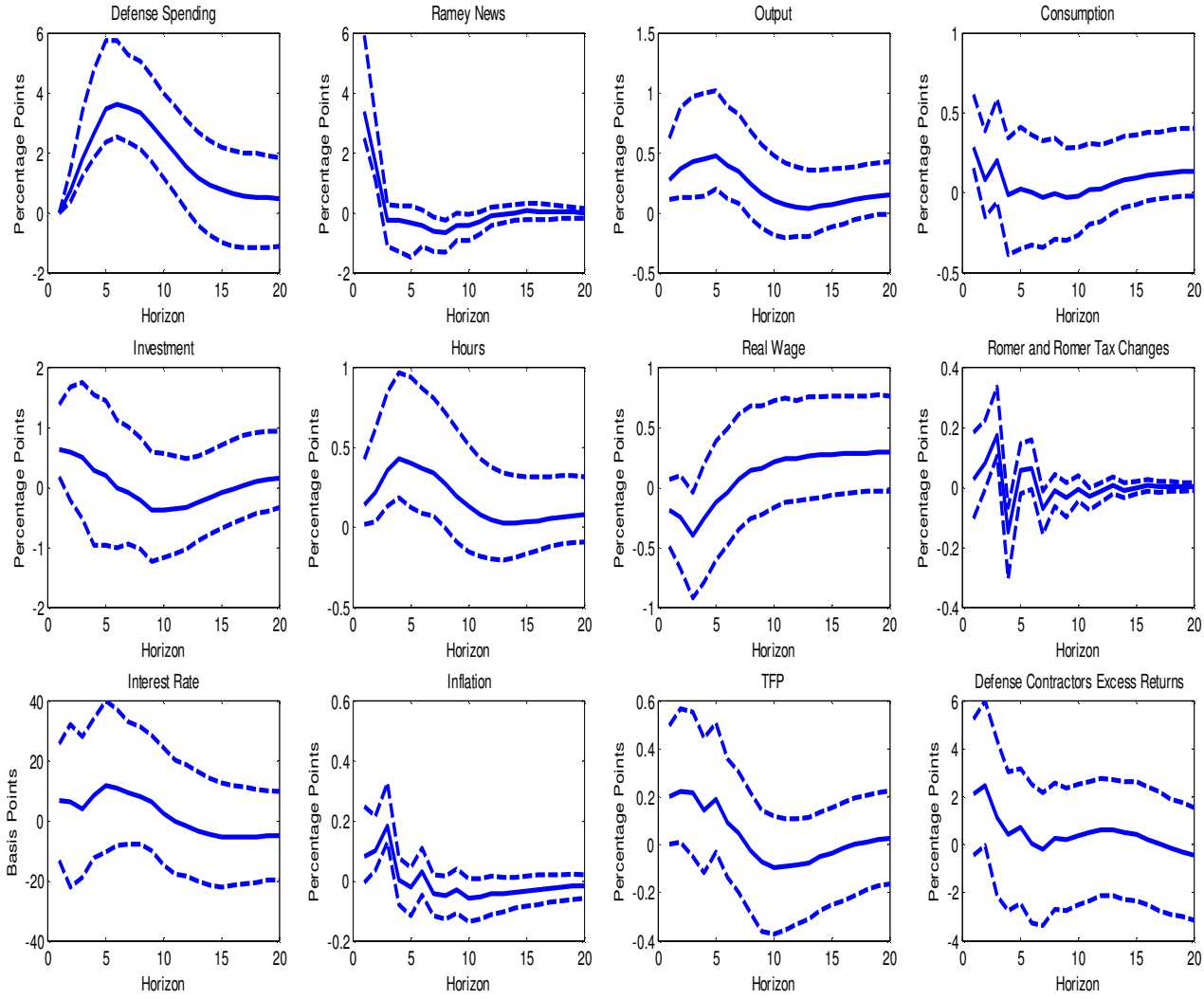
Notes: Panel (a): Solid lines are responses in the high unemployment state; circled lines are responses in the low unemployment state. The unemployment threshold value is 6.5%. 95% confidence intervals are shown. Panel (b): Solid lines are responses in the state in which a Democratic president is in office; circled lines are responses in the state in which a Republican president is in office. 95% confidence intervals are shown.

Figure 4: **The Cross-Correlation between MFEVORT and Lags/Leads of Other Structural Shocks**.



