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Evidence from State Flagship College Towns

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Do Research Universities Recession-Proof Their Regions? Evidence from State Flagship College Towns

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Abstract

Using synthetic differences-in-differences models, we study whether U.S. counties containing state flagship universities experienced resiliency via lower unemployment rates during the past three U.S. recessions. We find an insignificant effect for the 2001 recession and a large resiliency effect for the 2008-2009 recession. However, counties with flagship universities faced higher unemployment rates during the 2020 recession, and were therefore less resilient to the Covid-19 recession than other counties. These results support the hypothesis that stable consumption demand for non-tradables drives resiliency, which was absent during the 2020 recession when most university campuses were closed to students due to Covid-19 restrictions.

Keywords: Regional Business Cycles, Unemployment, Research Universities, Regional Resilience.

JEL Codes: R11, R23, R53.

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1 Introduction

Resilient regions are able to absorb destabilizing economic shocks without suffering persistent distress (Martin, 2012). This characteristic of local economies became increasingly important in policy discussions after the great recession, as a desirable outcome of place-based policies due to the enduring negative impacts that recessions can wreak on regional labor markets (Martin & Sunley, 2015; Hershbein & Stuart, 2022). Regional scholars and economic geographers have continued to explore the determinants of regional resilience after the Covid-19 pandemic (Kim et al., 2023).

Are there certain features of regional economies that make them more resilient? Recently, Howard et al. (2022) and Gagliardi et al. (2023) suggest that higher shares of college graduates and universities provided resiliency for manufacturing-dependent 'rust belt' regions during manufacturing's secular decline in the richest industrialized nations over the second half of the twentieth century. Is it possible that universities provided a cushion against more recent destabilizing events, such as the dot-com recession, the great recession, or the Covid-19 pandemic? Popular opinion answers in the affirmative, at least after 2008:

> "While college towns have long been considered recession-resistant, their ability to avoid the depths of the financial crisis shaking the rest of the nation is noteworthy . . . College towns like Morgantown have a distinct advantage over many other cities: They enjoy a constant stream of graduates, some who stay put and others who return years later – and each year brings a new crop of students and potential residents to the area." (Evans, 2009).

This popular view is *prima facie* plausible, as industry mix has historically been predictive of a region's sensitivity to negative shifts in the business cycle (Domazlicky, 1980; Owyang et al., 2005). In particular, manufacturing areas tend to suffer more severe recessions than local economies dominated by education or healthcare (Scavette, 2019). But we do not know whether the presence of universities *per se* makes regions resilient to recessionary shocks.

This is the question we seek to answer. Specifically, we examine the resilience of local economies in the aftermath of the last three U.S. recessions over three-year treatment horizons: the dot-com recession (2001-2003), the great recession (2008-2010), and the Covid-19 recession (2020-2022). In doing so, we examine whether the presence of a flagship research university makes a county more or less resilient to these events, where resilience is measured by a negative treatment effect on the local unemployment rate compared to control counties.

Our empirical approach is to use synthetic difference-in-differences models (Arkhangelsky et al., 2021) with data from the Bureau of Labor Statistics to compare changes in state flagship counties' unemployment rates to other U.S. counties that do not contain R1 or R2 research universities, the highest tiers of research universities. We focus on state flagship universities rather than private research universities, since the former tend to be located in smaller cities or rural areas and (unlike state branch university campuses) were not primarily sited with a view to local economic conditions. The identifying assumption is that the nation's other counties form a valid counterfactual for state flagship counties after conditioning on county fixed effects, year fixed effects, and differences in preexisting unemployment rate trends.

Our results suggest that the effect of flagship universities on regional resilience varies across the last three U.S. recessions. State flagship universities had an insignificant effect on their county unemployment rates during the dot-com recession and a large negative effect (-0.5 percentage point) during the great recession. However, state flagship counties tended to experience higher unemployment rates (+0.5 percentage point) in the aftermath of the Covid-19 recession. Universities do not, therefore, have a uniformly positive effect on regional resiliency. Instead, their effects are heterogeneous across different types of recessions.

These results speak to the wider literature in various ways. At a broad level, the long-run economic growth of nations ultimately depends on their policy choices with regard to investments in human, physical and intangible capitals (Romer, 1986; Lucas, 1988; Ortigueira & Santos, 1997), and regional economies reap similar benefits through place-based education and research and development expenditure (Gennaioli et al., 2012; Schweiger et al., 2022). The presence of research universities should, therefore, be consequential for the economic trajectories of their encompassing regions through their knowledge production activities. Prominent examples include the high-tech industry clusters in Silicon Valley (e.g., Stanford and UC Berkeley) and Pittsburgh (e.g., Carnegie Mellon and U of Pittsburgh) that were fostered by the shared research efforts and hiring of skilled graduates from nearby universities (Bartik, 2021; Duranton, 2011).

Recent studies do indeed find positive effects of universities on long-term regional economic growth (Cantoni & Yuchtman, 2014; Valero & Van Reenen, 2019). In contrast, research investigating the direct impact of universities on local labor market activity is mixed, with Beeson & Montgomery (1993) and Berlingieri et al. (2022) finding little impact of universities on employment, wages, or income. Ferhat (2022) finds heterogeneous impacts of French university openings on regional labor market outcomes, such that only economically distressed regions experience significant employment and wage effects.

A recent paper that is closely related to our research question is Howard et al. (2022). They exploit variability in the location of asylums and educational establishments in the late 19th and early 20th centuries to estimate the effect that universities had on local resilience some decades later. They find that much of the resilience effect from regional public universities is due to consumption within non-tradable sectors. In particular, the stability of consumption by the university population (faculty, students, and staff) may offer a short-term recession buffer for their surrounding local economy.

This mechanism is plausible, as the employment of faculty and other staff in universities is highly dependent on government funding via student enrollment through state appropriations and student loans from the U.S. Department of Education. Similarly, while state appropriations are sensitive to the business cycle, student enrollment at universities tends to be countercyclical, with more students enrolling during recessions than expansions (Humphreys, 2000; Betts & McFarland, 1995; Dellas & Koubi, 2003). Therefore, much of the local demand by students and faculty is driven by income derived outside of the regional economy, and is likely to be somewhat insensitive to fluctuations in the national economy. As a result, consumption by students and faculty raises the demand for local nontradable goods and services (Felsenstein, 1996; Lee, 2019), quite aside from the longer-term effects of universities on human capital formation (Abel & Deitz, 2011; Amendola et al., 2020; Cantoni & Yuchtman, 2014) or research and development activities and other local knowledge spillovers (Andersson et al., 2009; Kantor & Whalley, 2014; Hausman, 2022).

Our results provide supporting evidence for this mechanism. While the U.S. economy suffered a major negative consumption shock during the great recession, the dot-com recession was unusual in that overall consumption did not decline, so universities had no negative consumption shock from which to insulate their local economies. In comparison, the Covid-19 recession featured the absence of students from university campuses due to pandemic restrictions that compounded the negative demand shock locally. Thus, the importance of staff and student populations stabilizing demand for local nontradable goods and services is consistent with our findings of zero resiliency effect during the dot-com recession, a sizeable positive effect during the great recession, and a negative effect during the Covid-19 recession.

The rest of the paper is organized as follows. In section 2 we discuss the background of research universities in the United States, and in particular the choice of their location within states. We then outline our empirical approach in section 3 and discuss our results in section 4, which incorporates a range of robustness checks (supported by three online appendices) and two sets of illustrative synthetic control case studies. Section 5 considers our results in light of the wider literature, and section 6 concludes.

2 Research universities in the United States

Research universities are post-secondary higher education institutions that emphasize knowledge production as a core component of their activities through the academic research of their faculty and the training of doctoral students across various disciplines. Research universities emerged in early nineteenth century Prussia as teaching institutions, which were previously only concerned with the transmission of knowledge, began to incorporate the production of knowledge within the humanities (Atkinson & Blanpied, 2008).

The model for the American research university emerged in the latter half of the nineteenth century, when several U.S. institutions began to add specialized graduate programs to their undergraduate programs (Crow & Dabars, 2015).[1] The research-intensiveness within American universities was highly concentrated in these few schools until the second half of the twentieth century. In the aftermath of WW2, the U.S. federal government began to invest heavily into research and development across the nation's universities, either directly or through university-industry collaborations, which increased the number of universities that could be considered first-class research institutions (Atkinson & Blanpied, 2008).

The origin for many of America's most well-known public research universities is the 1862 Morrill Act, which provided federal funds to aid state development of post-secondary institutions (Croft, 2019). The legislation enabled the establishment of land-grant colleges for each state, funded from the sale of federal lands, which would be devoted to the teaching of agricultural and industrial arts. Several additional acts of legislation were subsequently passed to support research (the Hatch Act of 1887), historically Black colleges and universities (the Morrill Act of 1890), extension (the Smith-Lever Act of 1914), and tribal colleges and universities (the Equity in Educational Land-Grant Status Act of 1994), as discussed in Croft (2019). Many of the land-grant institutions that were established in the 1862 Morrill Act have become the primary public research universities in each of their respective states, or 'state flagship' universities.

A state flagship university indicates the leading institution within a network of state public universities. The flagship is typically the oldest, most selective, highest-enrolled, and most research-intensive public university within a state (Douglass, 2016). Flagships tend to receive high levels of research funding and investment from the state and federal governments. In its 2021 report, the Carnegie Classification of Institutions of Higher Education assigned its highest rating of R1 to forty-three state flagship universities, indicating very high research activity, while seven (in Alaska, Idaho, North Dakota, Rhode Island, South Dakota, Vermont, Wyoming) were designated with their second-highest rating of R2, indi-

[1] Crow & Dabars (2015) identify these universities as "five colonial colleges chartered before the American Revolution (Harvard, Yale, Pennsylvania, Princeton, and Columbia); five state universities (Michigan, Wisconsin, Minnesota, Illinois, and California); and five private institutions conceived from their inception as research universities (MIT, Cornell, Johns Hopkins, Stanford, and Chicago)" (pp. 17-18).

cating high research activity (ACE, 2024). Unlike many private research universities that were founded by benefactors or religious organizations in major U.S. cities (e.g., Boston U, Carnegie Mellon, Chicago, Johns Hopkins, Southern California, Vanderbilt), most flagship universities are located outside of the nation's largest metropolitan areas.

We focus on state flagship universities as they tend to be located in small to medium-sized cities and towns, where each should compose a larger share of its region's economy than a private research university in a major city. While there are a handful of exceptions (U of Minnesota, U of Washington, U of Hawaii, U of New Mexico, U of Utah), the vast majority of flagship universities are not located in their state's largest city. Public university branch campuses were eventually placed in larger cities to address regional economic growth and the growing demand for post-secondary education after the Second World War:

> "The original university builders had been suspicious of the cities, with their sinful distractions, so most early university campuses were located in rural, bucolic settings. They were, for the most part, built in places like Iowa City; Columbia, Missouri; Champaign-Urbana, Illinois; West Lafayette or Bloomington, Indiana; or Ann Arbor, Michigan or College Station. Some were built in the state capitals: Austin, Madison, Lincoln, St. Paul, or East Lansing. In any event, by the 1960s, it was clear that major cities did not have public universities to serve their rapidly expanding populations so branch campuses were built in Chicago, Milwaukee, Indianapolis, Kansas City, St. Louis, Boston, and elsewhere." (Berdahl, 1998).

