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(Small) Business Activity and State Economic Growth: Does Size Matter?

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BRUCE D., DESKINS J. A., HILL B. C. and RORK J. C. (Small) business activity and state economic growth: does size matter?, *Regional Studies*. Using a 1988–2002 panel of US state-level data, the impact of small and large business activity on gross state product (GSP), state personal income (SPI), and total state employment was examined. Business activity measures include annual counts of firms, establishments, and employees, the dollar value of payroll expenses, and annual births and deaths of establishments. The paper accounts for the simultaneity of business activity and overall growth, other determinants of economic growth, and spatial influences of small business activity. It is found that overall economic growth is faster when the net birth rate of new small firm establishments is positive.

Small business Entrepreneurship Economic growth

BRUCE D., DESKINS J. A., HILL B. C. and RORK J. C. (小型）商业活动与国家经济增长：与商业规模有关系吗？区域研究。利用1988－2002年间美国国家层面的数据,本研究考察了大、小型经济活动对于国家毛产品（GSP）、国家个体收入（SPI）以及国家总体就业的影响。商业活动的测评包括公司年度统计值、公司的确立、雇员、职员工资支付的美元价值以及每年成立与倒闭的公司。本文考察了经济活动、经济总体增长、其它的经济决定要素以及小型企业活动空间性影响之间存在的同时性。研究发现，在新小型公司网络建立增加的情况下，总体经济增长较快。

小型企业 企业家 经济增长

BRUCE D., DESKINS J. A., HILL B. C. et RORK J. C. Activité des (petites) entreprises et croissance économique de l'Etat: l'importance de la taille, *Regional Studies*. S'appuyant sur une série de données au niveau des Etats-Unis pour la période 1988–2002, nous examinons les conséquences de l'activité des petites et grandes entreprises sur le produit brut de l'État (GSP), sur le revenu personnel par tête (SPI) et sur l'emploi total de l'État. Les mesures de l'activité des entreprises portent sur les comptes annuels des entreprises, des établissements et du personnel, la valeur en dollar des dépenses de personnel ainsi que sur les naissances et les décès annuels dans les établissements. Nous tenons compte de la simultanéité de l'activité des entreprises et de la croissance globale, d'autres déterminants de la croissance économique et des influences sur l'espace de l'activité des petites entreprises. Nous constatons que la croissance économique globale est plus rapide lorsque le taux des naissances des petites entreprises nouvelles est positif.

Petites entreprises Entreprenariat Croissance économique

BRUCE D., DESKINS J. A., HILL B. C. und RORK J. C. Aktivitäten von (Klein-)Unternehmen und Wirtschaftswachstum im Staat: Kommt es auf die Größe an?, *Regional Studies*. Anhand eines Panels mit Daten auf der Ebene der US-Bundesstaaten im Zeitraum von 1988 bis 2002 untersuchen wir die Auswirkung der Aktivitäten von Klein- und Großunternehmen auf das Bruttostaatsprodukt, das persönliche Einkommen im Staat und das Gesamtbeschäftigungsniveau im Staat. Zu den Maßstäben für die Unternehmensaktivität gehören jährliche Zählungen von Firmen, Einrichtungen und Mitarbeitern, der Dollarwert der Lohnaufwendungen sowie die jährliche Anzahl an Firmengründungen und Firmenschließungen. Wir berücksichtigen die Gleichzeitigkeit von Geschäftsaktivitäten und Gesamtwachstum sowie weitere Determinanten des Wirtschaftswachstums und räumliche Einflüsse auf die Aktivität von Kleinunternehmen. Wir stellen fest, dass sich das generelle Wirtschaftswachstum beschleunigt, wenn die Nettorate der Gründungen von neuen Kleinbetrieben positiv ausfällt.

Kleinunternehmen Unternehmertum Wirtschaftswachstum

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BRUCE D., DESKINS J. A., HILL B. C. y RORK J. C. Actividad económica (pequeña) y desarrollo económico del estado: ¿et tamaño importa?, *Regional Studies*. Con ayuda de un panel de datos a nivel estatal de 1988–2002 de los EE UU., analizamos el efecto de la actividad comercial de pequeñas y grandes empresas en el producto bruto del Estado, los ingresos personales del Estado, y el empleo estatal total. En la actividad comercial se han medido los costes anuales de las sociedades, los establecimientos y empleados, el valor del dólar de los costes laborales y los nacimientos y fallecimientos anuales de los negocios. Tenemos en cuenta la simultaneidad de la actividad comercial y del crecimiento en general, otros determinantes del crecimiento económico y las influencias espaciales de la actividad de pequeñas empresas. Comprobamos que el crecimiento económico general es más rápido cuando es positiva la tasa neta de nacimientos de las pequeñas empresas nuevas.

Pequeñas empresas Empresariado Crecimiento económico

JEL classifications: M13, O4

INTRODUCTION

The US Small Business Administration (SBA) is known for reporting that small businesses are the primary engines of economic growth and the vast majority of employers, creating the lion's share of new jobs each year and more than half of all net new jobs in recessionary periods.[1] Interestingly, economic theory is rather inconclusive about whether small and large firms differ in the aggregate in terms of their impact on overall economic growth. To be sure, there might be no inherent reason to suspect that one new small firm would add more to overall economic growth than one new large firm. On the other hand, smaller (and arguably more entrepreneurial) businesses might be more likely to engage in fruitful research and development activities than larger businesses, thereby generating a larger economic impact. ACS and PLUMMER (2005) conclude that new firms exceed existing firms in their ability to generate an economic impact from new knowledge. Similarly, as discussed by DISNEY *et al*. (2003), new firms might pose a competitive threat to existing firms, thereby increasing overall productivity (and hence, growth).

The recent empirical evidence suggests that small firms do, in fact, contribute significantly to economic growth. This evidence, which is described in further detail below, has resulted in numerous efforts at the national, state, and local levels to foster small business development. Interestingly, despite a large and growing literature on the economic importance of small businesses at the international, national, and local levels, very little is known about the contributions of small businesses to economic growth at the state level, and how those contributions differ from those of larger businesses. This gap in the literature is particularly important to address, as significant small business development initiatives are often undertaken at the state level, especially in the USA.

Policy-makers are often motivated by the simple observation that small business activity and overall economic growth tend to track together over time. Observing common upward trends does not necessarily mean that small business activity increases growth (or vice versa). Indeed, gaining a good sense of the magnitude of small business contributions to growth is a non-trivial task. Econometric models must be sure to account for several potential problems. First, both small business activity and state economic growth have many common elements which must be controlled for in order to reduce the chance of omitted variable bias. Perhaps more importantly, models must account for the simultaneity of small business activity and economic growth, taking steps to determine causality rather than simple correlation between the trending series.

The present study explores the intricate relationships between small business activity and economic activity at the US state level using a panel of state data spanning the years 1988–2002 to address the above econometric issues. A wide variety of indicators of state small business activity were examined, including such things as simple counts of small business firms, establishments, employment, payroll, and the number of births and deaths of establishments within small firms. Similar measures of large business activity are included in order to assess the extent to which small business activity has smaller or larger effects than large business activity. Small business data are drawn from the US Census Bureau's Statistics of US Businesses programme, created from the annual County Business Patterns files with cooperation and partial funding from the Office of Advocacy of the SBA.[2] For economic activity, the paper focuses on three of the most prominent indicators of state economic health: gross state product (GSP), state personal income (SPI), and total state employment. Growth data are drawn from Census or Bureau of Economic Analysis (BEA) sources.

