**********Preliminary and Incomplete**********

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Do Tax Incentives Work? Evidence from Georgia's Film Tax Credit

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Introduction

Tax incentives as core industrial policy are essential in shaping the economic terrain since they promote industry-specific growth and potentially draw investments from corporations using targeted fiscal measures. They are also controversial, with significant debate about their cost, efficacy, and the extent to which they affect location decisions. Despite the lack of robust empirical evidence on the benefits of industry-specific incentives, proliferation across locations and industries continues. In addition to the traditional and high-tech industries often targeted by such policies, recent decades have also seen most U.S. states create programs aimed at the entertainment industry. Commonly referred to as film incentives, these programs aim to strategically support local economies by incentivizing production of films and episodic series in specific locations.

Forty-four states and the District of Columbia have implemented a film tax incentive and grant programs at some point in last three decades, with some states choosing to discontinue their programs (XXXcitation). Evaluating these programs is complicated by the temporary nature of film and episodic series production as well as by the prevalence of contract work in the industry. Individual productions are also more mobile than the businesses typically targeted by economic development incentive programs, with fewer fixed costs and long-term capital investments. The latter suggests film and episodic productions may be more responsive to tax incentives than other types of businesses.

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In this paper, we undertake a comprehensive investigation of one of the largest film incentive programs in the U.S. The Georgia Film Tax Credit (FTC) provides production companies with a transferable tax credit of up to 30 percent of eligible production expenses. It does not distinguish between expenses for resident and non-resident labor or between expenditures with in and out of state companies. The incentives are comparable to those in states like New York and Louisiana, but Georgia's statute is perpetual, unlike those states' laws which contain sunset provisions. The absence of caps or spending ceilings in Georgia is one of the incentive's most notable features. Georgia has had a significant increase in qualifying production activity since 2008 and, thus, a substantial increase in the tax credits generated by the FTC program. FY 2024 estimated FTC credit generation is $1.35 billion, making it the single largest tax expenditure in the state.

This paper investigates the evolution of Georgia's film industry after the 2008 FTC, providing evidence on changes in employment, wages, and the establishment landscape within the state. Additionally, it examines Georgia's role within the broader context of the U.S. film industry, analyzing the state's share of total film projects and budgets. This study also explores alternative explanations for the observed trends. Additionally, this paper considers how the FTC production company credits may benefit individuals by examining changes in individual worker employment status, hours, and wages as well as migration responses.

Background

A number of state film incentive program studies exist, including peer-reviewed academic publications, legislative audits, and industry studies. In this section, we briefly discuss the general findings.

Button (2019) analyzes all state film incentive programs in the United States, relating adoption to changes in feature film and television series production as well as establishment, wage, and employment. Button's research design is one of the more credibly causal of the reviewed studies. He finds that film incentives, on average, significantly increase television series filming after adoption; however, he finds no significant effect on feature films or employment, wages, and establishments in the film industry.[1] Thom (2018a) employs a similar

[1] The increase in television series filming ranges from 0.67 to 1.5 additional TV series, and this does not appear sufficient to generate significant employment, wage, and establishment effects. Button (2019) utilizes Quarterly Census of Employment and Wages (QCEW) data to estimate the employment, wage, and

research design and reaches similar conclusions, with transferable tax credits having a small employment effect, refundable tax credits having temporary wage effects, and no other effects on wages, output, employment, or industry concentration.

Owens and Rennhoff (2018) study film incentives through a discrete choice framework and find that incentives are effective at attracting production spending. They also note differences in the effects of incentive types for different kinds of studios. Independent studios did not respond to any type of incentive. On the other hand, all forms of incentives attracted medium-sized studio production. Major studios increased production only in response to refundable and transferable tax credits. However, they also find that successful attraction of production does not create a permanent film industry in the state and comes with significant state revenue losses. For the 29 states analyzed, fiscal return on investment ranged from 0.03–0.77.

Several peer-reviewed studies examine specific state programs, rather than estimate an average effect across states. Button (2021) uses a synthetic control research design to causally estimate the effects of Louisiana and New Mexico's film incentives. Louisiana and New Mexico are interesting case studies because they were early adopters of film incentives. The findings are similar to the average effects studies, with no significant changes in employment or establishments. Unlike the average effect studies, the case studies indicate no changes in television series filming but a statistically significant increase in feature film production. These studies use more robust methods than the average effects studies, but the different results highlight the ambiguity of the impact of such state film tax incentives.

Thom (2019) focuses on the five states that comprised 77 percent of all U.S. tax expenditures on film incentives in 2017: New York, Louisiana, Georgia, Connecticut, and Massachusetts. He finds mixed results using an interrupted time-series method, with Connecticut experiencing an initial increase in employment that dissipates over time, Louisiana experiencing a more gradual and sustained increase in employment, and no effect in the other states.

These findings contrast those in Workman's (2021) investigation of (changes to) California's film incentive programs. Exploiting random variation in the allocation of tax credits

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establishment results. He conducts robustness tests using County Business Patterns data on employment and establishments as well as using alternative specifications and controls with both data sets. In general, the effects are statistically indistinguishable from zero; however, there are known problems using the QCEW data for analyzing the industry, including that the data do not include contract employment or wages. Given the prevalence of contract work in the industry, this issue likely contributes to the lack of statistically significant employment, wage, or establishment effects.

through a lottery process, he finds that the tax incentive increases the probability that a film is made in California and significantly increased overall production spending and employment. Similarly, Meares et al. (2020) study Georgia and find increases in employment, wages, establishments, and the number of productions.

In addition to the peer-reviewed publications evaluating state film incentive programs, there have been many evaluations conducted on behalf of state legislatures, state agencies, and industry groups. These evaluations generally include information on economic impact, calculated from estimates of production activity benefiting from the incentive. Most also include a net fiscal impact calculation that relates the cost of the incentive program to the additional tax revenue generated by the incentive-related economic activity—the fiscal return on investment (ROI) for the state. Rarely, the evaluations will consider the alternative uses of film incentive program expenditures or the fact that some incentivized productions would have occurred in the absence of the credit.

Three recent reviews of state evaluations (Christopherson and Rightor, 2010: 14 state evaluations; Tannenwald, 2010: eight state evaluations; and Thom, 2018b: nine state evaluations) all reach the same conclusion that states lose money with these programs. Fiscal ROI ranges from 0.07–0.28. The only exception among the reviewed evaluations were two EY studies, funded in part by the Motion Picture Association, which found positive fiscal returns for New York and New Mexico.

