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# Can state tax policies be used to promote entrepreneurial activity?

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**Abstract** Despite a recent flurry of empirical research on the effects of taxes on small business activity, state-level taxes faced by entrepreneurs have been overlooked by most of the existing literature. Using a 50-state panel of tax policy information spanning the years 1989 through 2002, our analysis reveals that state tax policies generally do not appear to have quantitatively important effects on entrepreneurial activity. When we find statistically important effects, we find that higher individual income tax rates, the existence of a state-level estate, inheritance or gift tax, and a higher weight on the sales factor in the state corporate income tax apportionment formula all slightly reduce a state's share of the national entrepreneurial stock. Results also indicate that states with more progressive personal income tax structures and states that have more aggressive corporate income taxes through the imposition of a combined reporting requirement both tend to have slightly higher entrepreneurship rates. The composition of state tax portfolios is not found to be a significant determinant of state entrepreneurship.

**Keywords** State taxes · Small business taxation · Small business growth

**JEL Classifications** H2 · H7 · L26

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## 1 Introduction

The interplay between tax policy and entrepreneurial activity has enjoyed a resurgence in the empirical economics literature. Most of the recent research has focused on *federal* taxes, however, leaving *state* tax policies relatively unexplored. As states continue to grapple with difficult issues in business taxation and development incentives, a thorough consideration of the effects of state tax policies on entrepreneurial activity becomes even more important, especially when considering the possible benefits that could follow new entrepreneurial ventures through economic growth, innovation, and the like. In this report, we examine the relationships between state tax policy and entrepreneurship using a longitudinal database of detailed information on state tax policies for all 50 US states from 1989 through 2002.[1]

[1] This report extends the preliminary analysis in Bruce et al. (2004).

This investigation is warranted for a number of reasons. First, as a result of the focus on federal taxes, earlier research has only considered a subset of the taxes facing small businesses. For example, Cline et al. (2006) show that the total state and local tax burden for US businesses includes much more than direct business taxes such as corporate income taxes or state franchise, excise, or gross receipts taxes. Businesses—especially small businesses—also pay significant amounts of property and sales taxes, along with a growing menu of miscellaneous charges and fees. The existing array of state tax structures provides a virtual cornucopia of exogenous policy variation that can be used to cleanly identify entrepreneurial responses.[2]

A second motivation for our study is the observation that state governments continue to debate and enact the bulk of pro-entrepreneurship policy in the US without the benefit of hard data on the effects of those policies on small business development and success. On one hand, higher taxes might reduce entrepreneurial activity by lowering the returns. On the other hand, higher taxes increase the rewards from tax avoidance or evasion and thus might have the undesirable effect of increasing entrepreneurial activity. These two impacts might also offset each other, such that higher taxes have no noticeable impact on entrepreneurial activity. The extent to which tax policies—especially state tax policies—actually influence entrepreneurial activity requires empirical exploration. If taxes do not affect entrepreneurial activity (i.e., if the returns and avoidance effects are either both small or cancel each other out), using tax policy to encourage innovation or growth through entrepreneurship is not likely to be fruitful. Alternatively, if a nonzero effect can be determined, the actual parameter estimates can be used to more efficiently design tax policy to achieve desired changes in entrepreneurship.

As stated above, our paper is one of only a few to investigate the relationship between *state* tax policy and entrepreneurship, as the large majority of the literature has focused on federal policy. Building on the small number of earlier papers on the topic discussed below, our contribution most closely relates to the recent work of Georgellis and Wall (2006) and Garrett and Wall (2006), who estimate panel regressions to examine the various determinants of state-level entrepreneurship. Using data from 1991–1998, Georgellis and Wall (2006) find that the maximum (state plus federal) marginal individual income tax rate exerts a u-shaped effect on the number of non-farm sole proprietors as a share of the working-age population, while state homestead exemption levels also exert important effects on entrepreneurial activity. Garrett and Wall (2006) add new control variables and find that higher state corporate income tax rates and higher state minimum wages reduce state rates of entrepreneurship.

We extend their line of analysis in the following general ways, all of which are discussed in detail below: (1) we consider a broader array of state tax policy variables, (2) we consider an additional measure of entrepreneurial activity drawn from tax return data, (3) we consider not only the stock of entrepreneurship in a state, but also a state's share of national entrepreneurship in order to address location effects, (4) we consider not only tax rates but also tax shares in state tax portfolios, (5) we consider effective tax rates as a robustness check on our baseline analysis of statutory tax rates, (6) we consider agricultural entrepreneurship in another robustness check, and (7) we analyze a longer time period.

To summarize our results in one sentence, we find that state tax policies do not appear to have quantitatively important effects on entrepreneurial activity. Our analysis reveals a few potentially interesting exceptions to this general theme, however. For example, while top statutory tax rates on corporate income or sales taxes do not have highly statistically significant effects on observed rates of entrepreneurship, we do find that higher top marginal tax rates on personal income tend to reduce a state's share of the national entrepreneurial stock. Further, states with combined reporting requirements as part of their corporate income tax have higher entrepreneurship rates, as do states with more progressive personal income taxes. We do not find a significant relationship between state tax portfolios (i.e., tax shares) and observed entrepreneurship rates.

[2] Beale (2004) provides an exhaustive account of state and local policies encountered by home-based businesses.

## 2 Existing literature

Two broad areas of study in the earlier literature motivate this analysis. The first is the literature on the effects of state tax policies on business location decisions. These results are important because business location decisions can have important impacts on measured entrepreneurship or self-employment rates. In his oft-cited review of a vast array of empirical studies, Wasylenko (1997) concludes that taxes have statistically significant but quantitatively small effects on interregional location behavior. In a similar vein, Bartik (1991) concludes that higher state and local taxes reduce business activity in a region with an elasticity of about −0.3, while noting significant deviation from this average across studies.[3] However, this literature may be slightly less relevant to the present study because of its focus on location decisions among firms. If smaller businesses are less mobile than larger firms (and they might not be), they are perhaps less likely to respond to state differences in tax policies. Further, most state development incentives are targeted at larger manufacturing firms rather than small businesses.

The second broad area of relevant literature consists of empirical studies of taxation and entrepreneurship. The number of studies in this literature has grown significantly in recent years, largely due to greater availability of useful data. Time series studies have focused on federal tax policies and have generally concluded that higher federal income or payroll tax rates cause higher rates of entrepreneurship, specifically defined as self-employment (Long 1982; Blau 1987; Parker 1996; Cowling and Mitchell 1997; Robson 1998). Explanations often rest on the idea that high tax rates drive workers out of paid employment, or wage jobs, into entrepreneurial ventures where they can more easily avoid or evade taxes. Despite the consistency of the larger group of times series studies, a more recent and extensive time series analysis in this area by Bruce and Mohsin (2006) shows that the question of how taxes affect entrepreneurship is not yet settled. In addition to personal income and payroll taxes, Bruce and Mohsin consider corporate income taxes, capital gains taxes, and estate taxes. Results generally indicate that taxes have statistically significant but very small and scattered effects on entrepreneurship rates. Consequently, they are likely to be ineffective in generating desired changes in entrepreneurial activity. None of these studies consider the effects of state taxes.

Several other studies have examined cross-sectional or panel micro data to examine the influence of tax policies on individual decisions about entrepreneurship. Results from these studies have also been inconclusive (Bruce and Gurley 2005; Bruce 2000, 2002; Carroll et al. 2001; Gentry and Hubbard 2000; Moore 2003; Schuetze 2000). While some of these have indicated that higher tax rates on self-employment income have ambiguous effects on self-employment rates, a growing consensus suggests that tax rate increases reduce entrepreneurial entry, growth, hiring, investment, and survival. State taxes have been considered in only a portion of these studies, however, and then only as a component of a combined federal and state income tax rate.

A few studies have analyzed state-level time series or panel data to explicitly examine the effects of state tax policies on entrepreneurial activity and are therefore most relevant to the current paper. Carlton (1979) finds no strong evidence that local taxes influence the number of firm births. He uses rather rough proxies for tax variables, however, and only considers three industries for a limited time period. Bartik (1989) uses more detailed tax information and a broader array of industries and finds that higher property taxes, corporate taxes, and sales taxes on equipment negatively impact small business start-ups.[4] He also finds that personal income taxes and general sales taxes are not statistically significant, while government spending has mixed effects depending on the category of spending. His survey of earlier studies finds elasticities that are generally below 0.5 in absolute value.

Chen and Williams (1999) examine business failure rates from 1984 through 1993, estimating panel regressions for each of a number of industry categories. Although their focus is not exclusively on small businesses, they find that higher sales taxes per capita increase business failure rates for low-tech industries, while higher corporate income taxes per capita lead to lower failure rates for high-tech

[3] See also Ladd (1998).

[4] Bartik (1989) extended the preliminary results in Bartik (1987).

industries. Kreft and Sobel (2003) find that the existence of state inheritance taxes above the federal level is associated with lower rates of growth in the number of sole proprietors between 1996 and 2000.

Our empirical framework most closely resembles that of Georgellis and Wall (2006), who use panel regressions to examine the various determinants of state-level entrepreneurship.[5] Using data from 1991–1998, they find that the maximum (state plus federal) marginal tax rate exerts a u-shaped effect on the number of non-farm sole proprietors as a share of the working-age population. An increase in the marginal tax rate (MTR) reduces entrepreneurship up to a minimum effect at an MTR of about 35%, after which MTR increases lead to more entrepreneurial activity. No other tax variables are included in their analysis. Further, however, they do find an S-shaped relationship between homestead exemption amounts and entrepreneurship. Garrett and Wall (2006) extend the work of Georgellis and Wall to include state corporate income tax rates and state minimum wage legislation. They find that both higher state corporate income tax rates and higher state minimum wages reduce state rates of entrepreneurship.

