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Abstract

Much of the literature examining the effects of oil shocks asks the question "What is an oil shock?" and has concluded that oil-price increases are asymmetric in their effects on the US economy. That is, sharp increases in oil prices affect economic activity adversely, but sharp decreases in oil prices have no effect. We reconsider the directional symmetry of oil-price shocks by addressing the question "Where is an oil shock?", the answer to which reveals a great deal of spatial/directional asymmetry across states. Although most states have typical responses to oil-price shocks—they are affected by positive shocks only—the rest experience either negative shocks only (5 states), both positive and negative shocks (5 states), or neither shock (5 states).

Keywords: State-Level Oil Shocks
JEL codes: C31, E37, R12

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1. Introduction

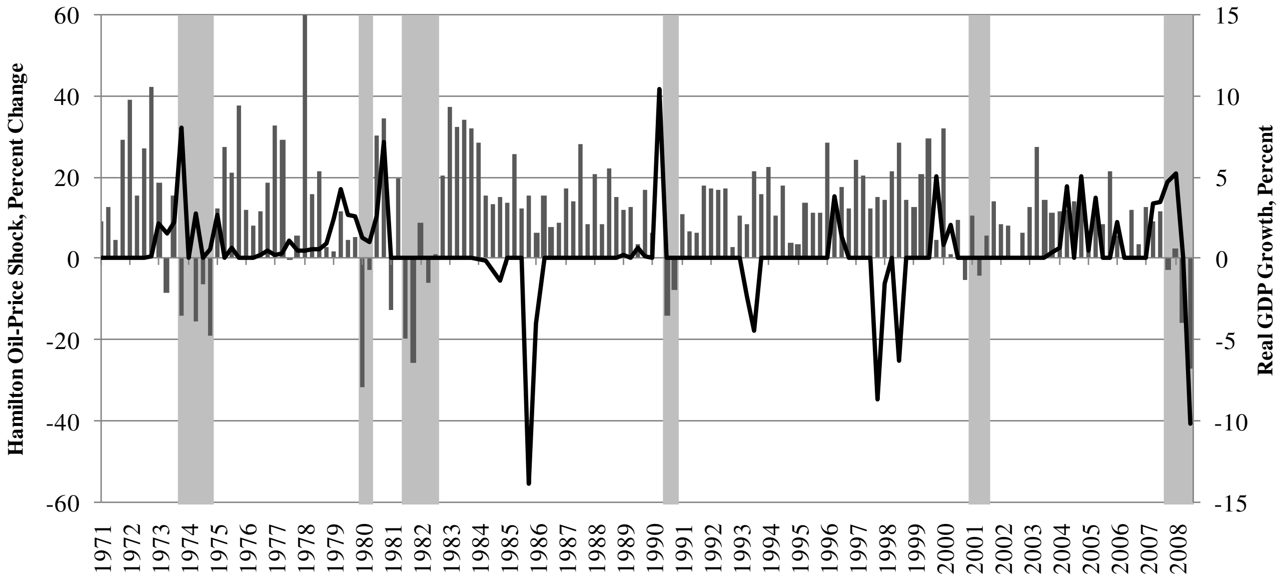
Oil-price shocks are often viewed as one of the primary exogenous causes of national macroeconomic fluctuations. Hamilton (2005), for example, suggests that nine of the ten recessions in the United States between 1945 to 2005 were preceded by large positive increases in oil prices.[1] Despite the preeminence of sharply increasing oil prices in advance of recessions, however, large decreases in oil prices have not tended to be followed by abnormally high national growth. This fact has led to a general acceptance that oil-price shocks are directionally asymmetric: Large positive oil-price shocks matter, but negative ones do not. Given the consensus view, studies have, for the most part, simply imposed directional asymmetry while focusing on the best ways to implement oil-price shocks into empirical models.[2] Hamilton (2003), titled "What is an Oil Shock?", is a prominent representative of these efforts.

Figure 1 illustrates the consensus described above and uses a Hamilton-type oil-price variable for which shocks occur only when the change in oil prices is larger than what had been experience in the recent past.[3] All six official U.S. recessions since 1971 were preceded by upward spikes in oil prices, whereas real GDP growth was seemingly unaffected by the downward spikes of 1984-85, 1986, 1993, and 1998.

[1] More recently, Engemann, Kliesen, and Owyang (forthcoming) confirms this tendency for the United States and finds it across six additional OECD countries.
[2] A notable exception is Kilian and Vigfusson (2010), who argue that censoring the oil price series in a VAR environment can produce biased impulse responses to oil shocks if the true data generating process for the shocks is not asymmetric. Also, Elder and Serletis (2010) find that these results can be influenced by oil-price volatility.
[3] This variable is described in more detail in section 2.

Figure 1. National Recessions and Oil-Price Shocks

NBER recessions are shaded gray; Dark gray columns are real GDP growth; Black line is a Hamilton-type oil-price shock variable.

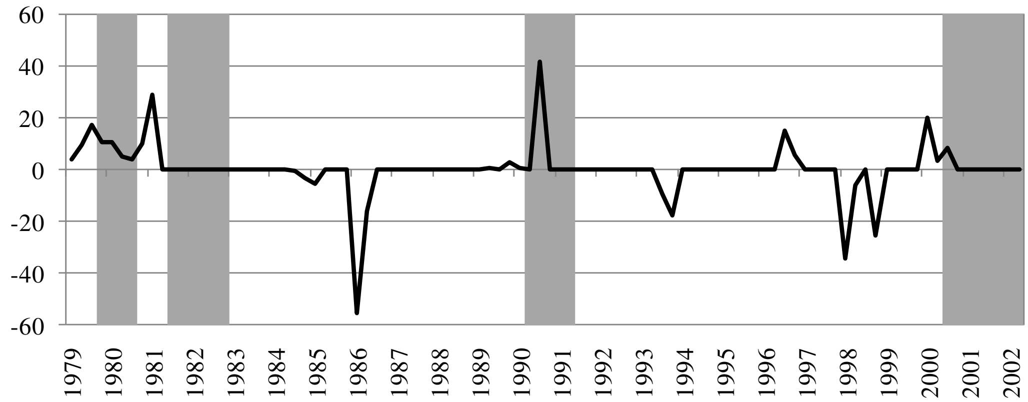


As our title suggests, our interest is in the locations of the effects of oil-price shocks. Specifically, we reexamine the consensus on oil-price shocks in the context of state-level business cycles. Our focus on the "where" of oil-price shocks is motivated by recent studies finding that state-level business cycles can differ a great deal from each other and from that of the country as a whole. In particular, energy-producing states and their neighbors have tended to experience idiosyncratic recessions following negative oil-price shocks, while often not experiencing the recessions seen at the national level (Owyang, Piger, and Wall, 2005; Crone, 2005; and Hamilton and Owyang, forthcoming).

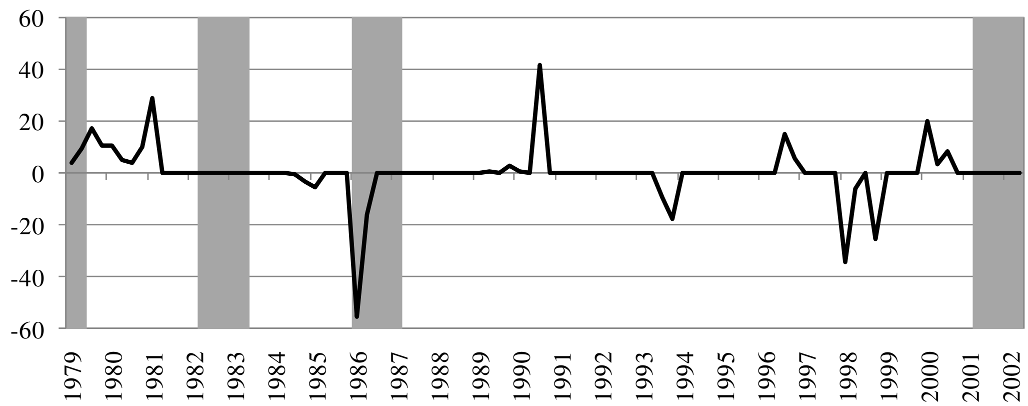
Figure 2, which compares oil-price shocks to the state recessions determined by Owyang, Piger, and Wall (2005) for 1979-2002, illustrates the potential variety across states in the relationship between oil prices and the business cycle. The top panel shows that North

Figure 2. State Recessions and Oil-Price Shocks
OPW (2005) state-level recessions are shaded gray. Black line is a Hamilton-type oil-price shock variable.

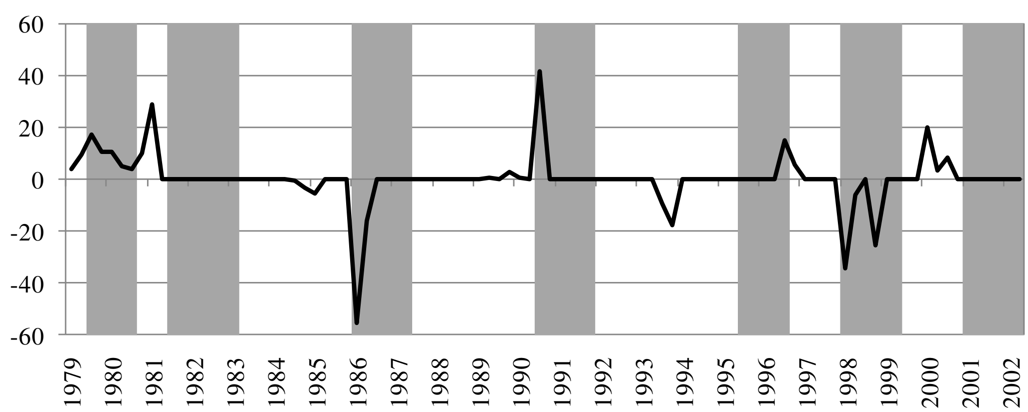
North Carolina



Texas



New Mexico



Carolina's experience was largely in line with that of the U.S., although North Carolina's 1990-92 recession began just prior to the sharp rise in oil prices that preceded the national recession. The middle panel of Figure 2 shows that Texas, a prominent energy-producing state, had a distinctly idiosyncratic business cycle, especially with regard to the role of oil prices. Specifically, Texas was in recession in 1979, but did not go into recession in 1980 or the early 1990s. It did, however, go into recession following the negative price shock of 1986. Finally, although Texas did experience a recession following the positive price shocks of 1980-81, it did not do so until nearly a full year after the start of the national recession. Of the three states illustrated in Figure 2, New Mexico was the most unfortunate in that it tended to experience recessions following both positive and negative oil-price shocks. Further, its recovery from recession in 1996 coincided with a sharp increase in oil prices. As with Texas, the role of oil in New Mexico's business cycle does not fit very well with the consensus view.