We reviewed additional state evaluations and calculated the fiscal ROI in those reports, reaching a similar conclusion. Fiscal ROI ranges from 0.10–0.56 for all additional studies, with the exception of a 2014 Maryland Film Industry Coalition study that suggests a positive ROI of 1.05

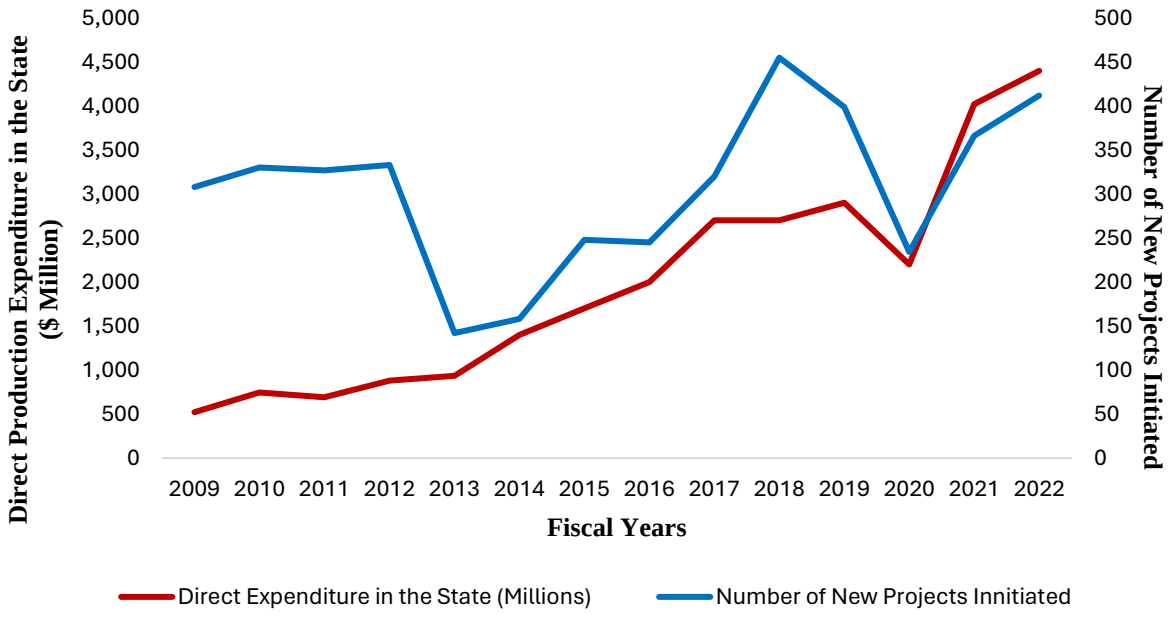
GA film tax credits

The Georgia Entertainment Industry Investment Act, commonly referred to as the Film Tax Credit (Ref. O.C.G.A. § 48-7-40.26), was enacted in 2005 to promote investment in film, television, and digital media projects. The 2005 legislation provided a modest 9 percent income tax credit for production in Georgia. Georgia House Bill 1100 (2008) significantly altered the original Georgia film income tax credit (FTC), increasing the credit to 20 percent of eligible

production expenditures and providing for an additional credit of 10 percent to companies that offer Georgia marketing opportunities. Although there have been amendments since 2008 that add eligibility for certain types of activities, alter the carryforward period, and institute audit requirements, the 2008 legislation is the basis for the current FTC program. Currently, the FTC is available to production companies spending at least $500,000 in qualified spending on one or more eligible productions. There is currently no cap on qualifying expenditures for companies, nor is there an aggregate cap for annual or lifetime credit generation.[2]

Figure 1 reports the number and total expenditures of projects certified by the Georgia Department of Economic Development (GDEcD) to receive Georgia Film Tax Credits. Although the total number of projects is relatively volatile, project expenditures have steadily increased over the period, except for the 2020 dip associated with COVID-19 shutdowns. There is a sharp increase in overall spending in 2014, which does not correspond to any major changes to the FTC – a point to which we will return later.

Figure 1. Number and Total Expenditures of Georgia Film Tax Credit Projects, 2009–22

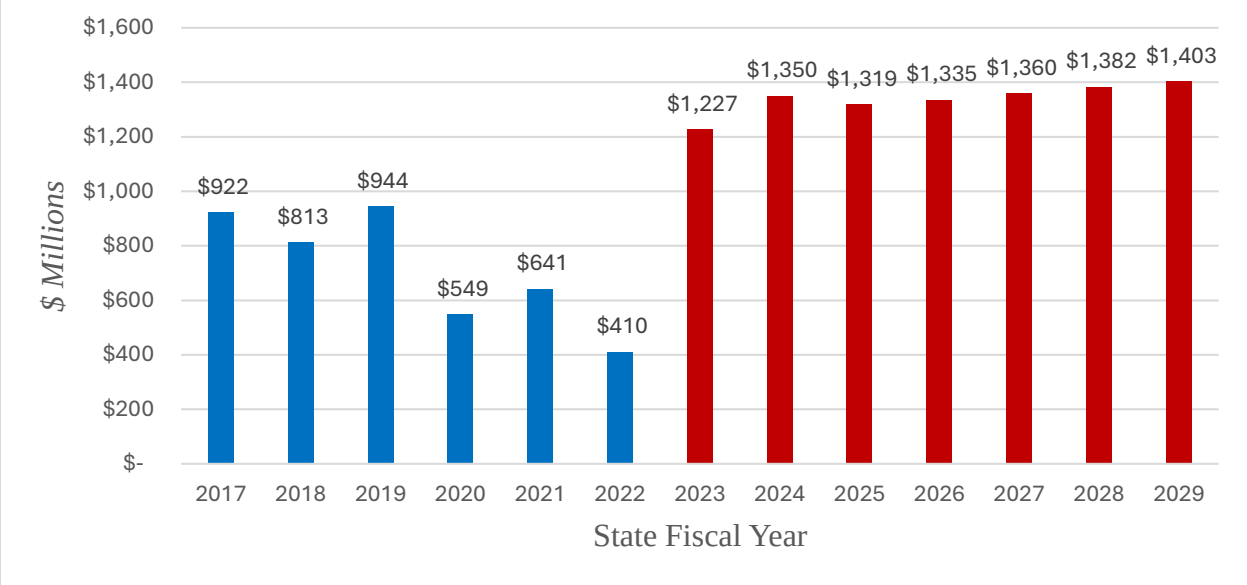


Source: Agency Performance Measure Reports, 2009–22

[2] A 2012 amendment extended the tax credit to Qualified Interactive Entertainment Production Companies (QIEPCs) with different eligibility requirements and a $12.5 million annual aggregate cap.