In sum, the previous literature has found that state tax policies can be important determinants of entrepreneurial activity, but magnitudes, signs, and statistical significance levels have not been conclusive, warranting additional research. This lack of consensus pertains especially to the effects of state-level tax policies on entrepreneurial activity. The present study expands upon the earlier literature in several ways. First, we consider a much broader set of tax policies in addition to the usual menu of tax rates. Second, we examine both a state's entrepreneurial stock as well as its share of the national entrepreneurship stock in order to understand how state tax policy might affect entrepreneurship rates within a state as well as the location of entrepreneurial activity across the nation. Third, we go beyond explicit tax policy variables to examine the influence of state tax portfolios (i.e., the share of total state taxes generated by each tax) on entrepreneurial activity. Finally, we use more recent data covering the period from 1989 through 2002 and test for robustness using alternative measures of entrepreneurial activity.[6]

## 3 Data and empirical methodology

### 3.1 Entrepreneurship measures

Our baseline empirical approach generally follows that of Georgellis and Wall (2006) and Garrett and Wall (2006), and consists of panel regressions of state rates of entrepreneurial activity on a set of tax variables and other controls, including a measure of the size of the public sector.[7] An important task in any study like this is deciding how to measure entrepreneurship. The notion of "entrepreneurial spirit" is something of an elusive concept, so a proxy must be used. To this end, most of the prior studies have used a variant of a self-employment rate or a firm birth rate, primarily because these are the easiest measures to obtain. Given that not all entrepreneurs are self-employed and that not all self-employed workers can be considered entrepreneurial, this study considers two different state-level measures of entrepreneurship. The first is the percentage of federal individual income tax returns filed from each state that report income from a small business or profession (on a Schedule C). The second, based on data from the Bureau of Economic Analysis (BEA), is the percentage of all non-farm workers in each state who are sole proprietors.[8]

A common criticism of virtually all measures of entrepreneurial or small business activity is that they include part-time and so-called partial entrepreneurs. No consensus has arisen about how to address this, or even what the consequences might be for empirical

[5] Georgellis and Wall (2000) develop the theory and empirical methods that are the foundation for this more recent paper, but the focus in the earlier paper is on British data, and no regional tax policy variables are considered.

[6] While a longer panel would provide for even greater robustness in our results, data for one of our primary measures of entrepreneurship (discussed below) are not available prior to 1989.

[7] A list of all variables along with their definitions, sources, and summary statistics are provided in the Appendix.

[8] A third useful measure of entrepreneurship is those individuals who receive income from other small businesses such as partnerships or S-corporations. However, state-level data on income from these sources are not widely available in a continuous panel. Also, while we exclude agricultural entrepreneurs in our baseline approach, we examine the effects of including them in the robustness checks that follow.

research.[9] Further, for virtually any measure of entrepreneurship for which data are available, there are questions about the extent to which it actually measures what one might consider to be true entrepreneurship. Rather than focusing on a single measure or claiming that either or both of ours are better than other available measures then, we simply present parallel treatments of two alternatives in order gauge sensitivity of our results to the definition of entrepreneurship.

In the analysis that follows, these two entrepreneurial measures are each viewed in two distinct ways. In our baseline specifications, we enter the state-specific entrepreneurship rates directly as described above. These values represent the stock of entrepreneurship in a state, as described above, and most closely relate to the self-employment rates used in much of the prior literature. With this approach our focus is more heavily toward the within-state effects of tax policy instead of on the cross-state locational effects of tax policy on entrepreneurship. As our primary focus is on the effects of tax policy on the tendency to start and maintain a small business, this approach is particularly useful because many entrepreneurs are involved only in smaller operations that do not span state boundaries.

For our first check on the robustness of our baseline findings, we convert state-specific counts of entrepreneurs into measures of each state's share of the national stock of entrepreneurs. Specifically, for the tax measure, we divide the number of Schedule C filers from each state by the total national number of Schedule C filers. For the employment measure, we divide the number of sole proprietors in each state by the total national number of sole proprietors. This alternative approach allows us to address the possibility that some entrepreneurs cross state lines and are responsive to tax policies in other states.

Consider our baseline analysis of entrepreneurship rates. If we find a negative effect of state income tax rates on entrepreneurship rates, it will not be clear whether this is picking up changes in the total national level of entrepreneurial activity or reallocation of entrepreneurial activity across state lines. To be sure, an individual state might not care about the source of newly generated entrepreneurial activity. A newly created small business might have the same effect on the state's economy as one that is simply attracted into the state from another state. The possible locational distortions from state tax competition have important implications for national tax policy, however. Our entrepreneurial share specifications get more directly to these location effects.[10]

Of course, we will need to evaluate the entrepreneurial stock and share results simultaneously in order to complete the picture. If a particular tax rate increase leads to lower entrepreneurship rates in the stock specifications but has no effect on entrepreneurial shares, then we can attribute the former effect to an overall reduction in entrepreneurial activity rather than a reallocation across state lines. Alternatively, if a tax rate increase has no effect on entrepreneurship rates but reduces shares, then we can more confidently attribute the effect to a reallocation rather than a net change in the amount of national entrepreneurial activity.

The first four columns of Table 1 present values of the tax return and employment measures of each state's entrepreneurial stock. Data are shown for the endpoints of our period of analysis—1989 and 2002—to provide a sense of the changes in entrepreneurial activity across states and over time. A few key themes emerge from this table. First, states with higher rates of entrepreneurial activity for the tax return measure typically have higher rates for the employment measure, although a number of exceptions arise in the data. In fact, the correlation coefficient between these two variables is 0.88 over the years between 1989 and 2002. Second, as shown by Georgellis and Wall (2006), entrepreneurial activity has grown over time in most states. Figure 1

[9] On the surface, one might imagine that part-timers might be less sensitive to tax rates or other policies since they might be less invested in their small business. On the other hand, this same group might actually be more responsive to tax policies since they have other sources of income. Indeed, some part-timers are engaged in entrepreneurial activity purely for the tax benefits it provides. In sum, it is not clear how the inclusion of part-timers might affect empirical results. It is also unclear how one might accurately identify and remove part-time or partial entrepreneurs from publicly available measures such as those in our study.

[10] To be sure, larger states will have higher entrepreneurial shares. We control for the size of the state in our entrepreneurial share models by including either the total number of tax returns or total state population, depending on the dependent variable being analyzed.

**Table 1** Entrepreneurship rates and shares by state

| | Stock of entrepreneurship | | | | Share of entrepreneurship | | | |
|---|---|---|---|---|---|---|---|---|
| | Tax return measure[a] | | Employment measure[b] | | Tax return measure[c] | | Employment measure[d] | |
| | 1989 | 2002 | 1989 | 2002 | 1989 | 2002 | 1989 | 2002 |
| Alabama | 11.3 | 14.0 | 12.1 | 14.9 | 1.3 | 1.4 | 1.3 | 1.3 |
| Alaska | 15.9 | 16.1 | 21.1 | 21.3 | 0.4 | 0.3 | 0.4 | 0.3 |
| Arizona | 13.2 | 13.9 | 15.7 | 17.1 | 1.5 | 1.6 | 1.6 | 1.8 |
| Arkansas | 14.0 | 15.4 | 15.7 | 16.2 | 1.0 | 0.9 | 1.0 | 0.9 |
| California | 14.8 | 16.7 | 16.1 | 19.5 | 14.2 | 13.5 | 14.0 | 14.2 |
| Colorado | 16.6 | 16.9 | 18.9 | 20.2 | 1.8 | 1.9 | 2.0 | 2.2 |
| Connecticut | 11.6 | 13.8 | 13.8 | 17.2 | 1.4 | 1.2 | 1.5 | 1.4 |
| Delaware | 9.5 | 11.0 | 10.8 | 13.0 | 0.2 | 0.2 | 0.2 | 0.2 |
| Florida | 12.6 | 14.8 | 14.0 | 16.4 | 5.4 | 6.1 | 4.9 | 5.6 |
| Georgia | 11.9 | 15.3 | 11.5 | 15.1 | 2.4 | 3.0 | 2.2 | 2.7 |
| Hawaii | 12.9 | 14.5 | 13.8 | 17.1 | 0.5 | 0.5 | 0.5 | 0.5 |
| Idaho | 16.6 | 17.3 | 19.6 | 20.3 | 0.5 | 0.5 | 0.5 | 0.6 |
| Illinois | 11.0 | 13.1 | 12.5 | 14.9 | 4.1 | 4.0 | 4.1 | 4.0 |
| Indiana | 11.6 | 12.5 | 12.4 | 14.5 | 2.1 | 1.9 | 1.9 | 1.9 |
| Iowa | 13.7 | 14.9 | 15.0 | 16.5 | 1.2 | 1.1 | 1.2 | 1.1 |
| Kansas | 14.7 | 14.9 | 16.6 | 16.6 | 1.1 | 1.0 | 1.2 | 1.1 |
| Kentucky | 13.1 | 14.3 | 13.1 | 14.5 | 1.4 | 1.3 | 1.2 | 1.2 |
| Louisiana | 12.5 | 14.1 | 13.4 | 15.3 | 1.5 | 1.4 | 1.4 | 1.4 |
| Maine | 15.5 | 17.5 | 16.8 | 20.2 | 0.6 | 0.6 | 0.6 | 0.6 |
| Maryland | 11.2 | 14.0 | 13.5 | 16.4 | 1.8 | 1.9 | 1.9 | 1.9 |
| Massachusetts | 12.1 | 14.2 | 12.2 | 15.8 | 2.5 | 2.3 | 2.4 | 2.4 |
| Michigan | 10.8 | 12.7 | 12.6 | 14.8 | 3.2 | 3.1 | 3.1 | 3.0 |
| Minnesota | 14.3 | 15.0 | 14.2 | 15.7 | 2.0 | 1.9 | 1.9 | 1.9 |
| Mississippi | 11.6 | 13.8 | 12.8 | 14.9 | 0.8 | 0.9 | 0.8 | 0.8 |
| Missouri | 12.9 | 14.1 | 13.6 | 15.8 | 2.1 | 1.9 | 2.0 | 2.0 |
| Montana | 17.0 | 18.2 | 21.1 | 23.2 | 0.4 | 0.4 | 0.4 | 0.5 |
| Nebraska | 13.9 | 14.9 | 15.0 | 16.0 | 0.7 | 0.6 | 0.7 | 0.7 |
| Nevada | 11.6 | 12.5 | 12.9 | 15.8 | 0.5 | 0.7 | 0.5 | 0.8 |
| New Hampshire | 14.3 | 15.4 | 16.2 | 18.8 | 0.6 | 0.5 | 0.6 | 0.6 |
| New Jersey | 10.3 | 12.4 | 12.6 | 14.8 | 2.8 | 2.7 | 2.9 | 2.6 |
| New Mexico | 13.8 | 14.6 | 17.0 | 16.8 | 0.6 | 0.6 | 0.7 | 0.6 |
| New York | 10.9 | 15.1 | 11.7 | 15.5 | 6.3 | 7.0 | 6.1 | 6.0 |
| North Carolina | 11.8 | 14.5 | 12.2 | 15.4 | 2.5 | 2.8 | 2.5 | 2.8 |
| North Dakota | 13.6 | 14.8 | 16.5 | 17.0 | 0.3 | 0.2 | 0.3 | 0.3 |
| Ohio | 10.9 | 12.1 | 12.3 | 14.4 | 3.9 | 3.5 | 3.8 | 3.6 |
| Oklahoma | 16.5 | 16.7 | 19.1 | 18.6 | 1.5 | 1.3 | 1.6 | 1.3 |
| Oregon | 14.8 | 15.4 | 17.3 | 18.6 | 1.3 | 1.3 | 1.4 | 1.4 |
| Pennsylvania | 10.7 | 12.0 | 13.2 | 14.6 | 4.2 | 3.7 | 4.4 | 3.8 |
| Rhode Island | 11.0 | 12.7 | 11.9 | 14.4 | 0.4 | 0.3 | 0.4 | 0.3 |
| South Carolina | 10.6 | 13.2 | 10.8 | 13.9 | 1.1 | 1.3 | 1.1 | 1.2 |
| South Dakota | 14.6 | 15.8 | 18.1 | 18.5 | 0.3 | 0.3 | 0.3 | 0.3 |
| Tennessee | 12.6 | 15.6 | 13.8 | 17.2 | 1.9 | 2.1 | 1.9 | 2.2 |

