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**Working Paper**

## Legislative tax announcements and GDP: Evidence from the United States, Germany, and the United Kingdom

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**No. 34-2021**

**Bernd Hayo and Sascha Mierzwa**

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# **Legislative Tax Announcements and GDP: Evidence from the United States, Germany, and the United Kingdom**

## **Abstract**

We study the announcement effect of legislated tax changes on GDP in the US, Germany, and the UK. Using, as the shock of interest, narratively identified information (Romer & Romer, 2009) about future tax changes at the quarter of their introduction to the legislative body, we analyse the dynamic results of Local Projections (Jordà, 2005). We find heterogeneous effects across the three countries: economic activity declines (increases) in the US (the UK), but remains unaffected in Germany. When allowing the responses to vary over the business cycle, we find evidence that US GDP drops regardless of the business cycle, whereas UK GDP rises only during non-recessionary times. We find significant effects for German GDP too: it rises (drops) during recessionary (non-recessionary) times. In general, consumption, investment, and employment follow in the path of GDP.

Keywords: Fiscal policy, tax policy, legislated tax changes, announcement effect, state dependence, United States, Germany, United Kingdom, Local Projections, narrative approach

JEL code: E62, E63, H20, H30, K34

## 1 Introduction

The empirical literature usually focuses on the implementation date of fiscal policy changes (Romer & Romer, 2010; Cloyne, 2013; Hayo & Uhl, 2014). However, as noted by Alesina et al. (2015) in the context of fiscal consolidation, this may not be appropriate: tax policy often follows multiyear plans and disregarding this structure could yield biased results. In fact, tax policy changes are usually preceded by a long legislative process and agents likely formulate hypotheses about the final tax bill throughout this process. Ramey (2011) stresses the importance of distinguishing between anticipated and unanticipated changes in fiscal policy. Considering the long inside lag of legislated tax changes, it is not likely that the changes were unanticipated.

In the context of legislated tax changes, Romer and Romer (2010) try to cope with this problem by computing ‘news about tax changes’, which is constructed by discounting the full-year revenue effects to the quarter of passage. Mertens and Ravn (2012) distinguish between tax changes implemented within and outside of one quarter after passage of the bill. They find evidence for anticipation effects in the year prior to implementation and estimate a drop in US GDP of around 1.5% before it rises by about 1.5% one year after implementation. For ‘unanticipated’ tax cuts, the authors find the standard result of rising GDP. Christofzik et al. (2021) report similar results for Germany. Alesina et al. (2015) argue that even such ‘unanticipated’ changes may have been informally anticipated.

We study the announcement effect of legislated tax changes on GDP in the United States, Germany, and the United Kingdom. Using narratively identified information about future tax changes at the quarter of introduction to the legislative body as the shock of interest, we analyse the results of Local Projections (Jordà, 2005). Even though we cannot perfectly control for the state of the public debate, we provide a better proxy than is used in the extant macroeconomic literature, as our dataset allows us to track the legislative steps of individual tax bills and to quantify their respective revenue effects at the date of introduction to the legislative body (Hayo & Mierzwa, 2020).

## 2 Data and Method

We augment and extend the datasets of Romer and Romer (2009), Cloyne (2012), and Uhl (2013) employing governmental records from the respective tax committees at important legislative steps. We commence our analysis in 1977Q1, as this is the first time German drafting bills contained detailed revenue projections; the sample ends in 2018Q4.

For the US and Germany, we choose as the ‘unanticipated’ shock of interest the quarter of introduction to the House and Bundestag, respectively.<sup>1</sup> For the UK, we select either Pre-Budget or Budget Days. When a measure was announced earlier in a white paper or as part of a parliamentary debate, this date is chosen. Using this information, we analyse the immediate effect on GDP of planned changes in direct and indirect taxes. We employ Local Projections (Jordà, 2005), as they are a versatile and robust dynamic estimation method (Owyang et al., 2013; Ramey & Zubairy, 2018). We also incorporate the potential influence of the business cycle on the effectiveness of ‘unanticipated’ taxes.