Figure 2 reports historic tax credit generation associated with these projects as well as projected future tax credit generation. The relatively lower levels of credit generation compared to the levels of project related activity in 2020-2022 reflects timing changes induced by HB 1037 (2020). Prior to HB 1037, the production spending used by GDEcD to certify tax credits generally occurred in the same year in which the Department of Revenue (DOR) generated the credits. HB 1037 requires an audit prior to credit generation for all production commencing after January 1, 2021. A review of project production dates relative to credit generation dates reveals an average two-year lag between production spending and credit generation in the post-HB 1037 environment.[3] Figure 2 incorporates this lag into calculations of future credit generation. Based upon current GDEcD project data and projected spending growth, it is expected that the FTC will generate more than $1.2–$1.4 billion in tax credits annually from 2023–29.[4]

Figure 2. Historical and Projected Credit Generation



Source: Historical data from 2017–22 from DOR data; projections are authors' calculations

[3] The lag between audit and production will also likely smooth the impact of recent industry strikes on future credit generation, as delayed projects join the queue for audits.

[4] The annual growth rate is based on IBISWorld projected national industry growth, assuming Georgia maintains its current industry share.

Empirical Strategy

Our analysis is comprised of two parts. The first focuses on identifying changes in state-level industry outcomes after the 2008 Georgia Entertainment Industry Tax Credit Bill. The second focuses on changes in entertainment industry worker outcomes.

Data

We are interested in state-level changes in industry employment, wages, and establishments as well as changes in the level and share of films and TV series filmed in Georgia.

Data on state-level employment, wages and establishments for the motion picture production industry comes from the Quarterly Census of Employment and Wages (QCEW), collected by the Bureau of Labor Statistics. This data only considers private business establishments and therefore may miss employment or wages under contract agreements. We address contract work in the industry with individual data. Following Button (2021) data on motion picture production are at the six-digit NAICS level (512110) and four-digit SIC level (7812) for the period of analysis.

Also following Button's methodology, we conduct analysis for related industries such as caterers, formal wear and costume rental, hotels and motels, independent artists, writers and performers, lessors and nonresidential buildings, payroll services, truck trailer, and RV rental and leasing. We do not find evidence of big spillover effects.

To understand changes in Georgia entertainment production activities, we use detailed project-specific data on film and television series production purchased from Studio Systems, Inc. Studio System is a proprietary industry database of feature films and TV series whose content is managed by their staff to guarantee data quality. We prefer this source to other sources that are user-generated.

We extracted from Studio System a database of feature films where filming was done between January 1, 1990, and December 31, 2022, and the filming took place, at least partially, in the United States. Budget information was not available for all films. We therefore also created a subset of feature films that contained budget information, 5,291 of 10,593 feature films. With this raw data we create state by year estimates of the number of featured films, the average budget per location, and the respective shares for each state of total films and budget for each year in the United States. A proportion of the feature films were filmed in multiple locations,

different states within the US and nations abroad as-well. When calculating the average budget per location we divided the estimated budget evenly across all the locations in which filming took place. Regarding the filming dates, we used the year the film was shot, when available, and the year of release when information on the start of the shooting was missing.

Similarly, we extracted from Studio System a database of TV series whose season span is included in the period between January 1, 1990, and December 31, 2022, and whose filming took place, at least partially, in the United States. This process yielded 465 TV series. With this raw data we created state by year estimates of the number of TV series. No information on budget was available in the Studio System data. A proportion of the TV series were filmed in multiple locations, different states within the US and nations abroad as-well. Regarding the filming dates, we used the season span of each series to determine the number of series year by year.

Finally, we investigate changes for individual workers and address contract work using microdata from American Community Survey (ACS). We use data on individuals' migration, contract work, hours, individual wages, and demographic characteristics.

State-level Analysis

Several econometric methods are available to estimate the impact of exposure to a particular policy, especially when the data for the unit of analysis is available in a panel structure, such is the case of states. Given that we have one treated unit (Georgia), the synthetic control method developed by Abadie et al. (2010) is our preferred method for analyzing the effect of the Georgia Film Tax credit on state-level industry outcomes. The synthetic control (SC) method is specifically designed for case study research in which there is only one treated unit. The SC method compares the actual Georgia outcomes after 2008 with a counterfactual scenario in which there was no FTC. The counterfactual outcomes are those from a "synthetic Georgia" produced using a weighted combination of potential control (or donor) units such that pre-treatment outcomes (employment, wages, establishments, share of films produced and share of budget involved before 2008) in the synthetic Georgia mirror the actual Georgia as closely as possible. The weights are optimally generated and fixed over time.

The potential control (or donor) units are the set of states that did not have film incentive programs during the study period.

We present the main results for the estimation using synthetic control method, although, we also run additional analysis with estimators such as difference-in-differences and synthetic difference-in-differences. Our findings are unaltered when using these additional methods.

Individual Generalized Differences-in-Differences

We start with a generalized difference-in-differences (DD) model.

$$y_{i,j,o,t} = \beta X_i + \delta\left[1(t \geq 2008) \times 1\left(\theta_j = Movie\right)\right] + \mu_t + \phi_o + \theta_j + \varepsilon_{i,j,o,t}$$

where our unit of observation is individual *i* in industry *j* in occupation *o* at year *t*. The outcome variables are migration to Georgia, self-employment, hours worked, and wages. Individual controls include marital status, school attainment, sex, age, race. We include time, occupation, and industry fixed effects. $\phi_o + \theta_j$ are occupation and industry fixed effects, respectively, that address variations in the outcome variables correlated with idiosyncratic and unobserved factors at the occupation and industry level during the period of analysis. Year-fixed effects μ_t absorb variations that affect all industries for a specific year, like economic conditions or changes in the business cycle in a certain year.