**Table 1** continued

| | Stock of entrepreneurship | | | | Share of entrepreneurship | | | |
|---|---|---|---|---|---|---|---|---|
| | Tax return measure[a] | | Employment measure[b] | | Tax return measure[c] | | Employment measure[d] | |
| | 1989 | 2002 | 1989 | 2002 | 1989 | 2002 | 1989 | 2002 |
| Texas | 14.8 | 16.6 | 17.5 | 17.9 | 7.6 | 8.2 | 8.2 | 8.1 |
| Utah | 15.6 | 15.1 | 16.5 | 17.9 | 0.7 | 0.8 | 0.8 | 0.9 |
| Vermont | 16.4 | 18.4 | 18.3 | 21.0 | 0.3 | 0.3 | 0.3 | 0.3 |
| Virginia | 11.2 | 12.7 | 12.0 | 14.1 | 2.3 | 2.3 | 2.3 | 2.3 |
| Washington | 13.5 | 13.5 | 16.4 | 17.2 | 2.1 | 2.0 | 2.3 | 2.2 |
| West Virginia | 11.7 | 19.3 | 14.2 | 15.2 | 0.6 | 0.5 | 0.6 | 0.5 |
| Wisconsin | 11.1 | 11.9 | 12.3 | 13.8 | 1.8 | 1.7 | 1.7 | 1.7 |
| Wyoming | 16.0 | 16.5 | 19.8 | 20.5 | 0.2 | 0.2 | 0.3 | 0.2 |

[a] Number of PIT returns with a Sch. C/Number of PIT returns

[b] Sole proprietor employment/Total employment

[c] Number of PIT returns with a Sch. C in state/Number of PIT returns with Sch. C in nation

[d] Sole proprietor employment in state/sole proprietor employment in nation


**Fig. 1** Average state entrepreneurship rates

displays the average of both measures of entrepreneurial stock across all 50 states over the time period of the analysis. While the employment measure appears to have grown steadily, the tax return measure grew quickly and then leveled off in the early 1990s. The last four columns of Table 1 present state shares of the national entrepreneurial stock for each of the two measures. The two entrepreneurial share measures are also similar. However, it appears that state shares of entrepreneurship typically did not change by large amounts between 1989 and 2002.

Next we present our set of explanatory variables included in the model. This set of control variables is largely consistent with the literature that explains entrepreneurship. We focus our primary attention on state tax policy, which can affect entrepreneurship by affecting the absolute profitability of entrepreneurial ventures as well as by affecting the relative profitability of entrepreneurship compared to wage employment or large business activity. Each of the tax explanatory variables is discussed in more detail below. Further, we include a number of other control variables to capture the broader economic climate in a state as well as state socioeconomic characteristics. The former group may affect entrepreneurship in that these variables account for whether a state has a macroeconomic climate that is conducive to successful entrepreneurial ventures, while the latter group includes social and demographic characteristics that are associated with entrepreneurship at the microeconomic level.

### 3.2 Statutory tax rates

Our principal task in this study is to uncover the various determinants of state and time variation in entrepreneurial activity, focusing primarily on the role of state tax policies. In the spirit of the prior literature, we begin with a consideration of statutory tax rates. Figure 2 shows averages across the 50 states of the top marginal state corporate income tax (CIT) rate, the top marginal state personal income tax

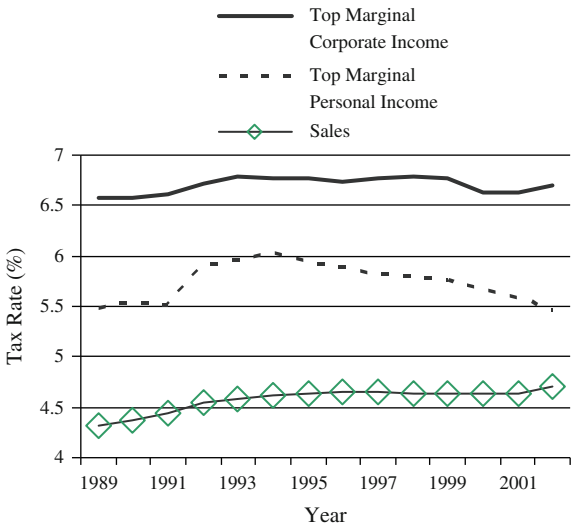


**Fig. 2** Average state tax rates

(PIT) rate, and the state sales tax rate for the time period of our analysis.[11]

Corporate income taxes can influence entrepreneurial activity in a few ways, one being decisions regarding organizational form. If CIT rates are high relative to PIT rates, for example, new businesses might choose to organize as unincorporated sole proprietorships to reduce taxes (Gordon and Slemrod 2000). This effect is artificial in that it only alters measured entrepreneurship, not true entrepreneurial activity. A second influence could be that high CIT rates could indicate that a state prefers to shift relatively more of its tax burden onto businesses. As shown, top CIT rates have remained relatively stable, increasing only slightly during the mid-1990s. It remains to be seen whether this small increase contributed to the growth in the stock of entrepreneurs shown in Fig. 1.

Personal income tax rates can affect entrepreneurs in many ways. As PIT rates increase, the returns to small business activity decline for sole proprietors. In addition, personal income taxes can insure against risk if rates are progressive and loss offset provisions are available (Domar and Musgrave 1944). Top PIT rates increased dramatically around the recession of the early 1990s but have gradually fallen since then to around their 1990 level. Again, the extent to which this trend has influenced entrepreneurial activity remains to be seen.

Although CIT and PIT rates are clearly important to small businesses, Cline et al. (2006) show that other state and local taxes are more important in practice. For example, it is well known among state and local tax experts that businesses are responsible for a significant share of state and local sales taxes (Ring 1999). As sales tax bases have eroded in recent years (Bruce and Fox 2000), states have responded by raising sales tax rates as shown in Fig. 2. If this growth represents a net increase in business taxes, this trend could have influenced state entrepreneurship rates. Alternatively, entrepreneurs might favor higher sales tax burdens in exchange for lower personal and corporate income tax burdens. We will return to this below.

### 3.3 Other elements of state tax policy

The analysis that follows moves beyond statutory tax rates and considers a number of other aspects of state tax policies. Unfortunately, the diversity of tax rules surrounding state property taxes on businesses makes empirical consideration of them quite difficult. Nonetheless, it is possible to control for a variety of other potentially relevant policies. Included first is a set of policy indicators involving state CIT structures. These consist of the sales factor weight in each state's CIT apportionment formula and dummies for the presence of a combined reporting requirement, a throwback rule, and legislation allowing limited liability corporations (LLCs).

Corporate profits for multi-state firms are apportioned for tax purposes to the states in which they have nexus. The apportionment formulas used by states typically consider the share of the firm's payroll, property, and sales. Equal weights were traditionally placed on the three factors, but many states have opted to increase the weight on sales in order to shift the CIT burden from multi-state businesses that manufacture within a state to those that manufacture out-of-state but sell into that state. Thus, higher sales factor weights might be associated with more entrepreneurial activity within a state's borders.