Our statistical approach follows Hamilton (2003), although we allow for positive and negative oil-price shocks. After applying the model to each state individually, we consider several variations on the notion of directional symmetry, all of which indicate that the usual result is far from the rule across states. For example, only 21 states pass a standard test for directional asymmetry, which is that the sums of the coefficients on positive and negative shocks are not statistically the same. After these test for the existence of positive and negative shocks, we look at the relative magnitudes of their effects across states and find similarly diverse results. For example, when we look at whether or not there is any significant response for at least one quarter following a shock, the states fall into four categories: Although 35 states experience only positive shocks, five see only negative shocks, another five see both positive and negative shocks, and the remaining five see neither shock.

In addition to estimating the state-by-state effects of oil-price shocks, our analysis provides general insights into the effects of oil prices by considering 51 macroeconomic responses rather than one. Further, our use of state-level data has at least one technical advantage over the use of national-level data alone. Specifically, with national data there is a potentially serious endogeneity problem because the typical assumption is that oil-price shocks are exogenous and caused by events external to the U.S. economy (Barsky and Kilian, 2004; Killian 2008a, 2008b, and 2009). Given the size and importance of the U.S. economy, this assumption is obviously problematic. In contrast, our assumption that the world oil price is exogenous at the state level requires significantly less credulity.[4]

We should note several papers that have investigated state or regional heterogeneity in the responses to oil-price shocks, although none is adequate for addressing our questions: Three have applied VARs to a handful of states and allowed for positive oil-price shocks only (Penn, 2006; Iledare and Olatubi, 2004; and Bhattacharya, 2003). Others merely imputed state effects from industry-level results rather than looking at actual states (Davis, Loungani, and Mahidhara, 1997; Brown and Yücel, 1995), while still others have derived regional effects from measures of resource dependence (Brown and Hill, 1988).

[4] In 2008, the United States accounted for about 23 percent world oil consumption and 10 percent of world oil production, which are large enough shares to be concerned about endogeneity. On the other hand, Texas accounted for about 2 percent of world oil production and California accounted for about 2 percent of world oil consumption.

The balance of the paper is structured as follows: Section 2 describes the model and presents national-level empirical results that serve as a benchmark. Section 3 uses state-level data and considers spatial asymmetries in the responses to oil. Section 4 summarizes and concludes.

2. Empirical Implementation

A common approach to modeling the effect of oil-price shocks is to use a bivariate, single-equation model of some aggregate variable, where aggregate growth is determined by lags of itself and past innovations to oil prices. Most often, the aggregate variable for the national economy is GDP, but, because state GDP data are not available at a suitable frequency for states, we use payroll employment. Specifically, we model the growth rate in state *i*'s employment, Δy_{it}, as an AR(4):

$$\Delta y_{it} = \alpha_i + \sum_{j=1}^{4} \beta_{ij} \Delta y_{i,t-j} + \sum_{j=1}^{4} \theta_{ij} \Delta Y_{-i,t-j} + \sum_{j=1}^{4} \gamma_{ij} \Delta x_{t-j}^{+} + \sum_{j=1}^{4} \kappa_{ij} \Delta x_{t-j}^{-} + \sum_{j=1}^{4} \delta_{ij} D_{t-j} + \varepsilon_{it}, \qquad (1)$$

where $\varepsilon_{it} \sim N(0, \sigma_i^2)$, and Δx_{t-j}^{+} and Δx_{t-j}^{-} are oil-price shocks whose directions are denoted by their superscripts. The preceding formulation allows us to measure potential asymmetric responses of state-level economic variables to oil shocks through the coefficients γ_{ij} and κ_{ij}. In (1), $\Delta Y_{-i,t-j}$ is the weighted growth rate of employment for all states excluding state *i*. The variable D_{t-j}, which takes on a value of 1 for the post-Hurricane-Katrina period accounts for the possibility of employment-growth outliers following the hurricane, and should be especially important for Louisiana and Mississippi. Obviously, (1) represents some restrictions on the cross-state relationships. Specifically, as in Carlino and DeFina (1998 and 1999), the model does not allow a complete set of cross-state correlations, except through the $\Delta Y_{-i,t-j}$, so we estimate a separate specification for each state.

In Hamilton's (1983) original paper, oil shocks are defined as the log change in oil prices under the implicit assumption that the effect of oil shocks on economic activity was symmetric—i.e., $\sum \gamma_{ij} = \sum \kappa_{ij}$. This condition was relaxed in Mork (1989), who modeled potential asymmetries but utilized the same log change in oil prices as the baseline shock. These approaches assume that small innovations in oil prices affect economic activity proportionately to large changes. On the other hand, one might believe that economic agents do no change their behavior in the presence of small fluctuations in oil prices, so Hamilton (1996; 2003) and others assume that the effects of oil price shocks are not only asymmetric but nonlinear. In Hamilton (1996), the best-fit model is one in which oil price shocks only have effects if the rise in prices is substantial—i.e., if the current (quarterly) price of oil rises above the maximum over the last year.[5] Thus, we define an oil-price shock as

$$\Delta x_t^+ = \max\left\{0, 100 \times \ln \frac{x_t}{\max\{x_{t-1}, \ldots, x_{t-4}\}}\right\}, \qquad (2)$$

which assumes that only increases in oil prices affect economic activity. Similarly, a negative oil-price shock is defined as

$$\Delta x_t^- = \min\left\{0, 100 \times \ln \frac{x_t}{\min\{x_{t-1}, \ldots, x_{t-4}\}}\right\}. \qquad (3)$$

[5] Hamilton uses the last month of the quarter as the quarterly oil price and Hamilton (2008) uses a three-year window and argues that the fit is better.

We estimate equation (1) first for the United States and then for each of the 50 states plus the District of Columbia. Our measure of oil prices is the producer's price index for oil, although WTI yields similar results. Our benchmark estimate of (1) uses the log change of seasonally-adjusted quarterly non-farm payroll employment for the United States for 1961.1 to 2008:4. Note that several studies have documented a change over time in the relationship between oil and the macroeconomy (Blanchard and Galí, 2010; Blanchard and Riggi, 2009). To allow for this, we estimate a one-time structural break in the relationship between oil and national employment growth using a relatively standard sup-Wald test (Andrews 1993) and find a structural break at 1973:4. This break coincides with the Arab oil embargo and the emergence of a OPEC as an active cartel.

Our regression results are provided in Table 1. Note that because there were no negative price shocks during the pre-break period it is not possible to estimate their effect for that sub-sample. For the full sample and the post-break sample, it is clear that the relationship between employment growth and oil prices is distinctly different depending on the direction of the oil-price shock. For both samples, employment growth has a statistically significant negative response two, three, and four quarters after a positive oil-price shock, but no such response occurs following negative oil-price shocks. More formally, the usual directional asymmetry, whereby only positive price shocks matter, is indicated for a state if $\sum \gamma_j > 0$ but $\sum \kappa_j = 0$. A higher statistical hurdle for asymmetry is a failure to reject that $\sum \gamma_j = \sum \kappa_j$. As Table 2 shows, directional symmetry is rejected by both criteria for the full sample and the post-break sample.

Table 1. Regression Results, Dependent Variable = Quarterly U.S. Employment Growth

Variable	Δy_{t-j}				Δx^{+}_{t-j}				Δx^{-}_{t-j}				
Lag	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	
Coefficient	β_1	β_2	β_3	β_4	γ_1	γ_2	γ_3	γ_4	κ_1	κ_2	κ_3	κ_4	α
Full Sample,	0.879*	-0.189†	0.089	-0.092	0.001	-0.008*	-0.010*	-0.010*	0.001	-0.001	-0.001	0.000	0.210*
1961:2-2008:4	(0.076)	(0.103)	(0.102)	(0.072)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.038)
Pre-Break,	0.856*	-0.170	-0.001	-0.116	0.017	-0.061	-0.044	-0.009					0.337*
1961:2-1973:3	(0.165)	(0.220)	(0.216)	(0.150)	(0.028)	(0.045)	(0.046)	(0.046)					(0.092)
Post-Break,	0.892*	-0.206†	0.112	-0.094	0.001	-0.007†	-0.009*	-0.009*	0.000	-0.001	-0.001	0.000	0.180*
1973:4-2008:4	(0.090)	(0.123)	(0.124)	(0.088)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.044)

Numbers in parentheses are standard errors. Statistical significance at the 5 percent and 10 percent levels are indicated by '*' and '†'.

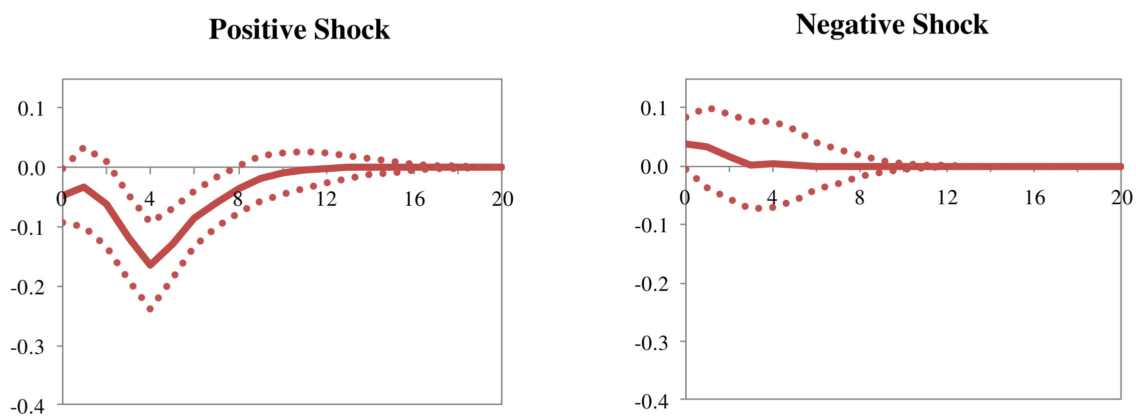
Table 2. Tests of Aggregate Directional Symmetry

H_0:	$\sum\gamma_j = 0$		$\sum\kappa_j = 0$		$\sum\gamma_j = \sum\kappa_j$
	$\sum\gamma_j$	p-value	$\sum\kappa_j$	p-value	p-value
Full Sample	-0.028	0.000 *	0.000	0.949	0.006*
Pre-Break	-0.097	0.183			
Post-Break	-0.025	0.000 *	-0.002	0.769	0.038*

Statistical significance at the 5 percent level is indicated by '*'.