We estimate the generalized DiD model using Georgia workers in the ACS. Our parameter of interest is δ, the difference-in-differences coefficient on the interaction of an indicator for the post-period $1(t \geq 2008)$ and an indicator that the individual reports working in the movie industry $1\left(\theta_j = Movie\right)$. It measures the differential change in outcomes after the FTC for individuals reporting work in the film and television industry relative to workers in other industries.

Results

Descriptive statistics

Tables 1 to 3 present the descriptive statistics for QCEW, Studio Systems, and ACS data, respectively. As a first approximation to the changes after the FTC, we can compare the mean and standard deviation for each outcome.

Tables 1 and 2 describe the Georgia Film industry relative to the industry in states comprising the counterfactual donor pool. The difference between Georgia and the 12 states with no film incentives is evident. Table 1 reveals that prior to the 2008 FTC Georgia's film industry

establishment, employment, and wage levels were already substantially higher than the unweighted average of donor states. The difference markedly increases after 2008. For example, Table 1 indicates that the average annual employment in the Georgia Film industry increases approximately 350 percent in the post period, while the control states increased by s the outcome that seems positively impacted by the FTC, with a tremendous increase of about 350% compared to an average 20 percent increase among control states. Similarly, according to Table 2, prior to 2008, Georgia hosted a greater proportion of US film projects and film budgets compared to the average of the control states. While potential donor states garner less than 1%, on average, of the the share of total US films and budgets before and after 2008, Georgia shares increase from roughly 1% in the pre-period to more than 14 and 19 percent, respectively, after 2008.

Tables 1 and 2 also reveal tremendous heterogeneity among the potential donor state outcomes as evidenced by the large standard deviations. Coupled with the differences in the control state averages and Georgia in the pre-period, this heterogeneity lends credence to the idea that equal weighting of potential donor states may not provide the best counterfactual for Georgia. Hence, our preference for the synthetic control design in which counterfactual states are optimally weighted to mimic Georgia's pre-period outcomes.

Tabe 1: Descriptive Statistics from QCEW

	Treatment (Georgia Film Industry)			Control (Donor States' Film Industry)		
	1990 -2022	Before 2008	After 2008	1990-2022	Before 2008	After 2008
Annual Establishments (avg)	369.4	272.7	485.5	123.2	106.4	143.3
	(135.2)	(71.46)	(95.42)	(227.8)	(195.8)	(260.1)
Annual Employment (avg)	5095.7	1910.3	8918.2	626.0	571.2	691.7
	(5502.6)	(558.6)	(6334.7)	(1285.3)	(1177.6)	(1403.9)
Total Annual Wages	322,422,843.7	71,728,745.2	623,255,761.9	34,551,147.5	24,424,472.9	46,703,157.1
	(444662419.6)	(25652578.1)	(522852082.2)	(80970160.6)	(54112380.9)	(103320840.5)
Observations	33	18	15	429	234	195

Notes: Standard deviation in parentheses.

Table 2: Descriptive Statistics from Studio System Data

	Treatment (Georgia Film Industry)			Control (Donor States' Film Industry)		
	1990-2022	Before 2008	After 2008	1990-2022	Before 2008	After 2008
Share of Total Films	0.0729	0.0153	0.142	0.00405	0.00453	0.00347
	(0.0806)	(0.00710)	(0.0736)	(0.00947)	(0.00915)	(0.00984)
Share of Total Budget	0.0947	0.0112	0.195	0.00388	0.00400	0.00373
	(0.125)	(0.00684)	(0.127)	(0.0113)	(0.0103)	(0.0124)
Share of TV series	0.0296	0.0261	0.0338	0.00834	0.00801	0.00874
	(0.00948)	(0.00440)	(0.0121)	(0.0136)	(0.0125)	(0.0149)
Observations	33	18	15	396	216	180

Notes: Standard deviation in parentheses.

Table 3 reports the mean and standard deviation for the ACS microdata used to examine individual outcomes. Recall that the sample is comprised of Georgia ACS respondents. The treated group consists of those respondents associated with the industry code for Motion pictures and video industries. There are some notable differences between the average Georgia film industry worker and other industry workers, with several of these differences increasing after 2008. For example, prior to 2008, film industry workers were slightly more likely to have resided in a place other than Georgia in the previous year than the average Georgia worker in other industries. After 2008, film industry workers were nearly twice as likely to be new Georgia residents. Individuals in the Georgia film industry worked fewer hours per week than other industry workers prior to 2008; however, they worked more hours per week after 2008. Regarding annual wages, both treatment and control industries increase their average wages, however, the increase is more pronounced among film industry workers, around 71% compared to 21%. With respect to demographic characteristics, in the film industry, the share of white men is higher than in other industries, and on average, workers in this industry are younger.

Table 3: Descriptive Statistics: ACS

	Treatment (Film Industry Workers)			Control (Other Industry Workers)		
	2001-2022	Before 2008	After 2008	2001-2022	Before 2008	After 2008
Residency 1yr ago	0.0656	0.0410	0.0692	0.0364	0.0379	0.0360
	(0.248)	(0.199)	(0.254)	(0.187)	(0.191)	(0.186)
Self-employment	0.218	0.228	0.216	0.0949	0.102	0.0926
	(0.413)	(0.420)	(0.412)	(0.293)	(0.303)	(0.290)
Usual hours worked per week	39.37	35.10	40.00	38.77	39.89	38.43
	(18.03)	(15.94)	(18.23)	(13.88)	(13.21)	(14.06)
Wage and salary income	39,953.9	24,566.0	42,218.5	43,120.8	37,062.1	44,931.0
	(55592.2)	(39396.9)	(57252.7)	(54465.2)	(43407.1)	(57232.8)
Marriage status	0.393	0.369	0.396	0.560	0.589	0.551
	(0.488)	(0.484)	(0.489)	(0.496)	(0.492)	(0.497)
School attainment	0.686	0.549	0.706	0.568	0.522	0.582
	(0.464)	(0.499)	(0.456)	(0.495)	(0.500)	(0.493)
Sex	0.650	0.623	0.653	0.515	0.521	0.513
	(0.477)	(0.486)	(0.476)	(0.500)	(0.500)	(0.500)
Age	34.67	33.18	34.88	40.67	39.92	40.90
	(12.95)	(13.69)	(12.82)	(12.82)	(12.35)	(12.96)
Race	0.722	0.754	0.717	0.663	0.695	0.653
	(0.448)	(0.432)	(0.450)	(0.473)	(0.460)	(0.476)
Observations	2089	268	1821	805926	185403	620523

mean coefficients; sd in parentheses
Source: auto.dta

The raw means in Tables 1-3 suggest substantial changes for the Georgia film industry and its workers after the FTC, but we cannot say much about the causal relationship between these changes and the FTC. In the next sections we present results using the above-described econometric models to attribute these effects to the tax incentives.