[11] While many small businesses will not actually face the top marginal rates used in our analysis, we view the top rates as useful policy signals in entrepreneurial decisions. However, we experiment with measures of effective tax rates in the analysis below.

Combined reporting rules are set up to force multi-unit firms to file a single CIT return rather than separate returns for each unit of the firm. These rules are intended to keep multi-unit firms from shifting taxable profits out of a state. Similarly, throwback rules are designed to ensure that all income is taxed somewhere. If a multi-state firm is able to locate profits in a state that does not tax corporate income or in which the firm does not have nexus, income which is not taxed (known as "nowhere income") is "thrown back" to the home state if that state has a throwback rule. Both of these rules have become popular as states have attempted to restore shrinking CIT bases in recent years. The presence of these rules might represent a state's overall effort to shift a larger part of its tax burden onto businesses. This relates to entrepreneurship in that a tax climate that attempts to shift the tax burden onto businesses could potentially discourage entrepreneurs from starting new businesses. On the other hand, in similar fashion to high CIT rates, combined reporting or throwback rules could encourage small businesses to remain small (or at least not incorporate). The rules could therefore result in an increase in the stock of entrepreneurship as measured by our two variables.

Finally, observed rates of entrepreneurship are expected to be higher in states that allow LLCs (or allowed them first since all states allowed LLCs by the end of 1997) because LLC owners (of single-owner LLCs only) would file a Schedule C with their federal return or call themselves self-employed on a labor market survey. Of course, this change only represents a change in organizational form and not an increase in economic activity.

To incorporate additional elements of state policy, we also include a measure of the tax and non-tax incentive programs that states offer to encourage economic development. It is expected that individuals and firms might respond to incentive packages offered by government for business development. However, an incentive variable may not perfectly correspond to entrepreneurship as many of the incentives are targeted at large, pre-existing firms or new branches thereof. An optimal measure of state economic development programs would fully capture the way in which the incentives affect the profitability of entrepreneurial ventures in a state. However, such data are unavailable given the significant variation in incentive programs across states and the way in which many incentive programs are individually tailored. Therefore, our measure of incentive programs is a simpler count of the overall number of tax- and non-tax incentive programs that states offer. While not a perfect measure, this approach at least partially captures the aggressiveness of states in targeting businesses with incentive programs.

We also include a dummy variable for whether a state imposes an inheritance, estate, or gift tax above the federal tax in a given year.[12] These taxes may reduce the amount of entrepreneurship in a state either by reducing the size of an entrepreneurial enterprise upon passage from an original owner to an heir or by reducing the survival probability of a small business (see Conway and Rork 2004).

Homestead exemptions for bankruptcy proceedings also may affect entrepreneurship by reducing the riskiness of entrepreneurial ventures. The potential losses from an unsuccessful entrepreneurial venture will be lessened as the dollar amount of housing investment that is exempt from being seized upon filing bankruptcy increases (see Berkowitz and White 2004). Therefore, we include two variables to capture homestead exemption amounts: (1) the dollar amount of the state's homestead exemption and (2) a dummy variable to denote those states that have an unlimited homestead exemption.[13]

We control for PIT progressivity by including the change in the average PIT rate (PIT liability divided by state personal income) given a change in income around the median income for a family of four.[14] Gentry and Hubbard (2000) find that more

[12] By 2001, most states had eliminated their inheritance, estate, and gift taxes. Instead, they rely on a "pick-up" tax, which captures a portion of federal tax liability and does not affect the overall tax liability on the estate.

[13] States with unlimited homestead exemptions are assigned the top value among states with limited exemptions. Therefore, the coefficient on the unlimited exemption dummy can be interpreted as the marginal effect of having an unlimited exemption relative to the state with the highest (finite) exemption amount.

[14] Specifically, using a married couple with two children as a representative household, the change in the average PIT rate associated with moving from a certain amount below the median income for a family of four to that same amount above median income is calculated. The year 2000 equivalent of this income range is $20,000. In other words, for the year 2000, average PIT rates are calculated at $10,000 below and $10,000 above median income as of 2000. For other years, an income range that is equivalent to $20,000 in 2000 dollars is used.

progressivity leads to lower rates of entry into entrepreneurship, suggesting that progressivity serves as a tax on successful entrepreneurs. Indeed, more progressive tax systems might disproportionately penalize entrepreneurs with exceptionally volatile income streams over time.[15] Greater progressivity also might serve as increased insurance against the risk of entrepreneurship, possibly increasing entrepreneurial activity as a result.

Regarding organizational form effects and the business tax policy variables described above (e.g., combined reporting requirements and throwback rules), an important component of this study is to ensure that the effects of true increases in entrepreneurship are disentangled from artificial changes in observed entrepreneurship rates (following from changes in business organization). This point is especially important for the results surrounding the top CIT rate and combined reporting requirements and throwback rules. For example, it was argued above that a high CIT rate may increase entrepreneurship simply because it deters small businesses from incorporating. This argument can be interpreted as a simple shifting in the mix of entrepreneurs and incorporated firms rather than a true increase in business activity. This does not reflect the primary intent of this study. Fundamentally, it is most important to examine the relationship between taxes and small businesses creation, not changes in organizational form. Thus, our empirical approach ensures that the estimated effects of the relevant policy variables isolate true entrepreneurship increases (as described below).

### 3.4 Tax shares

In a more significant departure from the previous literature, we consider the effects of state tax portfolios on entrepreneurial activity in a series of alternative specifications. Specifically, we replace all of the tax variables in our baseline models with variables representing the shares of total state tax revenues generated by (1) the CIT, (2) the PIT, (3) sales taxes, and (4) business licenses and fees. This approach is important for several reasons. First, to the extent that one tax is relatively more important in determining entrepreneurial activity, it stands to reason that states in which that tax is more important might have fewer small businesses than states that do not emphasize that particular tax. Second, because the many details of the tax structure cannot be perfectly captured in a relatively simple statistical analysis, the tax shares may serve as proxies for the broader structure of the state tax system. As previously stated, this is especially important in light of recent research that reveals that businesses are faced with much more than just corporate income taxes or business license fees (Cline et al. 2006). In addition, it is important to understand how the changing composition of state revenue portfolios (i.e., a shift from sales and business taxes to personal income taxes) may affect small businesses. No other studies have been identified that consider the relative merits of balanced state tax portfolios versus more concentrated tax structures in terms of their effects on entrepreneurial activity.

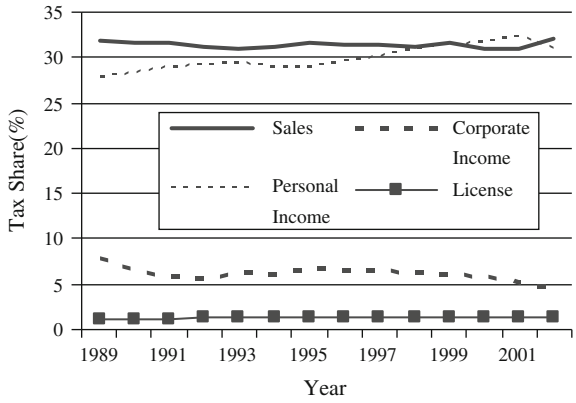


**Fig. 3** Average state tax shares

Figure 3 displays state averages of these four shares over time.[16] As is widely known, sales taxes have been replaced by personal income taxes as the dominant source of state tax revenue, and the corporate income tax share has generally fallen over time. Business licenses continue to provide a small but steady share of total state taxes.

[15] Loss-offset or income-averaging provisions might mitigate this possibility, but we have no way of controlling for those features of state income tax systems in our regressions. If those rules are relatively constant over time within states, our state fixed effects will at least partially account for them.

[16] We should note that the averages in Fig. 3 mask tremendous variation in tax shares between states and over time.

### 3.5 Other control variables

To control for state and time differences in the size and scope of government services, all models include measures of state expenditures per capita and local expenditures per capita. A higher level of government expenditures may foster business activity if businesses value the public goods that are provided. Conversely, higher government expenditures may deter business activity if businesses focus instead on the associated tax costs. The inclusion of local expenditures also accounts for the fact that we are not able to include features of state or local property tax systems due to a lack of consistently-defined data. Non-tax explanatory variables include the state unemployment rate, median income, poverty rate, population density, the rate of job growth, the share of a state's adult population with a bachelor's degree or higher, and the share of gross state product (GSP) in the agricultural and manufacturing sectors. The GSP shares may be important if entrepreneurship tends to be more viable in certain sectors. In regressions that explain state entrepreneurial shares, we include the total number of PIT returns for a state (tax return measure) or state population (employment measure) to control for state size.

Of primary importance is that all regressions include fixed effects for state-level heterogeneity and fixed effects for the year of the observation.[17] This technique controls for the numerous other state- and time-specific factors that may affect entrepreneurship that are not included in the model such as political factors, minimum wages, regulatory environments, fiscal centralization, and the like, to the extent that these factors remain constant within a state during our period of analysis. We use 1-year leads for all dependent variables to allow the entrepreneurship measures time to adjust to changes in the explanatory variables.[18] This approach also allows the estimated coefficients to avoid endogeneity bias. All results are reported with robust standard errors that account for unspecified heteroskedasticity or autocorrelation. Appendix 1 presents summary statistics for each variable for 1989 and 2002, and Appendix 2 presents data descriptions and source notes.

