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Abstract

This paper studies the effects of Job Creation Tax Credits (JCTCs) enacted by U.S. states over the past 20 years. First, we investigate *whether* JCTCs stimulate within-state job growth. Second, we assess from *where* any increased employment comes from – in-state or out-of-state? Third, we evaluate *when* JCTCs' effects occur? In particular, we test for negative anticipation effects between JCTC enactment and when legislation goes into effect. We investigate these questions using a difference-in-differences estimator applied to monthly panel data on employment, the JCTC value, the JCTC effective and legislative dates, and various controls.

Keywords: Job creation tax credits, state business tax incentives, spatial externalities, anticipation effects, fiscal foresight, implementation lags

JEL codes: H25, H32, H71

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1. Introduction

The current U.S. recession has taken a heavy toll on nearly all aspects of the economy. Perhaps nowhere has the toll been greater than on the labor market. The unemployment rate now exceeds 10% and monthly job losses have continued even as real quarterly GDP growth has turned positive. This stubbornly high unemployment rate has generated discussions about innovative fiscal policy instruments, such as job creation tax credits (JCTCs), to help stimulate labor demand. In fact, such discussion began early in the recession as policymakers debated various ways to stimulate the economy. For example, Bartik and Bishop (2009) recently argued that a "well-designed temporary federal job creation tax credit should be an integral part of the effort to boost job growth." President Obama included a JCTC in his economic platform as a candidate for presidency, and he and his transition team listed such a credit in their economic stimulus proposal. Though a JCTC was not included in the final stimulus package (the "American Recovery and Reinvestment Act of 2009") passed by Congress in February 2009, it has resurfaced in policy discussions of late due to the persistence of net job losses in the economy. The November 7/8, 2009 edition of the *Wall Street Journal* (p. A2) reports that "The White House appears ready to reconsider ideas for spurring jobs that it had rejected earlier in the year" and that "the president has indicated that he wants to take another look at the issue."

Such a credit has been tried only once before at the U.S. federal level, with the 1977-78 "New Jobs Tax Credit" (NJTC; see Sunley, 1980). The NJTC offered corporations with taxable income a credit whose value was proportional to the increase in the corporation's net payroll employment level above 102% of its previous year's employment level. Using survey data, Perloff and Wachter (1979) found that firms which reported knowing about the credit experienced 3% higher employment growth than other firms. Bishop (1981) also studied the employment effects of the NJTC and found that it increased employment in the Construction, Trucking, Wholesale, and Retail sectors in 1977-78 by between 0.66% and 2.95%.

Though the federal government has tried a JCTC only once and for a short period, nearly half of U.S. states have enacted JCTCs over the past twenty years. Chart 1 shows the policy diffusion process for state JCTCs, using the legislative enactment dates that we compiled for this paper. The first JCTCs were adopted in late 1992 and, by August 2009, twenty-four states had such a credit. One interesting feature of this policy diffusion process is its S-shaped pattern, which is common to the diffusion process for many state policies.

Chart 2 shows which states have these credits as of August 2009. The majority of the JCTC states are in the eastern United States, but there are also many in the West. The design of these JCTCs varies among states; the various designs are discussed in Section 4 below. The

monetary value of the JCTCs also varies among states (see Wilson and Notzon 2009), though for this preliminary draft, we do not incorporate monetary values.

For this paper, we compile the relevant legislative dates for all state JCTCs that have been passed in the U.S. since at least 1990 (and probably much earlier). For each JCTC, we have identified two dates: (1) the "signing" date on which the legislation is signed into law by the state's governor and (2) the "qualifying" date on or after which net new hires by an in-state employer can qualify for the credit. We combine this information with data on employment outcomes from January 1990 to August 2009 to investigate three important aspects of JCTCs: *whether*, *when, and where* they affect job growth. First, we assess *whether* JCTCs succeed in stimulating job growth within the enacting state or are merely an inframarginal transfer to employers. Second, using data for each JCTC state on the date at which the credit was signed into law and the date at which new hires may qualify for the credit, we evaluate *when* JCTCs' employment effects occur. In particular, by exploiting the variation among states in the sequence of these two dates – i.e., either having an implementation lag between signing and qualifying dates, a retroactive period between qualifying and signing dates, or simultaneous dates – we can test and control for anticipation effects.For instance, if firms have an implementation period after the legislation has been signed into law but before they can begin hiring under the credit, they may delay hiring until the qualifying date. This general phenomenon – sometimes called "Ashenfelter's Dip" (Ashenfelter 1978) in labor economics or "fiscal foresight" in macroeconomics – has become an important topic in recent debates over assessing the effects of fiscal policy (e.g., Ramey (2008), Romer and Romer (2009), and Leeper, Walker, and Yang (2009)). Third, in future work, we will explore *where* the employment effects of JCTCs are to be found. Do these credits affect only in-state job growth or do they also negatively affect job growth in "neighboring" states?

Our paper proceeds as follows. Section 2 offers some theoretical guidance on the effects of a JCTC and analyzes the intertemporal decisions faced by a firm. Section 3 presents our empirical model, discusses the three mutually exclusive regimes that describe JCTCs, and relates the model to the three questions of interest -- *whether*, *when, and where* JCTCs affect job growth. Section 4 describes the unique dataset that we have collected on state JCTCs. Section 5 discusses some preliminary empirical results. Section 6 discusses our results in terms of the thin extant literature and extracts some policy implications from our preferred estimates. Section 7 mentions the next steps in this research program.

2. Some Theoretical Guidance

2.1 Intensive Margin

The archetypical JCTC has an incremental design such that the value of the credit for a given firm is proportional to the difference between the current employment level and some base

level if this difference is positive and equals zero otherwise. The base level typically is last month's level of employment (e.g., payroll employment level as of the last pay period of the month (e.g., as in Illinois)). If the credit per added worker were equal to c, then the value of the credit for the firm would be $c \cdot \max\left[\left(L_t - L_{t-1}\right), 0\right]$.

Let us first analyze the effect of a credit enactment on the intensive margin of employment – i.e., employment choice for a given firm. For contracting firms $\left(L_t - L_{t-1}\right) < 0$, the value of the credit is zero and will have no effect. So we focus here on expanding firms, $\left(L_t - L_{t-1}\right) > 0$. Of course, the credit may affect the extensive margin – how many firms will be expanding rather than contracting – and we will return to this margin below in Section 2.2.

Assume the firm operates for 2 periods (t = 0,1). The state in which the firm operates puts a credit into effect in the second period (t=1). The credit is a subsidy per new hire for expanding firms. We first consider the case where the firm does not anticipate this credit in the first period. In this case, the firm will maximize each period's profits independently. Second period profits are:

$$\begin{aligned}\pi_1 &= p_1 Y_1 - w_1 L_1 - r_1 K_1 + c \cdot \left(L_1 - L_0\right) \\ &= p_1 Y_1 - \left(w_1 - c\right) L_1 - r_1 K_1 - c L_0\end{aligned} .$$

Notice that since the firm did not anticipate the credit in the first period, L_0 is exogenous.

Assume the production function is CES. The first-order condition for L_1 implies:

$$\ln L_1 = \ln Y_1 + \sigma \ln b - \sigma \ln\left(w_1 - c\right) + \sigma \ln p_1,$$

where $-\sigma$ is the elasticity of substitution between K and L in the CES production function ($\sigma > 0$) and b is the CES distribution parameter (L's factor share).

Now, consider the impact of the JCTC, c, on labor demand:

$$\frac{\partial \ln L_1}{\partial c} = \left(\frac{\sigma}{w_1 - c}\right)\left(1 - \frac{\partial w}{\partial c}\right) + \frac{\sigma}{p_1} \cdot \frac{\partial p_1}{\partial c}.$$

Notice that by allowing for the possibility that $\partial w / \partial c > 0$ and $\partial p / \partial c < 0$, we are recognizing that the incidence of the credit could shared between employers, workers, and consumers. How much of the value of the credit goes to each will depend on the elasticity of labor demand (σ), the elasticity of labor supply, and the price elasticity of output. Consider three extreme cases – (1) all of the credit goes to the firm, (2) all of the credit goes to workers, and (3) all of the credit goes to consumers:

Case 1) $\partial w/\partial c = 0$, $\partial p/\partial c = 0$ (L^S is perfectly elastic, p is perfectly inelastic)

$$\frac{\partial \ln L_1}{\partial c} = \left(\frac{\sigma}{w_1 - c} \right) > 0.$$

Case 2) $\partial w/\partial c = 1$, $\partial p/\partial c = 0$ (L^S is perfectly inelastic, p is perfectly inelastic)

$$\frac{\partial \ln L_1}{\partial c} = 0.$$

Case 3) $\partial w/\partial c = 0$, $\partial p/\partial c = -1$ (L^S is perfectly elastic, p is perfectly elastic)

$$\frac{\partial \ln L_1}{\partial c} = \sigma \left(\frac{p_1 - (w_1 - c)}{p_1 (w_1 - c)} \right) > 0.$$

So, $\frac{\partial \ln L_1}{\partial c} > 0$ unless labor supply is fixed, which seems unlikely to be relevant at the state level.

Now, consider the case where the second-period credit is anticipated in the first period. Suppose the discount rate is zero, for simplicity. At time 0, the firm chooses labor and capital for both periods to maximize total profits:

$$\begin{aligned} \pi \equiv \pi_0 + \pi_1 &= p_0 Y_0 + p_1 Y_1 - r_0 K_0 - r_1 K_1 - w_0 L_0 - w_1 L_1 + c\left(L_1 - L_0\right) \\ &= p_0 Y_0 + p_1 Y_1 - r_0 K_0 - r_1 K_1 - (w_0 + c) L_0 - (w_1 - c) L_1 \end{aligned} . \qquad (1)$$

Crucially, the second line of equation (1) indicates that, while c is a subsidy for employment in the second period, it is in fact a tax on employment in the first period. This is due to the incremental design of the credit, subsidizing the *change* in employment (L_1-L_0) rather than the level of employment.

The first-order conditions for employment in each period imply:

(2) $$\ln L_0 = \ln Y_0 + \sigma \ln b - \sigma \ln\left(w_0 + c\right) + \sigma \ln p_0, \text{ and}$$

$$\ln L_1 = \ln Y_1 + \sigma \ln b - \sigma \ln\left(w_1 - c\right) + \sigma \ln p_1.$$

The impacts of the credit on each period's employment are

$$\frac{\partial \ln L_0}{\partial c} = -\left(\frac{\sigma}{w_0 + c}\right)\left(1 + \frac{\partial w_0}{\partial c}\right) \leq 0 \text{, and}$$

$$\frac{\partial \ln L_1}{\partial c} = \left(\frac{\sigma}{w_1 - c}\right)\left(1 - \frac{\partial w_1}{\partial c}\right) \geq 0 ,$$

where we have assumed $\partial p_0/\partial c = \partial p_1/\partial c = 0$ (consumer price is unaffected by a tax followed by an offsetting subsidy). If labor supply is perfectly inelastic, then $\partial w_0/\partial c = -1$ (tax is fully passed on to workers) and $\partial w_1/\partial c = 1$ (subsidy is fully passed on to workers), and employment will be unaffected in both periods. Otherwise, employment will be reduced in the pre-credit period and increased in the credit period. The drop in employment in the pre-credit period ($\partial \ln L_0/\partial c < 0 < 0$) for an anticipated credit is an example of the "Ashenfelter Dip" (Ashenfelter, 1978).

2.2 Extensive Margin

The analysis in this sub-section will be in the next draft.

3. Empirical Model:

The event study methodology used in this paper is a two-way fixed effects panel regression containing a dummy variable identifying the event, which here corresponds to a state-month in which a JCTC goes into effect. We refer to this important date as the "effective date." Formally, the general regression model is:

$$\begin{aligned} y_{i,t} = {} & \zeta_i + \zeta_t + \varepsilon_{i,t} + \mathbf{X}_{i,t}\Theta \\ & + \alpha_0 E_{i,t} && \text{[Whether]} \\ [**] \quad & + \sum_{p=1}^{12} \alpha_p E_{i,t-p} && \text{[When, Before]} \\ & + \sum_{p=1}^{12} \alpha_{-p} E_{i,t+p} && \text{[When, After]} \\ & + \sum_{p=0}^{24} \phi_p E^{\#}_{i,t-p} && \text{[Where]} \end{aligned}$$

where:

$y_{i,t}$ is the dependent variable and is expressed either as the logarithm of the level or the growth rate of employment.

$E_{i,t}$ is a dummy equal to 1 if a JCTC goes into effect in month t in state i. That is, $E_{i,t} = 1$ if $t = t_i^E$, where t_i^E is the "effective" month, defined as the later of the signing month (t_i^S) and the qualifying month (t_i^Q): $t_i^E = \max(t_i^S, t_i^Q)$. We need to introduce the concept of effective date because the signing date can occur either before or after the qualifying date. The former situation occurs when there is an implementation period; the latter occurs when there is a retroactivity period. The effective month is the first month in which firms both know with reasonable certainty about the credit (as of signing date) and can act on that information (so after qualifying date). The signing month is the month in which a JCTC is signed into law by the governor (the first month in which information about the JCTC enters firms' information sets, a.k.a., the "innovation" date). The qualifying month is the month in which an eligible new hire could potentially generate a credit for the hiring corporation.

$E_{i,t}^{\#}$ is the spatial lag of $E_{i,t}$ – i.e., a weighted average of $E_{i,t}$ in all other 47 contiguous states. The weights reflect the inverse distance between population centroids in a given state (e.g., California) and the other 47 states. In the case of California, Arizona, Nevada, and Oregon would receive the largest weights, while Maine and Florida the smallest.

$\mathbf{X}_{i,t}$ is a vector of control variables. $\mathbf{X}_{i,t}\Theta$ essentially is an estimate of the counterfactual – what employment in state *i* at time *t would have been* if a credit had not been enacted. The variables we currently include in **X** are:

- state-specific quadratic time trends.
- predicted employment in *i*,*t* based on state *i*'s industry composition and national industry employment trends:

$$EL_{i,t} = L_{i,t-24}\left\{1 + \sum_s \omega_{i,s,t-24}\left[\ln\left(L_{s,t} - L_{i,s,t}\right) - \ln\left(L_{s,t-24} - L_{i,s,t-24}\right)\right]\right\},$$

$$\text{where } \omega_{i,s,t-24} = \frac{L_{i,s,t-24}}{L_{i,t-24}}.$$

The term in brackets represents (one plus) the predicted growth rate in employment in state *i* over the two-year period from *t-24* to *t*. This growth rate is calculated as a weighted average across industries of the national (excluding own-state) employment growth rates over that

period. We then apply that growth rate is state i's employment as of t-24 to get predicted employment in state i at time t.

The general model above is extremely flexible but has the drawback of containing a large number of parameters. Such a large number of parameters may make it difficult to obtain precise estimates. In order to obtain more precision, we put some structure on the distributed lag/lead coefficients by imposing polynomial distributed lags/leads (PDL; Almon, 1958):

$$\alpha_p = \mathrm{PDL}(p) = a + bp + cp^2 + \ldots$$
$$\Rightarrow \sum_p \alpha_p E_{i,t-p} = \sum_p \left(a + bp + cp^2 + \ldots\right) E_{i,t-p}$$
$$= a\sum_p E_{i,t-p} + b\sum_p pE_{i,t-p} + c\sum_p p^2 E_{i,t-p} + \ldots$$

We present some results below where we assume a 3rd-order PDL for the α's from p = -24 to -1 and a separate PDL for the α's from p = 1 to 24.