Industry

In this section, we report the results for our state-level industry outcomes obtained using synthetic control, synthetic difference-in-differences, and difference-in-differences methods. Our preferred estimates are obtained using synthetic control method, but the results from all three methods are quite similar.

Appendix Table A1 presents the potential donors of the synthetic control analysis and their respective weights depending on the outcome of interest. The list of potential donor states

includes all those without film tax incentives, but only certain states are used in each specification based on the weighting system. These chosen states are then the actual donor states. The main requirement for a valid causal interpretation is that the synthetic Georgia closely approximates the pre-incentive outcomes in Georgia. Although there are 12 donors: Alaska, Florida, Idaho, Iowa, Kansas, Michigan, New Hampshire, North Dakota, South Dakota, Vermont, Wisconsin, Wyoming, not all of them contribute to the creation of the Synthetic Georgia, since the optimization algorithm does not consider useful to replicate Georgia's pre-trend. As can be seen, Alaska and Florida usually have more weight.

Figures 3 to 7 present the graphical representation of the synthetic control (SC), synthetic DID, and DID approaches. Tables 5 and 6 show the Average Treatment on the Treated (ATT) of the FTC on the outcomes of interest.

Figures 3-7 demonstrate that the synthetic control method does a good job of approximating Georgia across all state-level outcomes in the pre-period. The differences between actual Georgia outcomes and synthetic Georgia are virtually indistinguishable prior to the 2008 change in the FTC. The figures also reveal that the SDID and DID methods provide reasonable approximations of the Georgia pre-period outcomes.

The figures also indicate striking gains in Georgia film industry outcomes after 2008, while there are minimal changes in synthetic Georgia's film industry. Of note, though, is that gains were relatively modest in the years immediately following the 2008 FTC and the most dramatic increases occur in 2014 and 2015, remaining elevated afterwards. For example, the SC annual employment results summarized in Figure 3 indicate that the difference between actual Georgia and synthetic Georgia is approximately 2000 film industry workers in 2014. This difference increased to over 6,000 by 2015 and to over 12,000 by 2017. Somewhat mechanically following from the employment results, we observe the same pattern in the total annual industry wage bill results (Figure 4). Figure 5 suggests that the 2014/2015 surges in employment and earnings were accompanied by more modest growth in industry establishments.

Figure 3. Georgia vs Synthetic Georgia: Annual Employment and Donor Weights by Method

