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ABSTRACT

We assess the extent to which unemployment insurance (UI) serves as an automatic stabilizer to mitigate the economy's sensitivity to shocks. Using a local labor market design based on heterogeneity in local benefit generosity, we estimate that a one standard deviation increase in generosity attenuates the effect of adverse shocks on employment growth by 7% and on earnings growth by 6%. Consistent with a local demand channel, we find that consumption is less responsive to local labor demand shocks in counties with more generous benefits. Our analysis finds that the local fiscal multiplier of unemployment insurance expenditure is approximately 1.9.

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1 Introduction

Fiscal response to any recession is significantly handicapped by the political difficulties that impede timely expansionary fiscal policy. The slow recovery from the "Great Recession" has prompted a lively debate on whether the unconventional monetary policy measures succeeded in boosting aggregate demand. In principle, automatic stabilizers bypass these difficulties and can be a key factor in easing the consequences of negative economic shocks.[1] However, despite the relevance of this issue, the economic literature provides very little guidance on whether automatic stabilizers are able to buffer shocks.[2]

This paper evaluates the extent to which unemployment insurance (UI) attenuates the decline in real economic activity in response to local labor demand shocks. There are several channels through which UI might moderate cyclical fluctuations. For instance, more generous UI may stabilize *aggregate demand* by attenuating fluctuations in disposable income (Brown (1955)) or *redistributing funds* to individuals with a higher propensity to consume (Blinder (1975)).[3] On the other hand, by increasing firms' hiring costs, more generous unemployment benefits may also accentuate economic fluctuations by discouraging job creation (Hagedorn et al. (2013)). In other words, the role of UI as an automatic stabilizer and the relevance of each channel through which it may impact on the economy are empirical questions. This paper shows that UI appears to have a beneficial effect on the economy by decreasing *sensitivity* to shocks and reducing the variability in aggregate income, employment and consumption.

Ideally, we want to isolate the impact of UI on the response of local economic activity to shocks by comparing outcomes in regions that have similar characteristics and are hit by similar labor demand shocks orthogonal to the local labor supply, but that differ in the

[1] They were quantitatively important; the Congressional Budget Office estimates that automatic stabilizers accounted for a significant fraction of the increase in government expenditure during the Great Recession: "In fiscal year 2012, CBO estimates, automatic stabilizers added $386 billion to the federal budget deficit, an amount equal to 2.3 percent of potential GDP. That outcome marked the fourth consecutive year that automatic stabilizers added to the deficit by an amount equal to or exceeding 2.0 percent of potential GDP, an impact that had previously been equaled or exceeded only twice in the past 50 years, in fiscal years 1982 and 1983." (Available here: http://www.cbo.gov/publication/43977)

[2] For a recent work on the role of automatic stabilizers see McKay and Reis (2013).

[3] See Krueger et al. (2015) as a recent example of theoretical work studying this channel.

generosity of their unemployment insurance programs. We approximate this ideal setting by following Bartik (1991) and Blanchard and Katz (1992) in constructing a measure of the predicted change in demand-driven labor shocks in a county, given by the interaction between its initial industrial composition and nationwide changes in employment in narrowly defined manufacturing industries. For instance, this Bartik shock measure should capture the differential effects of a national manufacturing shock on counties differing in local manufacturing composition. The key identifying assumption is that this measure is not related to county-specific labor supply shocks that may also affect labor market outcomes. By controlling for county fixed effects, we focus on short-term fluctuations in the labor demand, and general trends in labor supply – for example due to changes in demographics or immigration- cannot contaminate our experiment. Our estimated coefficient is the interaction between this Bartik shock and UI generosity.

Since we want to show that local economies are less responsive to local labor demand shocks where UI is more generous, our main measure of generosity is the average income replacement rate at the state level for the period 1996-2000. This static measure of unemployment benefits, which does not include UI extensions, is less susceptible to endogeneity problems, in that extensions are likely to be driven by local labor conditions. This approach also allows us to disentangle the direct effect of benefit extensions from their effects on the economy's sensitivity to shocks.[4] To account for the fraction of the worker's income that is replaced when he becomes unemployed, using micro data from the Current Population Survey (CPS) we compute the replacement rate conditional on being unemployed.[5] We control for several observable regional characteristics, in addition to including year and county fixed effects. Moreover, in a series of robustness checks we provide further evidence that our results are not driven by other heterogeneity between regions.

We start our analysis by estimating the importance of the effect of UI on aggregate

[4] Moreover, our results are robust to using a contemporaneous measure of UI generosity.

[5] States differ significantly in the generosity of benefits, which range from \$275 a week in Florida to \$646 a week in Massachusetts.

demand over the 1999-2013 period. This can be gauged by observing how employment growth responds to shocks in counties with different replacement levels. In more generous counties employment growth is significantly less responsive to local labor demand shocks. A one standard deviation increase in generosity reduces the elasticity of employment growth with respect to local shocks by about 7%. One potential concern with these estimates is that they could be driven by heterogeneity across counties, and specifically by differences in industrial characteristics. For instance, counties may be more or less cyclical as a function of their leading industries, and this might well be correlated with the generosity of unemployment benefits. To control for this, we compute the fraction of employed people in each sector and control for the interaction between the Bartik shock and the fraction of employees in the different sectors in all of our specifications. This allows counties whose main industry is manufacturing, for example, to react to the Bartik shock in a different way than those where services dominate. We also control for a series of economic and demographic characteristics of the counties and their interaction with the Bartik shocks.

To examine the channels through which unemployment insurance could buffer negative economic shocks, we decompose the effect of generosity on employment growth between the tradable and the non-tradable sectors as defined by Mian and Sufi (2014). We find that employment in the non-tradable sector, which is mostly driven by local consumption demand, reacts less to labor demand shocks in counties with more generous benefits, but employment in the tradable sector does not. Second, we analyze the sensitivity of consumption to shocks. We employ two main measures. First, we show that durable goods consumption, proxied by car sales, is less responsive to local labor demand shocks where UI is more generous. We find that a one standard deviation increase in generosity reduces the local shock elasticity of car sales growth by 12-15%. The main advantage of this measure is that car sales are registered in the place of residence, which avoids misleading factors such as workers consuming in counties other than where they live.[6] Second, we use data on total aggregate consumption at state

[6]Admittedly this result is almost certainly an overestimate, in that new car purchase is one of the components of household consumption most sensitive to disposable income and our measure of car sales only

level, which includes both durables and non-durables, and get very similar results with a one-standard-deviation increase in benefits attenuates consumption elasticity by 7%. This confirms the hypothesis that unemployment insurance has a significant impact on aggregate consumption by moderating fluctuations in the disposable income of the individuals with the highest marginal propensity to consume. Collectively, these results strongly suggest that it is through the demand channel that UI attenuates the economy's sensitivity to shocks.[7]

We complement the foregoing results by estimating the response of earnings growth to shocks in counties of differing generosity. We find that more generous counties react less strongly to adverse shocks, as captured by a negative interaction between the Bartik shock and UI generosity. The result is both statistically and economically significant. In fact, a one standard deviation increase (equivalent to 4-7%) in UI generosity decreases the effect of shocks by about 9%.[8]

To provide evidence that our results do not hinge on the county-level variation, we confirm our main results using data at state level and at commuting zone level. The advantage of the state level data is that it mirrors the main source of differences in UI generosity, which depends on state law, and allows us to confirm the results for total consumption growth rather than car sales. The commuting zones encompass all metropolitan and nonmetropolitan areas in the United States, and as Tolbert and Sizer (1996) and Autor and Dorn (2013) suggest, these are the appropriate geographic units to delineate local labor markets. Moreover, commuting zones can be used to estimate a local fiscal multiplier because spillovers among CZs are less pronounced than among counties. We find that the fiscal multiplier is about 1.9. This relates our paper to the series of recent papers using cross-state variation to estimate fiscal multipliers, which provide very similar estimates even though they use a

captures the extensive but not the intensive margin.

[7] A similar channel is proposed by Kekre (2015), who show that a marginal increase in UI generosity affects output and employment through a redistribution effect on aggregate demand, and supportive evidence is provided by Coglianese (2015).

[8] We supplement this evidence by analyzing the response of average wages to shocks, finding that they are significantly less sensitive to economic fluctuations in the counties where jobless benefits are most generous than where they are least generous.

different source of variation in government spending.

We also run additional robustness checks. First, we show that our results are not sensitive to the specific definition of UI generosity used, insofar as they hold when generosity is measured as the replacement rate times take-up rate as computed from CPS, or when we employ the replacement rates provided by the BLS or simply the log of the maximum weekly benefit as a proxy for the benefit generosity.

Second, to control for time-varying heterogeneity, such as other state policies that might affect the local economic conditions and at the same time be correlated with UI generosity, we control for the generosity of other government transfers, the presence of right-to-work laws and the minimum wage in the state and their interaction with the Bartik shock. All our results remain unaffected. A related concern centers on differences in experience-rating taxes across states. In earlier work, Card and Levine (1994) found that states and industries facing higher marginal unemployment experience taxes have lower employment volatility. Unfortunately, we were unable to update their measure to our time period, since their data for determining the marginal tax costs in 1979-1987 are not publicly available. We employ a simple alternative approximation of the tax schedule: the maximum minus the minimum UI tax rate in a state. We calculate an industry-weighted average of Card and Levine's measure of mean marginal tax costs in 1979-1987 (data available in the appendix of the working-paper version) and compare their measure with the maximum minus minimum rates in a midpoint year, 1983. First, we confirm that there is a strong correlation between our measure and the measure of the firm's marginal tax cost proposed by Card and Levine (2000), which gives us confidence that our measure can be a very good proxy for the firms' tax incentives to locate in a state based on the cost of firing. Using this marginal tax rate as a proxy and additional control, again the result is largely unaffected.

To provide further evidence that our results are driven by the demand channel, we provide evidence of intersectoral spillovers by computing the Bartik shocks excluding non-tradable and construction sectors and examining the spillovers of shocks that originate in these sector to the employment in the non-tradable sector. We show that the spillovers of shocks that originate in the tradable sector to the non-tradable one are lower in regions with more generous benefits. This procedure should capture the effects deriving from workers being fired, for instance, in the car manufacturing sector due to a general decline of the auto industry, who will then decrease their consumption of non-tradable goods, which depresses employment in non-tradables and total earnings growth.

We also set out two additional results that exploit heterogeneity across shocks and regions. We hypothesize that UI generosity should be more important for negative shocks, because UI payments themselves are more responsive to negative shocks than to positive ones and because consumption is more sensitive to negative shocks than to positive ones when households are financially constrained (e.g. Aiyagari (1994)). We provide evidence for this hypothesis by dividing the Bartik shocks into shocks below the median and above the median and showing that our main coefficient is negative and statistically significant only for the bottom half, whereas the interaction between UI and the Bartik shocks becomes smaller and insignificant for shocks above the median. Similarly, if our results are indeed driven by stronger demand from jobless workers we expect our effects to be larger when the unemployment rate is higher, i.e. when the unemployment rate is higher the total output can be more sensitive to demand shocks. We provide evidence consistent with this hypothesis by interacting the Bartik shock and the measure of UI generosity with the unemployment rate in the previous year. This result also supports the hypothesis that the fiscal multiplier might vary over the business cycle (Auerbach and Gorodnichenko (2012)).

Since a number of federal and state policy measures were taken during the Great Recession in response to local labor market conditions, such as the American Recovery and Reinvestment Act and the JOBS Act, we need to make sure that they are not responsible for our results. To do so, we exclude all the observations after 2008, finding that the magnitude and the statistical significance of our results are quite unaffected.

All in all, our findings can help to inform the debate on the importance of automatic stabilizers. While generous unemployment insurance programs may adversely affect the *level* of unemployment, we show that through the demand channel they significantly attenuate the volatility of economic outcomes by reducing the demand sensitivity to local demand shocks.

1.1 Related Literature

We contribute to the growing literature on the economic role of automatic stabilizers, in particular unemployment benefits. Blanchard et al. (2010), for instance, argue that better automatic stabilizers are crucial for more effective macroeconomic policy. Other papers, such as Auerbach and Feenberg (2000), Auerbach (2009), Feldstein (2009) and Blinder (2004), emphasize their importance in shaping the economy's response to shocks.

McKay and Reis (2013) propose a business-cycle model to study automatic stabilizers in general equilibrium. They capture the channels through which stabilizers mitigate the business cycle and quantify their importance. Specifically, McKay and Reis (2013) show that redistributive policies, such as UI, can have a significant effect in dampening aggregate shocks when monetary policy does not fully respond to fluctuations in aggregate activity.[9] This resembles our setting where monetary policy is set at the national level and is not contingent on the local economic shock.[10] We provide empirical support for the UI role as a stabilizer by observing that consumption responds less to adverse shocks in counties with more generous UI, because the unemployed have more disposable income.[11]

Some recent work has focused on the effects of UI extensions during the Great Recession, with mixed results. On the one hand, Hagedorn et al. (2013) argue that the general equilibrium effect operating through the response of job creation to benefit extensions is

[9] See Beraja et al. (2015) for a model in which regional economies differ from their aggregate counterparts as the types of shocks driving the local and aggregate business cycles differ.

[10] Another related paper is Dolls et al. (2012) which analyzes the effectiveness of the tax and transfer systems in the EU and the US to provide income insurance through automatic stabilization in the recent economic crisis.

[11] A related work, inquiring into how UI affects firms' policies, is Agrawal and Matsa (2013). This paper exploits changes in state unemployment insurance laws as a source of variation in the costs borne by workers during layoff spells, finding that firms choose conservative financial policies partly to mitigate workers' exposure to unemployment risk.

quantitatively important. They employ a regression discontinuity design focusing on U.S. state borders to show that benefit extensions raise equilibrium wages and lead to a sharp contraction in vacancy creation and a rise in unemployment.[12] On the other hand, Rothstein (2011) estimates that UI extensions had significant but small negative effects on the probability of benefit recipients' exiting unemployment and Chodorow-Reich and Karabarbounis (2016) find that benefit extensions have a limited role in influencing macroeconomic outcomes.[13] The present contribution differs in several respects. First, Hagedorn et al. (2013), Rothstein (2011), and Chodorow-Reich and Karabarbounis (2016) analyze the *direct impact* of UI extensions, whereas our paper seeks to determine, for a given level of UI, how much the *sensitivity* of local economic activity to labor demand shocks (as captured by the Bartik measure) depends on benefit generosity. Second, our results complement these findings by showing that while UI extensions may affect the level of employment, generosity also significantly buffers the volatility of real economy activity. In other words, UI might have a beneficial effect on the economy by decreasing sensitivity to shocks and reducing the variability of aggregate consumption, employment and earnings. Third, previous works define variation in generosity as the number of weeks of eligibility, whereas the main source of variation in our data stems from the workers' income replacement rate and the UI coverage. The effects – on moral hazard, say – between modifying the duration and altering the size of benefits may differ quite substantially. Furthermore, our results parallel recent works by Kekre (2015) and Coglianese (2015). The former shows that a marginal increase in UI generosity affects output and employment through a redistribution effect on aggregate demand, which corroborates the mechanism we propose, while the latter investigates the UI extensions during the Great Recession and, consistent with our empirical results, finds evidence of unemployment insurance boosting aggregate demand.[14]

[12] Similarly, Hagedorn et al. (2015), analyzing the Congressional decision in December 2013 to end the federal benefit extensions, they provide evidence that 1.8 million additional jobs were created in 2014 due to the benefit cut.