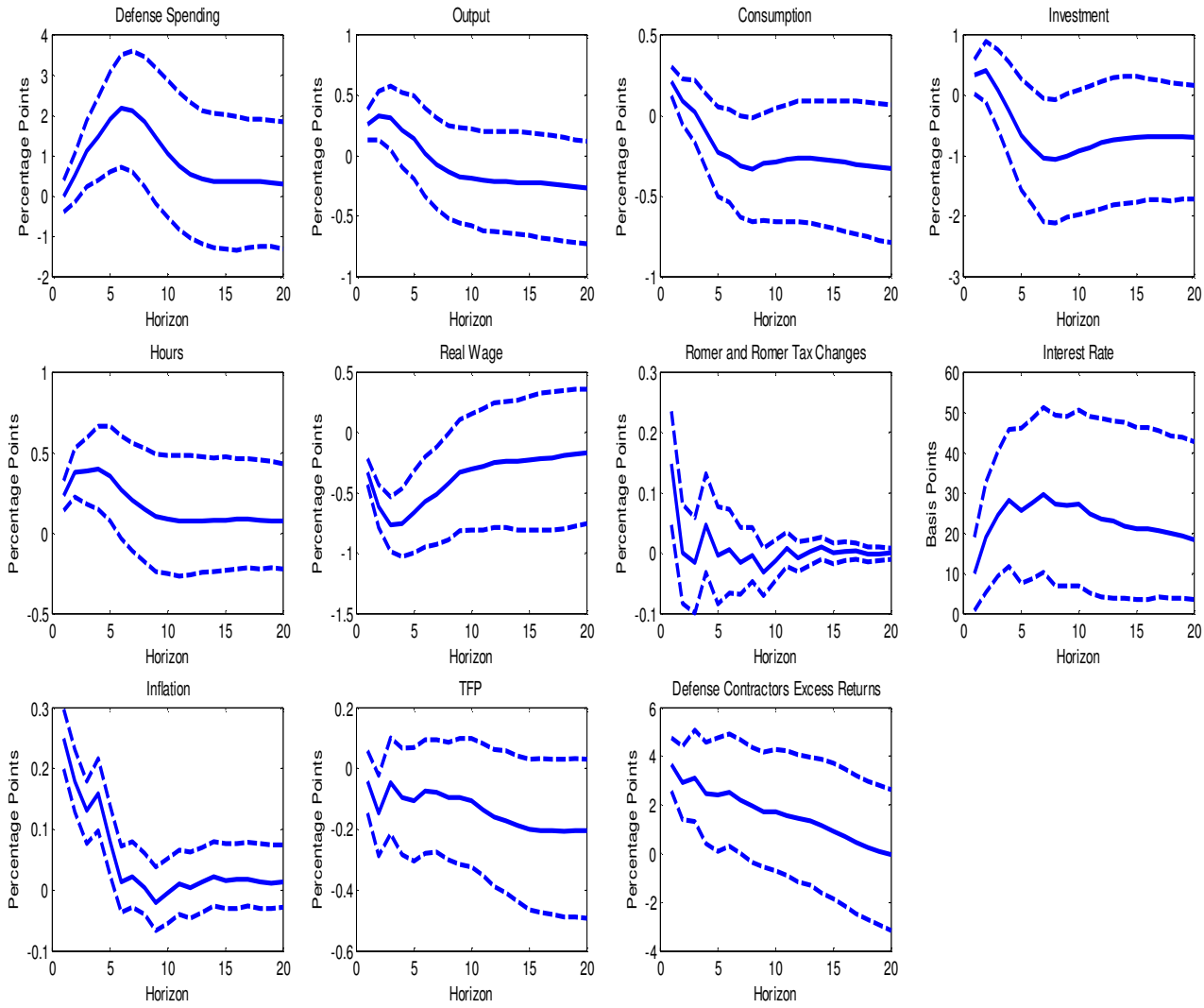
Notes: The solid line is the cross-correlation and the dashed lines represent the 95% asymptotic confidence interval. MFEVORT is the component of the MFEV news shock that is orthogonal to the Ramey news shock. The macroeconomic shocks with which the cross-correlations are computed are the Romer and Romer (2004) monetary policy shock measure, Romer and Romer (2010) exogenous tax shock measure, shock to the real price of oil, the TFP news shock and the unanticipated TFP shock from Barsky and Sims (2011), the innovation to the U.S. economic policy uncertainty index of Baker et al. (2012), and the unanticipated and anticipated tax shocks constructed by Mertens and Ravn (2012).

Figure 5: **Impulse Responses to a One Standard Deviation Defense News Shock: VAR with Solow Residual (Solid Lines)**.