4. Data:

In this section, we describe the data used in our empirical analysis. Before describing the features and patterns of the job creation tax credit data, let us first mention how we identified the states that have JCTCs and how we obtained details about their credits. Two sources were very useful as starting points for identifying JCTC states. Rogers (1998) is essentially a list and brief description of the state JCTCs in place as of 1997. Site Selection magazine's website (www.siteselection.com) contains tables for various recent years indicating which states have various tax incentives. We supplemented these sources with, for each state, a general web search for "tax credits" and a more targeted search in the legal database WestLaw. After having identified all 24 states that have or have had (though none has yet repealed their credit) a JCTC, we then used WestLaw to obtain the state statute code for the legislation associated with the JCTC. From a state's statute code, one can identify the Session Law that included the bill that was signed into law, officially authorizing the credit. States session laws and bills were found either in WestLaw or on the state's house/assembly website. These bills contain all of the relevant information on each JCTC that we needed for this paper.

4.1 The General Design of Job Creation Tax Credits

We start off with a description of the general structure or design of state JCTCs.[1] As mentioned above, 24 states have a broad JCTC with little or no restriction on eligible industries.[2] The details of these credits vary widely, but their basic designs are quite similar.

All the JCTCs currently in place are intended to subsidize net job creation by businesses. That is, only new jobs that expand a business's total payroll employment level qualify. With many state JCTCs, a company can only claim the credit if the number and/or wages of the new jobs are above specified thresholds and meet certain requirements, such as providing health insurance. In addition, some states offer multiple credit rates, which increase with the number or wages of the added jobs.

JCTCs are credits against a state's corporate income or franchise tax and use one of three basic structures. In most states, the credit amount is a percentage of the total annual wages or compensation of the new jobs that are added. In a number of other states, the credit is a percentage of the state income tax withholdings associated with the new jobs. The credit in a few other states, as well as the federal JCTC proposed by President Obama during the transition, is a fixed dollar amount per new job (for example, $1000 in Virginia). The president proposed a $3000 federal credit.

Another aspect of JCTCs is whether the credit is refundable, meaning that a business can receive a payment from the state even if it has no tax liability. President Obama proposed a refundable credit. Refundability is an important consideration in gauging a credit's fiscal cost and its effectiveness as a countercyclical policy tool because the fraction of companies that do not have positive net taxable income rises sharply in downturns, exactly when a government might want to subsidize job creation. Very few JCTC states offer refundability, though many do allow companies to carry forward the credit several years (i.e., to apply the credit against taxable income in future years).

Lastly, state JCTCs differ with regard to how many years a corporation can apply the credit against taxable income. Multi-year credits are intended to encourage future job retention in addition to current job creation.

4.2 The Timing of Job Creation Tax Credits

In any event study, the accurate timing of the event is crucial to properly identifying the relationship between the event and the outcome of interest. For the empirical analysis in this paper, we consider the event to be the moment in time after which the credit could most plausibly have an effect. This "effective date," referred to as t_i^E above, is the first moment at which firms both know with reasonable certainty about the credit (which we assume occurs on

[1] This description is based largely on the information provided in Wilson and Notzon (2009).

[2] One exception is Georgia, where only jobs in manufacturing are eligible for the credit. In our later analysis, we will check the sensitivity of our results to including or excluding Georgia's credit.

the signing date)[3] and can act on that information (which we assume occurs on the qualifying date). The legislative bills that we obtained for every state that has currently or has had a JCTC indicate both the qualifying date and the signing date of the credits.

There is considerable variation among states in whether the signing date comes before, after, or at the same time as the qualifying date. This variation, based on daily data, is shown in Chart 3. We classify the states into three regimes. There are six **"retroactive states"** that have a retroactive credit, meaning that their qualifying date precedes the signing date. It is worth mentioning that in every one of these retroactive states, the qualifying date is Jan. 1 of the year in which the credit was signed into law. In all of these cases, only net employment increases made after Jan. 1 can qualify for a credit. Therefore, if a retroactive credit causes any increase at all in employment in the state, then the increase should occur either at the time of the signing (if the credit was not anticipated) or after the Jan. 1 qualifying date (if the credit was anticipated).

There are five **"instantaneous states"** in which the signing and qualifying dates are the exact same day and another five in which the difference is less than 15 days and so we count as sharing the same signing and qualifying month (we assign these to the calendar month of the qualifying date).

Another eight **"implementation states"** have implementation periods – i.e., periods between a signing date and a later qualifying date – that range from one to ten months. In these states, any increase in employment caused by the credit should occur after the qualifying date. However, because the legislation was signed earlier, the credit "event" should be perfectly anticipated during the implementation period and one might expect to see employers delay hiring that might otherwise do until after the qualifying/effective date. Such an adverse pre-treatment effect of fiscal policy has been referred to as "Ashenfelter Dips" (after Ashenfelter, 1978) or "Fiscal Foresight." If such effects exist, we should find negative coefficients on the leads of the E dummy in our regression applied to the implementation states.

4.3 Outcome and Control Variables

In this preliminary draft, we consider nonfarm payroll employment as the outcome variable. (In future work, we will also consider overall payroll employment and the unemployment rate.)[4] Seasonally-adjusted monthly data by state were obtained from the Bureau

[3] We recognize the possibility that, in some instances, firms may be reasonably certain of passage of a JCTC prior to the signing date. The policy discussions and legislative history (especially the critical role of the House/Senate Conference Committee) surrounding the Carter JCTC (as documented by Sunley, 1980) suggests that the probability of passage was well below one until the final moment of passage.

[4] One important difference between the household-survey based unemployment rate and the employer-survey based employment data is that the former are geocoded according to state of employee residence whereas the latter are geocoded according to state of employer location. So a given state's JCTC may actually cause some (gross)

of Labor Statistics (BLS). The nonfarm employment data were also the source for the EL variable described above.

5. Results:

In this section, we present the preliminary results from estimating the general regression model described in Sections 3 and 4. As noted above, the regressions use seasonally-adjusted log private nonfarm employment as the dependent variable. The $\mathbf{X}_{i,t}$ vector here includes state and time fixed effects, state-specific quadratic time trends, and predicted employment based on state employment composition across industries (as of 12 months prior) and national industry trends. [The regression underlying Chart 4 excludes the spatial lag of the E. We will include the spatial lag terms in the next draft.] Because the model contains such a large number of parameters, we present these results graphically rather than in tabular form.

Charts 4, 5, and 6 contain plots of the α coefficients from equation (**) when the dependent variable is the level of employment (in logs). The charts correspond to the three regimes defined by legislative history: Charts 4, when there is neither implementation nor retroactivity periods; Charts 5, when there is an implementation period, and Charts 6, when there is a retroactivity period. The top panel in these charts shows the unrestricted coefficients; the bottom panel corresponds to a regression where the α_p coefficients are restricted to follow a 3rd-order polynomial for p = -1 to -24 and a separate 3rd-order polynomial for p = 1 to 24. There is a great deal of persistence and idiosyncratic volatility in the series.

In order to reduce idiosyncratic volatility, we formsubsample of states defined by the three credit regimes described above. Each subsample contains states with one of the three credit regimes plus all of the non-JCTC states (the controls). Chart 7 (instantaneous states), Chart 8 (implementation states), and Chart 9 (retroactivity states) continue to exhibit a great deal of persistence that blur interpretations. Nonetheless, in Charts 7 and 8, there is a noticeable rise in employment at p = 0, the qualifying date of the JCTC. This result is consistent with a positive answer to our *whether* question concerning JCTCs.

To reduce the impact of persistence, we reestimate the models with the growth rate of employment as the dependent variable. The results for the three subsamples are presented in Charts 10 to 12. We believe that the most accurate estimate of the effect of the JCTC can be obtained when there is no implementation nor retroactivity period because this case corresponds most closely to an unanticipated and immediately-effective policy change. Chart 10 displays the changes in the growth rate for those states where there is neither implementation nor retroactivity

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reduction in unemployment in neighboring states – this should bias the coefficients on the E dummies toward zero and positively bias the coefficients on $E^{\#}$, when U is the dependent variable.

periods. In this case, employment growth increases by 0.12% in period 0 and is statistically significantly different from zero at the 5% level.

When the JCTC legislation contains an implementation period, Chart 11 shows that there is negative growth (relative to the benchmark) for three of the four months before firms can receive the credit. This "Dip" is fully consistent with optimizing behavior on the part of firms who rationally anticipate the future credit. There is a substantial positive response of 0.31% of employment in period $p = 0$, when new hiring can start to generate a credit. (This response is statistically significant at the 10% level, with a p-value of 0.06.) The estimated impact of the JCTC of 0.31% may partly reflect "catch-up" behavior, as firms hire in period 0 to correct the negative growth occurring prior to the qualifying date.

Interestingly, subsequent to the qualifying date ($p > 0$), there is evidence of negative employment growth. This result is not readily explained by profit-maximizing behavior in the face of a well-designed credit. However, this pattern of results is consistent with "gaming": firms hire in period 0 to obtain the credit and then fire in subsequent periods to return to their preferred employment level. Credit programs are designed to prevent this behavior, but it is generally acknowledged that successful implementation is a challenging task. An alternative explanation is that firms "underhire" relative to their desired steady state levels during the implementation period, prefering instead to meet current demand by drawing down inventories, then temporarily overhire immediately after the credit goes into effect so as to replenish inventories, and finally gradually allow employment to return to steady state as inventories are replenished.

Chart 12 presents results for those states where there is a retroactivity period. The increase in employment growth in period 0 is only 0.06%, which is statistically insignificant and the smallest of the three regimes. This muted response may partly reflect that some firms anticipated prior to the signing date that the JCTC would be retroactive, though we believe that such effects are minimal given the vagaries of the legislative process.

In sum, the preliminary results displayed in Charts 10 to 12 suggest a positive answer to the *whether* question. Regarding *when*, there is some evidence of anticipation effects when firms face an implementation period (Chart 11). Our overall assessment is that an unanticipated JCTC leads to an increase in employment growth of 0.12% during the first month after the credit goes into effect (Chart 10). This figure may be biased upward if firms "game" the tax credit program by "artful" hiring/firing decisions. There is some evidence of this behavior in Chart 10. Lastly, assessing the *where* question requires the inclusion of additional regressors (the $E^{\#}$ variables in equation (**) that capture the effects of JCTCs enacted in neighboring states), and this extension will be pursued in future work.

6. Prior Literature and Policy Implications

A. Prior Literature A job tax credit has been tried only once before at the U.S. federal level, the 1977-78 "New Jobs Tax Credit" (NJTC). Sunley (1980) offers a detailed description of the convoluted policy discussions and legislative history surrounding the eventual enactment of the NJTC. It is particularly important to note that crucial details of the NJTC were not determined until the end of the process in the House/Senate Conference Committee and thus would have been difficult to anticipate. The NJTC offered corporations with taxable income a credit whose value was proportional to the increase in the corporation's net payroll employment level above 102% of its previous year's employment level.

The effectiveness of the NJTC has been discussed in three studies. Using survey data in a cross-section regression, Perloff and Wachter (1979) find that firms that reported knowing about the credit experienced 3% higher employment growth than other firms. Bishop (1981) also studies the employment effects of the NJTC but with time series data for several industries likely to be responsive to the NJTC. He reports that the NJTC increased employment in the Construction, Trucking, Wholesale, and Retail sectors in 1977-78 by between 0.66% and 2.95%. As in the Wachter study, the effects of the NJTC are measured by a variable reflecting the percentage of firms aware of the tax credit. By contrast, Sunley (1980, p. 408) concludes that the effects of the NJTC were "slight" because of the complexity of the law and delays between hiring decisions by firms and eligibility determination by regulators.

There are two other studies that have quantified the effects of marginal tax credits. Kesselman, Williamson, and Berndt (1977) estimate a translog cost function and report that, for equal revenue costs and hypothetical policies, the percentage increase in employment from a marginal employment tax credit is about twice as great as the comparable increase from a uniform employment tax credit. Faulk (2002) examines an incremental job tax credit in Georgia. With cross-section data, she estimates separate employment equations for eligible firms that are participating or non-participating in the Georgia program and a probit selection equation to determine participation. For those eligible firms participating in the program, employment rose by between 23 to 28 percent. The cost was between $2280 and $2680 per job created.

B. Policy Implications

Owing to the different empirical approaches and data, it is difficult to compare the estimates in the current paper to the prior literature. An alternative perspective on our results can be obtained with the following thought experiment. If a federal JCTC were to be passed today and it had the same impact on employment that we estimate for states (0.12%, based on those states whose JCTCs do not have a gap between legislative and qualifying dates), the credit would create 166,000 net new jobs. This would have a very modest impact on the unemployment rate and is small compared with the 640,000 new jobs attributed to the Stimulus Plan.

These calculations could be affected by at least two biases. All of the state JCTCs investigated in this paper are permanent. If the hypothetical national JCTC was expressly temporary, the expected expiration date of the job credit would enhance hiring incentives. A

perennial challenge with JCTCs that reward marginal hiring decisions is that the unobservability of the counterfactual path that would have occurred in the absence of tax credits. Policymakers are aware of this difficulty and the temptation for firms to "game" the tax credit program by "artful" hiring/firing decisions.[5] Insofar as firms are successful, these gaming activities will lead to a small net increase in employment evaluated over several months.

7. Conclusion

This draft is very preliminary. In further drafts, we plan to undertake the following work

- compute, for each state, the approximate value of its JCTC to a representative firm and use this measure to test whether more valuable credits have larger employment impacts;
- assess the "bang for the buck" of each state's credit using the data mentioned in the above point;
- estimate the effect of out-of-state JCTCs on in-state employment;
- extend the theory of the paper by exploring the potential impact of JCTCs on the extensive margin of job creation to better guide our empirical approach and interpretation of results;
- investigate the impact of JCTCs on gross versus net job creation in order to see whether the impact is different on the intensive vs. extensive margin.
- analyze the effect of state JCTCs by comparing employment growth differences between counties separated by state borders – a "spatial discontinuity" model.

[5] Bartik (2001) discusses design issues aimed at attenuating gaming behavior.