Using the estimated coefficients reported in Table 1, we generate impulse responses and evaluate positive and negative price shocks in terms of the depth and frequency of their effects. Figure 3 displays the impulse responses for the post-break period and yield the typical results: Employment growth is reduced by a positive oil-price shock for several quarters before returning to normal, but a negative shock has no statistically significant effect on employment growth. Although we used U.S. employment rather than GDP as our measure of economic activity, our results are generally consistent with the existing literature on the effects of oil-price shocks.

Figure 3. U.S. Employment Growth Response to Oil-Price Shocks, Post-Break
(Dotted lines indicate 95 percent confidence intervals)



3. The Spatial/Directional Asymmetry of Oil-Price Shocks

In this section, we demonstrate that the state-level analogue of the analysis performed above yields a great deal of heterogeneity in the effects of oil-price shocks. We explore this spatial/directional asymmetry from two complementary perspectives: the estimated coefficients on the oil-price shock variables and the impulse responses to oil-price shocks.

3.1. Spatial/Directional Asymmetry I: Oil-Price Shock Coefficients

We performed 51 independent estimations of equation (1) for the post-break period, the results of which are analogous to those in Table 1 for the U.S. and are provided in an appendix. As in the previous section for U.S. data, these estimates are summarized in Table 3 with the same tests for directional asymmetry that were performed using national data (Table 2). We find 37 states for which the sum of the coefficients on a positive price shock ($\sum \gamma_j$) is negative and statistically significant. Not only are there 12 states for which $\sum \gamma_j$ is statistically no different from zero, but for two states—North Dakota and Wyoming—it is positive and statistically significant. On the other hand, there is near unanimity in the lack of statistical significance for $\sum \kappa_j$. The exceptions are Delaware and Wyoming, which have opposite signs on $\sum \kappa_j$. Finally, as shown in the final column of Table 3, directional symmetry cannot be rejected for 30 states. Thus, the blanket observation that oil-price shocks have asymmetric effects on economic activity appears to be false at this level of disaggregation.

To get an idea of the geographic distribution of the magnitudes of the effects of oil-price shocks, we map the estimates for the positive-shock coefficients (Figure 4). For the most part, the nonconforming states—for which the sums of these coefficients are positive or not statistically significant—are energy states as determined by the relative importance of energy production in their economies (Snead, 2009).[6] Most of these states lie in the vast swath running from the western Gulf coast through Montana. The exceptions are the non-energy states of Hawaii and Vermont.

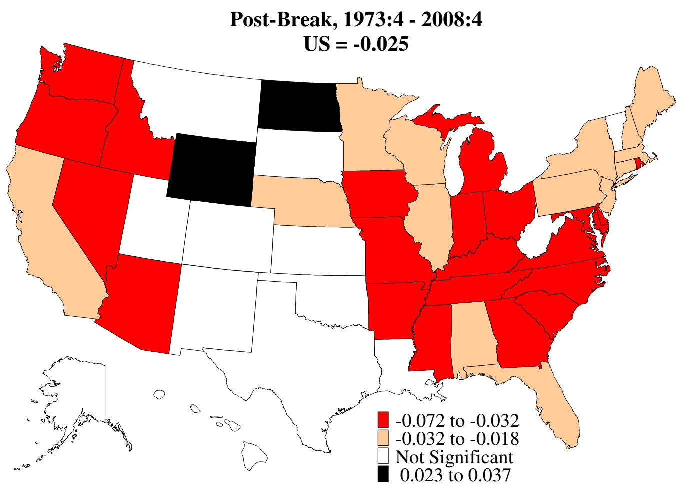
[6] As determined by Snead (2009), the 13 energy producing states are Alaska, Colorado, Kansas, Louisiana, Mississippi, Montana, New Mexico, North Dakota, Oklahoma, Texas, Utah, West Virginia, and Wyoming.

Table 3. The Spatial/Directional Asymmetry of Oil-Price Shocks, 1973:4-2008:4

H_0:	$\sum\gamma_j = 0$		$\sum\kappa_j = 0$		$\sum\gamma_j = \sum\kappa_j$
	$\sum\gamma_j$	p-value	$\sum\kappa_j$	p-value	p-value
AK	0.038	0.211	0.039	0.219	0.982
AL	-0.030	0.007 *	0.010	0.391	0.026*
AR	-0.046	0.000 *	0.008	0.560	0.008*
AZ	-0.053	0.000 *	0.013	0.360	0.003*
CA	-0.030	0.001 *	0.002	0.851	0.028*
CO	-0.010	0.346	0.003	0.816	0.453
CT	-0.028	0.005 *	0.002	0.862	0.066†
DC	-0.017	0.233	-0.006	0.700	0.627
DE	-0.051	0.002 *	-0.037	0.019 *	0.559
FL	-0.026	0.007 *	-0.003	0.771	0.128
GA	-0.053	0.000 *	0.003	0.799	0.004*
HI	-0.013	0.286	-0.014	0.297	0.986
IA	-0.018	0.082 †	-0.014	0.196	0.828
ID	-0.045	0.004 *	-0.004	0.804	0.115
IL	-0.022	0.014 *	-0.006	0.529	0.265
IN	-0.058	0.000 *	-0.001	0.926	0.008*
KS	-0.005	0.685	0.012	0.330	0.374
KY	-0.034	0.015 *	-0.010	0.487	0.268
LA	0.006	0.685	0.025	0.146	0.409
MA	-0.022	0.024 *	0.000	0.995	0.163
MD	-0.039	0.001 *	-0.006	0.597	0.065†
ME	-0.029	0.022 *	-0.020	0.149	0.640
MI	-0.072	0.000 *	0.003	0.849	0.003*
MN	-0.021	0.026 *	-0.010	0.337	0.463
MO	-0.042	0.000 *	-0.003	0.778	0.025*
MS	-0.047	0.000 *	0.012	0.345	0.003*
MT	-0.013	0.362	0.010	0.522	0.327
NC	-0.048	0.000 *	-0.010	0.427	0.043*
ND	0.023	0.053 †	0.004	0.744	0.308
NE	-0.025	0.026 *	0.016	0.177	0.024*
NH	-0.023	0.100 †	-0.001	0.935	0.330
NJ	-0.024	0.018 *	-0.012	0.280	0.446
NM	-0.013	0.194	0.018	0.111	0.064†
NV	-0.043	0.005 *	-0.010	0.529	0.179
NY	-0.020	0.010 *	-0.007	0.415	0.299
OH	-0.042	0.000 *	-0.008	0.466	0.052†
OK	0.018	0.226	0.022	0.134	0.823
OR	-0.061	0.000 *	0.006	0.642	0.001*
PA	-0.020	0.013 *	-0.013	0.137	0.575
RI	-0.051	0.002 *	-0.001	0.967	0.046*
SC	-0.057	0.000 *	-0.007	0.652	0.031*
SD	-0.010	0.379	-0.004	0.782	0.724
TN	-0.054	0.000 *	-0.005	0.667	0.009*
TX	0.004	0.690	0.014	0.165	0.442
UT	-0.009	0.337	0.015	0.143	0.120
VA	-0.038	0.000 *	-0.008	0.419	0.056†
VT	-0.016	0.163	-0.011	0.357	0.783
WA	-0.034	0.005 *	0.006	0.610	0.036*
WI	-0.031	0.001 *	-0.008	0.407	0.133
WV	-0.006	0.865	0.018	0.609	0.659
WY	0.037	0.073 †	0.056	0.020 *	0.567

Statistical significance at the 5 percent and 10 percent levels are indicated by '*' and '†', respectively.

