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International spillovers of fiscal news shocks

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Abstract: This paper investigates the domestic and international transmission of U.S. fiscal news shocks emphasizing the importance of the sentiment channel for the global economy. We identify these shocks using federal government spending forecasts from the Survey of Professional Forecasters. Employing the local projection method, we find that anticipated increases in U.S. government spending are expansionary domestically, leading to improved sentiment and enhanced financial conditions. On the other hand, the U.S. dollar appreciates, and the U.S. trade balance deteriorates when future fiscal expansion is expected. In the international context, we apply panel local projection models across a broad set of countries and show that positive sentiment and improved financial conditions driven by U.S. fiscal news spill over, stimulating demand and output growth in other economies. However, we find no significant effect of currency depreciation on net exports in a broad sample as rising domestic demand tends to boost imports. In turn, in a subsample of countries with high trade exposure to the U.S., the trade channel becomes significant, while financial channel diminishes in importance. At the same time, sentiment channel appears to play a significant role in all subsamples. Finally, we find that positive fiscal news shocks have strong stimulating effects (both domestic and international) during US recessions but not in expansions.

Keywords: government spending, news shock, international spillovers, international business cycles

JEL codes: C32, C33, E32, E62, F41

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1 Introduction

Changes in expectations about future fiscal policy, driven e.g. by political events such as presidential election, impact both financial and macroeconomic variables well before the policies are implemented. This phenomenon is well-documented in the US context, see e.g. Forni and Gambetti (2016). However, much less is known about the international effects of such fiscal news shocks even though they are likely to occur due to high importance of the US economy for the global business cycle. This paper seeks to fill this gap by providing empirical evidence on fiscal news spillovers focusing on three main transmission channels: trade, financial and sentiment using a sample of 18 open economies.

To this end we identify spending news shocks using federal government spending forecasts from the Survey of Professional Forecasters (SPF). Next, we confirm previous findings on the domestic effects of these shocks in the US using the local projection method. We find that anticipated increases in US government spending boost domestic output via sentiment and financial channels. However, the trade channel works in the opposite direction as US dollar appreciation leads to trade balance deterioration. To address the paper's central question—the international spillovers of US spending news shocks—we apply panel local projection models. Our results show that improved sentiment and financial conditions in the U.S., driven by fiscal news, stimulate foreign economies by boosting domestic demand and output growth. However, in our baseline sample, currency depreciation has an insignificant effect on net exports outside the US, likely due to rising imports amid strong domestic demand. When limiting the sample to countries with high trade exposure to the U.S., the trade channel becomes significant, while the sentiment and financial channels weaken. In turn, dividing the sample into advanced and emerging economies we find that financial channel is important only for the former while sentiment channel remains significant across both advanced and emerging markets. Overall, we conclude that changes in the sentiment are the primary channel of international spillovers of U.S. fiscal news shocks across a broad set of countries. Apart from investigating various transmission mechanisms, we also provide new evidence on state-dependent effects of US fiscal policy. We find that spending news shocks have significantly positive effects during recessions both domestically and internationally, even though in the latter case differences with expansions are short-lived.

This paper is closely related to two strands of the literature. The first consists of the articles that identify the government spending shocks and measure their effects. In their seminal paper, Blanchard and Perotti (2002) identify the shock to government purchases using a standard Cholesky decomposition with government spending ordered first under the assumption that government purchases were predetermined within the quarter. They found that government purchases shocks raised not only GDP but also hours, consumption, and real wages.

However, as Ramey (2011) and Forni and Gambetti (2016) show, government spending

shocks identified in small fiscal VARs a la Blanchard and Perotti (2002) are predictable, a phenomenon called "fiscal foresight". In the presence of fiscal foresight, the identified government spending shock potentially suffers from the problem of non-fundamentalness due to anticipation effects of changes in fiscal policy as a result of decision and implementation lags.

The literature has proposed various methods to tackle the issue of non-fundamentalness and to address fiscal foresight in the identification of government spending shocks. One approach focused on measuring the expectations about future defense spending. Fisher and Peters (2010) construct a measure of excess returns of large US military contractors using their stock performance which is shown to anticipate future military spending shocks. Ramey (2011) constructs a defense news variable, changes in the expected present value of government spending due to military events, after reading periodicals. Ben Zeev and Pappa (2017) identify US defence news shocks as the shocks that best explain future movements in defence spending over a five year horizon and are orthogonal to current defence spending using the medium-horizon identification methods of Barsky and Sims (2011). All these contributions find an increase in output in response to an anticipated fiscal spending shock.

Another approach incorporated forecasts about future government spending into the empirical models. Ramey (2011) and Auerbach and Gorodnichenko (2012) augment traditional VARs with one-period ahead forecasts of government spending to control for the expected change in fiscal policy in the identification of surprise shocks. Forni and Gambetti (2016) construct fiscal news variable by summing up revisions to government spending forecasts of SPF over the next three quarters and embed it into VAR to identify fiscal news and surprise shocks separately. They find a larger effect of the former on output relative to the latter. They also document that US dollar appreciates in response to fiscal news shocks but depreciates with surprise shocks, attributing this to expectations about future spending reversals. In a similar vein, Yong and Dingming (2019) identify surprise spending shock using sign restrictions and news spending shock using medium-horizon forecast error variance decomposition following Barsky and Sims (2011) and Ben Zeev and Pappa (2017) in a large Bayesian VAR setting. They find increasing output and long-run rates in response to the news shock. Other papers investigate whether stimulating effects of fiscal policy news are state-dependent documenting positive impact in recessions, see Auerbach and Gorodnichenko (2012) and Caggiano et al. (2015).All in all, findings in this strand of the literature highlight the importance of accounting for fiscal foresight when studying the effects of government spending shocks.

The second stream of research related to our paper focuses on the international spillover effects of these shocks. A number of them investigate the foreign effects of the US fiscal policy. Corsetti and Müller (2013) identify the US fiscal spending shock via Cholesky restrictions or forecast errors and find positive spillovers to the Euro Area and the UK, although they do not

document evidence of trade channel effects. Nicar (2015) identifies US government spending shocks via sign restrictions following Mountford and Uhlig (2009) and find positive spillover effect on Canada but negative on the Japanese and UK economies in the first three years. Faccini et al. (2016) use dynamic factor model and credit financial channel for the positive spillovers effect as an alternative to the trade channel given that they find an insignificant effect on the US trade balance (vis-à-vis the EA and the UK) following the government spending shock. They claim that real rates abroad decrease due to spending reversal which in turn stimulates consumption and investment.

Other papers focus on spillovers to shocks originating in multiple countries. Auerbach and Gorodnichenko (2013) construct a measure of fiscal innovation in OECD economies based on one-period ahead forecast errors and calculate the shocks for the receiving country as a sum of trade-weighted fiscal innovations. They find positive output spillovers which are dependent on the state of the business cycle in both the source and the recipient countries. Blagrave et al. (2018) identify the domestic fiscal spending and tax surprise shocks in five source countries using Blanchard and Perotti (2002) approach and estimate the spillovers on 55 recipient economies using trade linkages between source and recipient economies. They estimate positive spillover effects of surprise spending shocks on output and positive spillovers on consumption, investment, and trade balance only during zero lower bound episodes. Ilori et al. (2022) investigate domestic and international transmission mechanism of fiscal policy shocks originating in the United States and in Germany after controlling for anticipation effects of changes in fiscal policy by including government spending growth forecast variable as in Born et al. (2013). They show that the terms of trade depreciate following a domestic fiscal expansion, thus transferring some of the increased domestic purchasing power abroad. As a result, US government spending shock has a significant positive effect on the GDP of the remaining six G7 economies.

So far, all the papers mentioned above examined the spillover effects of the surprise government spending shock. The only study to our knowledge that examines the spillover effects of the news shocks is Ong (2018) where the author shows that the US fiscal spending news shocks – identified à la Forni and Gambetti (2016) – drive the Canadian long-term nominal interest rates.

This paper contributes to the literature by being the first to estimate the international spillover effects of fiscal news shocks on a broad sample of countries and to document their transmission channels looking at responses of a number of key variables. Moreover, we provide novel results on state-dependent US fiscal news shocks investigating their impact on domestic and foreign economies.

The rest of the paper is structured as follows. Section 2 presents the modelling framework and the data used in the study, section 3 describes results concerning domestic effects of fiscal news shocks, section 4 – their international counterparts, while section 5 documents how the

transmission of the US fiscal policy depends on the state of the US economy. Section 7 concludes.

2 Empirical model and data

In order to investigate transmission channels of US fiscal policy we proceed in three steps. First, we identify US government spending news shocks. Second, we estimate local projection models using the US data in order to validate the domestic impact of identified shocks. Finally, we estimate a set of panel local projections that provide the spillover effects of government spending shocks. Sections below present the method used in these steps in more details as well as data we utilize.

2.1 Shock identification

To tackle the problems posed by fiscal foresight, we incorporated a fiscal news variable, a proxy for anticipated future government spending, to our empirical model following the approach proposed by Forni and Gambetti (2016). Our fiscal news variable is a sum of forecast revisions over the next three quarters:

$$n_t^{13} = \sum_{h=1}^{3} \left[E_t g_{t+h} - E_{t-1} g_{t+h} \right]. \tag{1}$$

where $E_t g_{t+h}$ is the time t average SPF real federal government spending growth forecast for h period ahead. We opt to use cumulative SPF forecast revisions since cumulative forecasts carry more information about future government spending relative to the single period forecasts and they anticipate changes in the Ramey military news variable.[1]

We identify the US government spending news shocks by running the following autoregressive distributed lag (ARDL) model:

$$n_t^{13} = \alpha_n + \boldsymbol{\delta}(L) n_t^{13} + \boldsymbol{\gamma}(L) \mathbf{x}_t + \varepsilon_t \tag{2}$$

where n_t^{13} is the US fiscal news variable given in Eq. 1, $\mathbf{x}_t$ is the vector of control variables, $\boldsymbol{\delta}(L)$ and$\boldsymbol{\gamma}(L)$ are p-order lag polynomials, and ε_t is the residual.

The data for the variables in control vector, $\mathbf{x}_t$, in the baseline model comes from federal government consumption expenditures and investment spending (Government Spending), federal government current tax receipts (Tax Receipts), Gross Domestic Product (GDP), Trade Weighted Nominal U.S. Dollar Index (Exchange Rate), exports less imports over

[1] Forni and Gambetti (2016) showed that cumulative forecasts over four quarters has the lowest mean-square errors (see Table 1 on p. 70). Caggiano et al. (2015) found that cumulative SPF forecasts Granger cause Ramey military news variable for the sample between 1980Q3 to 2010Q4.

gdp (Trade Balance), 10-year treasury rate (Interest Rate - Long), and unemployment rate (Unemployment). The variables Government Spending, Tax Receipts and GDP enter into model in real growth terms after being divided by the GDP implicit price deflator. These variables – as well as Exchange Rate – are transformed to logs and subtracted from preceding period. The remaining variables enter into model in levels. Further details on our data can be found in Table 7.

In the baseline specification, we assume Government Spending has a contemporaneous impact on US fiscal news whereas all other variables have a lagged impact. This essentially corresponds to a Cholesky ordering where Government Spending is ordered first, Fiscal News second, and so on which is a standard practice in the fiscal news shock literature. Hence, the residual given in Eq. 2, ε_t , is our identified fiscal spending news shock.

Figure 1 plots the fiscal news shocks obtained from Eq. 1. Positive (negative) values mean that professional forecasters revise their expectations about future spending upward (downward). The news shock displays positive spikes during certain events such as Gulf War and Clinton's elections in early 90s, 9/11 attacks followed by War in Iraq, American Recovery and Reinvestment Act of 2009 proposed in response to the Great Recession. The negative spikes also coincides with important events such as Gramm–Rudman Acts in 1986 and 1987, fall of Berlin Wall in 1989, and Trump's election in 2016 and his first budget proposed in 2017 both with planned federal spending cuts.

We test the informational sufficiency of the estimated fiscal news shocks as suggested in Forni and Gambetti (2014). The idea of their method is that if a model estimated to recover the shock spans the information set of the agents, then the estimated shocks should be orthogonal to all past information. We extract principal components of FRED-QD database of McCracken and Ng (2020), which is a large US macroeconomic data set, to represent available macroeconomic information. Table 2 reports the p-values of the F-test of the regression of the fiscal news shocks on 1 to 4 lags of the first 1 to 4 principal components. The results from Table 2 indicate that the null of orthogonality is never rejected and the estimated shocks pass the informational sufficiency test in all cases.

