



BANK OF ENGLAND

Appendix to Staff Working Paper No. 638

Does partisan conflict impact the cash holdings of firms? A sign restrictions approach

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December 2016

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Does partisan conflict impact the cash holdings of firms? A sign restrictions approach

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1 Financial Constraint Based on Altman (1968) Z-Score

The results shown in Figure 1 use a firm's Altman Z-score as the determinant of financial constraint. A Z-score less than or equal to 1.81 indicates that a firm has a higher likelihood of failure. We thus consider these firms to be financially constrained. A firm with a Z-score greater than or equal to 2.99 has a lower probability of failure and is considered financially unconstrained.

Figure 1: Impulse Response of the Mean and *Median* Cash-to-total Assets Ratio Based on Altman Z-Score to a 10% Shock to Partisan Conflict

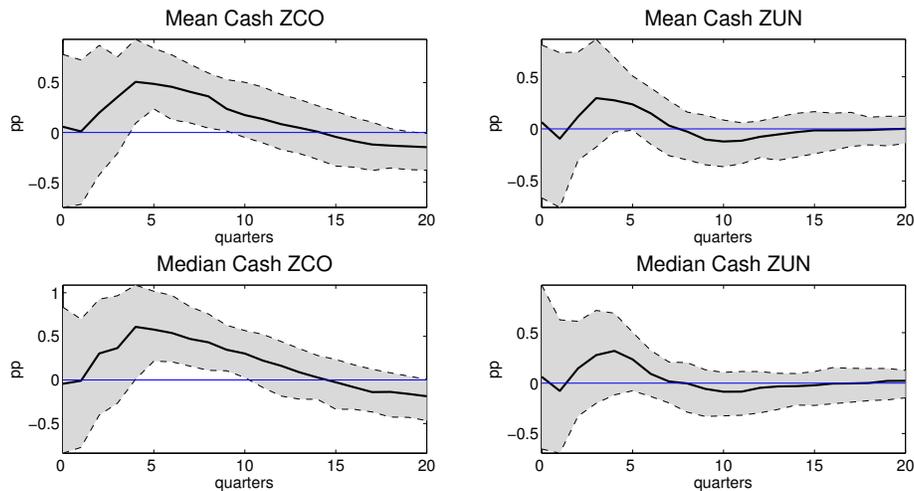
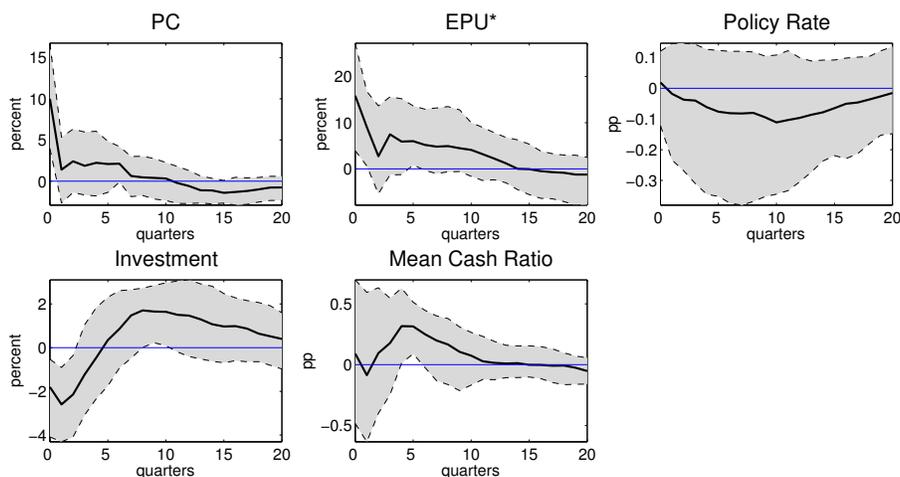


Figure depicts the median impulse responses of the mean cash-to-total assets ratio and the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014). Firms' Altman (1968) Z-scores are used as a determinant of financial constraint. Full results are available upon request.