In the unconditional case, our model takes the form:

$$z_{t+h} = \alpha + \psi(L)X + \varphi\Delta\tau^{Draft} + \beta(L)\Delta\tau^{Imp} + \phi D + \varepsilon_t \quad (1)$$

$z_{t+h}$  is defined as the cumulated h-step ahead growth rate of the dependent variable, i.e.,  $z_{t+h} = \ln(Y_{t+h}) - \ln(Y_{t-1})$  in the case of GDP. The vector  $X$  contains lags of the dependent variable, government spending, and tax revenues, all in logs of real per capita local currency values, as in Blanchard and Perotti (2002) and Colombo (2020).  $D$  contains a linear trend and, in the case of Germany, a step dummy

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<sup>1</sup> Usually, the first revenue figures are given in the report of the Committee on Ways and Means (Hayo & Mierzwa, 2020). We date those figures back to the introduction, assuming perfect anticipation. However, we check the robustness of this approach in Section 4.

for unification, taking the value 1 from 1991Q1 onward.  $\psi(L)$  and  $\beta(L)$  are lag polynomials of order 4. To control for actual changes in tax revenues, we include the contemporaneous effect and four lags of the implemented tax changes  $\Delta\tau^{\text{Imp}}$ . The draft shocks enter without lags and we are interested in the estimate of parameter  $\varphi$ . Both draft and implementation effects are expressed as a *cut* in overall tax liabilities in per cent of GDP. Standard errors are heteroscedasticity and autocorrelation consistent and the number of lags is selected automatically (Newey & West, 1987, 1994).

Following Auerbach and Gorodnichenko (2013), Owyang et al. (2013), Ramey and Zubairy (2018), and Demirel (2021), we condition the reactions to planned tax cuts on the state of the business cycle:

$$z_{t+h} = I_{t-1}[\psi_R(L)X + \varphi_R\Delta\tau^{\text{Draft}} + \beta_R\Delta\tau^{\text{Imp}}] + (1 - I_{t-1})[\psi_{NR}(L)X + \varphi_{NR}\Delta\tau^{\text{Draft}} + \beta_{NR}\Delta\tau^{\text{Imp}}] + \phi D + \varepsilon_t \quad (2)$$

As a business cycle indicator, we choose the CLI computed by the OECD,<sup>2</sup> and transformed into a dummy by the St. Louis FRED<sup>3</sup> (Hayo & Mierzwa, 2021). As is standard in the literature,  $I$  is lagged by one quarter to account for delayed adjustments in employment and government revenues. Here, we are interested in the coefficients of the draft effects during recessions ( $\varphi_R$ ) and non-recessions ( $\varphi_{NR}$ ).

### 3 Results

#### 3.1 Unconditional Effects of Drafting Tax Cuts

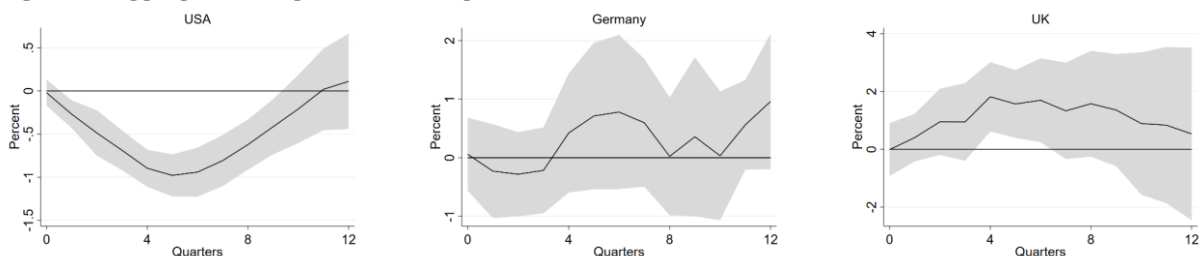
The left panel of Figure 1 shows the results for the US. About one year after announcing a tax cut equal to 1% of nominal GDP, US GDP drops by almost 1%. The effect is significant from the second quarter onwards and remains negative for more than two years. This adjustment is in line with Mertens and Ravn (2012), who argue that economic agents react to an announced tax cut by reducing today's spending and then increasing it when the tax cut is implemented.

