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The State-Level Nonlinear Effects of Government Spending Shocks in the US: The Role of Partisan Conflict

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Abstract: Utilising a nonlinear (regime-switching) mixed-frequency panel vector autoregression model, we study the effects of government spending shocks in the United States (US) over the business cycle, while considering the role of partisan conflict. In particular, we investigate whether partisan conflict is relevant to the differences in fiscal spending multipliers in expansionary and recessionary business cycle phases upon the impact of annual government spending shocks, using quarterly state-level data covering 1950:Q1 to 2016:Q4. We find new evidence that fiscal multipliers can vary with economic and political conditions. The cumulated effects of government spending shocks are strong and persistent in recessions when the level of partisan conflict is low.

Keywords: government spending shocks; fiscal policy multiplier; partisan conflict; panel analysis; vector autoregressions; mixed-frequency

JEL Classification: C32; E32; E62; H3

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1. Introduction

In response to the Great Recession after the Great Financial Crisis in 2007–2008, and to the global recession caused by the COVID-19 pandemic, governments in most industrialised countries have implemented a series of substantial fiscal stimulus plans, in particular, spending-based measures, to boost their sagging economies. The International Monetary Fund [1,2] recommended that sizeable discretionary fiscal stimulus packages be introduced by G20 countries to bolster demand and help to turn around global growth. The recent economic recessions, and the government fiscal policy responses to them, have led to a renewed research interest in the likely effects of fiscal stimulus in the United States (US) and across the world. A growing stream of literature in the field has focused on the nonlinear effects of fiscal policy over the business cycle and suggested that the size of fiscal spending multipliers could be larger in recessions than in expansions [3–7].

The spending multiplier is regarded as one of the important factors that governments need to take into consideration in setting fiscal policy. (The spending multiplier is typically defined as a ratio of a change in income to an exogenous change in government fiscal spending following the narrative approach [8]. The multiplier captures the response of real income to a government spending shock, and it relates income to a discretionary change in government fiscal spending.) For example, underestimating spending multipliers can lead governments to set unachievable fiscal targets and may affect the effectiveness and credibility of fiscal measures [8]. The literature survey completed by Mineshima et al. [9] suggests that there is no unique magnitude of spending multipliers and there are notable differences in the size of multipliers between countries as well as between the econometric methods employed. Existing empirical evidence shows that a typical range of first-year government spending multipliers is from 0 to 1 in developed countries and it can exceed 1 in abnormal economic conditions, for example, during abnormal times when the

economy is in recessions [8]. The International Monetary Fund [2] indicates that fiscal multipliers can cover a wide range of values, from positive through insignificant to negative. Perotti et al. [10] report values of multipliers as high as 4, while Krogstrup [11] presents a multiplier value as low as −2. Based on annual US data from 1917 to 2006, Barro and Redlick [12] estimate that spending multipliers are ranging from 0.4 to 0.7 (i.e., 0.4–0.5 over one year and 0.6–0.7 over two years). It is noteworthy that existing studies mostly examine the impact of fiscal policy at the aggregate country level in the US (for example, by estimating aggregate fiscal multipliers). There are very few papers that examine the effects of government spending shocks at the US state level [6,13,14]. To the best of the authors' knowledge, our study is the first to investigate the effects of government spending shocks in the US over the business cycle at the state level, while considering the role of partisan conflict. As noted by Batini et al. [8], there remain some practical difficulties in estimating spending multipliers, as the methodology used to quantify the effect of fiscal measures could be influenced by political decisions. Mineshima et al. [9] also note that one of the reasons that fiscal policy takes a back seat as an effective stabilisation tool is that fiscal policy is likely to be distorted by political constraints.