To isolate the impact of small business activities on state economies, other determinants of economic growth as identified in the prior literature are controlled. In addition to standard economic controls such as education levels and price indicators for inputs to production (namely energy prices and wage rates) and the above-mentioned large business indicators, also included are a broad array of state policy variables in the spirit of BRUCE and DESKINS (2006). The intent here is to identify available policy instruments for state governments while controlling for as many

possible determinants of economic growth as possible in order to isolate the true impact of small business activity above and beyond these other controls. State policy information is drawn from a detailed tax database maintained by the University of Tennessee Center for Business and Economic Research.

The estimation strategy accounts for the simultaneity of small business activity and economic growth by lagging all independent variables in a panel regression framework. This improves one's ability to determine the extent to which any relationships between small business activities and state economic growth are causal. The panel features of the data set are also harnessed to address correlations across states within each time period. As an added innovation, spatial econometric procedures are employed to account for the possibility that state economic growth is affected by small business activity in neighbouring states.

The combination of these econometric advances and an elaborate state panel of data permit one to make important contributions that are highly relevant to state and federal policy discussions. Most importantly, the results shed light on the impact of small business activity on key measures of state economic health after controlling for a variety of other factors. The focus on state-level data serves as a complement to earlier work at the national and local levels. The paper begins by summarizing the key findings from a number of relevant bodies of economic literature. It then describes the econometric model and estimation strategy in detail. Following a discussion of the data set, the results are presented and their policy implications are discussed.

REVIEW OF RELATED LITERATURE

Many different factors are critical to the growth and development of an economy. As a result, there has been extensive research on factors contributing to economic growth among states in the USA. Even though the contributions of small businesses to economic development have received increasing attention by development officials in the USA, little research has been conducted measuring the empirical relationships between the dynamics of entrepreneurship and economic growth at the state level. Several strands of the economics literature are relevant to this issue.

Entrepreneurial activity and economic growth

Early models of economic growth (SOLOW, 1956; SWAN, 1956) focused on the role of capital accumulation and diminishing returns in economic growth. But it was ROMER (1986) who gave notice to the fact that knowledge spillovers could be an unintended consequence of firm investment. A positive externality, these spillovers increased the stock of information in the economy relative to the existing capital stock. This helped form the basis of endogenous growth theory, whereby firms purposely invest in knowledge generation to gain increases in productivity (ROMER 1987, 1990; AGHION and HOWITT, 1992), which in turn increased the rate of economic growth.

Running parallel to this literature, economic theorists such as SCHUMPETER (1911), KNIGHT (1921), and BAUMOL (1968) recognized the importance of entrepreneurship to economic development. From these theoretical models, a literature has developed to explain empirically the relationship between entrepreneurial activity and economic growth, primarily at the national and local levels. The literature on the contributions of entrepreneurs and small businesses to economic growth is vast and varied. As seen below, several studies point to a positive impact, while others find no effect or even a negative effect.

Recent country-level analysis has been fostered by the Global Entrepreneurship Monitor (GEM), which conducted surveys to measure the level of entrepreneurial activity in 37 countries in 2002. Subsequent research has indicated that the effects of entrepreneurial activity on economic growth vary across countries based on the income level. Developed countries display a positive relationship between entrepreneurial activity and gross domestic product growth; however, developing countries display a negative relationship between entrepreneurial activity and gross domestic product growth (VAN STEL *et al.*, 2005). CARREE *et al.* (2002) investigate whether countries that have a self-employment rate that differs from an 'equilibrium rate' suffer in terms of economic performance. They find evidence that countries that have too high self-employment rates or too low self-employment rates suffer in terms of economic growth.

The issue has received increasing interest at the local or regional level as evidenced by a special issue of *Regional Studies* devoted to empirical studies of entrepreneurship and economic development. AUDRETSCH and KEILBACH (2004) include entrepreneurship capital (measured as firm start-ups) as a factor in the neoclassical growth model. Using German regional data, they find that entrepreneurship positively influences productivity. VAN STEL and STOREY (2004) examine the relationship between firm start-ups and employment growth in Great Britain. Comparing the 1980s with the 1990s, they find that business start-ups had a positive impact on overall employment growth in the 1990s, but no effect on overall employment growth in the 1980s. When looking at the effect of start-ups on specific regions in Great Britain they do find that start-ups had negative effects on employment growth in 'unenterprising' areas. In the article that is perhaps the most relevant to the present paper, ACS and ARMINGTON (2004) find that entrepreneurship increases employment growth rates in labour market areas in the USA.

Most work on the USA has involved the regional or city level (e.g. ACS and ARMINGTON, 2004; LEE *et al.*, 2004; ACS and PLUMMER, 2005). HOLTZ-EAKIN and

KAO (2003) provide perhaps the only evidence at the state level, although their focus is on the effects of overall firm birth and death rates on state productivity (GSP per worker). They find that higher overall firm birth rates lead with some lag to increased productivity. Their work is expanded upon by (1) examining GSP and employment as two separate economic growth measures (along with personal income); (2) analysing establishment births and deaths within small and large firms separately; (3) including a much wider set of policy indicators and other control variables; and (4) using a longer and more recent panel of state data. The present paper is also one of a small number of studies to explore the question using panel or spatial econometric methods. More importantly, only HOLTZ-EAKIN and KAO (2003) have examined this issue at the state level, despite the fact that this is often the level at which pro-entrepreneur policies are debated and enacted within the USA. By using the state as the level of observation, as opposed to smaller regional measures, it is hoped to bridge the disconnect between state policy and current research.

Determinants of state economic growth

To identify fully the effects of entrepreneurial activity on state economic growth, other variables encourage state growth as suggested by the prior empirical literature must also be considered. Given that state economic growth is important to politicians, public policies – and especially tax policies – are often portrayed as fostering growth. Because of this, a substantial literature exists that explains the effects of tax policy on the location of economic activity. Fortunately, this literature is summarized by BARTIK (1991) and WASYLENKO (1997), who conclude that tax policies are generally a small but statistically significant determinant of economic activity.

In addition to tax policies, states are also able to influence the level of economic development through spending policies. FISHER (1997) concludes, after reviewing the literature, that there is a positive relationship between government spending (primarily on transportation and public safety) and economic development in states.

State policies that encourage economic development do so by either creating new economic activity or by enticing economic activity away from other states. As a result, it might be expected that economic activity in one state is correlated with economic activity in surrounding states. To account for this, researchers have employed spatial econometric techniques that account for any potential spatial correlation. The primary body of literature examining spatial correlations has examined the tendency for states to respond to other states when setting tax rates (RORK, 2003). In addition, a number of other empirical studies consistently find that the actions of one state affect surrounding states (BRUECKNER, 2003).

In addition to state policies, other variables have been shown to affect economic growth. The theoretical literature on economic growth has long recognized the importance of such factors as physical and human capital. A number of empirical studies have examined these factors. For example, human capital (measured by a poverty rate or some measure of educational attainment), public and private investments, cost factors, industry mix, and national trends are all found to influence state economic growth (BARRO and SALA-I-MARTIN, 1991; GOETZ *et al.*, 1996; MUNNELL, 1990; TERKLA and DOERINGER, 1991).

The literature described above, which will guide the present analysis, is very informative and provides a number of key results for policy-makers at all levels of government. It is important to note, for example, that the existing evidence suggests that entrepreneurial activity is an important contributor to economic growth at the national and local levels. However, despite increasing attention by development officials in the states, additional research is needed to measure directly the empirical relationship between the dynamics of small business activities and economic growth at the state level.

