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What Happened to Illinois' Economy Following the January 2011 Tax Increases? A Midwestern Comparison

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Abstract: In January 2011, Illinois enacted legislation that substantially increased personal and corporate tax rates. Academic researchers and policymakers frequently reach divergent conclusions as to the effect of such increases on economic activity. Using employment, unemployment, and average weekly earnings data, we find that Illinois' economy has performed less well than expected compared to a control group of Midwestern peers since January 2011. We find that, compared to historical patterns, Illinois' employment is about 1.8 percent lower than we would expect and Illinois is losing six-one hundredths of a percent of employment relative to the rest of the Midwest each month. Also, Illinois' unemployment rate is about 1.25 percent higher than would be expected. This can be attributed to many factors, including the income tax increase.

1. Introduction

In January 2010 *Crain's Chicago Business*, a highly respected local business publication, described Illinois' fiscal condition as "[meeting] the classic definition of insolvency: its liabilities far exceed its assets, and the state is not generating enough cash to pay its bills" (qtd. in Dye, Hudspeth, and Merriman, 2011, p. 28). The State faced a projected budget deficit of nearly $12 billion for Fiscal 2012. By the end of Fiscal 2010, Illinois was 153 working days behind on paying its bills. Illinois was delaying payments to everything from pharmacies to social service providers, and the state comptroller described fiscal conditions as "the most dangerous…in recent history" (qtd. in Dye, Hudspeth, and Merriman, 2011, p. 28). School districts, universities, and other institutions were forced to lay off employees. Some state workers were forced to pay medical providers up front due to the State's delayed reimbursements to providers (Dye, Hudspeth, and Merriman, 2011).

Illinois' inaction on dealing with its ongoing fiscal crisis was accompanied by a decline in economic performance. Unemployment was high and the state population was declining as out-migrants greatly outnumbered in-migrants. The fiscal crisis left few options, and some observers believed that a tax increase was absolutely essential to maintain critical human services and education and prevent massive public employee layoffs. A January 2011 legislative session was held that included a number of Democratic legislators that either had been defeated or had not run in the November 2010 election. This lame duck session, the last before legislators elected in the previous November were sworn in on January 12, 2011, allowed lawmakers to vote in a tax increase without electoral consequence (Dye, Hudspeth, and Merriman, 2012). Governor Quinn signed the legislation, which was retroactive to January 1, the next day (Long, 2011). Personal income tax rates were raised from 3.0 percent to 5.0 percent in 2011-2014, to 3.75 percent in 2015-2023, and 3.25 percent thereafter. Illinois also changed corporate income tax rates from 4.8 percent to 7.0 percent in 2011-2014, to 5.25 percent in 2015-2023, and 4.8 percent thereafter. Amid continuing debate and persis-

tent fiscal crisis these tax increases began to phase out in January 2015.

While it is not possible to assess the impact of the tax increases on the economy without knowing what policy choices would have been made in the absence of the tax increases, we can at least assess how Illinois' economy performed relative to its historical record and to a control group of neighboring states that did not change fiscal policies. After a brief review of the literature about the impact of state tax policy on economic performance, we bring together available data to study this question.

2. Literature

A large literature in economics examines the relationship between taxation and both economic activity and labor markets. Considerable variation exists in the findings of these studies.

2.1. Taxes and Economic Activity

Tax increases may depress economic activity to the extent that taxes raise the cost of doing business relative to other states and, if taxes reduce after tax income, they also may depress household consumption (a key component of economic activity). Higher taxes may also discourage in-migration and ultimately lead to an erosion of a state's tax base. On the other hand, if tax increases are used to finance desired public services, they could make a location relatively more desirable and result in increased economic activity. Empirical studies yield mixed results.

Wasylenko and McGuire (1985) found that higher personal income tax rates and increases in overall taxation discouraged employment growth in a number of industries. Higher taxes might also discourage people from moving to a state, and thus diminish that state's economic growth over time. Saltz (1998) finds that "for those states hunting for revenues…the introduction of [an income tax] is likely to reduce the long term influx of population into the state and hence to reduce the long term economic growth and development of the state" (p. 600).

However, Wayslenko and McGuire note that "how…taxes are spent matter," and explain that expenditures on education increase employment growth (Wasylenko and McGuire, 1985, p. 509). They conclude that slow employment growth in some states could not be directly linked to taxes, whereas taxes were at least partially responsible for other states' slow growth (Wasylenko and McGuire, 1985). McGee (1985) analyzed data that included the recession of the early 1980s and found that differences in state tax systems did not account for significant differences in unemployment. Dalenberg and Partridge (1995), in an analysis of metropolitan areas, found that taxes were negatively related to total employment; however, consistent with Wasylenko and McGuire, education spending (which is often funded by taxes) was positively related to total employment.

Recent studies and literature reviews have continued to yield varied results. Poot (2000) found that several of the articles he reviewed linked higher tax rates with lower growth, and other studies reported inconclusive results, no effect of taxes on growth, or complex effects. Gabe (2003) points out that state and local taxes were believed to have little effect on economic activity in studies until about 1980, but studies after 1980 show adverse economic effects. Cebula and Alexander (2006), looking at the time period between 2000 and 2004, find that higher state income tax burdens negatively impacted in-migration. Tomljanovich (2004) argues that higher overall state tax rates negatively influence economic growth, but only in the short run, and that long-term growth is unaffected by changes in tax rates. Finally, a 2011 literature survey concluded that tax impacts on state economic growth are "highly variable" (Alm and Rogers, 2011).

Findings have continued to diverge since then. Walden (2012) notes that although certain regions of the country (the Midwest included) experienced higher unemployment rates than other regions during the Great Recession, taxes were not a significant factor in this difference. Cebula and Clark (2013) find that migrants are attracted by higher per pupil public school spending and that certain consumer-voters may be attracted by higher Medicaid benefits. Changes in migration brought about by public spending differences could influence economic activity. Conversely, Yakovlev (2014) finds that average state tax rates are negatively and significantly related to state economic growth, and Cebula, Foley, and Hall (2016) conclude, "The higher the state income burden in a state, the lower the level of disposable family income, ceteris paribus, and hence the less appealing the state is as a migration destination" (p. 5).