In recent years, US politics have been characterised by a high level of partisan conflict which has not only led to great political divisions but also high fiscal policy-related uncertainty [15]. The presence of increased partisan conflict and political polarisation can translate into high economic policy uncertainty [16], amplify business cycles [17], delay private investment decisions [15,18,19], and negatively affect the timing, quality, and effectiveness of government policy changes in response to unfavourable exogenous shocks [18,20,21]. There is much evidence showing that the rise of partisan conflict in US politics has become a big issue in recent years (for example, the congressional gridlock on budget negotiations over the 2013, 2018, and 2019 US government shutdowns) and has attracted wide attention in the literature [15,17,18,22–24]. Azzimonti [15,22] developed the partisan conflict index (PCI) to measure the degree of partisan conflict in the US and suggested that political divisions and partisan conflict make the size, timing, and composition of government economic policy more unpredictable. (The PCI was constructed by Azzimonti [15,22] based on textual analysis to compute the frequency of news articles from major US newspapers reporting political disagreement about government policy in a given period). The existing literature [25–27] also indicates that partisan conflict can have substantive economic policy consequences, and a high level of partisan conflict tends to reduce aggregate government spending.

Building on this line of the existing literature, this paper investigates, for the first time, the effects of government spending shocks (as measured by fiscal spending multipliers) over the business cycle using state-level data for a panel of 50 US states, conditional on the level of partisan conflict. The study contributes to the literature by examining how spending multipliers manifested themselves in expansions and recessions while explicitly taking into consideration the important role of partisan conflict. We explore whether partisan conflict is relevant to the differences in cross-state fiscal multipliers in boom and recessionary business cycle episodes upon the impact of annual government spending shocks by utilising a nonlinear (regime-switching) panel vector autoregression (PVAR) model of Mumtaz and Sunder-Plassmann [6], characterised by mixed frequency. The model also uses quarterly data, which in turn allows us to cover a long sample period of 1950:Q1 to 2016:Q4. The model allows for possible effects of structural breaks and provides estimates of not only the regime-dependent average fiscal multipliers, but also the same for individual US states.

The remainder of this paper is organised as follows: Section 2 describes the data and methodology, Section 3 discusses empirical results, and Section 4 provides a conclusion.

2. Data and Methodology

Our panel dataset included state-specific employment, real spending per capita, and real income per capita across 50 US states, and the sample period ranged from 1950:Q1

to 2016:Q4, with the fiscal policy, i.e., the spending variable, measured annually to give the model a mixed-frequency structure. (The sample period selected in this study is the same as the one in Mumtaz and Sunder-Plassmann [6]. The data are available at http://qed.econ.queensu.ca/jae/datasets/mumtaz004/, accessed on 13 April 2021). We used the partisan conflict index (PCI) to measure the degree of partisan conflict in the US. (The data are available at http://marina-azzimonti.com/datasets/, accessed on 13 April 2021). The index tracks the level of political disagreement about government policy among US politicians and measures the frequency of media coverage in newspapers reporting disagreement among policymakers.

Following Mumtaz and Sunder-Plassmann [6], the nonlinear threshold PVAR model is specified as follows:

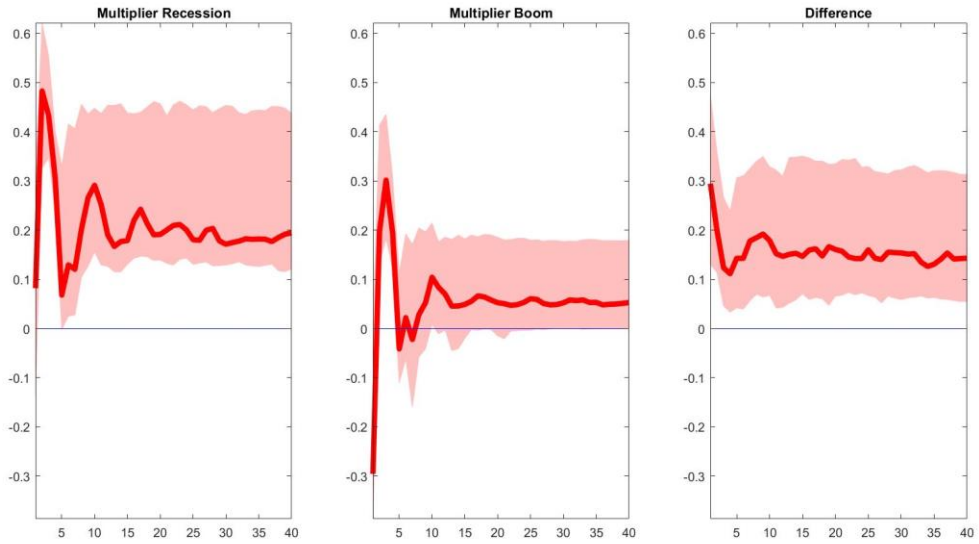
$$\begin{aligned} Z_{it} = (c_{1,i} + \sum_{j=1}^{P} b_{1,i,j} Z_{it-j} + \sum_{j=1}^{Q} d_{1,i,j} X_{t-j} + u_{it}) S_{it} \\ +(c_{2,i} + \sum_{j=1}^{P} b_{2,i,j} Z_{it-j} \sum_{j=1}^{Q} d_{2,i,j} X_{t-j} + u_{it})(1 - S_{it}) \end{aligned} \quad (1)$$