ECONOMETRIC STRATEGY

The fundamental empirical structure consists of panel regressions of state economic variables (GSP, SPI, or employment) on measures of small business activities and other controls using annual data for all 50 US states. Of utmost importance regarding the determination of causality within this framework is an assessment of the extent to which small business activities are endogenous. Specifically, it is highly likely that small business activity and state GSP, SPI, and employment are simultaneously determined. In the case of endogeneity or simultaneity, coefficients from regression analyses are likely to be biased (i.e., they will not be accurate estimates of true parameters). The preferred method for dealing with this, discussed in greater detail below, is simply to lag all independent variables by one year, expressing economic activity each year as a function of control variables (including small business measures) from the previous year's data.[3]

A related issue in state panel regressions is the extent to which observations in the data from one state are related to observations from another state or group of states. While small business activity in a state can be posited to have a direct effect on economic growth within that state, it has also been argued that new entrepreneurial activity is likely to increase inter-jurisdictional spillovers (ACS and PLUMMER, 2005). If true at the state level, such indirect effects will have an impact on the growth in other states. To account properly for this impact, known as spatial correlation, spatial econometric techniques are applied to the standard panel estimation.

The intuition behind spatial correlation is very similar to that of the more well-known serial autocorrelation. In serial correlation, observations are related by time, so that an observation in one year might impact an observation in the following year. With spatial correlation, observations are related by geography and their spatial relationship to one another. Thus, an observation in Tennessee might be influenced by observations in a neighbouring state such as Alabama. As this relates to the present question of the impact of small business activity on state growth, it could be the case that a burst of small business activity in Tennessee might impact the economic growth of Alabama, for example, if Tennessee businesses draw on labour from Alabama or use inputs that are produced in Alabama. Failing to account for this possibility could cause one to underestimate the total impact of entrepreneurial activity on state growth.

In order to model the interstate spillover properly, the geographic extent to which it is believed the spillover will be contained needs to be determined. In other words, each state's neighbour group must be identified. Because the spillovers are envisioned to be local in nature, the definition of 'neighbour' will be limited to be those states sharing a geo-political border. Thus, if Tennessee's economic growth was being looked at, its neighbours would be determined to be the states of Alabama, Arkansas, Georgia, Kentucky, Mississippi, Missouri, North Carolina, and Virginia.

Once neighbours are identified, weights are then assigned in order to capture the relative importance one state might wield over another. The paper experiments with four different weighting schemes. The first is *contiguity*, in which all neighbouring states are considered to wield equal influence. For the Tennessee example, observations from each of the eight states listed above would be given equal weights, whereas observations from California (as well as all other non-border states) would be assigned a weight of zero. Because Virginia has a larger population than Mississippi, it might be the case that Tennessee would be more concerned with what occurred in Virginia than in Mississippi. To account for this, the second weight is *population-contiguity*, in which the weights are based on the populations of the bordering states. Thus, Virginia would be given a higher weight than Mississippi.

Two other weighting schemes, *center* and *city*, depend on the physical distances between bordering states. Labourers from Memphis might be willing to drive to Arkansas for employment, but North Carolina is likely to be too far away. *Center* measures the distance from the centre of one state to the centre of a neighbouring state. It effectively measures the average distance a resident of the home state would need to travel to cross borders. Because population is not uniform, the weight *city* also is employed that considers the distance between the largest city (in terms of population) in the home state and the largest cities in each neighbouring state.

It is common in the spatial literature to use row-standardized weights, meaning the sum of weights equals 1. In the case of the contiguity weights for Tennessee, each competitor would be given a weight of one-eighth (or 0.125), since eight states border Tennessee. In creating population-contiguity weights, the bordering state's population is taken and divided by the population of all bordering states. For both centre and city, the aim is to ensure that states closer together get a higher weight. Therefore, the inverse of the distance is assigned as the weight for each state before row-standardization.

The estimating equation takes the following form:

$$\gamma_{i,t} = \alpha\gamma_{i,t-1} + Z_{i,t-1}\beta + \theta\sum_{j=1}^{50}(w_{i,j}x_{j,t-1}) + \lambda_{t-1} + \varepsilon_{i,t-1} \quad (1)$$

where $\gamma_{i,t}$ is the rate of economic growth for each measure of economic activity of state i at time t; Z is the set of explanatory variables which includes measures of small business activity; and the λ terms are fixed effects for each year of data. The initial value of either GSP, SPI or employment, denoted $\gamma_{i,t-1}$ in equation (1), is included to account for the convergence hypothesis,[4] which is included in growth models. Note that by including the lag of the dependent variable on the right-hand side, the state-level fixed effect is captured in both the dependent variable and the lag, hence its exclusion from equation (1).[5] The term $\theta\sum_{j=1}^{50}(w_{i,j}\,x_{j,t-1})$ measures the combined spillover effects that the small business activity (x) in each of the US states has on observation i.[6] The term w_{ij} represents the weight applied to neighbouring state j and is assigned as described above depending on the weighting scheme utilized. Regression coefficients are denoted above by α, β, and θ. Finally, $\varepsilon_{i,t}$ represents a mean-zero disturbance with finite variance and the usual econometric assumptions.

DATA

The analysis makes use of a rich state panel of data developed and maintained by the University of Tennessee's Center for Business and Economic Research (CBER). The contents of this database are drawn mainly from publicly available economic data, along with a detailed portfolio of tax and other policy variables gathered by CBER staff from various tax-related publications and contacts with state tax officials. This data source is supplemented with measures of small business activity as described in detail below, and other variables as needed.

Economic activity measures

Three measures of economic activity are examined to provide a broad perspective as well as maximum robustness and reliability of the results: gross state product

(GSP), state personal income (SPI), and total state employment.[7] Each variable enters the analyses in annual growth terms.[8]

Small business activity measures

Since the effects of small business activity on state economic growth constitute the centre of this study, several alternative measures of small business activity are considered, again to provide for maximum robustness in the results and for a broad perspective. These measures were developed by the US Small Business Administration Office of Advocacy in cooperation with the US Bureau of the Census. The first measure is the number of small business firms in a state. Second, the number of small business establishments in a state are considered, i.e. the number of physical business locations associated with small business firms. Third, the employment of small businesses is examined; as well as, fourth, the payroll of small businesses. Finally, while DISNEY *et al.* (2003) and ACS and ARMINGTON (2004) have shown new firm births to impact labour productivity and economic growth, respectively, both the numbers of births and deaths of establishments within small firms are studied to see if there are differences at the state level.[9]

This refreshingly broad set of small business indicators allows one to examine the key mechanisms, if any, by which small business activity influences state economic growth. Is it merely the presence of small business activity in an area (as measured by the count of firms or establishments) or employment (as measured by the count of employed workers or the total dollar value of payroll expenditures) that matters most for economic growth? Similarly, is it the stock of small business activity or the net growth or turnover (as measured by births and deaths) that has the largest impact? The only way to address these possibilities is to examine all the various small business activity measures in turn.

The baseline approach follows the SBA standard by defining a small business as any business with fewer than 500 employees. To assess the sensitivity of the results to this threshold, the authors also experimented with an alternative definition of small businesses as those with fewer than 100 employees. In all cases, small business measures enter each model as (1) the state's own measure; and (2) the weighted average of the measures from bordering states.

To assess accurately the impact of small business activity on state growth, one must control for as many other determinants of growth as possible. These controls are divided into non-tax and tax factors, and each set is discussed in greater detail below. Additional descriptions and source notes for all variables can be found in Table A1 in the Appendix.