[13] Relatedly, Christiano et al. (2013) show that during the zero lower bound, an expansion of UI would not result in an increase in unemployment rates.

[14] This paper is also related to the literature studying the general equilibrium effects of UI extensions, e.g.

Methodologically, our paper also relates to Blanchard and Katz (1992), Bound and Holzer (2000), Autor and Duggan (2003), Notowidigdo (2011) and Charles et al. (2013) which employ the Bartik (1991) procedure to capture the effects of local labor demand shocks. We complement this evidence by showing that the benefits have aggregate effects as an automatic stabilizer, reducing the sensitivity of the local economy to local labor shocks. We also contribute to the emerging cross-sectional literature on fiscal multipliers (e.g. Serrato and Wingender (2010a), Shoag et al. (2015) and Nakamura and Steinsson (2014)) which differs from the traditional empirical macroeconomics literature relying on time-series variation (e.g. Ramey and Shapiro (1998), Blanchard and Perotti (2002) and Ramey (2011b)). We exploit the variation in unemployment benefit generosity, not government spending, to investigate the sensitivity of local activity to shocks. Our estimate for the fiscal multiplier, at about 2, is close to those made in the previous literature.

Finally, several papers consider the effects of generosity on individuals. Gruber (1997), Browning and Crossley (2001) and Bloemen and Stancanelli (2005), among others, find that increases in benefits mitigate the drop in consumption during downturns, enabling the jobless to smooth their consumer spending.[15] Another strand of the literature has shown that unemployment insurance can reduce the incentives of the unemployed to find a new job, e.g Solon (1985), Moffitt (1985), Meyer (1990), Katz and Meyer (1990) and Card and Levine (2000).[16] The reason being that benefits undercut the incentive to find work by distorting the relative price of leisure and consumption, i.e. a substitution effect. Chetty (2008) shows that in an environment with liquidity constraints this reduction in search is not necessarily inefficient and provides evidence of a liquidity effect in addition to the conventional substitution effect, as workers have more cash on hand while unemployed.[17]

Levine (1993), Lalive et al. (2015), Marinescu (2014), Valletta (2014), and Johnston and Mas (2015).

[15] Another related work by Romer and Romer (2014) finds a large, immediate, and statistically significant response of consumption to permanent increases in Social Security benefits.

[16] For comprehensive reviews of this literature see Atkinson and Micklewright (1991) and Krueger and Meyer (2002).

[17] Relatedly, Kroft and Notowidigdo (2011) analyze how the level of benefits trades off the consumption smoothing effect with the moral hazard cost over the business cycle, showing that the latter is procyclical while the benefit is non-cyclical.

However, the introduction of insurance for unemployed individuals who elect to go into business for themselves could spur entrepreneurial activity significantly by strengthening their incentive to start a new firm (Hombert et al. (2014)). Such studies as Van Ours and Vodopivec (2008), Card et al. (2007), Lalive (2007), and Nekoei and Weber (2014) have analyzed the impact of UI generosity on the quality of job matches. We complement these findings by showing that the general-equilibrium considerations of unemployment benefits are important and should be considered in designing an optimal unemployment insurance system.[18] Finally, we examine the local general equilibrium effect of benefit generosity, not the effect on the behavior of unemployed individuals.

The remainder of the paper is organized as follows. Section 2 describes the empirical strategy, and Section 3 provides details on the data sources and summary statistics. Section 4 presents and interprets the main results on the effect of UI on the economy's sensitivity to shocks. Section 5 presents further evidence testing the robustness of our results. Section 6 employs our results to estimate a local fiscal multiplier of unemployment insurance benefits, and Section 7 concludes.

2 Empirical Methodology

To investigate how heterogeneity in generosity might affect local responses to labor demand shocks, we need to find a valid instrument for changes in local labor demand. We follow Bartik (1991) and Blanchard and Katz (1992) constructing an index by interacting cross-sectional differences in industrial composition with national changes in industry employment

[18] Other works on the role of UI during the Great Recession include Mueller et al. (2013), which employs the arbitrary pattern of unemployment benefit extensions to identify the effect of their exhaustion on applications for disability insurance; and Hsu et al. (2014) which exploits the heterogeneity in generosity across U.S. states and over time to show that unemployment benefits prevented 1.4 million mortgage foreclosures. We complement these studies by showing that jobless benefits also support aggregate demand, permitting not only mortgage payments, but also more spending on consumer goods and services.

shares – the "Bartik shock" strategy. The Bartik shock is defined as follows:

$$Bartik_{i,t} = \sum_{k=1}^{K} \varphi_{i,k,\tau} \left(\frac{\nu_{-i,k,t} - \nu_{-i,k,t-1}}{\nu_{-i,k,t-1}} \right)$$

Where $\varphi_{i,k,\tau}$ is the employment share of industry k in area i in the base year $\tau = 1998$, and $\nu_{-i,k,t}$ is the national employment share of industry k excluding area i in year t.[19]

Our baseline specification is:

$$\Delta Y_{i,t} = \beta_1 (Bartik_{i,t} \times UI_{i,\tau}) + \beta_2 Bartik_{i,t} + \beta_3 Bartik_{i,t} \times X_i + \eta_i + \gamma_t + \varepsilon_{i,t}, \qquad (1)$$

where $\Delta Y_{i,t}$ represents the growth rate of the main dependent variables. We estimate this specification using as weights the population in 2000.[20] Following Monte et al. (2015), since individuals might live and consume in a region but work in another one, we adjust for worker flows and make all variables based on the place of residence.[21] The coefficient of interest is β_1, which captures how the sensitivity of ΔY is affected by the generosity of unemployment benefits (UI), i.e. it shows whether regions with more generous unemployment benefits are more or less responsive to Bartik shocks. The coefficient β_2 captures the main effect of the Bartik shock, therefore $\frac{\beta_1}{\beta_2}$ captures how the sensitivity to shocks changes with the generosity of unemployment benefits. We also control for a number of county-level characteristics (X_i), such as the share of employees in each industrial sector and their interactions with the Bartik shock. We also include county and year fixed effects; that is, we allow for any general trend (such as changes in demographics) at the county level.[22] Since the main source of variation

[19] Each four-digit ISIC code is one industry. We also repeated our analysis with three-digit ISIC codes and the results are quantitatively and qualitatively the same. Please see the technical appendix for a detailed description of how we construct the main variables.

[20] Throughout the paper (except table A.8) all regressions are weighted by the population of the unit of observation (i.e. county, state or CZ) in 2000. Table A.8 in the appendix shows that the results are qualitative the same when we do not weight observations by population.

[21] We also provide evidence that our results hold when we run our specifications at the state and commuting zone level, which do not require an adjustment for the place of residence.

[22] As a robustness check, reported in the appendix Table A3, we also run a specification in which we include

is at the state level, we cluster the standard errors at the state level.[23]

As noted by Chodorow-Reich and Wieland (2016) in the context of labor reallocation, one of the main advantages of this Bartik research design is that, instead of focusing on the specific shocks determining the changes in employment, such as trade policy, technology or consumer tastes, we can employ the evolution of employment shares nationally to summarize the effects of the combination of these shocks for employment trends. The key identifying assumption to make this a measure of plausibly exogenous labor demand shocks is that this proxy must not be correlated with unobserved shocks to local labor supply. Specifically, we are assuming that changes in industry shares at the national level are uncorrelated with city-level labor supply shocks and can therefore be used as a demand-induced variation in local employment.[24] However, since we run our specifications at the annual frequency and we control for county fixed effects – which should capture long-term changes in labor supply due to for instance to changes in demographics- this is less of a concern. We also need to assume that in the absence of variation in the UI generosity, the predictive power of the Bartik shock is similar across different regions or not correlated with the generosity of the unemployment benefits.

We start our analysis with a graphical illustration of the main results. Figure 1 plots the effect of UI generosity in attenuating the impact of Bartik shocks, after we took out the average for each county, on each of our main dependent variables (i.e. consumption, employment in the non-tradable sector and employment in the tradable sector) using a spline regression with a knot at the 33rd percentile of the shock. The blue line shows the effect

lags of the main variables:

$$\begin{aligned}\Delta Y_{i,t} &= \beta_1(Bartik_{i,t} \times UI_{i,\tau}) + \beta_2(Bartik_{i,t-1} \times UI_{i,\tau}) + \beta_3 Bartik_{i,t} \\ &\quad + \beta_4 Bartik_{i,t-1} + \beta_5 \Delta Y_{i,t-1} + \eta_i + \gamma_t + \varepsilon_{i,t}.\end{aligned}$$

This is useful to show that our results are not driven by the persistency of the Bartik shocks or of the dependend variables.

[23] As Table A.9 in the Appendix shows, clustering at the county level would result in significantly lower standard errors.

[24] Other papers employing a similar strategy include Bound and Holzer (2000), Autor and Duggan (2003), Luttmer (2005), Notowidigdo (2011), David et al. (2013), and Chodorow-Reich and Wieland (2016).

for the counties with the least generous UI, those in the bottom quartile, while the red line depicts the effects for the most generous counties, those in the top quartile. The areas show the 95% confidence intervals and on the x-axis is the Bartik shock net of the county average over the 1999-2013 period. For instance, for consumption growth the counties above the 75th percentile in generosity exhibit very modest elasticity to Bartik shocks, even the most severe, while counties below the 25th percentile are significantly affected. Similarly, the sensitivity of employment growth in the non-tradable sector to labor shocks is significantly smaller in counties with more generous UI, while there is no significant difference between counties for employment in the tradable sector. The asymmetry of our effects is also encouraging: since most of the dampening effect comes from attenuating negative shocks, this is consistent with variations in UI generosity being the main driver of this result, since UI payments are more sensitive to large negative shocks than to positive shocks. This is only suggestive evidence, of course, and these results could be driven by other omitted factors, which is why the next few sections are devoted to demonstrating that they hold even after controlling for several potential confounding factors.

3 Data and Summary Statistics

In 1935 the United States created a joint federal-state system of insurance for workers losing their jobs. Each state sets its own UI tax schedules for employers, who also pay a federal tax under the Federal Unemployment Tax Act (FUTA), to finance federal extensions and emergency loans to states' trust funds, among other objectives. The law requires state taxes to be "experience-rated," so that the effective marginal rate rises with the number of claims deriving from a firm.

One key feature of this system is that the state can affect the generosity of its program, i.e. the level of benefits and the length of the benefit period. The size of the weekly benefit payment naturally depends on previous wages, but each state also sets a cap on the amount and limits the duration. During times of high unemployment, states may also enact extensions to the regular benefit period.

We employ four different measures of the "UI generosity". First, we consider a state-level measure: the empirical income replacement ratio estimated from the Annual Social and Economic Supplement (ASEC) to the Current Population Survey (CPS). We work with CPS data downloaded from IPUMS. Households are asked about their sources of income in the previous year, and their employment history. To estimate average weekly UI benefits for those receiving them, we divide the total unemployment benefits reported by a household by the number of weeks of joblessness. We calculate average weekly earnings by dividing income from wages and salaries by weeks worked in the year. We thus calculate an empirical "income replacement ratio" as the ratio of average weekly benefits to average weekly wages. To keep the sample size for each state reasonable, we examine a five-year average over 1996-2000, which gives us the replacement ratio for those who actually receive benefits. Figure 1.A in the Appendix depicts the substantial heterogeneity in generosity, darker regions being more generous. The main advantage of this measure is that it measure exactly what should drive the households' decisions: the fraction of income recovered by the unemployment insurance.

However, an important consideration missing from the previous measure is benefit "take-up." As noted in Blank and Card (1991), the take-up rate of UI benefits among the unemployed is far less than the eligible population for a variety of reasons, including differences in coverage eligibility, unionization rates, benefit generosity, and rules enforcement. We measure the "take-up rate" as the share of the unemployed in a state who actually receive unemployment benefits. We multiply this rate by the replacement ratio to produce a second measure of generosity, namely the average replacement ratio conditional on unemployment as opposed to conditional on receiving the unemployment benefits. This is helpful in capturing heterogeneity across states in the take-up rates, but the take-up rate itself might be affected by changes in UI policy, as they would affect the workers' incentives to apply for it.

Our third measure exploits differences in generosity between states and wage distribution within states. The Department of Labor publishes information on each state's benefit schedule. We measure the generosity of each state's benefits in 2000 as the ratio of the maximum weekly benefit to the average weekly wage in each county in 2000.[25] We use this normalization to capture the fraction of income replaced and to take account of the fact that the same dollar amount could have significantly different effects in the same state but in counties with different living costs. This measure captures well the differences in purchasing power across states. Finally, we also show that our results are robust to employing the replacement rates provided by the BLS which are computed as the weekly benefit amount divided by the average wage of UI recipients. Note that since extensions are endogenous to local labor market conditions, we measure generosity only as of 2000.[26] We investigate the impact of the programs from 1999 to 2013.[27]

We have used numerous sources of data for our dependent variables and controls. Here we mention the most significant. The Bureau of Economic Analysis provides time-series data on aggregate earnings (not including dividends, interest income and rents), average wages, and industrial composition; employment growth by industry for each county, the basis for computing the Bartik shocks, is computed using yearly data from County Business Patterns (CBP), which is also exploited to calculate employment growth in "non-tradable" industries, i.e. retail trade and hospitality, and "tradables," namely manufacturing. To calculate the aggregate effects of UI generosity on county-level consumption, we use a dataset for all new car sales in the United States provided by R. L. Polk & Company (Polk).

We employ a variety of controls in our specifications interacted with the Bartik shock.

[25] In the appendix, we show that our results also go through when we use the log of maximum benefits as measure of UI generosity.

[26] During the Great Recession two major federal programs were in effect: Extended Benefits and Emergency Unemployment Compensation. The Extended Benefits (EB) program, which was adopted in 1970 and typically funded in equal parts by state and federal governments, provides an additional 13 weeks of benefits when the state's insured unemployment rate rises above 5% and is at least 20% higher than its average over the previous two years. The Emergency Unemployment Compensation (EUC) program, enacted in June 2008, was instead entirely federally funded and offered up to 53 weeks of additional benefits.

[27] We use 1999 as the first year since the employment data in CBP before 1998 is reported based on the SIC classification and we do not want our result to be confounded by the change in the classification of the industries. Due to data limitations, we only consider the 2001-2011 period for the analysis of car sales at the county and state level.

We control for the share of employment in construction, manufacturing, services and public sector, as well as the share of self-employment (hence ineligible for UI benefits) using data from BEA (Economic Profile Table CA30 and Table CA25). To control for political differences across counties, which might contribute to greater generosity in other benefits or government programs, we control for the county's Democratic vote share in 2000 using election data from CQ Press available from the Census. Finally, we control for median income and the share of the county population with high school and college education, using data from the 2000 Census available on its website.