Moreover, since enrollment at flagships tends to encompass more out-of-state students than the typical state college (June, 2024), their attraction of students and financial resources should be less sensitive to in-state regional conditions over the business cycle. And while the normal schools examined in Howard et al. (2022) (which eventually evolved into regional state colleges) were in part selected based on local demand for educational instruction, state flagship university locations were primarily chosen in rural areas or state capitals where public land was available or private land was affordable.

Table 1: State Flagship Universities

University	State	County Pop (%)	Rural-Urban	Morrill Act 1862	Carnegie Class
U OF ALABAMA	AL	21	3	NO	R1
U OF ALASKA	AK	9	3	YES	R2
U OF ARIZONA	AZ	5	2	YES	R1
U OF ARKANSAS	AR	13	2	YES	R1
U OF CALIFORNIA-BERKELEY	CA	3	1	YES	R1
U OF COLORADO BOULDER	CO	14	2	NO	R1
U OF CONNECTICUT	CT	24	1	YES	R1
U OF DELAWARE	DE	5	1	YES	R1
U OF FLORIDA	FL	25	2	YES	R1
U OF GEORGIA	GA	39	3	YES	R1
U OF HAWAII AT MANOA	HI	2	2	YES	R1
U OF IDAHO	ID	32	4	YES	R2
U OF ILLINOIS URBANA-CHAMPAIGN	IL	31	3	YES	R1
INDIANA U-BLOOMINGTON	IN	35	3	NO	R1
U OF IOWA	IA	27	3	NO	R1
U OF KANSAS	KS	29	3	NO	R1
U OF KENTUCKY	KY	13	2	YES	R1
LOUISIANA STATE U	LA	9	2	YES	R1
U OF MAINE	ME	9	3	YES	R1
U OF MARYLAND-COLLEGE PARK	MD	5	1	YES	R1
U OF MASSACHUSETTS-AMHERST	MA	23	2	YES	R1
U OF MICHIGAN-ANN ARBOR	MI	19	2	NO	R1
U OF MINNESOTA-TWIN CITIES	MN	5	1	YES	R1
U OF MISSISSIPPI	MS	63	4	NO	R1
U OF MISSOURI-COLUMBIA	MO	22	3	YES	R1
U OF MONTANA	MT	10	3	NO	R1
U OF NEBRASKA-LINCOLN	NE	9	2	YES	R1
U OF NEVADA-RENO	NV	5	2	YES	R1
U OF NEW HAMPSHIRE	NH	13	1	YES	R1
RUTGERS U-NEW BRUNSWICK	NJ	8	1	YES	R1
U OF NEW MEXICO	NM	4	2	NO	R1
U AT BUFFALO	NY	4	1	NO	R1
U OF NORTH CAROLINA AT CHAPEL HILL	NC	29	2	NO	R1
U OF NORTH DAKOTA	ND	23	3	NO	R2
OHIO STATE U	OH	7	1	YES	R1
U OF OKLAHOMA-NORMAN CAMPUS	OK	11	1	NO	R1
U OF OREGON	OR	6	2	NO	R1
PENNSYLVANIA STATE U	PA	69	3	YES	R1
U OF RHODE ISLAND	RI	16	1	YES	R2
U OF SOUTH CAROLINA-COLUMBIA	SC	10	2	NO	R1
U OF SOUTH DAKOTA	SD	78	6	NO	R2
U OF TENNESSEE-KNOXVILLE	TN	8	2	YES	R1
U OF TEXAS AT AUSTIN	TX	5	1	NO	R1
U OF UTAH	UT	4	1	NO	R1
U OF VERMONT	VT	10	3	YES	R2
U OF VIRGINIA	VA	23	3	NO	R1
U OF WASHINGTON	WA	3	1	NO	R1
WEST VIRGINIA U	WV	30	3	YES	R1
U OF WISCONSIN-MADISON	WI	11	2	YES	R1
U OF WYOMING	WY	37	4	YES	R2

Sources: USDA, IPEDS, U.S. Census, Atkinson & Blanpied (2008), ACE (2024). 'County Pop (%)' is share of total enrollment and employment of home county population in 2019. 'Rural-Urban' is 2013 Rural-Urban Continuum Codes as calculated by the USDA (1 indicates most urban; 9 most rural). 'Morrill Act 1862' indicates originally founded as land-grant institution. 'Carnegie Class' indicates 2021 classification of doctoral universities into its first tier for research activity (R1 - Very high research activity) or second tier (R2 - High research activity).

Table 1 lists the nation's fifty state flagship universities and indicates their name and state.[2] Additionally, the percentage of the university's surrounding county that is associated with the university is listed under "County Pop (%)" (total enrollment and full-time equivalent staff, as measured by the Integrated Post-secondary Education Data System, divided by its encompassing county's annual population estimate from the U.S. Census Bureau as of 2019). This ranges from the University of Hawaii at Manoa, whose enrollment and employment only makes up 2 percent of Honolulu County's population, to the University of South Dakota, which makes up 78 percent of Clay County's population. The U.S. Department of Agriculture's 2013 Rural-Urban Continuum Codes for each of the flagship counties are displayed under "Rural-Urban", where 1 indicates the most densely populated urbanized areas in the country (e.g., Los Angeles County, California) and 9 indicates the most sparsely populated rural counties. Only fourteen of the flagship counties are located in "1" counties, with the majority being classified as "2" or "3." Lastly, the table indicates whether a flagship university was established through the Morrill Act of 1862 as well as its Carnegie Classification for research intensity.

3 Empirical Framework

3.1 Data

We use annual unemployment rates at the county level between 1997 and 2022 from the Bureau of Labor Statistics' Local Area Unemployment Statistics program. We identify our treated "flagship counties" using the definition of state flagship universities from Dancy & Voight (2019). Our control group is defined as counties that do not include R1 or R2 universities, which we identify using the list of universities by level of research activity from ACE (2024). We estimate industry shares of total employment for each county using data from the U.S. Census' County Business Patterns for three years immediately preceding U.S. recessions: 2000, 2007, and 2019. We also use rural-urban continuum codes from the U.S. Department of Agriculture for 2003 and 2013.

[2] We use the list of state flagship universities from Dancy & Voight (2019).

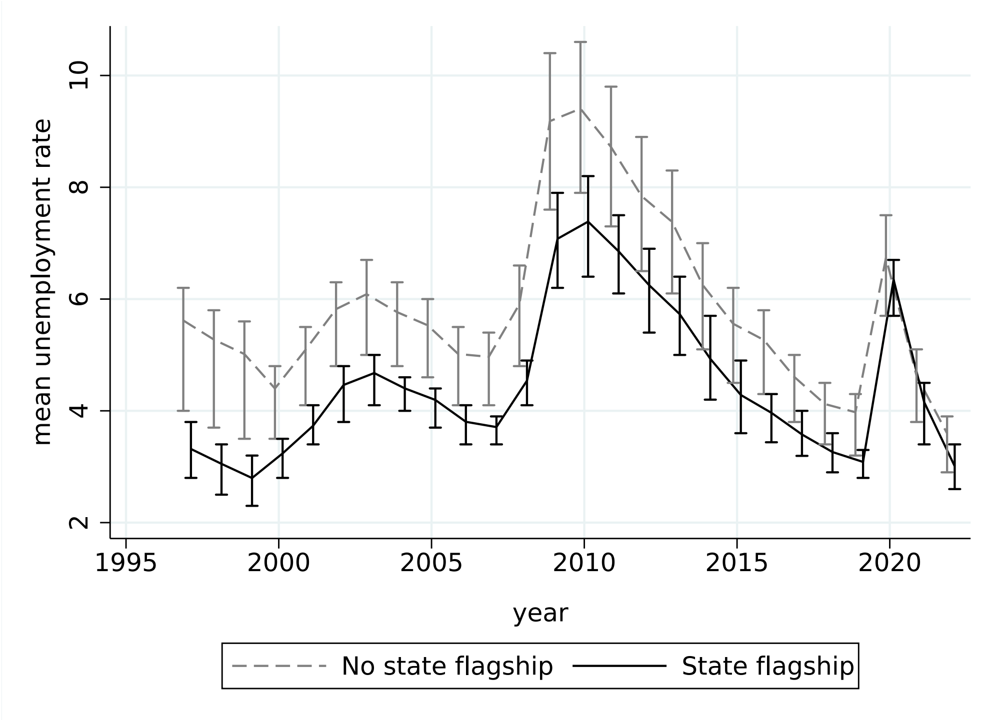
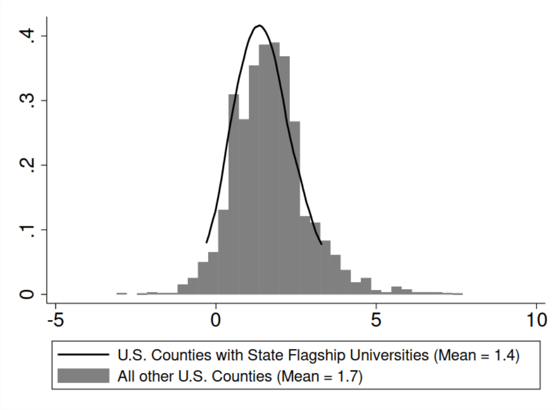
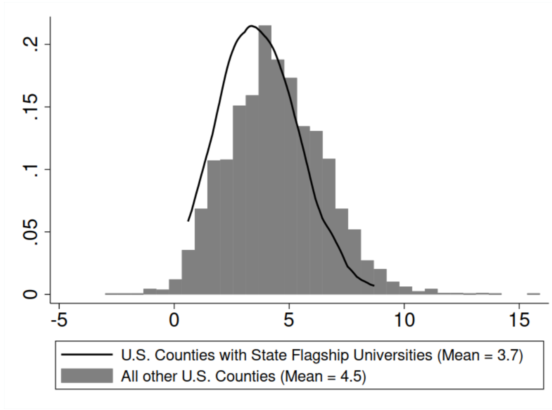


Figure 1: Mean unemployment rates across US counties with and without a state flagship university, 1997-2022. Vertical bars correspond to the 33rd and 67th percentiles of the unemployment rate distribution in both groups.