For Germany (centre panel of Figure 1), the point estimates are mostly positive but insignificant. Either agents are not particularly forward looking or the uncertainty surrounding the drafting of tax cuts is considered too high to warrant increasing economic activity.

In the UK (right panel of Figure 1), we observe a hike in GDP one year after the announced tax cut. The effect, however, lasts for less than a year. The impulse response function (IRF) resembles Cloyne's (2013) baseline result, likely reflecting the low uncertainty and short implementation lag associated with UK tax changes. Our peak effect of 1.8%, however, is lower than that found by Cloyne (2013).

Overall, we discover substantial cross-country heterogeneity in GDP response to drafting tax bills. US GDP declines within the first two years, German GDP is not affected, and UK GDP rises after around one year. US consumers and investors in particular appear to hold back their expenditures until the tax cut materialises.

**Figure 1: Aggregated Exogenous Drafting Tax Cuts, Unconditional Case**



Note: The shaded area represents 90% confidence bands.

<sup>2</sup> <http://www.oecd.org/sdd/leading-indicators/oecdcompositeleadingindicatorsreferenceturningpointsandcomponentseries.htm>

<sup>3</sup> <https://fred.stlouisfed.org/series/DEUREC>, 9 April, 2021

### 3.2 State-Dependent Effects of Drafting Tax Cuts

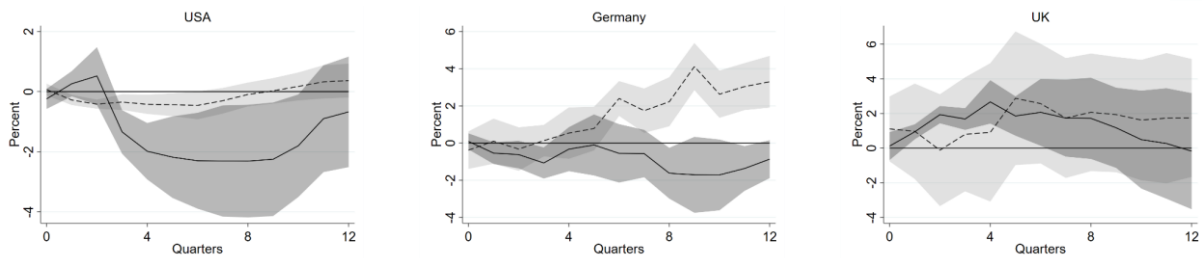
Figure 2 shows the results when conditioning the tax effect on the state of the business cycle (see Equation (2)). The dashed (solid) line and lighter (darker) error bands indicate the reaction during recessions (non-recessions).

The conditional effects of drafting tax bills on US GDP are given in the left panel of Figure 2. Initially, the effect is negative (insignificant) during recessions (non-recessions). After six months, the effect during non-recessions becomes negative and reaches a trough of around 2% after two years. The point estimate during recessions is significantly larger but still negative. We interpret this as agents waiting for the tax cuts to materialise in either state of the business cycle, but even more so when times are not bad.

German GDP exhibits a similar pattern during non-recessionary times, as we observe a drop of almost 2% after two years. During recessions, however, GDP grows by almost 4% after two years. Hence, German agents appear to increase (decrease) their economic activity after a planned tax cut is announced during recessions (non-recessions). The effect is initially negative during non-recessionary times when households have more leeway in adjusting their spending.

In the UK, GDP increases in either state of the business cycle, but insignificantly so during recessions. The positive effect during non-recessions amounts to around 2% one year after the shock. The graph resembles the one for ‘unanticipated’ implementation effects (Hayo & Mierzwa, 2021) but is smaller in magnitude.