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Chart 1

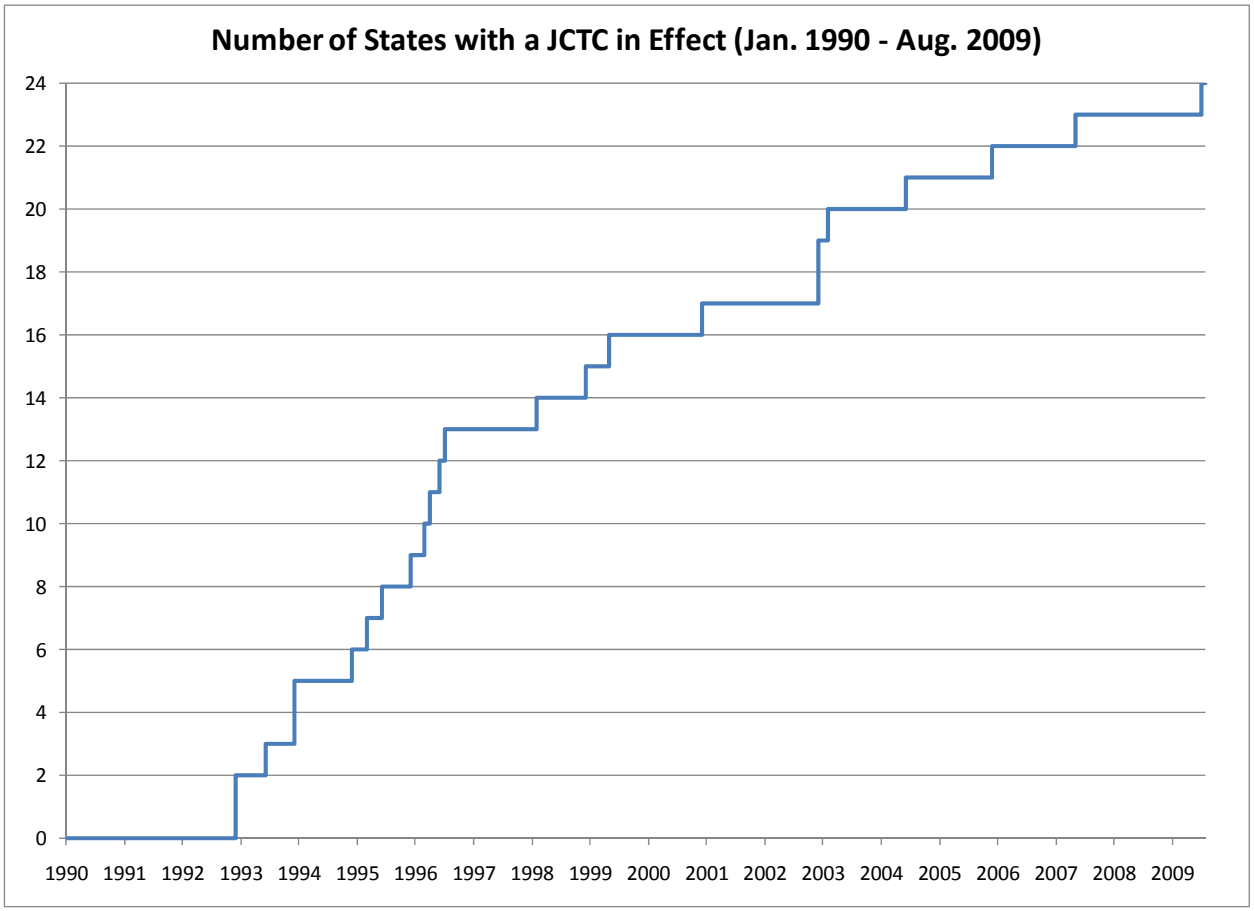

Number of States with a JCTC in Effect (Jan. 1990 - Aug. 2009)
24
22
20
18
16
14
12
10
8
6
4
2
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009

Chart 2

Map Showing States with JCTCs (in blue)

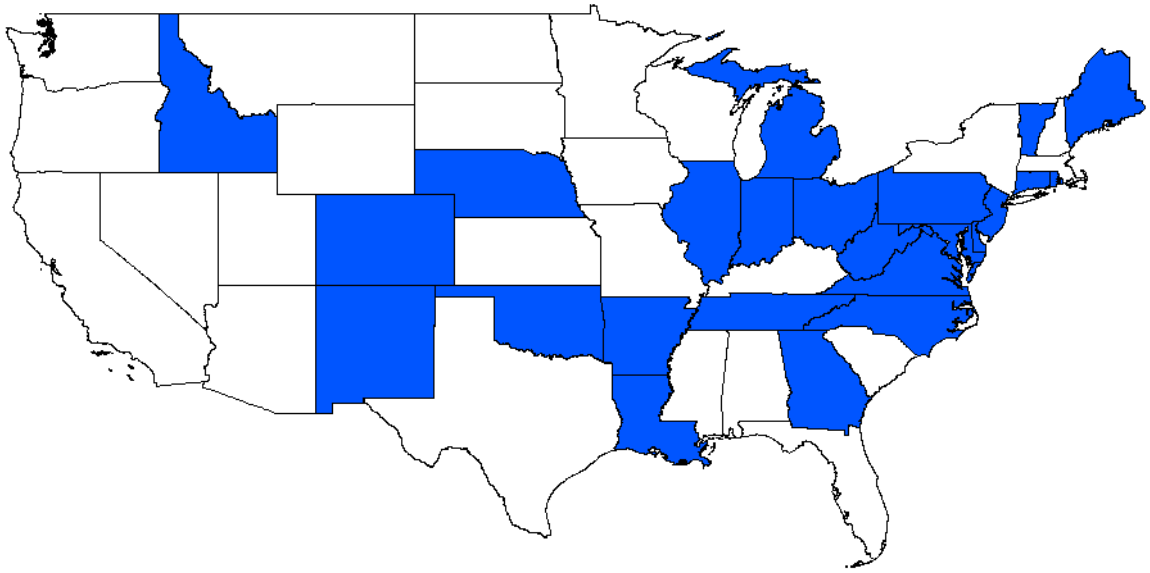


Chart 3

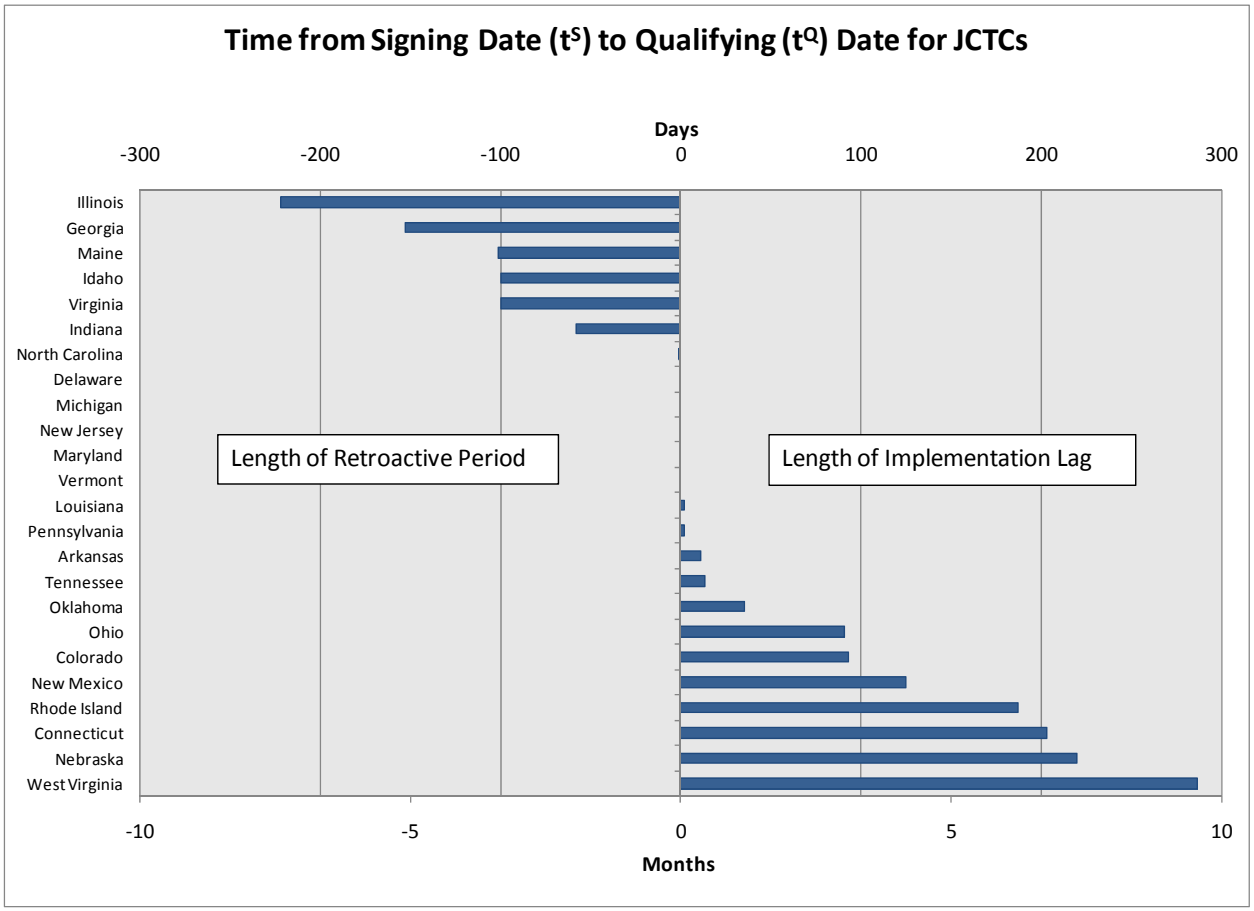
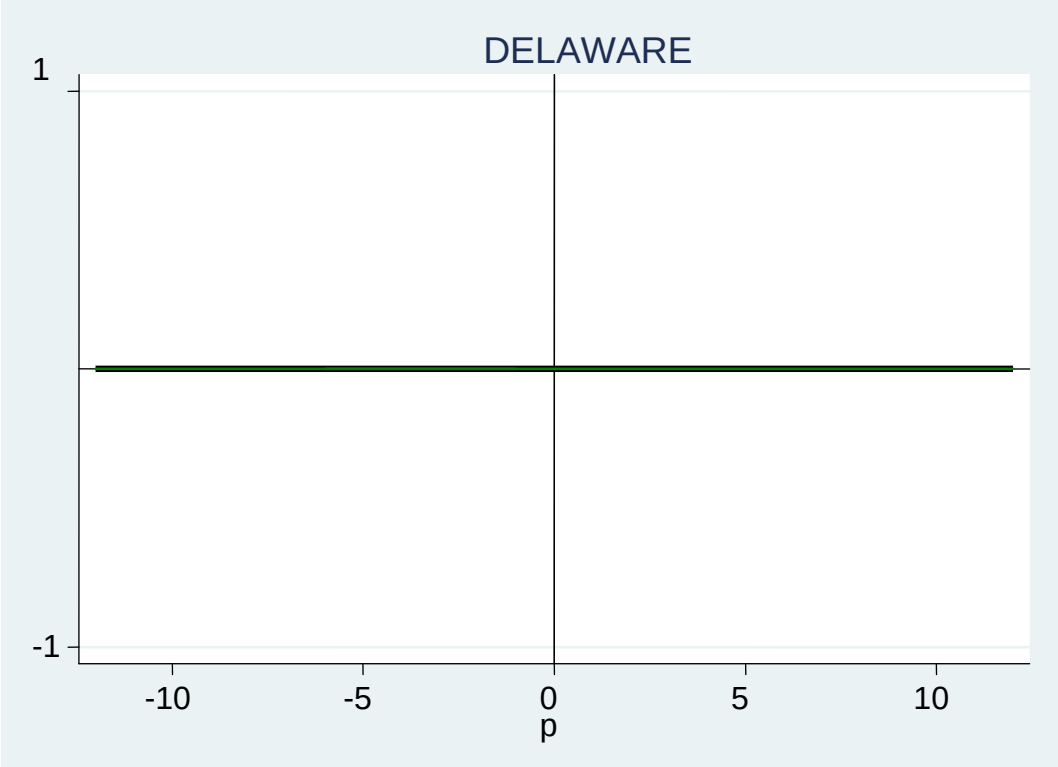

Time from Signing Date (t^S) to Qualifying (t^Q) Date for JCTCs
Days
-300
-200
-100
0
100
200
300
Illinois
Georgia
Maine
Idaho
Virginia
Indiana
North Carolina
Delaware
Michigan
New Jersey
Maryland
Vermont
Louisiana
Pennsylvania
Arkansas
Tennessee
Oklahoma
Ohio
Colorado
New Mexico
Rhode Island
Connecticut
Nebraska
West Virginia
Length of Retroactive Period
Length of Implementation Lag
-10
-5
0
5
10
Months

CHART 4: STATES WITHOUT IMPLEMENTATION OR RETROACTIVE PERIODS

(vertical line at 0 represents signing and qualifying month)

Delaware (industry data necessary for EL variable is missing for all periods)



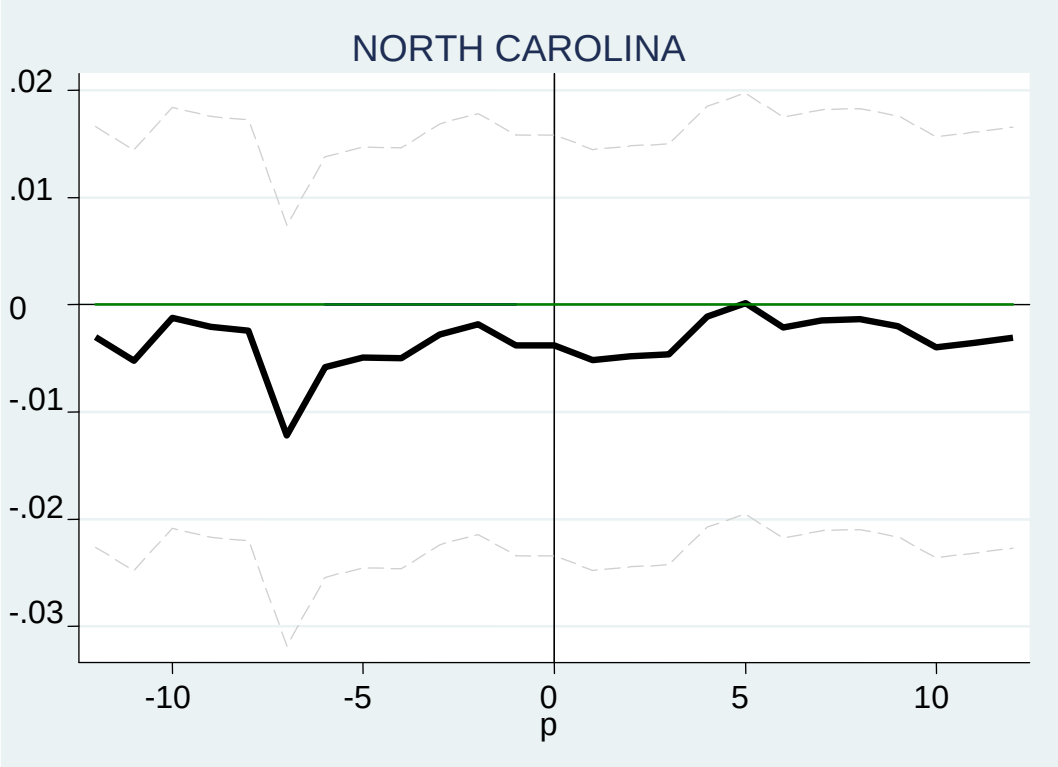
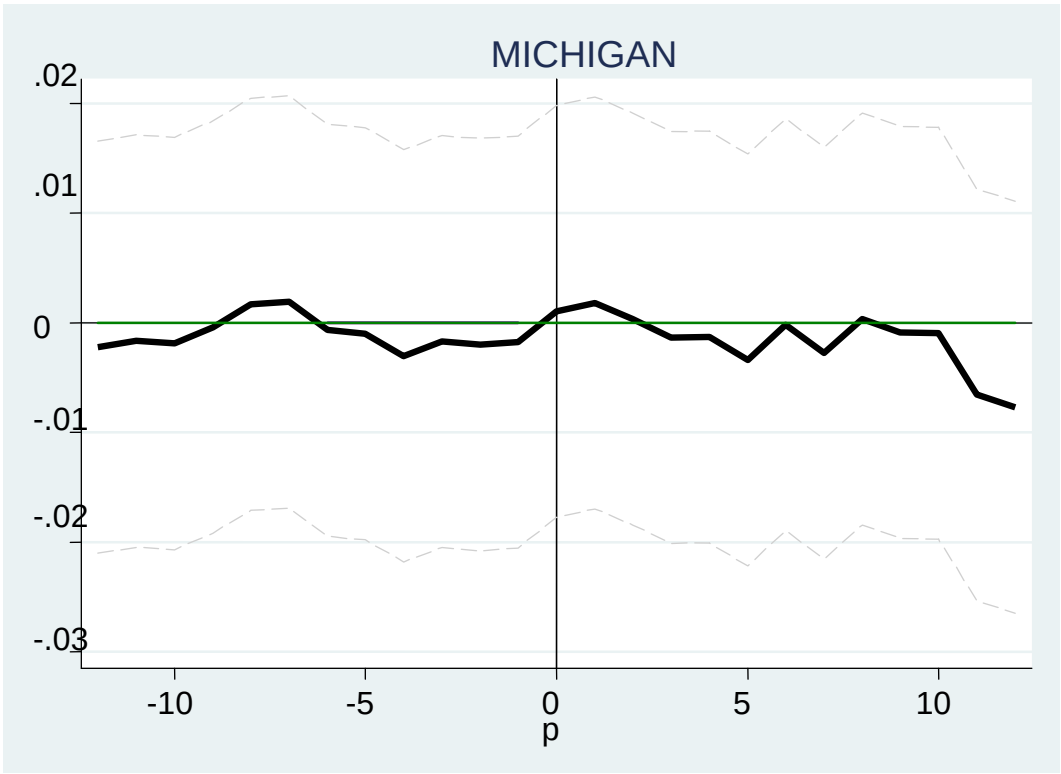