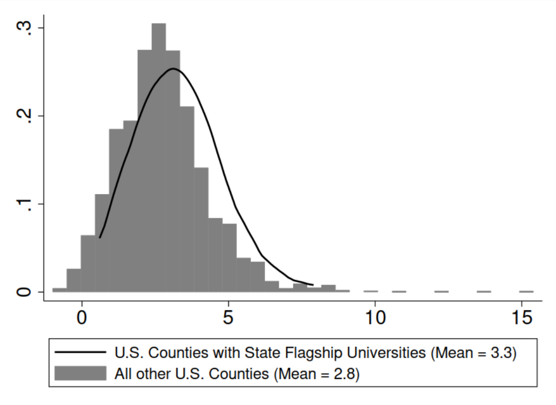
Figure 1 plots mean unemployment rates between flagship counties and controls from 1997 through 2022. The mean flagship county tended to be one to two percentage points below controls from 1997 through 2010, but the series slowly converge to less than one percentage point by 2020. Figure 2 evaluates the changes in the annual averages of county unemployment rates from the national business cycle's peak to trough across U.S. counties for the last three recessions: dot-com (2000-2003), great (2007-2010), and Covid-19 (2019-2020). The panels display the distributions of these changes as kernel densities for flagship counties and grey histograms for non-flagship counties. For the dot-com recession, the flagship county distribution is to the left of the other counties, indicating that they experienced smaller increases in their unemployment rates (roughly 0.3 percentage point lower on average). This also holds for the great recession, where the average flagship county experienced a 0.8 percentage point smaller increase in the unemployment rate than controls. However, flagship counties experienced higher unemployment rates during the Covid-19 pandemic (0.5 percentage point). This is consistent with the time series information in figure 1.



(a) 2001 (Dot-Com) recession



(b) 2008 (Great) recession



(c) 2020 (Covid-19) recession

Figure 2: Histogram of changes in county unemployment rates through recessions.

3.2 Model

Our main specification uses synthetic difference-in-differences (SDiD) to estimate an average treatment effect on flagship county unemployment rates by solving,

$$\hat{\tau}, \hat{\mu}, \hat{\alpha}, \hat{\beta} = \underset{\tau,\mu,\alpha,\beta}{\arg\min} \left\{ \sum_{i=1}^{J+1} \sum_{t=1}^{T} (Y_{it} - \mu - \alpha_i - \beta_t - D_{it}\tau)^2 \hat{\omega}_i \hat{\lambda}_t \right\}, \tag{1}$$

following Arkhangelsky et al. (2021). In equation (1), the dependent variable Y_{it} is the unemployment rate in county i at time t, while the dummy variable D_{it} is equal to one for counties with flagship universities during the 2001 (dot-com), 2008 (great), or 2020 (Covid-19) recession. The treatment effect is denoted by τ, while the fixed effects α_i and β_t control for cross-sectional and time invariant effects, respectively. Standard errors are clustered at the county level and computed using a block bootstrap with 100 replications.

While conceptually similar to a standard difference-in-differences estimator, there are two unusual aspects to our empirical approach. First, as displayed in figure 1, the parallel trends assumption obviously fails in (at least) the 2001 recession. The synthetic difference-in-differences estimator in equation (1) controls for this failure by adding cross-sectional and time weights ω_i and λ_t to force the control and treated group trends to be parallel prior to treatment. The second unusual aspect is our definition of the treatment variable. Usually, one considers a policy intervention that affects one group (the treatment group) without affecting a second group (the control group). In contrast, we consider an economic shock (the dot-com, great or Covid-19 recession) that affects two groups that differ by a pre-existing characteristic (the existence of a state flagship university).

Thus, we do not estimate the causal effect of a treatment versus its absence. Instead, we estimate the causal *difference* between two treatments, i.e., suffering a recession with or without a flagship university. In other words, τ in equation (1) measures the effect of a flagship university on a county's resilience to recession. As discussed in Fricke (2017), this modification of the standard difference-in-differences approach has been used to estimate the effects of school construction, childcare expansion, and minimum wage increases. A relatively well-known application can be found in Fetzer (2019), in which the relationship between support for Brexit and fiscal austerity in the United Kingdom is estimated by interacting a time dummy with differing rates of exposure to welfare reforms.

4 Results

4.1 Main results

Figure 3 plots point estimates and 95% confidence intervals from estimating the synthetic difference-in-differences model in equation (1) on the three recessions. For the 2001 recession, the pre-treatment period runs from 1997-2000 and the post-treatment period runs from 2001-2003. For the 2008 recession, the pre-treatment period runs from 2004-2007 and the post-treatment period runs from 2008-2010. For the 2020 recession, the pre-treatment period runs from 2016-2019 and the post-treatment period runs from 2020-2022.

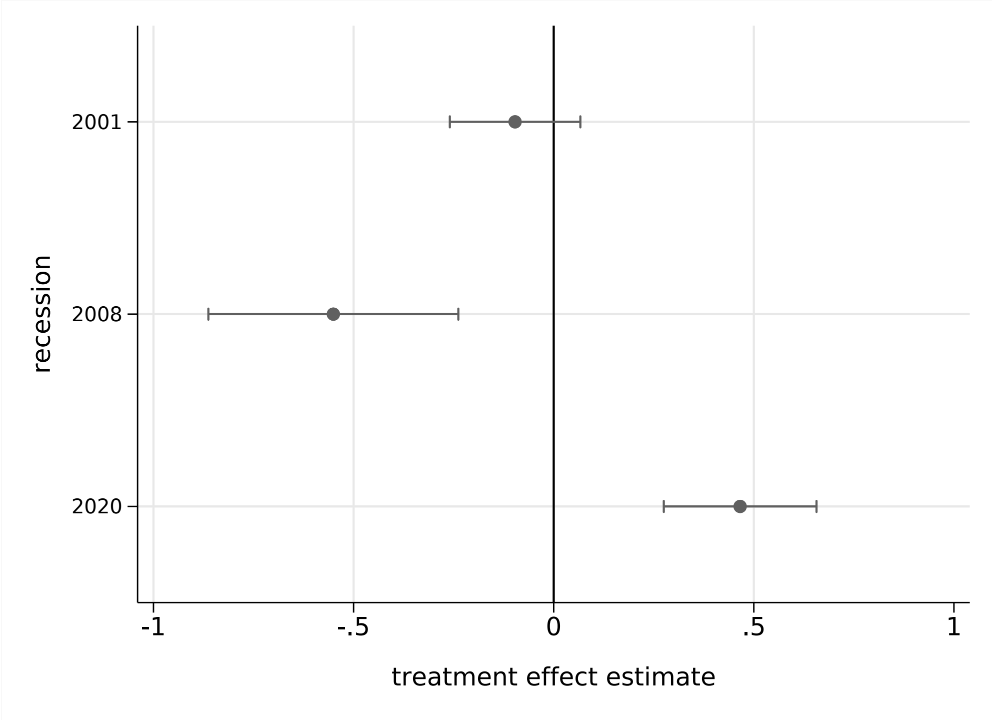


Figure 3: Estimates of the effect of a flagship university on a county's resilience to the 2001, 2008 and 2020 recessions, using the synthetic difference-in-differences estimator in (1). Horizontal bars correspond to 95% confidence intervals; standard errors are clustered by county.

Interestingly, all three possible effects are present in figure 3. Specifically, flagship universities appear to provide a small positive but insignificant resiliency effect for their host counties during the 2001 recession, a positive resiliency effect during the 2008 recession, and a negative resiliency effect during the 2020 recession. For the latter two recessions, these effects are quite large: the effect of the 2008 recession on the unemployment rate in counties with flagship universities was more than 0.5 percentage point lower than its effect on counties without flagship universities; the effect during the 2020 recession was almost equal and opposite in magnitude. In other words, flagship universities do *not* provide an unambiguous resiliency effect to recessions. Instead, we have a 'varieties of recessions' problem, in which universities appear to increase resilience to certain *types* of recessions, but not others.

We hypothesize that the main driver of flagship universities' resilience effect on their regions is through stable demand for consumption of non-tradable goods and services, as suggested by Howard et al. (2022). Figure 4 displays the growth of real personal consumption expenditures in the United States over the past 35 years. Our resiliency treatment effect for the

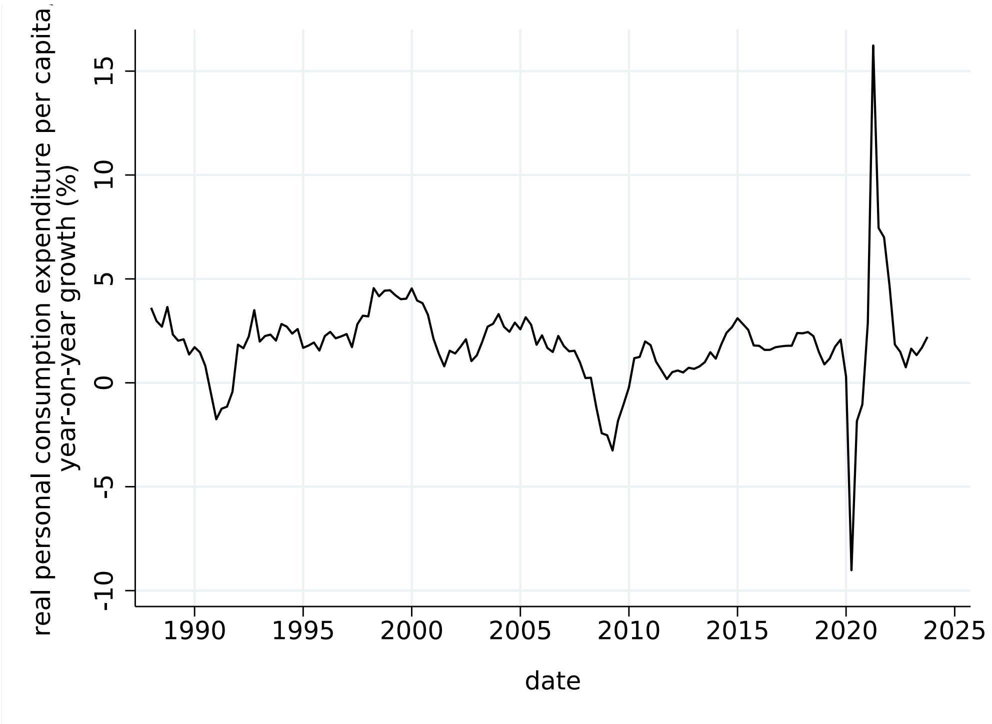


Figure 4: Year-on-year growth (%) of U.S. real personal consumption expenditure per capita. Source: BEA via Federal Reserve Bank of St. Louis (code A794RX).

dot-com (2001) recession is small and insignificant (-0.1 percentage point), indicating that flagship counties only had slightly lower unemployment rates from 2001-2003. However, this is not surprising, given that overall U.S. consumption only slowed and never declined in the wake of the dot-com recession (only spending on durable goods declined; Petev et al., 2012). Therefore, flagship counties did not have much of a negative consumption shock to absorb.

However, the 2008 (great) recession was characterized by a broad decline across consumption categories, which was protracted compared to previous recessions and matched with a decline in consumer confidence (Petev et al., 2012). It is therefore remarkable that flagship counties performed considerably better than the rest of the country in terms of their unemployment rates, which tended to be more than 0.5 percentage point lower than other U.S. counties without research universities. Local consumption by flagship university students (whose enrollment tends to be countercyclical) may have assuaged the impact of the most severe recession in a generation.

Lastly, the 2020 (Covid-19) recession was caused by the interaction of virus contagion fears and statutory stay-at-home policies that forced many parts of the economy to shut down

(Alexander & Karger, 2023). Firms and industries that are heavily reliant on face-to-face interaction suffered more than firms and industries that could operate remotely in this recession, and higher education was hit particularly hard (Birmingham et al., 2023). Most American universities shut their campuses to students between the spring and fall 2020 semesters (Cai et al., 2022), so many students chose to live with their parents rather than reside in their university towns. As a result, counties that are heavily reliant on higher education were badly affected by the 2020 recession, as the absence of students further compounded the negative consumption shock from the business cycle downturn.