2 Measuring Economic Policy Uncertainty with the Overall EPU Index

Index

Figure 2: Robustness of Impulse Response of the Mean Cash-to-Total Assets Ratio to a 10% Shock to Partisan Conflict Using the Overall EPU Index

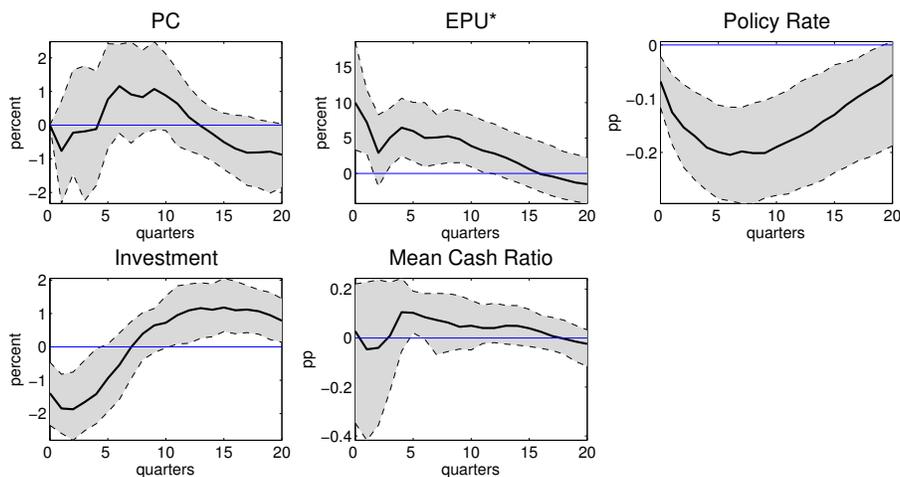


Note: The overall EPU index (EPU^*) is used rather than the news-based component only. The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014).

The results in the main text rely upon the news-based EPU Index as a proxy for economic policy uncertainty. As we mentioned in the section outlining the empirical model, the news-based measure is used because the PC Index is derived exclusively from news-based sources. Here, though, we verify that our baseline conclusions are robust to the overall EPU Index. Figure 2 shows that a 10% shock to the PC Index results in an increase in the mean cash-to-total assets ratio by about 3.5 percentage points above trend, again, approximately five quarters after a partisan conflict shock. This increase, though, is of a slightly smaller magnitude than the baseline results discussed in the main text.

As for a shock to economic policy uncertainty, a 10% rise in the overall EPU Index also results in an increase in the mean cash-to-total assets ratio. This result, presented in Figure 3, is consistent with the impact resulting from a shock to the news-based EPU and shows that the response of the mean cash-to-total assets ratio to an economic policy uncertainty shock is more muted than the response to a partisan conflict shock, regardless of which EPU Index we use. Figure 3 also shows similar responses of investment and the federal funds rate to a shock to the overall EPU Index.

Figure 3: Robustness of Impulse Response of the Mean Cash-to-Total Assets Ratio to a 10% Shock to the Overall EPU Index



Note: The overall EPU index (EPU^*) is used rather than the news-based component only. The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014).

3 Cholesky Decomposition

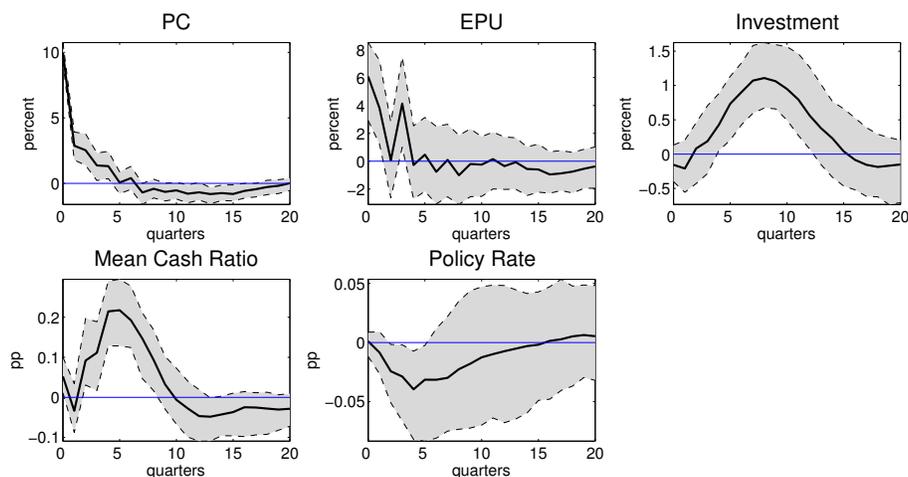
As another robustness check, we identify a partisan conflict shock through the common Cholesky decomposition (recursiveness assumption). We estimate the following VAR model:

$$B(L)y_t = d + \epsilon_t \quad (1)$$

where $y_t = [PC_t, EPU_t, I_t, Cash_t, FFR_t]'$.

As is well known in the macroeconomic literature, the ordering of the variables reflect the prior assumption an econometrician holds: variables ordered first are assumed to respond to other structural shocks with a time lag. The model is again estimated with Gibbs sampling with non-informative priors using four lags, as in the main text.