**Figure 2: Aggregated Exogenous Drafting Tax Cuts, State-Dependency**



Notes: The shaded area represents 90% confidence bands.  
The lighter (darker) shaded area indicates recession (non-recession) periods.

### 4 Robustness

To identify possible drivers of the heterogeneous effects shown above, we replace GDP in Equations (1) and (2) with real per capita consumption, investment, and government spending, all scaled by lagged GDP (Barro & Redlick, 2011; Owyang et al., 2013), as well as with employment. In general, consumption, investment, and employment follow in the path of GDP (see Figures A1 and A2 in the Appendix).

Throughout the analysis, we used contemporaneous observation of planned laws. To account for time delays in reaction to tax announcements, we include four lags of the draft (see Figures A3 and A4 in the Appendix). Next, we include eight lags of the implementation effects (see Figures A5 and A6 in the Appendix), as in Hayo and Uhl (2014). Moreover, we re-estimate Equations (1) and (2) employing our controls in first differences (see Figures A7 and A8 in the Appendix), rather than in logs (Alloza et al., 2019).

Finally, we use Auerbach and Gorodnichenko’s (2013) smooth-transition parameter for our state-dependent estimation (Equation (2)), based on an eight-quarter moving average of (log real) GDP and setting  $\gamma$ , the parameter of the logistic function, equal to 1.5 (see Figure A9 in the Appendix).

Our findings are generally robust to these variations in the estimation design.

## **5 Conclusion**

Using narrative identification and Local Projections, we study the effects of ‘unanticipated’ tax cuts, proxied by the earliest legislative announcements, on GDP in the US, Germany, and the UK over the period 1977Q1 to 2018Q4.

We find strong cross-country heterogeneity, with negative (positive) effects of drafting tax cuts on US (UK) GDP and insignificant reactions in Germany.

Conditioning the analysis on the state of the business cycle, that is, differentiating between recessionary and non-recessionary periods, we find that US GDP drops regardless of the business cycle, whereas the effect in the UK is positive, larger, and longer lasting during non-recessions. For Germany, GDP increases (decreases) after drafting tax cuts during recessions (non-recessions). Looking at the transmission mechanisms for these effects, we find that consumption, investment, and employment generally follow the dynamics of GDP.

Hence, ‘unanticipated’ tax cuts reduce economic activity in the US regardless of the business cycle position, whereas they can be expansionary in Germany (the UK) during recessions (non-recessions).