Non-tax control variables

Among the more important control variables in the regressions are indicators of *non*-small-business activity. For example, in models where the number of small firms (those with fewer than 500 employees) are of focus, the number of firms with 500 or more employees is also included as a separate variable. This allows one to assess the impact of an additional small firm while holding the number of large firms constant.[10] To be sure, the inclusion of large firm counts is also based on the notion that large firms contribute significantly to state economic growth, much more so than small firms in terms of percentages of output produced. In all models, non-small-business measures parallel the small business measures (e.g., counts of establishments within large firms are included in models with counts of establishments within small firms, and so on).

The list of determinants of economic growth includes a set of variables that represent key determinants of business production decisions. Input price effects are accounted for by including an index of the price of energy in the state and the average wage for manufacturing workers in a state, as high input prices may suppress economic growth.[11] Human capital is viewed to have a positive impact on state growth, hence a measure of the educational attainment of the state's population (the share of the state's population that has a bachelor's degree or more education) is included. Moreover, entrepreneurs are more likely to locate in states with an educated workforce (LEE *et al.*, 2004). State unemployment rates are used to proxy the general economic health of the state, whereas population density (residents per square mile of land area) helps capture in-state market density.

Measures of the intensity of the agricultural and manufacturing sectors (e.g., the share of a state's GSP that is in the agricultural and manufacturing sectors) are added to control for the differential impacts each sector has on the state economy. Finally, because different parts of the population might have differing impacts on state growth, the age distribution of a state's population is accounted for by including three variables to denote the percentage of a state's population that is between the ages of 25 and 44, between the ages of 45 and 64, and equal to or over the age of 65.[12] All panel regressions also include year-fixed effects to account for unobserved heterogeneity within time periods across states.[13]

State tax policy variables

The regressions also include several measures of state tax structures in an effort to increase the policy relevance of the results. The section begins with a consideration of the top statutory tax rates for each state's corporate income tax (CIT), personal income tax (PIT), and sales tax. Higher tax rates have potentially conflicting effects on economic growth. First, they might increase business costs and, thus, drive economic activity out of a state. However, while higher income tax rates reduce the returns to risky ventures, they also insure

against risk if rates are progressive and if a loss offset component is available, and might therefore be attractive to risky business start-ups.[14] In addition, higher tax rates might also signal a larger state government overall, and correspondingly, the provision of more government services that might attract businesses.

The inclusion of taxes that are not normally associated with businesses is supported by CLINE *et al.* (2003a, b), who show that many state and local taxes, including the sales tax, are very important business taxes. Indeed, RING (1999) shows that businesses are responsible for a significant share of state and local sales taxes. Further, state sales tax rates have grown slightly in recent years as sales tax bases have eroded (BRUCE and FOX, 2000), and this pattern could have influenced state economic growth if it represents a net increase in business taxes.

A number of other aspects of state tax policies are considered that might also have large effects on economic growth and have received significant attention in the policy-making arena. Beginning with state CIT structures, the present paper goes beyond statutory tax rates and also includes the sales factor weight in each state's CIT apportionment formula, dummies for the presence of a combined reporting requirement, a throwback rule, and legislation allowing limited liabilities corporations (LLCs). Each of these is discussed in greater detail below.

Corporate profits for multi-state firms are apportioned for tax purposes to the states in which they have a 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. Thus, higher sales factor weights might bring more economic activity within a state's borders (EDMISTON, 2002; BRUCE *et al.*, 2007).

Combined reporting requirements 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 a 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 these rules have become popular as states have attempted to restore shrinking CIT bases in recent years. Both these rules could have the undesirable effect of driving economic activity away from states because they raise effective tax rates for many businesses. In addition, states that allowed LLCs first (since all states allowed LLCs by the end of 1997) may have experienced an increase in economic growth because of the attractiveness of the LLC organizational form to many businesses.

To expand the focus beyond corporate taxes, counts of the number of tax and non-tax incentive programmes that states offer to encourage economic development are also included. Tax incentive programmes include such policies as tax exemptions for business inventory, corporate income tax deductions, credits, and special treatment, tax credits for goods in transit, tax exemptions for industrial machinery and equipment, and investment tax credits. Non-tax incentive programmes include direct state loan programmes, industrial development bond programmes, loan guarantees, and umbrella bonds. Individuals and firms might respond to tax and non-tax incentive packages offered by government for business development, thus affecting economic growth.

The imposition of an inheritance, estate, or gift tax above the federal tax in a given year might affect economic growth in a state since they might affect the overall tax burden that individuals face, and thus may raise the overall cost of doing business in a state.[15] Furthermore, an inheritance, estate, or gift tax might reduce economic growth by reducing the size of small businesses upon passage from an owner to an heir. With this, a dummy variable for the presence of a state-level inheritance, estate, or gift tax above the federal tax is included.

An initial look at the data

Table 1 provides summary statistics for the measures of small and large business activity. Given the panel data, means and standard deviations (SD) across the 50 states are provided for the first and last year of the data (1988 and 2002). A few findings from Table 1 are worth noting. First, the average number of small firms far exceeds the average number of large firms at both endpoints of the panel. While all small and large business indicators increased between 1988 and 2002, increases in the large-firm variables are larger in percentage growth terms. Birth and death counts indicate that there are many more of both among small firm establishments, and the net increase in small firm establishments is roughly four times the net increase in large establishments in both endpoints.

Table 2 provides similar information for the control variables. Unsurprisingly, GSP, SPI, and employment were all growing faster toward the beginning of the panel (a time of robust economic expansion) than toward the end of the panel (in or near the most recent recession). Energy prices and wages increased between the first and last endpoints, while agriculture and manufacturing became relatively less important. The share of state populations with at least a college degree increased dramatically during this time, while changes in age distributions over time reflect the ageing of the baby boom generation. While most of the tax policy measures remained relatively stable between 1988 and 2002, the data in Table 2 reveal that sales factor weights in state CIT formulas increased substantially. States also increased the availability of

Table 1. *Summary statistics for small and large business measures*

	1988		2002	
Variable	Mean	SD	Mean	SD
Small Business Firms	103 106	111 490	118 851	124 449
Small Business Establishments	110 171	118 749	127 354	132 642
Small Business Employment	987 171	1 078 275	1 162 183	1 220 967
Small Business Payroll	18 600 000	22 800 000	36 600 000	43 200 000
Small Business Births	12 711	14 894	13 999	15 567
Small Business Deaths	11 638	13 323	13 350	14 527
Large Business Firms	1684	966	2287	1199
Large Business Establishments	13 883	14 641	21 216	21 206
Large Business Employment	823 646	906 409	1 157 158	1 210 000
Large Business Payroll	19 700 000	23 800 000	44 700 000	52 200 000
Large Business Births	1325	1444	2242	2435
Large Business Deaths	1005	1066	2064	2173
Neighbouring Small Business Firms	101 266	49 341	116 024	52 942
Neighbouring Small Business Establishments	108 163	52 255	124 357	56 245
Neighbouring Small Business Employment	975 469	493 976	1 141 082	524 492
Neighbouring Small Business Payroll	18 300 000	10 700 000	35 900 000	18 800 000
Neighbouring Small Business Births	12 177	6001	13 483	6277
Neighbouring Small Business Deaths	11 301	5590	12 939	5991

Notes: Small businesses are those with fewer than 500 employees; large businesses are all others.
Birth and death data are for 1989 and 2001.
SD, standard deviation.

non-tax incentive programmes. Finally, while no state allowed the LLC organizational form in 1988, all had done so by 2002.

In keeping with the growth literature, and to correspond with the logged-growth dependent variables, all control variables in the regression models (with the exception of all tax variables) are entered as natural logs. This gives estimated coefficients the interpretation of elasticities of growth rates with respect to the control variables.