Figure 4. Positive Oil-Price Shock
Sum of State γ_{ij}s



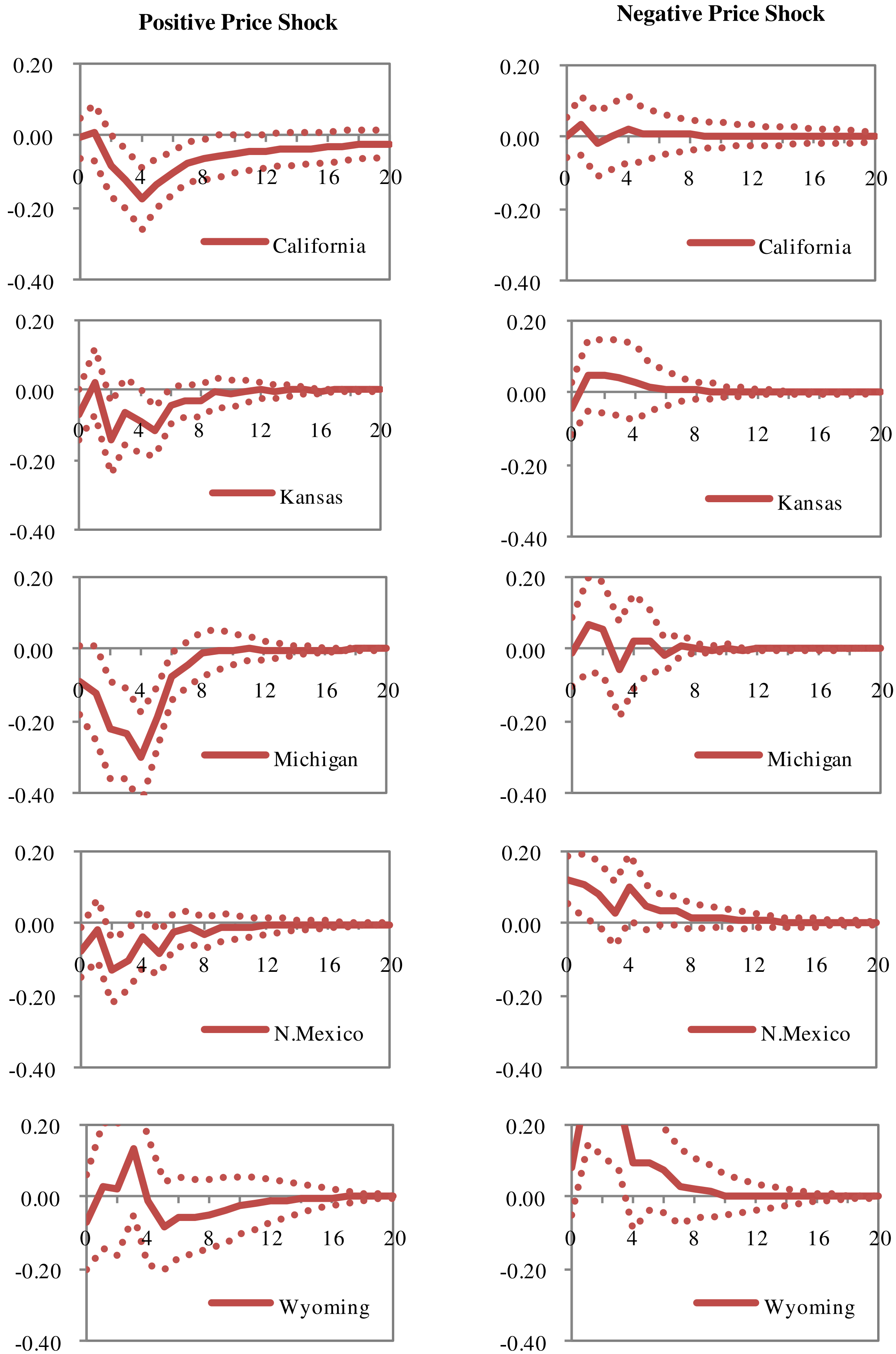
3.2. Spatial/Directional Asymmetry II: Impulse Responses

The preceding subsection looked at spatial asymmetries in oil-price shocks from the perspective of the shocks' estimated coefficients. A different perspective can be gained from the state-level impulse responses, which are generated via the estimated coefficients (the βs and the θs) and show the effect that each type of shock. Figure 5 provides the post-break responses to positive and negative oil-price shocks for five representative states: three with variants of the typical directional asymmetry—California, Kansas, and Michigan—and two with atypical responses—New Mexico and Wyoming.[7]

Unsurprisingly, given its size and diversity, the response for California is asymmetric and looks much like that for the United States as a whole (recall Figure 3): A positive oil-price shock

[7] The complete set of impulse responses can be found in the working paper version of this paper: Engemann, Owyang, and Wall (2012).

Figure 5. Responses to Oil-Price Shocks, Post-Break, Selected States
(Dotted lines indicate 95 percent confidence intervals)



leads to reduced employment growth for several quarters before returning to normal, but a negative oil-price shock has no effect on employment growth. Kansas has a negative but bouncy response to a positive oil-price shock, and its response to a negative oil-price shock is statistically insignificant. Manufacturing-heavy states, such as Michigan, see a much deeper response to a positive oil-price shocks than does the country as a whole. On the other hand, because Michigan's auto sector likely benefits from negative oil-price shocks, it has quarters for which the point estimates of its responses are positive, although not significantly so.

New Mexico is an example of a state with symmetric oil-price responses. As an energy state, its response to a positive oil-price shock is much like that of Kansas: negative but bouncy. But, because it is more energy intensive than Kansas, it experiences a positive and statistically significant response to negative oil-price shocks. This result is consistent with Figure 2, which showed how New Mexico entered recessions after both types of oil-price shocks. Our final example is Wyoming, the most energy-intensive state in the country, which experiences asymmetric responses to oil-price shocks, but not the typical kind. It sees a statistically significant and huge positive response to negative oil-price shocks only, but no statistically significant response to a positive oil-price shock.

The states are categorized in Table 4 according to their combination of responses to oil-price shocks. A state is said to be responsive to a shock if it sees at least one quarter when its response is statistically different from zero. On this basis, 35 states see the typical directional asymmetry of responding only to positive oil-price shocks, whereas five energy-intensive states see the reverse directional asymmetry of responding only to negative oil-price shocks. Finally, 10 states experience symmetric responses: five respond to both shocks and five respond to neither shock.

Table 4. Spatial/Directional Asymmetry II, Impulse Responses

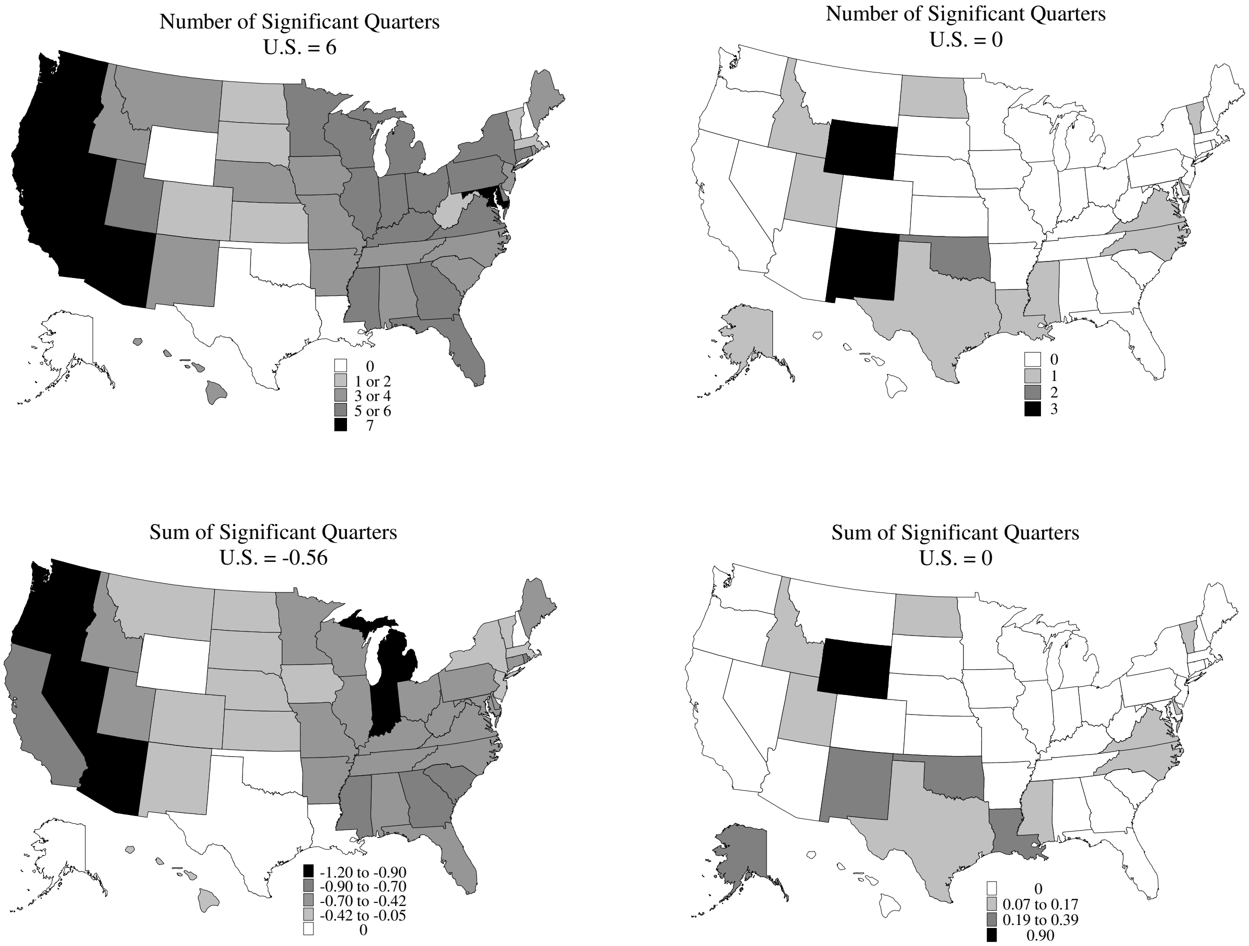
Positive Shocks Only (36)				Negative Shocks Only (5)	Both Shocks (5)	Neither Shock (5)
AL	IL	MO	PA	LA	DE	AK
AR	IN	MS	RI	ND	ID	CO
AZ	KS	NE	SC	OK	NC	DC
CA	KY	NH	TN	TX	NM	MT
CT	MA	NJ	UT	WY	VA	SD
FL	MD	NV	VT			
GA	ME	NY	WA			
HI	MI	OH	WI			
IA	MN	OR	WV			

A state experiences a shock if its response is statistically significant for at least one quarter.

Figure 6 illustrates the spatial distribution of responses to oil-price shocks, summarizing the responses according to their number of statistically significant quarters and the sums of the responses across those quarters. The states that were least responsive to positive oil-price shocks tended to be energy states and their neighbors, and the size of their responses were related to their energy-intensity. Even so, several northeastern states were also among the groups with the smallest responses. The states most affected by positive oil-price shocks included much of the Far West and the two most manufacturing-intensive states, Indiana and Michigan. Being an energy state was also associated with having a large positive response to a negative-oil-price shock: The six most energy-intensive states were so affected. On the other hand, there are five non-energy states with positive responses to negative oil-price shocks, although it was for one quarter only in each case.