2.2. Taxes and labor supply/personal income

A large literature also specifically studies the relationship of income taxes to labor supply. Except for some disagreement as to the magnitude of the

effect of taxes, the consensus is generally that increased income taxes cause a reduction in labor effort – that is, people work less (Keane, 2011). However, some highly regarded scholars question even this consensus (Manski, 2012).

Literature regarding the relationship of taxes to income also yields mixed findings. Dahl and Gane (1980), using nearly two decades of data, find that state and local taxes had an adverse effect on personal income growth from 1970-1977; however, the authors find no significant effect of state and local taxes on income growth during 1960-1969. Helms (1985) finds that increasing state and local taxes and fees to fund transfer payments has a negative effect on personal income. However, when revenues are used to fund certain public services, the effects of tax increases may raise income (Helms, 1985). Bauer, Schweitzer, and Shane (2012), using panel data for the 48 contiguous states from 1939 to 2004, found that, generally, tax rates were not significantly related to personal income.

In contrast, Holcombe and Lacombe (2004) found that states that raised their income tax rates more than neighboring states had slower income growth than their neighbors. Similarly, Reed (2008) presents robust evidence that taxes used to fund general state expenditures had a negative effect on income growth.

2.3. Regional differences in economic activity

In addition to studies regarding how taxation affects economic growth and labor supply, there is a literature that examines regional differences with regard to economic conditions and economic recovery. Despite Chicago's stature as a global city, Illinois' economy is still closely linked to its regional (Midwestern) neighbors (Hewings and Parr, 2009). Illinois sells many services (especially business services such as accounting and legal services) to these states, and it purchases many goods and services from these states. Testa (2014) describes Illinois as "highly integrated" with other industrial states in the Great Lakes region and points out "the Illinois economy regularly rises and falls along with the economies of these states." Testa specifically explains, "If Illinois's performance differs from its neighbors, it would be a cause for concern—and the degree of concern would be higher as Illinois fell further behind its neighbors" (2014). Testa conducts a classic shift-share analysis in which he compares Illinois' actual job creation or loss with the job creation or loss Illinois would have had if employment in each industry had grown or declined at same rate as employment in that industry in other Midwestern states. He shows that, using this methodology to control for relative industrial composition, Illinois performed worse than expected during the post-2011 recovery.

3. Methods and data

Based on previous literature, we believe it is reasonable to use Illinois' Midwest neighbors as controls to evaluate Illinois' economic performance after the January 2011 tax increase.[1] This is a particularly clean test of the net impact of the tax increase because in the period after January 2011 no other Midwest states implemented broad-based increases in their tax rates.[2]

Because we do not know what policies Illinois would have adopted in the absence of the tax increase, we cannot say whether the tax increase was the right policy choice. By January of 2011 Illinois faced a series of bad fiscal options including increases in taxes, drastic cuts in spending, and taking on new debt. We observe only a single choice that involved some combination of these policies. Our empirical results shed light on the net effect of Illinois' actions. While our results suggest that, compared to other Midwest states and past history, Illinois' economy performed worse than expected after the 2011 tax increase, Illinois' policy choices might still have been the best alternative available.[3]

In order to better understand the performance of Illinois' economy after January 2011, we estimate regression models to explain the level of five key economic indicators - employment, the unemployment rate, average weekly earnings, number of hours worked, and average hourly wage - using

[1] We use "Midwest" as defined by the U.S. Census, which includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin (http://www.census.gov/geo/maps-data/maps/pdfs/reference/us_regdiv.pdf).

[2] Smaller tax increases or changes to tax sunsets were enacted during this time. For example, Michigan began taxing pension income effective January 2012. (http://www.michigan.gov/documents/taxes/2012_Pension_Withholding_Guide_365268_7.pdf). However, no broad-based increases occurred in the rest of the Midwest.

[3] Conceptually it would also be possible to separately study how Illinois' adjustments in taxes, expenditures, and debt after January 2011 affected its economic performance. In practice, changes in expenditure and debt are multi-dimensional and involve hundreds or thousands of policy choices. Broad-based tax policy is somewhat simpler involving only a few key tax rates. For this reason we primarily discuss the tax rate change in the text, but our regression results should be interpreted as indicating the net effect of all January 2011 fiscal policy choices.

monthly data from the U.S. Bureau of Labor Statistics (BLS) in twelve Midwestern states through May 2014. For each indicator, our most general model is:

$$Y_{it} = \alpha_i + \beta_t + \gamma_i t + \delta D_i + \varphi D_i t + \mu_{it} \quad (1)$$

where Y_{it} is an indicator of economic activity in state i in period t, α_i is the mean (across-time) of the indicator in state i, β_t is the mean (across-states) of the indicator in period t, γ_i is the (state-specific) mean per-period growth rate of the indicator, D_i=1 only in Illinois after January 2011 (zero in all other states in all time periods and zero in Illinois prior to January 2011), μ_{it} is an error term in state i in period t that we assume has an expected value of zero and a variance such that we can estimate it in an unbiased manner using conventional robust, clustered-by-state, standard errors, and δ and φ are parameters to be estimated. They provide an estimate of Illinois' relative economic performance after January 2011.

Our estimation procedures build on earlier literature and are grounded in economic growth theory. Reed (2008) derives an equation to estimate the relationship between state income and tax policy beginning with Mankiw et al.'s (1992) augmented version of the Solow growth model. Reed's equation (3) shows the dependent variable (output) to be a function of inputs of capital and labor, efficiency of labor, and inputs of other factors. Within each state these variables move randomly around a state-specific time trend but for changes in state fiscal policy. During our observation period the only relevant state fiscal policy change is Illinois' January 2011 income tax increase.

Our equation (1) can be looked at as a special case of Reed's (2008) equation (3) where the level of the inputs, efficiency of labor, and input of other factors differ across states and over time. The state specific fixed effects (α_i) control for the level of these inputs as well as other factors that affect the dependent variable. Within each state these variables move randomly around a state-specific time trend, which we control for by estimating separate γ_i in each state. We attribute statistically significant deviations around these state-specific trends to changes in state fiscal policy, which we estimate with δ and φ. During our observation period, the most important state fiscal policy change is Illinois' January 2011 income tax increase.