4.2 Are the treatment effects reliable?

The results in section 4.1 rely on the synthetic difference-in-differences model outlined in section 3.2, in which control units and pre-treatment time periods are weighted to create a synthetic counterfactual. One limitation of this method, compared with standard difference-in-differences, is that there is no way to visually inspect the identification condition, as the absence of pre-trends is a result of the model.

To reassure the reader that our results are not being driven by a form of algorithmic p-hacking, figure 5 presents a choropleth of the cross-sectional weights $\hat{\omega}_i$ from (1) estimated on the 2008 recession period – the only recession in which we find positive resiliency effects. Counties with flagship universities (treated counties) are red, excluded counties (e.g., with non-flagship R1 or R2 universities) are black, and control counties are shaded from yellow to blue depending on their estimated weight $\hat{\omega}_i$ in the synthetic difference-in-differences model.

The treated counties, excluded counties, and the weights on the control counties are all fairly evenly spread across the USA. Moreover, the distribution of the cross-sectional weights is symmetric for the 2008 recession, with no control counties assigned zero weight. As discussed in appendix A, however, this is not true of the 2001 and 2020 recessions, in which the synthetic difference-in-differences weighting is more consequential (i.e., controls differential pre-trends to a greater degree). In those recessions, the weighting forces the demographic characteristics of control counties toward treated counties, despite the fact that these demographic characteristics are not used by the estimation method. In other words,

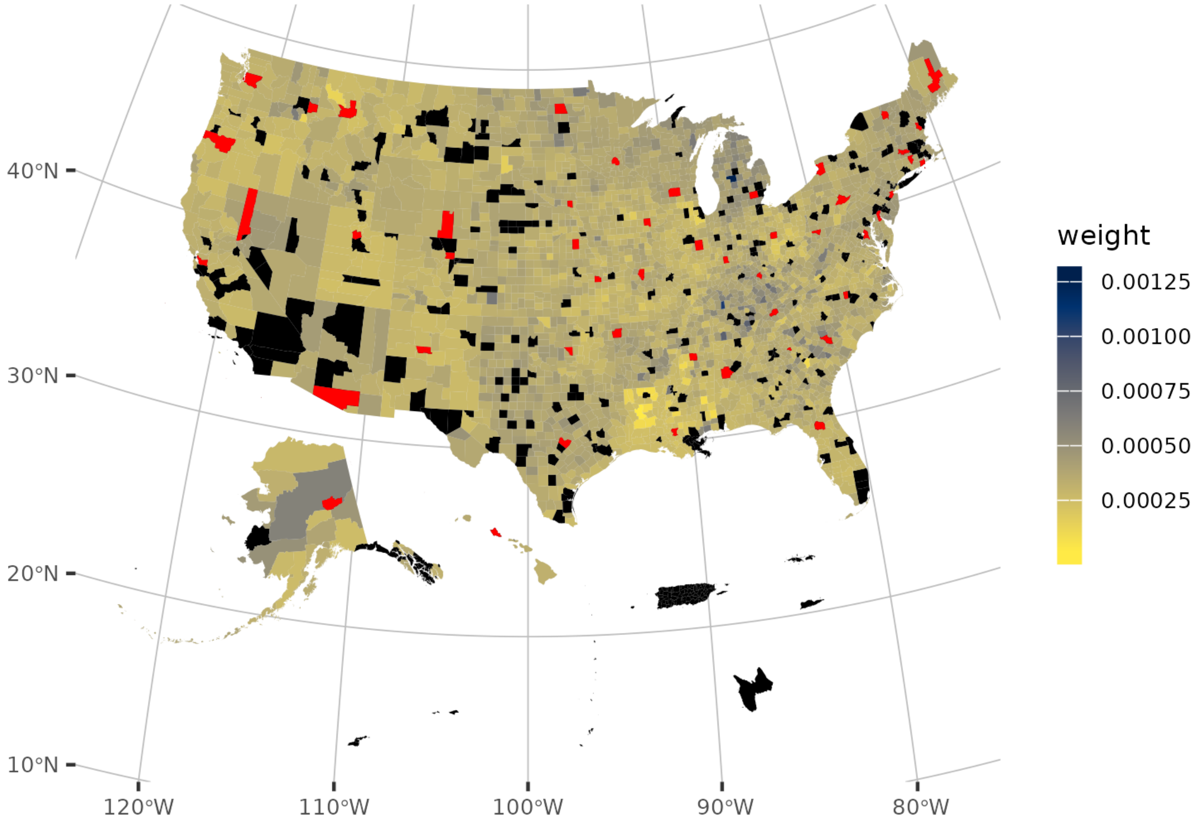


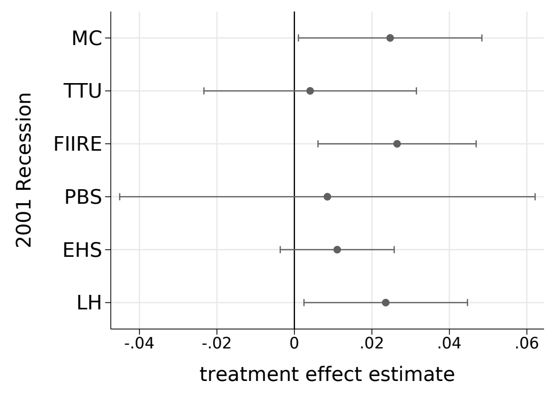
Figure 5: Choropleth of county weights from the SDiD model in (1) estimated on the 2008 recession. Counties with state flagship universities are shaded red; excluded counties (e.g., with non-flagship R1 or R2 universities) are shaded black.

the synthetic controls are more similar than the raw controls to the treated counties; again, this hopefully increases the plausibility of our results in section 4.1. Finally, appendix C increases the pre-treatment and post-treatment window lengths; the main results are robust to this change.

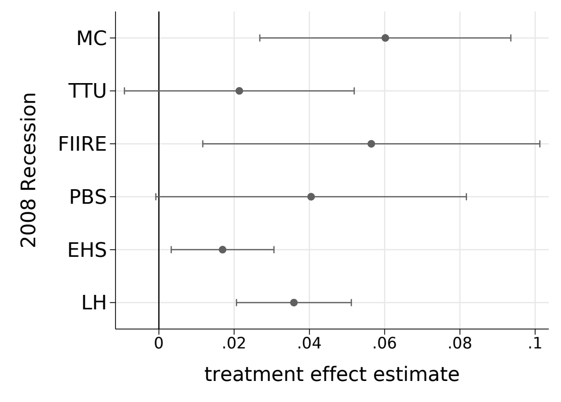
4.3 Is the consumption mechanism plausible?

Given the robustness checks outlined in section 4.2, we are fairly confident that the estimated treatment effects presented in section 4.1 are reliable. But what of our hypothesized mechanism?

Unfortunately, reliable consumption data are not available at the level of individual counties.



(a) 2001 recession



(b) 2008 recession

Figure 6: Synthetic difference-in-differences estimates of the effect of flagship universities on log employment by industry, 2001 and 2008 recessions. Horizontal bars correspond to 95% confidence intervals; standard errors are clustered by county.

But we can leverage employment by sector at the county level, using the County Business Patterns database. Figure 6 presents the results of our synthetic difference-in-differences model in (1) estimated on log employment across six different sectors – manufacturing and construction (MC); trade, transport and utilities (TTU); finance, insurance, information and real estate (FIIRE); professional and business services (PBS); education and health services (EHS); and leisure and hospitality (LH) – across the 2001 and 2008 recession windows.

The effect of having a flagship university is small or insigificant for most of these industries, in keeping with our main results in section 4.1, for the 2001 recession. The effects are qualitatively similar over the 2008 recession window but about twice as large in magnitude. In other words, employment loss in counties with flagship universities was considerably lower than in counties without flagship universities over the 2008 recession, across a range of industries that vary in the tradeability of their output.

In themselves, these effects are interesting but not instructive. Together with figure 7, however, they provide compelling evidence for the effect of a local consumption effect on non-tradable goods and services. This figure demonstrates that counties with flagship universities saw large and significant falls in leisure and hospitality employment, relative to counties without flagship universities, during the Covid-19 pandemic. In other words, the nationwide fall in demand for leisure and hospitality consumption was significantly worse in areas with

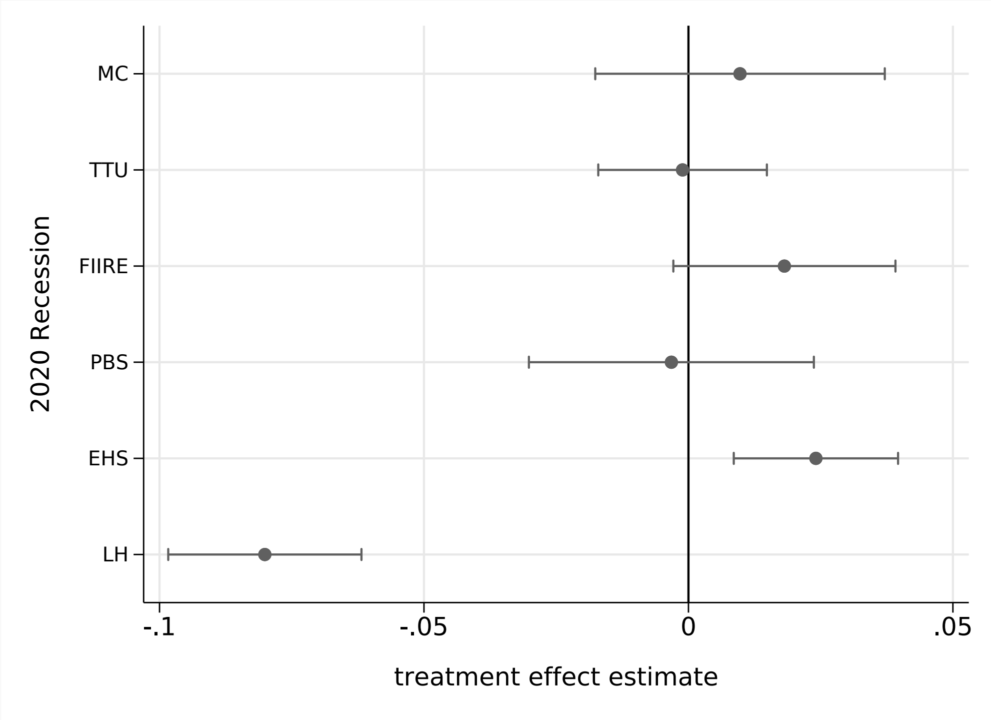


Figure 7: Synthetic difference-in-differences estimates of the effect of flagship universities on log employment by industry, 2020 recession. Horizontal bars correspond to 95% confidence intervals; standard errors are clustered by county.

higher student populations.