Figure 6. Summary of State Responses to Oil-Price Shocks, Post-Break

Positive Price Shock | **Negative Price Shock**



4. Conclusions

Nearly all of the literature examining the effects of oil shocks has concluded that oil-price increases are directionally asymmetric in their effects on the U.S. economy. That is, sharp increases in oil prices affect economic activity adversely, but sharp decreases in oil prices have no effect. We consider several variations on the notion of price-shock symmetry, all of which indicate that the usual asymmetry assumption is far from the rule across states. For example, only 21 states pass a standard test for directional asymmetry, which is that the sums of the coefficients on positive and negative shocks are not statistically the same. A similar picture emerges from an analysis of state-level impulse responses to oil-price shocks. Although most states have typical responses to oil-price shocks—they experience positive shocks only—the rest experience either negative shocks only (5 states), both positive and negative shocks (5 states), or neither shock (5). The magnitudes of the effects shocks also differ a great deal across states. The most energy-intensive states respond only to negative oil-price shocks and the states that respond to both shocks are is a mixed bag, including several non-energy states.

Discussions about the U.S. macroeconomy tend to include little, if any, appreciation of the extent to which conditions differ across cities, states, or regions. Recent research, however, has documented significant business-cycle differences across various geographic units. This paper goes a step further to show how oil-price shocks, which have tended to precede national recessions, can have opposite effects across states. This fact has several implications for policy makers. For one, true measures of the state of the economy can be masked by the fact that several states might be doing well following a positive price shock. Also, state and national governments can play different roles in responding to oil-price shocks: Nationally focused policies are more appropriate following positive oil-price shocks, whereas state-focused policies are more appropriate following negative shocks.

Appendix. Regression Results, Dependent Variable = Quarterly State Employment Growth

Variable	$\Delta y_{i,t-j}$				$\Delta Y_{-i,t-j}$				Δx^{+}_{t-j}				Δx^{-}_{t-j}				α_i
Lag	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	
AK	0.365*	0.114	0.441*	-0.252*	-0.254	0.528	-0.859†	0.687†	0.023	0.003	0.012	0.001	0.036*	0.001	0.003	-0.002	0.149
	(0.087)	(0.083	(0.082)	(0.084)	(0.368)	(0.503)	(0.503)	(0.359)	(0.018)	(0.018)	(0.019)	(0.019)	(0.018)	(0.019)	(0.019)	(0.018)	(0.213)
AL	0.045	0.119	0.157	0.198†	1.270*	-1.112*	0.126	-0.212	0.004	-0.008	-0.008	-0.018*	0.004	0.005	0.003	-0.002	0.246*
	(0.127)	(0.122)	(0.112)	(0.111)	(0.201)	(0.244)	(0.267)	(0.200)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.070)
AR	0.557*	-0.106	-0.002	0.069	0.466†	-0.565†	0.158	-0.065	-0.011	-0.002	-0.007	-0.026*	0.006	-0.004	0.007	-0.001	0.359*
	(0.138)	(0.152	(0.150)	(0.126)	(0.251)	(0.301)	(0.305)	(0.229)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.080)
AZ	0.324*	0.372*	0.129	0.026	0.891*	-1.348*	0.463†	-0.222	0.011	-0.018*	-0.033*	-0.014	0.004	-0.001	0.011	-0.001	0.353*
	(0.113)	(0.107	(0.106)	(0.109)	(0.219)	(0.250)	(0.274)	(0.212)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.094)
CA	0.556*	0.123	0.049	0.137	0.365*	-0.363*	-0.007	-0.044	0.005	-0.013*	-0.009	-0.012*	0.004	-0.007	0.002	0.003	0.149*
	(0.109)	(0.123	(0.116)	(0.106)	(0.143)	(0.165)	(0.165)	(0.129)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.056)
CO	0.517*	0.163	0.142	-0.062	0.456*	-0.443*	0.168	-0.190	0.006	-0.007	-0.004	-0.004	0.006	0.005	0.002	-0.009	0.183*
	(0.109)	(0.118	(0.117)	(0.111)	(0.164)	(0.194)	(0.193)	(0.153)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.006)	(0.007)	(0.007)	(0.072)
CT	0.086	0.413*	0.212*	0.040	0.758*	-0.572*	-0.002	-0.154	-0.001	-0.001	-0.004	-0.022*	-0.004	-0.002	0.001	0.007	0.108
	(0.105)	(0.105	(0.106)	(0.105)	(0.152)	(0.202)	(0.204)	(0.160)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.068)
DC	0.072	0.184*	0.153	0.184†	0.233	-0.159	-0.029	0.068	0.001	-0.005	-0.003	-0.009	0.010	-0.004	0.001	-0.013	0.053
	(0.091)	(0.091	(0.093)	(0.098)	(0.186)	(0.246)	(0.240)	(0.172)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.089)
DE	-0.139	0.280*	0.122	-0.109	0.786*	-0.579*	0.320	-0.259	-0.014	0.004	-0.017†	-0.024*	0.000	-0.014	-0.007	-0.016*	0.341*
	(0.100)	(0.097	(0.094)	(0.095)	(0.207)	(0.279)	(0.277)	(0.199)	(0.009)	(0.009)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)	(0.098)
FL	0.735*	-0.045	0.443*	-0.282*	0.233	-0.126	-0.371*	0.097	0.003	-0.010†	-0.010	-0.009	0.006	-0.009	0.005	-0.005	0.233*
	(0.106)	(0.116	(0.122)	(0.103)	(0.155)	(0.188)	(0.174)	(0.145)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.064)
GA	0.444*	0.141	0.068	-0.091	0.476*	-0.533†	0.019	0.111	-0.008	-0.013†	-0.010	-0.021*	0.005	-0.005	0.002	0.001	0.367*
	(0.132)	(0.138	(0.136)	(0.130)	(0.236)	(0.271)	(0.267)	(0.205)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)	(0.080)
HI	0.182†	0.286*	0.360*	-0.138	0.506*	-0.538*	0.238	-0.059	0.005	-0.001	-0.014†	-0.003	0.006	-0.018*	0.002	-0.004	0.082
	(0.092)	(0.086	(0.086)	(0.091)	(0.158)	(0.222)	(0.221)	(0.157)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.083)
IA	0.123	0.169	0.534*	-0.052	0.980*	-0.642*	-0.583*	0.135	0.005	0.003	-0.011†	-0.014*	0.002	-0.006	-0.002	-0.009	0.144*
	(0.114)	(0.118	(0.115)	(0.119)	(0.168)	(0.225)	(0.223)	(0.187)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.063)
ID	0.437*	0.055	0.436*	-0.168	0.469†	-0.835*	0.058	0.106	0.009	-0.014	-0.023*	-0.017†	0.000	-0.002	-0.006	0.004	0.341*
	(0.120)	(0.127	(0.134)	(0.123)	(0.265)	(0.346)	(0.336)	(0.241)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.106)
IL	0.047	0.167	0.202*	-0.259*	0.926*	-0.096	-0.426*	0.217	-0.006	0.001	0.003	-0.020*	0.001	-0.008	-0.004	0.005	-0.038
	(0.099)	(0.101	(0.101)	(0.095)	(0.134)	(0.193)	(0.197)	(0.167)	(0.005)	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.061)
IN	0.055	0.164	0.121	0.002	1.231*	-0.845*	-0.033	-0.178	-0.010	-0.020*	-0.009	-0.019*	0.004	-0.003	-0.001	-0.002	0.273*
	(0.134)	(0.140	(0.136)	(0.126)	(0.253)	(0.320)	(0.325)	(0.259)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.084)
KS	0.102	0.209†	0.204†	-0.073	0.809*	-0.409†	-0.304	0.179	0.008	-0.011	0.002	-0.003	0.002	0.003	0.005	0.002	0.148†
	(0.115)	(0.112	(0.111)	(0.113)	(0.183)	(0.229)	(0.230)	(0.182)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.075)

Appendix (continued). Regression Results, Dependent Variable = Quarterly State Employment Growth