Reed (2008) demonstrates that the basic results from his econometric model are robust to a large variety of alternative treatments. He finds that the basic tax results hold up with a large variety of combinations of non-tax control variables, in differences and levels, with a variety of treatments for potentially heteroskedastic variances of error terms, with a variety of assumptions about dynamic adjustments, and in a variety of time periods and geographic locations.

What makes our analyses different from most previous literature is that, although we have a relatively small number of states and a comparatively short time period, we have a very clean experiment, since Illinois was the only state in our sample to broadly increase taxes during this period.[4] Because we estimate the impact of a single policy change at a particular point in time in a particular state we can control for variation in non-tax factors by using state dummies, time dummies, and state-specific time trends without having to arbitrarily choose among control variables.

We use analogous models to estimate the parameters of all regressions. The first regression compares relative employment in Illinois before and after January 2011. Here, our dependent variable is the log of monthly nonfarm employment. The t subscript represents the month of the data and ranges from a low of 1 in January 2000 to a high of 173 in May of 2014. In the next section we report estimates of δ and φ obtained using BLS data in separate tables for each independent variable. For each case: column (1) constrains $\alpha_i, \beta_t, \gamma_i, \varphi$ to zero; column (2) allows for state-specific effects (the α_i); column (3) allows for state and time specific effects (the α_i and β_t); column (4) allows for all of the aforementioned variables plus a state/year interaction term (the γ_i), so that each state can have its own time trend (Buchmueller, Lo Sasso, & Wong, 2007); and column (5) augments column (4) by allowing Illinois to have a different time trend prior to, and after, January 2011 (φ). Our most preferred specification is column (5) since it includes the most general specification, controls for state and time effects, and also allows for state-specific time trends. We believe that the estimate of (δ) in column (4) is also informative by measuring the average relative performance of Illinois after January 2011, although it does not shed light on changes in Illinois' post January 2011 trend.

[4] Singhal (2014) exploits this experiment in a similar manner to study the impact of Illinois' personal income tax change on consumption.

4. Data analysis

4.1. Employment-LAUS

Figure 1 shows Illinois' total employment from January 2000 to May 2014 using Local Area Unemployment Statistics (LAUS) from BLS. LAUS data comes from BLS's household survey and is the source of state and local unemployment rates most discussed by policymakers and the media. Using LAUS data, despite some differences in magnitudes, both Illinois and the rest of the Midwest (ROM) experienced substantial declines in employment from early 2001 through mid-2003 and both made significant gains in employment from late 2003 through early 2008. Both saw declines in employment beginning in early 2000 and continued declines until early 2003 when both began recoveries, which continued for a number of years until beginning a sharp decline in 2008. Late 2008 and 2009 were disastrous in terms of employment for both Illinois and ROM, but both made steady gains beginning in early 2010.

After January 2011 (the vertical line in Figure 1), Illinois employment growth generally tracked the direction of employment growth in ROM through July 2012, but stayed slightly lower. Beginning in August 2012, Illinois began a descent. In December 2012, Illinois' employment level was 100.5 percent of its January 2011 level. By June 2013, Illinois fell to less than 100 percent of January 2011 employment, while at the same time ROM climbed to 101.9. Since that time, Illinois has remained behind ROM. As of May 2014, Illinois was at 101.8 percent of its January 2011 level, while ROM had climbed to 103.7 percent.

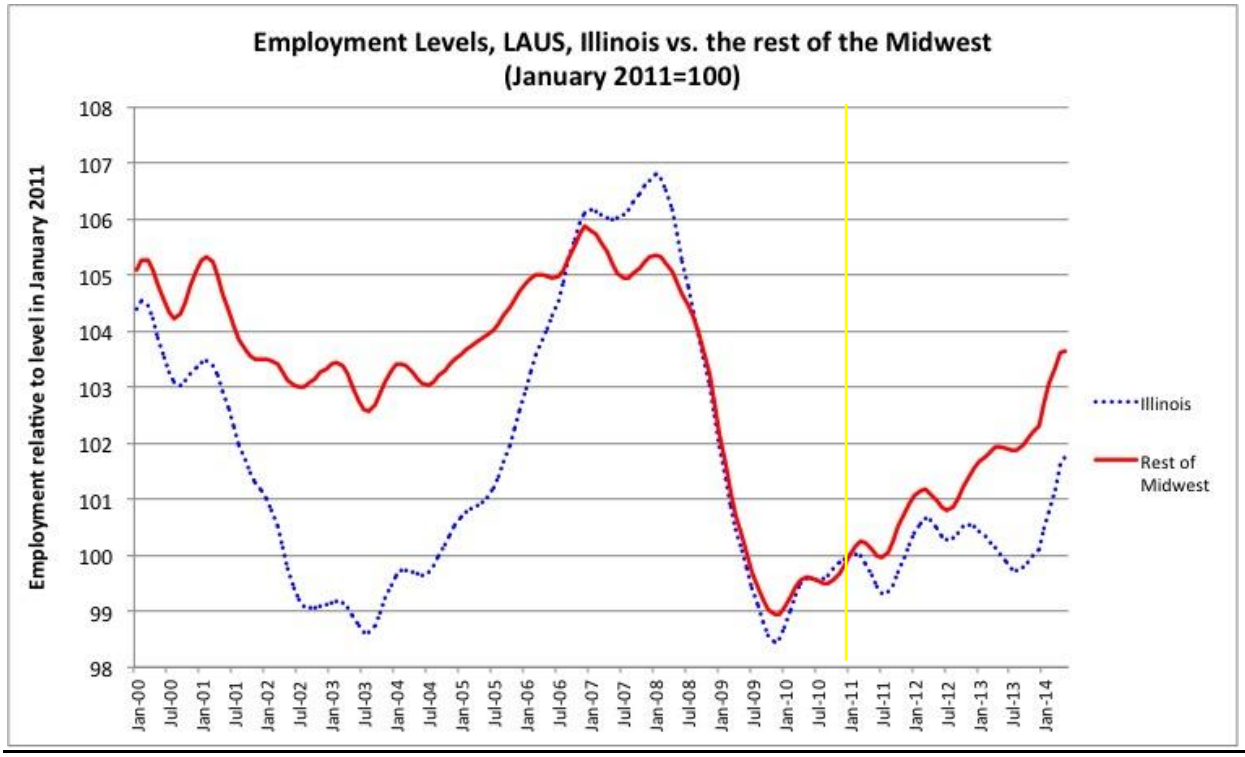


Figure 1. Employment, Illinois vs. the Rest of Midwest, LAUS – Local Area Unemployment Statistics, January 2000-May 2014