Table 1 shows the county-level summary statistics for our sample. The first row reports the maximum weekly benefit, which ranges from \$190 to over \$400 a week.[28] The next row shows that the number of weeks does not vary; for every state except Massachusetts, the maximum benefit period is 26 weeks. We then report our main measures of UI generosity, namely the income replacement rate conditional on being unemployed and our two alternative measures, the ratio of the maximum weekly benefit to the weekly wage and the replacement rate times the take-up rate.[29] The table shows that for all three measures there is significant heterogeneity across states, which confirms Figure 1. Among the static variables we also report some county-level controls, such as the sectorial shares of employees in manufacturing, construction, services and government. Panel B reports the statistics for our time-varying variables. There is a significant variation in the magnitude of the Bartik shock, as its standard deviation is about 2%. The impact of unemployment insurance is inherently asymmetrical, as it has an effect only when the Bartik shocks are negative.

Figure 1.B in the appendix shows that UI generosity is extremely persistent over time. In this figure, we plot the correlation between the average income replacement ratio in 1990-1995

[28] Tables A.1 and A.2 in the appendix provide the summary statistics for the state and the county level variables.

[29] We only consider UI transfers because, as is shown by Chodorow-Reich and Karabarbounis (2013), these account for 88% of all the transfers related to employment status (supplemental nutritional assistance (SNAP), welfare assistance (AFDC/TANF), and health care account for practically all the rest). Moreover, these non-UI transfers are mainly federal so their generosity does not vary by state.

and 2000-2005 weighted by population.[30] In addition, Table 2 gives the correlations between the different measures of generosity and a number of county characteristics, such as other government transfers, the proportions of employees in the different sectors, of self-employed, of high-school graduates and the Democratic vote share. We find that the main predictors of generosity are the Democratic vote percentage, wages and the proportion of individuals in industry. To control for these differences across counties, in all of our specifications, we control for all of the characteristics in Table 2 and their interaction with the Bartik shock.

For robustness, we run our analysis at a variety of levels of geographic aggregation. Our main analysis is at county level, and we adjust for worker flows across neighboring counties by taking weighted averages of key variables based on worker migration patterns used in Monte et al. (2015) so that all of our variables of interest are based on the place of residence. In addition, we use measures of aggregate earnings and average wages from the BEA, adjusted to be on a county-of-residence basis. We also run our analysis at two additional levels of aggregation: commuting zone (CZ) and state. CZs – there are 709 in the U.S. – are groups of counties that share a common labor market as reflected in commuting patterns.[31] This level of analysis controls better for worker employment and consumption patterns across counties. The state-level analysis provides two additional benefits. First, it corresponds to the main source of differences in the generosity of unemployment insurance benefits, so running regressions at the state level provides an additional robustness test, albeit at the cost of a good part of the variation in the Bartik shock relative to the county-level specifications. Second, BEA's Regional Accounts offer a more comprehensive measure of consumption at the state level, which we can use to capture the demand channel.[32]

[30] The other two measures of UI generosity are also highly persistent; similar graphs can be found in the supplementary appendix (Figures A.1-A.4).

[31] Note that each time we use a different geographical area, we calculate a new bartik shock in which we take out that state or CZ.

[32] Summary statistics for CZ and state level data are presented in the appendix.

4 Main Results

First we investigate the effect of unemployment benefit generosity on employment and consumption, to get an estimate of how generosity acts on the sensitivity of the economy to local labor shocks. We then turn to the effects on earnings growth. In this way we analyze the channels through which UI can affect the economy. To facilitate interpretation of the results, in the tables we demean all the interaction coefficients and UI generosity is normalized to have a standard deviation equal to 1. Hence, we can assess the effect of one-standard deviation increase in UI generosity on the sensitivity of the local economy to local shocks as the ratio between the interaction coefficient and the main effect: β_1/β_2 in (1).

4.1 Employment Growth

We start our analysis of how unemployment insurance could help stabilize the local economy by affecting the change in employment. For instance, more generous UI makes households' disposable income and therefore their demand less sensitive to their employment status. This also means that there will be weaker spillovers of a shock from one sector to another. We investigate this hypothesis by estimating the sensitivity of employment growth to shocks in Table 3.

In those counties with more generous benefits employment growth is significantly less responsive to local labor demand shocks. The effect is also economically significant, as a one-standard-deviation increase in generosity reduces the elasticity of employment growth with respect to local shocks by about 9%. Column (2) shows that the results remain significant after controlling for county and year fixed effects.[33]

A source of potentially relevant heterogeneity across counties is industrial characteristics. For instance, counties could be more or less cyclically sensitive as a function of their main industrial sector, which could also be correlated with the availability of unemployment ben-

[33] Controlling for year fixed effects may affect the magnitude of the main coefficient β_2, because by capturing the variation in the Bartik shock common to different regions, it reduces the total variation and the Bartik shock's predictive power.

efits. To check this possibility, we compute the fraction of the work force in each sector since 1998 for each county as provided by BEA, and then take the average for each sector over the sample period 1998-2013. The sectors are construction, manufacturing, government (which includes federal, military, state and local government) and services. As additional controls we consider the interaction between the Bartik shock and all the controls in Table 2, such as the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries, the democratic share and the fraction of individuals with college and high-school degrees. For instance, this specification allows manufacturing counties to react differently than mainly service-based counties. We find that the results remain significant both statistically and economically, indicating that they are not explained by differences in the main employment sectors.

To inquire into the demand channel thesis, we distinguish between the tradable and non-tradable sectors as defined by Mian and Sufi (2014) and compare the sensitivity of each to Bartik shocks. The non-tradable sector consists mainly of restaurants and retail shops as well as services; but it does not include construction.[34] The results are given in Columns (4)-(6) for the non-tradable sector, Columns (7)-(9) for tradables. We start with the baseline specification, with no controls, then control for county and year fixed effects (Columns 5 and 8), and then for county industrial composition (Column 6 and 9). We find that UI generosity reduces the sensitivity of the change in employment in the non-tradable sector by about 16-20% but has very little effect on the tradable sector either economically or statistically. This strongly suggests that our results are driven by the higher level of local aggregate demand produced by the greater disposable income of the unemployed.

[34] Tradable and non-tradable employment together account for about 25% of the total employment, since many industries are not classified in either group. Please refer to the appendix for a detailed definition of each industry.

4.2 Consumption Growth

Further evidence that the demand channel is the key mechanism driving our results comes from an examination of the impact of benefit generosity on consumption. To examine the aggregate demand effect, we investigate the county-level response of consumption – defined as car sales – to shocks. A caveat for this measure of consumption is that it might overestimate the overall attenuation of changes in consumption because car buying is one of the most volatile components of consumption and captures only the extensive margin, i.e. the number of cars sold. On the other hand, unlike other measures of consumption, in our data car sales are measured in the county of registration, not that of purchase, which means it captures consumption in the county of residence and not other counties that might have more highly developed commercial districts. This eases concerns about spillover effects. This point will be especially important for our border design (section 5.8). Furthermore, in section 5.2 we run our regressions at the state level, for which we have very detailed information on durable and non-durable consumption, which alleviates concerns about external validity of this measure.

The results are given in Table 4. The intuition behind our tests is that if generous benefits give the unemployed more disposable income, they will presumably reduce their consumption less sharply supporting aggregate demand and improving the local economy's resilience. Column (1) gives the baseline estimates with no controls; Column (2) adds county and year fixed effects. A one-standard-deviation increase in generosity reduces the elasticity of consumption growth to local labor shocks by about 18%. This effect remains significant and largely consistent for different specifications.

Column (3) also includes the interaction between other county characteristics and the Bartik shock, as in the previous specifications, to allow for the possibility that consumption might be more responsive to shocks in manufacturing rather than service counties.

These results relate to the work of Gruber (1997). Using household data, Gruber (1997) provides direct evidence of the consumption smoothing benefits of UI by exploiting differences in the generosity of benefits across states. We complement these results by showing that not only the direct effect of more generous UI but also the local general equilibrium effect will result in a more smooth consumption response to negative shocks.

4.3 Aggregate Earnings Growth

To examine the effects of UI on the economy we complement the previous analysis by investigating the response of aggregate earnings growth to shocks in counties with differing benefit generosity. We use aggregate earnings data from BEA (BEA Table CA30). The main advantage of earnings data rather than income data is that it does not count dividends or government transfers, which are unrelated to local economic activity and it is adjusted by the place of residence. Table 5 reports the results.

Column (1) considers the less restrictive specification, while Column (2) controls for unobserved differences across counties with county fixed effects. Other shocks common to all counties are captured by year fixed effects. Earnings growth in counties with more generous unemployment benefits tend to be less sensitive to adverse shocks, as is shown by the negative sign on the interaction between the Bartik measure and UI generosity. The result is both statistically and economically significant. In fact, a one-standard-deviation increase in UI generosity attenuates the effect of the shocks on aggregate earnings by about 8%. Column (3) controls for several county characteristics, such as the structure of the local economy by industrial sector, as in the previous sections.

In sum, we find that variation in the generosity of unemployment insurance significantly affects the elasticity of earnings growth to local labor supply shocks. Quantitatively, the impact of Bartik shocks on earning growth is about 15% lower in counties in the top quartile of UI generosity than in those in the bottom one.

5 Further Evidence and Robustness Checks

This section set out additional results showing the validity of our identification strategy by using alternative measures of UI generosity, by considering different geographical aggregation levels, by controlling for other potentially contaminating factors, by exploiting the heterogeneity in the data, by restricting attention to counties at the state border, and by examining several alternative explanatory hypotheses.

5.1 Alternative Measures of Unemployment Insurance Generosity

Our baseline measure of generosity employs UI benefit payments directly to compute the income replacement rate: the ratio of total benefits to the worker's weekly wage when employed. However, our results do not hinge on this particular proxy for generosity. Table 6 reports our main specification using two additional measures: the replacement rate times the take-up rate as measured in the CPS (Panel A) and the ratio of the maximum weekly benefit to the average weekly wage in the county in 2000 (Panel B).[35] The first measure takes into account that many jobless persons are not eligible for benefits: temporary employees and the self-employed, those who left their jobs voluntarily, and those whose industries are not covered by unemployment insurance, such as construction. To compute the take-up rate, we measure the share of unemployed individuals who actually receive UI benefits, which is slightly less than 40%. The second measure takes advantage of the very significant variation in the weekly benefit which ranges from \$275 a week in Florida to \$646 a week in Massachusetts. Rerunning the main specification with these new measures produces results comparable with the baseline in terms of both statistical and economic significance. In other words, our results do not depend on the particular proxy used but are driven mainly by differences in the unemployment generosity.

[35] Table A.4 reports similar results when we use: (1) the log of the maximum weekly benefits not normalized by average wages as proxy for the UI generosity; and (2) when we employ an alternative measure provided by the BLS defined as the weekly benefit amount divided by the average wage of UI recipients.

5.2 State and Commuting Zone

To show that our main results do not hinge on county-level variation, we confirm them using data at state and commuting zone levels.[36] The useful feature of state level data is that it corresponds to the main source of differences in UI generosity, namely state law and allows the results to be checked with reference to total consumption growth, not just car sales. Table 7 reports the results. Employment growth in the non-tradable sector is less sensitive to shocks when UI is more generous, while for the tradable sector there is no significant effect (Columns 1-3). Since our county-level measure of consumption captures only one of its major components, we also collect BEA data at state level on total aggregate consumption (durables and nondurables). Columns (4)-(6) reports the results. We find that a one-standard-deviation increase in generosity reduces the sensitivity of total consumption to negative employment shocks by about 7%. This strongly suggests that our findings are not driven by special features of the auto industry but are due to the broader aggregate demand channel. Even if less significant, Column (7) confirms the results on earnings growth.[37] Panel B also reports the results for the alternative measure of UI generosity. Table A.6 in the appendix shows that these results are robust to the inclusion of state-specific linear and quadratic trends.

The results for commuting zones are given in Table 8. Commuting zone comprise all US metropolitan and nonmetropolitan areas, and as Tolbert and Sizer (1996) and Autor and Dorn (2013) suggest, they are the logical geographic units for defining local labor markets. We show that our results are not driven by workers consuming in areas where they do not live or by spillovers between counties.[38] Both the magnitude and the significance of the

[36] For the CZ and State level results, we re-computed the Bartik shocks for state or CZ i by taking out that state or CZ i. In other words, we do not simply take the average of the county-level Bartik shocks.

[37] It should be noted that the main reason for the changes in the coefficient of the main effect of Bartik shock in the state level result is the fact that a higher fraction of state-level bartik shocks are absorbed with the time fixed effects. As can be seen in Table A.7 in the Appendix, not including the time fixed effects results in main coefficients that are very similar to the ones estimated in the county-level regressions.

[38] Note that for the CZ specifications, we do not do any other adjustment for commuting flows (e.g. Monte et al. (2015)).

results are quite similar to the county-level results. Panel B reports similar results for the alternative measure of UI generosity.

We use the result in Panel B of Table 8 to calculate the local fiscal multiplier for two main reasons. First, using the commuting zones results ensure that there are weaker spillovers to other regions. Second, by using the unconditional replacement rate measure of unemployment benefits, we avoid making any specific assumption about the take-up rate of unemployment benefits.

5.3 State Policies

A potential concern is the possible presence of other state policies, correlated with UI generosity, that affect the sensitivity of the economy to local labor shocks. For instance, Holmes (1998) shows that right-to-work laws produce an endogenous sorting of firms into states, which could well affect our estimates if the laws are correlated with UI generosity. Or the level of the minimum wage might also affect unemployment by making wages less responsive and inducing labor market rationing. Furthermore, there might be other government transfers correlated with UI generosity that might contaminate our estimates.

Since these interstate differences might also drive the sensitivity of the local economy to supply shocks, we test the robustness of our estimates by including the interaction between the Bartik shock and the presence of right-to-work laws, the minimum wage level and the log of other government transfers interacted with Bartik shocks (Table 9).[39] The data on these two policies comes from Holmes (1998) and Dube et al. (2010). The pattern is very similar to those found above. More generous UI reduces the sensitivity of earnings, non-tradable sector employment and car sales to negative shocks, while there is no comparable effect on employment in the tradable sector. This reassures us that our estimates are truly capturing the effect of differences in the generosity of jobless benefits and not other policy variations that could affect county-level sensitivity to economic fluctuations.

[39] The main government transfers include food stamps, income maintenance, disability, and medical benefits.

5.4 UI Tax and Firms Sorting

Theoretically our baseline results could be explained by a combination of the differences in UI generosity and an endogenous sorting of firms into different states based on marginal UI tax cost. For instance, firms whose activity is less cyclical or less sensitive to economic shocks might find it optimal to locate in states where the UI tax is less sensitive to their firing decisions, as their layoff risk is smaller. Although this is unlikely to explain our results entirely, we directly address this concerns using data on the top and bottom UI tax rates in each state. Interestingly, as Figure 2.A in the appendix shows, there is a very strong positive correlation between the difference in the maximum minus the minimum UI tax and the marginal tax cost computed by Card and Levine (2000), which uses proprietary data.[40] Accordingly, we use the difference in marginal tax rates to proxy for the cost borne by firms, which should affect location decisions.