RESULTS

The baseline regression results are presented in Tables 3–5. The dependent variables for these tables are GSP growth, employment growth, and SPI growth, respectively. Beginning with Table 3, note that most measures of small business activity do not have statistically significant impacts on GSP growth; states with more small business firms, establishments, employment, or payroll do not tend to have higher rates of GSP growth when other factors are controlled for. That said, it is found that the number of small firm establishments and the dollar value of small business payroll in *neighbouring* states both have positive but small effects on GSP growth.

More importantly, results also reveal that the number of births of establishments within small firms adds dramatically to GSP growth. Specifically, it is found that increasing small establishment births by 5% (which would be an increase of about 445 new establishments from the sample median of 8908 births) would result in a 0.465% increase in state GSP growth. To illustrate, such an increase in small establishment births would increase GSP growth from its median of 5.385% in the sample to a new GSP growth rate of 5.410%. Deaths of establishments within small firms detract from GSP growth to a similar degree. In fact, one cannot reject the null hypothesis that the effects of small establishment births and deaths are equal in absolute value terms. This is an important result as it suggests that when the net small establishment birth rate is positive (i.e., when the birth rate exceeds the death rate), GSP grows at a faster rate.[16]

Looking to the remaining control variables in Table 3, several consistent determinants of GSP growth are found. First, states with more large firm activity in the previous year tend to have higher GSP growth in the following year. This is not surprising as large firms generally contribute more to output than small firms on a per-firm basis. State GSP growth is also found to be fairly persistent, with greater prior-year growth associated with higher current-year growth. Also observed is higher GSP growth in states with lower manufacturing shares of their GSP and in states with a smaller share of their population between the ages of 45 and 64 (relative to the reference percentage of below age 25). In terms of state policy variables, states without throwback rules or state-level inheritance, estate, or gift taxes tend to have higher GSP growth in most models. States with higher sales tax rates are also found to have lower GSP growth (employment and payroll models only).

Table 2. Summary statistics for other regression variables

	1988		2002	
Variable	Mean	SD	Mean	SD
Gross state product growth rate (%)	6.38	2.13	3.46	4.07
State personal income growth rate (%)	7.82	1.68	3.68	1.16
Employment growth rate (%)	2.07	1.31	0.11	0.78
Population density	167.48	237.38	189.33	258.96
Unemployment rate (%)	5.46	1.84	5.35	0.99
Energy price index	7.44	1.04	11.55	2.11
College degree (%)	19.59	4.13	25.99	4.61
Wage (US$)	10.01	1.16	15.02	1.68
Agricultural share of GSP (%)	2.49	2.09	1.41	1.37
Manufacturing share of GSP (%)	19.01	7.07	13.26	5.17
Sales tax rate (%)	4.40	1.64	4.81	1.74
Top CIT rate (%)	6.49	3.15	6.64	2.96
Top PIT rate (%)	5.67	3.44	5.55	3.03
Sales factor apportionment (%)	34.42	17.80	43.64	22.94
Combined reporting	0.19	0.39	0.25	0.44
Throwback rule	0.47	0.50	0.44	0.50
Inheritance, estate, and gift taxes	0.52	0.50	0.27	0.45
Tax incentives	10.48	1.77	9.08	6.42
Non-tax incentives	5.38	2.14	12.88	8.82
LLC	0	0	1	0
Age 25–44 (%)	31.63	1.69	27.34	1.44
Age 45–64 (%)	18.47	1.11	25.06	1.46
Age ≥ 65 (%)	12.41	1.79	12.62	1.61

Notes: Gross state product (GSP), state personal income (SPI), and total employment growth rates listed for 1988 are actually for 1989.

SD, standard deviation; CIT, corporate income tax; PIT, personal income tax; LLC, limited liability corporation.

Similar small business results in the employment growth models are generally found in Table 4, although in these models no significant effect of small business activity is found in neighbouring states. Small establishment birth and death counts continue to exhibit significant and large impacts on employment growth, with coefficient magnitudes indicating that a 5% increase in small establishment births (again, approximately 445 new small establishments given the sample median) results in an increase in the employment growth rate of 0.435%. This would correspond to an increase in the employment growth rate from the median of 1.795% to a new growth rate of 1.803%. Although these numbers are smaller in absolute terms when compared with GSP growth, recall that the rate of employment growth has been significantly smaller than GSP growth.

In terms of the other control variables in Table 4, faster employment growth is found in states with more large-firm activity, lower population density, fewer highly educated residents, fewer residents between the ages of 45 and 64 (again relative to below 25), or a lower share of GSP from manufacturing. Faster employment growth is also found in states with higher energy prices or wages. States without state-level inheritance, estate, or gift taxes also tend to have higher rates of employment growth. Higher sales tax rates have a negative effect on employment growth in the employment and payroll models only.

These general trends continue in the SPI growth models in Table 5. While small business activity does not appear to have significant impacts on personal income growth, one again finds that small establishment births and deaths have large and significant effects. Given that median SPI growth was 5.525% during the sample, the results indicate that a 5% increase in births (again, approximately 445 new establishments) would result in an estimated increase in SPI growth of 0.405%, thereby increasing the SPI growth rate from the sample median of 5.525% to a new growth rate of 5.547%. States with more large-firm activity, lower population density, a smaller manufacturing share of GSP, and without state-level inheritance, estate, or gift taxes are again characterized by higher SPI growth. Also found in all five models in Table 5 are that higher unemployment rates reduce personal income growth.

To summarize, while the number of small firms, establishments within small firms, employees within small firms, and the dollar value of small business payroll do not appear to have statistically significant effects in the multivariate models, evidence is consistently found that small establishment births and deaths are very important determinants of GSP growth, employment growth, and SPI growth at the state level. These results indicate that simply having a lot of small business activity is less important to state growth than having *increasing* amounts of small business activity. Further, the results indicate that size does matter: small establishment births are much more critical to state economic growth than large establishment births (or, in fact, large firm activity in general). Both these themes indicate that dynamic activity among small firm establishments is better able to contribute directly to overall economic growth. This is perhaps not surprising in light of the results from the prior literature at the national and local levels, and when it is recalled from Table 1 that small firm establishment births outnumber large firm establishment births by up to ten-to-one in the data.

To take this a step further, a common theme across all the baseline models is that the effects of small establishment births are larger than any other factor. This general finding reveals that state efforts to promote small business formation will be more fruitful in terms of generating economic growth than virtually any other policy option in the models, including such things as tax rates and rules. Again, this is perhaps less surprising if one can assume that small establishment births are the most direct measure of entrepreneurial activity (or a fruitful entrepreneurial climate) at the state level.