where Z_{it} represents the endogenous variables of the model, $Z_{it} = \begin{pmatrix} G_{it} \\ Y_{it} \\ E_{it} \end{pmatrix}$. $G_{it} = \left(\widetilde{G}_{it} - \widetilde{G}_{it-1}\right)/\widetilde{Y}_{it-1}$, $Y_{it} = \left(\widetilde{Y}_{it} - \widetilde{Y}_{it-1}\right)/\widetilde{Y}_{it-1}$, $E_{it} = \left(\widetilde{E}_{it} - \widetilde{E}_{it-1}\right)/\widetilde{Y}_{it-1}$, and $\widetilde{G}_{it}$ is the real spending per capita for each US state i, $\widetilde{Y}_{it}$ is the real income per capita for state i, and $\widetilde{E}_{it}$ is state-specific employment. (The endogenous variables are transformed following the procedure of Hall [28]. The lag length of the VAR model is 4 (i.e., $p = 4$).) The regime-switching variable S_{it} is determined by a state-specific threshold process: $S_{it} = 1 \Leftrightarrow z_{it-d_i} \leq z_i^*$, where z_{it} is the four-quarter moving sum of Y_{it} and is approximately equal to the annual growth rate of real income. $c_{1,i}$ and $c_{2,i}$ capture the fixed effects in regime 1 (i.e., during recessions) and regime 2 (i.e., during expansions) for state i. X_t denotes a set of exogenous predictors at the US national level, including the real government spending per capita, real taxes per capita, real GDP per capita, GDP deflator, 3-month US Treasury bill rate, and Moody's seasoned Baa corporate bond yield. (The lag length of the exogenous variables is set to 1 (i.e., $Q = 1$).) In this study, we multiplied a PCI dummy variable with federal government spending and created an interaction variable that allowed us to investigate the effects of spending shocks in recessions and expansions under both high and low PCIs. (We used a dummy variable to distinguish the high degree of partisan conflict in the US from the low. We assigned a value of 1 to the dummy variable (denoted by PCI_high) when the level of PCI at time t is larger than its median value in the whole sample period and assigned a value of zero otherwise. Similarly, we set another dummy variable (denoted PCI_low) to 1 if the level of PCI at time t is smaller than its median value over the sample period, and zero otherwise.) The government spending multipliers were then calculated as the ratio of the cumulated impulse responses of real income to spending shocks. The model allowed for estimates of the regime-dependent spending multipliers for the average state and individual state i. The government spending multipliers were obtained by estimating the nonlinear threshold PVAR model specified in Equation (1) under the mixed-frequency framework, since the data for state-specific employment and real income are available at a quarterly frequency but government spending is only observed at a yearly frequency. (See [6] for more details about the mixed-frequency approach and the procedure for identifying the government spending shock). Given that government spending is not directly observable at the quarterly frequency but is estimated under the mixed-frequency framework, it is important to point out the potential limitation of this approach. As highlighted by Mumtaz and Sunder-Plassmann [6], if the estimate of changes in government spending at the quarterly frequency is a poor approximation of the underlying process, measurement errors may present in the structural shock, potentially influencing the im-