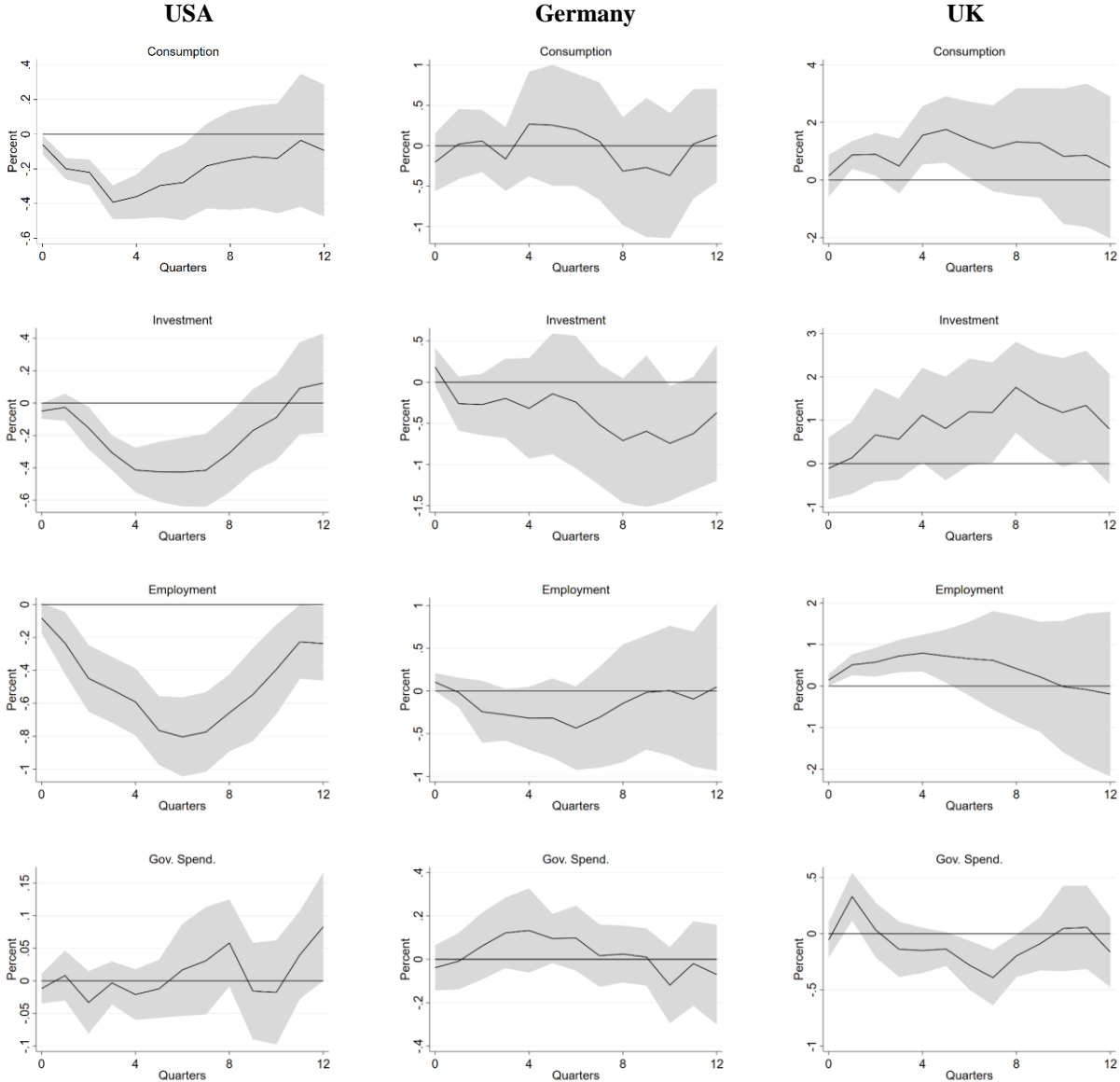
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# Appendix