First of all, Figure 2.B in the appendix shows that our measure of generosity is not significantly correlated with the unemployment insurance tax rate. Yet since it might still affect our results indirectly, we also control for the interaction of the Bartik shock with the difference in UI tax rates and with the log of the taxable wage base (Table 10). Our baseline findings are robust to this specification as well. And in fact if there were sorting, it should affect firms in the tradable and the non-tradable sectors alike, but we do not find any significant effect in the tradable sector. This confirms that our results cannot be explained by the sorting of firms into states depending on the marginal UI tax rate.

5.5 Alternative Bartik shocks

In obtaining the foregoing results we have computed the Bartik shocks for all sectors. However, we now show that there is significant intersectoral spillovers by excluding from the computation of the Bartik shocks the construction and the non-tradable sectors. Table 11

[40] The difference in the maximun minus the minimum UI tax is for the year 2002 as this is the first year for which we have the data.

shows the effects of these shocks on real economic activity. Intuitively, this procedure captures the effects of workers being dismissed, for instance, in the car manufacturing sector, which will decrease their demand in the non-tradable sector, e.g. restaurants, retail outlets and services. This in turn will depress the economy, lowering employment in non-tradables as well and depressing earnings. Table 11 shows that these effects, which might be due to spillovers or general equilibrium factors, are mitigated where UI is more generous. Specifically, let us emphasize the finding that shocks to other sectors are strong predictors of employment in the non-tradable sector and the fact that up to a third of these spillovers are attenuated when UI is more generous (Column 2). We also find that car sales and earnings growth are less responsive to shocks in the tradable sector when UI is more generous.

5.6 Heterogeneous Effects

In this section we exploit two sources of heterogeneity – the magnitude of shocks and local economic conditions – to provide further evidence in support of the mechanism hypothesized.

5.6.1 Asymmetric Effects

Up to now, we have considered all Bartik shocks together, not differentiating between positive and negative shocks. But we hypothesize that UI generosity should be more important for negative shocks, because UI payments themselves are more responsive to negative shocks than to positive ones and because consumption is more sensitive to negative shocks than to positive ones when households are financially constrained (e.g. Aiyagari (1994)). Moreover, the presence of asymmetric effects is consistent with an aggregate supply curve whose slope rises with output, as well as with the empirical work of Auerbach and Gorodnichenko (2012).

Evidence consistent with this hypothesis is given in Table 12. "Below Median Bartik Shock" identifies the bottom half in the magnitude of the Bartik shock, while "Above Median Bartik Shock" the top half. In Column (1) the dependent variable is employment growth, while in Columns (2) and (3) show that growth in the non-tradable and the tradable sectors, respectively. In Column (4) we investigate the effect of UI and Bartik shock on the growth of car sales as measured by Polk for the period 2001-2011. Column (5) investigates the effect on earnings growth.

We find that the coefficient of our main dependent variable is negative and statistically significant in the case of negative labor demand shocks, while the interaction between UI and the Bartik shocks becomes smaller and insignificant for positive shocks. The most significant results are those for consumption growth and for employment growth in the non-tradable sector; for the other variables the results are less pronounced.[41] Overall, Figure 1 stands confirmed: that is, more generous unemployment benefits attenuate the sensitivity mainly to negative shocks and has no effect in the case of positive.

5.6.2 Unemployment Rate

When can we expect unemployment insurance to be most effective in attenuating economic fluctuations, in other words, when is its multiplier effect greatest? Auerbach and Gorodnichenko (2012) find large differences in spending multipliers between recessions and expansions, fiscal policy being considerably more effective in the former. Accordingly, we hypothesize that the dampening effect of more generous UI is larger when the local economy is further away from the full employment, then the positive aggregate demand response of jobless benefits should be more effective in reducing the economy's sensitivity to shocks during downturns. We test this thesis by interacting our main coefficient of interest, $Bartik_{i,t} \times UI$, with the lagged county unemployment rate in the preceding year. We chose the previous year's rate rather than the current year's in order to minimize the endogeneity concerns. Table 13 reports the results: the dampening effect of UI generosity is larger when unemployment rate is larger for employment growth in the non-tradable sector and earnings growth.

[41] Note that total employment is not a weighted average of the employment in the tradable and non-tradable sectors, because they only account for at most 25% of total employment. The remaining are sectors that cannot be classified in either category (see the technical appendix for more details).

5.7 Excluding the Great Recession

An important source of unobserved heterogeneity that could contaminate our results is the policies undertaken during the Great Recession. For instance, during the financial crisis there were several extensions of UI and a number of federal interventions to support unemployed workers, which may have affected counties' sensitivity to Bartik shocks. If this is so, our result could be distorted by such policies. To address this concern, we restrict our sample to the years before 2008 (Table A.5 in the Appendix). All of our results, except that for earnings growth, remain both economically and statistically significant. We can conclude that the lower sensitivity of employment and consumption growth to local labor shocks in counties with more generous UI does not depend on recession-induced increase in benefits.

6 Fiscal Multiplier

The Great Recession has revived interest in the stimulus provided by changes in government spending and taxation. We contribute to the discussion by using our estimates to obtain a local fiscal multiplier for UI expenditures. In this calculation, we use the result based on the commuting zones when we measure unemployment benefits with the unconditional income replacement rate. Commuting zones have the advantage of being subject to weaker spillovers between regions: most of the effect of the UI payments on local earnings is captured by the change in the total earnings of that commuting zone. Using the unconditional income replacement rate already takes into account that not every unemployed worker receives the unemployment benefits, and does not require any specific assumption about the take-up rate.

Let us start from the following specifications:

$$Earning\,Growth_{i,t} = \beta_1(Bartik_{i,t} \times UI_{i,\tau}) + \beta_2 Bartik_{i,t} + \beta_3 Bartik_{i,t} \times X_i + \eta_i + \varepsilon_{i,t}, \quad (2)$$

and

$$UI\,Payment\,per\,capita_{i,t} = \theta \times Bartik_{i,t} + \gamma_{i2} + \varepsilon_{it} \tag{3}$$

and let us define σ_{UI} the standard deviation of the UI generosity payment and μ_{UI} its mean.

We want to compute the local multiplier on earnings λ. To be clear, we are not interested in the direct effect of UI extensions on income. Instead, we would like to compare the reaction of two similar economies, one with more generous UI and one with less generous UI, to the same Bartik shock. Formally, we compare the change in the earnings due to a Bartik shock of size x of a local economy with UI generosity that is one standard deviation above the average ($\sigma_{UI} + \mu_{UI}$), with the response of an economy with an average UI generosity to the same shock, and we divide that by the difference in the UI payments in these two economies. Formally, we can define the local multiplier as

$$\lambda = \frac{\Delta\left(Earnings|Bartik = x, UIgen = \mu_{UI} + \sigma_{UI}\right) - \Delta\left(Earnings|Bartik = x, UIgen = \mu_{UI}\right)}{\Delta\left(UI\,Payment|Bartik = x, UIgen = \mu_{UI} + \sigma_{UI}\right) - \Delta\left(UI\,Payment|Bartik = x, UIgen = \mu_{UI}\right)}$$

Using equation (2) we can estimate the change in earnings caused by the increase in the generosity of UI as follows:

$$\Delta\left(Earnings|Bartik = x, UIgen = \mu_{UI} + \sigma_{UI}\right) - \Delta\left(Earnings|Bartik = x, UIgen = \mu_{UI}\right)$$
$$= \delta \times x \times \sigma_{UI} \times avg.\,Earnings\,per\,capita \times Population$$

Note that this is directly derived from (2). The regression results reported in Table 8.B are based on normalized values of UI generosity and therefore increasing UI generosity by σ_{UI} is equivalent to an increase in the UI generosity by one unit.

For the calculations of the effect of an increase in the generosity of unemployment insurance on the UI payments, we focus on its direct effect. Specifically, we assume that if UI payments are α percent more generous, the total UI payments for the same shock will increase by α percent. This calculation ignores two factors. First, it ignores the local general equilibrium effect that by making unemployment benefits more generous, the local economy becomes less responsive to local labor demand shocks. According to our calculations and the result on the effect of UI generosity of UI on employment (Table 8.B), this may result to overestimate the increase in the UI payments by at most 5%. Second, an increase in UI generosity may also increase the length of the unemployment spell, which increases the total UI payments and leads us to underestimate the effect of increase in UI generosity on the increase in UI payments.

Using Equation (3), we calculate the direct effect of the increase in UI generosity on UI payments as:

$$\Delta\left(UI\,Payment|Bartik = x, UIgen = \mu_{UI} + \sigma_{UI}\right) - \Delta\left(UI\,Payment|Bartik = x, UIgen = \mu_{UI}\right)$$

$$= \left[\theta \times bartik_{it} \times \left(\mu_{UI} + \sigma_{UI}\right)/\mu_{UI} - \theta \times bartik_{it}\right] \times Population$$

$$= \theta \times bartik_{it} \times \sigma_{UI}/\mu_{UI} \times Population$$

where σ_{UI}/μ_{UI} captures how many percentage points the generosity of UI will increase when we increase the UI generosity by σ_{UI}, i.e. how much the payment will increase as a result of an increase in the generosity of UI. Therefore, we can rewrite the multiplier as:

$$\lambda = \frac{\delta \times avg.\,Earnings\,per\,capita}{\theta} \times \left(\frac{\sigma_{UI}}{\mu_{UI}}\right)^{-1}$$

$$= \frac{-0.07 \times \$27.5k}{\$3.3k} \times \left(\frac{0.04}{0.13}\right)^{-1} = 1.90$$

Notice that although the UI payments are a small fraction of the total earnings, because they are very cyclical and more responsive to local shocks than the total income they have a significant effect on dampening the effects of local economic shocks. The fact that $\theta = \$3.3k$ means that a one-standard-deviation increase in the Bartik shock, equivalent to 2.3%, results in an increase of about $80 in UI payments yearly per capita.[42]

This relates our paper to the series of recent papers using cross-state variation to estimate fiscal multipliers.[43] Moreover, our estimates are very consistent with those found in other papers that use a different source of variation in government spending. For instance, Serrato and Wingender (2010b) exploit the fact that a large number of federal spending programs depend on local population levels and exploit changes in the methodology that the Census uses to provide a count of local populations to estimate a fiscal multiplier of 1.57. Shoag et al. (2010) instruments state government spending with variations in state-managed benefit pension plans and find that government spending has a local income multiplier of 2.12 and an estimated cost per job of $35,000 per year. More recently, Chodorow-Reich et al. (2012) examine the effect of the $88 billion of aid to state governments through the Medicaid reimbursement process contained in The American Recovery and Reinvestment Act (ARRA) of 2009 on states' employment and find a multiplier of about 2. Whereas Nakamura and Steinsson (2014) employ data on military procurement spending across U.S. regions their differential effects across regions to estimate an "open economy relative multiplier" of approximately 1.5.

Our estimates are broadly consistent with the range of estimates for fiscal multipliers on income and employment provided by the existing studies, which also reassures us that our methodology is not capturing other unobserved differences across counties that might bias our results upwardly.

[42] It should be noted here that as shown by Nakamura and Steinsson (2014), the implication of this local fiscal multiplier for the aggregate multiplier is highly sensitive to how strongly aggregate monetary policy leans against the wind. In other words, this local multiplier can result into a larger aggregate multiplier in periods in which the zero lower bound is binding and into a smaller aggregate multiplier in normal times.

[43] For a survey of the literature on national output multipliers see Ramey (2011a).

7 Concluding Remarks

This paper evaluates the extent to which unemployment insurance attenuates the sensitivity of real economic activity to local labor demand shocks. Our strategy follows Bartik (1991) and Blanchard and Katz (1992) in constructing a measure of the predicted change in demand-driven labor shocks at county level. This measure is interacted with county-level benefit generosity in the year 1998.

Two principal findings emerge. First, estimating the response of earnings growth to shocks in counties differing in relative UI generosity, we find that where unemployment benefits are more generous, the local economy tends to react significantly less sharply to negative shocks.

Second, we provide evidence that the main channel through which this effect is produced is demand: car sales are less sensitive to negative shocks in counties with more generous UI. Moreover, only the non-tradable sector, where activity is driven mainly by local demand conditions, shows variations in employment corresponding to the interstate variation in UI generosity. These results are robust to checks for unobserved heterogeneity between areas and other policy measures that might affect the responsiveness of the economy to shocks.

Overall, the paper offers new evidence to contribute to the debate on the importance of automatic stabilizers, demonstrating that more generous unemployment benefits, working through the demand channel, significantly attenuate the volatility of economic fluctuations.

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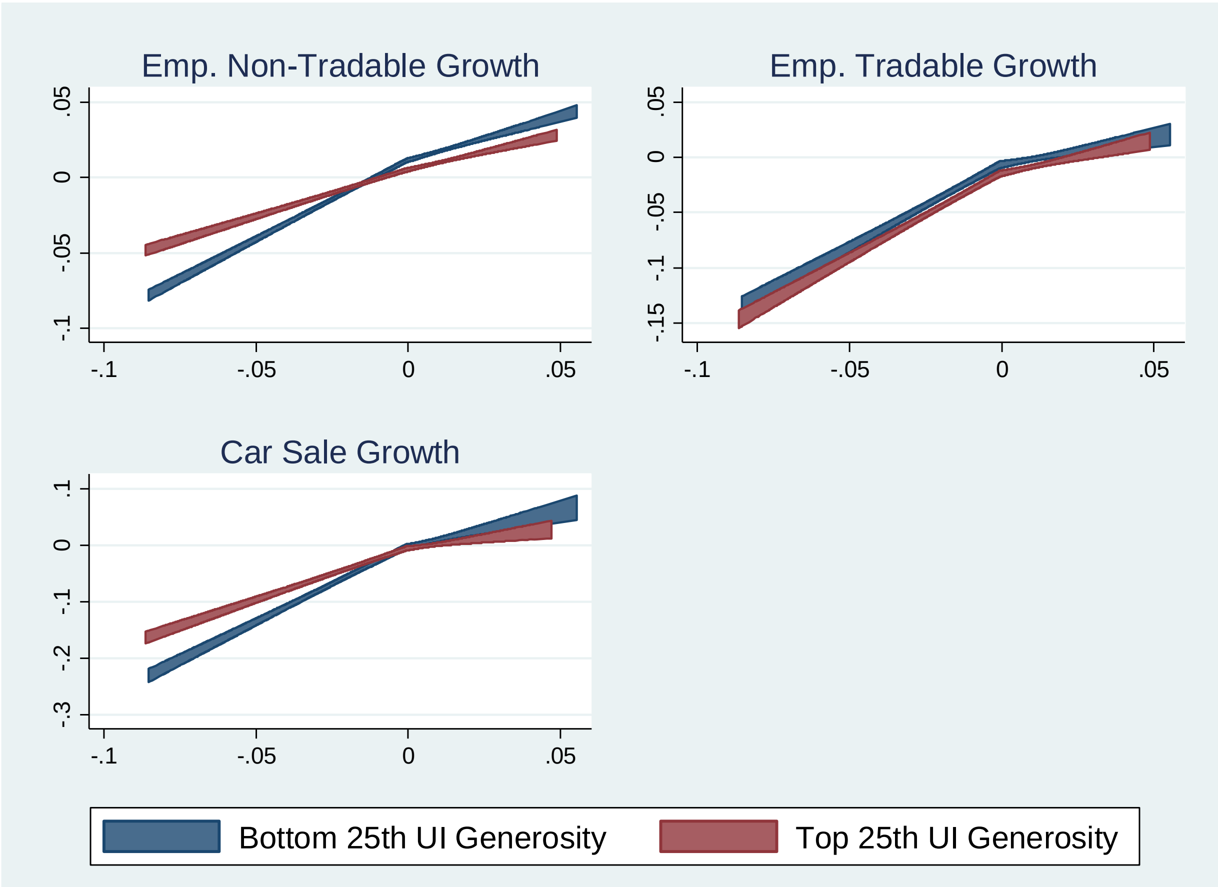

Figure 1 Spline Estimation

This graph depicts the effect of the UI generosity in attenuating the Bartik shocks using a spline estimation methodology for each dependent variable and comparing counties in the top and bottom quartile of UI generosity. The knots for the spline regression are at the 33th percentile of Bartik shock. The figure also reports the 95% confidence intervals. The blue and the red areas show the effects for the bottom and the top quartile in UI generosity (measured by the income replacement ratio), respectively.

