Available online at www.sciencedirect.com
ScienceDirect
Journal of Business Venturing 23 (2008) 641–655
JOURNAL of BUSINESS VENTURING

Testing Baumol: Institutional quality and the productivity of entrepreneurship ☆

Russell S. Sobel *

James Clark Coffman Distinguished Chair in Entrepreneurial Studies, Department of Economics and Entrepreneurship Center, West Virginia University, P.O. Box 6025, Morgantown, WV 26506-6025, United States

Abstract

Baumol's [Baumol, W.J., 1990. Entrepreneurship: productive, unproductive and destructive. Journal of Political Economy 98 (5), 893–921] theory of productive and unproductive entrepreneurship is a significant recent contribution to the economics of entrepreneurship literature. He hypothesizes that entrepreneurial individuals channel their effort in different directions depending on the quality of prevailing economic, political, and legal institutions. This institutional structure determines the relative reward to investing entrepreneurial energies into productive market activities versus unproductive political and legal activities (e.g., lobbying and lawsuits). Good institutions channel effort into productive entrepreneurship, sustaining higher rates of economic growth. I test and confirm Baumol's theory, and discuss its significance to the literature, economic prosperity, and policy reform.

Keywords: Entrepreneurship; Institutional quality; Economic freedom; Economic growth

1. Executive summary

One of the major recent contributions to the economics of entrepreneurship literature is William Baumol's theory of productive and unproductive entrepreneurship. Baumol theorizes that entrepreneurial individuals have a choice to devote their labor effort toward either private-sector wealth creation, or toward securing wealth redistribution through the political and legal processes (e.g., lobbying and lawsuits). This decision is influenced by the corresponding rates of return–or profit rates–to the activities, which in turn is shaped by the quality of existing political and legal institutions.

When institutions provide for secure property rights, a fair and balanced judicial system, contract enforcement, and effective constitutional limits on government's ability to transfer wealth through taxation and regulation, it reduces the profitability of unproductive political and legal entrepreneurship. Under this incentive structure, creative individuals are more likely to engage in the creation of new wealth through productive market entrepreneurship. Thus, differences

☆ I am grateful to three anonymous referees, special issue editor Maria Minniti, and Peter Leeson for helpful comments and suggestions. I would like to thank Joshua Hall and Andrea Dean for their excellent research assistance.
* Tel.: +1 304 293 7864.
E-mail address: Russell.Sobel@mail.wvu.edu.

0883-9026/$ - see front matter © 2008 Elsevier Inc. All rights reserved.
doi:10.1016/j.jbusvent.2008.01.004

in measured rates of *private sector* entrepreneurship are partially due to the different directions entrepreneurial energies are channeled by prevailing economic and political institutions, through the rewards and incentive structures they create for entrepreneurial individuals.

This paper examines the relationship between measures of the quality of state political and legal institutions and measures of both productive and unproductive entrepreneurship. I find that better institutional structures produce higher venture capital investments per capita, a higher rate of patents per capita, a faster rate of sole proprietorship growth, and a higher establishment birth rate. The results also show that those states with the worst institutions have the worst records on total lobbying activity and legal quality/lawsuit abuse—the unproductive types of entrepreneurship.

This paper constructs a state index and ranking of 'net entrepreneurial productivity' in which productive entrepreneurship is measured relative to unproductive political and legal entrepreneurship. The relationship between having good institutions and the index of net entrepreneurial productivity across states is highly significant. The index of net entrepreneurial productivity also helps to explain differences in the levels of economic prosperity across states.

This paper not only provides the first empirical evidence in support of Baumol's theoretical contribution, but also examines the effects of unproductive entrepreneurship on state economic prosperity. The paper concludes with a set of recommended policy reforms that would help to improve the quality of institutions and create higher levels of productive private sector entrepreneurship.