2.2 Domestic effects

In order to verify the domestic effects of US fiscal news shocks we run the following local projection based on Jordà (2005) method:

$$y_{t+h} - y_{t-1} = \alpha_h + \beta^h \varepsilon_t + \boldsymbol{\gamma}(L)\mathbf{x}_t + \nu_{t+h} \tag{3}$$

for $h = 0, 1, 2, ..., 15$, where y_t is variable of interest at time t in the US, $\mathbf{x}_t$ is vector of control variables, $\boldsymbol{\gamma}(L)$ is polynomial in the lag operator, and ε_t is the identified fiscal spending news shock as described in the previous subsection. Our variable of interest, y_t, corresponds to one

of the following fourteen macroeconomic, financial and sentiment variables in time t in the US: federal government consumption expenditures and investment spending (Government Spending), federal government current tax receipts (Tax Receipts), Gross Domestic Product (GDP), private services and nondurables consumption (Consumption), durable consumption and private fixed investment (Investment), exports less imports over gdp (Trade Balance), Trade Weighted U.S. Dollar Index (Exchange Rate), 10-year treasury rate (Interest Rate - Long), federal funds rate (Interest Rate - Short), Moody's Seasoned Baa Corporate Bond Yield Relative to Yield on 10-Year Treasury (BAA Spread), Total Credit to Private Non-Financial Sector (Credit NFS), Net Percentage of Domestic Banks Tightening Standards for Commercial and Industrial Loans to Large and Middle-Market Firms (Credit Tightening), Index of Consumer Sentiment (Consumer Sentiment) and Business Conditions Expected in the Next 12 Months (Business Sentiment) of University of Michigan Consumer Survey. Government Spending, Tax Receipts, GDP, Consumption, and Investment are in real terms after being divided by GDP deflator. All variables except Interest Rates and BAA spread are in logs. Our vector of baseline control variables, $\mathbf{x}_t$, contains the same set of variables used in the identification of fiscal spending news shock. Apart from these variables, the set of controls contains lags of the US fiscal news variable and endogenous variable from each specification which enters into Eq. 3 in first differences for Interest Rates and BAA Spread and in growth rates for all others. The details of data sources are described in Table 7.

The data span the period 1981Q3-2019Q4 at a quarterly frequency. In the baseline regression, we estimate the model on 4 lags consistently with data frequency. However, we test this and other assumptions against several alternatives described in section 6. We aim to determine the impact of the fiscal news shocks on the US economy at business cycle frequencies; hence, we look at 16 quarters (4 years) in our impulse analysis. In order to account for possible serial correlation in the error terms, we use the Newey-West correction for our standard errors.

2.3 International spillovers

Similarly, to domestic effects of government spending shocks, we investigate their international spillovers by the means of panel local projections:

$$y_{j,t+h} - y_{j,t-1} = \alpha_{j,h} + \varepsilon_t \beta^h + \boldsymbol{\gamma}^{\boldsymbol{h}}(\boldsymbol{L})\mathbf{x}_{j,t} + \nu_{j,t+h} \tag{4}$$

for $h = 0, 1, 2, ..., 15$ quarters, where $y_{j,t}$ depicts one of the following fourteen macroeconomic, financial and sentiment variables in time t in country j: GDP, consumption, investment, exports, imports, net exports contribution to GDP scaled by country average trade openness, 3-month interest rate, 10-year government bond yield, the nominal exchange rate against the US dollar, stock price index, consumer and business sentiment indicators, credit spread

between interest on loans to non-financial corporations (NFCs) and short-term interest rate, loan volume to NFCs. As in the context of domestic effects ε_t represents the fiscal spending news shock, while the control variables include a number of lagged macroeconomic and financial indicators that are the same for all regressions. In the baseline specification they include: past news shocks, domestic and global (OECD) GDP growth rates, natural logarithm of VXO index measuring market uncertainty, exchange rate against the US dollar and oil prices as well as levels of domestic short-term interest rate and CPI inflation. Apart from these variables, the set of controls contains lags endogenous variable from each specification.

In the baseline regressions we assume 4 lags as in the specification for the US economy presented in section 2.2. The model is assumed to convey the country fixed effects $\alpha_{j,h}$, as is standard in the literature, while β^h captures the impact of spending news shocks on variables of interest. Finally, $\nu_{j,t+h}$ are the residuals whose standard errors are estimated using Driscoll and Kraay (1998) to account for cross-section dependence. The dataset contains eleven advanced economies: Australia, Canada, Israel, Korea, New Zealand, Norway, Sweden, France, Germany, Japan, United Kingdom and seven emerging markets: Chile, Colombia, Czechia, Hungary, Mexico, Poland and Turkey. It spans the time period 1970q1 - 2019q4 subject to data availability. Data sources are described in Table 7.

3 Domestic effects of government spending shocks

Figures 2 and 3 display the impulse response obtained from the estimation of Eq. 3. The solid lines are the mean responses of the US variables to a US fiscal news shock while the shaded area represents 68 percent confidence bands.

First, focusing on the responses of fiscal variables in Figure 2, we notice that government spending does not change on impact but increases gradually over time and then stabilizes in response to the fiscal news shock. This is consistent with the informational content of the fiscal news variable since the fiscal news shock is expected to capture the movements in future government spending. We do not find any significant change in the Tax Receipts suggesting that higher government spending expenditures are funded by higher debt.

Turning to the macro variables in Figure 3, we see that GDP increases slightly on impact, peaks in the first year, and then remains positive until it turns negative at the end of the third year. However, the responses are statistically significant only in the first two years implying the short-run expansionary effect of fiscal news shocks. The behavior of Consumption and Investment is similar to GDP, their responses are positive and significant in the first two to three years, but afterward become insignificant. The US dollar appreciates and the trade balance worsens in response to the fiscal news shock. These findings echo the results of Forni and Gambetti (2016) in which authors argue that agents expect higher future government spending following news shock which drives long-term interest rates up, appreciates the US

dollar, and eventually causes a trade deficit. The same mechanism is present in our empirical work since long-term interest rates increase in the first few quarters. Overall, the evidence suggests that fiscal news shock stimulates the economy in the first couple of years and then this positive impact disappears.

To explore the possible transmission channels of the fiscal policy on the economy, in particular the crowding in effects of government spending on consumption and investment in the short-run, we analyze the responses of several confidence and financial indicators. On the confidence side, both US business and consumer sentiments increase in response to the fiscal news shock and then the positive impact diminishes after the first year. At the same time financial conditions improve. Risk premium, approximated by BAA spread, declines on impact and remains negative in the first five quarters before reverting to the initial level. Together with less tight credit standards this translates into higher credit supply to non-financial firms. On the other hand, interest rates increase on impact as the central bank counteracts an expansionary shock, but they fall after a few quarters as the shock impact on GDP weakens. Overall, improving confidence and financial variables suggest that consumers and businesses are more optimistic and investors believe in higher business growth following the fiscal news shock which explains the crowding in effects.

4 Evidence on international spillovers

The international effects of U.S. government spending shocks are illustrated in Figures 4 and 5. Following the positive news shock of the same size as in section 3, the business sentiment index in other countries gradually improves reaching the peak after 1 year, in tandem with its U.S. counterpart. The favorable sentiment is reflected in stock prices rising gradually by 2% over 2 years. Moreover, improving financial conditions in the U.S. spill over to other countries, contributing to credit spreads narrowing by 5 bps within one year. At the same time interest rates go down for a few quarters which may be attributable to a decrease in risk premium. Lower interest rates together with positive sentiment support lending to non-financial corporations that increase gradually by almost 0.5% after 2.5 years as well as investments which grow by 0.5%. The rise in investment demand is accompanied by consumption expansion which translates into output growth by 0.2%. The contribution of net exports is statistically insignificant on impact. On the one hand exports rise due to currency depreciation against the U.S. dollar. On the other hand, however, higher domestic demand boosts imports, rendering the net export response neutral. Notably, consumer sentiment remains unaffected by U.S. expansionary fiscal news, underscoring the critical role of corporate and financial sectors in the international transmission of these shocks.

In order to shed more light on the relative importance of transmission channels we divide the sample into three subsamples. Two of these consist of divergent groups of countries:

advanced economies (AEs) and emerging market economies (EMEs), while the third includes countries with high trade exposure to the US (Canada, the United Kingdom, Germany, Korea, Japan, and Mexico).

Comparing spillovers to AEs and EMEs (Figures 6 and 7, respectively) we notice a limited role for the financial channel, as it appears to be at work only in AEs, where rising loans and falling spreads are observed. In contrast, EMEs experience a temporary increase of credit spreads, while corporate lending remains statistically insignificant. The business sentiment channel, however, seems to operate in both groups, though it is quantitatively stronger in EMEs, which translates in higher GDP growth in EMEs as compared to AEs following US fiscal expansion. On the other hand, the trade channel seems to play a minor role in both groups, as – similarly to the full sample results – rising exports are offset by increasing imports.Interestingly, this pattern changes when we examine countries with high trade exposure to the US (Figures 8 and 9). In this group, export growth significantly outpaces imports, leading to a substantial increase in net exports. Meanwhile, the business sentiment is still present, while financial looses importance as credit rises insignificantly limiting the rise in domestic demand. All in all our findings suggest that the sentiment is the primary channel of international spillovers of U.S. fiscal news shocks in the sample.

5 Non-linear effects of news shocks

In order to understand deeper domestic and international effects of fiscal news shocks, we follow the literature that investigates state-dependent policy effects. To this end we identify recession and expansion periods in the US, estimate impulse response to fiscal news shocks in these two states of the economy as well as their international counterparts.

5.1 Domestic economy

To account for the possible state dependence, we modify Eq. 3 as follows and estimate over the horizon h:

$$y_{t+h} - y_{t-1} = F(z_{t-1}) \left[\alpha_{R,h} + \boldsymbol{\gamma}_R^h(L)\mathbf{x}_t + \beta_R^h \varepsilon_t\right] + [1 - F(z_{t-1})] \left[\alpha_{E,h} + \boldsymbol{\gamma}_E^h(L)\mathbf{x}_t + \beta_E^h \varepsilon_t\right] + \nu_{t+h}, \tag{5}$$

where $\mathbf{x}_t$is the vector with same set of control variables used in Eq. 3, ε_t is fiscal news shock, the coefficients β_R^h and β_B^h measure the responses of the variable y_t in horizon h to the shock during recessions (state R) and expansions (state E), respectively, and $\boldsymbol{\gamma}_R^h(L)$ and $\boldsymbol{\gamma}_E^h(L)$ are two-order lag polynomials. We select lag length two considering the fact that there are only a few states of recessions in our sample. In the above equation $F(z_{t-1})$ is a transition function which can be interpreted as a measure of probability of being in a recession given

by:

$$F(z_t) = \frac{\exp(-\gamma z_t)}{1+\exp(-\gamma z_t)}, \gamma > 0, z_t \sim N(0,1), \tag{6}$$

where z_t is a standardised transition variable that regulates transition from a state to another and γ is a smoothness parameter which affects the probability of being in a recession $F(z_t)$. We fix $\gamma = 2$ to match the observed frequencies of the US recessions as identified by the NBER business cycle dates, that is, 12% in our sample and follow Auerbach and Gorodnichenko (2012) using the seven quarter centered moving average of the growth rate of real GDP for the transition variable z_t. As a result, the current state of the economy is impacted both by previous and future periods which in theory could pose a risk to mislabel the current state if economy is about to change the state. However, in our case high realizations of $F(z_t)$ are associated with recession periods while turning points of business cycles seem to coincide well with changes in transition function as Figure 10 shows..

Figure 11 exhibits the responses of fiscal and macro variables to a fiscal news shock during recessions and expansions. Government spending increases gradually over time in both states; however, it increases faster in recessions and with a few quarters lags in expansions. This might be due to faster consensus and legislation process on the size of fiscal stimulus during recessions to stimulate the economy. Tax receipts do not show a significant pattern during recessions, whereas they gradually decline during expansions in response to a fiscal news shock possibly due to a larger increase in GDP relative to total federal tax revenue.

The responses of macro variables to a fiscal news shock are quite different under different states. GDP and investment increase in the recession but decline in the expansion and the differences in the responses are statistically significant. Consumption also behaves similarly but confidence intervals mostly overlap. On the other hand, the trade balance responds oppositely, worsens during recessions, and improves during expansions. At the same time US dollar is on impact stronger in recession than in expansion following the fiscal news shock. This suggests that the announcement of fiscal stimulus during a recession improving growth expectations leads to increasing demand for the US dollar. Overall, we find that fiscal news shock stimulates domestic activity when the economy is in recession as Auerbach and Gorodnichenko (2012) and Caggiano et al. (2015).

Finally, looking at the confidence and financial indicators, we find an increase in consumer and business sentiment in response to a news shock only in the recessionary regimes. The employment of fiscal policy during low economic activity seems to improve the expectations of consumers and investors for the future economy. The financial conditions, on the other hand, provide mixed behavior. Risk premium increases but interest rates with long maturity decline during recession whereas the opposite happens during expansions and the differences in responses across different states are significant. We do not find significant differences in the responses of short-term rates and credit conditions between the regimes.

5.2 International spillovers of state-dependent fiscal news shocks

In this section we address the issue of state-dependent spillovers of fiscal new shocks. To this end, we use transition functions estimated for the US and run panel local projection of the form:

$$y_{j,t+h} - y_{j,t-1} = \alpha_{j,h} + (1 - F(z_{t-1}))\left(\alpha^{E,h} + \varepsilon_t \beta^{E,h} + \boldsymbol{\gamma}^{\boldsymbol{E,h}}(\boldsymbol{L})\mathbf{x}_{j,t}\right) + ... \\ ... + F(z_{t-1})\left(\alpha^{R,h} + \varepsilon_t \beta^{R,h} + \boldsymbol{\gamma}^{\boldsymbol{R,h}}(\boldsymbol{L})\mathbf{x}_{j,t}\right) + \nu_{j,t+h} \quad (7)$$

where $\mathbf{x}_t$is the vector of control variables that we use the baseline panel estimation (see Eq. 4). Consistently with our specification of Eq. 3 we set the number of lags to two. As we show in section 6, panel regression assuming two lags points provides similar impulse responses as the baseline 4-lag estimation, even though some of them become statistically insignificant.