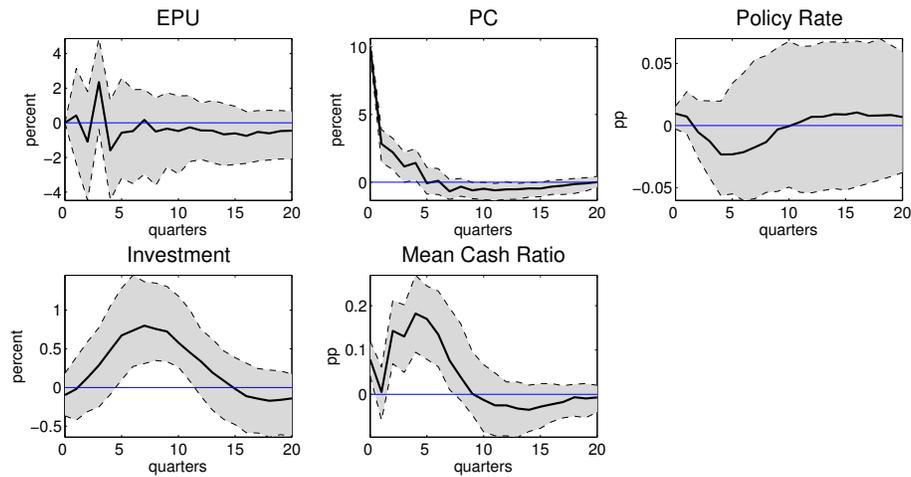
Figure 4: Robustness of Impulse Responses of Mean Cash-to-Total Assets to a 10% Shock to the Partisan Conflict Index using Cholesky Decomposition



Note: The solid lines depict the median impulse response and the dashed lines form the 68% probability bands. Identification is based on a Cholesky decomposition using the variable ordering discussed in Section 3.

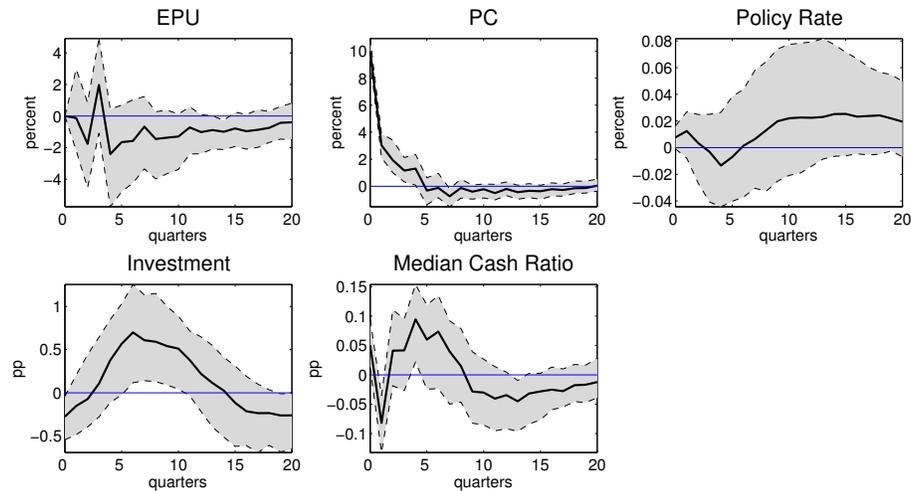
Figure 4 displays the estimated impulse responses of the model to a 10% positive shock to the PC Index. Overall, the predicted qualitative effects of this shock identified via Cholesky decomposition are similar to those from sign-restriction methods. The figure shows that an adverse partisan conflict shock causes economic policy uncertainty to rise. Compared with the baseline results, the rise in economic policy uncertainty is smaller under Cholesky decomposition. The magnitude of the rise in cash holdings is also milder, reaching a peak of 0.2 percentage points above trend five quarters after the shock. Private investment declines on impact, but the response is insignificant. These results are robust to various orderings, including changing the ordering of PC_t and EPU_t , or placing EPU_t at the end of the vector of variables as in Cheng, Hankins, and Chiu (2016). These results are shown in Figures 5, 6, 7, and 8.