The evidence in figures 6 and 7 is supported by descriptive statistics and further results presented in appendix B, as well as evidence of the counter-cyclicality of flagship student enrollment. In addition, we present regressions using the scale of flagship universities (enrollment plus faculty as a percentage of county population) as the independent variable, and demonstrate that our main results in section 4.1 can be interpreted as the expected resiliency effects of an 'average' flagship college across the three recessions.

Finally, the results in figures 6 and 7 help to alleviate any concerns over our use of sub-state geography estimates from the Local Area Unemployment Statistics in the main results. Unlike the national unemployment rate, which is based on a survey of 60,000 U.S. households, the survey sample size for any given county can be rather small. Therefore, the Bureau of Labor Statistics relies on a disaggregation technique that uses data from various sources (e.g., the American Community Survey, Quarterly Census of Employment and Wages, Unemployment Insurance Claims) to calculate county estimates, which aggregate into consistent estimates at the state level (Bureau of Labor Statistics, 2025). This process results in county-level estimates being interdependent on estimates from other counties in the same state. This within-state correlation likely biases us *against* finding a treatment effect using unemployment rates; notwithstanding this, figures 6 and 7 use payroll employment data and so do not suffer from the interdependency among counties within states.

4.4 Case studies using the synthetic control method

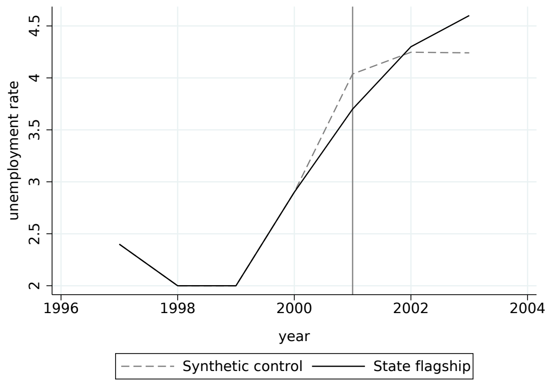
Finally, to bolster our results with illustrative case studies, we make use of the synthetic control method (SCM). Following Abadie et al. (2010), suppose that of the $J+1$ counties in question, all suffer a recession at time $t = t_0$ but only the first county has a flagship university. Denote by Y_{1t}^N the unemployment rate that *would have been* observed in the first county at time $t > t_0$ if it did not have a flagship university. Then we estimate Y_{1t}^N by,

$$\hat{Y}_{1t}^N = \sum_{i=2}^{J+1} \hat{w}_i Y_{i,t}, \tag{2}$$

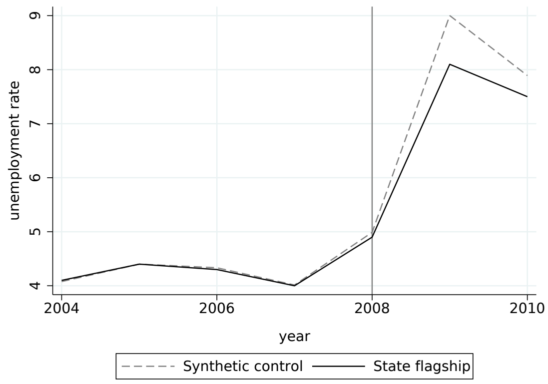
in which the weights $w = (w_2, ..., w_{J+1})$ are positive and sum to one, and are computed by constrained optimization to match the flagship county on pre-recession unemployment rates. The synthetic control estimator of τ_t, the effect of a flagship university on a county's resilience to recession at a specific time $t > t_0$, is simply the difference between the actual unemployment rate of that county and the estimated $\hat{Y}_{1t}^N$. The donor pool for each flagship county model consists of the state's other counties not containing R1 or R2 research universities.

To illustrate the full-sample results in more detail, figures 8 and 9 present synthetic controls for the states of Kentucky and West Virginia. Panel A plots the 2001 recession, panel B the 2008 recession, panel C the 2020 recession, and panel D plots the full samples, in which the pre-2001 synthetic controls are run through to 2022. In both cases, the pool of donor units for the synthetic controls is limited to within-state counties.

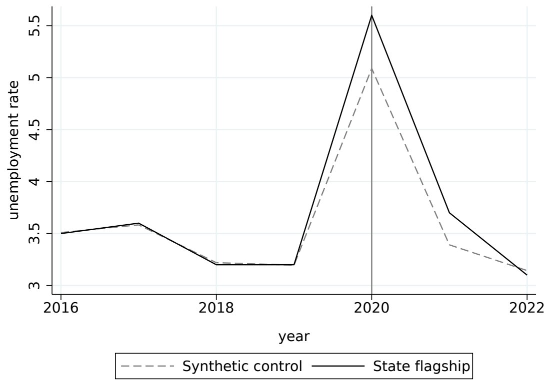
Figures 8 and 9 both illustrate the full sample results discussed above. There is no obvious resiliency effect during the 2001 recession, a positive resiliency effect during the 2008 reces-



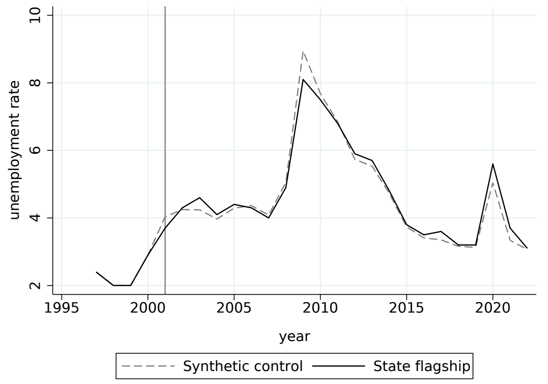
(a) 2001 recession



(b) 2008 recession



(c) 2020 recession

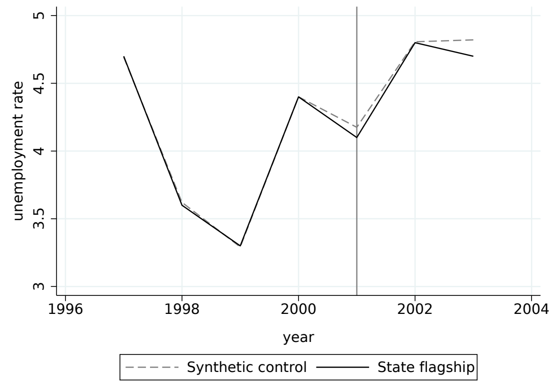


(d) Full sample

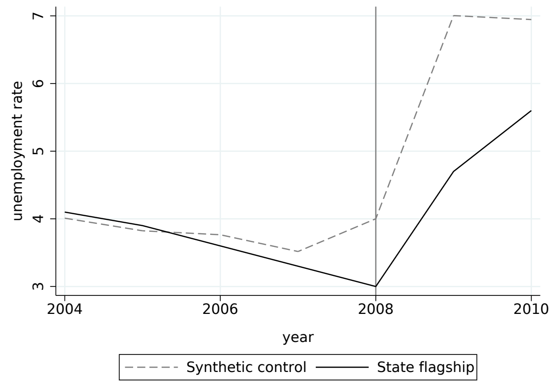
Figure 8: Synthetic controls for Kentucky in the 2001, 2008 and 2020 recessions. Panel (d) runs the 1997-2000 synthetic control forward for the entire sample. Solid black line is the trajectory of the treated county (Fayette County, home to the University of Kentucky), dashed grey line is the trajectory of the synthetic control.

sion, and a negative resiliency effect during the 2020 recession. Interestingly, we also see these effects when the pre-2001 synthetic control is allowed to run forward to 2022, in panel D of each figure.

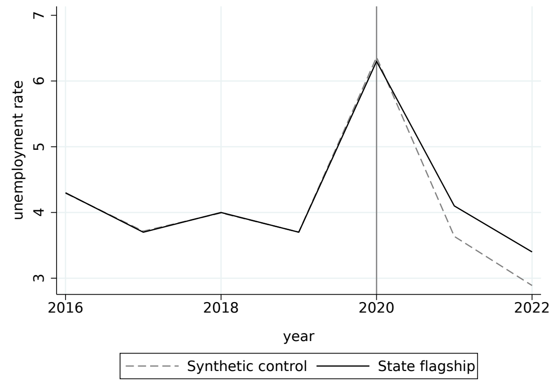
In panel D of figure 8, for example, the synthetic control is chosen by matching on pre-2001 unemployment rates of the treated county (Fayette County, home to the University of Kentucky). The unemployment rate of this ‘doppelganger’ Fayette closely tracks the unemployment rate of Fayette County itself until 2008, when it becomes elevated relative to Fayette during that recession. The ‘doppelganger’ recovers by 2011, however, after which it closely tracks Fayette until 2020. During the Covid-19 pandemic and after, the unemployment rate in Fayette County is higher than its synthetic counterpart. We observe similar



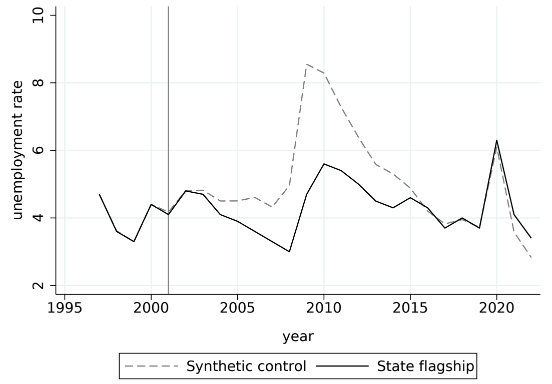
(a) 2001 recession



(b) 2008 recession



(c) 2020 recession



(d) Full sample

Figure 9: Synthetic controls for West Virginia in the 2001, 2008 and 2020 recessions. Panel (d) runs the 1997-2000 synthetic control forward for the entire sample. Solid black line is the trajectory of the treated county (Monongalia County, home to West Virginia University), dashed grey line is the trajectory of the synthetic control.

patterns for Monongalia County, West Virginia in Figure 9.[3]

5 Discussion

Section 4 argues that flagship universities provide a resiliency effect to some – but not all – types of recessions. While we have presented a range of empirical robustness checks, we also hope that our results are consistent with a range of conceptual approaches to regional resilience. This remains a contested – yet highly popular – concept in economic geography and regional economics. A useful overview of the conceptual basis of resilience can be found

[3]Note that we have specifically chosen Kentucky and West Virginia *because* this effect is so clear, in order to illustrate the full sample results from the synthetic difference-in-differences model in greater detail. There are other states with similar synthetic control results, but most are less clear-cut. Incidentally, West Virginia University (based in Morgantown within Monongalia County) is discussed in the *Wall Street Journal* article quoted in the introduction, above.

in a 2010 special issue of the *Cambridge Journal of Regions, Economy and Society* (see Christopherson et al., 2010), while a more recent survey can be found in Peng et al. (2017).

As discussed in Martin & Sunley (2015, 2020), among the major issues at stake are the definition of regional resilience, the method by which it should be operationalized and measured, and the characteristics of local economies that make them more or less resilient. Regarding the first issue, many (perhaps most) definitions revolve around the ability of regions to recover successfully from shocks, whether these are neoclassical accounts that involve a return to equilibrium (Rose & Liao, 2005), or evolutionary accounts that stress the importance of adaptive changes (Simmie & Martin, 2010). A related question is the nature of shocks; regions might be resilient to one type of shock but not another (Martin & Sunley, 2015).