CHART 4: STATES WITHOUT IMPLEMENTATION OR RETROACTIVE PERIODS (continued) (vertical line at 0 represents signing and qualifying)



month)

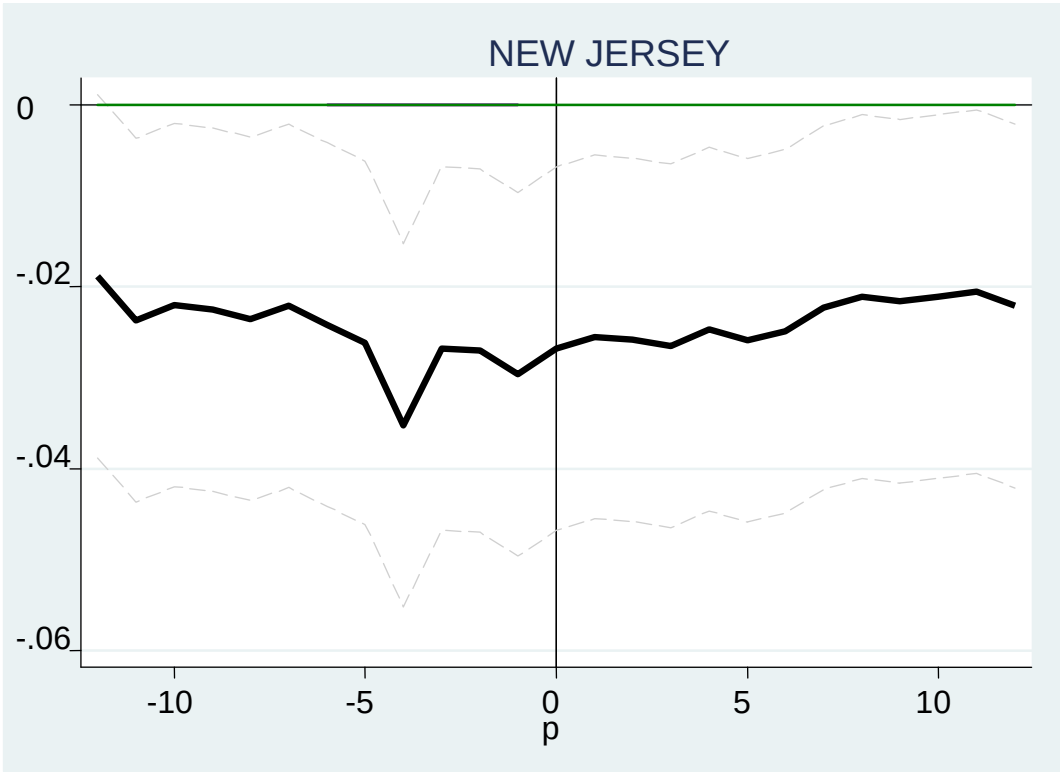
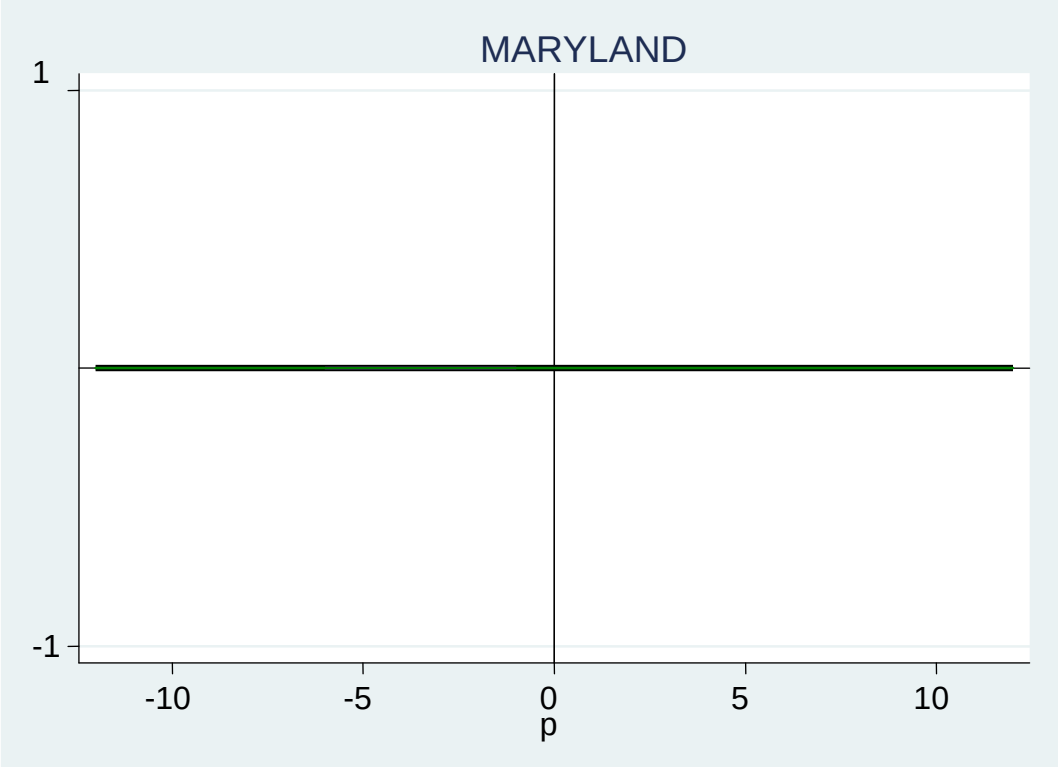


CHART 4: STATES WITHOUT IMPLEMENTATION OR RETROACTIVE PERIODS
(continued) (vertical line at 0 represents signing and qualifying)
(industry data for EL missing for all periods)



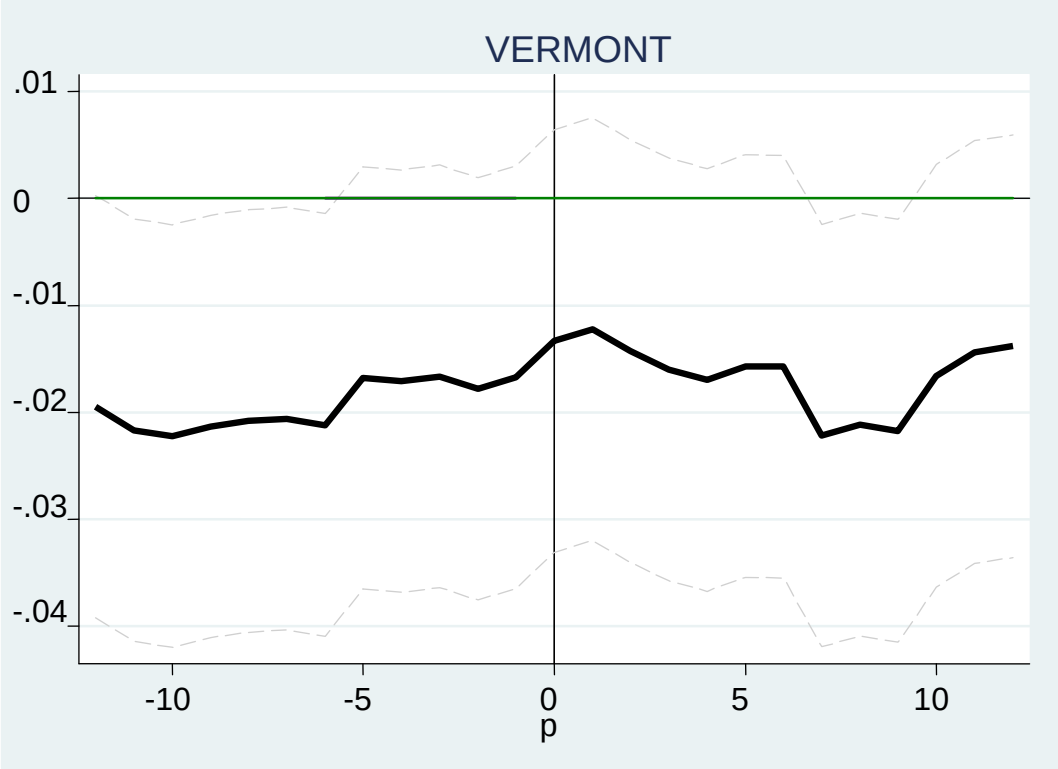
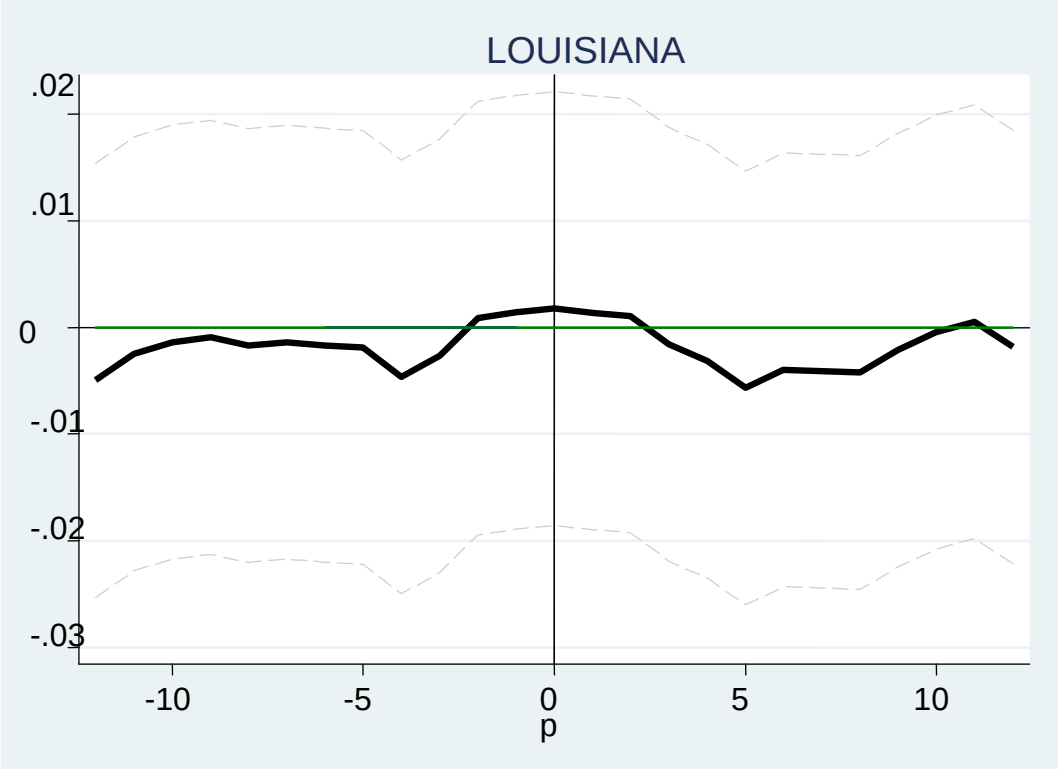


CHART 4: STATES WITHOUT IMPLEMENTATION OR RETROACTIVE PERIODS
(continued) (vertical line at 0 represents signing and qualifying)