Table 1

Summary Statistics

The table reports the summary statistics for the main variables. Panel A focus on the variables computed in 2000, while Panel B examines the variables over the period 1999-2013 (car sales data is for 2001-2011). The data on earnings growth and industrial composition is collected from the Bureau of Economic Analysis, while employment growth by industry for each county is computed using yearly data provided by the County Business Patterns (CBP). Data on average wages is provided by the BEA. R. L. Polk & Company records all new car sales in the United States and provides our measure of car sales. Democratic share unavailable at the county-level in Alaska. Alternative Bartik schock are the shocks to the sectors other than construction and non-tradable sectors.

Panel A. Static Variables in 2000

	(1) N	(2) Mean	(3) St. Dev	(4) p1	(5) p10	(6) p50	(7) p90	(8) p99
Max Weekly Benefit	3,098	297.4	62.72	191.1	230.3	283.9	406.8	440.1
Number of Weeks	3,098	26.17	0.816	26	26	26	26	30
Replacement Rate	3,098	0.364	0.0391	0.301	0.307	0.367	0.414	0.440
Replacement Rate x Take-Up Rate	3,098	0.132	0.0395	0.0723	0.0930	0.123	0.186	0.229
Log of Median Income	3,088	10.66	0.239	10.12	10.36	10.65	11.01	11.26
Share of Employees in Construction Sector	3,098	0.0581	0.0209	0	0.0373	0.0558	0.0841	0.118
Share of Employees in Manufacturing Sector	3,098	0.116	0.0677	0	0.0430	0.105	0.206	0.341
Share of Employees in Services Sector	3,098	0.548	0.0911	0.280	0.419	0.565	0.652	0.702
Share of Employees in Government Sector	3,098	0.140	0.0610	0.0626	0.0826	0.125	0.212	0.371
Share of Self-Employed workers	3,098	0.177	0.0671	0.0721	0.112	0.165	0.263	0.420
Share of High School graduates	3,098	80.31	7.405	59.70	69.90	81.80	88.80	92.80
Share of College Graduates	3,098	24.36	9.473	8.400	12.61	24.50	38.20	51.90
Tax Difference	3,098	6.406	1.319	4.734	5.299	6.052	8.324	9.783
Right to Work Laws	3,098	0.383	0.486	0	0	0	1	1
Other government transfers	3,098	3,385	547.7	2,483	2,768	3,218	4,082	4,756
Democratic Share	3,079	0.488	0.130	0.215	0.330	0.474	0.647	0.806
Population	3,098	1.047e+06	1.875e+06	8,752	35,759	407,847	2.467e+06	9.538e+06

Panel B. Dynamic Variables

	(1) N	(2) Mean	(3) St. Dev	(4) p1	(5) p10	(6) p50	(7) p90	(8) p99
Bartik Shock (1998 as base year)	46,470	0.00238	0.0233	-0.0688	-0.0291	0.00814	0.0257	0.0333
Alternative Bartik Shock	46,470	0.00317	0.0220	-0.0623	-0.0296	0.00844	0.0250	0.0350
Employment Growth	46,470	0.00519	0.0335	-0.0865	-0.0365	0.00833	0.0408	0.0824
Employment in Non-Tradable Sector Growth	46,470	0.00560	0.0440	-0.104	-0.0444	0.00708	0.0500	0.125
Employment in Tradable Sector Growth	46,470	-0.0174	0.102	-0.246	-0.111	-0.0190	0.0623	0.289
Income Growth	46,470	0.0394	0.0391	-0.0701	-0.00315	0.0404	0.0812	0.135
Car Sales Growth	34,032	-0.0234	0.123	-0.330	-0.194	-0.0161	0.118	0.287
Average Wages Growth	46,470	0.0295	0.0329	-0.0485	-0.00215	0.0283	0.0602	0.125
Labor Force Growth	46,470	0.00718	0.0246	-0.0584	-0.0171	0.00656	0.0325	0.0807
Unemployment Growth	46,470	0.175	0.528	-0.413	-0.280	0.00973	0.902	2.009

Table 2

UI Generosity and County Characteristics

The table reports the correlations between our three measures of UI generosity and several regional characteristics measured in 2000. Each column is a separate weighted least squares regression. The data on industrial composition, other transfers and on average wages are collected from the Bureau of Economic Analysis while fraction of high school and college graduates and the median income are from census. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	Fraction Constr.	Fraction Manuf.	Fraction Service	Fraction Gov.	Min Wage	Right To Work	Log Average Wages	Fraction Self Employed	Fraction High School Graduates	Fraction College Graduates	Max UI Tax rate - Min UI Tax rate (as of 2002)	Median Income	Dem. Share	Other Transfers
Replacement Ratio	-0.0256	0.215*	0.0267	-0.139*	-0.0739	-0.143	-0.432	-0.129*	26.74*	-4.465	12.08***	-0.229	0.213	4,795***
	-0.0415	-0.115	-0.19	-0.0819	(0.812)	-2.464	-0.772	-0.0688	-13.87	-13.86	-4.106	-0.522	-0.33	(1,291)
Observations	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,088	3,079	3,098
R-squared	0.002	0.015	0	0.008	0.000	0	0.004	0.006	0.02	0	0.128	0.001	0.004	0.117
Replacement Rate × TakeUp	-0.108***	0.348***	0.151	-0.216***	1.388	-7.153***	0.729	-0.192***	40.46***	11.02	13.30***	0.784	0.712**	6,419***
	(0.0307)	(0.109)	(0.152)	(0.0584)	(0.877)	(1.711)	(0.513)	(0.0664)	(13.17)	(15.07)	(4.404)	(0.495)	(0.278)	(1,688)
Observations	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,088	3,079	3,098
R-squared	0.042	0.041	0.004	0.020	0.092	0.338	0.013	0.013	0.047	0.002	0.159	0.017	0.047	0.214
Max Weekly Benefit /Average Weekly Wage	0.0291***	0.0465	-0.251***	0.0742***	-0.118	0.0499	-1.445***	0.268***	-5.047	-34.83***	2.045*	-0.727***	-0.286***	889.0**
	(0.00771)	(0.0287)	(0.0374)	(0.0261)	(0.178)	(0.507)	(0.129)	(0.0679)	(5.354)	(3.655)	(1.143)	(0.0863)	(0.0640)	(405.3)
Observations	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,098	3,088	3,079	3,098
R-squared	0.033	0.008	0.127	0.025	0.007	0.000	0.531	0.267	0.008	0.226	0.040	0.155	0.081	0.044

Table 3

Employment Growth

The table reports coefficient estimates of weighted least square regressions relating the employment growth to the unemployment insurance generosity and Bartik shock using as weights the population in 2000. The full sample includes the period 1999-2013. In Columns 1-3, the dependent variable is the employment growth. In Columns 4-9 we distinguish between employment growth in the non-tradable and tradable sectors. Columns 1, 4 and 7 show the effects without any controls, while in Columns 2, 5 and 8 we include county and year fixed effects. In Columns 3, 6 and 9 we control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Employment Growth			*Employment in Non-Tradable Sector*			*Employment in Tradable Sector*	
Bartik Shock × UI Generosity	-0.08**	-0.07**	-0.06**	-0.13**	-0.13**	-0.12***	-0.02	0.02	-0.01
	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)	(0.04)	(0.04)	(0.04)	(0.03)
Bartik Shock	0.94***	1.23***	1.25***	0.72***	0.45***	0.51***	1.27***	1.79***	1.82***
	(0.03)	(0.08)	(0.07)	(0.05)	(0.10)	(0.11)	(0.04)	(0.20)	(0.22)
County Fixed Effects		Yes	Yes		Yes	Yes		Yes	Yes
Year Fixed Effects		Yes	Yes		Yes	Yes		Yes	Yes
Bartik Shock × Controls			Yes			Yes			Yes
Observations	46,470	46,470	46,050	46,470	46,050	46,050	46,470	46,050	46,050
R-squared	0.43	0.07	0.08	0.01	0.02	0.01	0.08	0.01	0.01
Number of Counties	3,098	3,098	3,070	3,098	3,070	3,070	3,098	3,070	3,070

Table 4

Car Sales

The table reports coefficient estimates of weighted least square regressions relating car sales to the unemployment insurance generosity and Bartik shock using as weights the population in 2000. The number of cars sold in each county is provided by Polk, and the full sample includes the period 2001-2011. In all columns the dependent variable is the car sales. Column 1 shows the effects without any control, while in Column 2 we include county and year fixed effects. In Columns 3 we control for the interaction between the Bartik shock and all the controls in Table 2, such as the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the democratic share and the fraction of individuals with high-school and college degrees. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)
		Car Sales	
	Full Sample	*Full Sample*	*Full Sample*
Bartik Shock × UI Generosity	-0.31***	-0.32***	-0.27***
	(0.08)	(0.07)	(0.07)
Bartik Shock	1.97***	1.70***	1.69***
	(0.11)	(0.27)	(0.24)
County Fixed Effects		Yes	Yes
Year Fixed Effects		Yes	Yes
Bartik Shock × Controls			Yes
Observations	34,032	34,032	33,755
R-squared	0.15	0.02	0.03
Number of Counties	3,097	3,097	3,070

Table 5

Earnings Growth

The table reports coefficient estimates of weighted least square regressions relating earnings growth to the unemployment insurance generosity and Bartik shock using as weights the population in 2000. The full sample includes the period 1999-2013. In all columns the dependent variable is the earnings growth. Column 1 shows the effects without any control, while in Column 2 we include county and year fixed effects. In Columns 3 we control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)
		Earnings Growth	
	Full Sample	*Full Sample*	*Full Sample*
Bartik Shock × UI Generosity	-0.09***	-0.08**	-0.07***
	(0.03)	(0.03)	(0.02)
Bartik Shock	1.03***	1.24***	1.23***
	(0.04)	(0.08)	(0.07)
County Fixed Effects		Yes	Yes
Year Fixed Effects		Yes	Yes
Bartik Shock × Controls			Yes
Observations	46,470	46,470	46,050
R-squared	0.38	0.06	0.08
Number of Counties	3,098	3,098	3,070

Table 6

Robustness I: Different Measures of UI Generosity

The table reports coefficient estimates of weighted least square regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock using as weights the population in 2000. The full sample includes the period 1999-2013. In Panel A, instead, we employ the replacement rate times the take-up rate as measured from CPS. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. We control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Panel A - Replacement Rate x Take-Up

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.05*	-0.10*	0.02	-0.21***	-0.05**
	(0.03)	(0.05)	(0.03)	(0.08)	(0.03)
Bartik Shock	1.26***	0.53***	1.84***	1.73***	1.25***
	(0.07)	(0.11)	(0.21)	(0.24)	(0.07)
Observations	46,050	46,050	46,050	33,755	46,050
R-squared	0.08	0.01	0.01	0.03	0.08
Number of fips	3,070	3,070	3,070	3,070	3,070

Panel B -UI Generosity = Max Weekly Benefit / Average Weekly Wage

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.07**	-0.12**	0.00	-0.40***	-0.13***
	(0.03)	(0.06)	(0.04)	(0.10)	(0.03)
Bartik Shock	1.25***	0.50***	1.83***	1.62***	1.19***
	(0.08)	(0.11)	(0.22)	(0.24)	(0.07)
Observations	46,050	46,050	46,050	33,755	46,050
R-squared	0.08	0.01	0.01	0.03	0.08
Number of Counties	3,070	3,070	3,070	3,070	3,070

Table 7

Robustness II: State Level Evidence

The table reports coefficient estimates of weighted least square regressions relating economic activity measured at the state level to the unemployment insurance generosity and Bartik shock using as weights the population in 2000. Panel A shows the results for the Replacement Rate while Panel B consider the unconditional measure of take-up times the Replacement Rate. In Columns 1-3 the dependent variable is employment growth, and employment growth in the non-tradable and tradable sector. Columns 4-6 distinguish between total consumption growth, durable goods and car sales. Car sales is the dollar amount spend on cars as provided by the BEA. Column 7 reports the results for income growth. The data is provided by BEA, and the full sample includes the period 1999-2013. In all columns we control for state and year fixed effects and the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Panel A - Replacement Rate

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Total Consumption Growth*	*Durable Goods Growth*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.04	-0.11***	-0.04	-0.03*	-0.07*	-0.12**	-0.05**
	(0.03)	(0.04)	(0.03)	(0.02)	(0.04)	(0.05)	(0.02)
Bartik Shock	1.16***	0.20	2.55***	0.70***	2.14***	2.29***	1.27***
	(0.20)	(0.26)	(0.41)	(0.15)	(0.26)	(0.42)	(0.25)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	765	765	765	765	765	765	765
R-squared	0.16	0.09	0.10	0.19	0.21	0.25	0.14
Number of States	51	51	51	51	51	51	51

Panel B - Replacement Rate x Take-Up

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employment Growth	*Employment in Non-Tradable*	*Employment in Tradable Sector*	*Total Consumption Growth*	*Durable Goods Growth*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.07*	-0.08*	-0.07**	-0.03**	-0.03	-0.01	-0.08***
	(0.04)	(0.05)	(0.04)	(0.02)	(0.04)	(0.07)	(0.02)
Bartik Shock	1.11***	0.20	2.49***	0.69***	2.17***	2.39***	1.22***
	(0.20)	(0.26)	(0.41)	(0.15)	(0.25)	(0.40)	(0.25)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	765	765	765	765	765	765	765
R-squared	0.16	0.08	0.10	0.19	0.21	0.24	0.14
Number of States	51	51	51	51	51	51	51

Table 8

Robustness III: Commuting Zone

The table reports coefficient estimates of regressions relating the main dependent variables at the commuting zone level to the unemployment insurance generosity and Bartik shock to the tradable sector. The full sample includes the period 1999-2013. Panel A shows the results for the Replacement Rate while Panel B consider the unconditional measure of Replacement Rate. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. We control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the CZ level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Panel A - Replacement Rate