2. Introduction

For almost three hundred years, economists have been making contributions to the academic literature on entrepreneurship. Among the most significant historical contributions were those of Cantillon, Say, Mill, Knight, Schumpeter, and Kirzner, who advanced our understanding of the entrepreneur's role in the economy. One recent contribution that might someday make this list comes from economist William Baumol, who first published his theory of 'productive and unproductive entrepreneurship' in 1990. His contribution is significant because it fundamentally shifts the focus of academic inquiry toward the role of institutions in affecting entrepreneurship.[1]

Baumol's theory is founded on the idea that entrepreneurs exploit profit opportunities not only within private markets but also within the political and legal arenas. Thus, differences in measured rates of *private sector* entrepreneurship are partially due to the different directions entrepreneurial energies are channeled by prevailing economic and political institutions, through the rewards and incentive structures they create for entrepreneurial individuals.

In areas with institutions providing secure property rights, a fair and balanced judicial system, contract enforcement, and effective limits on government's ability to transfer wealth through taxation and regulation, creative individuals are more likely to engage in productive market entrepreneurship—activities that create wealth (e.g., product innovation). In areas without strong institutions, these same individuals are instead more likely to engage in attempts to manipulate the political or legal process to capture transfers of existing wealth through unproductive political and legal entrepreneurship—activities that destroy wealth (e.g., lobbying and lawsuits). This reallocation of effort occurs because the institutional structure largely determines the relative personal and financial rewards to investing entrepreneurial energies into productive market activities versus investing those same energies instead into unproductive political and legal activities.[2]

In this paper I attempt to provide the first complete empirical test of Baumol's theory, examining the impact of institutional quality on both the levels of productive and unproductive entrepreneurship. My results confirm Baumol's conjecture that areas with better institutions have both more productive entrepreneurship, and also less unproductive entrepreneurship. A tradeoff clearly exists between the levels of these two activities in an economy. The policy implications of Baumol's theory are clear; rather than focusing on expanding government programs like subsidized loans, workforce education, or programs aimed at increasing 'entrepreneurial inputs' as a way to foster productive entrepreneurship, the better path is through institutional reform that constrains or minimizes government's role, lowering the return to unproductive types of entrepreneurship. Government programs too often encourage entrepreneurial individuals to devote effort toward figuring out how to obtain the transfers or subsidies, rather than devoting those efforts toward satisfying consumers and creating wealth.

[1] The idea that free-market institutions, such as secure private property rights, are vital to economic growth was also stressed in the works of Peter Bauer, see Dorn (2002) for a good discussion of Bauer's contributions in this area.

[2] For example, a steel entrepreneur might react to competition by trying either to find a better way of producing steel (productive entrepreneurship), or by lobbying for subsidies, tariff protection, or filing legal anti-trust actions (unproductive entrepreneurship).

This paper continues by first reviewing economists' contributions to our understanding of entrepreneurship, from Cantillon through Baumol. A framework is then presented to highlight the difference between academic inquiries into the role of entrepreneurial inputs versus the role of institutions. Measures of unproductive and productive entrepreneurship, as well as of institutional quality, are discussed and analyzed to see if the predictions of Baumol's theory hold.

3. Economists' contributions to entrepreneurship

In 1730, economist Richard Cantillon identified the willingness to bear the personal financial risk of a business venture as the defining characteristic of an entrepreneur.[3] In the early 1800s, economists Jean Baptiste Say and John Stuart Mill further popularized the academic usage of the word 'entrepreneur.' Say stressed the role of the entrepreneur in creating value by moving resources out of less productive areas and into more productive ones. Mill used the term 'entrepreneur' in his popular 1848 book, *Principles of Political Economy*, to refer to a person who assumes both the risk and management of a business. In this manner, Mill provided a clearer distinction than Cantillon between an entrepreneur and other business owners (such as shareholders of a corporation) who assume financial risk, but do not actively participate in the day-to-day operations of the firm.

Building on Cantillon and Mill, economist Frank Knight emphasized that entrepreneurs deal with uncertainty about the future, not with risk. Probabilities can be estimated for risky activities and thus are insurable. Entrepreneurs, however, are dealing with uncertainty about the profitability of their new combinations of resources. Since entrepreneurs cannot insure against the probability that new goods and services will fail, entrepreneurs bear the burden of the uncertainty associated with the market process.