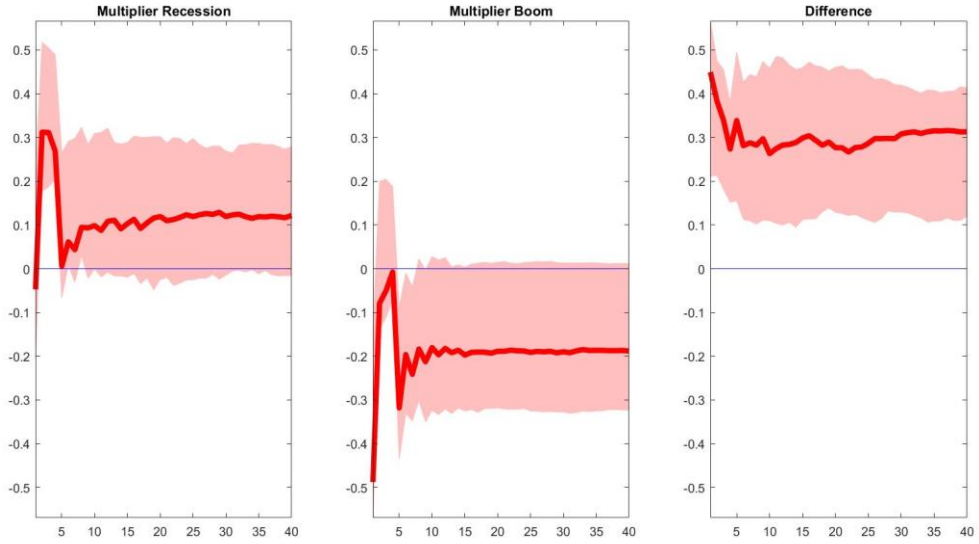
pulse responses. However, the study of Foroni and Marcellino [29] provided evidence for the effectiveness of the mixed-frequency approach. In a Monte Carlo simulation setting, Foroni and Marcellino [29] showed that the mixed-frequency VAR models can provide a good approximation to the true impulse responses.

3. Results and Analysis

We first report the estimated spending multipliers of an "average" or "typical" state in the US from the posterior estimates of the average parameters of the model. Figure 1 shows the estimated multipliers for real income for the average state in recessions and expansions when PCI is low (in Panel A) and when PCI is high (in Panel B).



Panel A: Spending multipliers when PCI is low



Panel B: Spending multipliers when PCI is high

Figure 1. The estimated spending multipliers of an "average" state in the US. Figure 1 shows the estimated spending multipliers for the average state when PCI is low (in **Panel A**) and when PCI is high (in **Panel B**) in the recession-and expansion-regimes and the difference in multipliers in these two regimes. The shaded areas indicate the 68% highest posterior density interval (HPDI) for multipliers.

We provide new evidence that the cumulated effects of government spending shocks are strong and persistent during recessions when the level of partisan conflict is low. Our results show that, in the recession regime, government expenditure multipliers are large and statistically significant at all 40 horizons when PCI is low (as shown on the left of Panel A). In contrast, government spending multipliers are smaller in size and only significant in the short horizon in the regime of recessions when PCI is high (as shown on the left of Panel B). The finding aligns with the work of Azzimonti [15], who observed a negative relationship between partisan conflict and private investment in the US. High levels of partisan conflict can lead to high fiscal policy uncertainty, make expected returns on investment less predictable, and discourage private investment, thereby reducing the expansionary effects of government spending shocks on real income.

We also find that fiscal multipliers are positive and statistically significant at short horizons during expansions when the level of partisan conflict is low. This is indicative of the fact that government spending shocks can increase income in the short run in times of economic expansion when the degree of political disagreement about government policy among US politicians is low. Our results show that, in the expansionary regime, government spending multipliers dissipate quite quickly, within 4 quarters, when PCI is low (as shown in the middle of Panel A). In contrast, when PCI is high, government spending multipliers are negative and statistically significant at some horizons, but in general, these multipliers are not statistically different from zero for most horizons in expansions (as shown in the middle of Panel B).