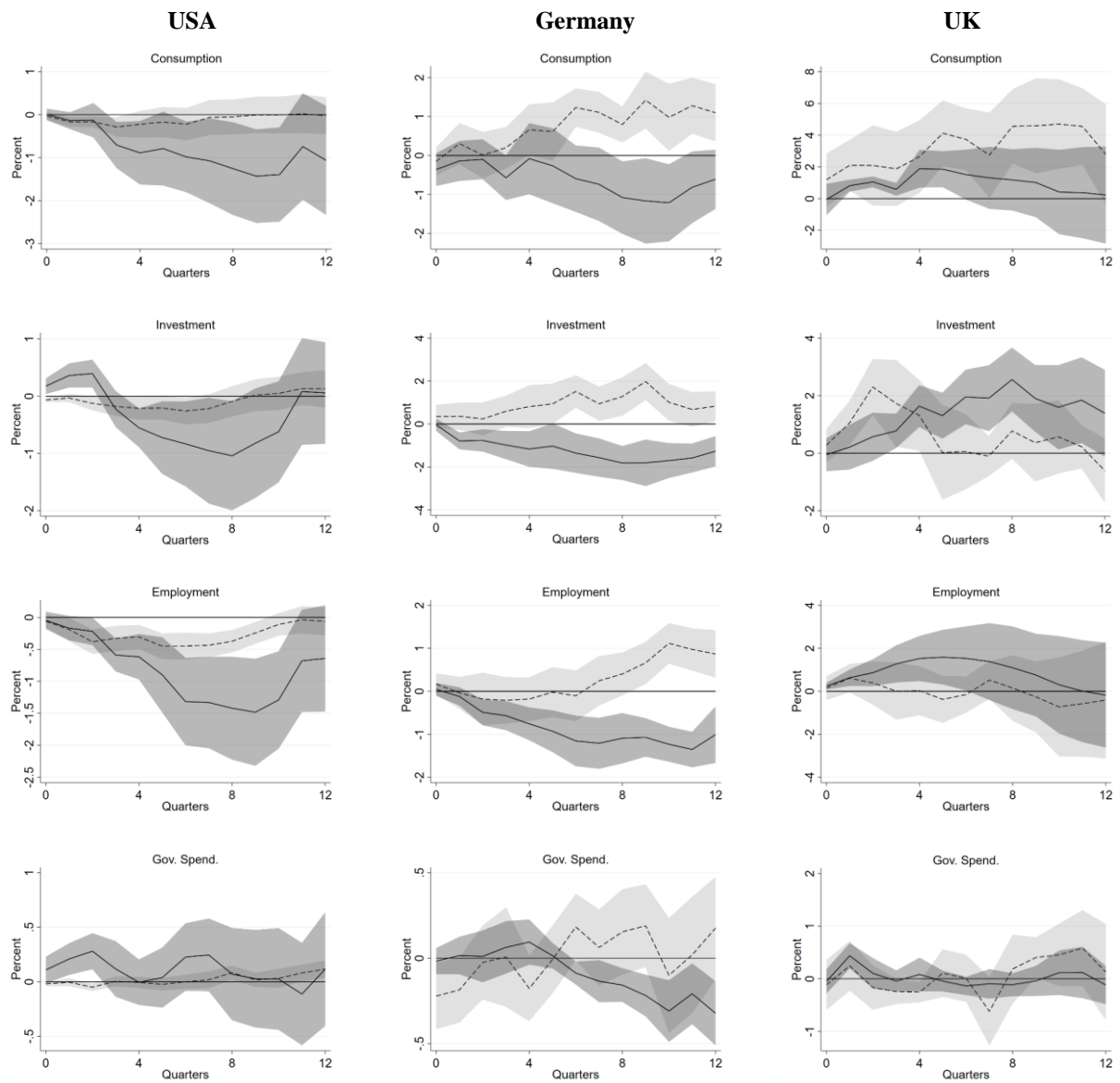
## Transmission Channels

Figure A1: Transmission of Exogenous Drafting Tax Cuts, Unconditional Case



Note: The shaded area represents 90% confidence bands.

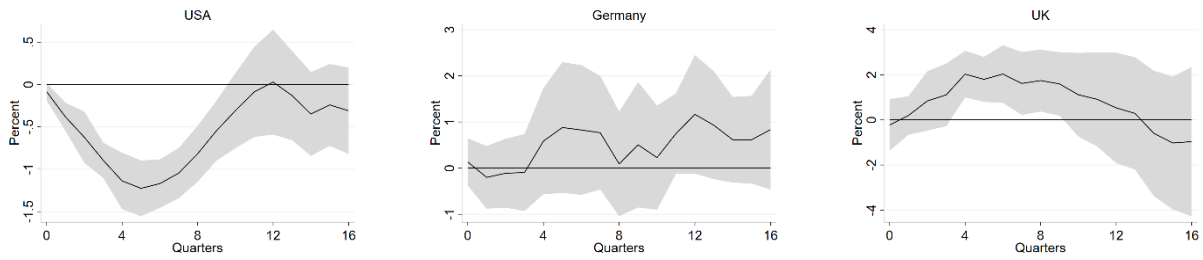
**Figure A2: Transmission of Exogenous Drafting Tax Cuts, State-Dependent Case**



Notes: The shaded area represents 90% confidence bands.  
The lighter (darker) shaded area indicates recession (non-recession) periods.