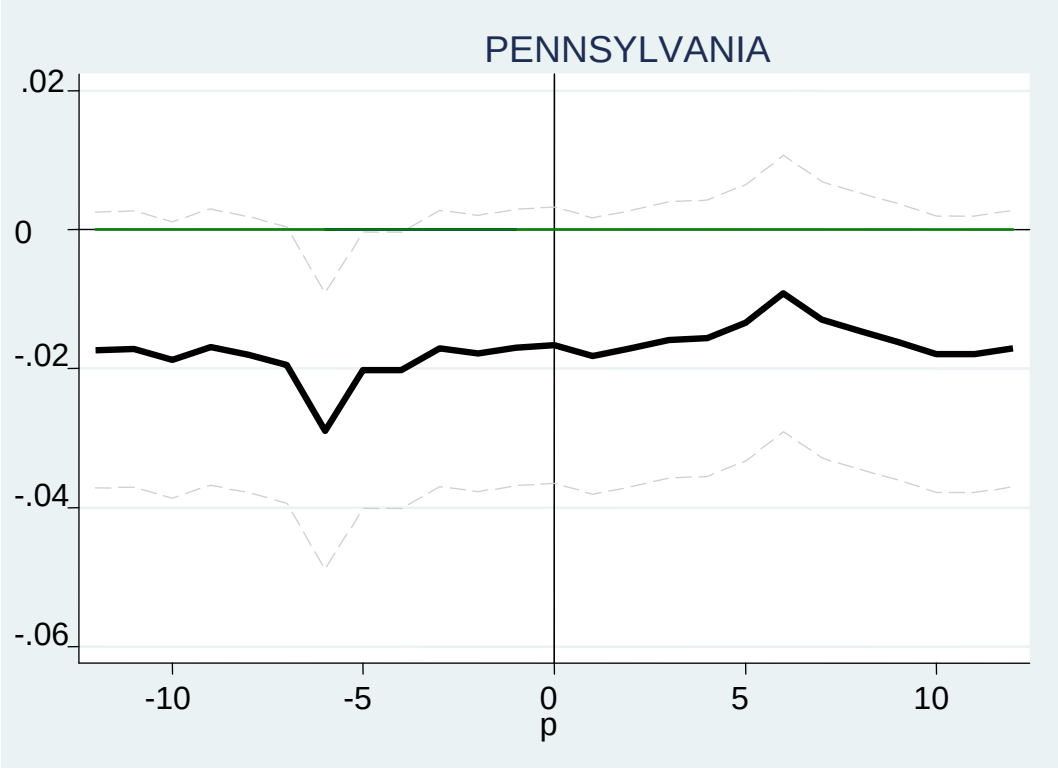
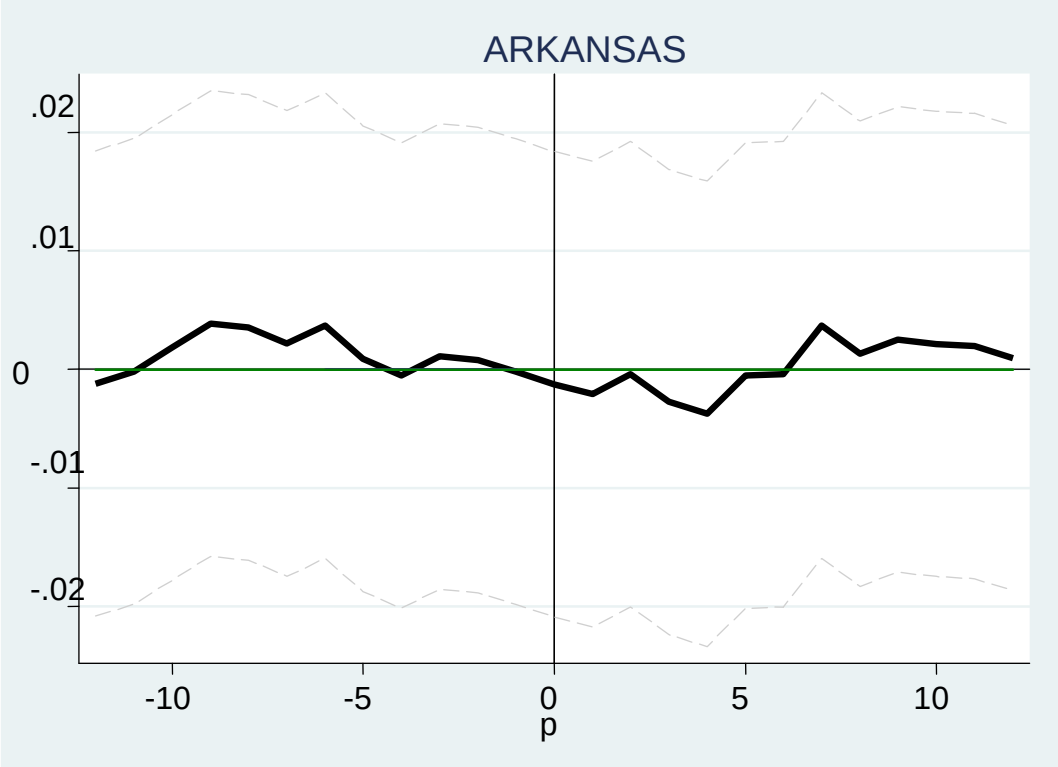


CHART 4: STATES WITHOUT IMPLEMENTATION OR RETROACTIVE PERIODS (continued) (vertical line at 0 represents signing and qualifying)



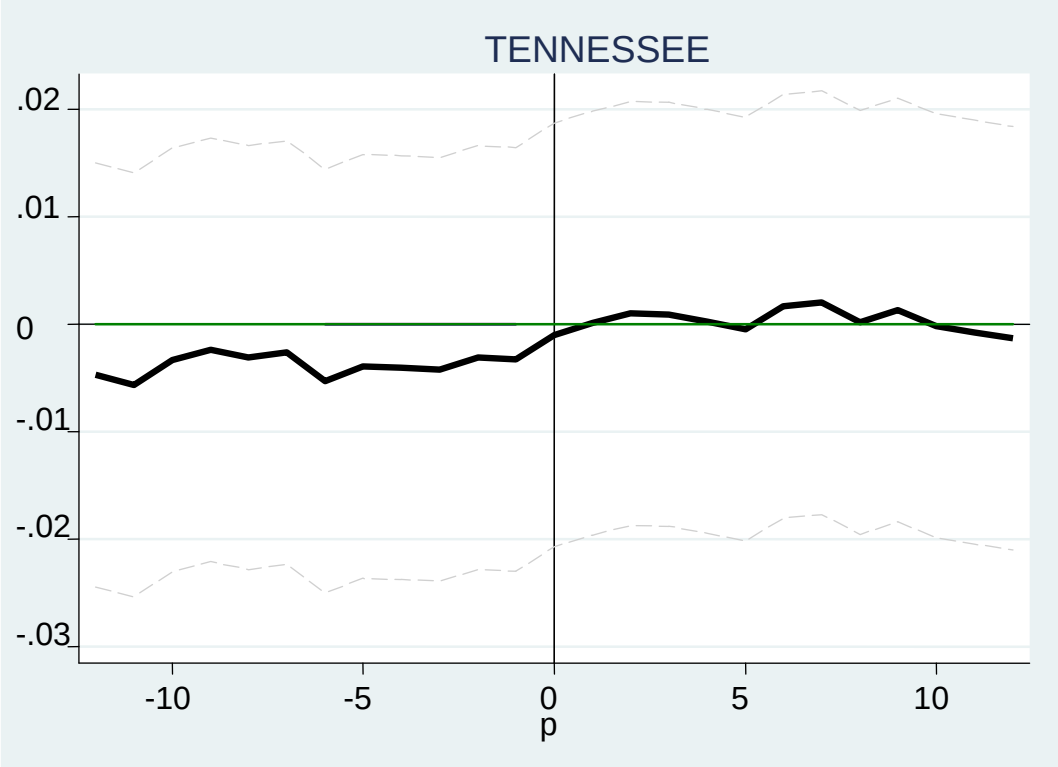


CHART 5: STATES WITH AN IMPLEMENTATION PERIOD (IP)

(pre-0 vertical line is signing month; line at 0 month is qualifying month)

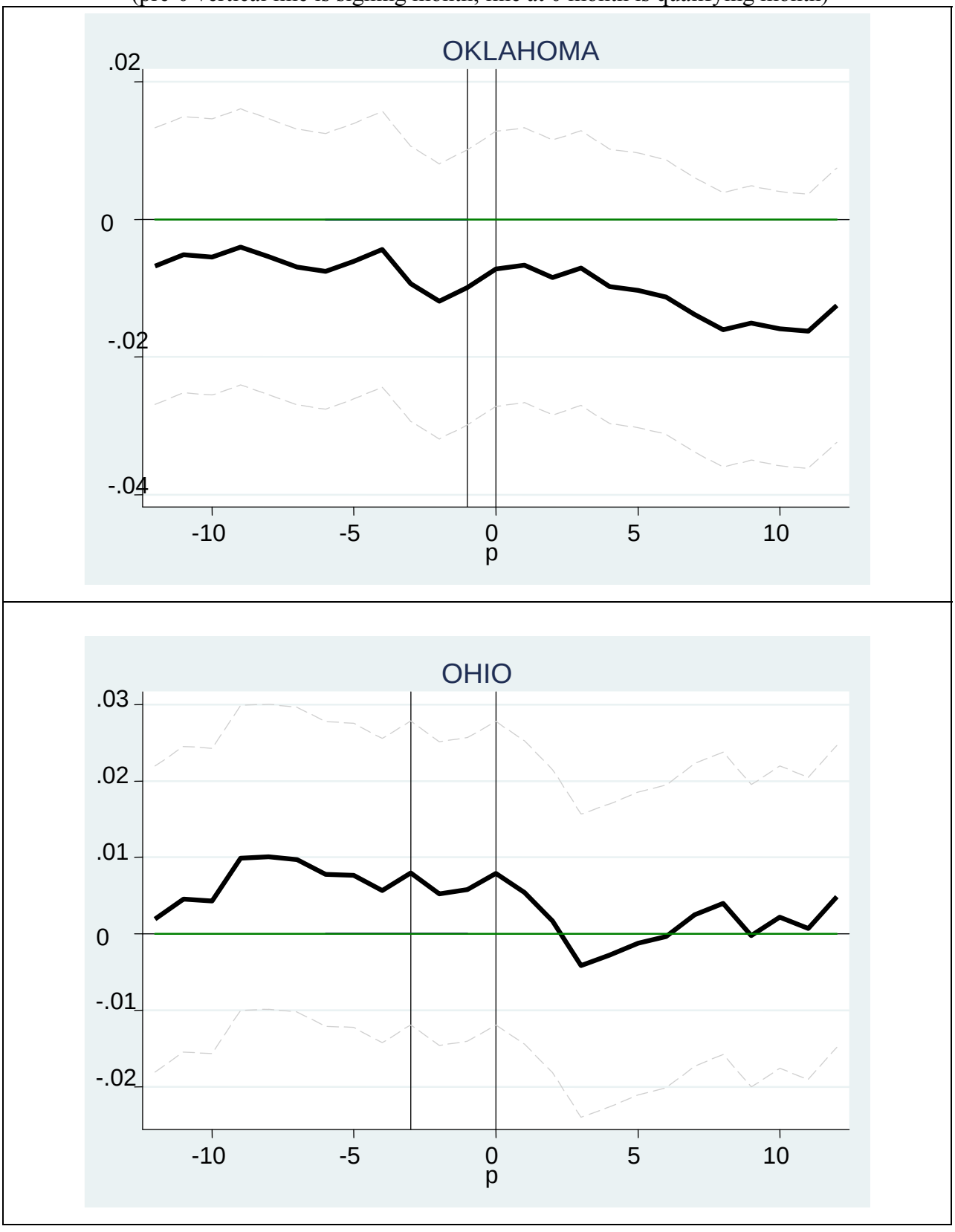
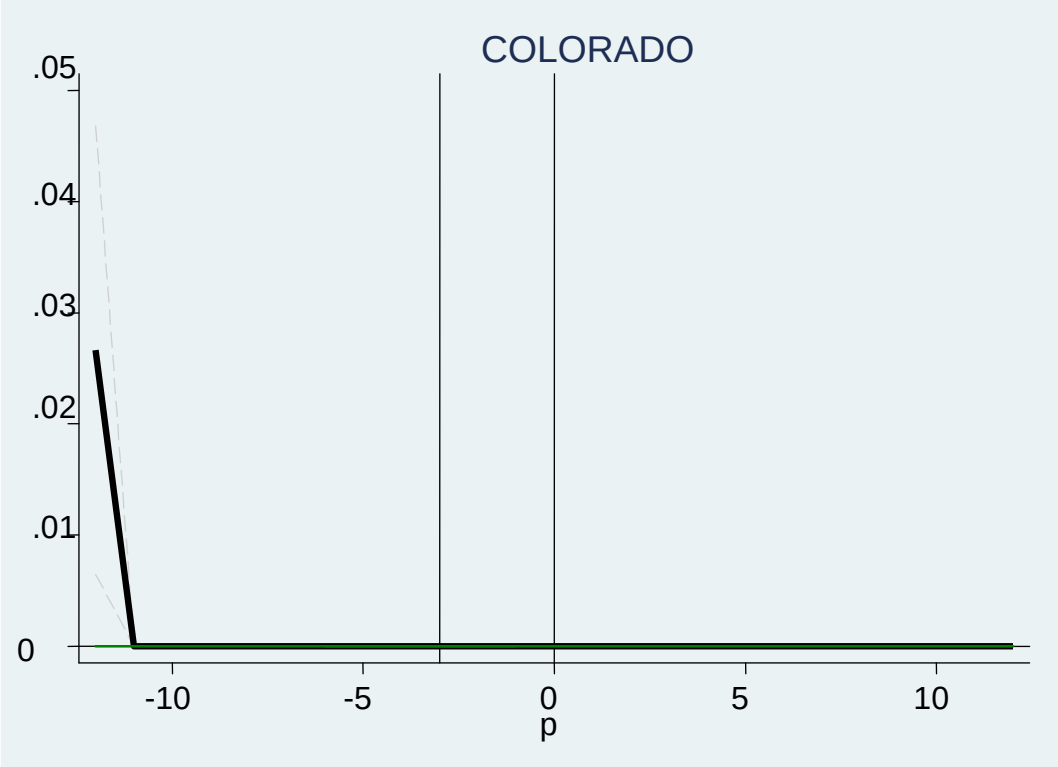


CHART 5: STATES WITH AN IMPLEMENTATION PERIOD (IP)
(continued) (pre-0 vertical line is signing month; line at 0 month is qualifying month)



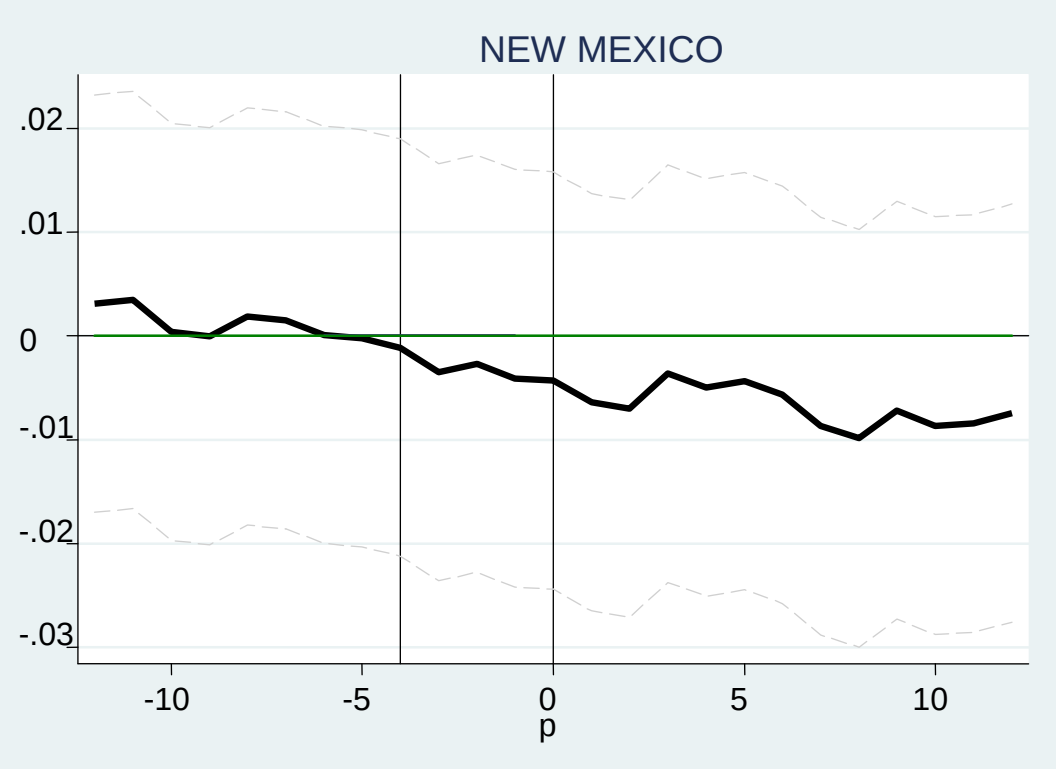
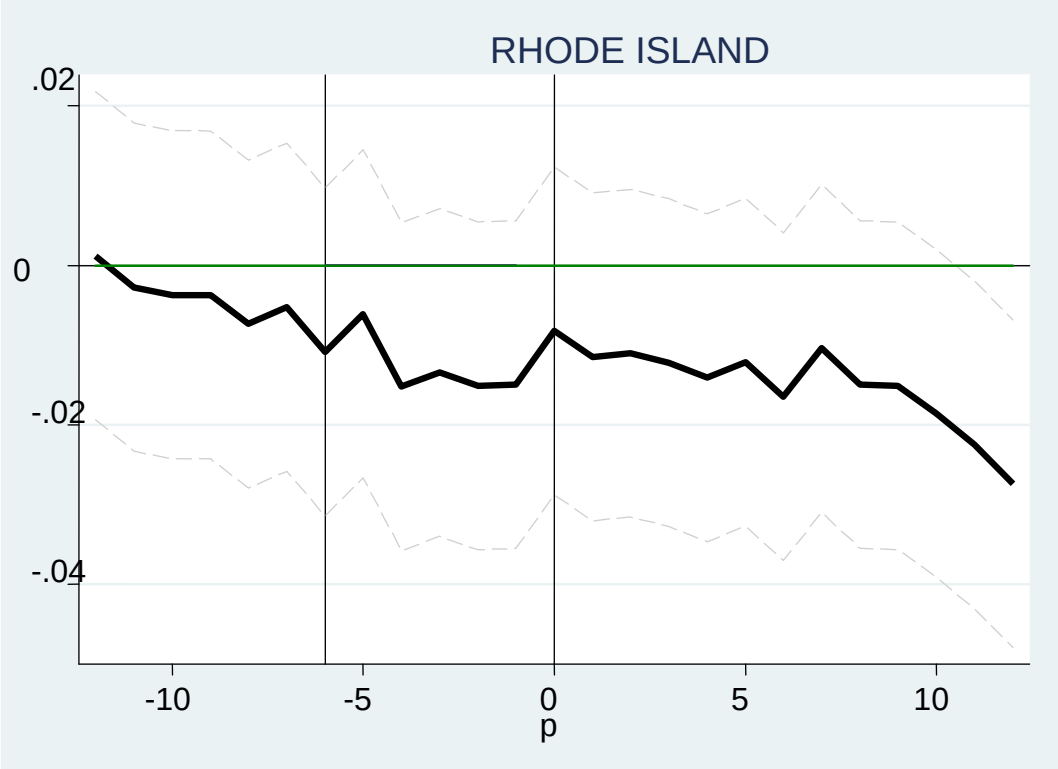