Figure 13 presents the impulse responses of foreign variables to US fiscal news shocks conditioned on the state of the US economy. In line with the evidence for the US, we find that positive news shocks have expansionary effects in other economies mostly during US recessions. This results concern all three transmission channels that we investigate: trade, sentiment and financial. In case of trade, positive GDP response during recessions triggers export growth in other economies amid insignificant depreciation of their exchange rates. At the same time, stimulating effects of fiscal news shocks for the sentiment and GDP growth in the US during recession support business sentiment and investments abroad in first four quarters after the shock. Against this background, financial conditions improve as credit spread go down and credit growth increases following its US counterpart.

Admittedly, most of positive and statistically significant differences in international spillovers between expansions and recessions are short-lived and occur in the first year after the shock. It suggests that in the longer run it is difficult to disentangle the effects of fiscal news shocks during recessions and expansions within our framework. This may be due to country-specific conditions that may impact their long-lasting responses to a the US shock on top of the state of the US economy. Accounting for them, however, would imply another layer of state-dependence which has to be left for future work given still relatively short samples.

6 Robustness checks

We validate the robustness of results in three dimensions. First, we check whether the shock identification method affects the results – to this end we propose alternative specifications of Eq. 2 by: i) including Index of Consumer Sentiment as an additional control variable and allowing it to have contemporaneous effect on fiscal news variable, ii) using purged fiscal news variable, we regress fiscal news variable on the sums of forecasts revisions of real GDP growth and use the residual from this regression to isolate the impact of other news shocks

in fiscal spending forecasts, iii) allowing fiscal news to have contemporaneous impact on all variables (ordering fiscal news variable first in Cholesky order). We provide the results of these robustness checks on domestic variables in Figures 14, 15, and 16, and on international spillovers in Figures 7, 20 and 21 by keeping Eqs. 3 and 4 same as in the baseline model. We find they are in line with the outcome from the baseline model.

Second, we investigate the impact of different specifications in Eq. 3 on the US domestic responses by: i) setting the number of lags to two (Figure 17) and ii) adding lagged stock prices as an additional control variable to account for news other than fiscal ones (Figure 18). Third, , we check modifications in the specification of the panel estimation with respect to number of lags (two instead of four), see Figures 23 and 24 as well as verifying set of control variables by adding lagged stock prices (Figure 22). Most of the results in these alternative specifications hold, even though some responses become statistically insignificant.

7 Conclusions

In this paper, we analyze the international spillover effects of the US fiscal news shocks. Since part of the federal government spending is anticipated in advance due to legislation and implementation lags, a phenomenon called fiscal foresight, we first identify the shocks – the changes in federal government spending expected to be implemented. Then, we estimate the impact of these shocks on the US economy and find that they raise output and crowd in private consumption and investment in the short-run. Next, we measure the cross-country spillover effects. Our results show that positive US fiscal news shocks boost demand and expand the economic activity in the recipient countries.

When we inspect the spillover effects we find that among two traditional transmission channels, finance, and trade, the former is at play in our sample. Both short and long-run interest rates decline, and credit volume increases in response to the shock. On the other hand, there is no evidence of a positive impact of trade channel in the whole sample. Although exports increase, the imports rise as well, and zero net effect on trade balance is observed. Focusing on the subsample of countries with strong trade linkages with the US, we find improvement in their trade balance. On top of these, we document a third channel where the global business sentiment and stock prices increase following the US fiscal news shock. Across different country samples, the business sentiment channel is robust. In contrast, the finance channel operates largely in advanced economies. Therefore, our work stresses confidence as an important international spillover mechanism of US fiscal policy.

Finally, we document non-linear effects of US fiscal news shocks, both domestically and internationally. Spending news shocks turn out to have strong stimulating impact for the domestic output and demand during US recessions driven by improving sentiment and financial conditions. Expansions, on the other hand, are characterized by either insignificant or

even negative responses to positive fiscal news shock, with the main exception being rising trade balance. State-dependent domestic effects of fiscal policy spill over to other countries through all three channels considered in the paper. Positive impact of the fiscal news on the US economy in recessions supports exports, sentiment and financial conditions in other economies resulting in significantly higher output abroad in the short run during US recessions than in expansions.

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Tables and figures

Table 1: List of variables in local projection models

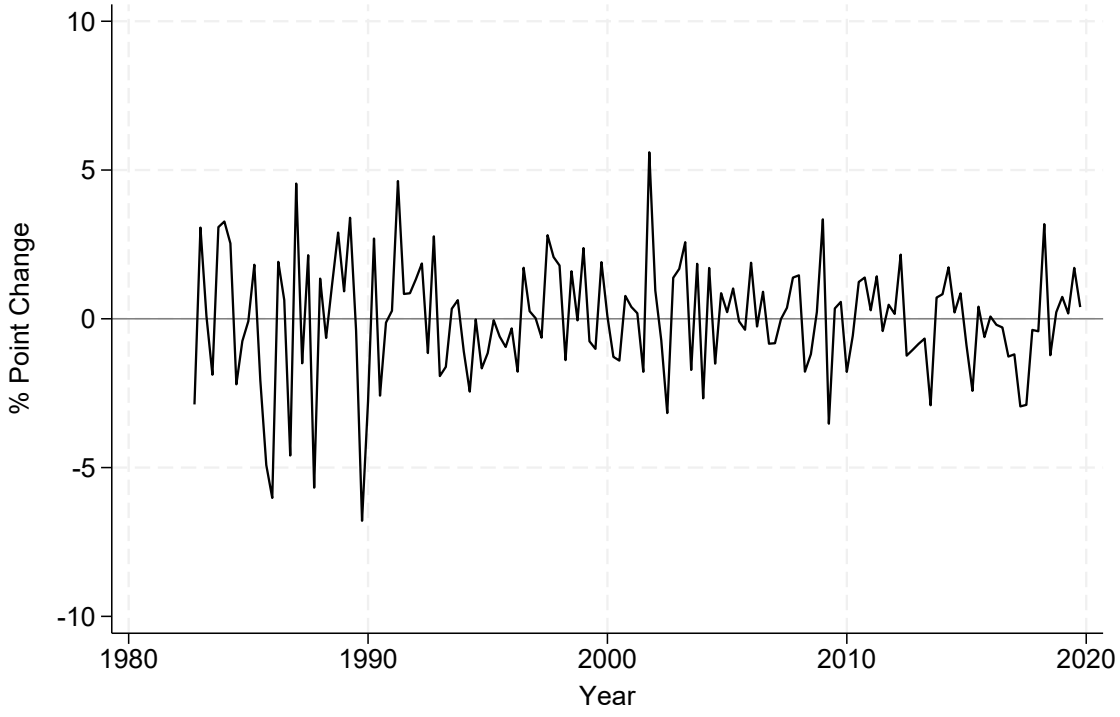
Variable Description	Data source	Data description
Government Spending,	BEA	Federal Government Consumption Expenditures and Gross Government Investment
Tax Receipts	BEA	Federal Government Current Tax Receipts
Trade Balance	BEA	Export less Imports divided by GDP
GDP	Fred	Nominal Gross Domestic Product
Consumption	Fred	Personal Consumption Expenditures: Services and Nondurable Consumption
Investment	Fred	Private Residential and Nonresidential Fixed Investment
Exchange Rate	Fred	Trade Weighted U.S. Dollar Index: Major Currencies, Goods
Interest Rate - Long	Fred	10-Year Treasury Constant Maturity Rate
Interest Rate - Short	Fred	Effective Federal Funds Rate
BAA Spread	Fred	Moody's Seasoned Baa Corporate Bond Yield Relative to Yield on 10-Year Treasury Constant Maturity
Credit NFS	Fred	Total Credit to Private Non-Financial Sector
Credit Tightening	Fred	Net Percentage of Domestic Banks Tightening Standards for Commercial and Industrial Loans to Large and Middle-Market Firms
Panel regressions		
GDP, Consumption, Investments, Exports, Imports (expenditure approach)	OECD	VOBARSA: National currency, volume estimates, OECD reference year, annual levels, seasonally adjusted
CPI	OECD	CPI: 01-12 - All items, Percentage change on the same period of the previous year
Share prices	OECD	Index, 2015=100
Short- and long-term interest rates	OECD	Dataset: Monthly Monetary and Financial Statistics (MEI)
Exchange rate against the US dollar	OECD	Currency exchange rates, monthly average
VXO	Piffer and Podstawski (2017)	CBOE S&P 100 Volatility Index: VXO
Sentiment indicators (consumer and business)	OECD	OECD Standardised CCI / BCI, Amplitude adjusted (Long term average=100), seasonally adjusted
Oil prices	Fred	Crude Oil Prices: Brent - Europe, Dollars per Barrel, Quarterly, Not Seasonally Adjusted
Loans to non-financial corporations	BIS	timeseries key: Q.AU.N.A.M.XDC.A
Interest rate on loans to NFCs	Bloomberg	AILRNLBT (Australia), FMSCCP3M (Canada), ISPRATE (Israel), KSDREQUP (Korea), SEINMNAA (Sweden), FRLNBLML (France), BDIRNF15 (Germany), JNPSPLMF (Japan), GBIRZJ3L (UK), COLRORDI (Colombia), CZBLNFTR (Czechia), HHAOOVDH (Hungary), AIOANFBO (Poland)

	Number of lags			
Principal components	1	2	3	4
1	0.82	0.73	0.86	0.85
2	0.80	0.78	0.92	0.93
3	0.92	0.93	0.98	0.98
4	0.89	0.83	0.96	0.98

Table 2: Informational sufficiency test

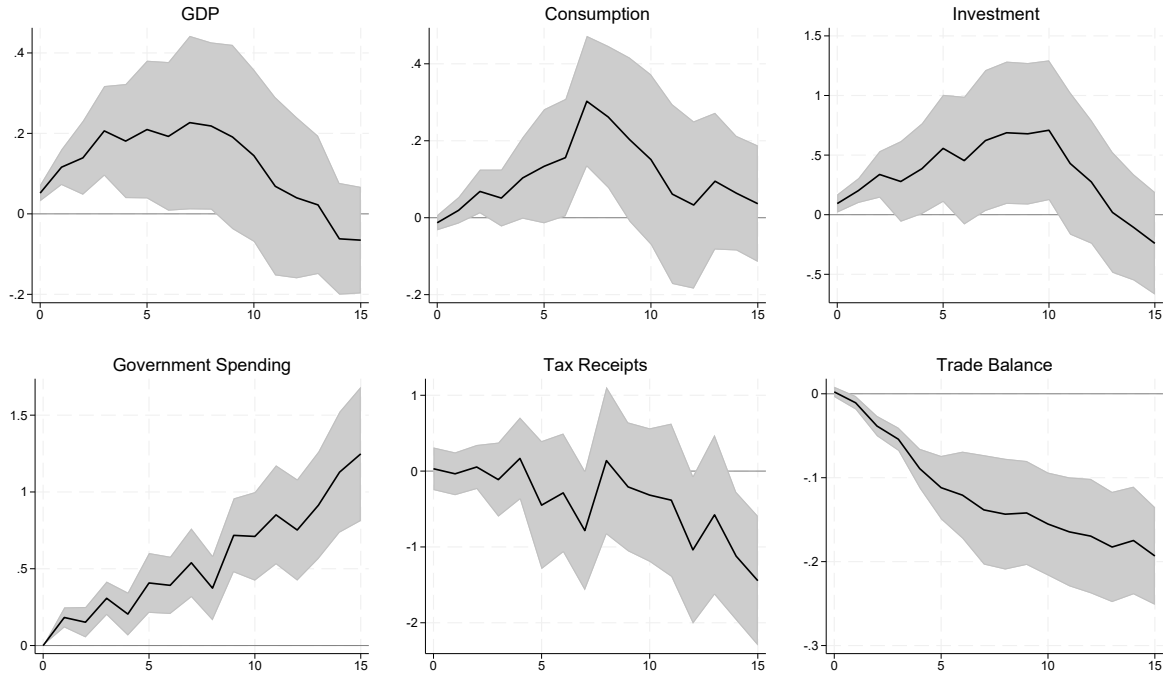
Notes: Each entry of the table reports the p-value of the F-test in a regression of the fisca lnews shock on $1, 2, 3$,and 4 lags of the the first j principal components, $j = 1, ..., 4$.