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.06***	-0.15***	-0.02	-0.24***	-0.04**
	(0.02)	(0.03)	(0.03)	(0.05)	(0.02)
Bartik Shock	0.92***	0.60***	1.10***	2.03***	0.91***
	(0.08)	(0.11)	(0.22)	(0.32)	(0.11)
CZ Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	10,390	10,395	10,361	7,623	10,395
R-squared	0.07	0.07	0.01	0.04	0.06
Number of Counties	693	693	693	693	693

Panel B - Replacement Rate x Take-Up

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.04***	-0.15***	-0.02	-0.22***	-0.07***
	(0.02)	(0.03)	(0.03)	(0.07)	(0.02)
Bartik Shock	0.92***	0.59***	1.09***	1.99***	0.89***
	(0.09)	(0.11)	(0.22)	(0.33)	(0.11)
CZ Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	10,390	10,395	10,361	7,623	10,395
R-squared	0.07	0.06	0.01	0.04	0.06
Number of Counties	693	693	693	693	693

Table 9

Robustness IV: State-Level Policies

The table reports coefficient estimates of regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock controlling for other state policies. We control for the presence of right-to-work laws and the minimum wage in the state and their interaction with the Bartik shock. We also control for the interaction between the Bartik schock and the log of other government transfers. The full sample includes the period 1999-2013. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. We control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.05**	-0.10***	-0.00	-0.19***	-0.05*
	(0.03)	(0.03)	(0.03)	(0.07)	(0.03)
Bartik Shock × Right-to-Work	0.03	0.05	-0.01	0.17**	0.05
	(0.03)	(0.06)	(0.03)	(0.08)	(0.03)
Bartik Shock × Minimum Wage	0.06***	0.11***	0.01	0.11	0.00
	(0.02)	(0.03)	(0.02)	(0.08)	(0.02)
Bartik Shock × Other Transfers	-0.04*	-0.04	-0.01	-0.29***	-0.07**
	(0.02)	(0.04)	(0.02)	(0.06)	(0.03)
Bartik Shock	1.22***	0.46***	1.82***	1.49***	1.18***
	(0.08)	(0.11)	(0.22)	(0.23)	(0.08)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	46,050	46,050	46,050	33,755	46,050
R-squared	0.09	0.02	0.01	0.04	0.09
Number of Counties	3,070	3,070	3,070	3,070	3,070

Table 10

Robustness V: Sorting of Firms into States

The table reports coefficient estimates of regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock controlling for UI tax rate. We control for the difference between the max and min UI tax rate and its interaction with the Bartik shock as well as the Log of taxable wage base and the Bartik shock. The full sample includes the period 1999-2013. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. We control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.06**	-0.10**	-0.03	-0.27***	-0.05**
	(0.03)	(0.05)	(0.04)	(0.07)	(0.02)
Bartik Shock × (Tax Max – Tax Min)	-0.05*	-0.11**	0.02	-0.17**	-0.07***
	(0.03)	(0.04)	(0.03)	(0.08)	(0.02)
Bartik Shock × Log(Taxable Wage Base)	0.03	0.05	0.05	0.16***	0.01
	(0.02)	(0.04)	(0.03)	(0.06)	(0.02)
Bartik Shock	1.24***	0.49***	1.83***	1.65***	1.22***
	(0.07)	(0.10)	(0.21)	(0.23)	(0.08)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	46,050	46,050	46,050	33,755	46,050
R-squared	0.09	0.02	0.01	0.04	0.08
Number of Counties	3,070	3,070	3,070	3,070	3,070

Table 11

Robustness VI: Alternative Bartik shocks

The table reports coefficient estimates of regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock to the sectors other than construction and non-tradable sectors. The full sample includes the period 1999-2013. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. We control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
	-0.07**	-0.12***	-0.02	-0.27***	-0.08***
Bartik Shock × UI Generosity	(0.03)	(0.05)	(0.04)	(0.07)	(0.02)
Bartik Shock	0.89***	0.32***	1.53***	1.23***	0.89***
	(0.05)	(0.10)	(0.19)	(0.22)	(0.06)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	46,050	46,050	46,050	33,755	46,050
R-squared	0.07	0.01	0.01	0.02	0.07
Number of Counties	3,070	3,070	3,070	3,070	3,070

Table 12

Heterogeneous Effects I: Asymmetric Effects

The table reports coefficient estimates of regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock. The full sample includes the period 1999-2013. "Below Median Bartik Shock" identifies the bottom half in the magnitude of the Bartik shock after we take out the average for each county, while "Above Median Bartik Shock" identifies the top half. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. In all specifications we control for county and year fixed effects as well as the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Below Median Bartik Shock × UI Generosity	-0.06*	-0.16***	-0.01	-0.27***	-0.07***
	(0.04)	(0.05)	(0.04)	(0.09)	(0.02)
Above Median Bartik Shock × UI Generosity	-0.08***	-0.01	0.01	-0.19	-0.07
	(0.03)	(0.07)	(0.11)	(0.13)	(0.06)
Below Median Bartik Shock	1.24***	0.64***	2.17***	2.32***	1.01***
	(0.14)	(0.15)	(0.24)	(0.31)	(0.18)
Above Median Bartik Shock	1.27***	0.43***	1.59***	1.22***	1.42***
	(0.09)	(0.13)	(0.27)	(0.47)	(0.10)
Below Median Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Above Median Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	46,050	46,050	46,050	33,755	46,050
R-squared	0.08	0.02	0.01	0.04	0.10
Number of Counties	3,070	3,070	3,070	3,070	3,070

Table 13

Heterogeneity II : Unemployment Rate

The table reports coefficient estimates of regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock. We control for the lagged county unemployment rate as well as its interactions with the Bartik shock and the UI generosity. The full sample includes the period 1999-2013. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity × Lagged Unemployment Rate	-0.02*	-0.05*	0.02	-0.13	-0.03*
	(0.02)	(0.03)	(0.03)	(0.09)	(0.02)
Bartik Shock × UI Generosity	-0.07**	-0.13***	0.02	-0.33***	-0.09***
	(0.03)	(0.05)	(0.04)	(0.08)	(0.03)
Bartik Shock × Lagged Unemployment Rate	0.00	0.02	0.03	0.14	-0.09***
	(0.02)	(0.03)	(0.04)	(0.09)	(0.03)
UI Generosity × Lagged Unemployment Rate	0.00	0.00**	0.00	-0.00**	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Bartik Shock	1.11***	0.38***	1.67***	1.58***	1.11***
	(0.08)	(0.08)	(0.18)	(0.25)	(0.08)
Lagged Unemployment Rate	-0.01***	-0.01***	-0.01***	0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	46,456	46,456	46,456	34,018	46,456
R-squared	0.08	0.02	0.01	0.03	0.07
Number of Counties	3,098	3,098	3,098	3,097	3,098

For Online Publication

Appendix

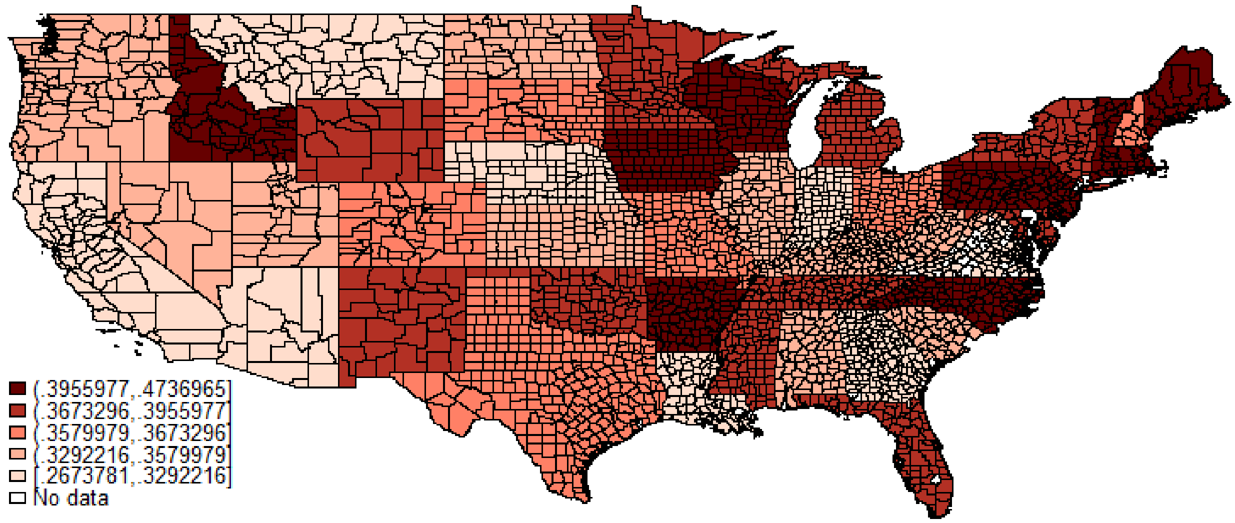

Figure 1.A UI Generosity: Replacement Ratio

This graph shows the unemployment insurance generosity in 2000, with darker states having more generous UI benefits. To measure the UI generosity we employ the Annual Social and Economic Supplement (ASEC) to the Current Population Survey (CPS). We thus calculate an empirical "income replacement ratio" as the ratio of average weekly benefits to average weekly wages. To keep the sample size for each state reasonable, we examine a five-year average over 1996-2000, which gives us the replacement ratio for those who actually receive benefits.

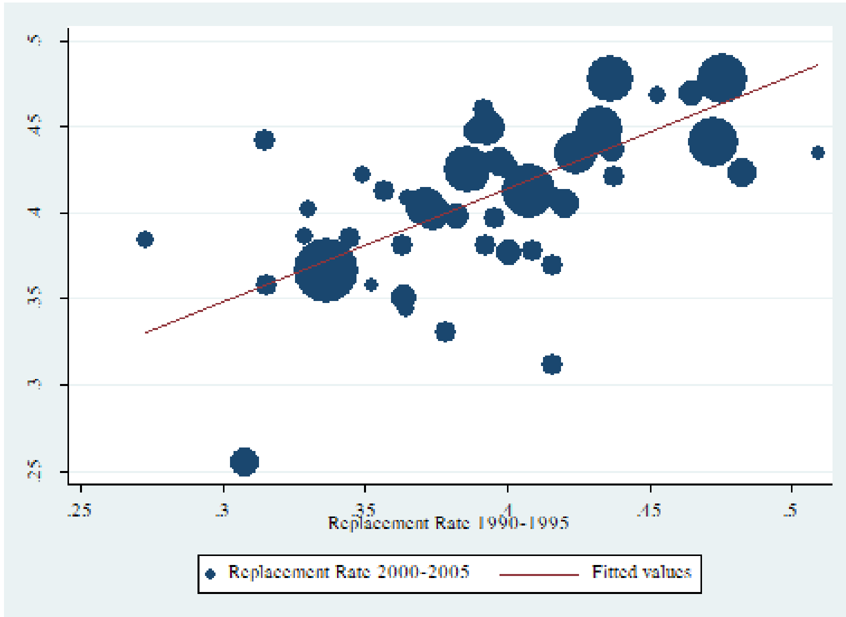

Figure 1.B Persistence of UI Generosity

This graph shows the correlation between the average replacement rate in the periods 2000-2005 and 1990-1995 for all counties weighted by population. Larger dots represent states with larger populations.

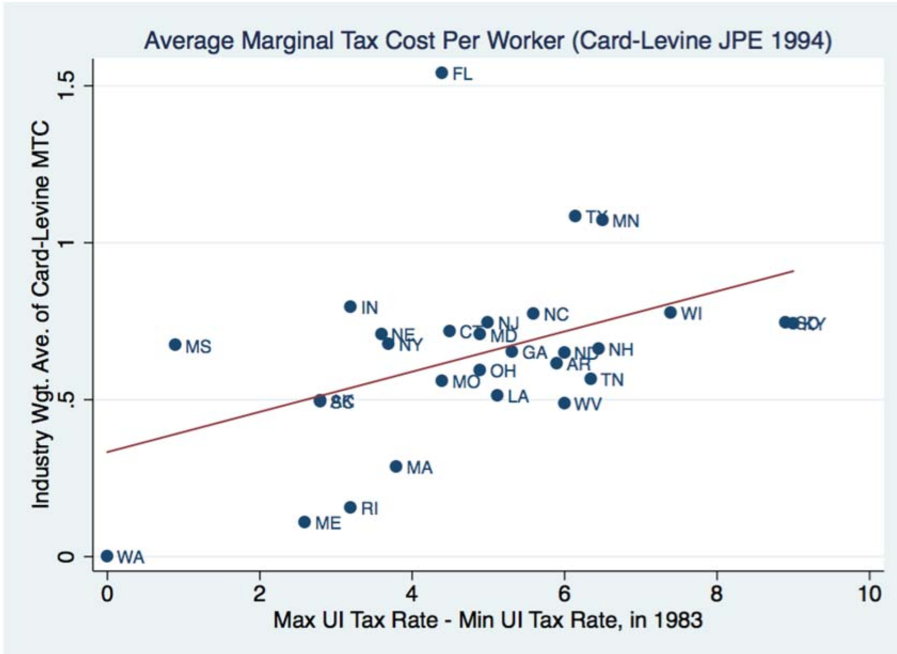

Figure 2.A Correlation between Max-Min UI Tax and Marginal Tax Cost

Figure plots the correlation between the difference between the maximum and the minimum UI tax rate and the industry weighted average marginal tax cost provided by Card and Levine (2000).

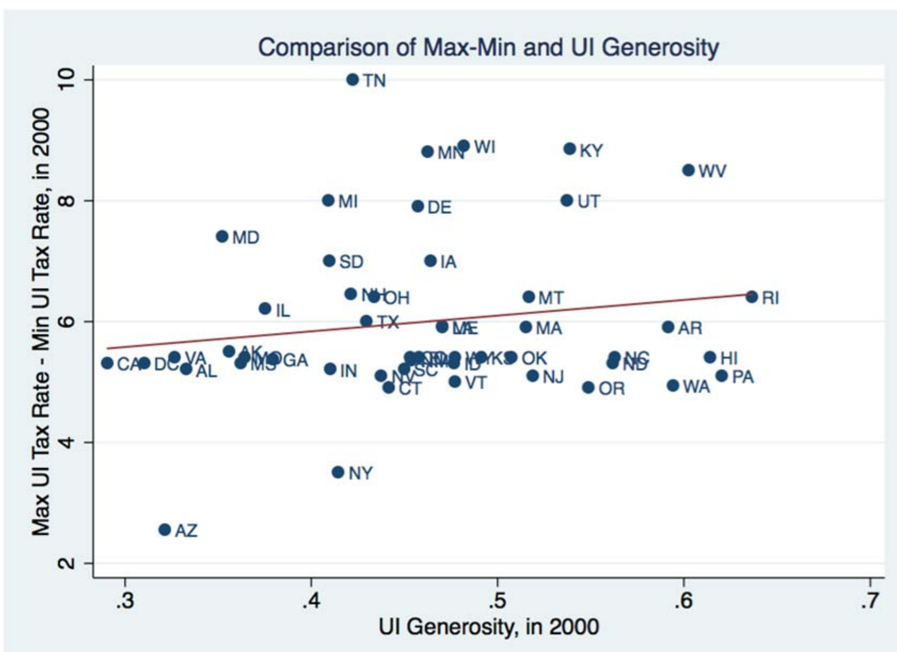

Figure 2.B UI Generosity and Max-Min UI Tax

Figure plots the correlation between the difference between the maximum and the minimum UI tax rate and the UI generosity in 2000.