CHART 5: STATES WITH AN IMPLEMENTATION PERIOD (IP)
(continued) (pre-0 vertical line is signing month; line at 0 month is qualifying month)



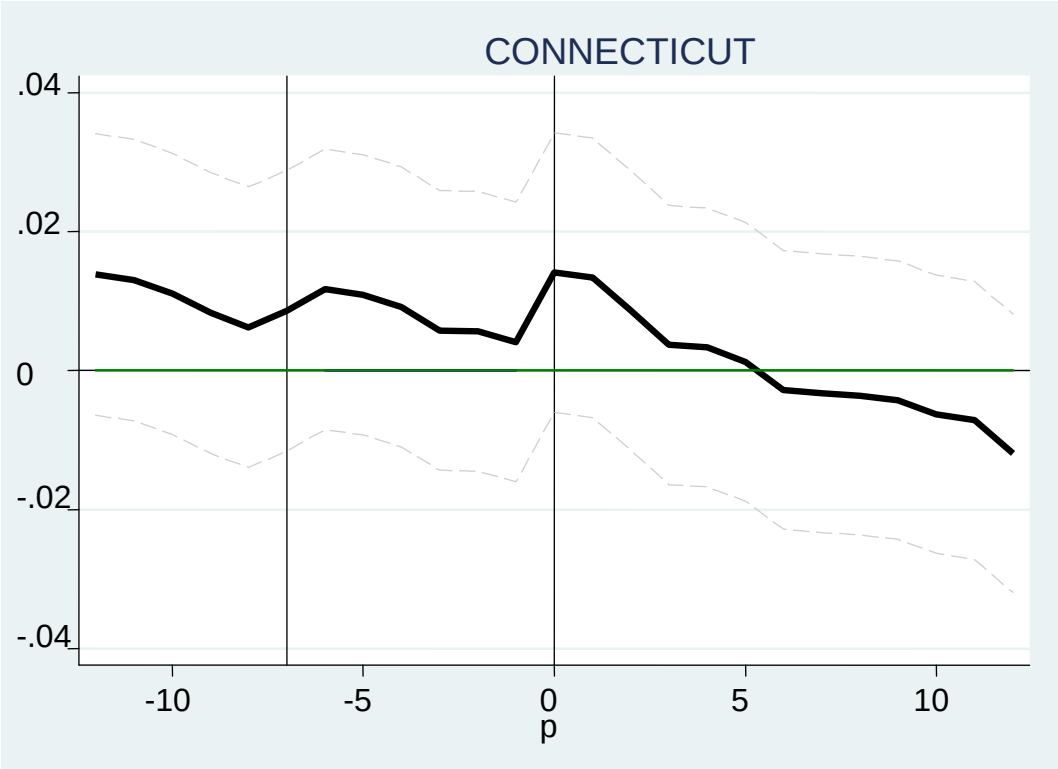
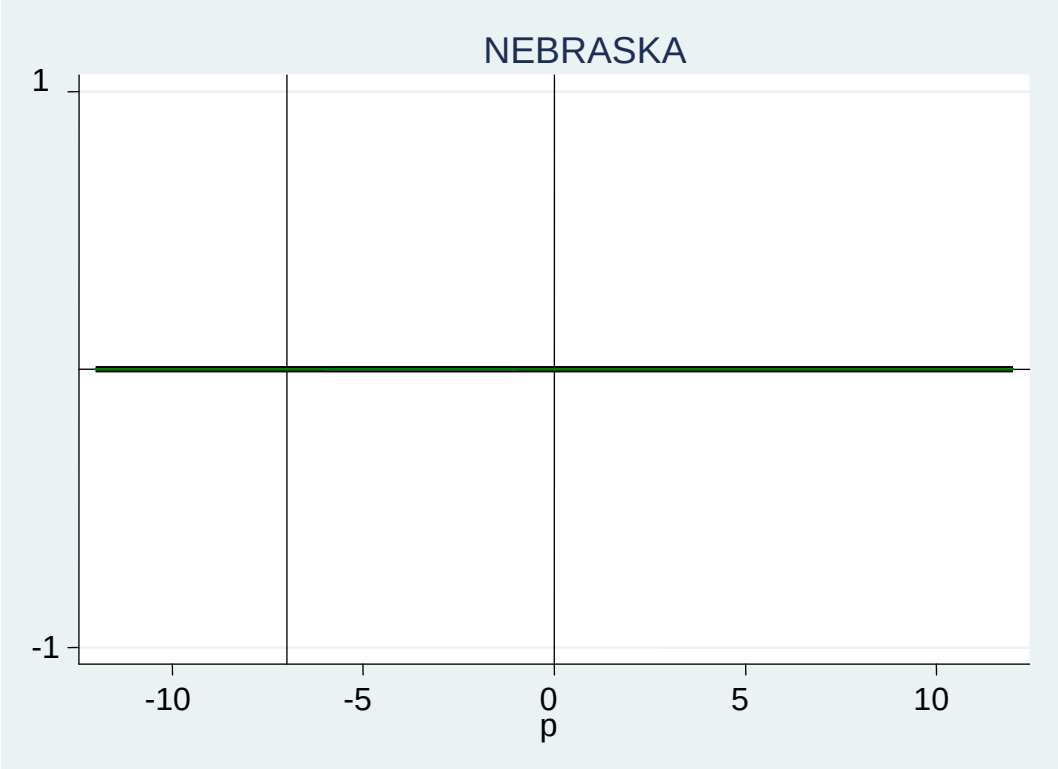


CHART 5: STATES WITH AN IMPLEMENTATION PERIOD (IP)
(continued) (pre-0 vertical line is signing month; line at 0 month is qualifying month)
Nebraska (EL is missing around time of JCTC b/c of missing industry data)



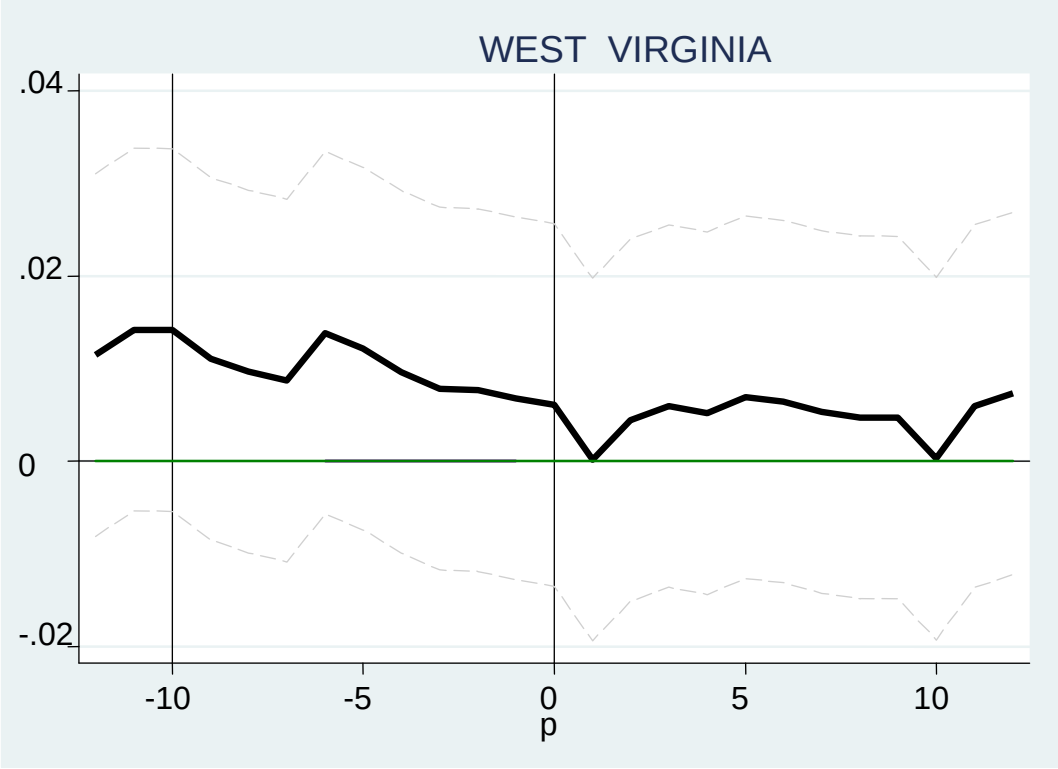
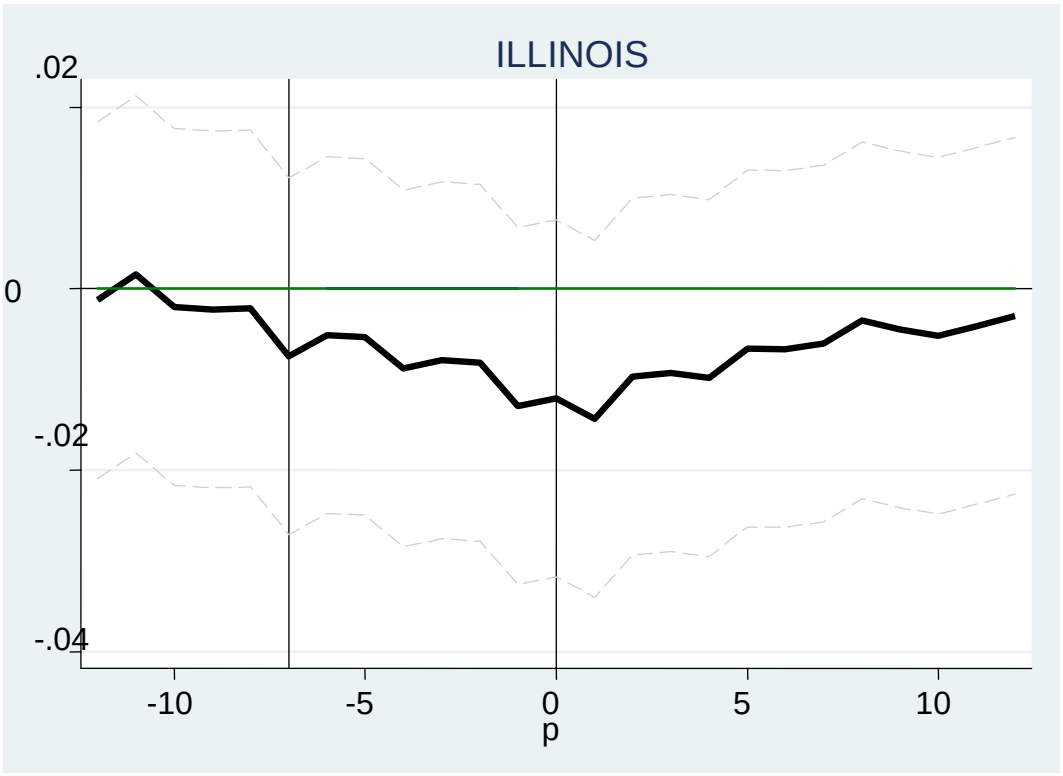


CHART 6: STATES WITH A RETROACTIVE PERIOD (RP)