Figure 1: News Shocks



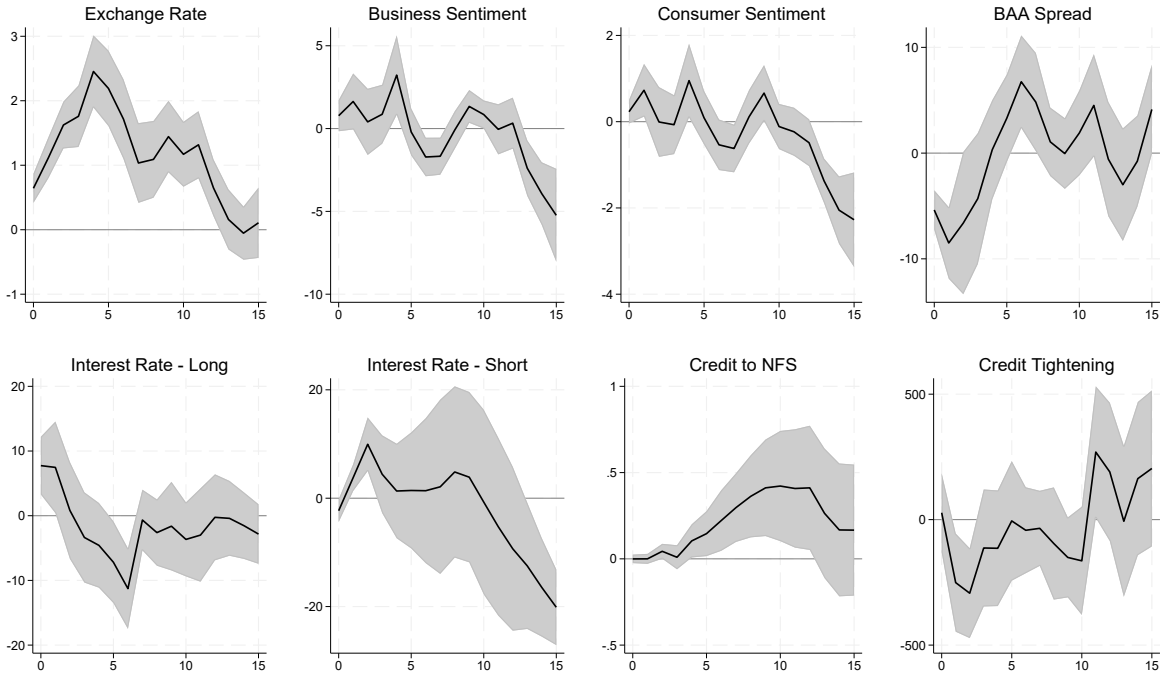
Note: The US fiscal news shocks identified in baseline model.

Figure 2: Impulse responses of US macroeconomic variables to fiscal news shock



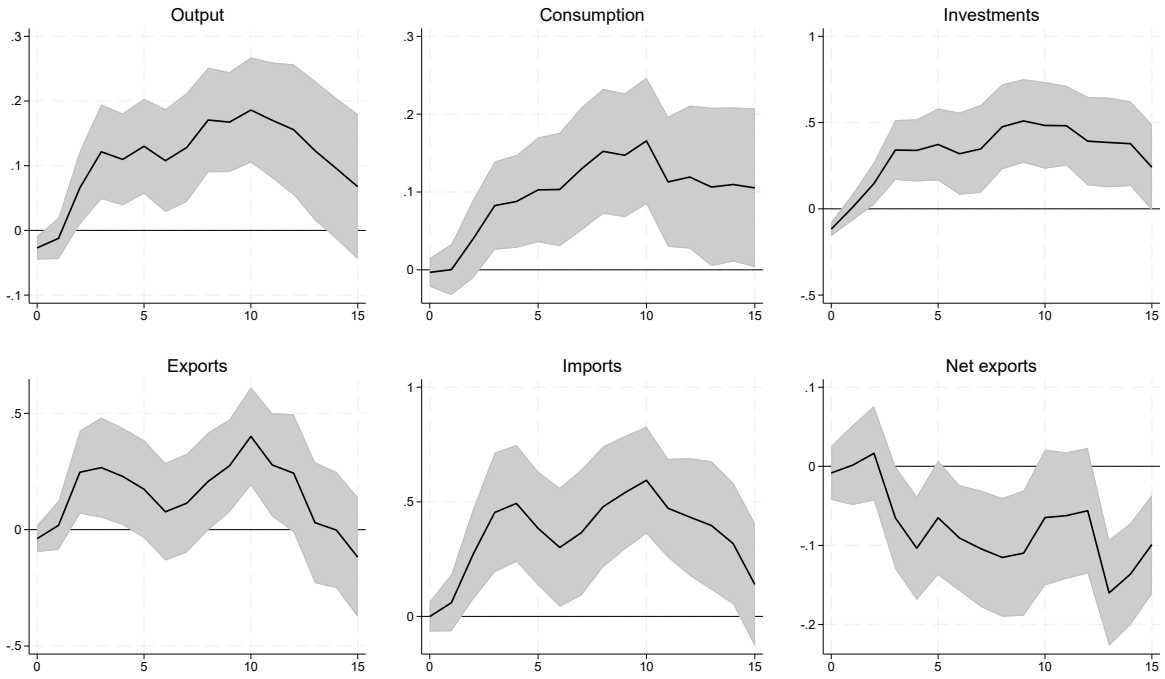
Note: Local projection estimation for the US economy, time unit is quarter. Units on vertical axis are log percent changes for all variables but Trade Balance is expressed in percentage points. The shaded area depicts 68% Newey-West confidence bands.

Figure 3: Impulse responses of US financial variables and sentiment indicators to fiscal news shock



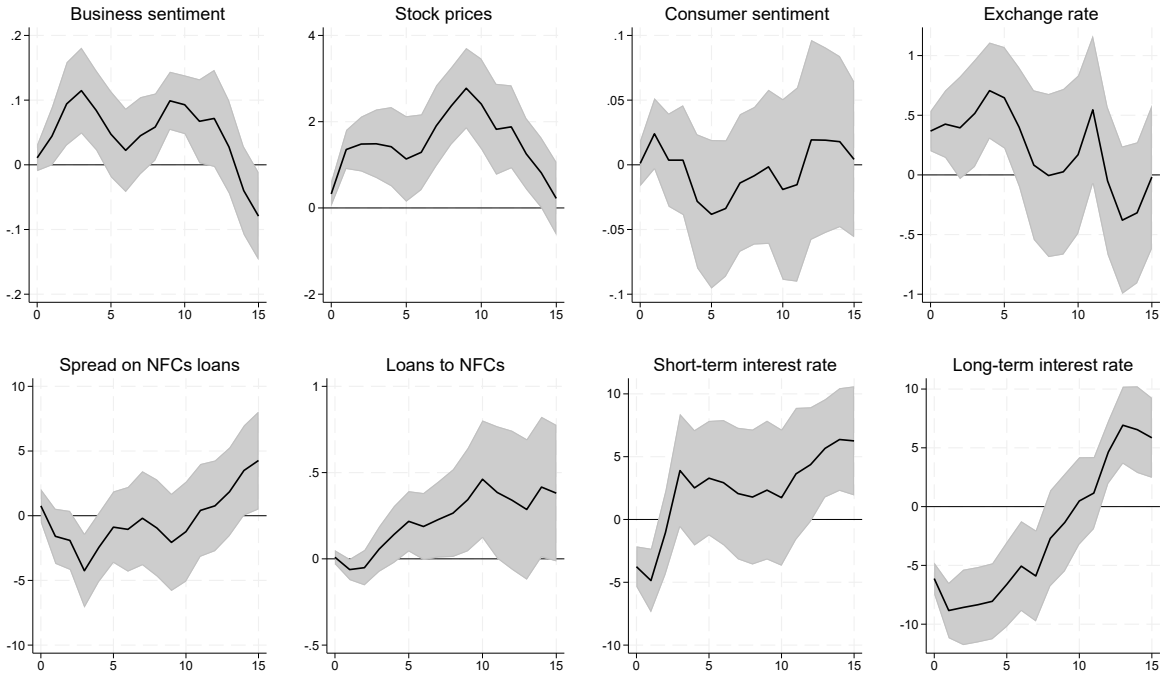
Note: Local projection estimation for the US economy, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, while other units on vertical axis are log percent changes. The shaded area depicts 68% Newey-West confidence bands.

Figure 4: Impulse responses of macroeconomic variables abroad to fiscal news shock



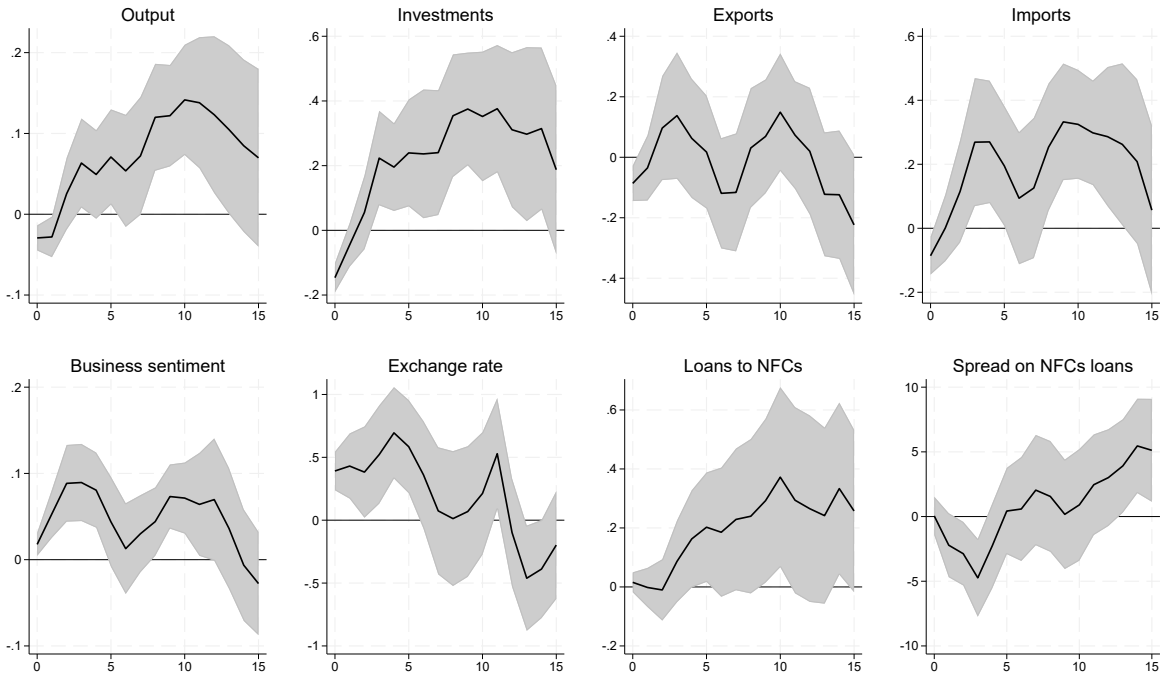
Note: Local projection panel estimation for 18 open economies, time unit is quarter. Units on vertical axis are log percent changes for all variables but Net exports that are expressed in percentage points. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 5: Impulse responses of financial variables and sentiment indicators abroad to fiscal news shock



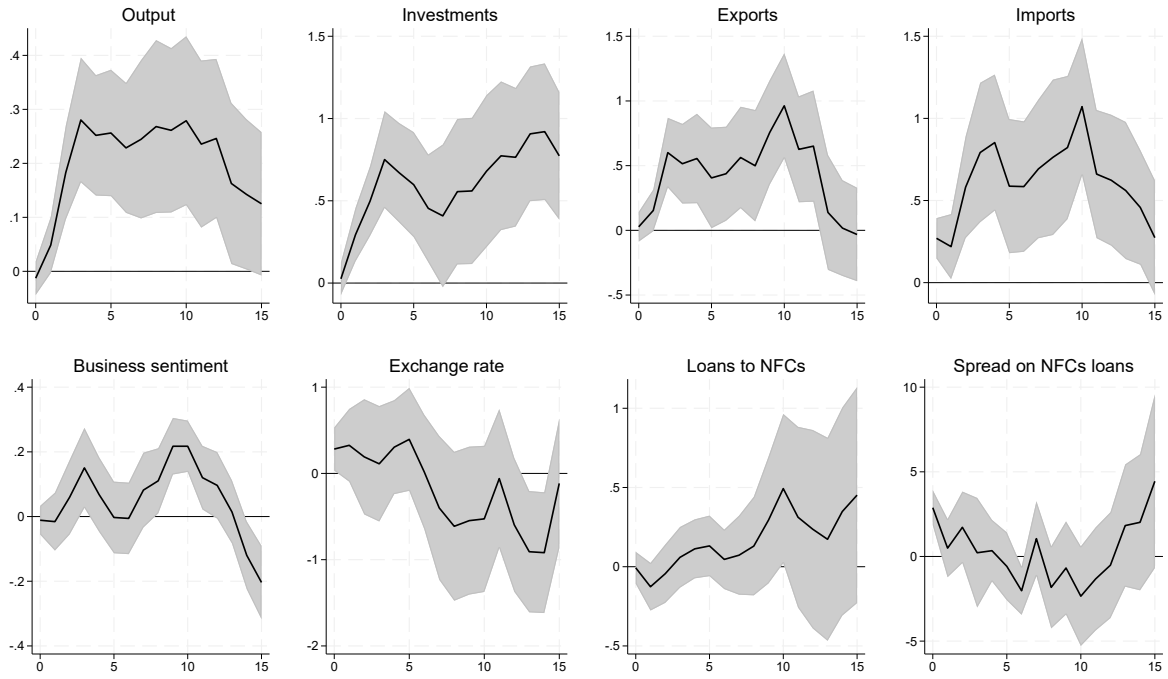
Note: Local projection panel estimation for 18 open economies, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, while other units on vertical axis are log percent changes. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 6: Spillovers of fiscal news shock to advanced economies