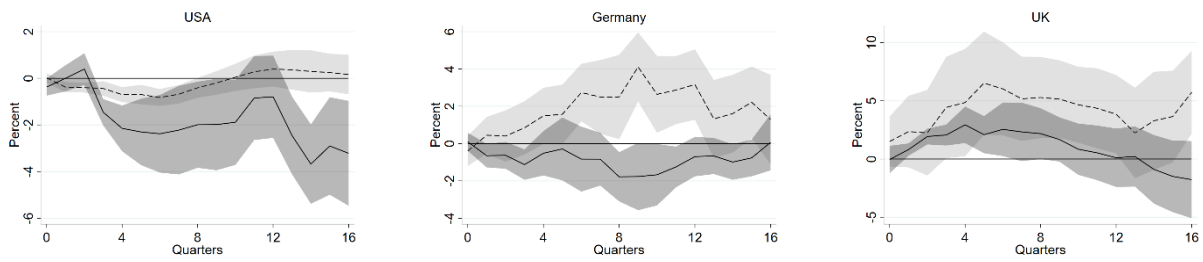
## Robustness: Four Lags of Drafting Tax Shocks

Figure A3: Exogenous Drafting Tax Cuts, Unconditional Case, 4 Lags of Shock



Notes: The shaded area represents 90% confidence bands.

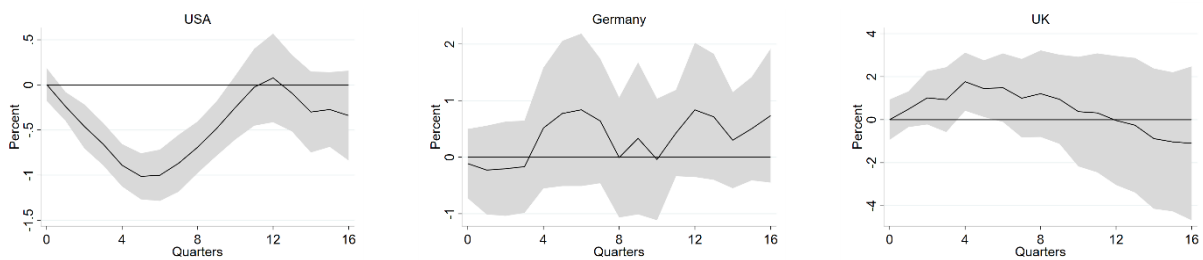
Figure A4: Exogenous Drafting Tax Cuts, State-Dependent Case, 4 Lags of Shock



Notes: The shaded area represents 90% confidence bands.  
The lighter (darker) shaded area indicates recession (non-recession) periods.

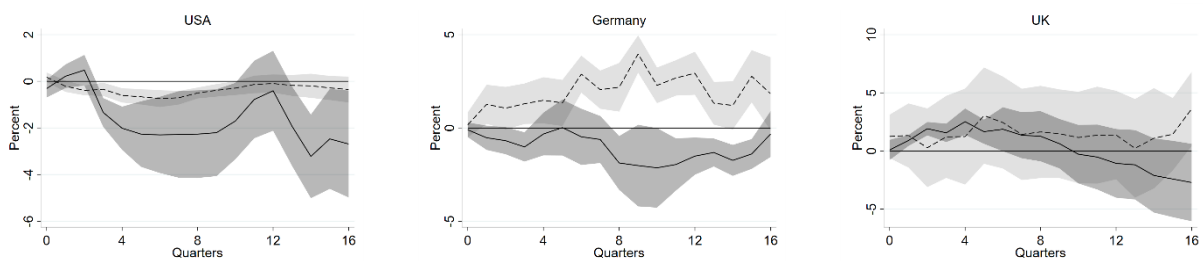
## Robustness: Eight Lags of Implemented Tax Changes

Figure A5: Exogenous Drafting Tax Cuts, Unconditional Case, 8 Lags of Implemented Tax Changes



Note: The shaded area represents 90% confidence bands.