The divergence of Illinois' employment becomes clear in the regression results (Table 1), which show that after Illinois' tax increase employment was significantly less than expected.[5] The large positive estimate of the coefficient on the Illinois tax increase dummy (δ) in column (1) comes from a regression that does not control for state fixed effects and merely indicates that the relatively large state of Illinois continued to have higher employment than its Midwest neighbors after January 2011. The negative estimates of δ in columns (2), (3), and (4) indicate that Illinois' employment was less than expected compared to its Midwestern neighbors after January 2011. The estimate of δ reported in column (4), for

[5] A Levin-Lin-Chu test (Levin, Lin and Chu 2002) rejects the hypothesis of an autoregressive parameter in favor of the hypothesis that the panels are stationary. Analogous tests yield analogous results for the other dependent variables discussed in this paper.

example, suggests that after allowing for state and time specific factors as well as differences in individual state employment trends Illinois's employment was about 1.8 percent lower than would be expected after January 2011.

Table 1. Regression results: natural log of employment: LAUS, January 2000-May 2014.

	Illinois' relative change in employment after January 2011 – LAUS:				
	(1) T1C1	**(2) T1C2**	**(3) T1C3**	**(4) T1C4**	**(5) T1C5**
IL tax increase dummy	1.1387*** (0.2675)	-0.0189*** (0.0000)	-0.0226 (0.0149)	-0.0182*** (0.0053)	0.0697** (0.0276)
IL tax trend					-0.0006** (0.0002)
Adjusted R^2	0.0308	0.9988	0.9991	0.9998	0.9998
N	2076	2076	2076	2076	2076

Notes: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Dependent variable is monthly data on log of employment (LAUS) from January 2000 to May 2014.
No controls in Column 1 regression; Col. 2 regression includes state dummies; Col. 3 regression includes state and time dummies; Col. 4 includes all dummies in Col. 3 plus a state/time interaction term. Col. 5 includes all dummies in Col. 4 plus iltaxtrend variable.
Source of employment data is Bureau of Labor Statistics (not seasonally adjusted).

The estimated coefficients in column (5) are somewhat more complex to interpret. Estimates of the coefficient φ allow us to separate the immediate impact of the January 2011 change in tax policy from its impact over a longer period.[6] According to our analysis, the estimated value of $\varphi D_i t$ ranged from -0.0798 [=-0.0006*133] in January 2011 (when t=133) to -0.1038 in May 2014 (when t=173). This suggests that, based on our regressions, other things equal, Illinois' predicted January 2011 employment was about one percent lower than its Midwest neighbors (-.0101=0.0697-0.0798). However, by May 2014 Illinois' predicted employment was approximately 3.4 percent lower than its Midwest neighbors (-.0341=0.0697-0.1038) and, on average each month, Illinois is predicted to lose six one-hundredths of a percent of employment relative to its Midwest neighbors. Thus, our column (5) regression suggests that Illinois not only did less well than its Midwestern neighbors after January 2011, but Illinois also had a negative trend compared to these neighbors.

4.2. Employment: CES

Illinois' relatively poor showing using LAUS data is also reflected, with some subtle differences, in Current Employment Statistics (CES) data. CES is also published by BLS. CES data uses employer payroll records and, in contrast to LAUS, which is based on the location of residence, is based on the number of jobs in an area regardless of where employees live (Clark, 2005).

As shown in Figure 2, CES data (like LAUS data in Figure 1) show Illinois tracking below ROM after January 2011; however, this difference is not statistically significant with CES data. One of several possible explanations for the diverging trends in employment is that Illinois has a "growing number of part-time workers that now has reached a record high" (Boss, 2013). Workers with two part-time jobs would be double-counted by CES (Boss, 2013). If Illinois workers were more prone to get two jobs than workers in other Midwestern states, this could account for the different patterns in Figures 1 and 2.

Table 2 shows regression results using CES employment data. By this measure, Illinois still has a negative trend relative to ROM, but the trend is smaller (two one-hundreds of a percent of employment as opposed to six one-hundredths) and not statistically significant.

We wondered whether Illinois' poor post-January 2011 increase employment growth might be solely the result of its relatively poor economic performance since early 2013. Table 3 reports the same employment regressions reported in Table 1, but excludes data from January 2013 onward. When we do this we see only slight differences in estimated coefficients. Illinois post-tax increase employment remains about 1.4 percent less than expected and the estimated coefficient is statistically significant at the 0.05 level.

[6] A rational expectations interpretation might lead us to expect our estimate of ϕ to be zero since all of the impact of the tax change would be immediately anticipated by completely rational economic actors.