Furthermore, our results also show large differences in the size of multipliers in recessions and expansions, with these differences being bigger when the level of partisan conflict is high than when it is low. As shown on the right of Panels A and B, the null hypothesis that the difference in multipliers in recessions and expansions equals zero can be rejected across all horizons. The differences in multipliers in recessions and expansions across 40 horizons are around 0.15 when PCI is low and around 0.30 when PCI is high. Our results, showing that fiscal multipliers are systematically larger in recessions relative to expansions, are in line with the findings from the existing literature [4–6]. This finding is consistent with the economic intuition that government spending shocks are less likely to crowd out private investment and consumption in recessions. Furthermore, we provide support to the view of the nonlinear effects of government spending shocks and present new evidence that the fiscal multipliers can vary with both the economic and political conditions of the states.

The model specified in Equation (1) does not only provide estimates of the regime-dependent spending multipliers for the average state in the US, but it also allows for calculations of spending multipliers for each US state. In Table 1, we report the estimated cumulated cross-state spending multipliers at the 40-quarter horizon in recessions and expansions when PCI is low and when PCI is high.

Table 1. The estimated state-specific multipliers in recessions and expansions.

Panel A: Spending Multipliers in Recessions						
US States	*when PCI is Low*			*when PCI is High*		
	Multipliers	−1 SD	+1 SD	Multipliers	−1 SD	+1 SD
AL	0.25	−0.44	1.07	−0.16	−0.86	0.54
AK	0.50	0.26	1.17	0.39	−0.62	0.80
AZ	−0.23	−1.00	1.17	−0.61	−1.83	1.06
AR	0.65	−0.23	1.12	0.45	−0.68	0.98
CA	−0.08	−0.86	0.29	−0.86	−1.30	−0.13
CO	−0.60	−2.00	1.06	−1.16	−1.64	1.25
CT	0.12	−1.47	1.36	0.76	−1.35	2.29
DE	0.67	−1.10	1.46	0.23	−0.66	1.49
FL	−0.10	−1.20	1.36	−0.11	−2.13	1.74

Table 1. *Cont.*

GA	−0.01	−1.14	1.52	0.51	−1.67	1.16
HI	0.28	−0.46	1.26	0.37	−0.30	1.33
ID	0.56	−0.55	1.17	0.14	−0.87	0.82
IL	−0.50	−0.72	0.34	−0.52	−0.84	0.10
IN	2.06	1.31	2.94	2.19	1.49	2.68
IA	1.02	−0.13	1.43	0.67	−0.82	2.33
KS	0.88	0.27	1.53	0.27	−0.22	1.19
KY	1.04	0.49	1.28	0.68	0.28	1.09
LA	0.23	−0.90	0.74	−0.36	−0.82	0.45
ME	0.71	0.43	0.92	0.32	0.08	0.76
MD	3.01	1.22	4.23	2.12	−1.12	3.32
MA	−0.39	−1.49	0.63	0.11	−0.70	1.29
MI	1.91	1.11	3.26	2.17	−0.11	3.04
MN	0.51	−0.27	0.83	0.36	−0.39	0.94
MS	0.98	0.40	1.88	0.72	−0.38	1.14
MO	−0.18	−0.72	1.29	−0.21	−0.83	0.41
MT	−0.82	−1.36	0.20	−0.75	−2.82	−0.08
NE	0.36	−0.93	1.33	0.06	−1.55	1.36
NV	0.61	−0.11	1.40	0.67	−0.79	1.50
NH	0.67	−0.52	1.20	−0.16	−0.86	0.65
NJ	0.51	−0.14	1.01	0.22	−0.33	0.92
NM	0.22	−0.43	0.79	−0.14	−0.61	0.40
NY	−0.35	−0.83	0.21	−0.78	−1.76	−0.50
NC	−0.59	−1.34	0.44	−0.95	−1.58	−0.38
ND	−0.64	−4.30	0.48	−1.60	−3.93	0.98
OH	−0.25	−0.92	0.44	−0.24	−0.65	0.63
OK	0.92	−0.45	1.52	0.25	−1.21	1.82
OR	0.16	−0.93	1.11	−0.04	−1.10	0.44
PA	−0.18	−0.79	0.64	−0.06	−0.77	0.62
RI	0.62	0.31	0.95	0.81	0.12	1.39
SC	0.32	−0.07	1.02	0.38	−0.29	1.47
SD	1.37	−0.19	3.01	0.95	−0.81	1.95
TN	0.29	−0.81	1.19	0.02	−0.71	0.88
TX	0.01	−0.80	0.83	0.12	−0.26	0.95
UT	1.05	0.30	2.39	0.37	−0.56	1.28
VT	0.54	0.14	0.97	0.63	−0.02	1.30
VA	0.54	−0.65	1.44	0.40	−1.08	1.44
WA	−0.75	−1.69	−0.29	−0.74	−1.71	−0.31
WV	0.14	−0.33	1.31	0.40	−0.32	1.32
WI	0.25	−0.04	0.78	0.33	−0.03	0.60
WY	−0.25	−1.48	0.75	−0.70	−1.62	−0.16