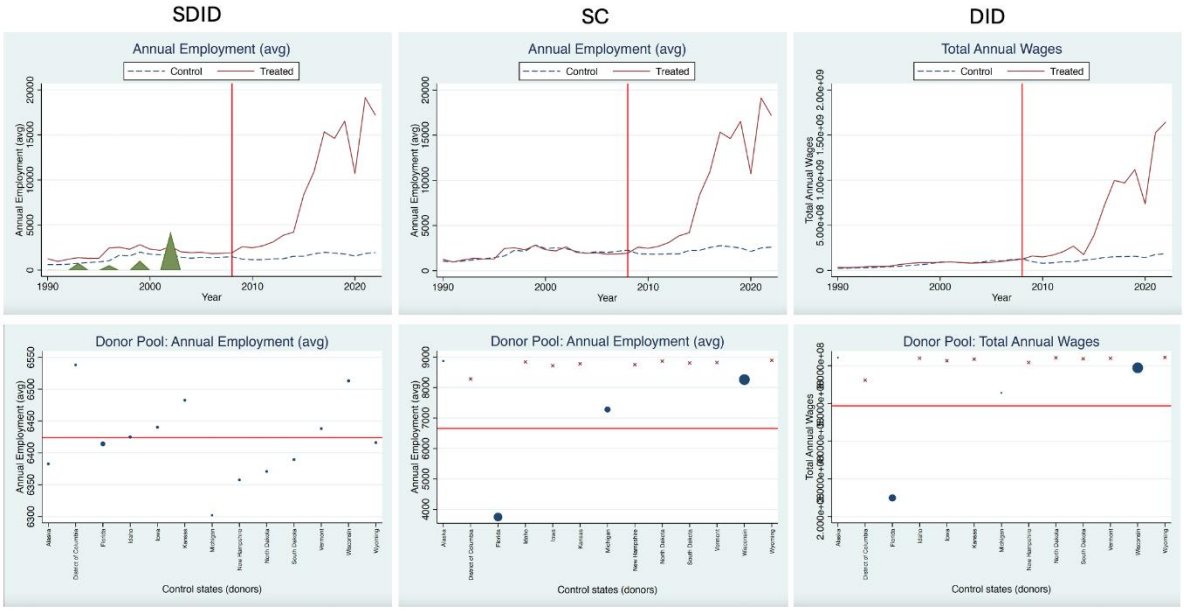


Figure 4. Georgia vs Synthetic Georgia: Annual Wages and Donor Weights by Method

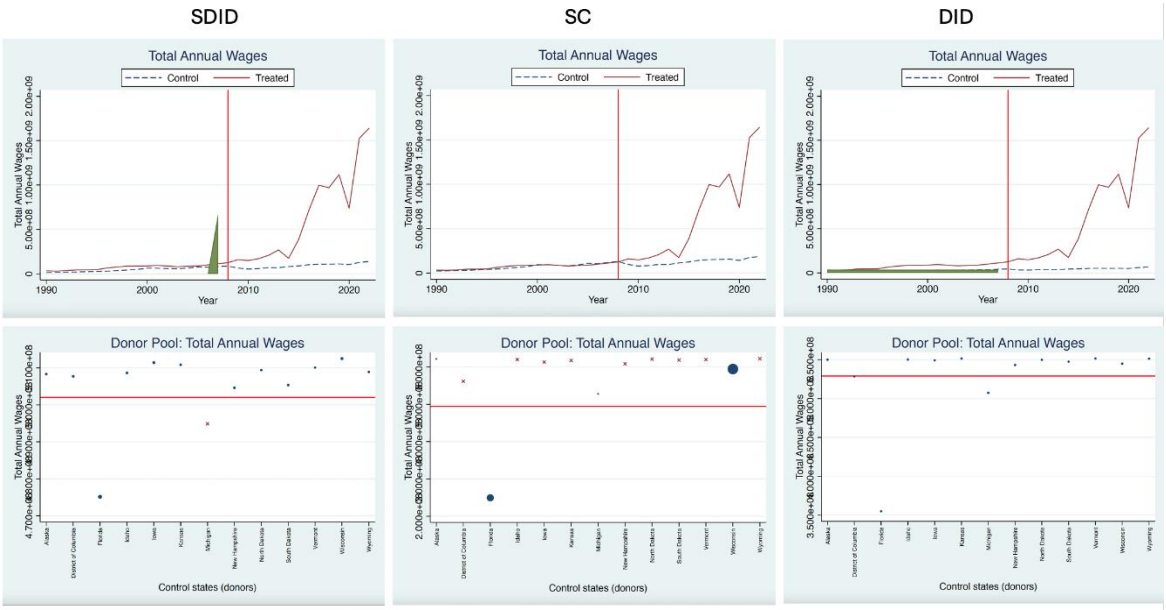
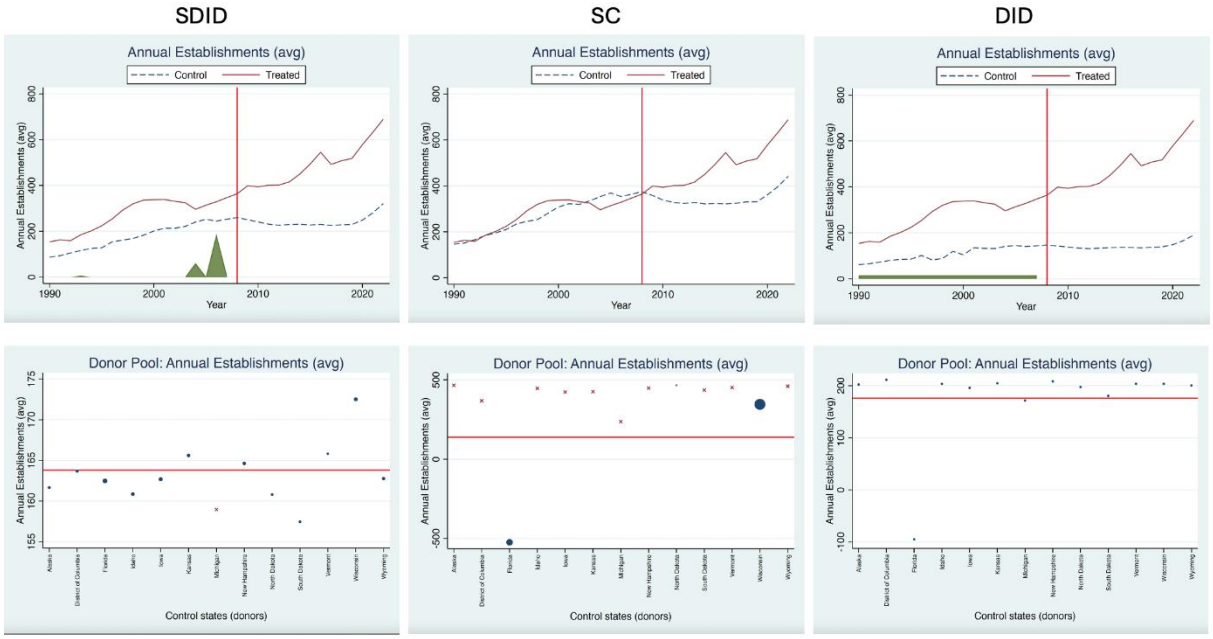


Figure 5. Georgia vs Synthetic Georgia: Annual Establishments and Donor Weights by Method



Figures 6 and 7 report results for Georgia's share of total US film projects and total US film budgets, respectively. Unlike the gradual and modest employment, wage, and establishment gains after 2008 seen in Figures 3-5, there is an immediate rise in Georgia's share of film projects and budgets. The difference between Georgia's actual and synthetic shares of US film projects jumps from less than one percent in 2008 to approximately five percent in 2009. The difference in Georgia's share of project budgets also increases from less than one percent in 2008 to approximately 5 percent in 2009. This suggests that the FTC successfully attracted new film production to the State. Taken with the employment, wage, and establishment results, the FTC induced a five-fold increase in Georgia's share of US film projects and budgets, 40 percent increase in employment, and 12 percent increase in establishments between 2008 and 2009.

The film production results also mirror substantial employment and wage gains between 2014 and 2015. The difference between actual and synthetic Georgia estimated shares of film productions rises from approximately 11 percent in 2014 to 18 percent in 2015, continuing to rise until peaking at 27 percent in 2017. The share of film budgets attributable to the FTC similarly increases from 9.5 percent in 2014 to 27 percent in 2015, peaking at 39 percent in 2017 before decreasing to approximately 2015 levels.

Although we've focused on our preferred synthetic control results, the SDID and DID estimates suggest similar FTC induced changes. These findings imply that the FTC prompted an immediate and substantial increase in Georgia's share of film production. The initial increase in production generated modest increases in employment and wages. The most dramatic industry gains, however, occur between 2014 and 2015.

Figure 6. Georgia vs Synthetic Georgia: Share of Total Films and Donor Weights by Method