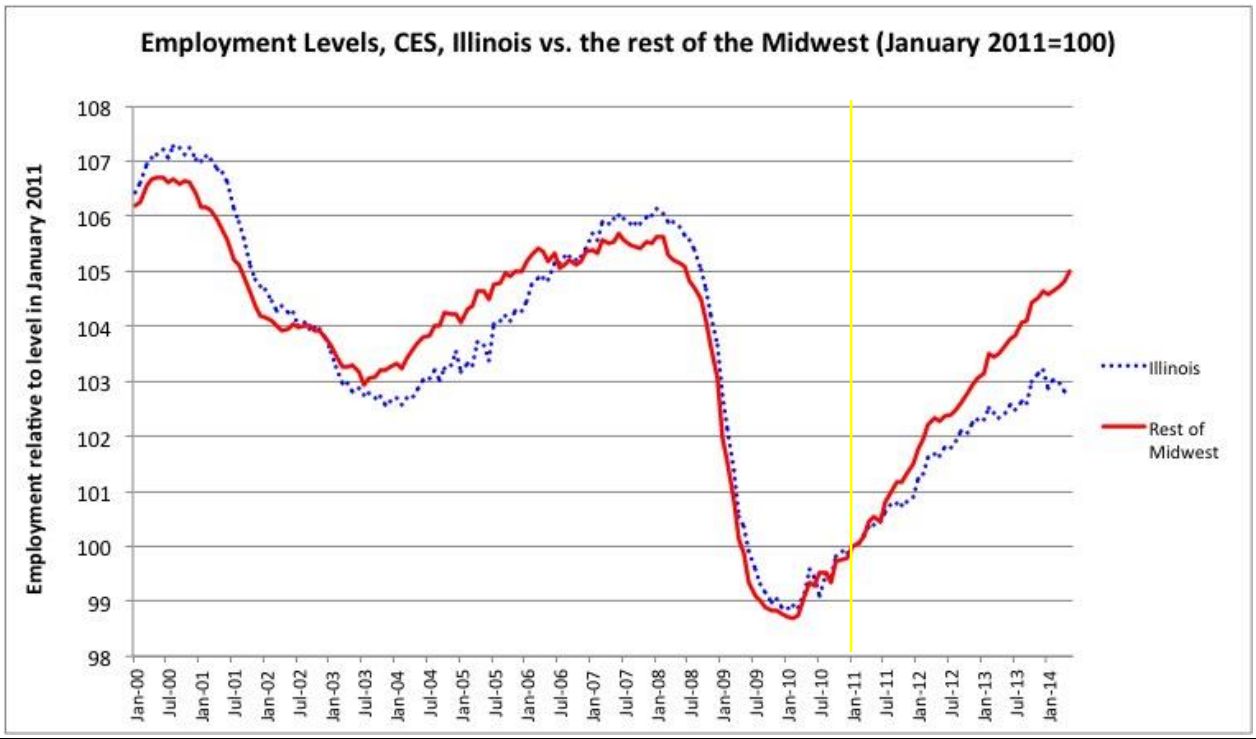


Figure 2. Employment, Illinois vs. the Rest of Midwest, CES, January 2000-May 2014.

Table 2. Regression Results: Natural log of employment: CES, January 2000-May 2014.

	Illinois' relative change in employment after January 2011 – CES:				
	(1) T1C1	**(2) T1C2**	**(3) T1C3**	**(4) T1C4**	**(5) T1C5**
IL tax increase dummy	1.1300*** (0.2646)	-0.0212*** (0.0000)	-0.0407* (0.0219)	-0.0056 (0.0101)	0.0306 (0.0351)
IL tax trend					-0.0002 (0.0003)
Adjusted R^2	0.0310	0.9978	0.9982	0.9998	0.9998
N	2076	2076	2076	2076	2076

Notes: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Dependent variable is monthly data on log of employment (CES) from January 2000 to May 2014.
No controls in Column 1 regression; Col. 2 regression includes state dummies; Col. 3 regression includes state and time dummies; Col. 4 includes all dummies in Col. 3 plus a state/time interaction term. Col. 5 includes all dummies in Col. 4 plus iltaxtrend variable.
Source of employment data is Bureau of Labor Statistics (not seasonally adjusted).

Table 3. Regression results: natural log of employment: LAUS (excluding January 2013 to May 2014).

	Illinois' relative change in employment after Jan. 2011 – LAUS (excl. January 2013 - May 2014)				
	(1) T1C1	**(2) T1C2**	**(3) T1C3**	**(4) T1C4**	**(5) T1C5**
IL tax increase dummy	1.1315*** (0.2693)	-0.0191*** (0.0000)	-0.0165 (0.0145)	-0.0137** (0.0047)	0.0322 (0.0321)
IL tax trend					-0.0003 (0.0002)
Adjusted R^2	0.0195	0.9989	0.9992	0.9999	0.9999
N	1872	1872	1872	1872	1872

Notes: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Dependent variable is monthly data on log of employment (LAUS) from January 2000 to May 2014.
No controls in Column 1 regression; Col. 2 regression includes state dummies; Col. 3 regression includes state and time dummies; Col. 4 includes all dummies in Col. 3 plus a state/time interaction term. Col. 5 includes all dummies in Col. 4 plus iltaxtrend variable.
Source of employment data is Bureau of Labor Statistics (not seasonally adjusted).

4.3. Unemployment rate

Another important economic indicator is the unemployment rate. Although experts understand that monthly data on state unemployment rates should be interpreted cautiously, media and politicians often circulate state unemployment rates as evidence of economic doldrums or recovery.[7] We wondered whether Illinois' January 2011 tax increase would affect unemployment rates similarly to employment. Figure 3 shows Illinois' unemployment rate from January 2000 to May 2014, using data from LAUS. Similar to employment, late 2008 and 2009 were particularly bad periods for both Illinois and ROM, but both made steady gains beginning in early 2010.

After January 2011, Illinois' unemployment rate remained close to or above its level in January 2011. In May 2014, Illinois' unemployment rate was approximately 80 percent of its January 2011 rate (7.52 percent vs. 9.37 percent unemployment, respectively). During the same period, the ROM unemployment rate has remained lower than January 2011 for every month, and as of May 2014 is just below 70 percent of the January 2011 rate.

Our regression results shown in Table 4 reflect a similar picture. Column 2 compares Illinois' relative unemployment rate before and after January 2011. Here, the dependent variable is the monthly unemployment rate calculated using LAUS data on labor force and employment from January 2000 (t=1) to May 2014 (t=173).[8] Our primary independent variable is again a 0/1 dummy variable representing Illinois' relative economic performance after January 2011. The regression estimates can be interpreted in a manner exactly analogous to the employment regressions presented above. We again find a statistically significant increase in unemployment after January 2011. According to these regression estimates, Illinois post-January 2011 unemployment rate is about 1.25 percent higher compared to ROM than it has been historically (column 4). However, in column (5) we find no evidence that the *growth* rate of the unemployment rate in Illinois is significantly different than we would expect.