Figure 5: Impulse Responses of Mean Cash-to-Total Assets to a 10% Shock to the Partisan Conflict Index Using Cholesky Decomposition with an Alternative Variable Ordering



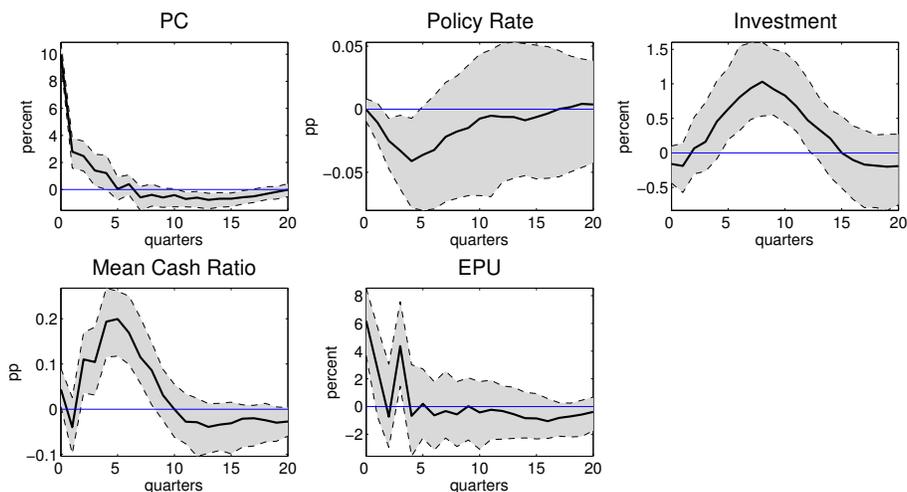
The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is based on a Cholesky decomposition with the PC Index placed in the second position as opposed to the first position, which is how the results are presented in the main text.

Figure 6: Impulse Responses of *Median* Cash-to-Total Assets to a 10% Shock to the Partisan Conflict Index Using Cholesky Decomposition with an Alternative Variable Ordering



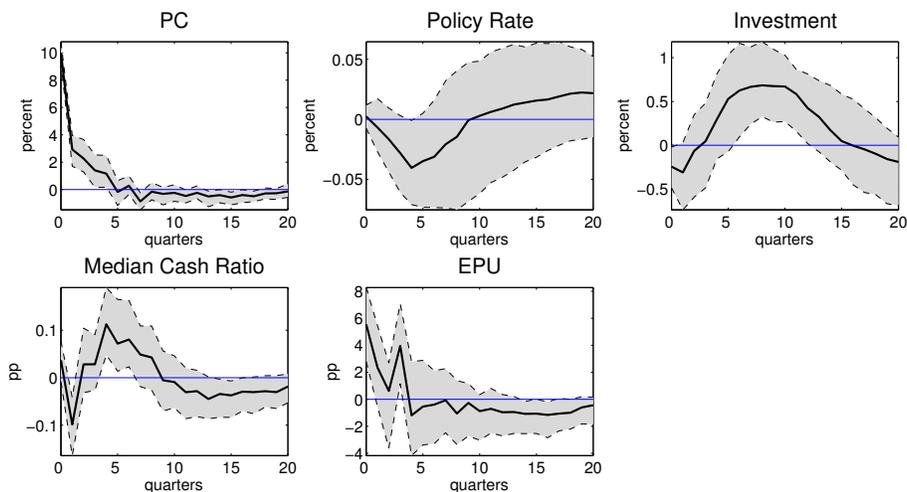
The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is based on a Cholesky decomposition with the PC Index placed in the second position as opposed to the first position, which is how the results are presented in the main text.

Figure 7: Impulse Responses of Mean Cash-to-Total Assets to a 10% Shock to the Partisan Conflict Index Using Cholesky decomposition with an Alternative Variable Ordering



The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is based on a Cholesky decomposition with the EPU Index in the last position as opposed to the second position, which is how the results are presented in the main text.

Figure 8: Impulse Responses of *Median* Cash-to-Total Assets to a 10% Shock to the Partisan Conflict Index Using Cholesky decomposition with an Alternative Variable Ordering



The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is based on a Cholesky decomposition with the EPU Index in the last position as opposed to the second position, which is how the results are presented in the main text.

4 Additional Robustness Checks

Below we present results using several different robustness checks. Figure 9 employs a two-sided Hodrick-Rescott (HP) Filter to detrend the variables PC Index, real private domestic investment, and the mean cash-to-total assets ratio. Figure 10 uses the growth rates of the PC Index, the news-based EPU Index, real private domestic investment, and the mean cash-to-total assets ratio. Figures 11 and 12 show results from shocks to partisan conflict and economic policy uncertainty, respectively, when the model is extended to five lags, and Figures 13 and 14 present the results from an economic policy uncertainty shock using the alternative sign and zero restrictions discussed in Section 6.2.1.