Two other economists, Joseph Schumpeter and Israel Kirzner, also greatly advanced our understanding of the role of the entrepreneur. Schumpeter ([1911] 1934, 1942) stressed the role of the entrepreneur as an innovator. To Schumpeter, an entrepreneur is someone who finds new combinations of resources and creates products that did not previously exist. From a Schumpeterian view, the entrepreneur is a disruptive force in an economy because the introduction of these new combinations leads to the obsolescence of others. The introduction of the compact disc, and the corresponding disappearance of the vinyl record, is just one of many examples of this process Schumpeter termed 'creative destruction.' Cars, electricity, aircraft, and personal computers are others. Schumpeter viewed this disruptive force as the source of true economic progress. In addition to stressing the disruptive role of entrepreneurs, Schumpeter differentiated between innovators and creditors. Innovators serve the creative function while creditors serve the financing function. True entrepreneurship is the creative, or innovative aspect of business formation—not the financing component.

Kirzner's (1973, 1997) view of entrepreneurship stands in some contrast to Schumpeter's. Instead of focusing on the disequilibrating role of the entrepreneur, Kirzner views entrepreneurship as an equilibrating force in which entrepreneurs discover previously unnoticed profit opportunities and act on them, bringing markets toward their zero economic profit, long-run equilibria. Thus Kirzner's 'arbitraging' entrepreneur initiates a change that moves a market toward equilibrium, rather than disrupting an existing equilibrium as does Schumpeter's entrepreneur. Holcombe (1998) attempts to bring together the Schumpeterian and Kirznerian views by explaining that a Schumpeterian innovation (such as, say, the introduction of the automobile) creates multitudes of new profit opportunities (in areas like auto accessories and fuel delivery) that are there to be exploited by Kirznerian entrepreneurs.

Perhaps the most significant theoretical contribution to our understanding of entrepreneurship since the time of Kirzner is Baumol's theory of productive and unproductive entrepreneurship. First published in his 1990 article, this theory has been further elaborated in Baumol (1990, 1993, 2002), Boettke (2001), Boettke and Coyne (2003), Coyne and Leeson (2004), Kreft and Sobel (2005), and Ovaska and Sobel (2005). Baumol conjectures that entrepreneurship is an omnipresent feature of human nature, and what differs across areas is not the degree of underlying entrepreneurial spirit, but instead how that spirit is channeled. In the political and legal arenas, just like in the market sector, there are both Schumpeterian 'innovation' and Kirznerian 'arbitrage' opportunities that can and do generate profit for entrepreneurial individuals.

These entrepreneurial individuals have a choice to devote their labor efforts toward either private sector wealth creation, or toward securing wealth redistribution through the political and legal processes. This decision is influenced by the corresponding rates of return to the two activities. Institutions providing secure property rights, a fair and

[3] For additional discussion and references on this historical material see Sobel (2008).

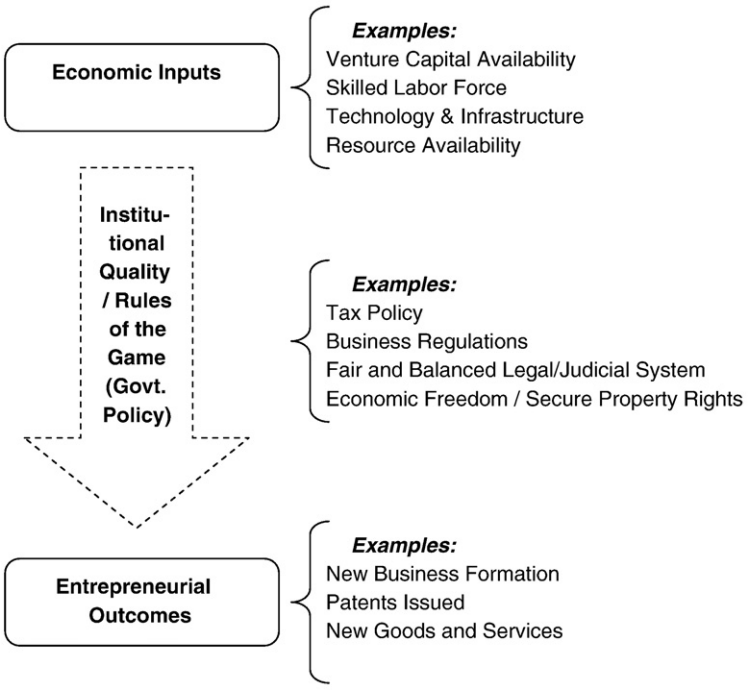

Fig. 1. The entrepreneurial process.