## 4 Results and discussion

### 4.1 Effects of state tax rates and rules on entrepreneurial stock

Results for our baseline fixed effects regressions of state entrepreneurship rates on statutory tax rates, other indicators of state tax policies, and the full set of non-tax controls are provided in Table 2. None of the tax rate measures have statistically significant effects on our employment-based measure of entrepreneurship, and the statutory top marginal state personal income tax (PIT) rate does not have a statistically significant effect on our tax-based measure.[19] Of course, given our empirical approach, we are only able to estimate the combined effect of the returns and avoidance effects discussed in the introduction. The lack of statistical significance suggests either that the two effects cancel each other out, or that both are individually small or insignificant. In contrast, results indicate that an increase in the top marginal corporate income tax (CIT) rate reduces our tax-return based measure of entrepreneurship, while higher sales tax rates increase our tax-return based measure of entrepreneurship. However, these latter two results are not statistically significant at high levels of confidence. A few of the other included measures of state tax policy have statistically significant impacts on the two measures of entrepreneurial activity: States with a combined reporting requirement tend to have rates of entrepreneurial activity that are about 0.66 (tax measure) or 0.42 (employment measure) percentage points higher than states

[17] The use of a random effects specification was considered but a Hausman (1978) test revealed that this was statistically inappropriate. Correlation between the regressors and the random effects will likely lead to biased coefficient estimates.

[18] Given our lead structure, our entrepreneurship measures are actually for the years 1990 through 2003, while data for all explanatory variables are for 1989 through 2002.

[19] The lack of statistical significance is not attributable to multicollinearity as diagnostics did not reveal a significant degree of correlation among the explanatory variables. In addition, the results generally hold in more parsimonious specifications of our basic model. First, our findings were unchanged in models that included only tax policy variables. Also, tax rates were not significant in models that included only tax rates.

**Table 2** Fixed effects regressions: entrepreneurial *stock* and statutory tax policy

| Variable | Tax return measure | Employment measure |
|---|---|---|
| Top corporate income tax rate | −0.048* | −0.025 |
| | (0.026) | (0.027) |
| Top personal income tax rate | 0.022 | −0.046 |
| | (0.029) | (0.052) |
| Sales tax rate | 0.136* | 0.065 |
| | (0.074) | (0.067) |
| Sales factor apportionment | −0.0002 | −0.001 |
| | (0.002) | (0.002) |
| Progressivity | 0.424** | 0.525*** |
| | (0.158) | (0.155) |
| Combined reporting | 0.656*** | 0421*** |
| | (0.159) | (0.142) |
| Throwback rule | −0.084 | 0.144 |
| | (0.097) | (0.124) |
| Inheritance, estate, and gift | 0.025 | −0.061 |
| | (0.094) | (0.080) |
| LLC | 0.237** | 0.065 |
| | (0.109) | (0.083) |
| Tax incentives | 0.039*** | 0.034*** |
| | (0.010) | (0.008) |
| Non-Tax incentives | 0.012 | −0.013** |
| | (0.008) | (0.006) |
| Homestead exemption (thousands) | −0.002*** | 0.001 |
| | (0.001) | (0.001) |
| Unlimited homestead exemption | 0.127 | 0.107 |
| | (0.160) | (0.129) |
| Unemployment rate | 0.015 | 0.216*** |
| | (0.068) | (0.031) |
| Median income (thousands) | −0.056*** | −0.012 |
| | (0.022) | (0.010) |
| College degree (%) | 0.032* | 0.014 |
| | (0.020) | (0.012) |
| Poverty rate | −0.014 | −0.020* |
| | (0.013) | (0.010) |
| Population density | 0.013*** | 0.013*** |
| | (0.003) | (0.003) |
| Job growth rate | −0.031 | −0.060*** |
| | (0.019) | (0.019) |
| Agricultural share of GSP | 0.020 | 0.175*** |
| | (0.028) | (0.032) |
| Manufacturing share of GSP | −0.054*** | −0.016 |
| | (0.014) | (0.013) |
| State expenditures per capita (thousands) | 0.061 | −0.028 |
| | (0.140) | (0.104) |
| Local expenditures per capita (thousands) | −0.006 | −0.012** |
| | (0.006) | (0.005) |
| Constant | 12.57*** | 11.70*** |
| | (1.39) | (0.82) |
| *R*-squared | 0.389 | 0.693 |

*, **, ***Indicate statistical significance at the 10%, 5%, and 1% levels respectively

*Notes*: Regressions include state and year fixed effects

All percentages are on a 0–100 scale

All right-hand-side variables are lagged 1 year

without a combined reporting requirement.[20] This finding is described in more detail below.[21]

The PIT progressivity measure has a positive and significant effect on the employment measure of entrepreneurship, contrary to the findings of Gentry and Hubbard (2000). While they found that increased convexity in the tax rate schedule reduced the probability of entry in entrepreneurship, our results indicate that states with more progressive PIT schedules have higher employment-based measures of entrepreneurship. In addition to obvious differences in data and methods, we attribute this result to three other possible effects. First, on the surface, more progressive tax rate schedules involve greater insurance against risk and, therefore, could serve as an incentive for entrepreneurial activity. Second, this result might also reflect some correlation between tastes for income redistribution (as evidenced by PIT progressivity) and tastes for entrepreneurship or risk-taking at the state level. In other words, states that

[20] One hypothesis might be that combined reporting captures regional effects since this requirement is more prevalent in western states. However, in the fixed effects model coefficient estimates are to be interpreted as holding state specific effects constant. Therefore, this effect is driven by changes in this policy *within* states over the timeframe of the analysis and cannot reflect regional effects.

[21] An argument that policy endogeneity might be driving these results is not compelling, as combined reporting and throwback rules are implemented primarily to recapture shrinking mobile corporate income tax bases.

prefer more income redistribution might also have stronger tastes for entrepreneurship and risk-taking. Third, since we also include the top marginal PIT rate in our model, the progressivity index might be picking up variation in marginal PIT rates at lower points in the income distribution (i.e., given a top marginal rate, more progressivity suggests lower marginal rates at incomes below the median). The important factor from an entrepreneur's perspective, to the extent that this explanation has merit, is that lower initial marginal rates can encourage entrepreneurial activity.

The allowance of LLCs also has an effect on the tax return measure of entrepreneurship. States that allow LLCs (or, since all states now allow LLCs, those that allowed them first) have slightly higher tax-based measures of entrepreneurship despite the finding that employment-based entrepreneurship seems to be unaffected by this policy. This result is intuitive; as corporations reclassify themselves as LLCs or as LLCs are otherwise created, their owners (in the case of single ownership) must report income for tax purposes on a Schedule C even though they might not call themselves "self-employed" on a labor market survey.

The number of tax incentives offered by states is associated with slightly higher rates of entrepreneurship. This result is intuitive as tax incentive programs are in part designed to encourage entrepreneurship by reducing entrepreneurial tax burdens; these results indicate they are having some success. However, according to this model, the impact of adding one tax incentive program is very small. One more incentive program increases entrepreneurship rates by only 0.04 (tax measure) or 0.03 (employment measure) percentage points—an economically insignificant magnitude. We find a negative relationship between non-tax incentive programs and employment-based entrepreneurship. Lastly, results indicate that higher homestead exemption amounts slightly reduce our tax-based entrepreneurship measure.

Although not the focus of this research, results for the remaining controls in Table 2 are worthy of additional discussion. Results show that employment-based entrepreneurship rates are higher with higher unemployment rates, echoing some of the earlier literature that finds that self-employment is often used as an alternative to wage employment when jobs are scarce. In addition, results show that employment-based entrepreneurship is lower when job growth is higher. Somewhat surprisingly, median income has a significant and negative impact on tax-based entrepreneurship rates according to this model. While many of the earlier micro-data studies have found a positive relationship between income and entrepreneurship at the individual level, this finding suggests that lower income states tend to have more entrepreneurial activity. In contrast, higher poverty rates are associated with lower entrepreneurship rates (for the employment measure only).

State industrial structure is also an important determinant of state entrepreneurial activity. States with larger shares of their GSP in the agricultural sector tend to have higher rates of employment-based entrepreneurship and states with larger shares of their GSP in the manufacturing sector tend to have lower rates of tax-based entrepreneurial activity. Further, results indicate that states in which a larger share of the adult population holds a college degree tend to have higher rates of tax-based entrepreneurship. In addition, entrepreneurship rates are higher in more densely populated states.

Turning back to the results regarding combined reporting requirements, the presence of this policy might represent an overall state tax climate that is less favorable toward larger businesses and perhaps more favorable toward small businesses. Alternatively, such policies might simply deter small businesses from incorporating.[22] It is important to understand whether this effect represents a true increase in entrepreneurship or whether it is simply picking up changes in organizational form. We investigate this by estimating identical models to those in Table 2 except for the inclusion of the total number of non-self-employed firms in the state as an additional explanatory variable.[23] In this context, the coefficient on the combined reporting rule is interpreted as the

[22] A third possible explanation could involve tax planning activity. Perhaps, when firms are faced with combined reporting requirements and throwback rules (that are intended to increase tax liability), they are cost-justified in adopting tax planning strategies to offset these effective tax rate increases. Many possible tax planning strategies could involve the use of outside consultants rather than employees inside the firm. If so, this would increase the number of entrepreneurs based on the measures used here.

[23] Full results of this model are available upon request.

effect of this rule on the measures of entrepreneurship, holding the number of non-self-employed firms constant. Results indicate that, after including this control, a combined reporting requirement is still a statistically significant determinant of both measures of entrepreneurship. Furthermore, the magnitudes of the coefficients are roughly the same as in the prior model. Thus, the appropriate conclusion is that the effect of combined reporting on entrepreneurship represents more than simple organizational form changes since the results show that these rules increase entrepreneurial activity even while holding the number of non-self-employed firms constant (i.e., not allowing it to decrease).