Figure 9: Impulse Response of Mean Cash-to-total Assets to a 10% Shock to Partisan Conflict. Data are detrended by a two-sided HP filter.

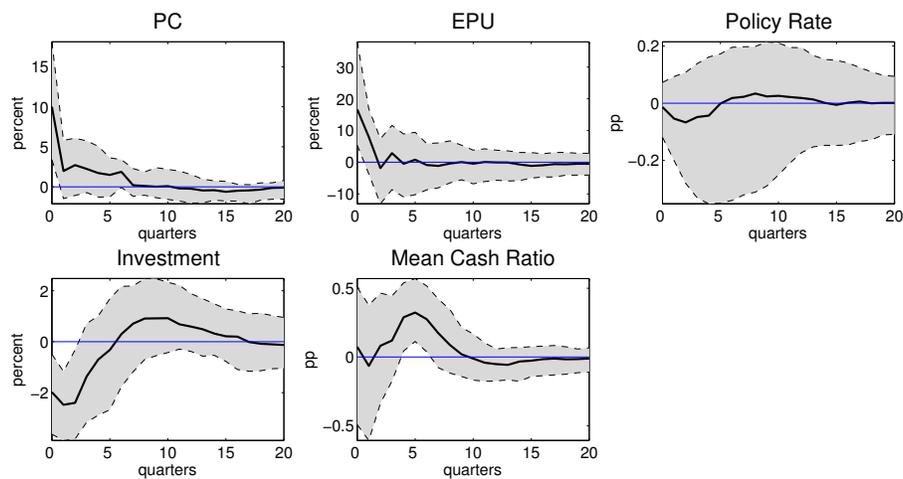


Figure depicts the median impulse responses of the mean cash-to-total assets ratio and the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014). The variables PC Index, real private domestic investment, and mean cash-to-total assets are detrended using a two-sided Hodrick-Prescott (HP) filter.

Figure 10: Impulse Response of the Growth Rate of Mean Cash-to-total Assets to a 10% Shock to Partisan Conflict

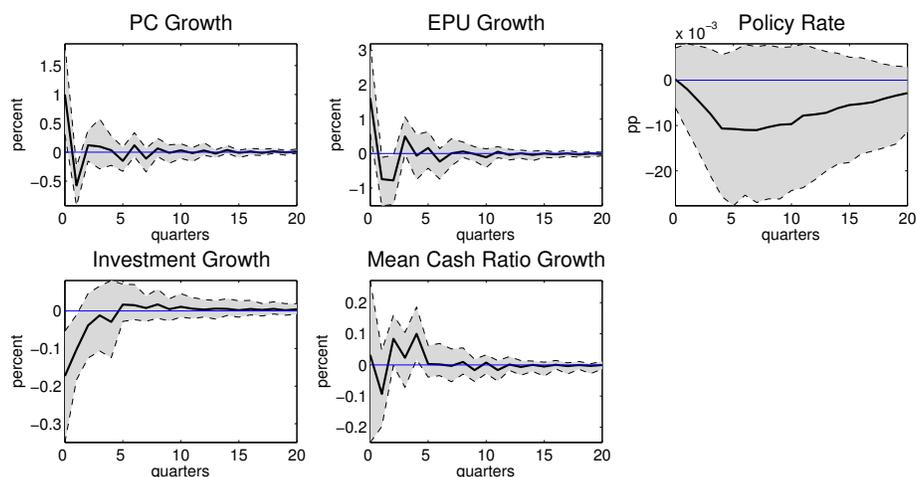
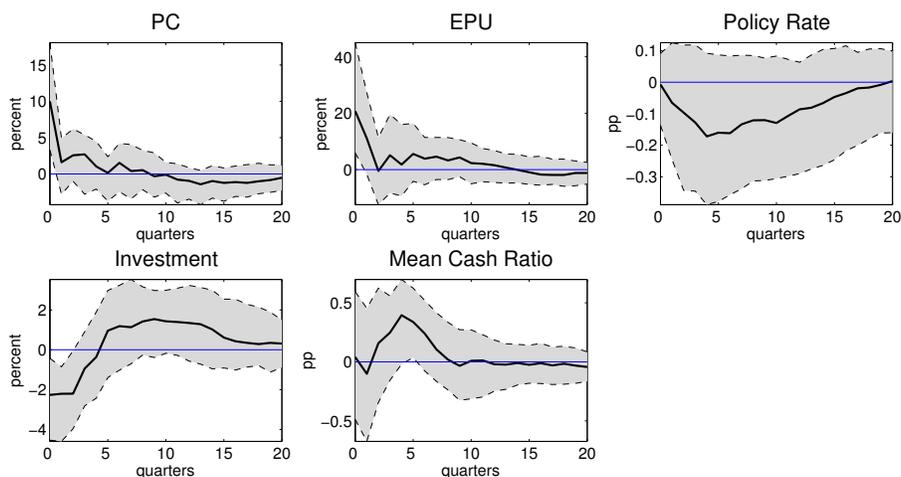