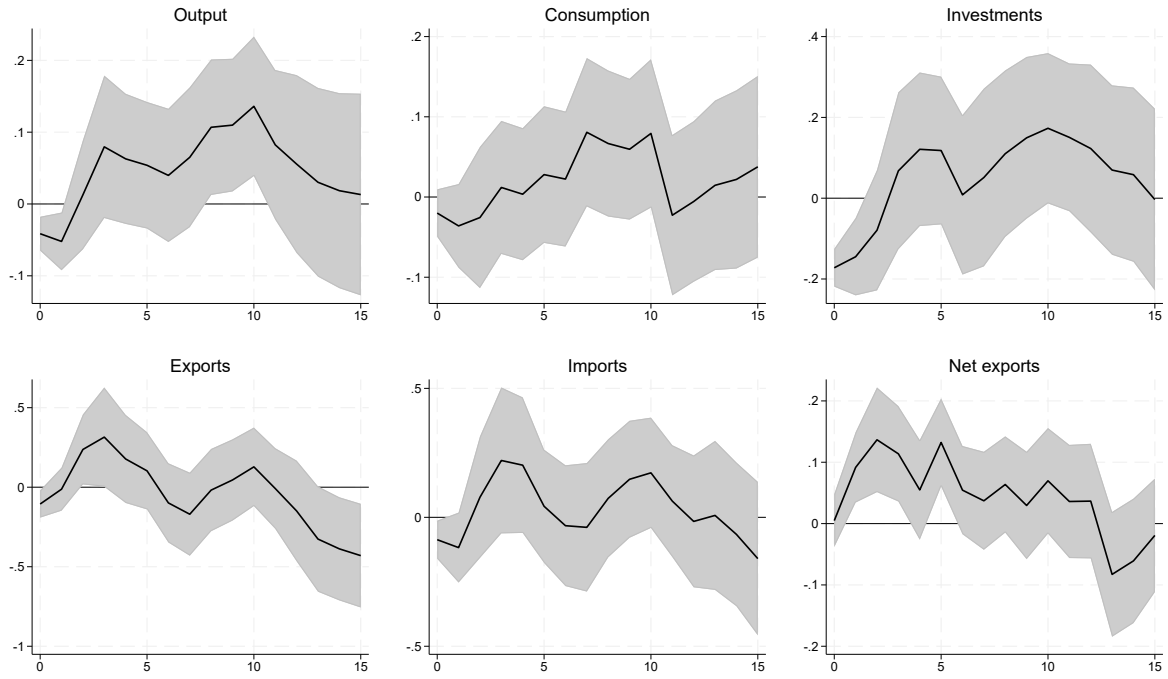
Note: Local projection panel estimation for 11 advanced small open economies, time unit is quarter. Sentiment indicator is expressed in the index units, interest rate and spread in basis points, while other units on vertical axis are log percent changes. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 7: Spillovers of fiscal news shock to emerging market economies



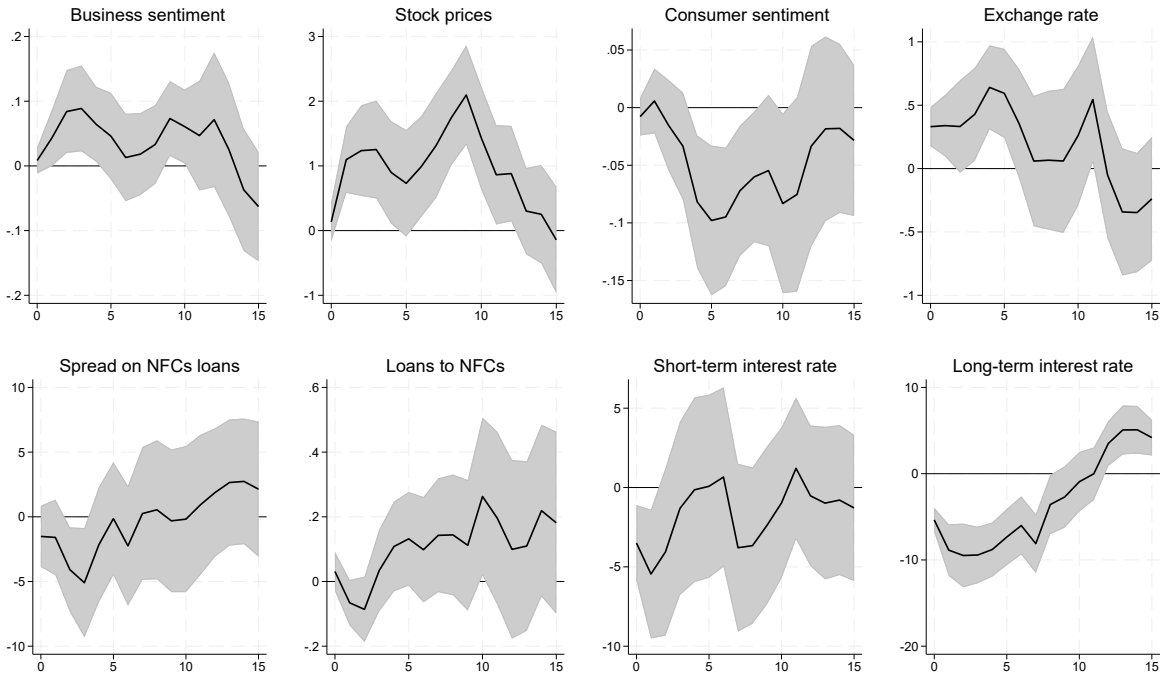
Note: Local projection panel estimation for 7 emerging open economies, time unit is quarter. Sentiment indicator is expressed in the index units, interest rate and spread in basis points, while other units on vertical axis are log percent changes. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 8: Impulse responses of macroeconomic variables abroad to fiscal news shock: countries with high trade exposure to the US



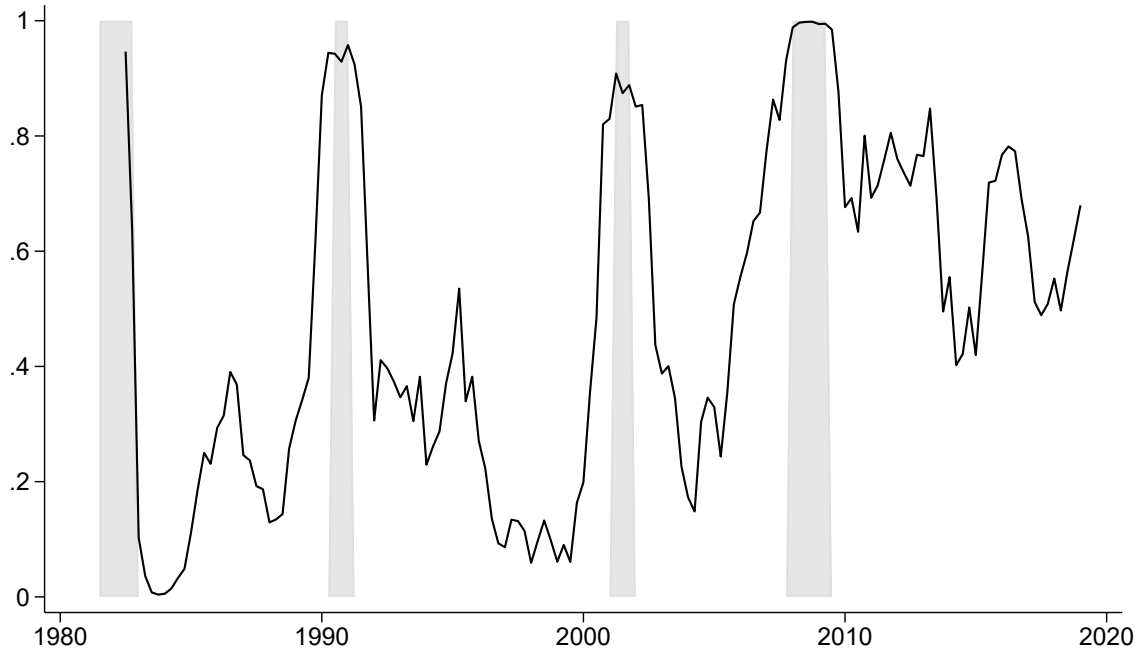
Note: Local projection panel estimation for 18 open economies, time unit is quarter. Units on vertical axis are log percent changes for all variables but Net exports that are expressed in percentage points. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 9: Impulse responses of financial variables and sentiment indicators abroad to fiscal news shock: countries with high trade exposure to the US



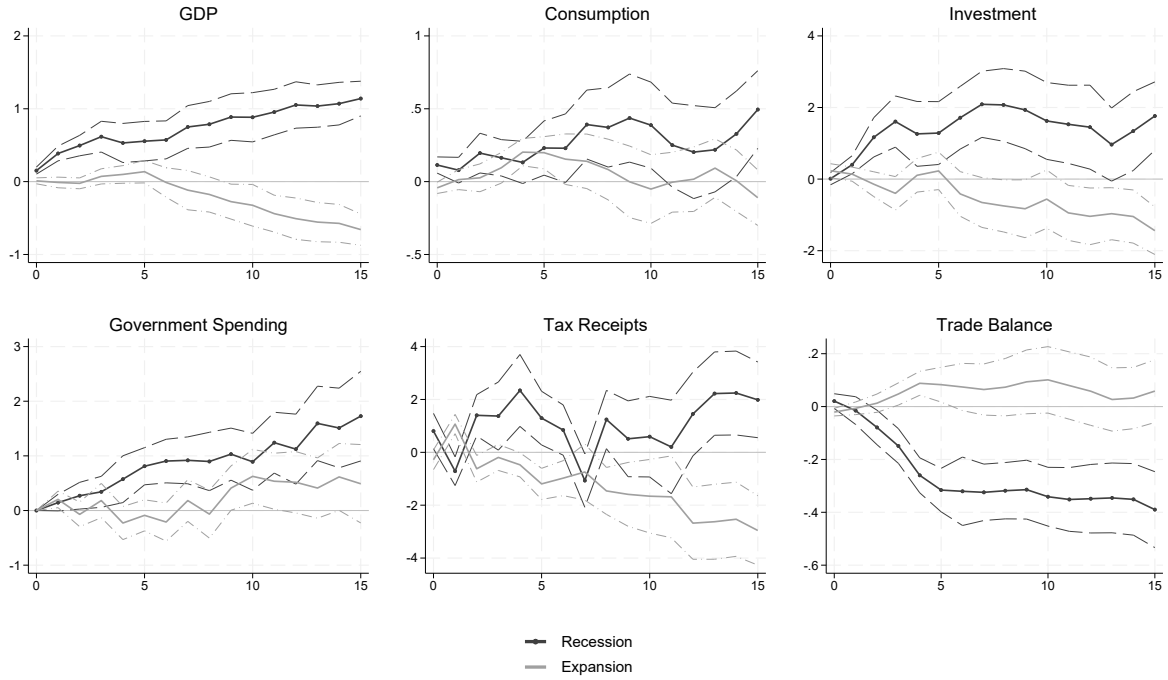
Note: Local projection panel estimation for 18 open economies, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, while other units on vertical axis are log percent changes. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 10: Probability of Being in a Recessionary Phase



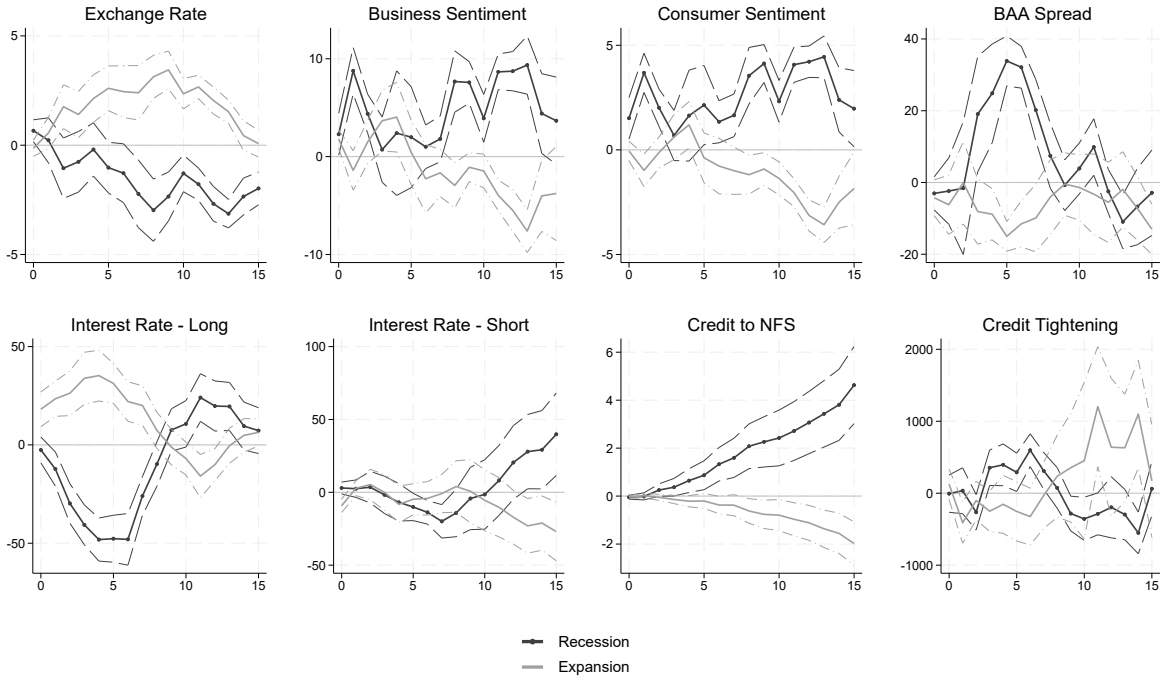
Note: The solid line shows the evolution of the transition function $F(z_t)$. The shaded area shows NBER recession dates.