Table 3. *Regression results: gross state product (GSP) growth on small business activity*

Variable	Firms	Establishments	Employment	Payroll	Births/deaths
Small Business Measure, <500 Emp	0.018	−0.004	−0.001	0.019	0.015
	(0.012)	(0.013)	(0.012)	(0.012)	(0.023)
Business Measure, ≥500 Emp	0.044***	0.025***	0.043***	0.055***	0.008
	(0.009)	(0.007)	(0.008)	(0.011)	(0.013)
Neighbouring Small Business, <500 Emp	0.002	0.005**	0.003	0.003*	–
	(0.002)	(0.002)	(0.002)	(0.002)	–
Small Business Births, <500 Emp	–	–	–	–	0.093***
	–	–	–	–	(0.016)
Small Business Deaths, <500 Emp	–	–	–	–	−0.094***
	–	–	–	–	(0.017)
Business Births, ≥500 Emp	–	–	–	–	0.015
	–	–	–	–	(0.009)
Business Deaths, ≥500 Emp	–	–	–	–	0.0001
	–	–	–	–	(0.010)
Neighbouring Births, <500 Emp	–	–	–	–	−0.006
	–	–	–	–	(0.017)
Neighbouring Deaths, <500 Emp	–	–	–	–	0.012
	–	–	–	–	(0.016)
GSP	−0.041***	−0.020*	−0.044***	−0.076***	−0.035***
	(0.013)	(0.012)	(0.014)	(0.019)	(0.013)
Population density	−0.001	−0.002	−0.002	−0.003*	−0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Unemployment rate (%)	−0.007	−0.008*	0.003	0.005	−0.0002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Energy price index	0.016	0.018	0.009	0.005	0.005
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
College degree (%)	−0.009	−0.001	0.009	−0.001	0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Wage (US$)	0.014	0.008	0.014	−0.017	−0.004
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Agriculture share of GSP (%)	0.003	0.002	0.006**	0.008***	−0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Manufacturing share of GSP (%)	−0.009***	−0.006*	−0.012***	−0.015***	−0.003
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Sales tax rate (%)	−0.001	−0.001	−0.002**	−0.002***	0.0005
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Top CIT rate (%)	−0.00002	−0.0004	0.0004	0.0003	0.0001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Top PIT rate (%)	−0.0002	−0.00005	−0.0004	−0.0005	−0.0005
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Sales factor apportionment (%)	−0.00003	−0.0001	−0.0001	−0.0001	0.000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Combined reporting	0.0001	0.002	−0.001	−0.002	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Throwback rule	−0.006***	−0.006***	−0.006***	−0.007***	−0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Inheritance, estate, and gift	−0.005**	−0.005**	−0.006***	−0.003	−0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Tax incentives	−0.0004	−0.0004	−0.0004	−0.0004	−0.0003
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Non-tax incentives	−0.0001	−0.0001	−0.0001	−0.0002	−0.0001
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
LLC	−0.006*	−0.006	−0.005	−0.004	−0.007*
	(0.004)	(0.004)	(0.003)	(0.003)	(0.004)
Age 25–44 (%)	0.053*	0.049	0.035	0.027	0.065**
	(0.032)	(0.032)	(0.031)	(0.031)	(0.032)
Age 45–64 (%)	−0.082***	−0.070***	−0.057**	−0.061***	−0.061**
	(0.023)	(0.024)	(0.023)	(0.023)	(0.025)
Age ≥65 (%)	0.006	0.008	0.001	−0.004	0.019
	(0.013)	(0.013)	(0.013)	(0.012)	(0.015)

(*Table continued*)

Table 3. *Continued*

Variable	Firms	Establishments	Employment	Payroll	Births/deaths
Constant	0.310**	0.194	0.263**	0.360***	0.213
	(0.127)	(0.126)	(0.117)	(0.121)	(0.136)
R^2	0.312	0.294	0.321	0.330	0.372

Notes: *, **, ***Statistical significance at the 10%, 5%, and 1% levels, respectively.
Entries are regression coefficients followed by standard errors in parentheses.
All variables except tax parameters are logged. All percentage variables range from zero to 100. All independent variables are lagged one year.
GSP, gross state product; CIT, corporate income tax; PIT, personal income tax; LLC, limited liability corporation.

Table 4. *Regression results: employment growth on small business activity*

Variable	Firms	Establishments	Employment	Payroll	Births/deaths
Small Business Measure, $<$500 Emp	0.006	−0.009	−0.007	−0.005	−0.003
	(0.008)	(0.008)	(0.008)	(0.005)	(0.013)
Business Measure, $\geq$500 Emp	0.021***	0.012**	0.017***	0.012***	0.014*
	(0.005)	(0.006)	(0.006)	(0.004)	(0.007)
Neighbouring Small Business, $<$500 Emp	0.0001	0.002	0.001	0.002	–
	(0.001)	(0.001)	(0.001)	(0.001)	–
Small Business Births, $<$500 Emp	–	–	–	–	0.087***
	–	–	–	–	(0.006)
Small Business Deaths, $<$500 Emp	–	–	–	–	−0.077***
	–	–	–	–	(0.007)
Business Births, $\geq$500 Emp	–	–	–	–	0.006
	–	–	–	–	(0.004)
Business Deaths, $\geq$500 Emp	–	–	–	–	−0.012***
	–	–	–	–	(0.004)
Neighbouring Births, $<$500 Emp	–	–	–	–	0.013
	–	–	–	–	(0.0080
Neighbouring Deaths, $<$500 Emp	–	–	–	–	−0.01
	–	–	–	–	(0.008)
Employment	−0.016*	−0.002	−0.009	−0.005	−0.013
	(0.010)	(0.012)	(0.012)	(0.007)	(0.012)
Population density	−0.004***	−0.004***	−0.004***	−0.004***	−0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Unemployment rate (%)	−0.003	−0.003	0.0003	−0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Energy price index	0.019***	0.020***	0.015***	0.016***	0.009**
	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)
College degree (%)	−0.019***	−0.014***	−0.012***	−0.015***	−0.003
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
Wage (US$)	0.011**	0.011**	0.011**	0.005	0.001
	(0.005)	(0.005)	(0.005)	(0.006)	(0.004)
Agriculture share of GSP (%)	0.002	0.002	0.003**	0.002*	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Manufacturing share of GSP (%)	−0.006***	−0.005***	−0.007***	−0.007***	−0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Sales tax rate (%)	−0.0002	−0.0003	−0.001**	−0.001*	0.001**
	(0.0003)	(0.0004)	(0.003)	(0.0003)	(0.0003)
Top CIT rate (%)	−0.0003	−0.0004	−0.0002	−0.0003	0.0001
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0002)
Top PIT rate (%)	0.0002	0.0001	0.0001	0.0001	−0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0002)
Sales factor apportionment (%)	−0.0001	−0.00002	−0.00003	−0.00003	0.00004**
	(0.00003)	(0.00003)	(0.00003)	(0.00003)	(0.00002)
Combined reporting	−0.001	0.0004	−0.001	−0.0002	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Throwback rule	−0.002	−0.002	−0.001	−0.001	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inheritance, estate, and gift	−0.002*	−0.002**	−0.002**	−0.002*	0.001

(*Table continued*)

Table 4. *Continued*

Variable	Firms	Establishments	Employment	Payroll	Births/deaths
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax incentives	−0.00004	−0.0001	−0.00004	−0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Non-tax incentives	−0.0001	−0.0001	−0.0001	−0.0002*	−0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
LLC	0.0002	0.001	0.001	0.001	−0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age 25–44 (%)	0.011	0.009	0.005	0.008	0.026*
	(0.016)	(0.016)	(0.016)	(0.016)	(0.014)
Age 45–64 (%)	−0.043***	−0.037***	−0.032***	−0.035***	−0.025**
	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)
Age ≥65 (%)	−0.003	−0.004	−0.005	−0.005	0.008
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	0.140*	0.097	0.103	0.077	−0.001
	(0.079)	(0.089)	(0.064)	(0.066)	(0.081)
R^2	0.596	0.589	0.595	0.589	0.758

Notes: *, **, ***Statistical significance at the 10%, 5%, and 1% levels, respectively.
Entries are regression coefficients followed by standard errors in parentheses.
All variables except tax parameters are logged. All percentage variables range from zero to 100. All independent variables are lagged one year.
GSP, gross state product; CIT, corporate income tax; PIT, personal income tax; LLC, limited liability corporation.