In order to determine whether Illinois' relatively poor economic performance might be solely the result of poor performance after January 2013, Table 5 reports regressions on the unemployment rate excluding observations from January 2013 onward (thus, the dataset ends at the post January 2011 peak of Illinois' employment recovery as a percentage of labor force). Again, we see slight differences in coefficients, but the result remains an increase in the unemployment rate which is statistically significant at the 0.01 level.

4.4. Weekly earnings

Next, we examine average weekly earnings in Illinois before and after January 2011. Figure 4 shows average weekly earnings of private employees from January 2007 to May 2014 for Illinois and ROM. Again we compare the relative performance of Illinois and ROM before and after January 2011, and again we find important co-movements in the data. In this data series, we see no evidence of a significant relative decline in Illinois' performance after January 2011.[9]

Regression results (Table 6) controlling for state and time specific factors and allowing for individual state trends paint a similar picture. Our dependent variable is the log of average weekly earnings of all private employees from the Bureau of Labor Statistics from the first month in which we have complete data (January 2007, t=85) to May 2014.[10] Our primary independent variable is again a 0/1 dummy variable representing Illinois' economic performance after January 2011. Each of the columns is analogous to those in earlier regression tables. Results presented in column 4 imply that Illinois did not have a statistically significant relative decline in weekly earnings after January 2011. The results in column (5) suggest a similar story. They suggest that after January 2011 (t=133) there was an immediate decrease in weekly earnings of about 0.1 percent [-0.0001=-0.0666+(133*0.0005)]. Since that time, our estimates suggest that Illinois weekly earnings have been rising about five-one hundredths of one percent faster per month than would otherwise be expected, so that by May 2014 Illinois' weekly earnings were about 2 percent [0.0199 =-0.0666+ (173*0.0005)] higher than would otherwise be expected.

[7] Wolfers (2014) suggests putting more emphasis on monthly state employment than unemployment figures as we do above.

[8] We use (labor force-employment)/labor force) to calculate the unemployment rate in order to provide more decimal places but verify that this rate rounds to the BLS rate issued each month.

[9] Our analysis shows a statistically significant 1.38 percent decrease in Illinois' relative average number of hours worked after January 2011 but also shows a statistically insignificant 1.71 percent increase in Illinois employees' relative average hourly wage after January 2011. The net after January 2011 change in Illinois relative weekly earnings was not statistically significant.

[10] Weekly earnings data, as well as related measures later in this document, use data from January 2007 forward, as this is the extent of available data from BLS.

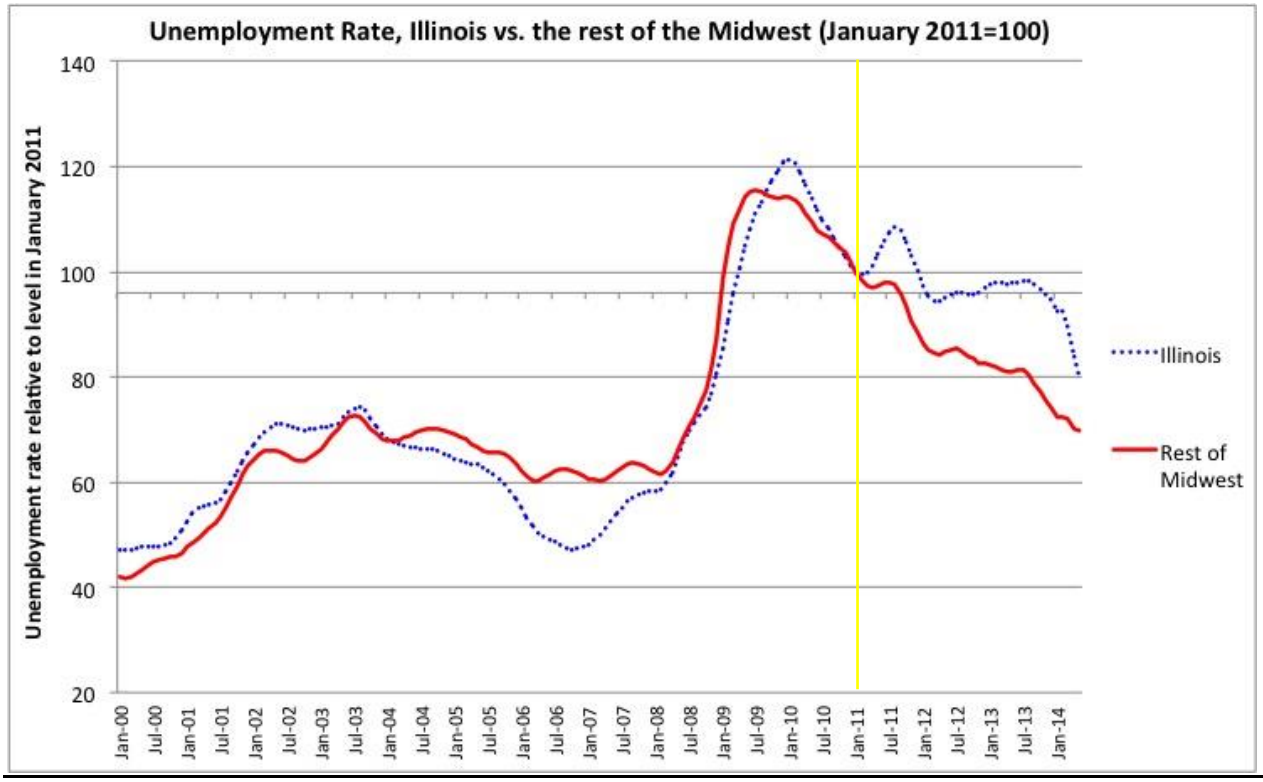


Figure 3. Unemployment rate, Illinois vs. Rest of the Midwest, January 2000-May 2014.

Table 4. Regression results: Unemployment Rate (labor force-employment)/labor force) - LAUS, January 2000-May 2014.