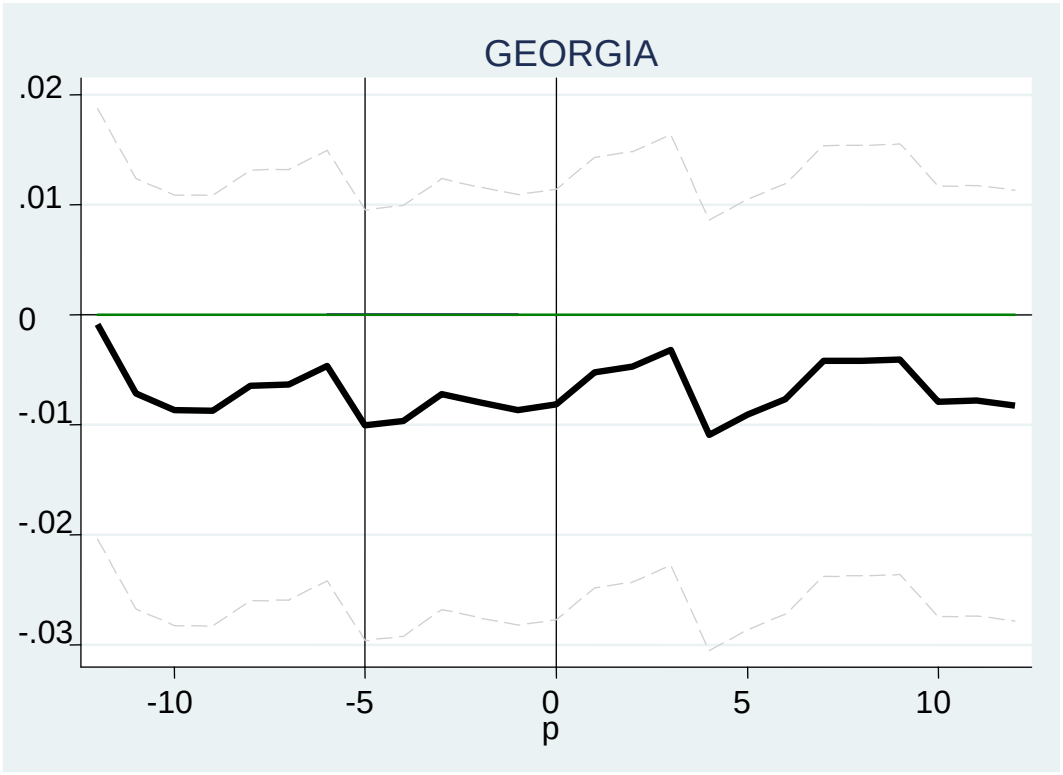
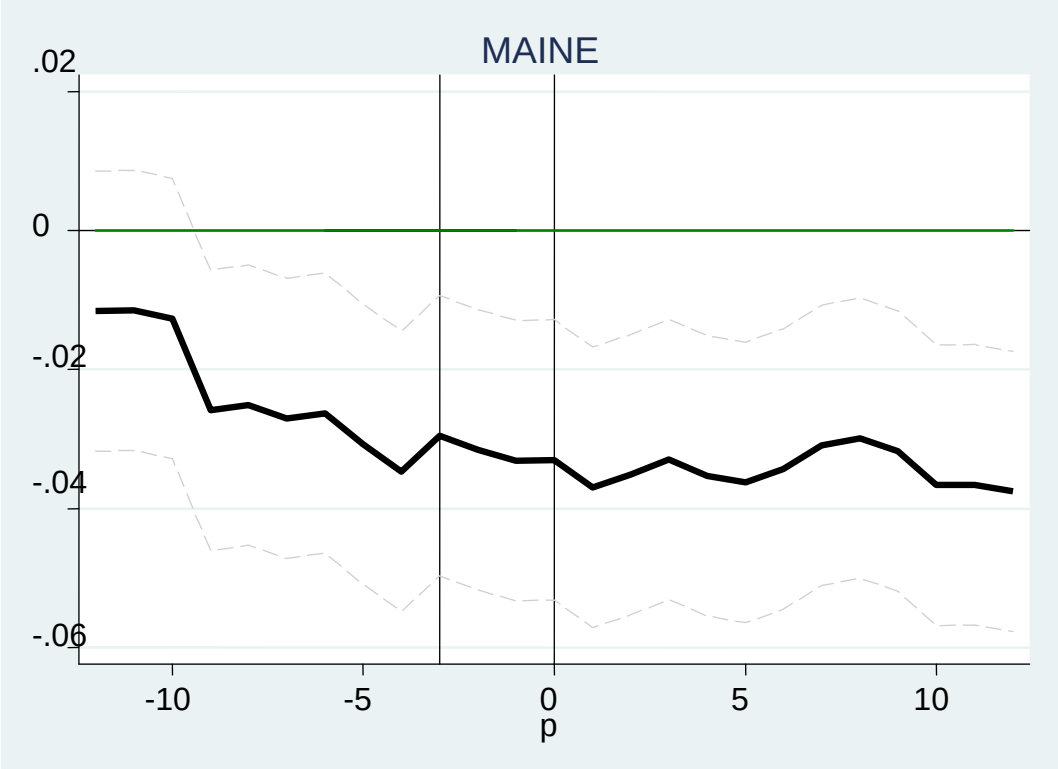


CHART 6: STATES WITH A RETROACTIVE PERIOD (RP) (continued)



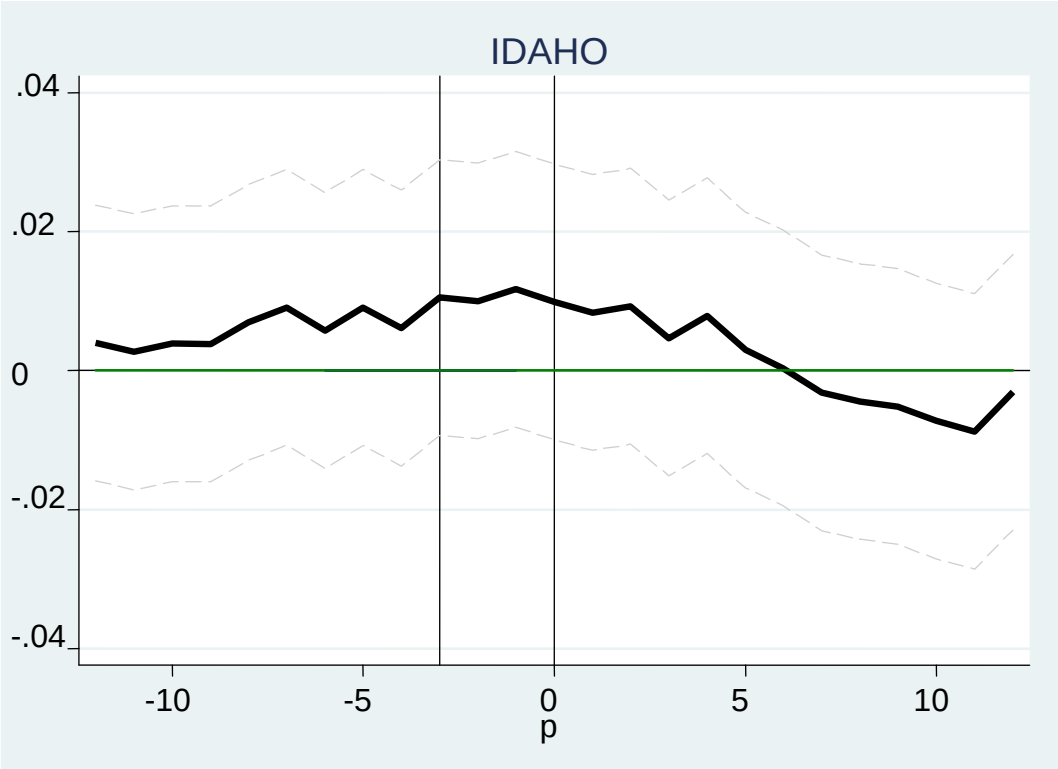
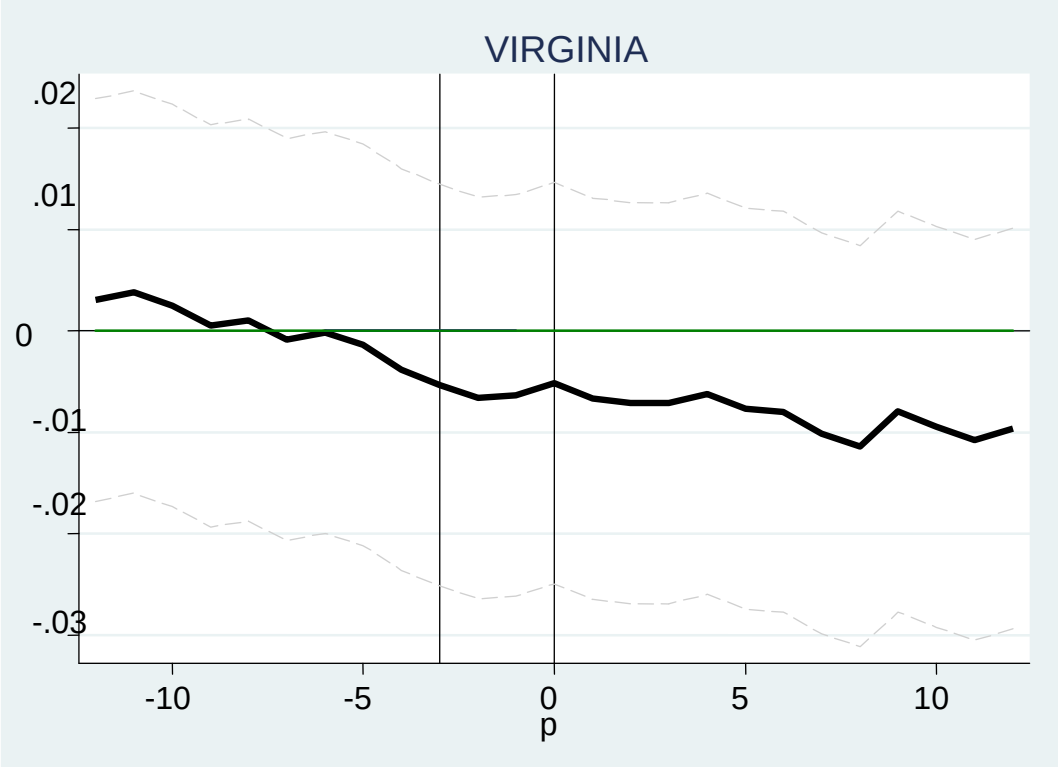


CHART 6: STATES WITH A RETROACTIVE PERIOD (RP) (continued)