Panel B: Spending Multipliers in Expansions

US States	*when PCI is Low*			*when PCI is High*		
	Multipliers	−1 SD	+1 SD	Multipliers	−1 SD	+1 SD
AL	0.22	−0.23	0.51	−0.29	−0.62	0.11
AK	0.25	−0.14	0.49	0.00	−0.29	0.30
AZ	−0.51	−1.42	0.33	−0.87	−2.21	−0.12
AR	0.36	−0.30	1.26	0.26	−0.18	0.97
CA	−1.25	−2.51	−0.98	−1.72	−3.03	−1.47
CO	−1.29	−1.93	−0.05	−1.95	−2.92	−0.78
CT	0.03	−0.63	0.84	−0.30	−0.92	0.42
DE	0.47	−0.64	0.86	0.35	−0.49	0.71
FL	−0.21	−1.66	0.50	−0.58	−2.58	0.63
GA	−0.19	−1.27	0.55	−0.29	−1.42	0.33
HI	0.65	0.16	1.01	0.24	−0.12	0.85
ID	0.49	−0.47	1.54	−0.20	−1.09	0.83
IL	−0.59	−1.19	−0.23	−0.93	−1.43	0.02
IN	1.03	0.04	1.81	1.03	0.32	1.68

Table 1. *Cont.*

IA	0.68	−0.08	1.37	−0.20	−0.70	1.38
KS	0.67	−0.09	1.44	−0.03	−0.87	0.59
KY	0.74	0.28	1.09	0.30	−0.11	0.95
LA	0.30	−0.44	0.56	−0.27	−0.91	0.29
ME	0.52	0.17	1.02	0.12	−0.24	0.57
MD	1.40	0.64	1.79	0.57	−0.17	1.03
MA	−0.35	−1.10	0.54	−0.76	−1.67	−0.04
MI	0.43	−0.64	1.43	−0.01	−0.94	0.79
MN	0.37	−0.43	0.90	0.02	−0.63	0.52
MS	0.86	0.06	1.40	0.43	−0.55	0.76
MO	−0.25	−0.97	0.46	−0.84	−1.30	−0.16
MT	−0.88	−1.48	−0.24	−1.15	−2.16	−0.16
NE	0.25	−0.60	0.90	−0.45	−1.45	0.54
NV	0.19	−0.65	0.87	−0.30	−1.30	1.01
NH	0.36	−0.01	1.22	−0.37	−0.78	0.12
NJ	0.68	0.39	1.24	0.28	−0.29	0.72
NM	−0.05	−0.47	0.19	−0.57	−0.94	−0.24
NY	−0.65	−1.20	0.02	−1.00	−1.61	−0.49
NC	−0.86	−1.43	0.24	−0.98	−1.89	−0.44
ND	−2.23	−3.34	−0.43	−1.99	−4.69	−0.12
OH	−0.53	−1.16	0.11	−0.88	−1.18	−0.17
OK	0.33	−0.67	1.29	−0.21	−1.28	1.13
OR	0.13	−0.49	0.74	−0.63	−1.44	−0.07
PA	−0.91	−1.17	0.14	−0.67	−1.36	0.20
RI	0.31	0.07	0.66	0.06	−0.20	0.51
SC	−0.11	−0.71	0.29	−0.25	−0.80	0.19
SD	0.66	−1.60	1.64	0.40	−1.57	1.23
TN	0.19	−0.29	0.66	−0.39	−1.30	0.61
TX	−1.13	−2.48	−0.05	−1.64	−2.07	−0.58
UT	0.45	0.11	1.02	0.10	−0.58	0.78
VT	0.03	−0.45	0.45	0.11	−0.27	0.36
VA	0.81	−0.07	1.18	0.03	−0.85	0.90
WA	−0.54	−0.84	−0.19	−0.54	−1.40	−0.18
WV	0.29	−0.02	0.99	0.18	−0.26	0.68
WI	0.10	−0.08	0.70	−0.12	−0.38	0.30
WY	−0.62	−1.55	0.34	−0.84	−2.12	−0.26