Figure 11: Impulse responses of US macroeconomic variables to fiscal news shock in recessions and expansions



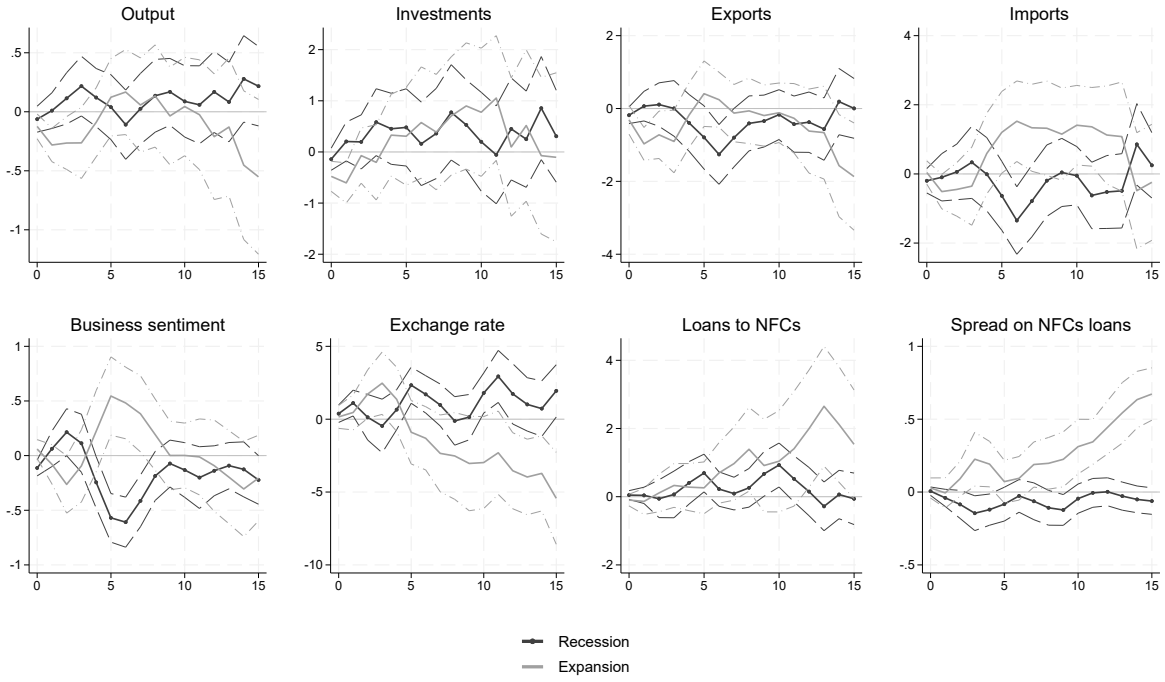
Note: State-dependent local projection estimation for the US economy, time unit is quarter. Units on vertical axis are log percent changes for all variables but Trade Balance is expressed in percentage points. Black and gray solid lines show impulse responses and dashed black and dashdot lines depict 68% Newey-West confidence bands in recession and expansion regimes, respectively.

Figure 12: Impulse responses of US financial variables and sentiment indicators to fiscal news shock in recessions and expansions



Note: State-dependent local projection estimation for the US economy, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, while other units on vertical axis are log percent changes. Black and gray solid lines show impulse responses and dashed black and dashdot lines depict 68% Newey-West confidence bands in recession and expansion regimes, respectively.

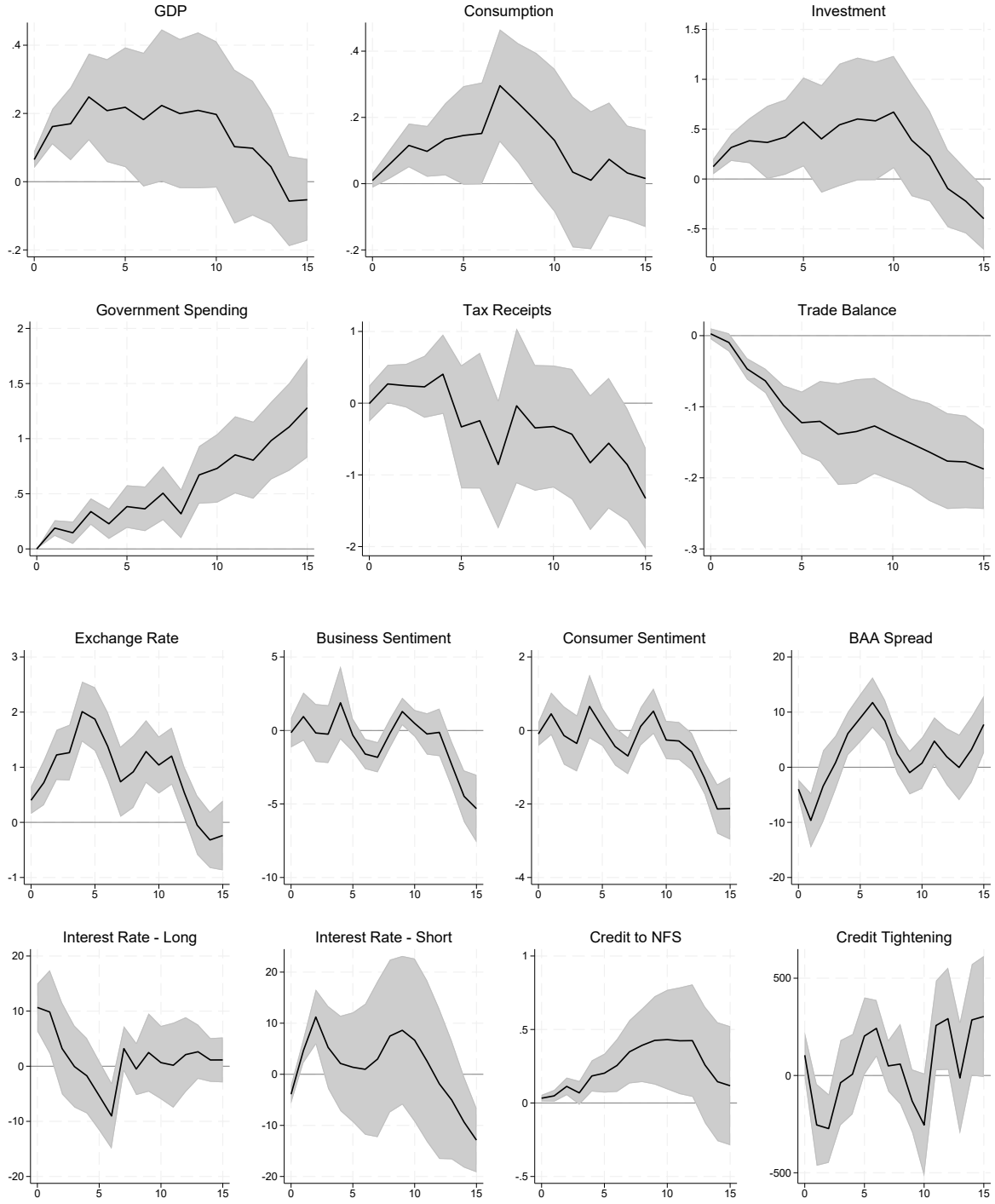
Figure 13: Spillovers of fiscal news shock: recessions vs expansions



Note: State-dependent Local projection panel estimation for 18 open economies, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, while other units on vertical axis are log percent changes. Black and gray solid lines show impulse responses and dashed black and dashdot lines depict 68% Discroll-Kraay confidence bands in recession and expansion regimes, respectively..

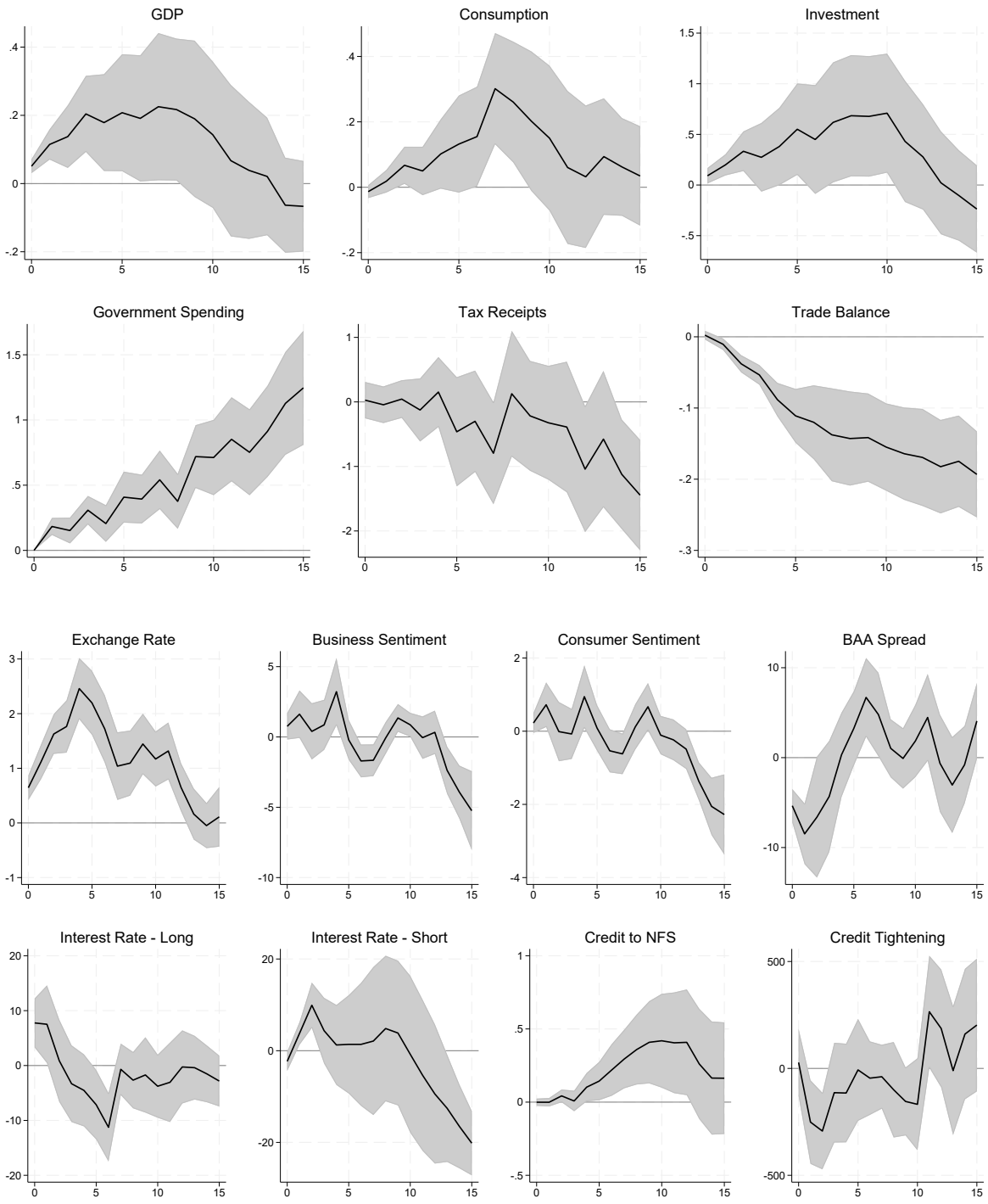
Appendix A - Robustness checks

Figure 14: Robustness Check: Shock identification - Consumer sentiment as an additional control variable



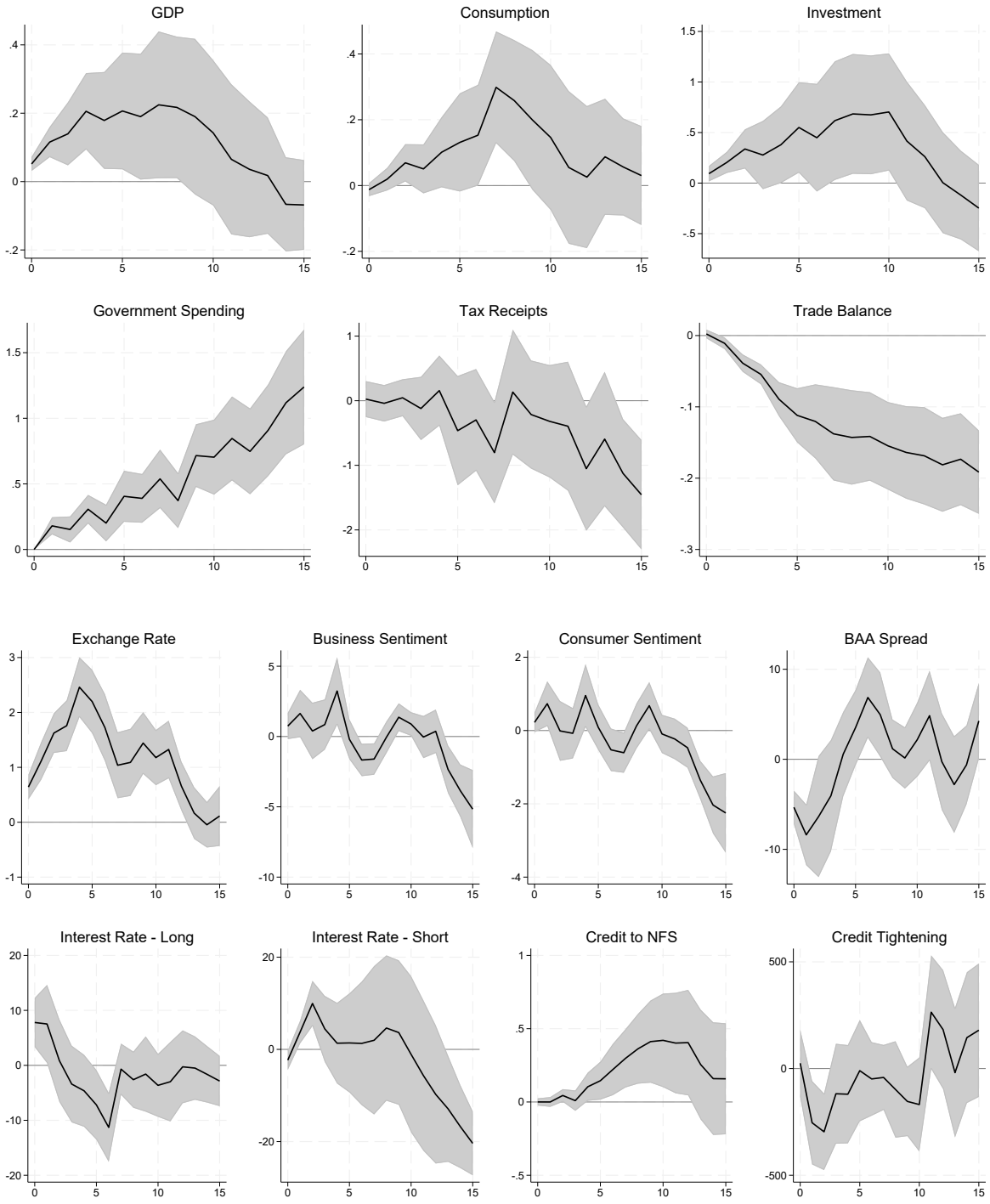
Note: Local projection estimation for the US economy, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, trade balance in percentages, while other units on vertical axis are log percent changes. The shaded area depicts 68% Newey-West confidence bands.