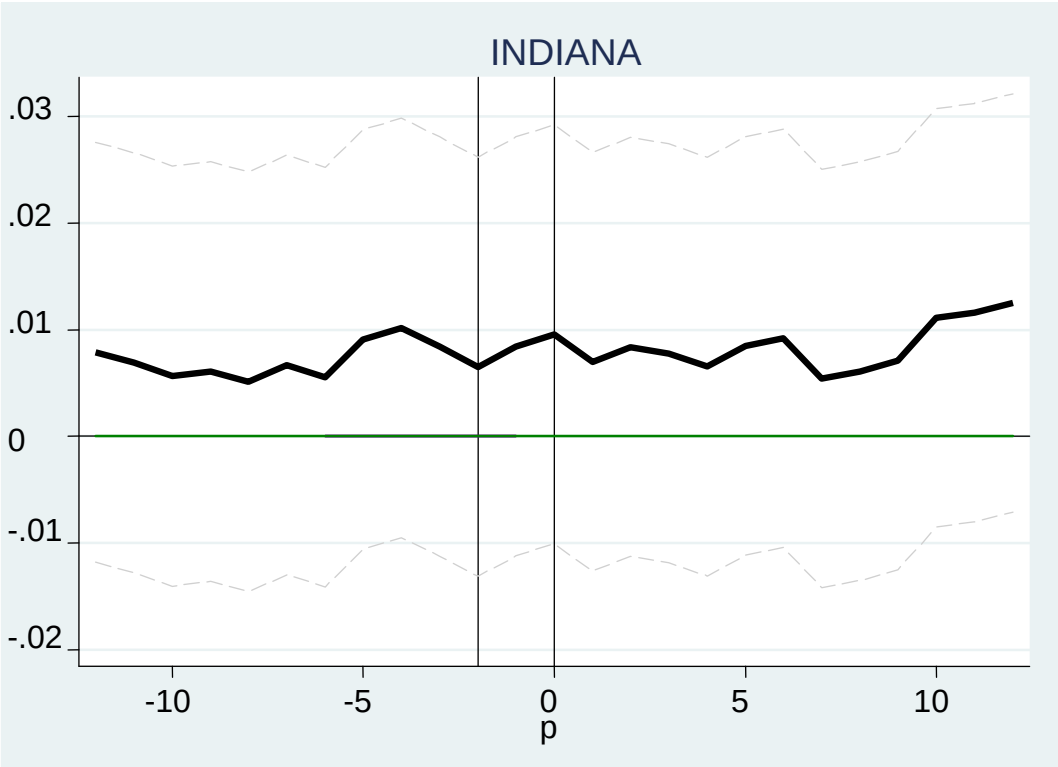


CHART 7: STATES WITHOUT IMPLEMENTATION OR RETROACTIVE PERIODS LEVELS

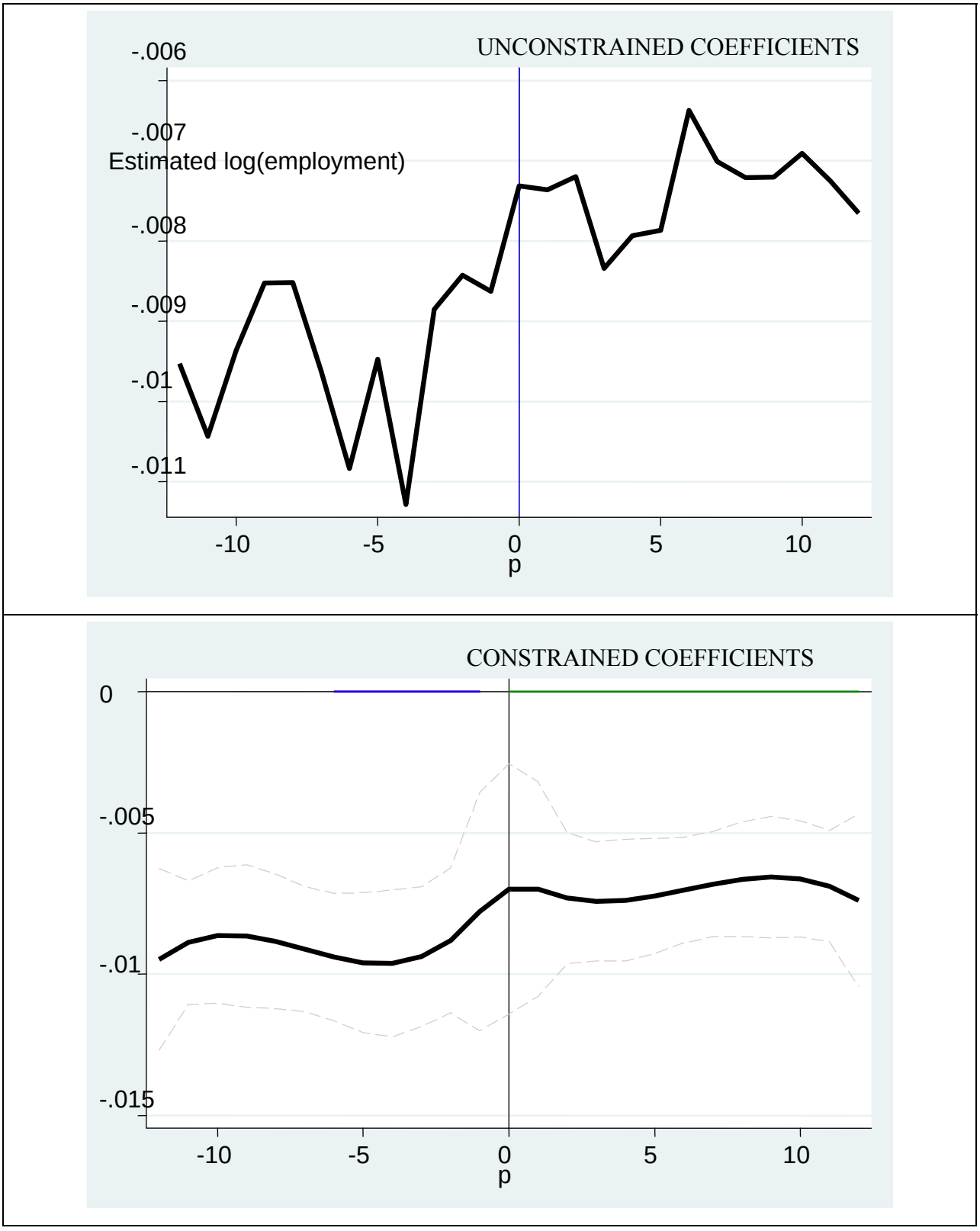


CHART 8: STATES WITH AN IMPLEMENTATION PERIOD (IP) -- LEVELS

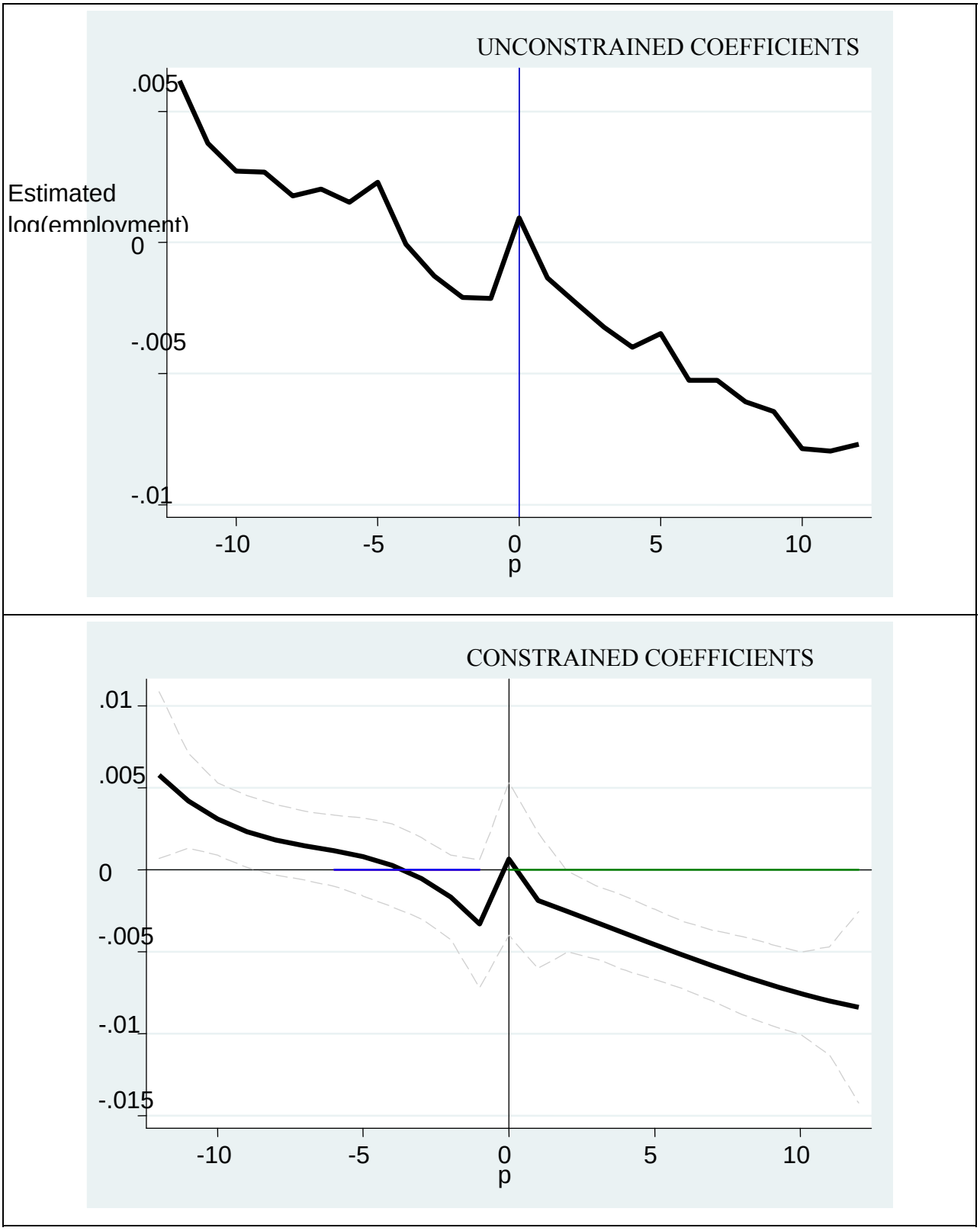


CHART 9: STATES WITH A RETROACTIVE PERIOD (RP) -- LEVELS

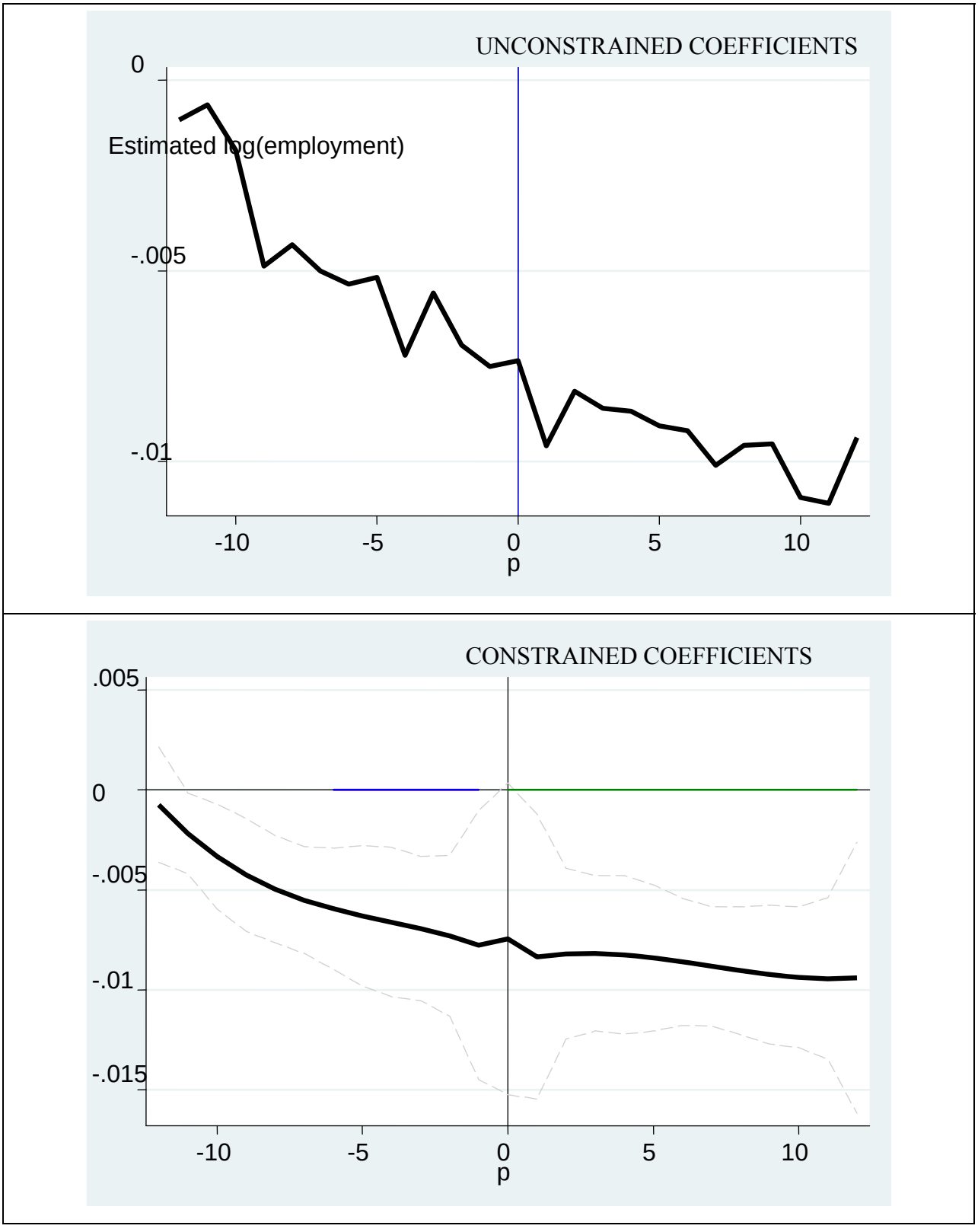


CHART 10: STATES WITHOUT IMPLEMENTATION OR RETROACTIVE PERIODS GROWTH

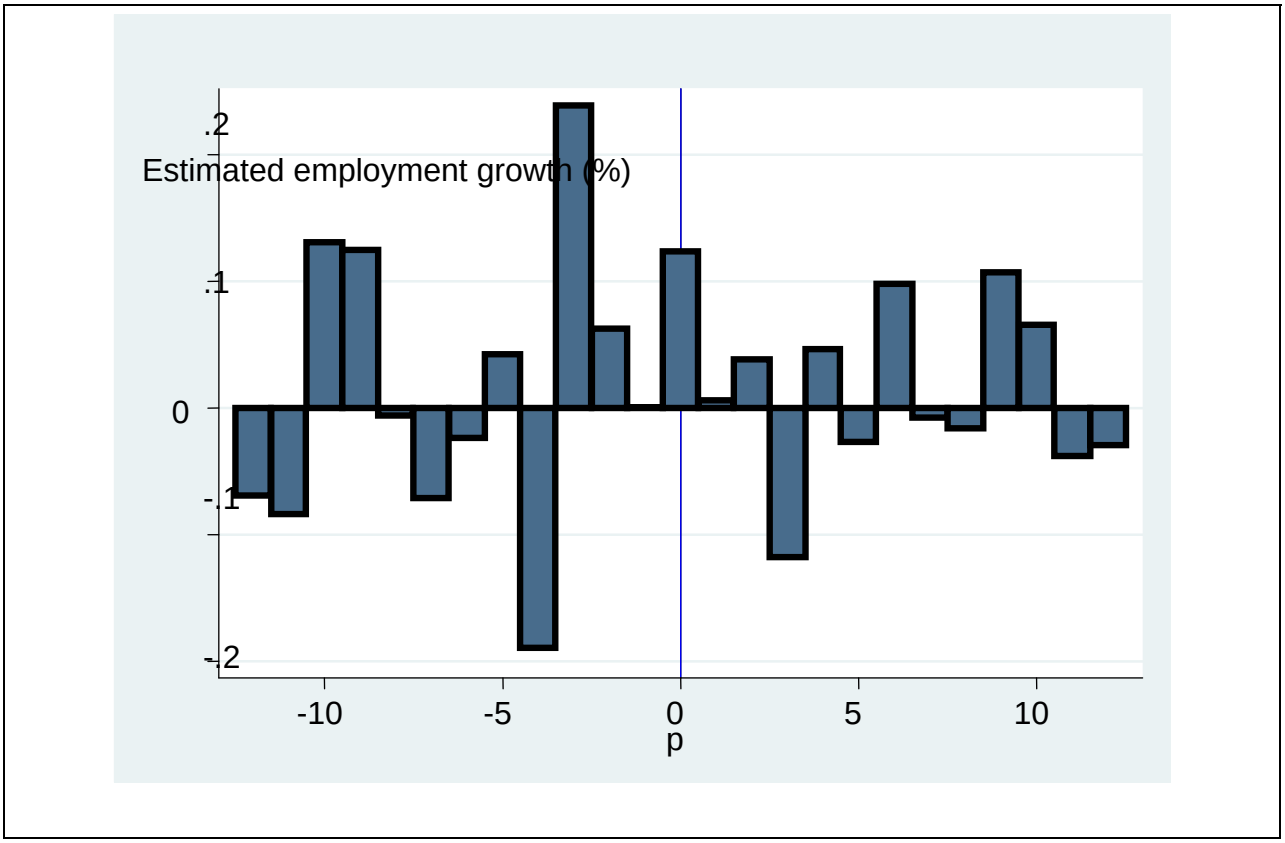


CHART 11: STATES WITH AN IMPLEMENTATION PERIOD (IP) -- GROWTH

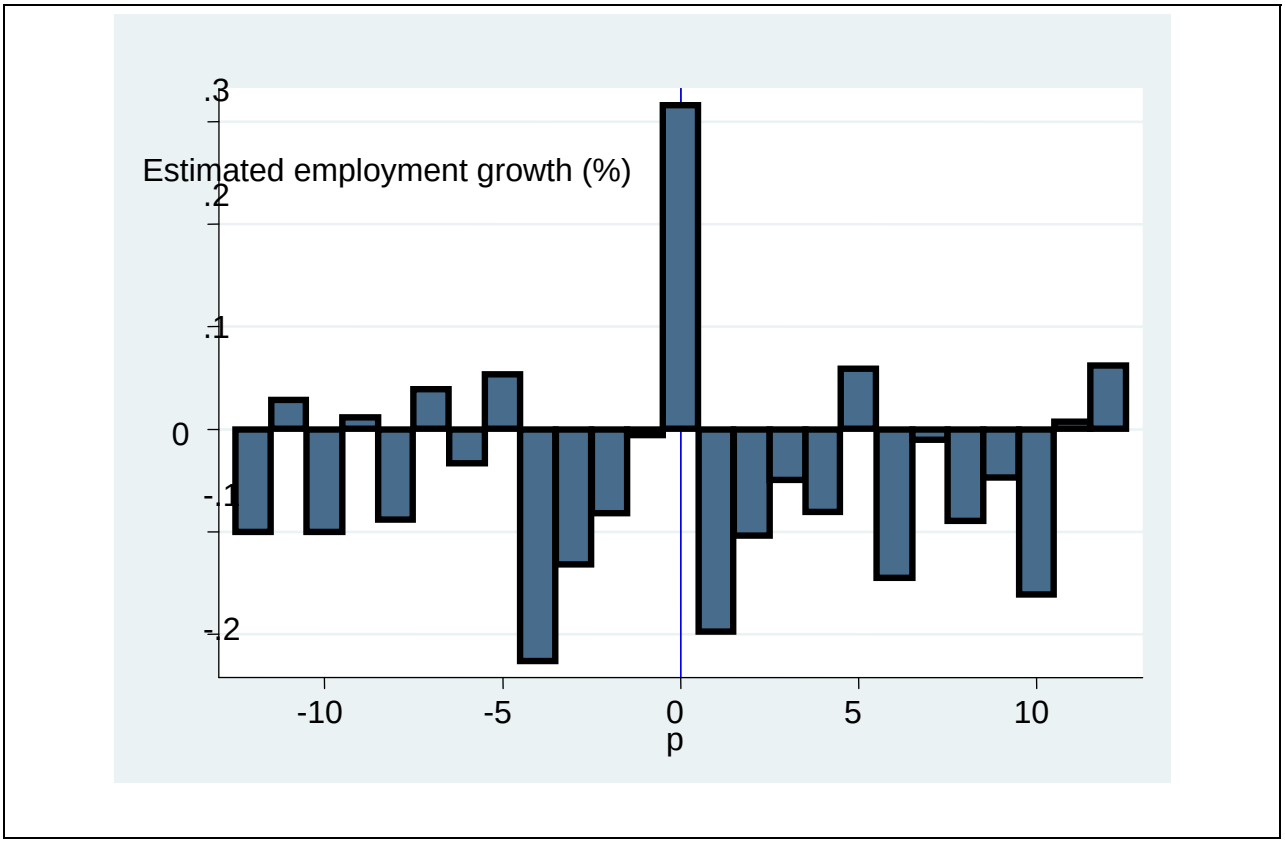


CHART 12: STATES WITH A RETROACTIVE PERIOD (RP) -- GROWTH