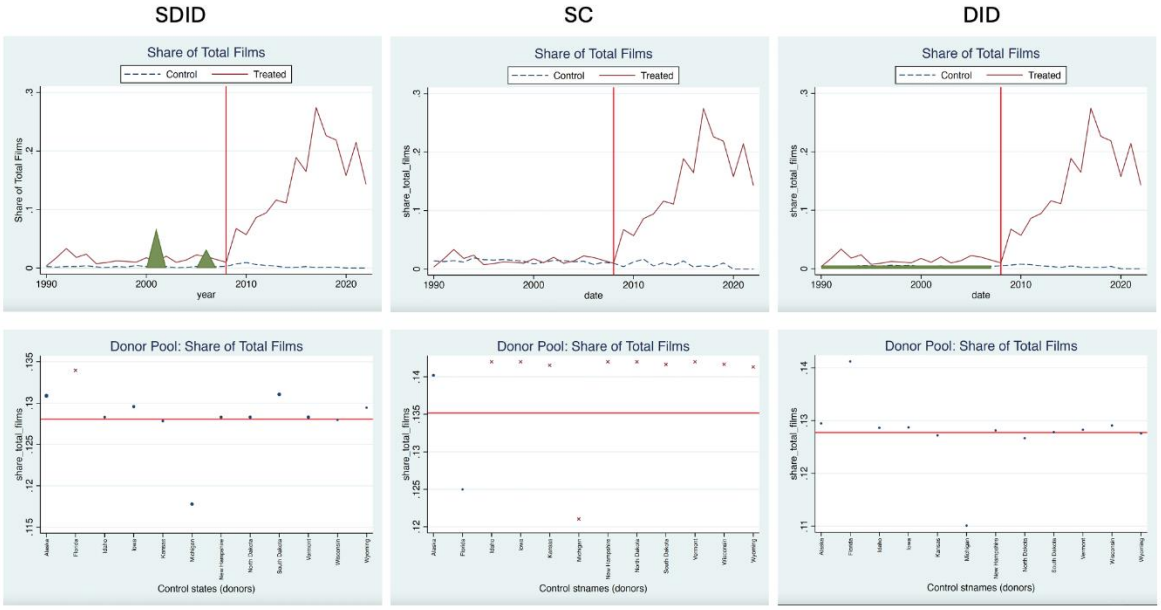
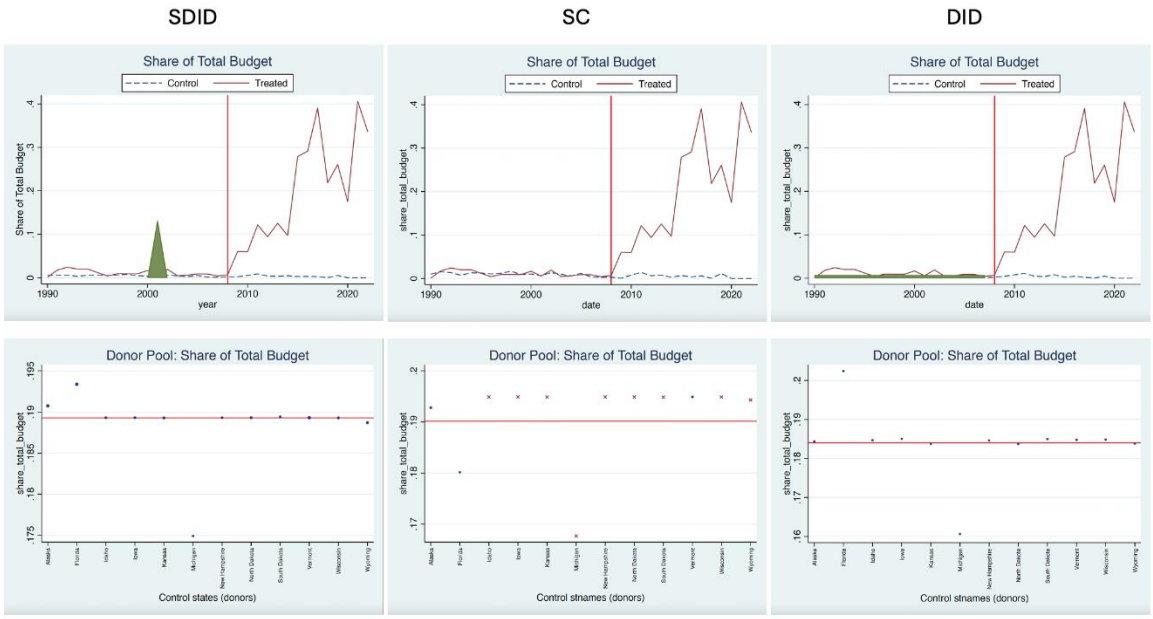


Figure 7. Georgia vs Synthetic Georgia: Share of Total Budget and Donor Weights by Method



All of our estimates of the FTC induced effects rely on a similar assumption: the FTC is the only change affecting the Georgia film industry after 2008. Under this assumption, we can attribute the reported changes to the FTC. Yet, our results raise two important questions about this assumption. First, why did the most dramatic effects occur six years after the 2008 FTC between 2014 and 2015? Second, how should we think about agglomeration effects when attributing industry changes to the FTC?

To answer the first question, we closely examine the projects and other state policies in 2014 and 2015. We found no evidence of substantial changes in other states' film incentive programs that might have diverted substantial activity to Georgia. However, this period saw Georgia host production of several big-budget box-office films—including *The Hunger Games: Mockingjay Part 1 & 2*, *Insurgent*, *Taken 3*, and *Furious 7.* Additionally, there was a large increase in purpose-built studio space, with the opening of Atlanta Filmworks (36,000 sq.ft.) and Trilith (Pinewood) Studies (717,150 sq. ft.). The latter studio accommodates much of the Marvel universe film production, with AntMan (2015) starting production here in 2014 followed by Captain America: Civil War (2016) and Guardians of the Galaxy: Vol. 2 (2017). Although production in purpose-built studios, particularly at Trilith, has been robust (and growing) since the 2014-2015 surge, attraction of large budget films to other parts of the state has been hit or miss.

Fixed capital investments like the purpose-built studios do not benefit from the FTC; however, the productions using the purpose-built studios do benefit from the FTC. The extent to which purpose-built studios and other fixed investments by production-related companies generate activity beyond that which is induced by the FTC is an open question. Yet, this is a critical policy issue. On the one hand, it could be argued that the FTC successfully induced enough activity to build a critical industry mass that itself attracts production activity. Thus, the high level of tax incentive support is no longer necessary. On the other hand, it could be argued that the productions utilizing this industry infrastructure only occur in Georgia because of the generous FTC. Thus, reductions in industry support would substantially decrease utilization.

To understand the magnitude of this question, we calculate the "but-for" percentages implied by our estimates under the assumption that all estimated gains are attributable to the FTC and not other industry changes. To do so, we take the difference between Georgia and synthetic Georgia and represent this difference as a share of the actual outcomes in Georgia for each year. To

interpret these as the causal effect of the FTC, one must assume that nothing else occurred that differentially influenced Georgia's film industry outcomes. Table 4 summarizes the results.

The estimates range from essentially 0 percent, indicating that all of the activity would have occurred in the absence of the incentive, to 100 percent for the last few years of film shares and budgets. Estimates for establishments are on average the smallest and indicate that 11–30 percent of new establishments are attributable to the FTC. On the other hand, the FTC appears to induce the bulk of film activity and, more recently, television projects. The average is approximately 65 percent, with the general trend suggesting an increasing share of all outcomes would not have occurred without the FTC.