### 4.2 Effects of state tax rates and rules on state shares of national entrepreneurship

In order to address the issue of locational distortions discussed above, we now turn to an examination of the effects of tax rates and rules on state shares of the national entrepreneurial stock. This consists of regression analysis similar to that presented in Table 2 with the primary difference being that, in this specification, the dependent variable is a state's share of the national entrepreneurial stock. Also included are controls for a state's size, namely the number of PIT returns in a state (tax return measure) or the state's population (employment measure). Table 3 presents these results, which indicate that higher top PIT rates reduce both measures of entrepreneurship. Coefficient magnitudes suggest that a one-percentage-point increase in the top PIT rate will reduce a state's share of national entrepreneurship by about 0.016 to 0.017 percentage points for the two measures of entrepreneurship (translating into an approximately 0.8% change given the average entrepreneurial share of 2%). Overall, this somewhat small effect reveals the possibility that interstate mobility of small businesses is rather limited.

Viewed in light of our entrepreneurial stock results in Table 2, the share results in Table 3 suggest that the significant effects of corporate and sales tax rates on entrepreneurship rates do not arise from interstate reallocation of entrepreneurial activity. These two tax rates, both of which have significant effects on the tax-based entrepreneurship rate in Table 2, are not found to have significant effects on entrepreneurial shares in Table 3. Additionally, the significant effect of the PIT rate in Table 3 but not in Table 2 suggests that variation in the PIT rate only serves to encourage the movement of entrepreneurial activity across state lines.

Other results in Table 3 indicate that states that place a higher weight on the sales factor in the CIT apportionment formula tend to have slightly lower entrepreneurial shares. Results indicate that a shift from a 33% to a 50% weight on the sales factor would decrease a state's share of national entrepreneurship by just under 1%. This is perhaps unsurprising since higher sales factor weights are generally designed to favor large businesses. Similar to the earlier results regarding entrepreneurial stock, results identify a significant relationship between combined reporting requirements and the tax-based measure of entrepreneurial share. States with a combined reporting requirement tend to have tax-based entrepreneurial shares that are 0.05 percentage points (or 2.7%) higher than states without such a requirement. This result continues to hold when the number of firms in a state (excluding the self-employed) is held constant, again indicating more than a shift in organizational form. In a more significant deviation from the entrepreneurial stock specification, results indicate that states that have inheritance, estate, or gift taxes tend to have tax-based entrepreneurial shares that are around 1.9% lower than states without such taxes. Somewhat surprisingly, we find that states that allow for LLCs tend to constitute a lower share of the national entrepreneurial stock than states without such an allowance, even though our earlier analysis found a positive effect of LLC allowances on state entrepreneurship rates. We suspect that states might have allowed LLCs in an effort to slow the out-flow of business activity across state lines, among other reasons. States with more tax incentives for economic development tend to have higher entrepreneurial shares. However, the effect is small; states with one additional tax incentive program are associated with national entrepreneurial shares that are 0.4 or 0.2% higher for the tax return and employment measures, respectively. PIT progressivity is no longer found to be a statistically significant determinant of entrepreneurship in this context.

Regarding other control variables, the most striking result is that states with larger state governments, as measured by state expenditures per capita, tend to have lower entrepreneurial shares. This finding is

**Table 3** Fixed effects regressions: entrepreneurial share and statutory tax policy

| Variable | Tax return measure | Employment measure |
|---|---|---|
| Top corporate income tax rate | −0.001 | 0.0002 |
| | (0.006) | (0.006) |
| Top personal income tax rate | −0.016** | −0.017** |
| | (0.007) | (0.008) |
| Sales tax rate | −0.022 | −0.015 |
| | (0.020) | (0.016) |
| Sales factor apportionment | −0.001*** | −0.001* |
| | (0.0004) | (0.0004) |
| Progressivity | −0.020 | −0.007 |
| | (0.033) | (0.027) |
| Combined reporting | 0.047** | 0.005 |
| | (0.011) | (0.014) |
| Throwback rule | −0.012 | 0.012 |
| | (0.015) | (0.021) |
| Inheritance, estate, and gift | −0.037** | −0.012 |
| | (0.019) | (0.015) |
| LLC | −0.045*** | −0.058*** |
| | (0.011) | (0.016) |
| Tax incentives | 0.008*** | 0.004** |
| | (0.002) | (0.002) |
| Non-tax incentives | 0.001 | −0.009*** |
| | (0.002) | (0.002) |
| Homestead exemption (thousands) | −0.00002 | −0.00004 |
| | (0.0002) | (0.0001) |
| Unlimited homestead exemption | −0.004 | −0.0081 |
| | (0.015) | (0.020) |
| Unemployment rate | 0.004 | 0.009* |
| | (0.006) | (0.006) |
| Median income (thousands) | −0.010*** | −0.004** |
| | (0.002) | (0.002) |
| College degree (%) | 0.001 | −0.0001 |
| | (0.002) | (0.002) |
| Poverty rate | −0.004** | −0.005** |
| | (0.002) | (0.002) |
| Population density | 0.002*** | 0.002** |
| | (0.0004) | (0.001) |
| Job growth rate | 0.002 | −0.004 |
| | (0.003) | (0.003) |
| Agricultural share of GSP | −0.003 | −0.005 |
| | (0.004) | (0.004) |
| Manufacturing share of GSP | −0.0002 | 0.005*** |
| | (0.002) | (0.002) |
| State expenditures per capita (thousands) | −0.046** | −0.079** |
| | (0.020) | (0.031) |
| Local expenditures per capita (thousands) | −0.001 | −0.001 |
| | (0.001) | (0.001) |
| Number of PIT returns (thousands) | 0.0002*** | – |
| | (0.00001) | – |
| Population (thousands) | – | 0.0001 |
| | – | (0.00004) |
| Constant | 1 89*** | 1.90 *** |
| | (0.26) | (0.32) |
| *R*-squared | 0.334 | 0.278 |

*, **, ***Indicate statistical significance at the 10%, 5%, and 1% levels respectively

*Notes*: Regressions include state and year fixed effects

All percentages are on a 0–100 scale

All right-hand-side variables are lagged 1 year

consistent with the notion that larger state governments (corresponding to a higher tax burden) drive away firms. This finding stands in contrast to the reasoning that firms would be attracted to districts with larger governments due to relatively abundant public service provision. Similar to the entrepreneurial stock specification, estimates present seemingly conflicting results regarding poverty and median income. Higher poverty reduces a state's share of the national entrepreneurial stock, but higher median income reduces it as well (tax return measure only). In addition, higher unemployment increases a state's entrepreneurial share (employment measure only).

### 4.3 Effects of state tax portfolios on entrepreneurial activity

In our next set of alternative specifications, we replace the state tax rates and other tax policy variables with state tax share variables for the CIT, PIT, sales tax, and business licenses as described above. This is the first such analysis of the possible impact of state tax portfolios on entrepreneurial activity. Results in Table 4 include two specifications of entrepreneurial stock and two of entrepreneurial shares, mirroring the treatment in Tables 2 and 3. The CIT share and the license tax share have negative and

**Table 4** Fixed effects regressions: state entrepreneurship and tax shares

| Variable | Entrepreneurship stock | | Entrepreneurship share | |
|---|---|---|---|---|
| | Tax return | Employment | Tax return | Employment |
| Corporate income tax share | −0.025* | −0.018* | 0.002 | 0.001 |
| | (0.013) | (0.011) | (0.002) | (0.002) |
| Personal income tax share | −0.001 | −0.009 | −0.002 | −0.005** |
| | (0.008) | (0.009) | (0.002) | (0.002) |
| Sales tax share | −0.011 | −0.002 | −0.001 | −0.002 |
| | (0.011) | (0.009) | (0.001) | (0.002) |
| License tax share | −0.045* | −0.048* | 0.016*** | 0.012* |
| | (0.024) | (0.029) | (0.006) | (0.007) |
| Unemployment rate | 0.005 | 0.195*** | 0.004 | 0.007 |
| | (0.064) | (0.031) | (0.006) | (0.006) |
| Median income (thousands) | −0.067*** | −0.021** | −0.011*** | −0.006*** |
| | (0.021) | (0.010) | (0.002) | (0.002) |
| College degree (%) | 0.028 | 0.008 | 0.001 | −0.002 |
| | (0.020) | (0.013) | (0.002) | (0.002) |
| Poverty rate | −0.016 | −0.021** | −0.003 | −0.006*** |
| | (0.012) | (0.010) | (0.002) | (0.002) |
| Population density | 0.013*** | 0.01 4*** | 0.001*** | 0.001* |
| | (0.003) | (0.003) | (0.0004) | (0.001) |
| Job growth rate | −0.033 | −0.066*** | 0.005 | −0.004 |
| | (0.021) | (0.019) | (0.003) | (0.004) |
| Agricultural share of GSP | 0.009 | 0.167*** | -0.004 | 0.0004 |
| | (0.028) | (0.028) | (0.004) | (0.005) |
| Manufacturing share of GSP | −0.052*** | −0.013 | −0.001 | 0.005*** |
| | (0.013) | (0.013) | (0.002) | (0.002) |
| State expenditures per capita (thousands) | −0.032 | −0.081 | −0.040* | −0.088*** |
| | (0.121) | (0.110) | (0.022) | (0.032) |
| Local expenditures per capita (thousands) | 0.0004 | −0.014*** | −0.001 | −0.003 |
| | (0.006) | (0.005) | (0.001) | (0.001) |
| Number of PIT returns (thousands) | – | – | 0.0002*** | – |
| | – | – | (0.0001) | – |
| Population (thousands) | – | – | – | 0.0001 |
| | – | – | – | (0.00004) |
| Constant | 15.08** * | 13.33*** | 1.85*** | 2.05*** |
| | (1.30) | (0.90) | (0.20) | (0.28) |
| *R*-squared | 0.354 | 0.668 | 0.256 | 0.179 |

*, **, ***Indicate statistical significance at the 10%, 5%, and 1% levels respectively

*Notes*: Regressions include state and year fixed effects

All percentages are on a 0–100 scale

All right-hand-side variables are lagged one year

significant effect on both measures of entrepreneurial stock. In other words, states that rely more heavily on corporate income taxes and license fees tend to have slightly lower entrepreneurship rates. However, these findings are only marginally statistically significant (at the 10% level only). These results do not support the notion that entrepreneurs collectively favor tax structures with more emphasis on sales taxation and less on income taxation. Results for the non-tax variables in the stock specifications are largely consistent with those in Table 2.