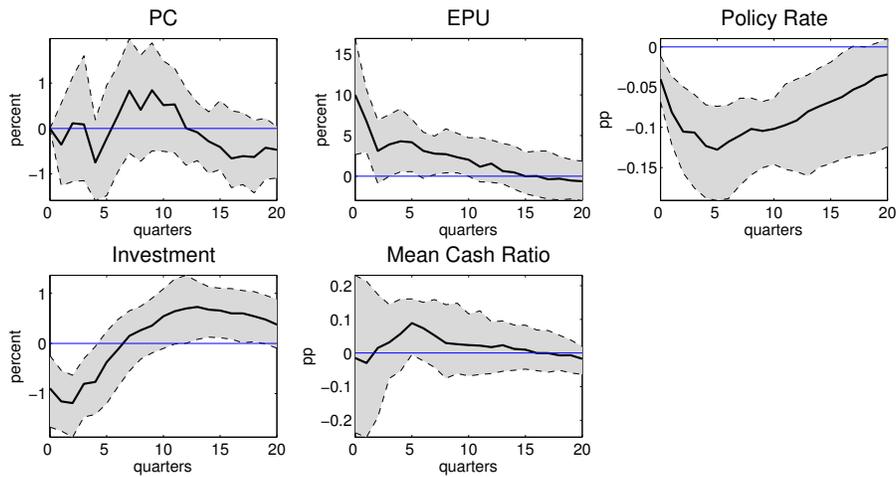
Figure depicts the median impulse responses of the mean cash-to-total assets ratio and the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014).

Figure 11: Impulse Response of the Mean Cash-to-Total Assets Ratio to a 10% Shock to Partisan Conflict Using Five Lags



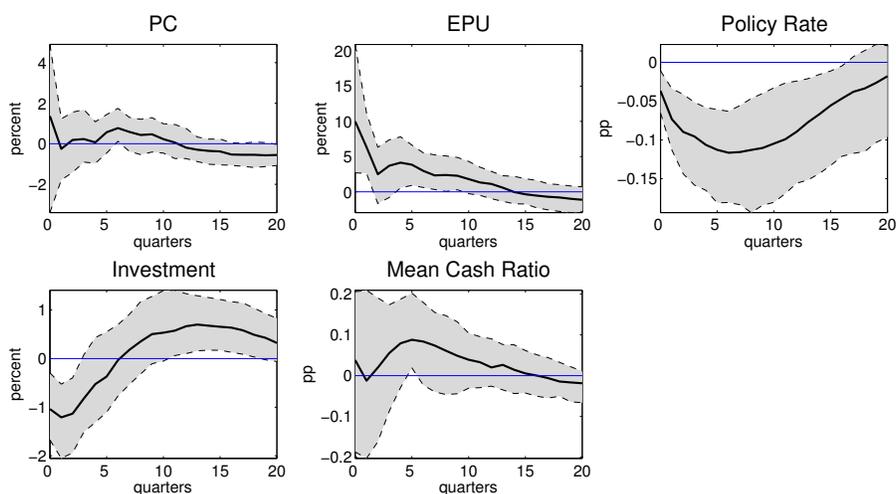
The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014). The estimated model uses five lags rather than the four lags that are used throughout the main text. Economic policy uncertainty is measured using the news-based EPU Index.

Figure 12: Impulse Response of the Mean Cash-to-Total Assets Ratio to a 10% Shock to the **EPU Index** Using Five Lags