Supplementary Appendix

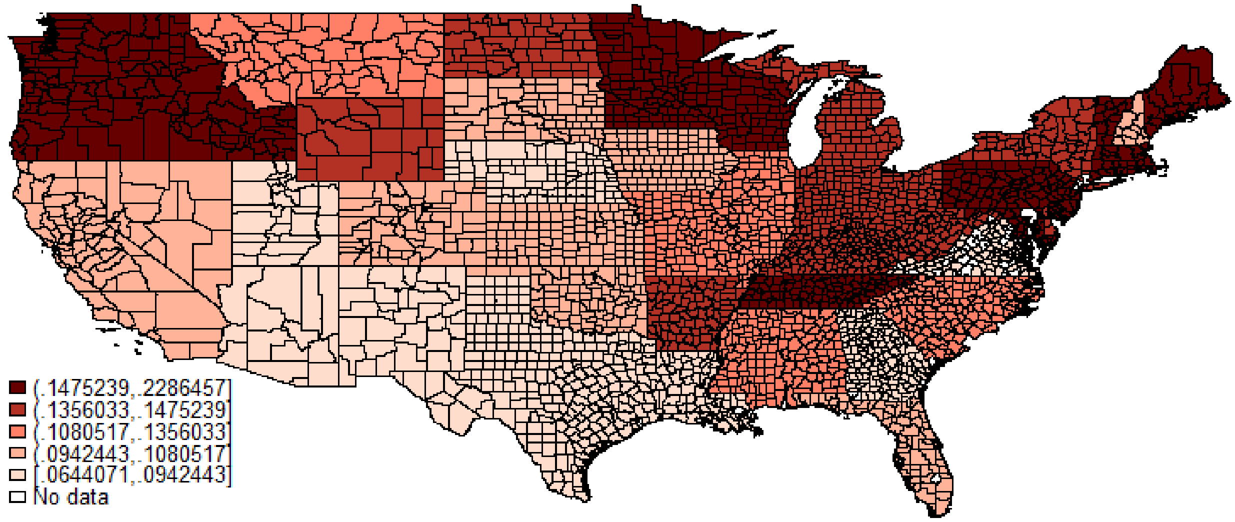

Figure SA.1 UI Generosity: Replacement Rate X Take-Up Rate

This graph shows the replacement rate times the take-up rate measure of unemployment insurance generosity, with darker regions having more generous UI benefits.

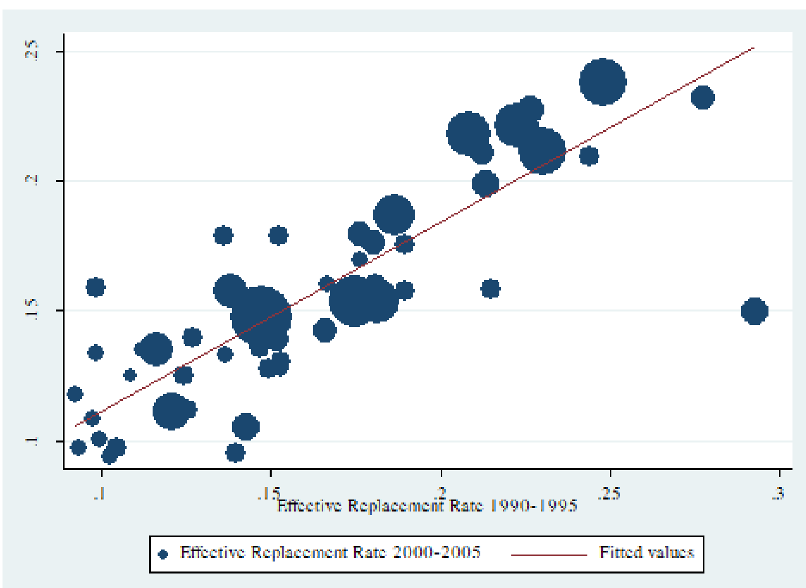

Figure SA.2 Persistence of UI Generosity

This graph shows the correlation between the average replacement rate in the periods 2000-2005 and 1990-1995 for all counties weighted by population.

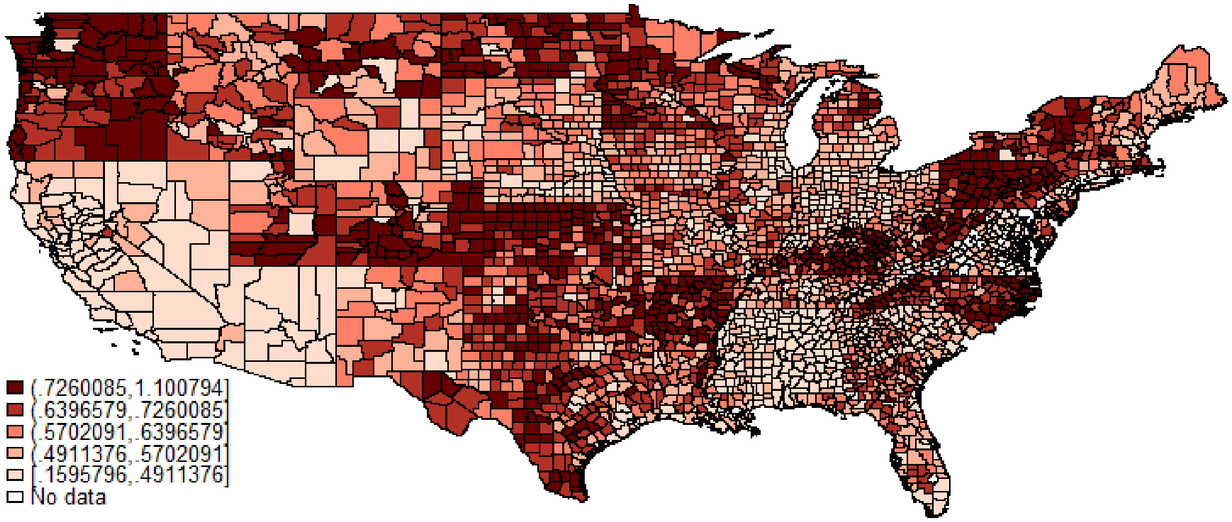

Figure SA.3 UI Generosity: Max Benefit/Average Wage

This graph shows the ratio of the maximum unemployment insurance weekly benefit and the average weekly wage as measured in 2000 for all counties, with darker regions having more generous UI benefits.

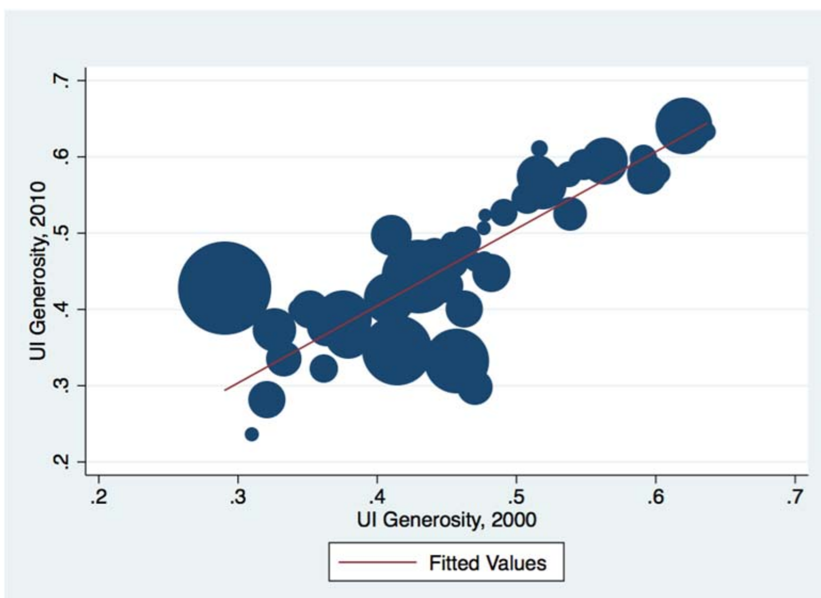

Figure SA.4 Persistence of UI Generosity

This graph shows the correlation between the unemployment insurance generosity in 2000 and in 2010 for all the counties weighted by population.

Table A.1

Summary Statistics

The table reports the summary statistics for the main variables for commuting zones. Panel A focus on the variables computed in 2000, while Panel B examines the variables over the period 1999-2013. The data on earnings growth and industrial composition is collected from the Bureau of Economic Analysis, while employment growth by industry for each county is computed using yearly data provided by the County Business Patterns (CBP). Data on average wages is provided by the BEA. R. L. Polk & Company records all new car sales in the United States and provides our measure of car sales. Democratic share unavailable at the county-level in Alaska. Alternative Bartik schock are the shocks to the sectors other than construction and non-tradable sectors.

Panel A. Static Variables in 2000

	(1) N	(2) Mean	(3) St. Dev	(4) p1	(5) p10	(6) p50	(7) p90	(8) p99
Max Weekly Benefit	709	297.4	63.15	190.0	226.2	287.4	408.0	431.0
Number of Weeks	709	26.17	0.760	26.00	26.00	26	26.00	30.00
Replacement Rate	709	0.365	0.0380	0.301	0.307	0.367	0.414	0.440
Replacement Rate x Take-Up Rate	709	0.132	0.0391	0.0723	0.0942	0.125	0.186	0.229
Max Weekly Benefit/Average Weekly Wage	709	0.408	0.110	0.216	0.271	0.397	0.560	0.696
Share of Employees in Construction Sector	709	0.0559	0.0125	0.0246	0.0410	0.0550	0.0709	0.0980
Share of Employees in Manufacturing Sector	709	0.115	0.0543	0.0217	0.0570	0.112	0.185	0.272
Share of Employees in Services Sector	709	0.554	0.0694	0.363	0.457	0.567	0.633	0.671
Share of Employees in Government Sector	709	0.140	0.0459	0.0874	0.0998	0.123	0.205	0.311
Log of Median Income	707	10.68	0.219	10.15	10.39	10.70	10.97	11.10
Share of Self-Employed workers	709	0.169	0.0385	0.113	0.133	0.159	0.211	0.305
Share of High School graduates	709	79.80	6.082	62.33	72.13	80.60	86.29	90.33
Share of College Graduates	709	23.38	7.299	10.28	14.05	23.21	34.24	43.74
Democratic Share	693	0.485	0.101	0.246	0.357	0.482	0.602	0.702
Population	709	3.139e+06	4.180e+06	38,860	166,079	1.573e+06	8.705e+06	1.645e+07

Panel B. Dynamic Variables

Bartik Shock (1998 as base year)	10,635	-0.00247	0.0261	-0.0724	-0.0460	0.00602	0.0250	0.0326
Alternative Bartik Shock	10,635	0.00146	0.0224	-0.0647	-0.0334	0.00675	0.0241	0.0338
Employment Growth	10,623	0.00457	0.0301	-0.0790	-0.0345	0.00801	0.0363	0.0696
Employment in Non-Tradable Sector Growth	10,635	-0.0167	0.101	-0.415	-0.0561	0.00874	0.0433	0.0821
Employment in Tradable Sector Growth	10,596	-0.0214	0.0711	-0.204	-0.101	-0.0198	0.0459	0.172
Income Growth	10,635	0.0390	0.0371	-0.0649	-0.00168	0.0404	0.0793	0.127
Car Sales Growth	7,790	-0.0241	0.113	-0.306	-0.191	-0.0157	0.106	0.242
Average Wages Growth	10,635	0.0294	0.0255	-0.0338	0.00241	0.0290	0.0548	0.0975
Unemployment Growth	10,605	0.169	0.522	-0.406	-0.278	0.00816	0.858	1.992
Labor Force Growth	10,635	0.00715	0.0173	-0.0375	-0.0117	0.00720	0.0250	0.0541

Table A.2

Summary Statistics

The table reports the summary statistics for the main variables collected at the state level. Panel A focus on the variables computed in 2000, while Panel B examines the variables over the period 1999-2013. The data on earnings growth and industrial composition is collected from the Bureau of Economic Analysis, while employment growth by industry for each county is computed using yearly data provided by the County Business Patterns (CBP). Data on average wages is provided by the BEA. R. L. Polk & Company records all new car sales in the United States and provides our measure of car sales. Democratic share unavailable at the county-level in Alaska. Alternative Bartik schock are the shocks to the sectors other than construction and non-tradable sectors.

Panel A. Static Variables in 2000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	N	Mean	St. Dev	p1	p10	p50	p90	p99
Max Weekly Benefit	51	297.3	64.86	190	230	284	408	441
Number of Weeks	51	26.17	0.824	26	26	26	26	30
Replacement Rate	51	0.364	0.0395	0.301	0.307	0.367	0.414	0.440
Replacement Rate x Take-Up Rate	51	0.132	0.0399	0.0723	0.0930	0.123	0.186	0.229
Max Weekly Benefit/Average Weekly Wage	51	0.447	0.0962	0.293	0.293	0.444	0.593	0.636
Share of Employees in Construction Sector	51	0.0568	0.00842	0.0434	0.0451	0.0531	0.0675	0.0762
Share of Employees in Manufacturing Sector	51	0.115	0.0368	0.0378	0.0608	0.106	0.164	0.191
Share of Employees in Services Sector	51	0.559	0.0438	0.458	0.499	0.550	0.618	0.636
Share of Employees in Government Sector	51	0.138	0.0221	0.111	0.121	0.133	0.167	0.210
Log of Median Income	51	10.65	0.128	10.30	10.49	10.65	10.78	10.91
Share of Self-Employed workers	51	0.168	0.0212	0.139	0.147	0.165	0.190	0.222
Share of High School graduates	51	80.37	3.797	72.86	75.65	80.61	86.02	87.95
Share of College Graduates	51	24.39	3.927	16.66	19.41	23.53	29.78	33.19
Democratic Share	51	48.27	7.381	27.60	38	48.50	56.50	60.20
Population	51	1.231e+07	9.923e+06	642,023	2.848e+06	8.431e+06	3.399e+07	3.399e+07

Panel B. Dynamic Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	N	Mean	St. Dev	p1	p10	p50	p90	p99
Bartik Shock (1998 as base year)	765	0.00382	0.0232	-0.0640	-0.0279	0.0104	0.0267	0.0332
Alternative Bartik Shock	765	0.00493	0.0215	-0.0574	-0.0295	0.0117	0.0251	0.0336
Employment Growth	765	0.00633	0.0254	-0.0685	-0.0289	0.0111	0.0345	0.0562
Employment in Non-Tradable Sector Growth	765	0.00454	0.0261	-0.0701	-0.0265	0.00765	0.0349	0.0617
Employment in Tradable Sector Growth	765	-0.0239	0.0437	-0.145	-0.0872	-0.0178	0.0238	0.0629
Income Growth	765	0.0394	0.0314	-0.0586	0.00605	0.0398	0.0752	0.118
Total Consumption Growth	765	0.0450	0.0240	-0.0253	0.0239	0.0457	0.0733	0.0924
Durable Consumption Growth	765	0.0322	0.0493	-0.105	-0.0491	0.0418	0.0825	0.129
Car Sale Growth	765	0.0199	0.0693	-0.187	-0.0778	0.0346	0.0896	0.146