Table 4: Synthetic Control "But-for" Estimates by Outcome and Year

	Employment	Wages	Establishments	Share of US Films	Share of US Film Budgets	Share of US TV Series	**Average**
2009	29.43%	43.44%	10.72%	14.07%	85.95%	-0.84%	**30.46%**
2010	31.47%	53.81%	11.86%	82.60%	90.52%	-0.84%	**44.90%**
2011	36.91%	56.11%	17.20%	86.18%	90.48%	-7.23%	**46.61%**
2012	42.16%	56.95%	17.78%	86.00%	89.59%	28.51%	**53.50%**
2013	53.30%	66.38%	18.80%	92.03%	91.91%	24.25%	**57.78%**
2014	48.33%	40.00%	22.15%	93.39%	98.33%	37.42%	**56.60%**
2015	74.05%	70.50%	29.61%	98.42%	98.18%	41.51%	**68.71%**
2016	76.32%	81.10%	33.85%	93.64%	99.23%	61.07%	**74.20%**
2017	81.81%	85.62%	28.48%	99.37%	99.10%	61.07%	**75.91%**
2018	81.48%	85.31%	35.13%	99.39%	94.87%	61.07%	**76.21%**
2019	84.43%	86.80%	35.15%	93.45%	97.48%	75.93%	**78.87%**
2020	79.91%	81.46%	37.16%	98.64%	100.00%	81.57%	**79.79%**
2021	86.81%	89.10%	35.44%	100.00%	100.00%	84.57%	**82.65%**
2022	84.56%	89.01%	32.22%	100.00%	100.00%	86.71%	**82.08%**
Average	**63.64%**	**70.40%**	**26.11%**	**88.37%**	**95.40%**	**45.34%**	**64.88%**

The finding that the "but-for" percentage is increasing, rather than decreasing, over time runs counter to the idea that incentives act to establish a nascent industry that will eventually reach a point where support is no longer needed. Instead, these results suggest that the industry has become more dependent upon the incentive over time.

The caveat to this interpretation is crucial: We cannot rule out the possibility that the industry reached a sustainable point during the study period and favorable factors associated with industry concentration are being attributed to the FTC.

Tables 5 and 6 report the average treatment (ATT) effect on the treated for our state-level outcomes under the assumption that all post-period industry changes are attributable to the FTC.

Table 5: Average Treatment on the Treated by Method, Studio System Data

ATT	(1)	(2)	(3)
	SDID	SC	DID
Share of Films	0.128***	0.135***	0.128***
	(20.83)	(21.17)	(18.45)
Share of Budgets	0.189***	0.190***	0.184***
	(21.13)	(34.81)	(24.46)
Observations	429	429	429

* p$<$0.10, ** p$<$0.05, *** p$<$0.01

Table 6: Average Treatment on the Treated by Method, QWEC Data

ATT	(1)	(2)	(3)
	SDID	SC	DID
Employment	6424.0***	6658.3***	6887.5***
	(33.31)	(9.31)	(18.15)
Establishments	163.8***	138.6	175.9*
	(4.57)	(0.67)	(1.83)
Wages	502000000***	494000000***	529000000***
	(23.90)	(5.45)	(8.48)
Observations	462	462	462

* p$<$0.10, ** p$<$0.05, *** p$<$0.01

Individual Workers: Migration, contract work, hours, and individual wages

Table 7 presents the results of the generalized difference-in-differences. The coefficients are the estimated post-2008 difference for Georgia workers in the film industry relative to all other workers. Our preferred estimates that include the full set of fixed effects are in Column 3.

Table 7 indicates that there is a significantly higher probability of being an in-migrant for film industry workers after the 2008 FTC. This suggests that film industry workers from other states were differentially attracted to Georgia in the 2008-2022 period, and that a non-trivial

portion of the employment and wage growth benefited new residents rather than existing residents.

Georgia workers in the film industry also worked 5-6 hours more in the usual week after the 2008 FTC than workers in other industries. In the post-period, Georgia film workers also earned $4,000-$6,500 more annually than workers in other industries.

Given the relatively large share of contract work in the film and television industry, it is interesting that Table 7 indicates a significant decrease in the probability that a film industry worker is self-employed.

Table 7: Generalized Difference-in-Differences Estimation, ACS Data

	(1)	(2)	(3)
Migration	0.0424***	0.0424***	0.0413***
	(.0115918)	(.0019601)	(.0020765)
Self-Employment	-0.0151	-0.0151**	-.04193***
	(.0359386)	(.0070049)	(.0075997)
Hours Worked	6.382***	6.382***	5.081***
	(1.2272)	(.34797)	(.21615)
Wage	4,227	4,227***	6,505***
	(3,406.798)	(1,181.989)	(663.994)
Observations	812,476	812,476	812,476
Clusters (Ind code)	No	Yes	Yes
Fixed Effects	No	No	Yes

* p$<$0.10, ** p$<$0.05, *** p$<$0.01
Standard errors in parenthesis

Conclusion

Our preliminary results indicate that the Georgia FTC induced substantial increases in industry outcomes as well as individual gains in hours and wages. However, the results also suggest that the FTC induced significant increases in film worker migration to the State, which raises questions about the distribution of gains between incumbent residents and in-migrants. Further, the analysis raises questions about the extent to which we can attribute long-term industry growth to continuance of the FTC rather than industry infrastructure.

We look forward to comments and suggestions to further refine our analysis and shed light on remaining questions.

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Appendix

Table A1: Synthetic Control Weights of the Donors by Outcome Variable

	Weights				
Donor Pool	Share of Total Budget	Share of Total Films	Annual Wages	Annual Employment	Annual Establishments
Alaska	41%	67%	0%	1%	0%
Florida	26%	33%	29%	33%	24%
Idaho	0%	0%	0%	0%	0%
Iowa	0%	0%	0%	0%	0%
Kansas	0%	0%	0%	0%	0%
Michigan	0%	0%	1%	14%	0%

New Hampshire	0%	0%	0%	0%	0%
North Dakota	0%	0%	0%	0%	0%
South Dakota	0%	0%	0%	0%	0%
Vermont	33%	0%	0%	0%	0%
Wisconsin	0%	0%	70%	53%	76%
Wyoming	0%	0%	0%	0%	0%