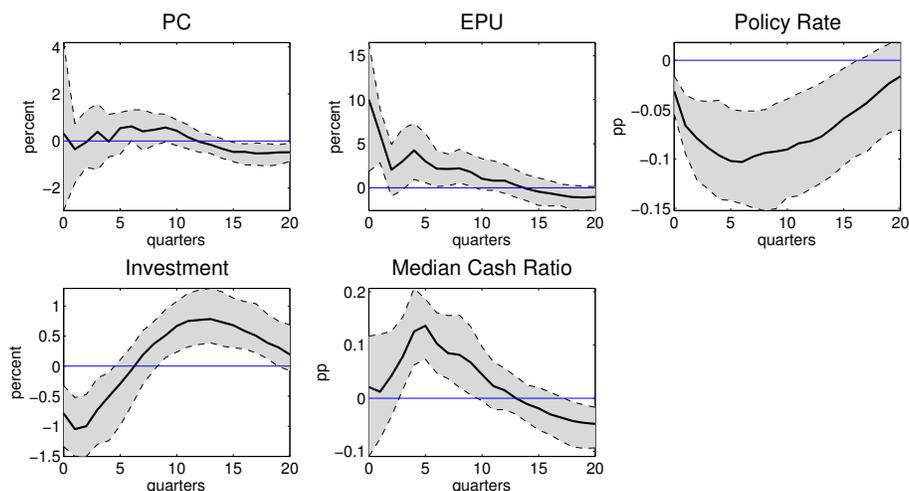
The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014). The estimated model uses five lags rather than the four lags that are used throughout the main text. Economic policy uncertainty is measured using the news-based EPU Index.

Figure 13: Impulse Response of Mean Cash-to-Total Assets to a 10% Shock to the **EPU Index** Across All Firms Using an Alternative Sign and Zero Restrictions Scheme



The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014). Sign and zero restrictions are imposed according to the alternative identification scheme presented in Table 3 in the main text.

Figure 14: Impulse Response of *Median* Cash-to-Total Assets to a 10% Shock to the **EPU Index** Across All Firms Using an Alternative Sign and Zero Restrictions Scheme

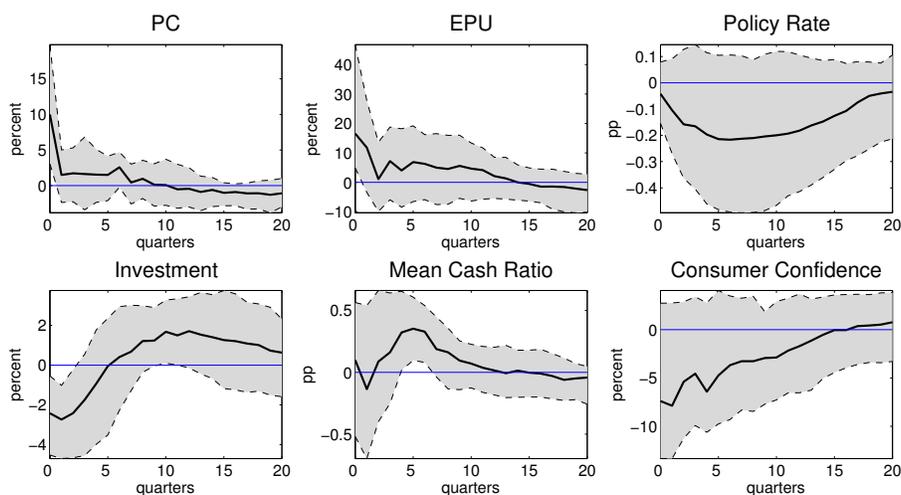


The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014). Sign and zero restrictions are imposed according to the alternative identification scheme presented in Table 3 in the main text.

5 Models incorporating Consumer Confidence and S&P 500 Indexes

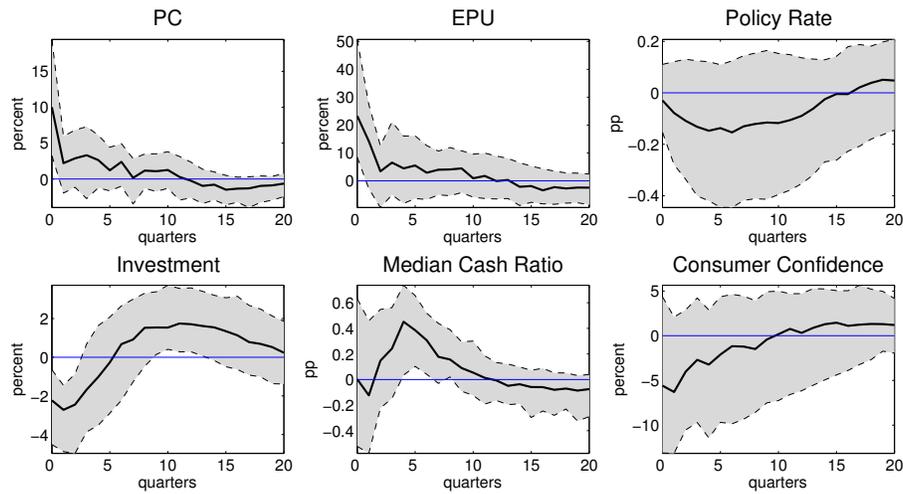
The remaining figures shows results obtained after augmenting the baseline model to incorporate consumer confidence and stock market activity. The proxy for consumer confidence is the University of Michigan Consumer Sentiment Index and the indicator for stock market activity is the S&P 500 Index. Both indexes are important economic indicators that could yield additional information about how partisan conflict shocks impact the economy. The partisan conflict shock is identified with the sign and zero restriction method, however we place no restrictions on the responses of the consumer confidence and S&P 500 indexes. The addition of these variables to the model does not affect our primary results. The mean and median cash-to-total assets ratios still increase in response to a partisan conflict shock. Furthermore, investment continues to decline upon impact of the shock.