Variable	$\Delta y_{i,t-j}$				$\Delta Y_{-i,t-j}$				Δx^{+}_{t-j}				Δx^{-}_{t-j}				α_i
Lag	$j=1$	$j=2$	$j=3$	$j=4$	$j=1$	$j=2$	$j=3$	$j=4$	$j=1$	$j=2$	$j=3$	$j=4$	$j=1$	$j=2$	$j=3$	$j=4$	
KY	-0.136	0.286*	0.004	0.159	1.394*	-1.002*	0.259	-0.261	-0.007	-0.018*	0.007	-0.015†	0.006	-0.011	0.005	-0.011	0.207*
	(0.113)	(0.114)	(0.115)	(0.112)	(0.221)	(0.297)	(0.305)	(0.228)	(0.008)	(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.086)
LA	0.284*	0.108	0.247*	-0.018	0.609*	-0.320	-0.126	-0.010	0.007	0.000	0.009	-0.009	0.022*	0.009	-0.002	-0.004	0.077
	(0.104)	(0.106)	(0.103)	(0.064)	(0.207)	(0.257)	(0.249)	(0.180)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.093)
MA	0.304*	0.362*	0.423*	-0.256*	0.933*	-1.047*	-0.115	0.093	0.006	-0.010†	-0.005	-0.013*	0.005	-0.002	0.002	-0.005	0.150*
	(0.108)	(0.110)	(0.111)	(0.111)	(0.156)	(0.198)	(0.192)	(0.165)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.065)
MD	0.007	0.259*	0.197†	0.083	0.611*	-0.202	-0.392†	0.163	-0.007	-0.014*	-0.010	-0.007	-0.001	-0.002	-0.002	-0.001	0.204*
	(0.111)	(0.111)	(0.110)	(0.111)	(0.169)	(0.216)	(0.213)	(0.163)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.069)
ME	0.264*	0.065	0.101	0.126	0.914*	-0.964*	0.306	-0.216	0.000	-0.003	-0.018*	-0.008	-0.007	-0.003	-0.003	-0.006	0.203*
	(0.112)	(0.113)	(0.106)	(0.102)	(0.187)	(0.238)	(0.253)	(0.191)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.079)
MI	0.236†	0.030	0.411*	-0.207	0.939*	-0.818*	-0.309	0.289	-0.008	-0.023*	-0.017†	-0.023*	0.006	0.001	-0.005	0.002	0.251*
	(0.125)	(0.124)	(0.131)	(0.127)	(0.275)	(0.331)	(0.314)	(0.236)	(0.009)	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)	(0.107)
MN	0.110	0.277*	0.178	0.038	0.846*	-0.551*	0.041	-0.162	-0.004	-0.006	-0.006	-0.005	-0.003	-0.004	0.003	-0.006	0.154*
	(0.115)	(0.119)	(0.122)	(0.116)	(0.148)	(0.181)	(0.178)	(0.153)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.059)
MO	0.017	0.038	0.074	-0.191	0.969*	-0.411†	-0.065	0.230	-0.007	-0.025*	0.000	-0.010	0.000	-0.009	0.005	0.000	0.159*
	(0.122)	(0.125)	(0.118)	(0.117)	(0.180)	(0.222)	(0.223)	(0.170)	(0.006)	(0.006)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.067)
MS	0.517*	0.133	0.022	-0.070	0.515*	-0.759*	-0.004	0.255	0.004	-0.012	-0.026*	-0.014	0.013†	-0.008	0.001	0.006	0.265*
	(0.125)	(0.132)	(0.129)	(0.119)	(0.216)	(0.248)	(0.259)	(0.209)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)	(0.079)
MT	0.155†	0.097	0.184†	0.142	0.885*	-0.647*	-0.342	0.101	0.004	-0.009	-0.012	0.004	0.014	-0.008	-0.001	0.006	0.247*
	(0.093)	(0.095)	(0.093)	(0.092)	(0.194)	(0.265)	(0.271)	(0.200)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.102)
NC	0.432*	0.151	-0.328*	-0.054	0.574*	-0.668*	0.657*	-0.116	-0.002	-0.012†	-0.024*	-0.011	-0.001	-0.004	0.001	-0.006	0.335*
	(0.123)	(0.128)	(0.126)	(0.124)	(0.215)	(0.234)	(0.238)	(0.188)	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.077)
ND	0.236*	0.220*	0.079	0.051	0.946*	-1.007*	0.268	-0.016	0.011	0.003	0.000	0.009	0.015*	-0.009	-0.001	-0.001	0.070
	(0.092)	(0.096)	(0.087)	(0.084)	(0.143)	(0.208)	(0.231)	(0.163)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.079)
NE	0.119	-0.055	0.138	-0.259*	0.595*	-0.271	0.012	0.370*	0.001	-0.005	-0.017*	-0.004	0.008	0.003	0.000	0.005	0.233*
	(0.097)	(0.095)	(0.096)	(0.096)	(0.158)	(0.211)	(0.207)	(0.158)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.075)
NH	0.329*	0.358*	0.246*	-0.011	0.571*	-0.844*	-0.039	-0.192	-0.003	-0.008	-0.008	-0.004	0.002	-0.002	0.003	-0.004	0.308*
	(0.116)	(0.117)	(0.118)	(0.118)	(0.229)	(0.283)	(0.286)	(0.225)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.090)
NJ	0.163	0.374*	0.054	0.050	0.612*	-0.548*	-0.021	-0.035	-0.001	-0.005	-0.003	-0.014*	-0.002	-0.006	-0.007	0.004	0.142*
	(0.115)	(0.115)	(0.116)	(0.116)	(0.166)	(0.212)	(0.219)	(0.167)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.065)
NM	0.282*	0.095	0.227*	0.060	0.611*	-0.596*	0.011	0.023	0.008	-0.019*	-0.005	0.004	0.009	0.003	0.000	0.006	0.242*
	(0.107)	(0.107)	(0.104)	(0.105)	(0.146)	(0.176)	(0.182)	(0.132)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.080)
NV	0.444*	0.256*	0.132	-0.074	0.522*	-0.660*	0.290	-0.100	-0.001	-0.023*	-0.010	-0.009	-0.011	0.000	0.002	-0.002	0.348*
	(0.105)	(0.113)	(0.116)	(0.111)	(0.227)	(0.283)	(0.279)	(0.218)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.009)	(0.116)

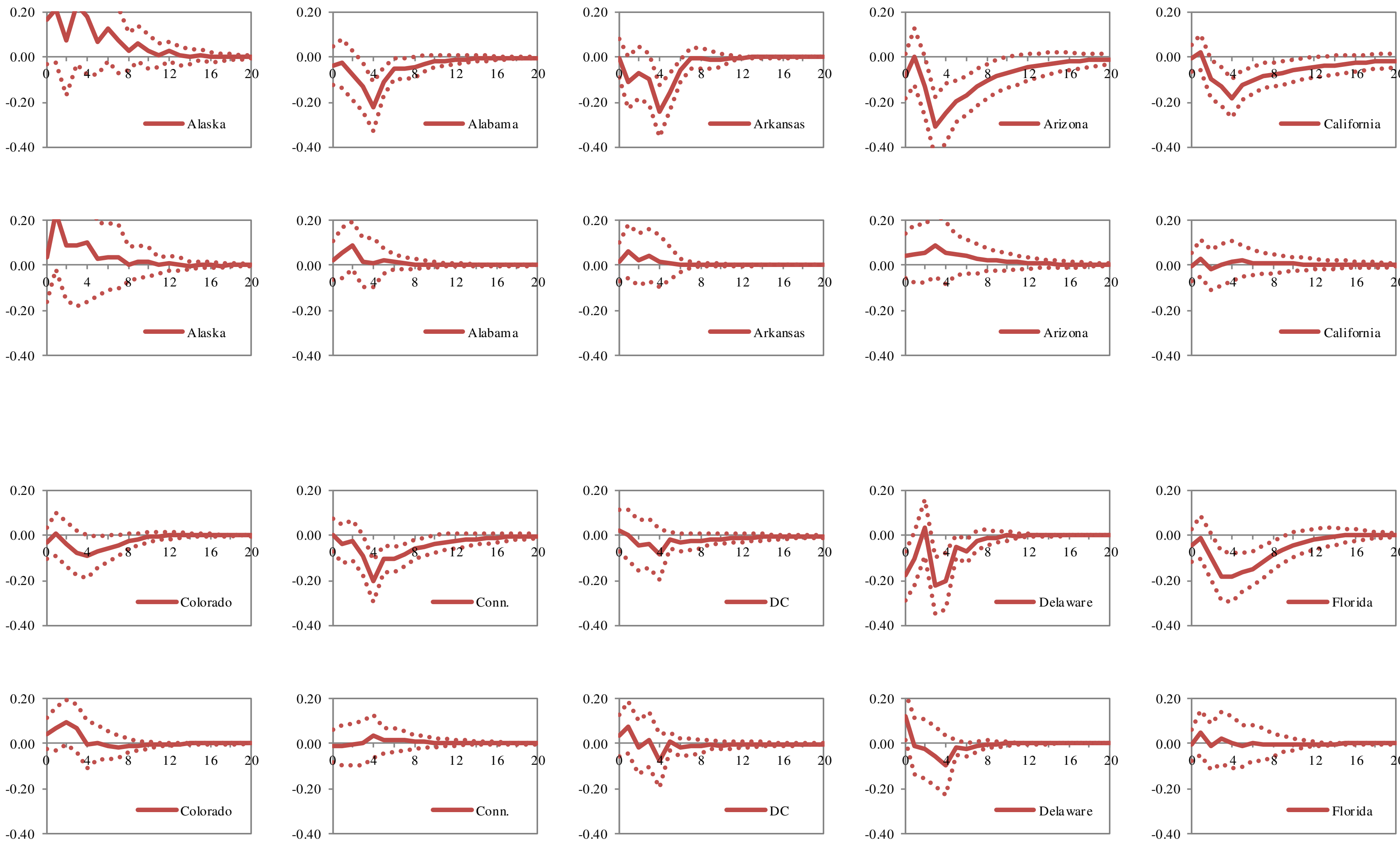
Appendix (continued). Regression Results, Dependent Variable = Quarterly State Employment Growth