	Illinois' relative change in unemployment rate after January 2011:				
	(1) T1C1	**(2) T1C2**	**(3) T1C3**	**(4) T1C4**	**(5) T1C5**
IL tax increase dummy	0.0372*** (0.0041)	0.0262*** (0.0000)	0.0164*** (0.0021)	0.0125*** (0.0030)	-0.0043 (0.0145)
IL tax trend					0.0001 (0.0001)
Adjusted R^2	0.0575	0.4503	0.8659	0.9286	0.9286
N	2076	2076	2076	2076	2076

Notes: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Dependent variable is monthly data on unemployment rates from January 2000 to May 2014.
No controls in Column 1 regression; Col. 2 regression includes state dummies; Col. 3 regression includes state and time dummies; Col. 4 includes all dummies in Col. 3 plus a state/time interaction term. Col. 5 includes all dummies in Col. 4 plus iltaxtrend variable.
Source of employment data is Bureau of Labor Statistics (not seasonally adjusted).

Table 5. Regression results: unemployment rate (labor force-employment)/labor force) – LAUS (excluding January 2013 to May 2014).

	IL' relative change in unemployment rate after Jan. 2011 excl. Jan. 2013 to May 2014:				
	(1) T1C1	**(2) T1C2**	**(3) T1C3**	**(4) T1C4**	**(5) T1C5**
IL tax increase dummy	0.0393*** (0.0041)	0.0280*** (0.0000)	0.0148*** (0.0025)	0.0114*** (0.0025)	-0.0139 (0.0176)
IL tax trend					0.0002 (0.0001)
Adjusted R^2	0.0408	0.4160	0.8599	0.9386	0.9386
N	1872	1872	1872	1872	1872

Notes: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Dependent variable is monthly data on unemployment rates from January 2000 to December 2012.
No controls in Column 1 regression; Col. 2 regression includes state dummies; Col. 3 regression includes state and time dummies; Col. 4 includes all dummies in Col. 3 plus a state/time interaction term. Col. 5 includes all dummies in Col. 4 plus iltaxtrend variable.
Source of employment data is Bureau of Labor Statistics (not seasonally adjusted).

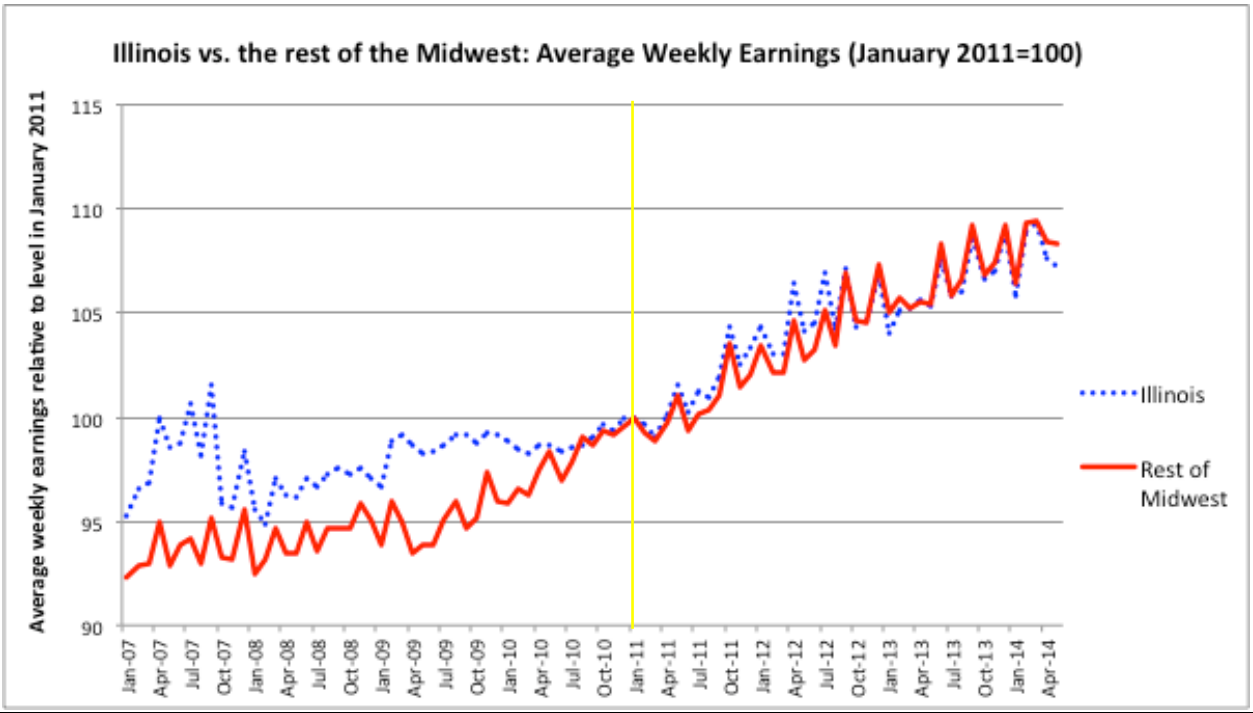


Figure 4. Average weekly earnings, Illinois vs. the Rest of the Midwest, January 2007-May 2014 (not seasonally adjusted).

Table 6. Regression Results: log of average weekly earnings for each month: CES (Jan. 2007-May 2014).

	Illinois' relative change in weekly earnings after January 2011:				
	(1) T1C1	**(2) T1C2**	**(3) T1C3**	**(4) T1C4**	**(5) T1C5**
IL tax increase dummy	0.1638*** (0.0196)	0.0646*** (0.0000)	-0.0287 (0.0196)	0.0022 (0.0124)	-0.0666 (0.0711)
IL tax trend					0.0005 (0.0006)
Adjusted R^2	0.1091	0.5602	0.8394	0.9534	0.9535
N	1068	1068	1068	1068	1068

Notes: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Dependent variable is monthly data on log of weekly earnings from Jan 2007 to May 2014.
No controls in Column 1 regression; Col. 2 regression includes state dummies; Col. 3 regression includes state and time dummies; Col. 4 includes all dummies in Col. 3 plus a state/time interaction term. Col. 5 includes all dummies in Col. 4 plus iltaxtrend variable.
Source of employment data is Bureau of Labor Statistics (not seasonally adjusted).