Figure 15: Robustness Check: Shock identification - Purged fiscal news



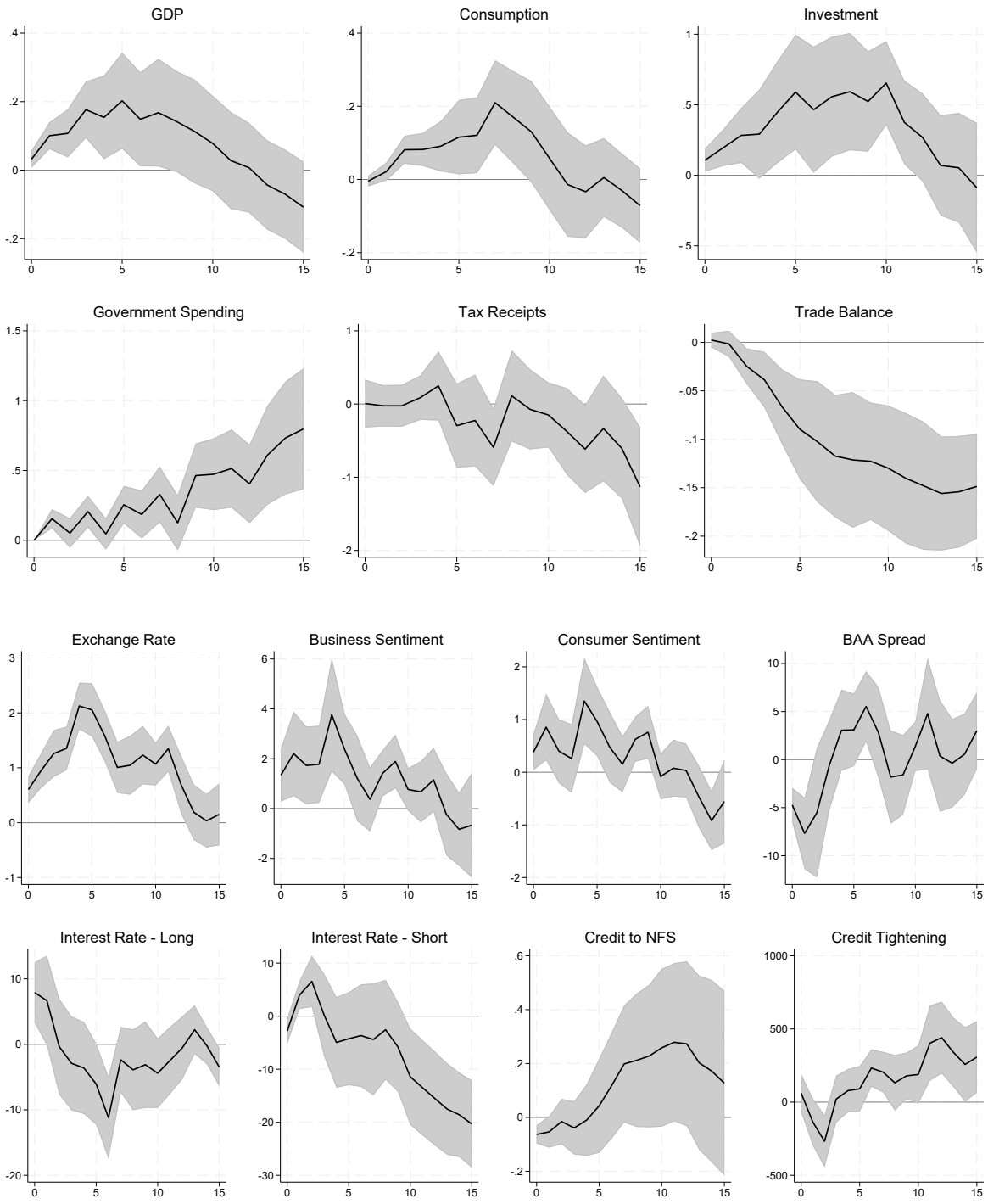
Note: Local projection estimation for the US economy, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, trade balance in percentages, while other units on vertical axis are log percent changes. The shaded area depicts 68% Newey-West confidence bands.

Figure 16: Robustness Check: Shock identification - Fiscal news ordered first



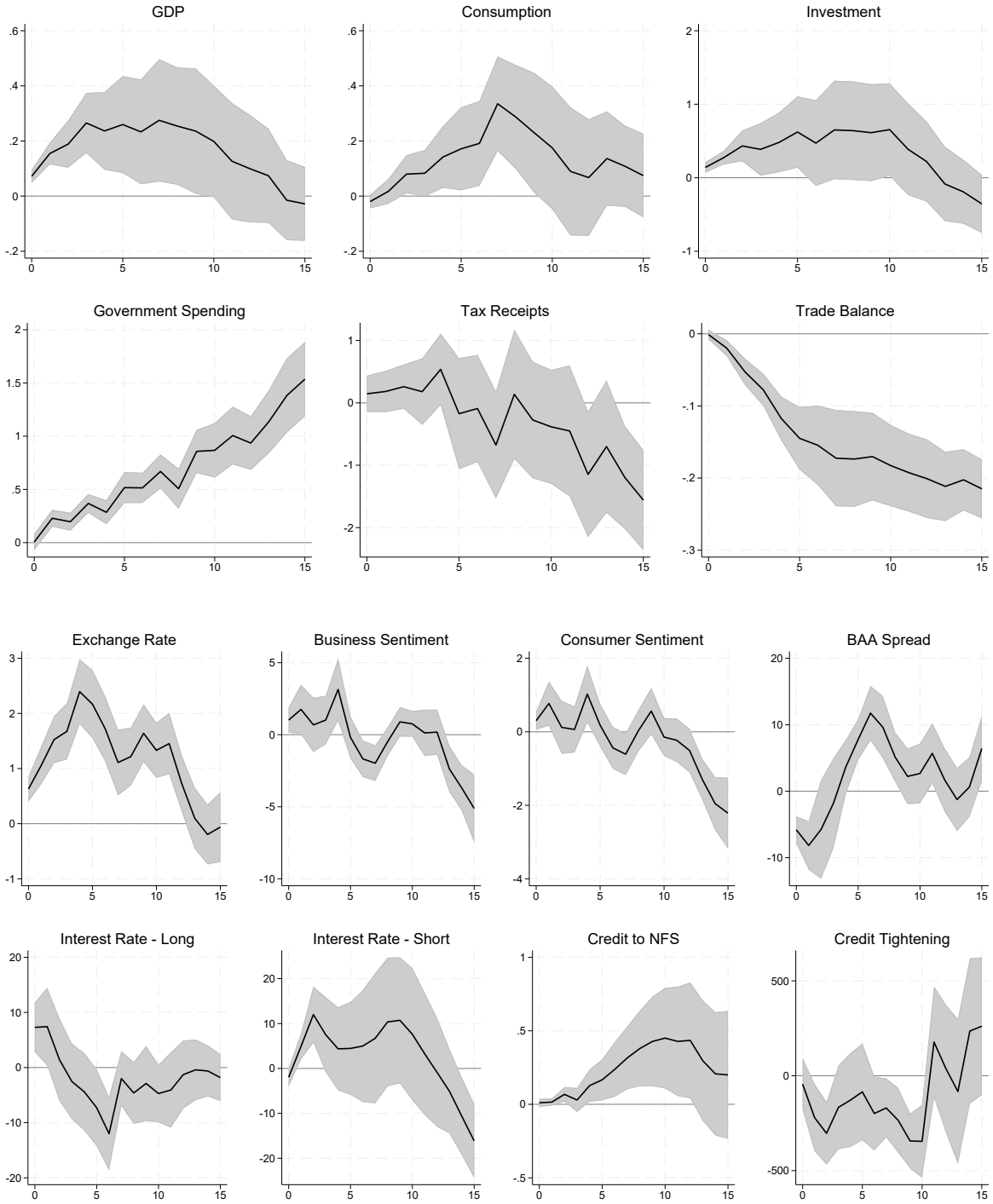
Note: Local projection estimation for the US economy, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, trade balance in percentages, while other units on vertical axis are log percent changes. The shaded area depicts 68% Newey-West confidence bands.

Figure 17: Robustness Check: Domestic effects - two lags



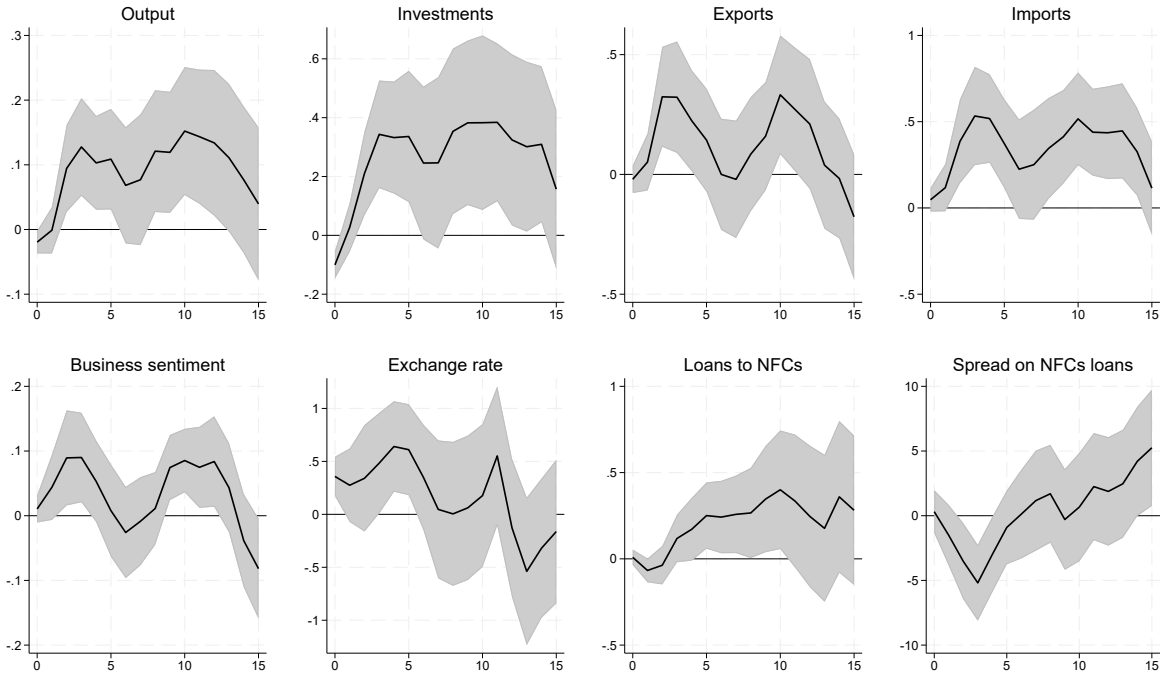
Note: Local projection estimation for the US economy, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, trade balance in percentages, while other units on vertical axis are log percent changes. The shaded area depicts 68% Newey-West confidence bands.