balanced judicial system, contract enforcement, and effective limits on government's ability to transfer wealth through taxation and regulation, have a lower return to unproductive political entrepreneurship. Under this incentive structure, creative individuals are more likely to engage in the creation of new wealth through productive market entrepreneurship. In areas without good institutions, the rate of return to unproductive entrepreneurship is higher and creative individuals engage in attempts to capture transfers of existing wealth through unproductive political entrepreneurship—such as lobbying and lawsuits.

Baumol's theory may be viewed as a one period model of an individual entrepreneur's utility maximization over a private consumption good c, with a normalized price of \$1. Income, Y, is entirely spent on consumption, so $c=Y$. The individual maximizes utility subject to a normalized labor allocation constraint in which the share of entrepreneurial effort devoted to productive entrepreneurship, e_p, plus the share devoted to unproductive entrepreneurship, e_u, equals one, or $e_p+e_u=1$. Finally, the budget constraint, in terms of the returns to productive entrepreneurial activity, r_p, and unproductive entrepreneurial activity, r_u, is $Y=e_p r_p+e_u r_u$.

Optimization produces the familiar result that the individual will allocate his or her effort so as to equate the marginal return per hour worked across the two activities. In a world of heterogeneous agents, comparative advantages will dictate that some individuals will arrive at corner solutions in which they are either full time political entrepreneurs (i.e., lobbyists) or full time private entrepreneurs.

The economy's '*net entrepreneurial productivity*' (NEP) is given by: $\mathrm{NEP}=e_p-e_u$. The economy's net entrepreneurial productivity (NEP) is a function of returns to the two activities, so $\mathrm{NEP}=f(r_p, r_u)$. Net entrepreneurial productivity rises as either the reward to productive entrepreneurship rises [i.e., $\partial \mathrm{NEP}/\partial r_p>0$], or as the return to unproductive entrepreneurship falls [i.e., $\partial \mathrm{NEP}/\partial r_u<0$]. We will return to this theoretical model later to derive the empirical measures employed in this study.

Baumol's theory is important because it fundamentally redirects the academic focus of policy-relevant questions about how best to foster entrepreneurship and economic growth. This can more clearly be understood by considering Fig. 1.

Fig. 1 illustrates the process by which entrepreneurial outcomes are generated. Economic inputs, such as venture capital and resource availability, are converted into entrepreneurial outcomes like new businesses created or patents issued. However, the quantity of entrepreneurial outcomes generated from a given amount of economic inputs depends

primarily on the institutions, or 'rules of the game,' under which entrepreneurs operate. Prior to Baumol, most economists and policy makers focused only on the relationship between entrepreneurial inputs and entrepreneurial outcomes, essentially assuming away the rules of the game from the analysis. Baumol's theory also considers the institutional context, and rules of the game, under which entrepreneurs operate.

His theory also helps to explain why so many government programs aimed at subsidizing entrepreneurial inputs, such as government loan and education programs, have shown little success in actually promoting entrepreneurship. Increasing inputs has little impact on outcomes when the rules of the game are poor. Baumol's theory suggests that the policy focus should, instead, be on how to improve the quality of institutions to get the largest productive entrepreneurial output out of an economy's entrepreneurial inputs.

4. Entrepreneurship, institutions, and economic growth

Productive entrepreneurship is important to an economy because it is the fundamental source of economic growth and wealth creation. Reynolds et al. (1999), for example, show that one-third of the differences in national economic growth rates can be attributed to differences in entrepreneurial activity. Zacharakis et al. (2000) study sixteen developed economies and find that entrepreneurial activity explains approximately one-half of the differences in GDP growth between countries. More recently, Henderson (2002) shows that entrepreneurs significantly impact economic activity at a more local level through fostering localized job creation, increasing wealth and local incomes, and connecting local economies to the larger, global economy. The research seems to conclude that productive entrepreneurial activity is the primary source of economic growth.