Notes: −1 SD and +1 SD represent minus one and positive one standard deviation of the multipliers.

Our results indicate the presence of heterogeneity in spending multipliers across individual states. We find evidence that fiscal stimulus is a particularly useful tool that policymakers in some US states can employ in recessions when the level of partisan conflict is low. For example, as shown in Panel A of Table 1, when PCI is low, we observe that the spending multipliers in Indiana (IN), Maryland (MD), and Michigan (MI) are 2.06, 3.01, and 1.91, respectively, in times of recessions. Moreover, our results show a large number of states have positive spending multipliers when PCI is low. The results provide new evidence for the nonlinear effects of government spending shocks at the level of US states, showing that government spending multipliers are conditional on the economic and political conditions of US states. The findings of this paper have important policy implications, since a substantial heterogeneity in the state-level impacts of government spending can be an important consideration for governments in making economic policy decisions.

In Table 2, we provide summary statistics for spending multipliers of 50 US states in recessions and expansions. Our results show that in recessions, the mean of state-level spending multipliers is 0.36 when PCI is low. This is considerably higher than the mean of 0.16 when PCI is high. In addition, we find that during economic expansions, the mean of state-level spending multipliers is close to zero when PCI is low and becomes negative when PCI is high. The results for median also confirm that state-level spending multipliers

are systematically larger in recessions than expansions. In addition, we observe the largest spending multiplier of 3.01 in recessions when PCI is low.

Table 2. Summary statistics of spending multipliers in recessions and expansions.

Panel A: Spending multipliers in recessions		
	when PCI is low	*when PCI is high*
Mean	0.36	0.16
Median	0.29	0.23
Maximum	3.01	2.19
Minimum	−0.82	−1.60
Standard Deviation	0.73	0.75
Panel B: Spending multipliers in expansions		
	when PCI is low	*when PCI is high*
Mean	0.02	−0.35
Median	0.21	−0.28
Maximum	1.40	1.03
Minimum	−2.23	−1.99
Standard Deviation	0.69	0.64

4. Conclusions

Using a regime-switching mixed-frequency PVAR model and state-level data, this paper investigates the effects of annual government spending shocks on quarterly real income, while explicitly taking into consideration the important role of partisan conflict in the US. To the best of the authors' knowledge, this paper is the first to study the role of partisan conflict in the state-level nonlinear effects of government spending shocks in the US. The paper explores the differences in government spending multipliers in the expansionary and recessionary business cycle episodes when partisan conflict is low and high. The study presents new evidence that fiscal multipliers can vary with economic and political conditions. The cumulated effects of government spending shocks are strong and persistent during recessions when the level of partisan conflict is low. In contrast, government spending multipliers are smaller in size and only statistically significant in the short horizon in recessions when the degree of political disagreement about government policy among US politicians is high. The results also show that fiscal multipliers are systematically larger in recessions relative to expansions. Due to the limitation of data availability, this study focuses on the role of partisan conflict on government spending shocks in the US, with a special focus on the size of fiscal spending multipliers. Future research could look into the role of partisan conflict on government spending shocks in other economies, especially in developing countries, using the nonlinear (regime-switching) mixed-frequency panel vector autoregression (PVAR) model.

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