Figure 18: Robustness Check: Domestic effects - Controlling for stock prices -



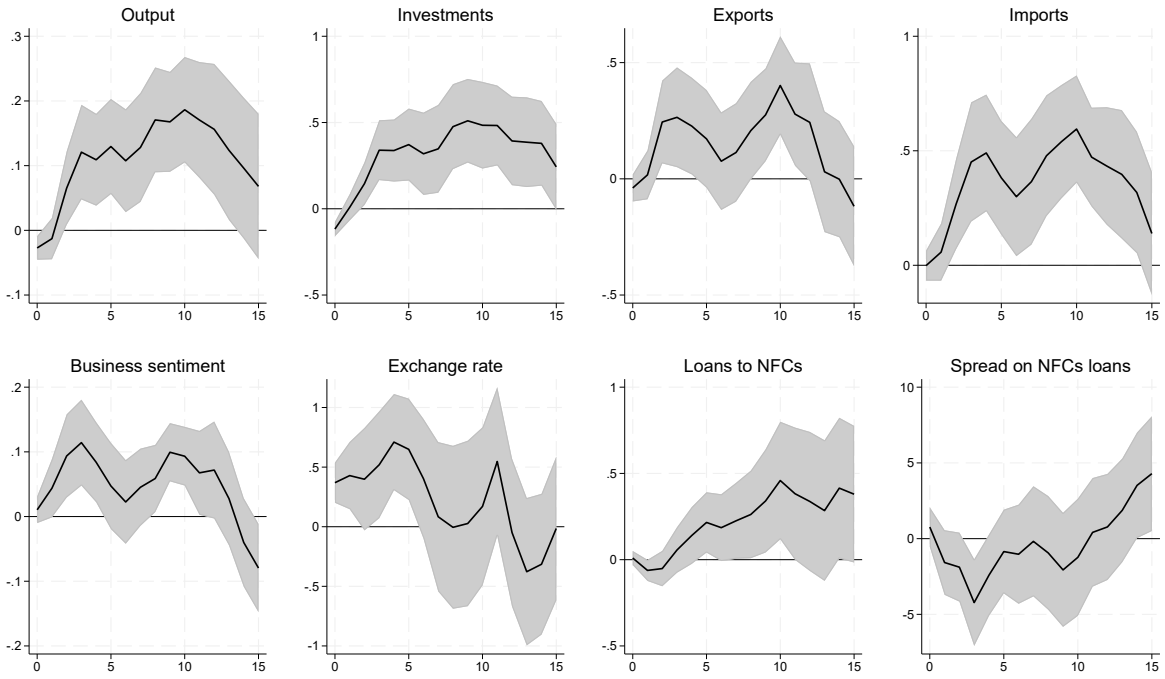
Note: Local projection estimation for the US economy, time unit is quarter. Sentiment indicators are expressed in the index units, interest rates and spread in basis points, trade balance in percentages, while other units on vertical axis are log percent changes. The shaded area depicts 68% Newey-West confidence bands.

Figure 19: Robustness check: spillovers of fiscal news shock - Consumer sentiment as an additional control variable



Note: Local projection panel estimation for 18 open economies, time unit is quarter. Sentiment indicator is expressed in the index units, interest rate and spread in basis points, while other units on vertical axis are log percent changes. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 20: Robustness check: spillovers of fiscal news shock - Purged fiscal news



Note: Local projection panel estimation for 18 open economies, time unit is quarter. Sentiment indicator is expressed in the index units, interest rate and spread in basis points, while other units on vertical axis are log percent changes. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 21: Robustness check: spillovers of fiscal news shock - Fiscal news ordered first

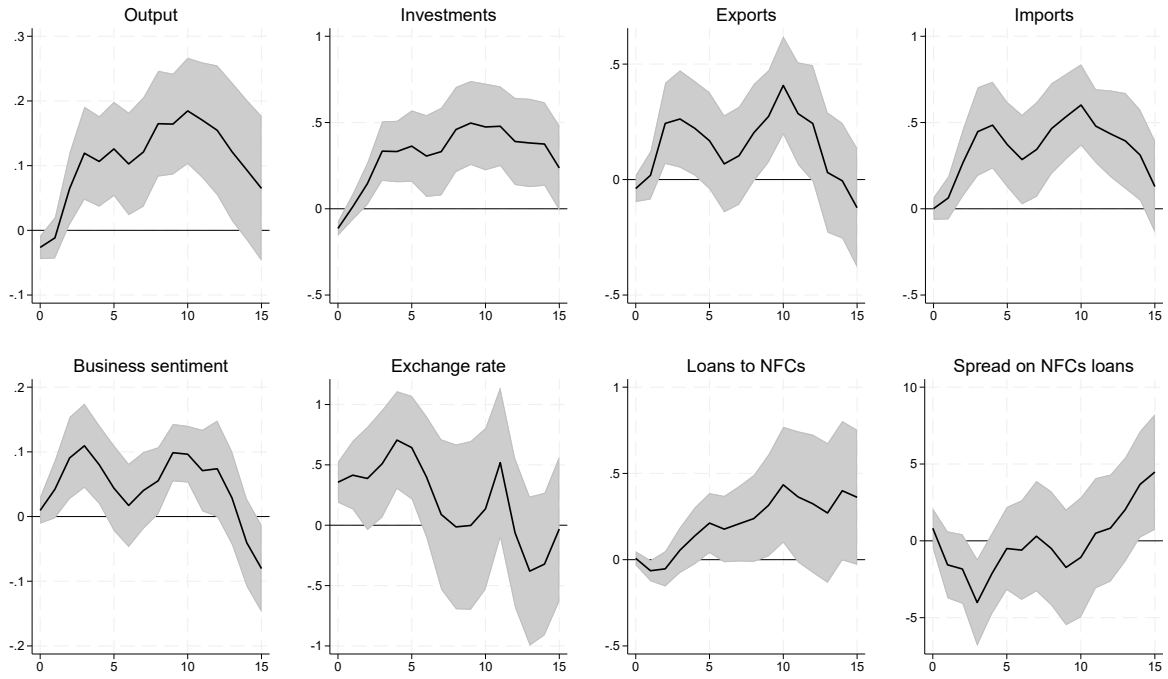


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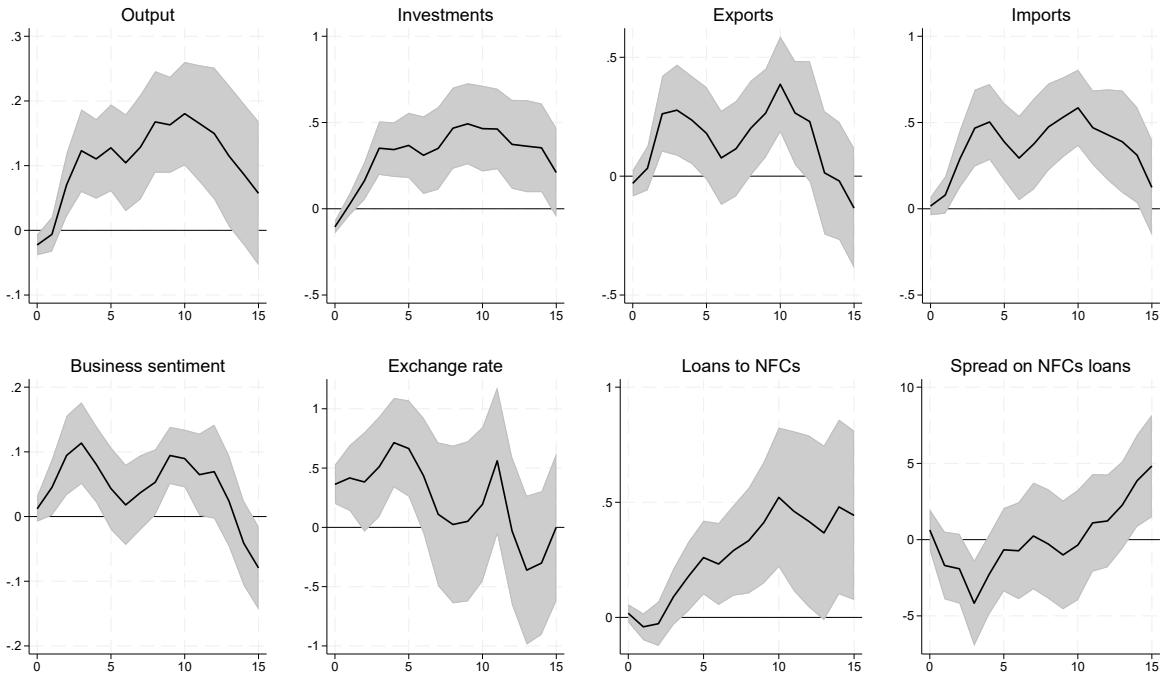
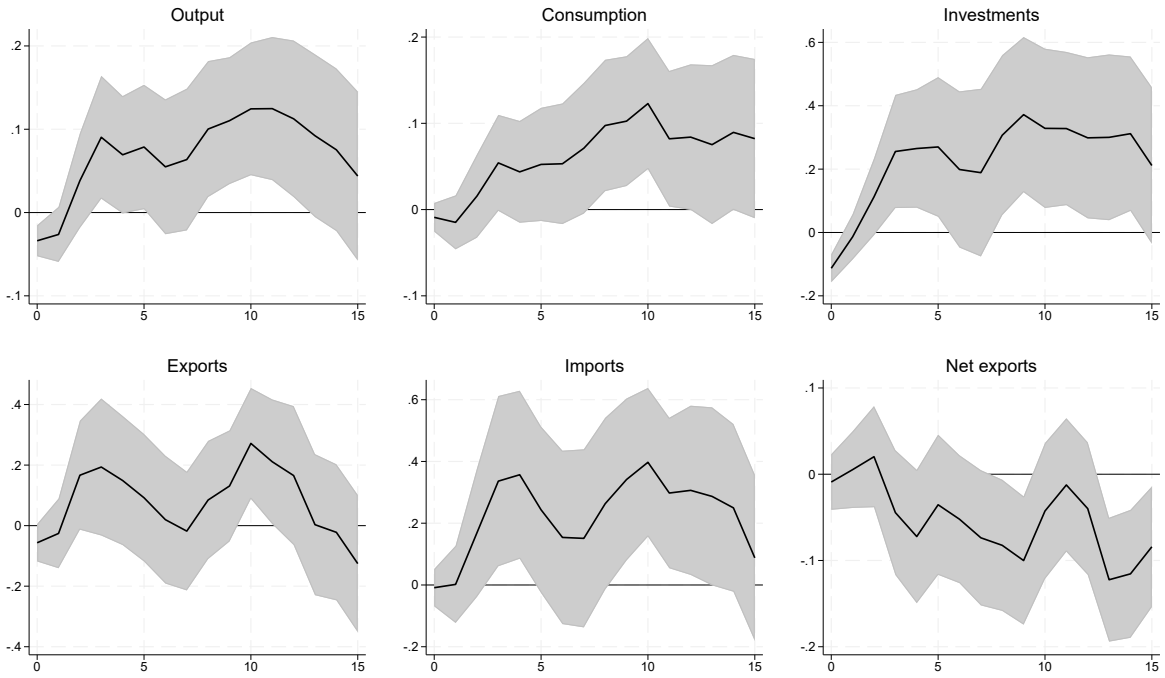
Figure 22: Robustness check: controlling for stock prices



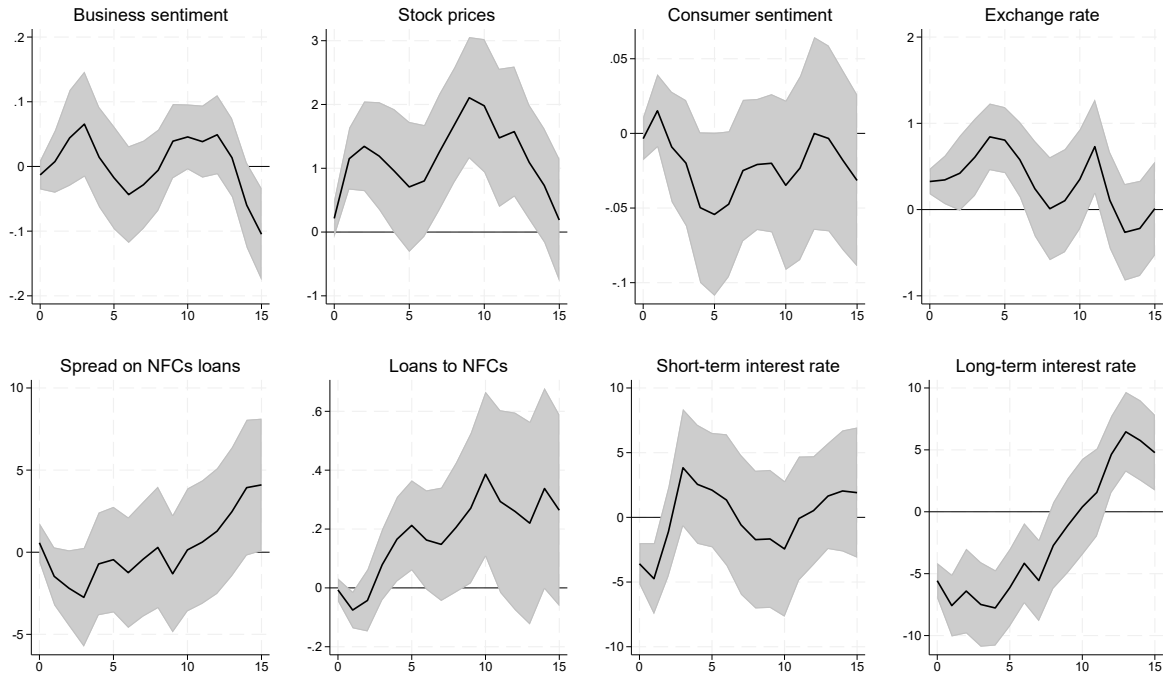
Note: Local projection panel estimation for 18 open economies, time unit is quarter. Sentiment indicator is expressed in the index units, interest rate and spread in basis points, while other units on vertical axis are log percent changes. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 23: Robustness check: spillovers of fiscal news shock, fewer lags of controls - macroeconomic variables



Note: Local projection panel estimation for 18 open economies, time unit is quarter. Units on vertical axis are log percent changes for all variables but net exports that are expressed in percentage points. The shaded area depicts 68% Discroll-Kraay confidence bands.

Figure 24: Robustness check: spillovers of fiscal news shock, fewer lags of controls - sentiment and financial variables



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