Regarding the manner in which resilience should be measured, this again depends on the researchers' chosen conceptualization. The obvious approach to measuring the equilibrium (or engineering) definition of resilience is to estimate a general equilibrium model; a recent example of this approach is Di Pietro et al. (2021). Researchers relying on an evolutionary approach often use statistical models with less *a priori* structure (e.g., Faggian et al., 2018; Sargento & Lopes, 2024), but there are also formal evolutionary models of regional resilience (e.g., the use of agent-based modelling in Ge et al., 2018).

We have relied on a purely statistical approach to measure the response of county-level unemployment rates to recessionary shocks. We are, therefore, defining resilience as the ability of counties to weather a certain type of economic shock, but we do not impose the condition that a pre-shock equilibrium will (or will not) be restored. Moreover, we do not constrain the characteristics of resilience across heterogeneous shocks. In fact, US county-level unemployment rates approach an average of between 4% and 5% after the recessionary shocks in our sample, but different counties react to recessions in very different ways.

Our results suggest that higher education institutions are a useful component of policy approaches to regional resilience that aim to exploit the benefits of diverse industrial structures. That is, the establishment of educational institutions, or regional offshoots of existing institutions, is likely to improve the resilience of localities to a certain class of shock.

This conclusion is consistent with the existing literature studying the impact of diverse industrial structure on regional resilience, but while (for example) Brown & Greenbaum (2017) arrive at the slightly pessimistic conclusion that, “regions may not be able to quickly change their industrial diversity in the short term or be able to retain firms that they attract in more peripheral industries in the longer run”, educational institutions are a specific example that could, in principle, be established quite quickly. Moreover, once established, ‘anchor institutions’ like universities tend to remain in place and have long-run effects on human capital that reinforce resilience in the long run (Giannakis & Bruggeman, 2017).

Are there any threats to these policy conclusions going forward? There are certainly threats to the continuing ability of universities to generate economic benefits. Johnstone (2012), for example, observes that budgetary squeezes on higher education in the aftermath of recessions might jeopardize the ability of colleges and universities to perform their traditional knowledge transfer and workforce training roles. Thus, despite the positive resiliency effects provided by universities in the aftermath of (at least some) recessions, the effects of those recessions might threaten the benefits of universities going forward. This is most obvious when colleges and universities are forced to close, which happened at an elevated rate following the 2008 crisis, and recently increased again after plateauing during the pandemic (Kelchen et al., 2024; Castillo & Welding, 2025).

Another contemporary change that might threaten the local economic benefits of higher education is the long-term trend toward distance learning, recently exacerbated by the Covid-19 pandemic. As illustrated in figure 10, the percentage of students enrolled in post-secondary distance education courses increased from 26% in 2012 to 36% by the eve of the pandemic. This figure then spiked during the pandemic itself, and although falling in its aftermath, was still over 50% in 2022 and 2023. Clearly there are benefits to this; expanding access to higher education is certainly a good thing. But a permanently lower geographic concentration of students would, presumably, reduce any resiliency effects of universities to their host cities in the future.

We do not, however, think that these problems negate our policy conclusions. Recessionary

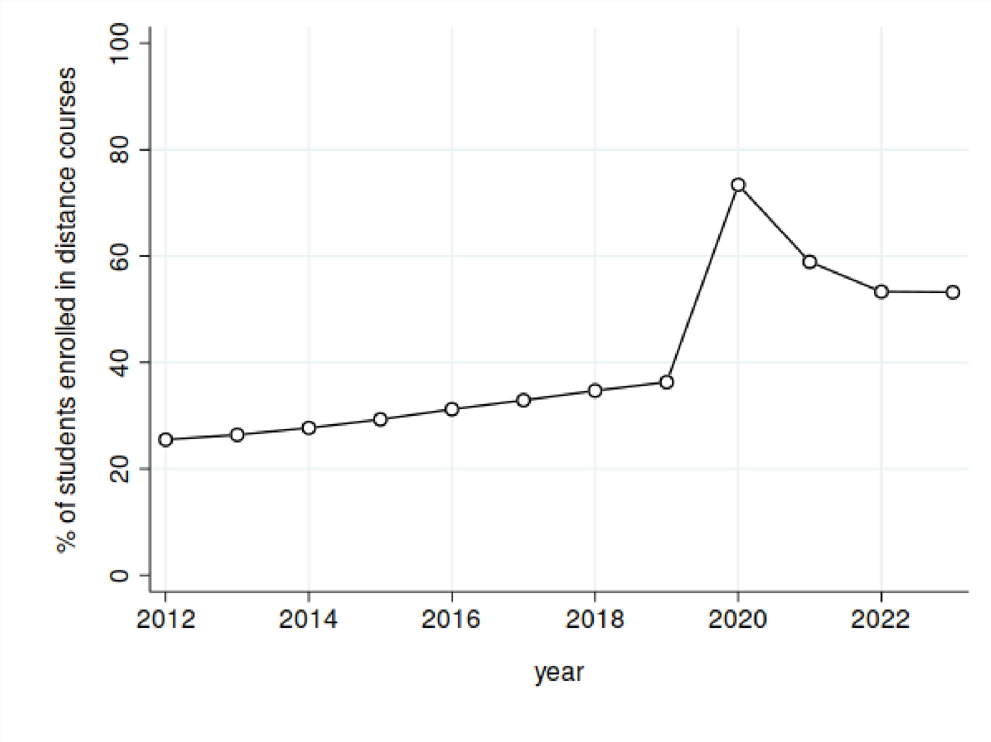


Figure 10: Percentage of students enrolled in distance education in post-secondary institutions; data from the National Center for Education Statistics https://nces.ed.gov/ipeds/trendgenerator/.

squeezes on higher education funding – while certainly a problem – do not tend to be permanent; funding tends to increase with subsequent recoveries (Gillen, 2024). And funding problems are, in any case, amenable to policy intervention. Interestingly, public support for state and federal funding of colleges increased dramatically between 2010 and the eve of the Covid-19 pandemic, and this source of funding could be increased with sufficient political support (Quadlin & Powell, 2022). The long-term effects of the expansion of distance learning are, of course, more uncertain.

Finally, we hope that our policy conclusions are consistent with different conceptual approaches to the roles and benefits of higher education itself. As noted in Carnevale & Rose (2012) – among many others – there are intrinsic as well as extrinsic benefits to higher education, which cannot (or should not) be measured purely in dollars and cents. These authors argue that making policy in view of the economic benefits of colleges and universities should not distract attention from their intrinsic benefits; they should "do more than provide new technology and new foot soldiers for the American economy." We would argue, however, that while a narrow focus on the knowledge production and workforce training roles of universities may well result in students who "do not study enough Plato", the resiliency effect of higher education institutions is largely independent of this concern. As we have shown, universities create local resilience by stabilizing consumption, and it seems highly unlikely that this effect is weaker for universities with a philosophy department.

6 Concluding Remarks

In this paper, we provide evidence on the effects of research universities on regional resilience by estimating the impact of recent U.S. recessions on local unemployment. We use data from the Bureau of Labor Statistics to identify resiliency effects by comparing the unemployment rate trajectories in counties that contain state flagship universities to other U.S. counties not containing research universities. Using synthetic difference-in-differences models, we find a small but insignificant resiliency effect during the dot-com (2001) recession, a large and significant resiliency effect for the great (2008) recession, and a negative resiliency effect for the Covid-19 (2020) recession.

These results are consistent with the hypothesis that university communities provide stable consumption demand, especially for non-tradable goods and services (Howard et al., 2022). The dot-com recession did not result in a drastic reduction in U.S. consumption, which is consistent with our weak and insignificant resiliency effect. However, the long-lasting and broad negative consumption shock during the great recession was more clearly absorbed by counties containing state flagship universities, resulting in lower local unemployment rates. In contrast, the absence of students from university campuses reversed the resiliency effect of state flagship universities during the Covid-19 recession, which resulted in their counties suffering higher unemployment rates in 2020 compared to the rest of the United States.

The obvious policy conclusion from this exercise is that the establishment of educational institutions, or regional offshoots of existing institutions, is likely to improve the resilience of localities to consumption-based recessions. A corollary of this result is that educational 'anchor institutions' are not a silver bullet, but given the complexity of resiliency (and its contested nature), it is unlikely that any one policy can increase resilience for every type of region. In a broader sense, our results support the conclusion that diverse industrial structure improves regional resilience and identifies one specific avenue by which this occurs.

The history of community engagement in the United States is a long one, with significant examples in the early land-grant system and settlement houses in the 19th century, and the creation of Federal agencies like ACTION in the 20th century (Ross, 2002). After a period of abeyance, the policy pendulum appears to be swinging back to this type of engagement (Koekkoek et al., 2021), which ought to have positive indirect effects on regional resilience, and should be supported by central government, local government, and universities themselves.

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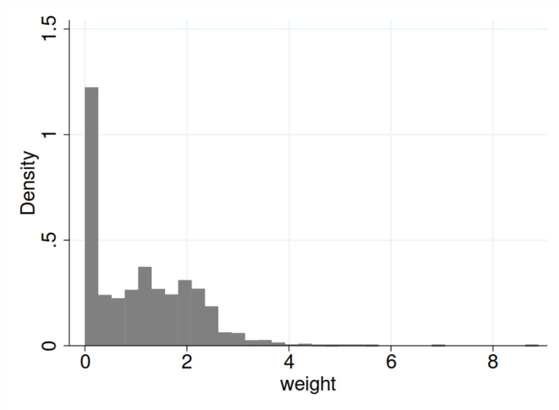
Online Appendices

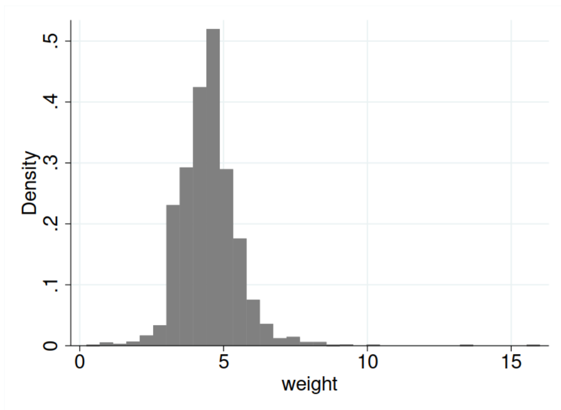
A Further information on synthetic control weights

Figure 5 in the main text presents a choropleth of the cross-sectional weights $\hat{\omega}_i$ from (1) estimated on the 2008 recession period – the only recession in which we find positive resiliency effects – to reassure the reader that our results are not being driven by a form of algorithmic p-hacking.