Only three of the eight tax coefficients are statistically different from zero in the entrepreneurial shares models in Table 4. Specifically, states with higher PIT shares tend to have lower rates of employment-based entrepreneurship and states that place a heavier reliance on business licenses and fees tend to have higher entrepreneurship shares (both

measures). To summarize, the collective results in Table 4 do not reveal a strong significant influence of state tax portfolios on state entrepreneurship rates or shares.

## 4.4 Additional robustness checks

### *4.4.1 Effective tax rates*

A common criticism in studies such as this that rely on top marginal tax rates is that not all entrepreneurs are taxed at the top rates. While marginal rates, and especially top marginal rates, are viewed as appropriate policy signals that might elicit entrepreneurial responses, it seems appropriate to investigate the sensitivity of the findings above to the use of a set of tax variables that more closely resemble effective tax rates. To this end, we repeat the baseline regressions in Table 2 after replacing the top marginal CIT and PIT rates and the sales tax rates with a set of three effective tax rates calculated as the ratio of tax revenue (for the CIT, PIT, and sales taxes) to state personal income. Also included are business licenses relative to state personal income as these fees may significantly affect the success of a small business.[24] Full results of these models are presented in Table 5.

The primary difference between the effects of effective and statutory tax rates is that the effective PIT rate has a moderately significant negative effect on both entrepreneurship rates. Results indicate that a one-percentage-point increase in the effective PIT rate decreases the tax-based measure of entrepreneurship by 0.158 percentage points, and the employment-based measure of entrepreneurship by 0.17 percentage points, both relatively small magnitude. These results are only statistically significant at the 10% level. The CIT and sales tax rate measures are no longer statistically significant in this context, in contrast to Table 2. One additional difference is that these alternative results indicate that our effective license tax rate measure exhibits a statistically significant and negative effect on both entrepreneurship rates. All other tax policy results are largely unchanged from those in Table 2, as well as results regarding non-tax controls.

[24] This variable was not included in the baseline regressions since it is difficult to capture a "business license tax rate" when the format of these taxes varies widely across states.

### *4.4.2 Agricultural entrepreneurship*

Another common concern in empirical studies of entrepreneurship and self-employment is whether to include entrepreneurs in the agricultural sector. For the baseline models above, the agricultural sector was excluded to parallel previous studies more closely. However, the exclusion is typically motivated by a concern that agricultural entrepreneurs respond differently to tax and other non-tax factors. This argument could pertain to any other sub-category of entrepreneurs, however. In order to investigate the sensitivity of our baseline results to the inclusion of agricultural entrepreneurship, we repeated the models in Table 2 after including agricultural entrepreneurs in both measures. Specific additions are (1) the inclusion of individuals who file a PIT return with farm income (Schedule F) as entrepreneurs for the tax-based measure and (2) a consideration of the ratio of all sole proprietors to all workers instead of just non-farm equivalents for the employment measure. Full results for this exercise are presented in Table 6.

Results from including agricultural entrepreneurs are virtually identical to those in the baseline model. The one noticeable exception from these two specifications is that states with an unlimited homestead exemption have higher entrepreneurship rates. In fact, states with an unlimited homestead exemption are associated with rates of entrepreneurship that are 2.7% higher than the state with the largest (finite) exemption amount.

### *4.4.3 Nonlinear tax rate and homestead exemption effects*

The recent work of Georgellis and Wall (2006) and Garrett and Wall (2006) reveals significant nonlinear effects of top (federal plus state) individual income tax rates and homestead exemption limits. It is possible that the general lack of significance from our linear specifications might be the result of offsetting effects from an underlying nonlinear effect. To address this, we experimented with quadratic specifications of the three tax rates and a cubic specification of the homestead exemption amount in separate versions of the baseline models in Table 2. None of the higher order (squared tax rates and squared and cubed homestead exemption) terms were statistically

**Table 5** Fixed effects results: state entrepreneurship and effective tax rates

| Variable | Entrepreneurial stock | |
|---|---|---|
| | Tax return | Employment |
| Corporate income revenue/SPI | −0.166 | 0.055 |
| | (0.119) | (0.079) |
| Personal income tax revenue/SPI | −0.158* | −0.170* |
| | (0.095) | (0.091) |
| Sales tax revenue/SPI | −0.058 | −0.013 |
| | (0.197) | (0.106) |
| License tax revenue/SPI | −0.906*** | −0.556* |
| | (0.308) | (0.335) |
| Sales factor apportionment | 0.0003 | −0.001 |
| | (0.002) | (0.002) |
| Progressivity | 0.485** | 0.505*** |
| | (0.176) | (0.159) |
| Combined reporting | 0.639*** | 0422*** |
| | (0.158) | (0.140) |
| Throwback rule | −0.118 | 0.113 |
| | (0.094) | (0.127) |
| Inheritance, estate, and gift | −0.026 | −0.087 |
| | (0.090) | (0.081) |
| LLC | 0.219** | 0.066 |
| | (0.108) | (0.082) |
| Tax incentives | 0.040*** | 0.035*** |
| | (0.010) | (0.008) |
| Non-tax incentives | 0.004 | −0.01 7*** |
| | (0.009) | (0.006) |
| Homestead exemption (thousands) | −0.002*** | −0.001 |
| | (0.001) | (0.001) |
| Unlimited homestead exemption | 0.133 | 0.132 |
| | (0.152) | (0.124) |
| Unemployment rate | 0.006** | 0.206*** |
| | (0.068) | (0.030) |
| Median income (thousands) | −0.055** | −0.010 |
| | (0.022) | (0.010) |
| College degree (%) | 0.034* | 0.015 |
| | (0.021) | (0.013) |
| Poverty rate | −0.012 | −0.018* |
| | (0.012) | (0.010) |
| Population density | 0.014*** | 0.01 4*** |
| | (0.003) | (0.003) |
| Job growth rate | −0.030* | −0.061*** |
| | (0.018) | (0.0179 |
| Agricultural share of GSP | 0.024 | 0.175*** |
| | (0.028) | (0.033) |
| Manufacturing share of GSP | −0.057*** | −0.013 |
| | (0.014) | (0.013) |
| State expenditures per capita (thousands) | 0.116 | 0.034 |
| | (0.148) | (0.107) |
| Local expenditures per capita (thousands) | −0.006 | −0.013** |
| | (0.006) | (0.005) |
| Constant | 13.24*** | 11.58*** |
| | (1.35) | (0.74) |
| R-squared | 0.391 | 0.693 |

*, **, ***Indicate statistical significance at the 10%, 5%, and 1% levels respectively

*Notes*: Regressions include state and year fixed effects

All percentages are on a 0–100 scale

All right-hand-side variables are lagged 1 year

significant in these models.[25] That said, given the number of differences in data, specification, and econometric approach between our work and that of Georgellis and Wall (2006) and Garrett and Wall (2006), it is difficult to pin this difference in primary findings on any one of these differences.

## 5 Conclusions

In this study, we present an examination of state-level panel data for the period from 1989 through 2002 to better understand the relationship between state tax policies and entrepreneurial activity. Regression analyses indicate that top marginal state tax rates on corporate income and state sales tax rates do not have statistically significant effects on state entrepreneurship rates. This suggests that any disincentive effects of higher tax rates (due to lower returns from entrepreneurial activity) are offset by incentive effects due to the greater rewards from tax avoidance or evasion, or that both effects are individually small or insignificant.

In contrast, higher top marginal state tax rates on personal income tend to reduce a state's share of the

[25] Full results of these and any other unreported models are suppressed for brevity but are available upon request.

**Table 6** Fixed effects results: statutory tax policy with agricultural entrepreneurship

| Variable | Entrepreneurial stock | |
|---|---|---|
| | Tax return | Employment |
| Top corporate income tax rate | −0.068** | −0.041 |
| | (0.030) | (0.026) |
| Top personal income tax rate | 0.045 | −0.050 |
| | (0.030) | (0.059) |
| Sales tax rate | 0.121 | 0.025 |
| | (0.084) | (0.071) |
| Sales factor apportionment | 0.001 | −0.0002 |
| | (0.002) | (0.002) |
| Progressivity | 0.500*** | 0.527*** |
| | (0.179) | (0.154) |
| Combined reporting | 0.474** | 0.338** |
| | (0.189) | (0.168) |
| Throwback rule | −0.048 | 0.111 |
| | (0.113) | (0.142) |
| Inheritance, estate, and gift | 0.075 | −0.083 |
| | (0.112) | (0.087) |
| LLC | 0.247* | 0.049 |
| | (0.127) | (0.086) |
| Tax incentives | 0.038** | 0.029*** |
| | (0.011) | (0.008) |
| No n-Tax incentives | 0.011 | −0.009 |
| | (0.009) | (0.006) |
| Homestead exemption (thousands) | −0.002 | 0.00004 |
| | (0.001) | (0.001) |
| Unlimited homestead exemption | 0.536*** | 0.487** |
| | (0.179) | (0.159) |
| Unemployment rate | −0.020 | 0212*** |
| | (0.079) | (0.032) |
| Median income (thousands) | −0.081*** | −0.015 |
| | (0.025) | (0.010) |
| College degree (%) | 0.030 | 0.012 |
| | (0.024) | (0.013) |
| Poverty rate | −0.012 | −0.008 |
| | (0.015) | (0.011) |
| Population density | 0.016*** | 0.015*** |
| | (0.003) | (0.003) |
| Job growth rate | −0.044* | −0.053*** |
| | (0.023) | (0.020) |
| Agricultural share of GSP | 0.253*** | 0.321*** |
| | (0.037) | (0.043) |
| Manufacturing share of GSP | −0.066*** | −0.022 |
| | (0.017) | (0.014) |
| State expenditures per capita (thousands) | −0.138 | −0.005 |
| | (0.158) | (0.109) |
| Local expenditures per capita (thousands) | −0.009 | −0.015*** |
| | (0.006) | (0.006) |
| Constant | 15.28*** | 13.10*** |
| | (1.61) | (0.87) |
| R-squared | 0.335 | 0.609 |

*, **, ***Indicate statistical significance at the 10%, 5%, and 1% levels respectively

*Notes*: Regressions include fixed year effects

All percentages are on a 0–100 scale

All right-hand-side variables are lagged 1 year

national entrepreneurial stock. States with more aggressive corporate income taxes, specifically those that include combined reporting requirements, tend to have higher entrepreneurship rates. Paradoxically, states with more progressive individual income taxes also tend to have higher entrepreneurship rates. Higher weights on the sales factor in the corporate income tax apportionment formula and the existence of a state-level estate, inheritance, or gift tax above the federal estate tax are both associated with lower state shares of the national entrepreneurial stock. All of these effects are quite small in magnitude, however. We find no evidence of an economically significant effect of state tax portfolios on entrepreneurial activity.