Table A.3

Lags of Main Variables

The table reports coefficient estimates of regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock. The full sample includes the period 1998-2013. The measure of UI generosity is the Replacement Rate. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector, respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. We also include the lagged Bartik shock, as well as the lagged dependent variable and the lagged interaction term. We also control for the interaction between the Bartik shock (as well as the lagged bartik shock) and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.06**	-0.10**	0.01	-0.28***	-0.07***
	(0.03)	(0.05)	(0.04)	(0.07)	(0.02)
Bartik Shock	1.13***	0.46***	1.86***	2.14***	0.99***
	(0.08)	(0.12)	(0.24)	(0.27)	(0.08)
Lagged (Bartik Shock × UI Generosity)	-0.03*	-0.05*	-0.04	0.13	-0.00
	(0.01)	(0.03)	(0.03)	(0.08)	(0.02)
Lagged (Bartik Shock)	0.38***	0.45***	0.36***	0.18	0.42**
	(0.09)	(0.10)	(0.11)	(0.36)	(0.19)
Lagged Employment Growth	-0.07***				
	(0.02)				
Lagged Employment in Non-Tradable Sector		-0.21***			
		(0.02)			
Lagged Employment in Tradable Sector			-0.17***		
			(0.01)		
Lagged Car Sales				-0.08*	
				(0.04)	
Lagged Earnings Growth					-0.03
					(0.04)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Lagged Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	42,980	42,980	42,980	30,681	42,980
R-squared	0.09	0.07	0.04	0.05	0.09
Number of Counties	3,070	3,070	3,070	3,070	3,070

Table A.4

Alternative Measures of UI Generosity

The table reports coefficient estimates of weighted least square regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock. The full sample includes the period 1999-2013. Panel A employs the log of the maximum UI weekly benefit as proxy for the UI generosity. Panel B uses an alternative measure provided by the BLS defined as the weekly benefit amount divided by the average wage of UI recipients. In Columns 1 the dependent variable is employment growth, in Columns 2 it is employment growth in the non-tradable sector, while in Columns 3 we investigate the effect of UI and Bartik shock on the employment in the tradable sectors. In Columns 4 we analyze the effect of UI on car sales growth as provided by Polk, while in Columns 5 the dependent variable is earnings growth. In all columns we control for county and year fixed effects as well as by the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

Panel A - UI Generosity = Log(Max Weekly Benefits)

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × Log(Max Weekly Benefits)	-0.05	-0.09*	0.00	-0.23**	-0.06*
	(0.03)	(0.05)	(0.03)	(0.10)	(0.03)
Bartik Shock	1.25***	0.50***	1.83***	1.66***	1.22***
	(0.08)	(0.11)	(0.22)	(0.25)	(0.08)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	46,050	46,050	46,050	33,755	46,050
R-squared	0.08	0.01	0.01	0.03	0.08
Number of counties	3,070	3,070	3,070	3,070	3,070

Table A.5

Excluding the Financial Crisis

The table reports coefficient estimates of regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock. The full sample includes the period 1999-2007. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. We control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.07**	-0.11**	-0.06	-0.29**	-0.02
	(0.03)	(0.05)	(0.07)	(0.13)	(0.04)
Bartik Shock	1.31***	0.46***	1.92***	0.99**	1.16***
	(0.12)	(0.15)	(0.28)	(0.47)	(0.11)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	27,630	27,630	27,630	21,480	27,630
R-squared	0.08	0.01	0.01	0.01	0.09
Number of Counties	3,070	3,070	3,070	3,069	3,070

Table A.6

State-Specific Trends

The table reports coefficient estimates of regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock controlling for state-specific trends. The full sample includes the period 1999-2013. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. We control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.06**	-0.12***	-0.03	-0.30***	-0.07***
	(0.03)	(0.04)	(0.04)	(0.07)	(0.02)
Bartik Shock	1.19***	0.46***	1.76***	1.60***	1.08***
	(0.07)	(0.11)	(0.20)	(0.28)	(0.07)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
State Linear and Quadratic Trends	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	46,050	46,050	46,050	33,755	46,050
R-squared	0.07	0.01	0.01	0.03	0.07
Number of fips	3,070	3,070	3,070	3,070	3,070

Table A.7

State Level Evidence (No Year FE)

The table reports coefficient estimates of weighted least square regressions relating economic activity measured at the state level to the unemployment insurance generosity, as measured by the Replacement Rate, and Bartik shock using as weights the population in 2000. In Columns 1-3 the dependent variable is employment growth, and employment growth in the non-tradable and tradable sector. Columns 4-6 distinguish between total consumption growth, durable goods and car sales. Car sales is the dollar amount spend on cars as provided by the BEA. Column 7 reports the results for income growth. The data is provided by BEA, and the full sample includes the period 1999-2013. In all columns we control for state fixed effects and the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Total Consumption Growth*	*Durable Goods Growth*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.05	-0.10***	-0.06*	-0.03*	-0.08**	-0.13**	-0.06**
	(0.04)	(0.04)	(0.03)	(0.02)	(0.04)	(0.06)	(0.03)
Bartik Shock	0.95***	0.72***	1.24***	0.75***	1.16***	0.76***	1.04***
	(0.03)	(0.03)	(0.03)	(0.01)	(0.03)	(0.05)	(0.02)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	No	No	No	No	No	No
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	765	765	765	765	765	765	765
R-squared	0.80	0.47	0.46	0.57	0.33	0.10	0.64
Number of States	51	51	51	51	51	51	51

Table A.8

Unweighted Regressions

The table reports coefficient estimates of unweighted regressions relating the main dependent variables to the unemployment insurance generosity measured by the replacement rate and Bartik shock. In Panel A the full sample includes the period 1999-2013 and restrict attention to counties whose population is higher than 75 thousand. Panel B reports the results for unweighted regressions at the commuting zones level for CZ with a population higher than 150 thousand. In Column 1 the dependent variable is employment growth, while in Column 2 and 3 it is the employment growth in the non-tradable and tradable sector respectively. In Column 4 we investigate the effect of UI and Bartik shock on the car sales growth measure as provided by Polk. In Column 5 the dependent variable is the earnings growth. We control for the interaction between the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	Geographical Level= Counties				
	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.03	-0.07*	0.01	-0.25***	-0.05**
	(0.03)	(0.04)	(0.05)	(0.07)	(0.02)
Bartik Shock	1.26***	0.52***	1.90***	1.82***	1.23***
	(0.07)	(0.09)	(0.28)	(0.24)	(0.08)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	10,095	10,095	10,095	7,403	10,095
R-squared	0.08	0.01	0.02	0.04	0.10
Number of Counties	673	673	673	673	673

	Geographical Level= Commuting Zones				
Bartik Shock × UI Generosity	-0.01	-0.06***	-0.00	-0.18***	-0.03**
	(0.01)	(0.02)	(0.03)	(0.06)	(0.01)
Bartik Shock	0.86***	0.58***	1.17***	1.79***	0.96***
	(0.06)	(0.07)	(0.20)	(0.24)	(0.06)
CZ Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	4,530	4,530	4,530	3,322	4,530
R-squared	0.08	0.04	0.02	0.03	0.08
Number of Counties	302	302	302	302	302

Table A.9

Clustered at the County Level

The table reports coefficient estimates of weighted least square regressions relating the main dependent variables to the unemployment insurance generosity and Bartik shock using as weights the population in 2000. The full sample includes the period 1999-2013. In Columns 1 the dependent variable is employment growth, in Columns 2 it is employment growth in the non-tradable sector, while in Columns 3 we investigate the effect of UI and Bartik shock on the employment in the tradable sectors. In Columns 4 we analyze the effect of UI on car sales growth as provided by Polk, while in Columns 5 the dependent variable is earnings growth. In all columns we control for county and year fixed effects as well as the interaction of the Bartik shock and the controls. Controls include the fraction of employees in construction, manufacturing, government (which includes federal, military, state and local government), self-employed and services industries as well as the log of median income,democratic share and the fraction of individuals with high-school and college degree. Standard errors are clustered at the state level. Asterisks denote significance levels (***=1%, **=5%, *=10%).

	(1)	(2)	(3)	(4)	(5)
	Employment Growth	*Employment in Non-Tradable Sector*	*Employment in Tradable Sector*	*Car Sales*	*Earnings Growth*
Bartik Shock × UI Generosity	-0.06***	-0.12***	-0.01	-0.27***	-0.07***
	(0.01)	(0.02)	(0.03)	(0.05)	(0.02)
Bartik Shock	1.25***	0.51***	1.82***	1.69***	1.23***
	(0.06)	(0.07)	(0.14)	(0.20)	(0.06)
County Fixed Effects	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Bartik Shock × Controls	Yes	Yes	Yes	Yes	Yes
Observations	46,050	46,050	46,050	33,755	46,050
R-squared	0.08	0.02	0.01	0.03	0.08
Number of Counties	3,070	3,070	3,070	3,070	3,070

1 Technical Appendix

1.1 Construction of the Bartik Shocks

Our construction of the Bartik shock using County Business Pattern (CBP) data proceeds in five steps. A brief-description of each step is below. We calculate the shocks separately at the state, Commuting Zone (CZ) and county levels. Note: we have only tested the code up to NAICS 4-digit aggregation.

1.1.1 Step 1: Create bridges for each NAICS change

There are minor changes in NAICS codes in 2002 and 2007. This step creates an employment-weighted bridge for each NAICS cell. We download bridges from the Census. [1] The SIC-NAICS mapping will always be problematic, but the NAICS changes are relatively minor and the weighted mappings seem to work well.

There was also a change in NAICS codes in 2012, but the Census Core Statistics bridge will not be released until June 2016.[2]

1.1.2 Step3. Combine bridges

This step combines all the weighted bridges constructed above: NAICS1997 to NAICS 2002, and NAICS2002 to NAICS2007.

1.1.3 Step 4. Load and clean CBP data

This step loads and cleans the raw County Business Patterns (CBP) data.[3]

Many smaller counties and industries have employment data that are suppressed by the Census Bureau for privacy reasons. In these cases, we use the number of establishments multiplied by the midpoint of the number of employees in each size class.

[1] http://factfinder.census.gov/ (IDs: EC0700CBDG1, EC0700CBDG2, EC0200CBDG1, EC0200CBDG2).

[2] See here for an update: http://www.census.gov/econ/census/help/sector/core_business_statistics_series.html

[3] Raw CBP data are downloaded from: http://www.census.gov/econ/cbp/download/

If the selected level of geography is a Commuting Zone (CZ), this step also recodes county FIPS codes to their 2000 FIPS membership, for matching with the county-CZ bridge downloaded from http://www.ers.usda.gov/data-products/commuting-zones-and-labor-market-areas.aspx

We replace any missing Geography X Industry X Year cell with a 0.

1.1.4 Step5 - Construct Bartik Shock

This step constructs the Bartik shocks for each of the two datasets with different balance assumptions. The Bartik shock is defined as:

$$b_{i,t} = \sum_k \phi_{i,k,\tau} \times [(\nu_{-i,k,t} - \nu_{-i,k,t-1})/\nu_{-i,k,t-1}]$$

Where: $\phi_{i,k,\tau}$ is the employment share of industry k in geography i, $\nu_{-i,k,t}$ is the national employment share of industry k excluding geography i. τ is the base year, described in more detail below.

First, we construct employment growth rates by industry, leaving out employment in the geography (the term in square brackets above).

Second, we construct the industry weights using base year as 1998. We have also tried different base years going back to 1989 and the result is mainly unchanged. We also construct separate weights when we exclude non-tradable industries and construction.

Finally, we multiply the growth rates by the weights and sum over all industries in a given geography and year. We also do this separately for the non-tradable industries.

1.2 Construction of Replacement Ratio and Take-Up Rate

We calculate replacement rates for unemployment insurance and other public benefits using the Annual Social and Economic Supplement (ASEC) to the Current Population Survey (also known as the March CPS). We download the relevant variables from the Minnesota

Population Center's Integrated Public Use Microdata Series (IPUMS-CPS).[4] The March CPS asks households about income from unemployment insurance and labor earnings over the previous year, as well as weeks worked and weeks unemployed over the previous year.

For the sample of households who report at least one week of unemployment, we use these variables to calculate an unemployment insurance effective "take-up" rate and an effective "replacement ratio."

We define the take-up rate as reporting positive UI benefits last year. An individual who reported positive weeks of unemployment and who reported no UI benefits last year is classified as not taking up UI. Reasons for not taking up UI include ineligibility for benefits, administrative costs (such as applying and submitting work logs), among other reasons.

The replacement ratio is defined as follows:

replacement ratio = ($ UI Benefits last year / Weeks unemployed last year) / ($ Labor Income last year / Weeks Worked last year)

The numerator is the average weekly benefit amount, and the denominator is the average weekly wage. Again, the replacement rate is defined only for people who reported at least 1 week of unemployment.

We make a few sample restrictions: We restrict to people in the labor force (working or unemployed) for all weeks in the year. So that the weekly wage is well estimated, we restrict the sample to people who worked at least 6 months out of the year.

We pool samples from survey years 1997-2001 (which actually refer to calendar years 1996-2000 since the survey is retrospective) to get reasonable sample sizes at the state level and calculate the mean replacement ratio and takeup rate by state.

[4] Miriam King, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick. Integrated Public Use Microdata Series, Current Population Survey: Version 3.0. [Machine-readable database]. Minneapolis, MN: Minnesota Population Center [producer and distributor], 2010.

1.3 Definition of Tradable Industries, Non-tradable Industries and Construction Sector

We follow Mian and Sufi (2015) definition of tradable and non-tradable sectors. Here we should emphasize that there will be man y industries that are not classied neither as a tradable industry nor as a non-tradable.

Tradable industries are defined as any industry with the NAICs code equal to: 1132 1141 2111 2121 2122 2123 3111 3112 3113 3114 3115 3116 3117 3118 3119 3121 3122 3131 3132 3133 3335 3149 3151 3152 3159 3161 3162 3169 3221 3222 3231 3241 3251 3252 3253 3254 3255 3256 3259 3261 3262 3271 3272 3279 3311 3313 3314 3315 3322 3324 3325 3326 3327 3329 3331 3332 3333 3334 3335 3336 3339 3341 3342 3343 3344 3345 3346 3351 3352 3353 3359 3361 3362 3363 3364 3365 3366 3369 3372 3391 3399 5112.

These mainly include agriculture, mining, manufacturing and software publishers.

Non-tradable industries are any industry with the NAICS code equal to: 4451 4452 4453 4461 4471 4481 4482 4483 4511 4512 4521 4529 4531 4532 4533 4539 7221 7222 7223 7224 4411 4412 4413 4421 4422 4431.

These mainly includes retail trade and restaurants.

Finally construction is defined as any industry with NAICS code equalt to: 1133 2361 2362 2371 2372 2373 2381 2382 2383 2389 3211 3212 3219 3273 3323 3371 4233 4441 4442 5311 5312 5313 5413.