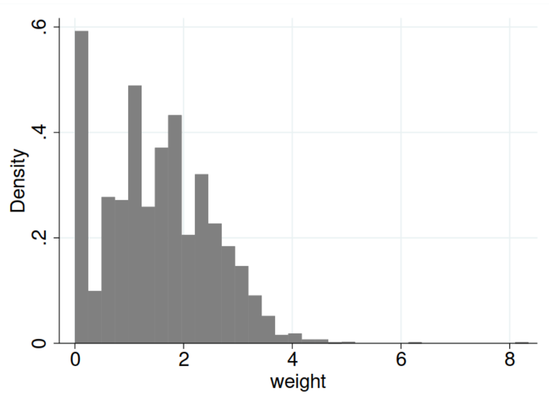
This appendix presents more evidence to this end. Figure A1 presents the distribution of the cross-sectional weights for each of the recessions. The 2001 and 2020 recessions require a more extreme distribution of weights – and more counties with zero weights – to achieve parallel pre-trends in the SDiD models than the 2008 recession. Interestingly, then, our



(a) 2001 (Dot-Com) recession

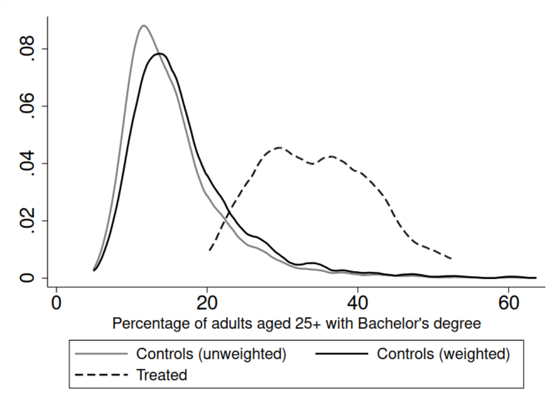


(b) 2008 (Great) recession

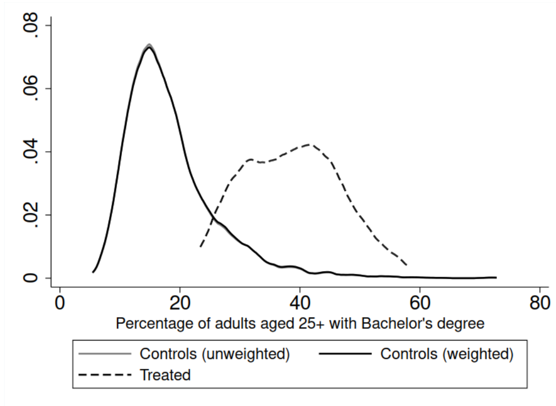


(c) 2020 (Covid-19) recession

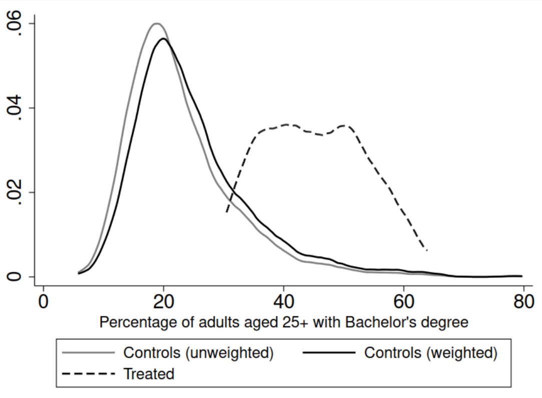
Figure A1: Histogram of normalized weights on control counties for synthetic difference-in-differences models



(a) 2001 (Dot-Com) recession



(b) 2008 (Great) recession



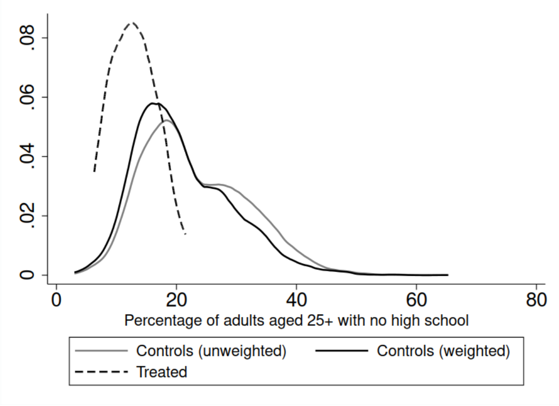
(c) 2020 (Covid-19) recession

Figure A2: Kernel density plots of proportions of adults (aged 25+) with a bachelor's degree, for control counties, control counties weighted by SDiD weights, and treated counties, for synthetic difference-in-differences models

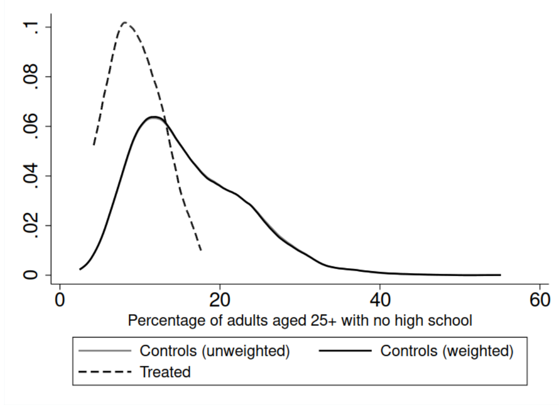
positive treatment effect is relatively well-identified even without weighting.

This observation is also supported by figures A2-A5. These plot kernel densities for the percentage of the adult population (aged 25+) with bachelor's degrees, the percentage of the adult population (aged 25+) who did not complete high school, the overall civilian employment rate, and the log count of the civilian workforce (which can be used to gauge the size distribution of counties by working age population).

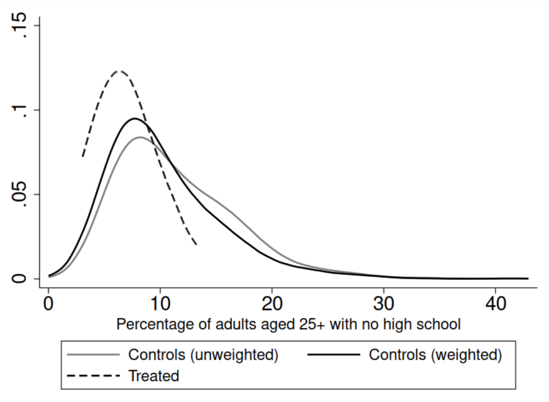
Each figure splits present density estimates for the raw control counties, the control counties weighted by SDiD weights, and the treated counties. For the 2001 and 2020 recessions – in which the weighting is more consequential, given figure A1 – the SDiD models force the distribution of the synthetic controls toward the treated counties. The effect is not particularly large, but is always of the correct 'sign' for the educational variables and employment



(a) 2001 (Dot-Com) recession



(b) 2008 (Great) recession

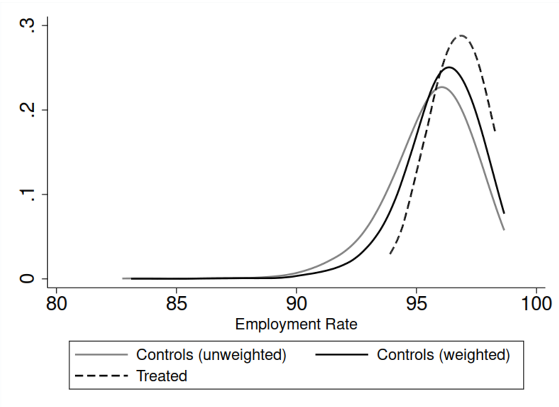


(c) 2020 (Covid-19) recession

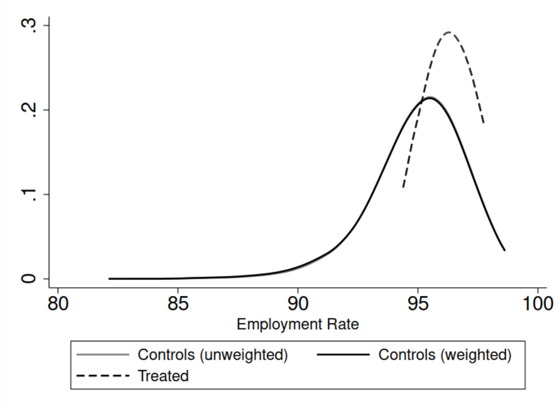
Figure A3: Kernel density plots of proportions of adults (aged 25+) without a high school diploma, for control counties, control counties weighted by SDiD weights, and treated counties, for synthetic difference-in-differences models

rate, suggesting that the synthetic controls are more similar to the treated counties than the raw controls (the 'size' of the counties, as gauged by the civilian workforce, appears to be irrelevant). This is reassuring, given that no demographic data are used in the SDiD estimation procedure.

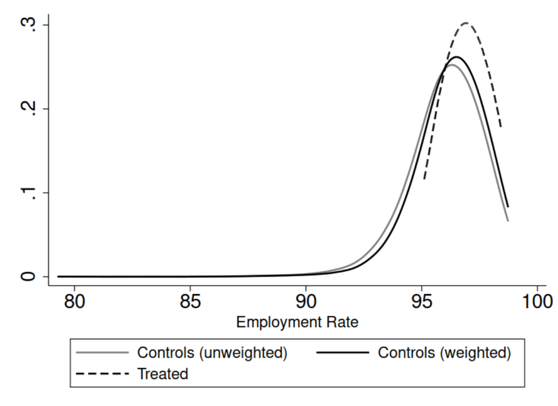
For the 2008 recession, the weighting does not change the demographic characteristics of the synthetic controls. This is unsurprising, given that the weights are relatively inconsequential. In other words, the 2008 recession estimates are well-identified without synthetic weights, so the unweighted non-treated counties are themselves adequate controls.



(a) 2001 (Dot-Com) recession

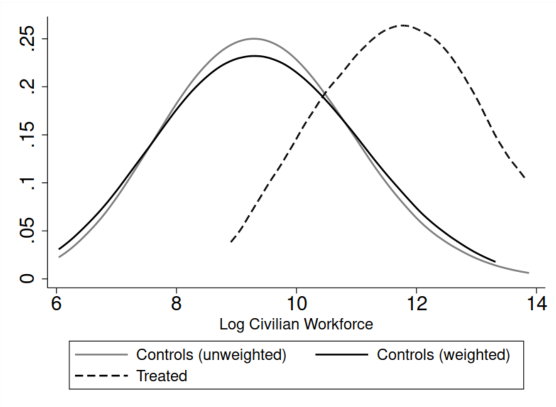


(b) 2008 (Great) recession

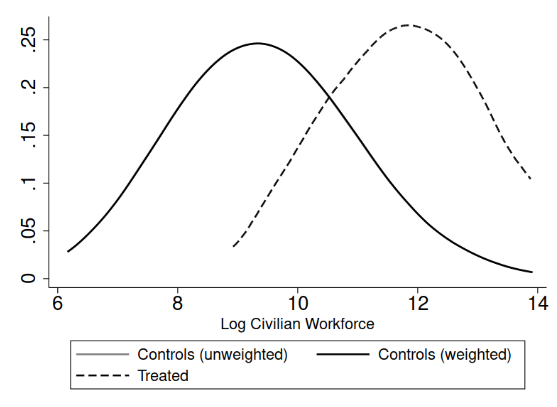


(c) 2020 (Covid-19) recession

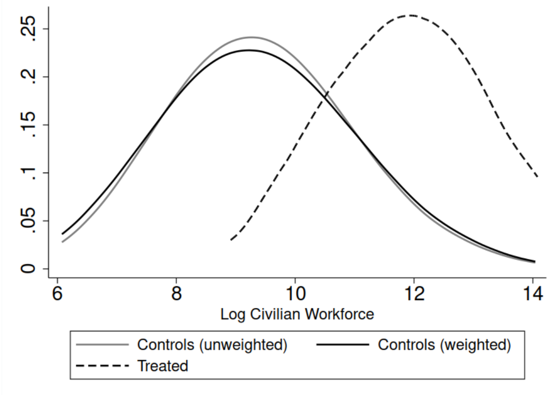
Figure A4: Kernel density plots of civilian employment rate, for control counties, control counties weighted by SDiD weights, and treated counties, for synthetic difference-in-differences models