These results are important in the design of state tax policy, as they suggest that tax policy changes will probably not have the effects on small business activity that policy makers might believe. Rather than attempt to target tax breaks to small businesses, then, states should focus on traditional tax reforms involving lower tax rates, broader tax bases, and simpler tax systems that will create a more neutral and productive tax environment for small businesses, large businesses, and individuals alike.

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## Appendix 1

See Table 7

**Table 7** Summary statistics

| Variable | 1989 | | 2002 | |
|---|---|---|---|---|
| | Mean | Std. dev. | Mean | Std. dev. |
| Schedule C returns/total returns | 13.10 | 2.00 | 14.70 | 1.82 |
| Nonfarm sole prop. emp./total nonfarm emp. | 14.81 | 2.75 | 16.7 | 2.27 |
| Sch. C + Sch. F returns/total returns | 15.93 | 4.17 | 17.08 | 3.32 |
| Sole proprietor emp./total emp. | 16.72 | 3.69 | 18.16 | 2.76 |
| Share schedule C returns | 2.00 | 2.36 | 2.00 | 2.37 |
| Share proprietor employment | 2.00 | 2.36 | 2.00 | 2.37 |
| Top corporate income tax rate | 6.58 | 3.01 | 6.69 | 2.93 |
| Top personal income tax rate | 5.47 | 3.37 | 5.50 | 3.10 |
| Sales tax rate | 4.32 | 1.75 | 4.70 | 1.84 |
| Corporate income tax share | 7.89 | 5.66 | 4.44 | 4.36 |
| Personal income tax share | 27.73 | 15.87 | 31.06 | 17.20 |
| Sales tax share | 31.79 | 14.68 | 32.08 | 14.97 |
| License tax share | 1.18 | 2.72 | 1.24 | 3.63 |
| Corporate income revenue/SPI | 0.53 | 0.55 | 0.28 | 0.24 |
| Personal income tax revenue/SPI | 1.81 | 1.04 | 2.04 | 1.09 |
| Sales tax revenue/SPI | 2.05 | 0.99 | 2.09 | 1.00 |
| License tax revenue/SPI | 0.08 | 0.21 | 0.09 | 0.29 |
| Sales factor apportionment | 36.71 | 15.21 | 43.22 | 22.56 |
| Progressivity | 0.50 | 0.46 | 0.24 | 0.22 |
| Combined reporting | 0.22 | 0.42 | 0.28 | 0.45 |
| Throwback rule | 0.48 | 0.50 | 0.46 | 0.50 |
| Inheritance, estate, and gift tax | 0.50 | 0.51 | 0.26 | 0.44 |
| LLC | 0.04 | 0.20 | 1.00 | 0.00 |
| Tax incentives | 10.47 | 1.82 | 8.90 | 6.42 |
| Non-tax incentives | 5.49 | 2.09 | 12.86 | 8.74 |
| Homestead exemption (thousands) | 50.0 | 54.9 | 73.2 | 68.2 |
| Homestead exemption unlimited | 0.16 | 0.37 | 0.12 | 0.33 |
| Unemployment rate | 5.15 | 1.35 | 5.37 | 1.04 |
| Median income (thousands) | 39.57 | 5.58 | 61.87 | 8.46 |
| College degree (%) | 20.37 | 4.20 | 26.00 | 4.52 |
| Poverty rate | 12.55 | 3.93 | 11.69 | 3.13 |
| Population density | 165.3 | 234.7 | 185.6 | 255.0 |
| Job growth rate (excluding farming) | 2.31 | 1.37 | 0.12 | 0.77 |
| Job growth rate (including farming) | 2.15 | 1.34 | 0.14 | 0.79 |
| Agricultural share of GSP | 2.85 | 2.56 | 1.40 | 1.36 |
| Manufacturing share of GSP | 18.44 | 7.47 | 12.84 | 5.52 |
| State expenditures per capita (thousands) | 2.27 | 0.96 | 4.65 | 1.27 |
| Local expenditures per capita (thousands) | 1.32 | 0.41 | 3.44 | 0.86 |

*Note*: All percentages are on a 0–100 scale

Median income, state and local expenditures per capita, and homestead exemption and measured in thousands of current year dollars

## Appendix 2

See Table 8

**Table 8** Data descriptions and source notes

| Variable | Definition |
|---|---|
| Schedule C returns/total returns | Federal tax returns with a schedule C as a share of total tax returns, by state (1) |
| Sch. C + Sch. F returns/total returns | Federal tax returns with a schedule C or F as a share of total tax returns, by state (1) |
| Nonfarm sole prop. emp./total Nfarm emp. | Nonfarm sole prop. employment as a share of total nonfarm employment in a state (2) |
| Sole proprietor emp./total emp. | Sole proprietership employment as a share of total employment in a state (2) |
| Top corporate income tax rate | Highest marginal corporate income tax rate (3) |
| Top personal income tax rate | Highest marginal personal income tax rate (3) |
| Sales tax rate | General sales tax rate (3) |
| Corporate income tax share | Corporate income tax collections as a share of total tax collections in a state (4) |
| Personal income tax share | Personal income tax collections as a share of total tax collections in a state (4) |
| Sales tax share | Sales tax collections as a share of total tax collections in a state (4) |
| License tax share | Corporate license and fee collections as a share of total tax collections in a state (4) |
| Corporate income revenue/SPI | Corporate income tax collections as a share of state personal income (5) |
| Sales tax revenue/SPI | Sales tax collections as a share of state personal income (5) |
| License tax revenue/SPI | Corporate license and fee collections as a share of state personal income (5) |
| Sales factor apportionment | Weight given to sales factor in the corporate income tax apportionment formula (3) |
| Progressivity | Change in avg. tax rate relative to $20,000 change in income. (Scaled by 10,000) (6) |
| Combined reporting | 1 if a state has a combined reporting requirement (3) |
| Throwback rule | 1 if a state has a throwback rule (15) |
| Inheritance, estate, and gift tax | 1 if a state has an inheritance, estate, or gift tax (13) |
| LLC | 1 if a state allows LLCs (7) |
| Tax incentives | Number of tax incentive programs a state offers (14) |
| Non-tax incentives | Number of non-tax incentive programs a state offers (14) |
| Homestead exemption | Dollar amount of home equity that is exempt from bankruptcy (12) |
| Homestead exemption unlimited | 1 if a state has an unlimited homestead exemption (12) |
| Unemployment rate | State unemployment rate (8) |
| Median income (thousands) | State median income (8) |
| College degree (%) | Share of state population with a bachelor's degree or higher (8) |
| Poverty rate | Percent of state population living below poverty line (8) |
| Population density | Population/square miles in a state (9) |
| Job growth rate (excluding farming) | Growth rate in non-farm employment over previous year (10) |
| Job growth rate (including farming) | Growth rate in total employement over previous year (10) |
| Agricultural share of GSP | State agricultural producation as a share of total gross state product (10) |
| Manufacturing share of GSP | State manufacturing producation as a share of total gross state product (10) |
| State expenditures per capita (thousands) | Total state tax collections per person (11) |
| Local expenditures per capita (thousands) | Total local tax collections in a state per person (11) |
| Number of non self-employed firms | Count of the number of firms in a state (excluding the self-employed) (16) |

**Table 8** continued

*Notes*

1. Author's calculations based on data from *Statistics of Income Bulletin*, Internal Revenue Service (various years)
2. *Regional Economic Accounts*, Bureau of Economic Analysis (various years)
3. *State Tax Handbook*, Commerce Clearing House (various years)
4. Author's calculations based on data from *State Government Tax Collections*, US Census Bureau (various years)
5. Author's calculations based on data listed in note 4 (tax collections) and note 8 (state personal income)
6. Author's calculations based on data listed in note 8 (median income) and note 3 (tax rates)
7. www.llcweb.com
8. *Statistical Abstract of the United States*, US Census Bureau (various years)
9. Author's calculations based on data from data listed in note 8
10. Author's calculations based on data from *Regional Accounts Data,* Bureau of Economic Analysis (various years)
11. Author's calculations based on data from note 4 (tax collections) and note 8 (population)
12. Elias et al. (1989–2002)
13. Conway and Rork (2003)
14. National Association of State Development Agencies (1989–2002)
15. *State Tax Handbook*, Commerce Clearing House (various years) and various state revenue departments
16. *Statistics of US Businesses*, US Census Bureau (various years)

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