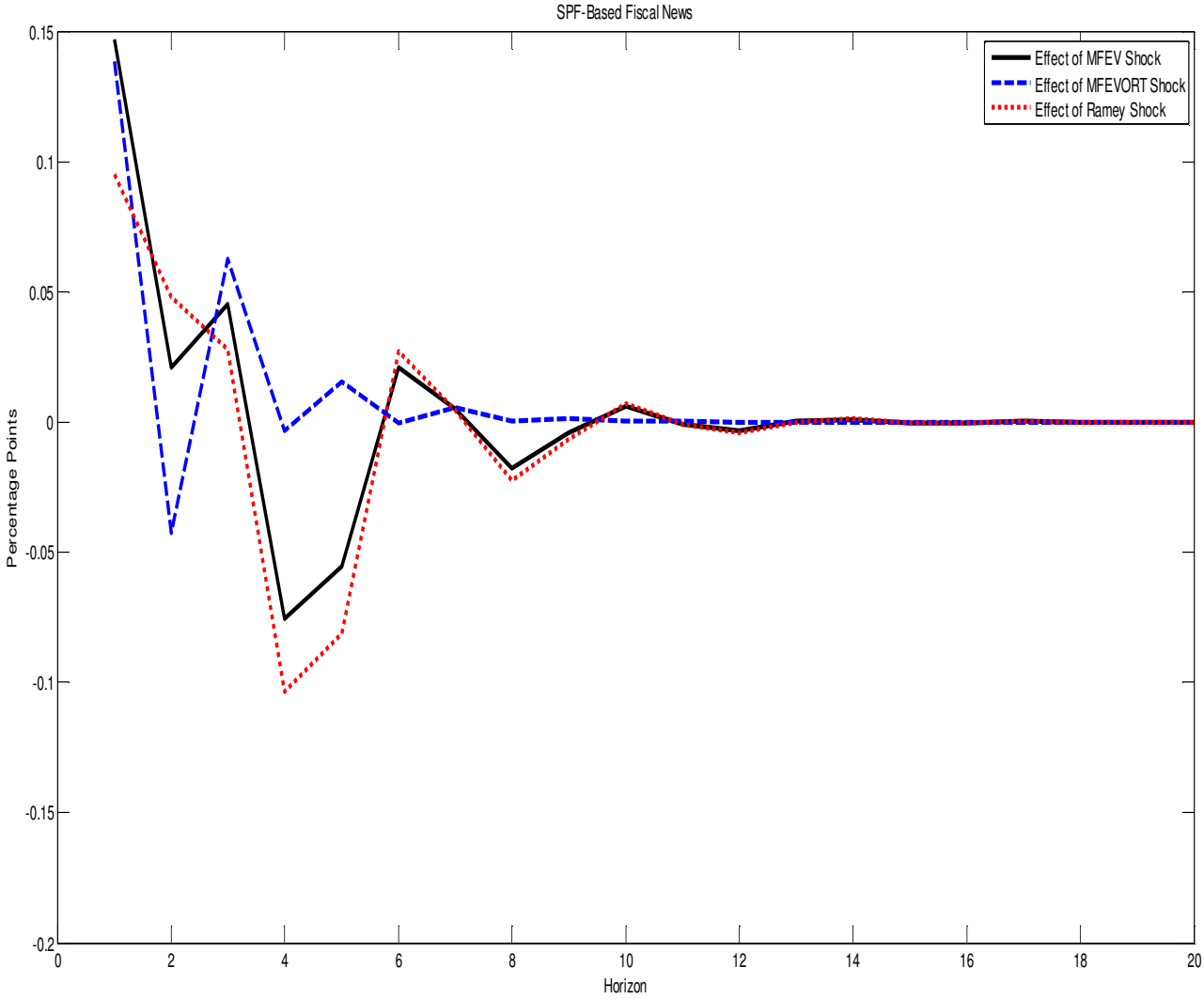
Notes: The impulse responses were obtained from replacing the Fernald (2012) TFP series with the Solow residual in the benchmark VAR. Dashed lines represent 2.5th and 97.5th percentile Hall (1992) confidence bands generated from a residual based bootstrap procedure repeated 2000 times.

Figure 6: **Impulse responses to MFEVORT2 (Solid Lines)**.



Notes: The impulse responses were obtained from projecting the variables in the benchmark VAR onto their own lags and the current and lagged values of the artificial residual obtained from projecting the MFEV news shock series obtained from the non-Ramey VAR on to Ramey's shock series (i.e., MFEVORT2). Presented impulse responses are with respect to a one standard deviation change in the Ramey-independent component. Dashed lines represent 2.5th and 97.5th percentile Hall (1992) confidence bands generated from a residual based bootstrap procedure repeated 2000 times. Horizon is in quarters.

Figure 7: **Impulse Responses of SPF-Based Fiscal News Series to MFEV, MFEVORT, and the Ramey (2011) News Shock (Solid Lines).**



Notes: The SPF-based news series was constructed as the revision, between period $t-1$ and t, of expectations of growth in federal spending from period $t-1$ to period $t+3$, which is the longest horizon reported by the SPF. The impulse responses were obtained from projecting the SPF series onto its own four lags and the current and four lagged values of the MFEV shock, the artificial residual (MFEVORT) obtained from projecting the MFEV news shock series onto shock to the Ramey news series, and the shock to the Ramey news series. Presented impulse responses are with respect to a one standard deviation change in the shocks. Horizon is in quarters.