(a) 2001 (Dot-Com) recession



(b) 2008 (Great) recession



(c) 2020 (Covid-19) recession

Figure A5: Kernel density plots of log civilian workforce, for control counties, control counties weighted by SDiD weights, and treated counties, for synthetic difference-in-differences models

B Robustness to scale and student characteristics

Tables B1, B2 and B3 present results from models that replace the binary treatment variable D_{it} with two alternative treatment variables, D_{it}^{scale} and D_{it}^{local}, which are (respectively) the interaction of our original D_{it} with the university size relative to county population, and students paying home-state tuition relative to total enrollment. All data are from IPEDS, and 'university size' is defined as FTE staff + student enrollment in 2007 and 2019 for the 2008 and 2020 recessions, respectively, and student enrollment in 2000 for the 2001 recession (where data on FTE staff is unavailable). The models are,

$$Y_{it} = \alpha_i + \beta_t + \tau_{scale} D_{it}^{scale} + u_{it},$$
$$Y_{it} = \alpha_i + \beta_t + \tau_{local} D_{it}^{local} + u_{it},$$
$$Y_{it} = \alpha_i + \beta_t + \tau_{scale} D_{it}^{scale} + \tau_{local} D_{it}^{local} + u_{it},$$

and are simple difference-in-differences models with standard errors clustered by county.

These models estimated on the 2001 recession are difficult to interpret. A larger student population relative to county population appears to have a positive effect on unemployment, but this disappears (or at least becomes insignificant) when the proportion of students paying home fees is incorporated (which, intuitively, should not make a huge difference in either the 2001 or 2008 recessions). As there are no data on FTE staff for the 2001 recession (and therefore we are mis-measuring scale here), it is possible that bias is explaining these results.

Table B1: Additional regressions for 2001 recession.

	Scale	Local	Scale and Local
$\hat{\tau}_{scale}$	0.0297		0.00356
	0.000		0.714
$\hat{\tau}_{local}$		0.00779	0.00723
		0.000	0.003
Overall R^2	0.0454	0.0449	0.0449
Observations	20195	20195	20195

p-values in second row

Table B2: Additional regressions for 2008 recession.

	Scale	Local	Scale and Local
$\hat{\tau}_{scale}$	-0.0292		-0.0285
	0.000		0.000
$\hat{\tau}_{local}$		-0.00683	-0.000257
		0.003	0.939
Overall R^2	0.367	0.367	0.367
Observations	20153	20153	20153

p-values in second row

The results for the 2008 recession, on the other hand, are both intuitive and interesting. University scale, i.e., FTE staff plus student enrollment as a percentage of county population as of 2007, has a strong negative effect on unemployment. As scale is measured on a scale of 0 to 100, and the average scale is 17.7%, the resiliency effect of a flagship university is around $-0.0292 \times 17.7 = -0.517$, which is very close to our main result for the 2008 recession in figure 3. As a result, we can be reasonably certain that our average treatment effect on the treated (ATT) estimates in the main text are, in fact, measuring an average treatment effect. In comparison, the proportion of home-state students has an unexpected sign but is insignificant when included with scale.

The results in table B3 for the 2020 recession support the results in table B2. When included separately, the scale and locality variables are significant and of the correct sign, with reasonable explanatory power. Interestingly, the multiple regression suggests that the

Table B3: Additional regressions for 2020 recession.

	Scale	Local	Scale and Local
$\hat{\tau}_{scale}$	0.00638		-0.0149
	0.093		0.001
$\hat{\tau}_{local}$		0.00787	0.0119
		0.000	0.000
Overall R^2	0.249	0.248	0.249
Observations	20192	20192	20192

p-values in second row

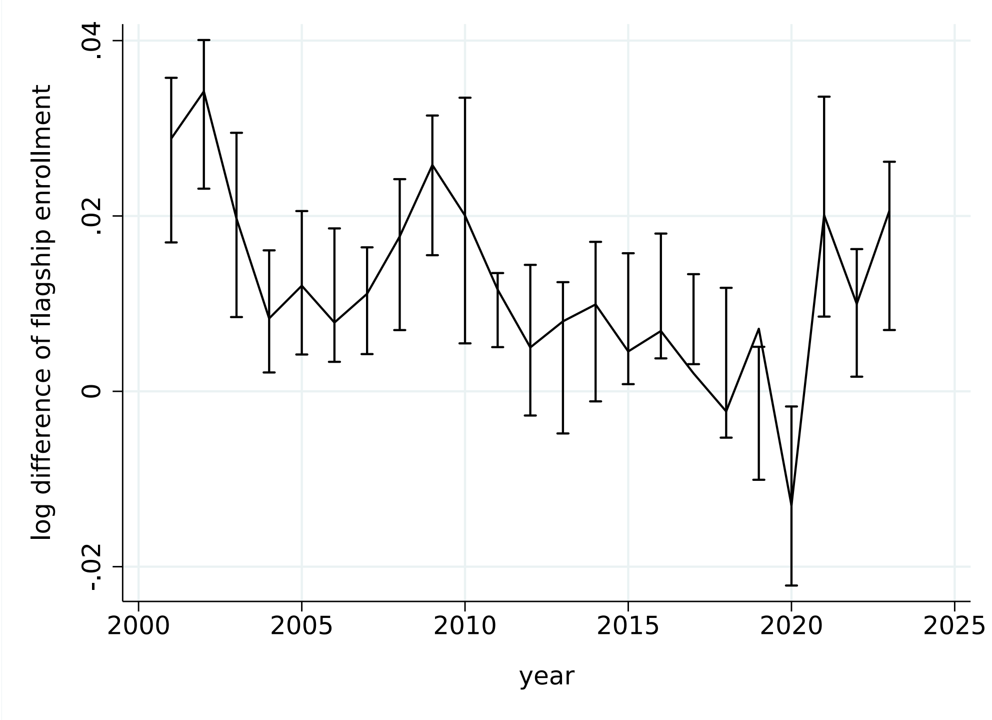


Figure B1: Mean enrollment growth across US state flagship universities, 2000 - 2023. Vertical bars correspond to the 33rd and 67th percentiles of the enrollment growth rate distribution.

proportion of local students is what is driving the main result (positive effect on unemployment; negative resiliency), which is consistent with the hypothesis that students remaining at home (and a significant distance from the county in question) is driving the results for the 2020 recession. Overall, these results support our hypothesized consumption mechanism.

Finally, figure B1 plots mean enrollment growth across US state flagship universities between 2000 and 2023, with data from IPEDS. One can observe a clear countercyclical enrollment pattern around the 2001 and 2008 recessions, with increases in enrollment growth during those recessions and falls in enrollment growth in the aftermath of those recessions (although note that, on average, flagship university enrollment growth was positive between 2000 and 2017). The 2020 recession is, perhaps unsurprisingly, somewhat more complicated, with a large fall in average enrollment numbers between 2019 and 2020, followed by a very strong rebound between 2020 and 2021. Overall, enrollment grew during this recession, although volatility masks the signal to some extent.

C Robustness to varying window sizes

In the main results, we use three year pre-treatment and post-treatment window sizes for the synthetic difference-in-differences estimates. There is a trade-off here; for example, longer pre-treatment periods improve identification *ceteris paribus*, but the larger the pre-treatment window, the more likely that the estimates might be affected by previous shocks (in this case, the previous recession).

In our case, the results are robust to increasing the pre-treatment and post-treatment window sizes, as demonstrated in figure C1. This figure extends the post-treatment period to 7 years for the 2001 and 2008 recessions (i.e., 2001-2007 for the 2001 recession and 2008-2014 for the 2008 recession), and the pre-treatment periods to their maximum possible extent (subject to the previous recession) for the 2008 and 2020 recessions (i.e., 2002 for the 2008 recession and 2009 for the 2020 recession; 2010 might also be chosen here, but in practice, it makes very little difference). The results are very similar to those in the main text.

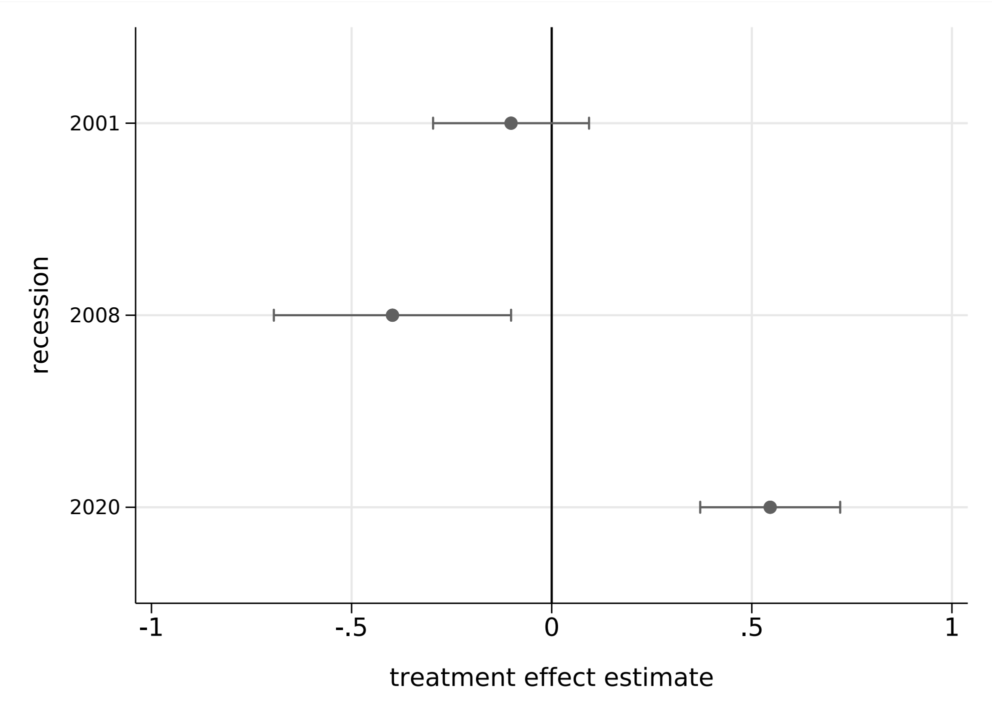


Figure C1: Estimates of the effect of a flagship university on a county's resilience to the 2001, 2008 and 2020 recessions, using the synthetic difference-in-differences estimator in (1). Horizontal bars correspond to 95% confidence intervals; standard errors are clustered by county.