Yet there exists an entirely different and unrelated strand of economic literature attempting to explain economic growth differentials by differences in the quality of institutions. This literature has arisen in large part due to the publication of the *Economic Freedom of the World* index by economists James Gwartney and Robert Lawson (2005, first published in 1996). This index is updated annually, and has now been used in hundreds of studies published in academic journals and books. Because state and local policies also impact the degree of 'economic freedom', authors Amela Karabegovic and Fred McMahon released their *Economic Freedom of North America* ranking individual U.S. states and Canadian provinces with respect to each other in terms of their institutional quality.

Generally these indices attempt to condense into a single number the degree of 'economic freedom' individuals have in a geographic area. The index measures institutional quality specifically with respect to the extent of capitalism and limited government on a scale from zero to ten. Zero means that a state is completely economically unfree. Ten means it is completely free, or has the best institutions. Three subcomponents compose this index: (1) the size of government, which considers measures of government spending and ownership as a percent of the state economy, (2) takings and discriminatory taxation, which measures how well government protects private property rights and the presence of low tax rates that allow owners to keep residual income, (3) labor market freedom, which covers government regulation and control of labor markets including measures of state minimum wages and government employment.[4] In sum, these measures provide a broad index of the extent to which states adopt policies consistent with the ones that best discourage unproductive political entrepreneurship. Studies using these indices such as Farr et al. (1998), Gwartney et al. (1999), Cole (2003), and Powell (2003) have consistently shown that countries with higher economic freedom scores not only have larger per capita incomes, but also tend to have higher rates of economic growth.

Baumol's theory provides a way to make sense of, or synthesize, these two seemingly separate 'fundamental' explanations for economic growth. The index of economic freedom measures precisely those institutional structures that should lower the return to unproductive entrepreneurship, promoting productive entrepreneurship over unproductive entrepreneurship. Thus, underlying economic freedoms generate economic growth *because* they more heavily promote productive entrepreneurial activity, which is the source of economic growth. Both sets of literature are indeed correct, economic freedom and entrepreneurship are both highly correlated with economic growth. It is the institutional structure as measured by economic freedom, however, that promotes productive, wealth-generating entrepreneurial activity which is the source of economic growth.

It is worthwhile to make a distinction between the total supply of entrepreneurs and the allocation of entrepreneurs between productive and unproductive activities. Within a specific geographic area, from year to year, changes in total

[4] A list of the specific subcomponents of each of these areas can be found in Karabegovic and McMahon (2005), which is available online at: http://www.freetheworld.com/.

productive entrepreneurship, Baumol argues, are largely caused by changes in institutional structures, rather than changes in the population's underlying propensity to be entrepreneurial. When comparing different geographic areas, however, there are other factors that may influence the total supply of entrepreneurs. This is why in the subsequent empirical work other control variables are included, and is also why the main test is performed using a newly created index that measures these two activities as relative proportions.

To appreciate Baumol's contribution to economic growth theory requires understanding the difference between positive-sum, zero-sum, and negative-sum economic activities. Activities are positive-sum when net gains are created. Private market activities are positive-sum because both parties gain in voluntary transactions. Government actions that transfer wealth, regulate, subsidize, or protect industry from competition are instead zero-sum. One party's gain (e.g., the subsidy) is offset exactly by another party's loss (e.g., the taxes). However, the fact that it requires an investment of resources into lobbying to secure the zero-sum transfer means that the overall impact on the economy is negative-sum. Magnifying this is the fact that others will devote resources to political lobbying on the other, defensive, side as well. The resources devoted toward securing (and fighting against) zero-sum political transfers have an opportunity cost—in essence we have more lobbying firms and fewer DVD manufacturers.[5] Unproductive entrepreneurship is unproductive precisely because it uses up resources in the process of capturing zero-sum transfers, and these resources had alternative, productive uses.

The remainder of this paper is devoted toward using different measures of both productive and unproductive entrepreneurship and seeing whether they indeed relate, as Baumol's theory would predict, to the level of institutional quality as measured by the index of economic freedom.