Table 5. *Regression results: state personal income (SPI) growth on small business activity*

Variable	Firms	Establishments	Employment	Payroll	Births/deaths
Small Business Measure, <500 Emp	0.015	−0.0002	−0.004	0.005	0.002
	(0.009)	(0.009)	(0.008)	(0.007)	(0.015)
Business Measure, ≥500 Emp	0.022***	0.009*	0.015***	0.016***	−0.002
	(0.006)	(0.005)	(0.005)	(0.005)	(0.008)
Neighbouring Small Business, <500 Emp	0.001	0.002	0.001	0.001	–
	(0.002)	(0.002)	(0.002)	(0.001)	–
Small Business Births, <500 Emp	–	–	–	–	0.081***
	–	–	–	–	(0.011)
Small Business Deaths, <500 Emp	–	–	–	–	−0.069***
	–	–	–	–	(0.012)
Business Births, ≥500 Emp	–	–	–	–	0.002
	–	–	–	–	(0.005)
Business Deaths, ≥500 Emp	–	–	–	–	0.002
	–	–	–	–	(0.006)
Neighbouring Births, <500 Emp	–	–	–	–	0.016
	–	–	–	–	(0.011)
Neighbouring Deaths, <500 Emp	–	–	–	–	−0.013
	–	–	–	–	(0.011)
SPI	−0.024**	−0.007	−0.009	−0.020**	−0.014
	(0.011)	(0.010)	(0.010)	(0.009)	(0.011)
Population density	−0.004***	−0.004***	−0.004***	−0.005***	−0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Unemployment rate (%)	−0.009***	−0.009***	−0.006*	−0.005*	−0.006*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Energy price index	0.015**	0.014*	0.011	0.011	0.004
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)
College degree (%)	−0.010**	−0.006	−0.003	−0.006	0.002
	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
Wage (US$)	0.003	−0.001	0.00001	−0.01	−0.011
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Agriculture share of GSP (%)	−0.002	−0.002	−0.001	−0.001	−0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Manufacturing share of GSP (%)	−0.005**	−0.003	−0.005*	−0.006**	0.001

(*Table continued*)

Table 5. *Continued*

Variable	Firms	Establishments	Employment	Payroll	Births/deaths
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Sales tax rate (%)	0.0003	0.0001	−0.0003	−0.0002	0.001**
	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.0005)
Top CIT rate (%)	−0.0004	−0.001	−0.0003	−0.0004	−0.0003
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0003)
Top PIT rate (%)	−0.0001	−0.00001	−0.0001	−0.0001	−0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Sales factor apportionment (%)	0.00002	0.000	−0.00001	0.000	0.0001
	(0.00004)	(0.000)	(0.00004)	(0.000)	(0.00004)
Combined reporting	−0.0005	−0.0001	−0.001	−0.001	0.0003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Throwback rule	−0.002	−0.002	−0.001	−0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inheritance, estate, and gift	−0.003**	−0.003**	−0.003**	−0.002*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Tax incentives	0.00001	−0.0001	−0.00004	−0.00003	0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Non-tax incentives	−0.0001	−0.0001	−0.0001	−0.0002	−0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
LLC	.00001	0.001	0.001	0.001	0.0001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Age 25–44 (%)	0.038*	0.035	0.029	0.026	0.044**
	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
Age 45–64 (%)	−0.024*	−0.021	−0.014	−0.012	−0.001
	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)
Age ≥ 65 (%)	−0.006	−0.007	−0.007	−0.007	0.003
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Constant	0.131	0.053	0.042	0.06	−0.008
	(0.091)	(0.092)	(0.076)	(0.074)	(0.099)
R^2	0.644	0.637	0.641	0.641	0.698

Notes: *, **, ***Statistical significance at the 10%, 5%, and 1% levels, respectively.
Entries are regression coefficients followed by standard errors in parentheses.
All variables except tax parameters are logged. All percentage variables range from zero to 100. All independent variables are lagged one year.
GSP, gross state product; CIT, corporate income tax; PIT, personal income tax; LLC, limited liability corporation.

Another important theme from the baseline results is that small business activity in neighbouring states generally does not influence a state's own rate of economic growth. In the two cases in which the neighbour variable is statistically significant, its sign is positive, thus suggesting that more small business activity in bordering states might actually increase a state's own rate of economic growth. This finding reveals that states need not be concerned about losing small business activity to neighbouring states, as there is no evidence that small business activity across the border has any kind of negative effect on a state's own economic growth.

Robustness checks

To assess the sensitivity of the findings, a number of alternative versions of the baseline models in Tables 3–5 were estimated. The first modification is intended to address the concern that 500 employees might be too high a cut-off in the determination of small versus large businesses. To this end, the baseline measures of small and large business activity were replaced with equivalents that use 100 employees as the small-large threshold value. Results are virtually indistinguishable from the baseline findings and are, therefore, not discussed in significant detail herein.[17]

A second set of alternative models addresses the possibility that the extensive specifications might still suffer from omitted variable bias. Following the work of Gropp *et al.* (1997), Fan and White (2003), and Berkowitz and White (2004), measures of state bankruptcy laws in the form of the dollar value of the homestead exemption, which is the dollar value of assets than can be protected in the event of bankruptcy (along with an indicator for unlimited exemptions in certain states), were included. These variables are intended to account for the possibility that differences in state bankruptcy laws might translate into differences in both access to credit and the incentive to engage in or continue with a small business activity. The dollar value of state government expenditures per capita was also included to obtain a better sense of the effects of the size of state government on economic growth above and beyond the various tax measures included in the baseline models. Finally, an attempt was made to control for differences in the political climate by

including indicators of gubernatorial election years and whether the governor and all houses of the state legislature were of the same political party. In sum, none of these included variables was found to have meaningful impacts on state economic growth and, more importantly, their inclusion did not change the main small business results.

Yet another set of alternative specifications was estimated to investigate the possibility that the extensive specification might introduce multicollinearity. While there is reason to believe that each of the included control variables can have an impact on state economic growth (as discussed above) and omitted variable bias may result from leaving then out, the baseline results indicate that several of the variables are not statistically significant. To consider the extent to which the inclusion of so many controls yields multicollinearity (and associated inflated standard errors), parsimonious versions of the baseline models were estimated in which all tax policy variables were excluded. Again, results were nearly identical to the baseline findings in Tables 3–5.

In yet another series of robustness checks, the authors experimented with alternative weighting schemes (*population-contiguity*, *centre*, and *city*, as defined above) for the neighbour-state small business variables. Note that the baseline models use a *contiguity* weighting scheme where each neighbouring state is equally weighted. Consequently, this robustness check amounted to the estimation of three new regressions for every one of the baseline regressions. While different weighting methods yielded slightly different findings in a few cases, the general themes from the baseline results remained. Specifically, it was continually found that a state's own small business activity has little impact on economic growth while births and deaths have large and significant effects. It is also worth noting that in all cases in which small business activity in neighbouring states was found to have a statistically significant effect on own-state economic growth, the effect was found to be positive.

CONCLUSION

Using a 50-state panel of data spanning the years 1988–2002, it was found that small business activity has very important impacts on overall state economic growth. Specifically, after accounting for simultaneity of small business activity and economic growth, it is found that small establishment births are the single largest determinant of growth in GSP, SPI, and employment. While it is also found that small establishment deaths have an equally large negative impact on economic growth, the effects of births and deaths are found to be statistically equivalent in absolute value terms. This is a key finding as it suggests that economic growth is faster when the net small firm establishment birth rate is positive (i.e., when the birth rate exceeds the death rate).