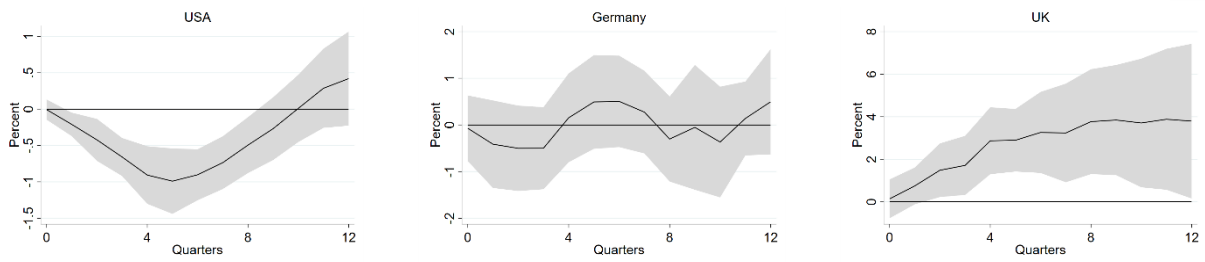
Figure A6: Exogenous Drafting Tax Cuts, State-Dependent, 8 Lags of Implemented Tax Changes



Notes: The shaded area represents 90% confidence bands.  
The lighter (darker) shaded area indicates recession (non-recession) periods.

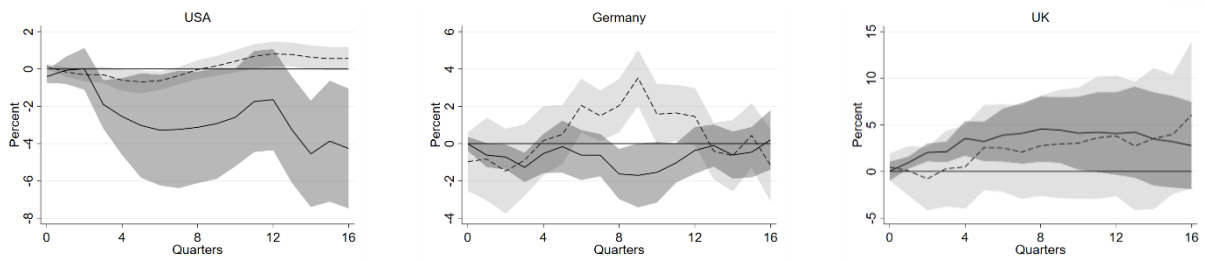
## Robustness: Controls in First Difference

Figure A7: Exogenous Drafting Tax Cuts, Unconditional Case, First Differences



Note: The shaded area represents 90% confidence bands.

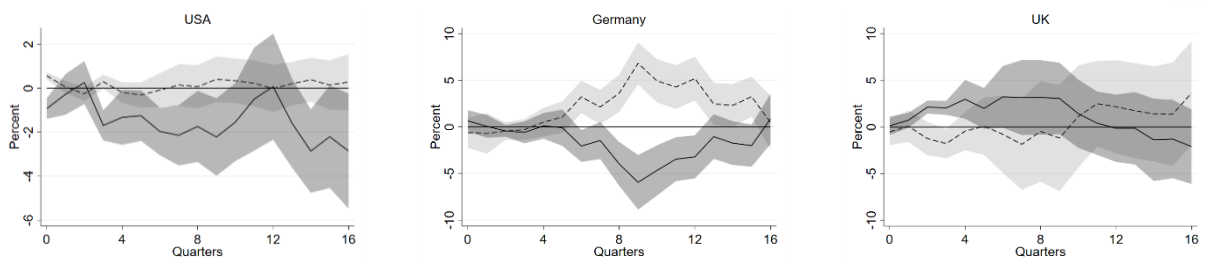
Figure A8: Exogenous Drafting Tax Cuts, State-Dependent Case, First Differences



Notes: The shaded area represents 90% confidence bands.  
The lighter (darker) shaded area indicates recession (non-recession) periods.

## Robustness: A&G (2012) Smooth-Transition Parameter

Figure A9: Exogenous Drafting Tax Cuts, State-Dependent Case



Note: The shaded area represents 90% confidence bands.