5. Institutional quality and the levels of productive and unproductive entrepreneurship

One of the issues to overcome in testing Baumol's theory is that all three of the required variables are truly unobserved. This necessitates the use of proxies or indices, and my hope is to present enough alternatives to show that the results are not sensitive to any single measure. I examine cross-sectional data from the continental 48 U.S. States. Measures, particularly those of the unproductive entrepreneurship, simply are not consistently available internationally to examine this part of the hypothesis using international data.

As measures of productive entrepreneurship I use venture capital investments per capita, patents per capita, the growth rate of self-employment activity, the establishment birth rate (all new firms), and the large-establishment birth rate (new firms with 500 or more employees). All variables, their precise definitions, years, sources, and descriptive statistics are provided in Appendix A. In each case a multi-year average (generally centered around the year 2000) is used to lessen the potential that a particularly good or bad single year is used. These measures attempt to span the spectrum of what could be considered productive entrepreneurship, from small lifestyle entrepreneurs to gazelle firms, and within-firm innovation.

For measures of unproductive entrepreneurship, I use three measures developed in Sobel and Garrett (2002) of the number of political and lobbying organizations in each state's capital. In addition, a measure of unproductive entrepreneurship through legal channels/lawsuits is examined. This measure is derived from the well-regarded 'Harris Poll' index of legal and liability system quality and fairness.[6] States scoring poorly on this index generally have significant legal fraud and abuse, particularly in the areas of class-action, medical malpractice, and workers compensation lawsuits.[7] Because this index measures judicial quality, I invert the index score to arrive at the measure of unproductive legal entrepreneurship.[8]

[5] This notion is the seminal insight of political economist Gordon Tullock in his theory of rent seeking published in 1967 (Tullock, 1967). For additional information and background on the economic literature on rent seeking see Tollison (1982) and McChesney (1987).

[6] This index, a cooperative effort of the Institute for Legal Reform, the Harris Poll, and the U.S. Chamber of Commerce ranks the 50 states based on how fair their court systems are perceived to be, particularly with regard to liability system abuse. The study is based on a survey of over 1400 practicing attorneys and general counsels who answered a comprehensive battery of questions.

[7] Many of these poorly-scoring states are that way because of their unusual method of electing state supreme court judges by partisan elections (see Sobel and Hall, 2007). Candidates for the court in these few states often run on clearly biased political platforms, for example Democrats promising voters they will use their position to side with workers over large corporate businesses in rulings.

[8] The scale of the index is 0 to 100, so it is inverted by subtracting it from 100 to arrive at the new score (e.g., so a 25 becomes a 75, a 99 becomes a 1, etc.).

Table 1
Institutional quality and productive entrepreneurship: regression results

	Dependent variable				
Independent variable	Venture capital investment per capita	Patents per capita	Sole proprietor- ship growth rate	Total establishment birth rate	Large firm establishment birth rate
Constant	−836.182 (1.124)	−64.462 (0.382)	86.924 (1.327)	64.003*** (2.782)	46.180*** (3.076)
Institutional quality	32.127** (2.041)	8.178** (2.348)	4.206** (2.999)	0.838* (1.823)	0.873*** (2.717)
Median age	−1.251 (0.298)	−0.398 (0.425)	−0.266 (0.712)	−0.320 (2.653)	−0.146* (1.713)
Population density	−0.0125 (0.308)	0.0201** (2.268)	−0.0003 (0.089)	0.0012 (0.998)	0.0030*** (3.688)
Percent college degree	11.908*** (6.024)	1.246*** (2.896)	−0.252 (1.443)	0.009 (0.145)	0.042 (1.048)
Percent male	8.836 (0.621)	0.222 (0.069)	−1.741 (1.376)	−0.928** (2.079)	−0.736 (2.538)
Observations	48	48	48	48	48
R-squared	0.875	0.659	0.347	0.504	0.571