Figure 15: Impulse Responses of Mean Cash-to-Total Assets to a 10% Shock to the Partisan Conflict Index **Incorporating the Consumer Confidence Index**



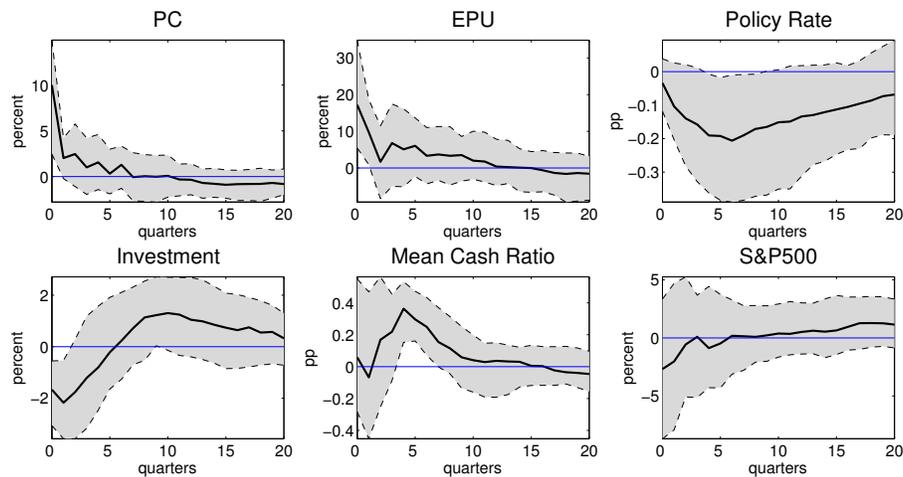
The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014).

Figure 16: Impulse Responses of *Median* Cash-to-Total Assets to a 10% Shock to the Partisan Conflict Index Incorporating the Consumer Confidence Index



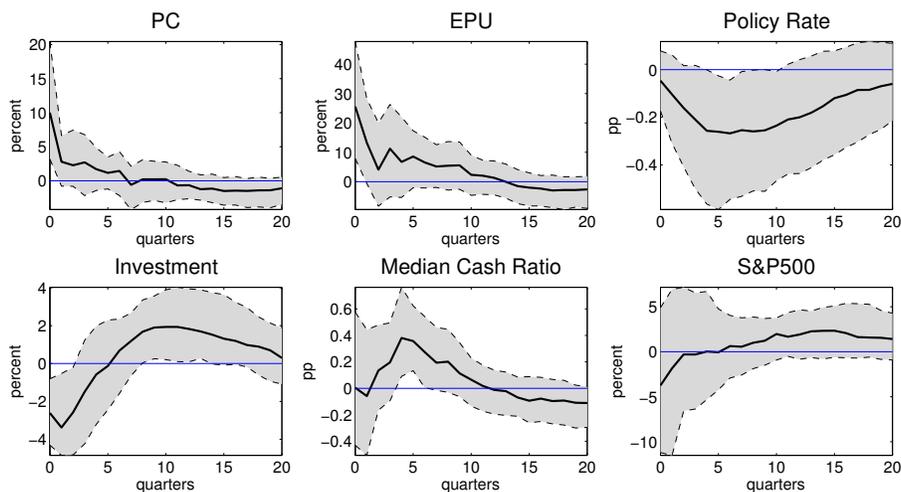
The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014).

Figure 17: Impulse Responses of Mean Cash-to-Total Assets to a 10% Shock to the Partisan Conflict Index Incorporating the S&P 500 Index



The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014).

Figure 18: Impulse Responses of *Median* Cash-to-Total Assets to a 10% Shock to the Partisan Conflict Index Incorporating the S&P 500 Index



The solid line depicts the median impulse response and the dashed lines form the 68% probability bands. Identification is made using sign and zero restrictions according to the algorithm proposed by Arias, Rubio-Ramirez, and Waggoner (2014).

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