4.4.1. Average weekly hours

Mathematically, weekly earnings are equal to the product of average weekly hours worked and average hourly earnings. Our next set of regressions (Table 7) breaks these components apart and compares average weekly hours worked in Illinois before and after January 2011. Our dependent variable is the log of average weekly hours of all private employees from the BLS from January 2007 (t=85) to May 2014 (t=173). Our primary independent variable is again a 0/1 dummy variable representing Illinois' economic performance after January 2011. Results presented in column 4 show a statistically significant 1.23 percent decrease in average hours worked after January 2011. Column 5 results again suggest a similar story. According to these results, immediately after January 2011 (t=133) hours worked in Illinois were about 0.85 percent (-0.0085=0.0846+(133*-0.0007)) lower than would otherwise be expected. By May 2014 (when t=173) hours worked in Illinois were 3.65 percent (-0.0365=0.0846+(173*-0.0007)) lower than would otherwise be expected.

Table 7. Regression results: log of average weekly hours for each month: CES (Jan. 2007-May 2014).

	Illinois' relative change in average weekly hours after January 2011:				
	(1) T1C1	**(2) T1C2**	**(3) T1C3**	**(4) T1C4**	**(5) T1C5**
IL tax increase dummy	0.0177*** (0.0046)	0.0055*** (0.0000)	-0.0111 (0.0066)	-0.0123** (0.0050)	0.0846*** (0.0266)
IL tax trend					-0.0007*** (0.0002)
Adjusted R^2	0.0187	0.3769	0.6487	0.8306	0.8334
N	1068	1068	1068	1068	1068

Notes: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Dependent variable is monthly data on log of average weekly hours from Jan 2007 to May 2014.
No controls in Column 1 regression; Col. 2 regression includes state dummies; Col. 3 regression includes state and time dummies;
Col. 4 includes all dummies in Col. 3 plus a state/time interaction term. Col. 5 includes all dummies in Col. 4 plus iltaxtrend variable.
Source of employment data is Bureau of Labor Statistics (not seasonally adjusted).

Table 8. Regression Results: log of average hourly earnings for each month: CES (Jan. 2007-May 2014)

	Illinois' relative change in average hourly earnings after January 2011:				
	(1) T1C1	**(2) T1C2**	**(3) T1C3**	**(4) T1C4**	**(5) T1C5**
IL tax increase dummy	0.1461*** (0.0201)	0.0591*** (0.0000)	-0.0175 (0.0134)	0.0145 (0.0095)	-0.1512** (0.0541)
IL tax trend					0.0012** (0.0004)
Adjusted R^2	0.1027	0.6593	0.9015	0.9674	0.9680
N	1068	1068	1068	1068	1068

Notes: Standard errors in parentheses. * p<0.10, ** p<0.05, *** p<0.01.
Dependent variable is monthly data on log of average hourly earnings from Jan 2007 to May 2014.
No controls in Column 1 regression; Col. 2 regression includes state dummies; Col. 3 regression includes state and time dummies;
Col. 4 includes all dummies in Col. 3 plus a state/time interaction term. Col. 5 includes all dummies in Col. 4 plus iltaxtrend variable.
Source of employment data is Bureau of Labor Statistics (not seasonally adjusted).

4.4.2. Average hourly earnings

Our regressions on the second component of weekly earnings – hourly earnings – compares Illinois' relative average hourly earnings before and after January 2011. Here, our dependent variable is the log of average hourly earnings of all private employees from the BLS from January 2007 (t=85) to May 2014 (t=173). Our primary independent variable is again a 0/1 dummy variable representing Illinois' economic performance after January 2011. Results (Table 8) presented in the column 4 suggest that after January 2011 Illinois experienced a statistically insignificant slight increase in the average hourly earnings of employees. Interpretation of the column 5 results are analogous to our earlier regressions and suggest that hourly earnings were approximately 0.8 percent (0.0084=-0.1512+(133*.0012)) higher than would be expected immediately after January 2011. Our statistical analysis also suggests that hourly earnings in Illinois have been growing faster than would be expected relative to Illinois' Midwestern neighbors after January 2011, and by May 2014 were about 5.6 percent higher (0.0564=-0.1512+(173*.0012)) than would be expected.

5. Conclusions

As acknowledged in the introduction to this paper, it is not possible to assess the impact of the tax increases on the economy without knowing what policy choices would have been made in the absence of the tax increases. Our statistical results suggest that compared to historical patterns, Illinois' employment is about 1.8 percent lower than we would expect, and it is losing six-one hundredths of a percent of employment relative to the rest of the Midwest each month. Also Illinois' unemployment rate is about 1.25 percent higher than would be expected. Average hours worked are about 0.85 percent lower than expected, but average hourly earnings are about 0.8 percent higher than would be expected. This does not necessarily mean that Illinois' decision to increase its personal and corporate tax rates in January of 2011 were mistakes. Alternative policy choices, e.g., doing nothing and facing an even larger backlog of unpaid bills or drastic cuts in services, could have had an even worse impact on the economy. What we can say though, is that relative to pre-tax increase trends and a control group of states from the rest of the Midwest statistical evidence is consistent with the tax increase exacerbating Illinois' economic problems.

It is still too early to tell if Illinois' slow employment growth represents a permanent trend. Looking back at earlier periods, we can see from Figure 1 that Illinois' and the rest of the Midwest's employment trends sometimes diverge for significant periods of time only to converge again in later periods. However, using conventional measures of statistical reliability, Illinois' employment growth per LAUS has been relatively poor compared to its Midwest neighbors after January 2011, and especially after December 2012.

Although our results are consistent with the hypothesis that Illinois' tax increase had a detrimental impact on its economy, we cannot rule out other explanations. For example, Illinois has continued to struggle fiscally since the tax increase and has delayed paying its vendors due to its backlog of unpaid bills. Such vendors may be reluctant to hire, and thus employment may suffer. Similarly, Illinois faced its own fiscal cliff in January 2015 when the January 2011 tax increase began to be phased out. Illinois-based employers may be reluctant to hire because of uncertainty about Illinois' long-term fiscal health.

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