The estimation procedure accounts for cross-border spillover effects of small business activity by controlling for small business activity in neighbouring states. While it might be thought that a greater amount of small business activity in neighbouring states might detract from a state's own rate of economic growth, the results reveal just the opposite. In all cases in which neighbour-state small business activity is a statistically significant determinant of economic growth, its effect is positive. Given these potential positive spillovers, states need not worry about losing small business activity to other states because it does not appear that small business activity is a zero-sum game between neighbouring states.

The present models also account for a broad menu of policy variables, including such things as tax rates and other features of state tax structures, in an attempt to gauge the economic growth prospects of several high-profile policy options. The general finding is that states have few options in this area for enhancing GSP, SPI, and employment growth rates. Instead, the results indicate that the most fruitful policy option available to state governments is to establish and maintain a fertile environment for new establishment formation. Every one of the models indicates that states with more new small firm establishments grow at a higher rate over time, even after one controls for the level of economic activity and a variety of other factors.

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APPENDIX

Table A1. *Data descriptions and source notes*

Variable	Definition
Small Business Firms, <500 Emp	Number of firms with fewer than 500 employees[a]
Small Business Establishments, <500 Emp	Number of physical locations associated with firms that have fewer than 500 employees[a]
Small Business Employment, <500 Emp	Total employment of firms that have fewer than 500 employees[a]
Small Business Payroll, <500 Emp	Totally payroll of firms that have fewer than 500 employees[a]
Small Business Births, <500 Emp	Number of establishment births associated with firms that have fewer than 500 employees[a]
Small Business Deaths, <500 Emp	Number of establishment deaths associated with firms that have fewer than 500 employees[a]
Small Business ..., <100 Emp	Equivalent measures – small business defined as those firms with fewer than 100 employees[a]
Business ..., ≥500 Emp/≥100 Emp	Equivalent business measures for those firms with more than 500/100 employees[a]
Neighbouring Small Business ...	Equivalent small business measures for neighbouring states[a]
Gross state product (thousands)	Gross state product (GSP)[b]
State personal income	Total state personal income[c]
Employment	Total state employment[b]
Population density	Population/square mile in a state[d]
Unemployment rate (%)	State unemployment rate[c]
Energy price index	Index of energy costs for all forms of energy[e]
College degree (%)	Share of the state population with a bachelor's degree or higher[d]
Wage (US$)	Average hourly wage for manufacturing workers[f]
Agricultural share of GSP (%)	State agricultural production as a share of total gross state product[g]
Manufacturing share of GSP (%)	State manufacturing production as a share of total gross state product[g]
Sales tax rate (%)	General sales tax rate[h]
Top CIT rate (%)	Highest marginal corporate income tax (CIT) rate[h]
Top PIT rate (%)	Highest marginal personal income tax (PIT) rate[h]
Sales factor apportionment (%)	Weight given to sales factor in the corporate income tax apportionment formula[h]
Combined reporting	=1 if a state has a combined reporting requirement[h]
Throwback rule	=1 if a state has a throwback rule[i]
Inheritance, estate, and gift taxes	=1 if a state has an inheritance, estate, or gift tax[j]
Tax incentives	Number of tax incentive programmes a state offers[k]
Non-tax incentives	Number of non-tax incentive programmes a state offers[k]
Limited liabilities corporation (LLC)	=1 if a state allows limited liability companies[l]
Age 25–44 (%)	Share of the state population between the ages of 25 and 44[d]
Age 45–64 (%)	Share of the state population between the ages of 45 and 64[d]
Age ≥65 (%)	Share of the state population equal to or over the age of 65[d]

Notes: [a]Authors' calculations based on data from US Census Bureau, *Statistics of US Businesses* (various years).
[b]US Bureau of Economic Analysis (various years).
[c]US Census Bureau, *Statistical Abstract of the United States* (various years).
[d]Authors' calculations based on data from US Census Bureau, *Statistical Abstract of the United States* (various years).
[e]US Department of Energy (various years).
[f]US Bureau of Labor Statistics (various years).
[g]Authors' calculations based on data from US Bureau of Economic Analysis (various years).
[h]Commerce Clearing House (various years).
[i]Commerce Clearing House (various years) and various State revenue departments.
[j]Conway and Rork (2004).
[k]National Association of State Development Agencies (various years).
[l]See http://www.llcweb.com/.

NOTES

1. For additional details see, http://www.sba.gov/advo/.
2. Full source information for all data used in this study, see Appendix Table A1.
3. Another method involves the use of contemporaneous (rather than lagged) data while instrumenting for the endogenous variable in a first-stage regression. For example, if small business activity is endogenous in the GSP regression, one would need to estimate a first-stage regression of small business activity on (1) at least one instrumental variable (IV) and (2) all of the other exogenous variables in the GSP regression. The instrumental variable would be some factor that significantly affects small business activity but that does not have an independent influence on GSP. Given the obvious difficulty with finding suitable instrumental variables, the lag structure is preferred.
4. The convergence hypothesis is the idea that wealthier states will grow more slowly than poorer states. The hypothesis manifests itself as a negative coefficient on the initial level of economic activity.
5. For further explanation, see WOOLDRIDGE (2001). Note that this specification implicitly controls for time-invariant state-specific factors, such as institutional differences (ACEMOGLU *et al.*, 2005), migration patterns (KEEBLE and WALKER, 1994), and the like.
6. Often, spillovers are modelled through the use of a spatial lag, as in the case of ACS and PLUMMER (2005). In the present model, this would imply that state A's growth would be impacted by the growth of its neighbours. Because the authors believe the spillover is better captured in neighbouring entrepreneurial activity as opposed to neighbouring growth rates, the spatial lag approach is forgoed and a spatial cross-regressive term is instead included.
7. These data are published by the US Census Bureau and the Bureau of Economic Analysis.
8. Specifically, year-to-year growth is calculated as the natural log of (γ_t/γ_{t-1}). Results were nearly identical when growth was calculated as $[(\gamma_t - \gamma_{t-1})/\gamma_{t-1}]$.
9. The Census defines births as establishments that have zero employment in the first quarter of the initial year and positive employment in the first quarter of the subsequent year. Similarly, deaths are establishments that have positive employment in the first quarter of the initial year and zero employment in the first quarter of the subsequent year. Small business establishment births and deaths are only available for March 1989 to March 2001, while other small business measures are available for 1988–2002. It should, therefore, be noted that births and deaths are technically lagged by 1.75 years since those data pertain to activity between March of the current year and March of the prior year. Births and deaths are preferred as being entered as two separate variables in the models such that effects of births might differ than effects of deaths. A single measure of net growth or turnover would be too restrictive in this sense. This issue will be returned to in the discussion of the results below.
10. Without controlling for the number of large firms, the measured impact of a new small firm would not be the same as the likely impact of a *new* small firm. In this sense, the measured impact would not be able to distinguish between the effect of a truly new small firm and a formerly large firm that shrinks in size into the small firm category.
11. The energy price index represents the cost of producing 1 million British thermal units (BTUs) of energy based on a weighted average of the cost of energy from different sources such as coal, natural gas, nuclear, etc., in each state.
12. These age distribution measures are viewed as more illustrative than the mean or median of a state's population.
13. These time-fixed effects also account for inflationary growth in the (logged) nominal variables in the models.
14. For more discussion of these issues, see BRUCE and DESKINS (2006) and BRUCE and GURLEY (2005), *passim*.
15. 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. For an excellent discussion of these taxes, see CONWAY and RORK (2004).
16. Indeed, in more restrictive models in which the two separate small firm establishment birth and death variables were replaced with a net growth measure (specifically, births minus deaths), the effect of net growth was generally positive and statistically different from zero, but very small in magnitude. This result is consistent with those in the baseline models.
17. Full results from all robustness checks are available from the authors upon request.

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