Variable	$\Delta y_{i,t-j}$				$\Delta Y_{-i,t-j}$				Δx^{+}_{t-j}				Δx^{-}_{t-j}				α_i
Lag	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	$j = 1$	$j = 2$	$j = 3$	$j = 4$	
NY	0.210†	0.389*	0.027	0.089	0.512*	-0.428*	0.110	-0.176	0.004	-0.013*	-0.003	-0.008	-0.003	-0.003	0.004	-0.005	0.082
	(0.116)	(0.120)	(0.121)	(0.111)	(0.124)	(0.165)	(0.163)	(0.122)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.051)
OH	-0.115	-0.074	0.370*	0.044	1.243*	-0.207	-0.376	-0.146	-0.004	-0.013*	-0.009	-0.015*	-0.002	-0.003	-0.001	-0.001	0.039
	(0.131)	(0.132)	(0.133)	(0.135)	(0.212)	(0.273)	(0.262)	(0.221)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.084)
OK	0.258*	0.307*	0.024	0.011	0.427*	-0.035	-0.094	0.017	0.002	0.010	0.007	-0.001	0.020*	0.019*	-0.019*	0.002	0.020
	(0.103)	(0.100)	(0.095)	(0.092)	(0.189)	(0.241)	(0.236)	(0.173)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.009)	(0.009)	(0.086)
OR	0.576*	0.010	0.128	0.075	0.223	-0.393	0.051	-0.041	-0.004	-0.013†	-0.025*	-0.019*	0.000	0.011	-0.004	0.000	0.337*
	(0.124)	(0.135)	(0.131)	(0.114)	(0.220)	(0.265)	(0.257)	(0.193)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.079)
PA	-0.167	0.271*	-0.012	0.099	0.975*	-0.546*	0.128	-0.147	0.000	-0.005	-0.006	-0.010†	0.002	-0.005	0.000	-0.009†	0.014
	(0.109)	(0.112)	(0.112)	(0.111)	(0.135)	(0.188)	(0.187)	(0.149)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.059)
RI	0.140	0.029	0.178	-0.103	1.126*	-0.849*	0.075	-0.101	0.011	-0.020*	-0.012	-0.030*	0.002	-0.004	0.003	-0.001	0.190†
	(0.107)	(0.112)	(0.109)	(0.106)	(0.248)	(0.328)	(0.331)	(0.248)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.103)
SC	-0.025	0.032	-0.079	-0.006	1.354*	-0.735*	0.151	-0.072	0.005	-0.017*	-0.012	-0.033*	-0.001	-0.007	0.006	-0.005	0.373*
	(0.122)	(0.120)	(0.114)	(0.113)	(0.252)	(0.290)	(0.296)	(0.224)	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.090)
SD	0.121	0.114	0.213*	0.146	0.945*	-0.549*	-0.185	-0.211	-0.006	0.000	-0.004	-0.001	-0.001	-0.009	0.003	0.003	0.238*
	(0.098)	(0.100)	(0.099)	(0.097)	(0.163)	(0.223)	(0.225)	(0.176)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)	(0.084)
TN	0.227	0.247†	-0.105	-0.016	0.923*	-0.845*	0.108	0.008	-0.009	-0.009	-0.011	-0.024*	0.003	-0.009	0.000	0.001	0.329*
	(0.149)	(0.147)	(0.143)	(0.136)	(0.248)	(0.277)	(0.281)	(0.236)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.072)
TX	0.803*	0.087	-0.279*	0.099	0.151	-0.185	0.344*	-0.196†	0.007	-0.001	-0.006	0.004	0.022*	-0.007	-0.001	0.000	0.150*
	(0.106)	(0.128)	(0.129)	(0.107)	(0.135)	(0.158)	(0.144)	(0.110)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.058)
UT	0.252*	0.429*	0.057	-0.057	0.849*	-0.817*	0.337†	-0.232	0.005	-0.003	-0.007	-0.004	0.009	-0.005	0.008	0.004	0.230*
	(0.103)	(0.104)	(0.102)	(0.103)	(0.138)	(0.181)	(0.190)	(0.151)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.076)
VA	0.119	0.482*	0.190	-0.223†	0.623*	-0.683*	0.052	0.131	-0.005	-0.013*	-0.006	-0.014*	0.001	-0.006	-0.006	0.002	0.271*
	(0.121)	(0.125)	(0.126)	(0.122)	(0.162)	(0.200)	(0.204)	(0.158)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.063)
VT	0.351*	0.026	0.273*	0.129	0.562*	-0.352†	-0.209	-0.071	-0.006	-0.009	-0.003	0.002	-0.002	-0.004	0.004	-0.009	0.149*
	(0.115)	(0.114)	(0.113)	(0.114)	(0.171)	(0.209)	(0.209)	(0.164)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.073)
WA	0.333*	0.235*	0.219†	-0.052	0.291	-0.060	-0.232	0.083	-0.004	-0.009	-0.013†	-0.008	0.005	0.004	-0.001	-0.002	0.233*
	(0.108)	(0.111)	(0.110)	(0.108)	(0.181)	(0.228)	(0.216)	(0.162)	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.078)
WI	0.037	0.172	0.287*	-0.027	0.904*	-0.470*	-0.181	-0.017	0.000	-0.014*	-0.009	-0.008	0.001	-0.003	-0.006	-0.001	0.186*
	(0.127)	(0.121)	(0.118)	(0.123)	(0.164)	(0.197)	(0.193)	(0.167)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.059)
WV	-0.395*	-0.072	-0.180†	-0.060	1.740*	-1.184†	0.799	0.114	-0.034†	0.012	0.024	-0.008	0.002	0.002	0.010	0.005	-0.201
	(0.093)	(0.101)	(0.100)	(0.094)	(0.466)	(0.678)	(0.672)	(0.470)	(0.020)	(0.020)	(0.022)	(0.022)	(0.021)	(0.021)	(0.021)	(0.021)	(0.218)
WY	0.432*	0.033	0.275*	-0.123	0.668*	-0.003	-0.227	0.001	0.011	0.000	0.031*	-0.005	0.040*	0.014	0.015	-0.014	0.015
	(0.092)	(0.094)	(0.096)	(0.085)	(0.248)	(0.341)	(0.342)	(0.247)	(0.012)	(0.012)	(0.012)	(0.013)	(0.012)	(0.013)	(0.013)	(0.013)	(0.124)

Numbers in parentheses are standard errors. Statistical significance at the 5 percent and 10 percent levels are indicated by '*' and '†', respectively.

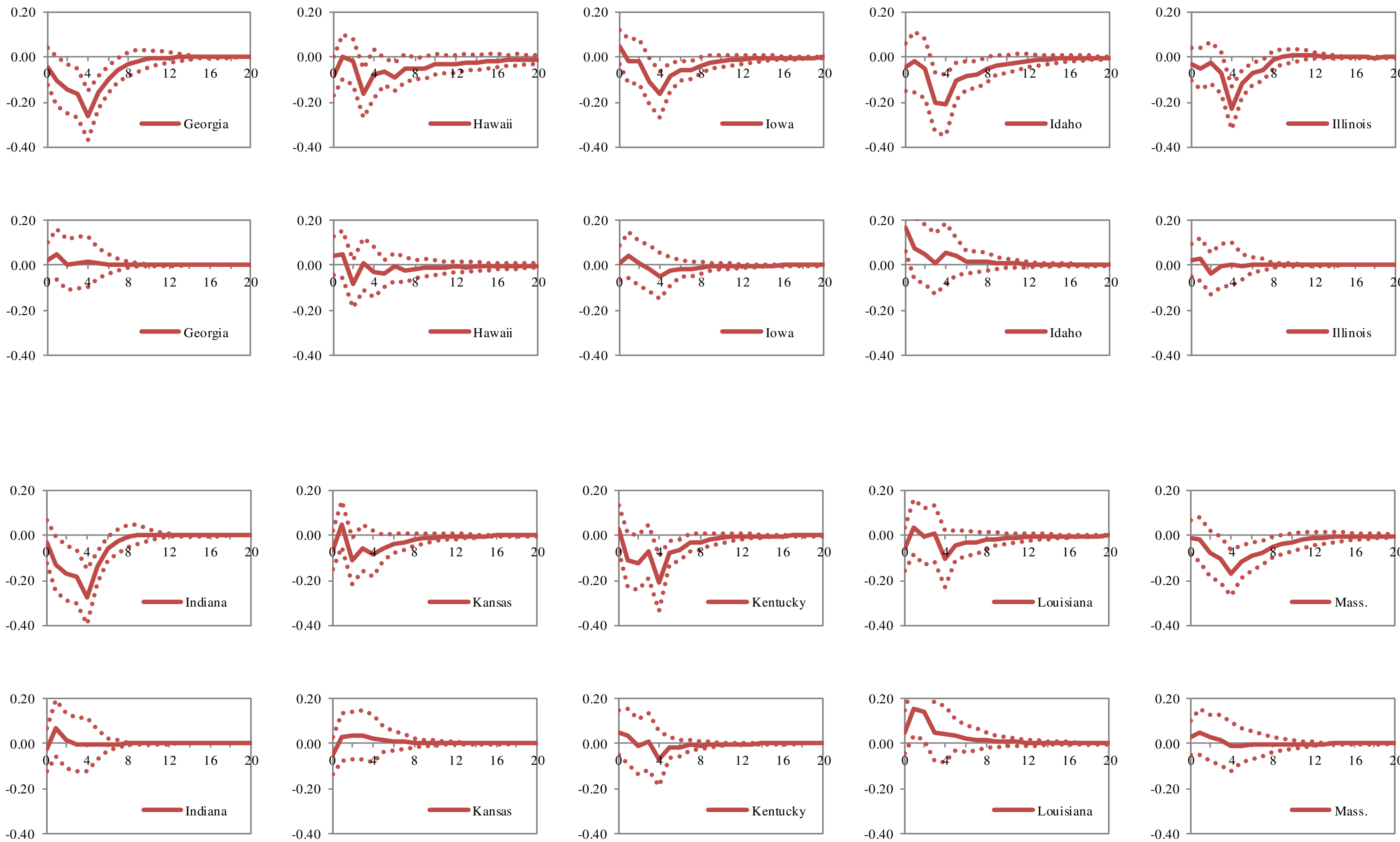
Appendix: State Responses to Oil-Price Shocks, Post-Break

For each state, the top figure is the response to a positive price shock
and the bottom is the response to a negative price shock



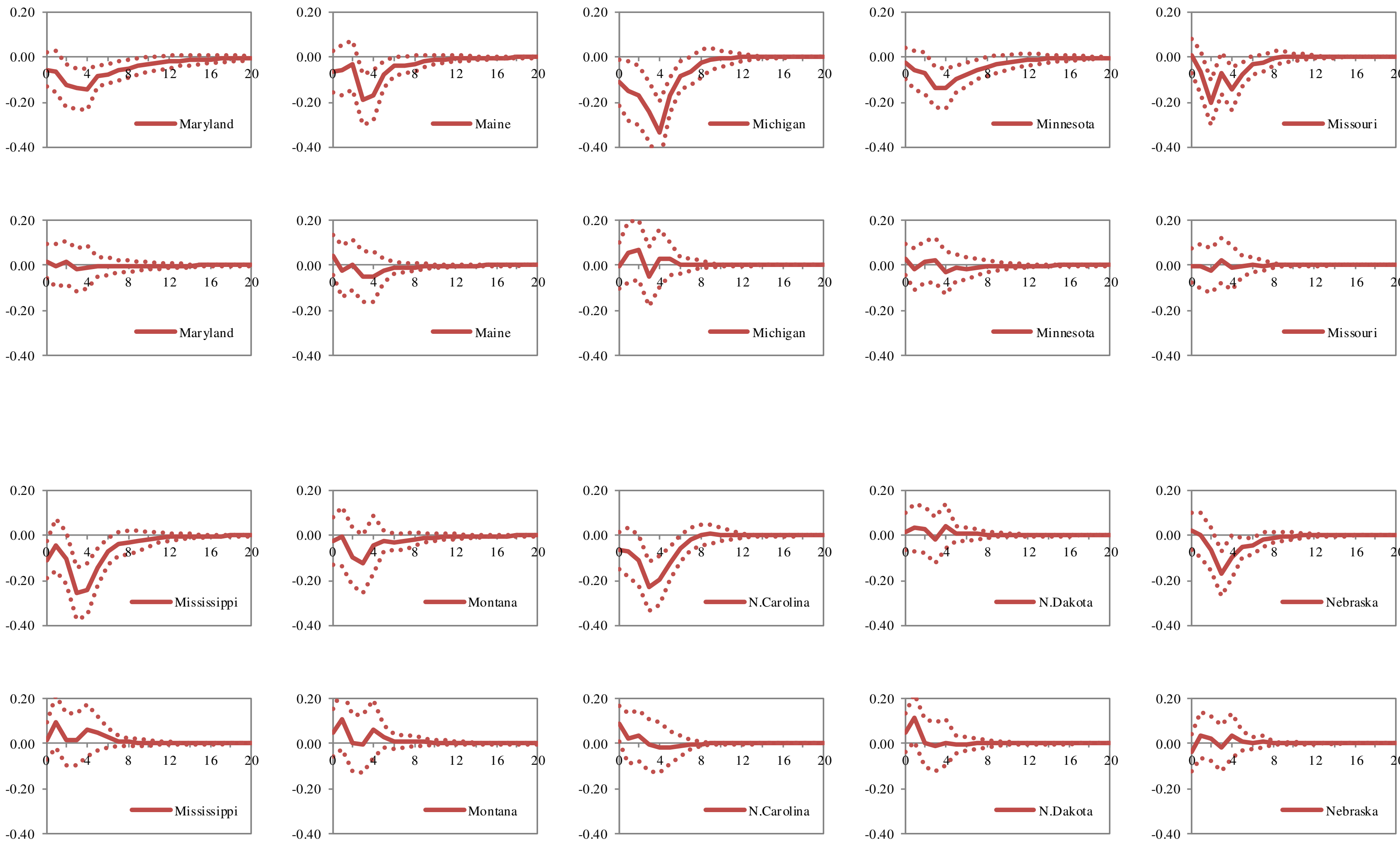
Appendix (continued): State Responses to Oil-Price Shocks, Post-Break

For each state, the top figure is the response to a positive price shock
and the bottom is the response to a negative price shock

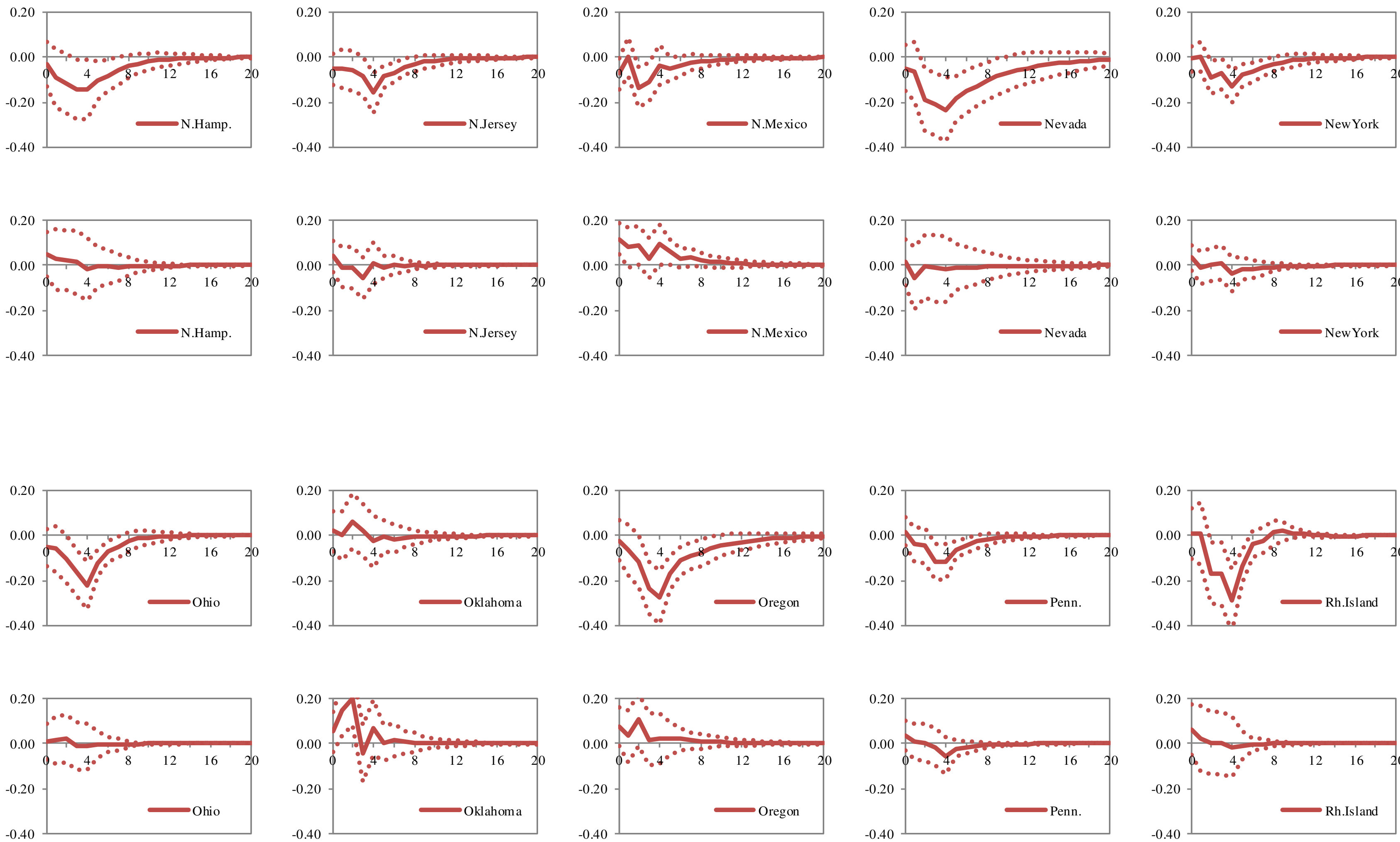


Appendix (continued): State Responses to Oil-Price Shocks, Post-Break

For each state, the top figure is the response to a positive price shock
and the bottom is the response to a negative price shock

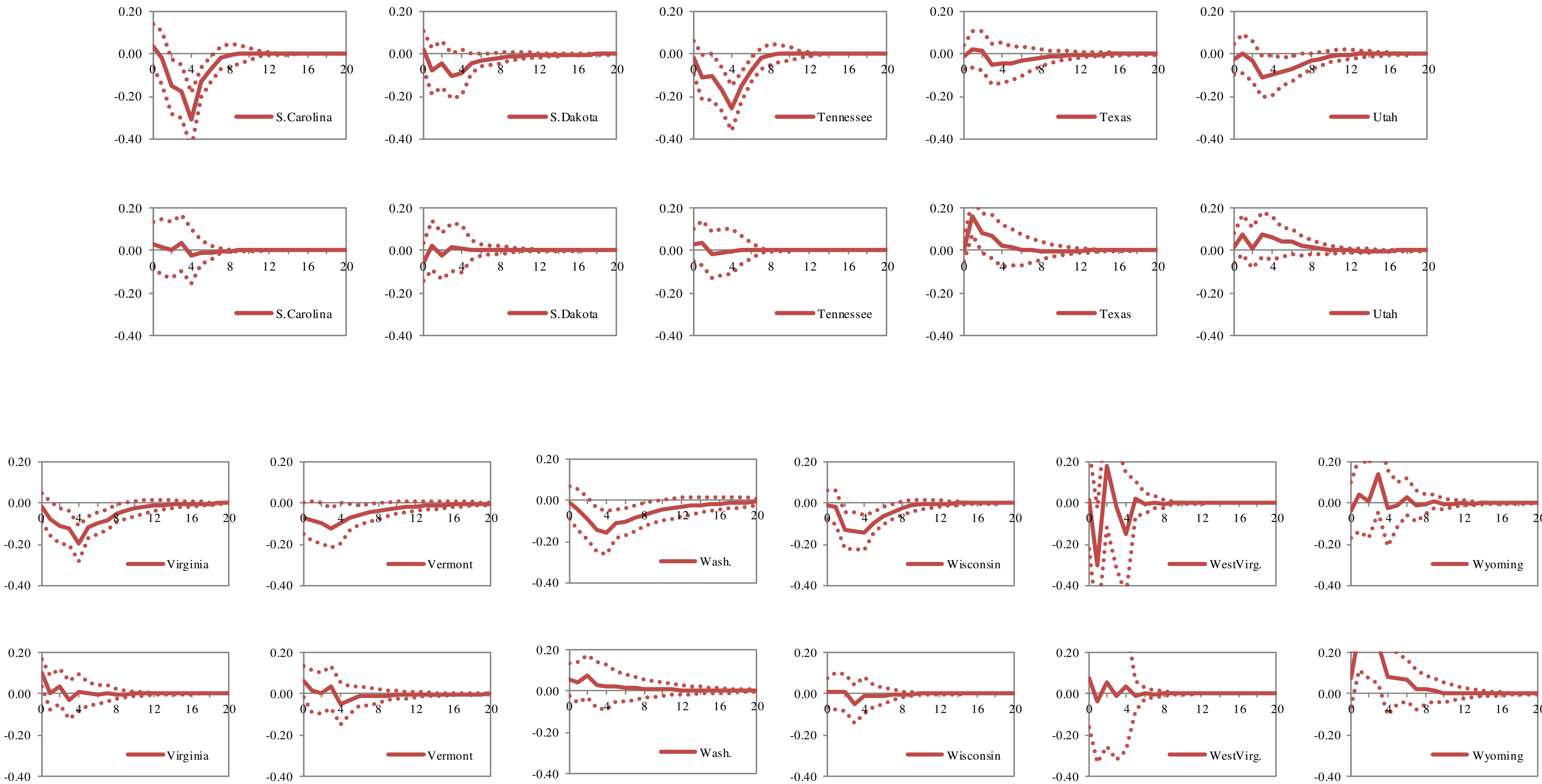


Appendix (continued): State Responses to Oil-Price Shocks, Post-Break
For each state, the top figure is the response to a positive price shock
and the bottom is the response to a negative price shock



Appendix (continued): State Responses to Oil-Price Shocks, Post-Break

For each state, the top figure is the response to a positive price shock
and the bottom is the response to a negative price shock



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