Notes: Absolute *t*-statistics in parentheses; asterisks indicate significance as follows: ***=1%, **=5%, *=10%. All regressions were checked to ensure outliers were not driving the results, and that there were no problems with multicollinearity. In the regressions in which there were statistically significant outliers, robust regression techniques were employed to obtain unbiased coefficient estimates. I follow Barnett and Lewis (1995) outlier identification techniques using both the T_n and Dixon's Q test statistics. Statistical significance was found in three of the regressions in Table 1 and none of the regressio4ns in Table 2. Rather than excluding these observations, they are 'dummied out' in the list of independent variables for that equation only. They were all fairly obvious cases: CA (Silicon Valley) and MA (Boston), the two major 'home' VC markets, in the venture capital equation; CA (Silicon Valley) and ID (Boise, home of DRAM patent giant Micron Technology) in the patent equation; and the two least populated rural states, MT and WV, in the total establishment birth rate equation (likely a relic introduced through including the population density variable). The corresponding coefficients on these dummy variables (and absolute *t*-ratios) were respectively: 382.9 (7.935), 426.8 (8.347), 18.07 (1.694), 55.08 (5.115), 2.10 (1.875), and 1.62 (1.126). In each of these three cases, effectively, the remaining 46 states are used to fit the equation, similar to the results that would be produced by a least median squares estimation technique.

First I examine the relationship between the level of productive entrepreneurship in each state and the state's institutional quality score from Karabegovic and McMahon (2005). Ordinary least squares regressions are performed for each measure of productive entrepreneurship. In addition to including institutional quality, I also include several control variables. It is important not to include any variables that could potentially be endogenous, or are simply alternative measures of the same phenomenon (e.g., state income would be one that is rejected for both reasons). Thus, I use only a selection of geographic and demographic controls such as median age, population density, percent of the population that is male, and the percent of the population with a college degree. However, additional variables and measures will be explored later for robustness checking.

Table 1 presents the results of the regressions. Institutional quality is found to be of the correct sign, and statistically significant at a 5% level in two of the specifications, and at 1% in the other two. The estimated coefficients for institutional quality are also economically significant. The coefficient may be interpreted as the difference in entrepreneurial activity associated with a one unit difference in the state's institutional quality score. Given the within-sample range of this index, a one unit difference would be roughly equivalent to comparing the 35th ranked state's level of entrepreneurial activity with the 15th ranked state.

The state with a one unit higher institutional quality score is predicted to have $32 larger per capita venture capital investments, which relative to the cross-state average of $82, converts roughly into a 39% higher level of venture capital investments.[9] A one unit higher institutional quality score is associated with 8.2 additional patents for every 100,000 residents, or 36.6% higher level of patent activity. A state with a one unit higher score also has roughly a 4.2 percentage point higher rate of growth in self-employment activity (note this is a cumulative 5 year growth rate), a difference that would reflect typical growth rates of 15% compared to 11%. Establishment birth rates (both total and large) are higher by about 0.8 percentage points, a difference of about 7 to 8%.

[9] Percentage changes are calculated based on the within sample mean for the variable of interest.

Table 2
Institutional quality and unproductive entrepreneurship: regression results

	Dependent variable			
Independent variable	Unproductive political entrepreneurship (lobbying orgs. per capita measure 1)	Unproductive political entrepreneurship (lobbying orgs. per capita measure 2)	Unproductive political entrepreneurship (lobbying orgs. per capita measure 3)	Unproductive legal entrepreneurship (100 minus Harris judicial index)
Constant	72.493** (2.127)	229.125* (1.797)	553.552* (1.786)	−44.020 (0.388)
Institutional quality	−1.718** (2.460)	−6.362** (2.435)	−13.898** (2.189)	−6.177** (2.544)
Median age	0.700 (0.359)	−0.309 (0.423)	−1.226 (0.691)	−1.236* (1.913)
Population Density	0.136 (0.721)	0.559 (0.792)	0.277 (1.611)	0.0031 (0.505)
Percent college degree	−0.876 (0.957)	−0.139 (0.406)	−0.291 (0.350)	−0.912*** (3.010)
Percent male	−1.165* (1.750)	−3.207 (1.288)	−7.698 (1.272)	3.795* (1.732)
Observations	48	48	48	48
R-squared	0.183	0.152	0.168	0.424

Notes: Absolute *t*-statistics in parentheses; asterisks indicate significance as follows: ***=1%, **=5%, *=10%. All regressions were checked to ensure outliers were not driving the results, and that there were no problems with multicollinearity. None of the regressions in this table required robust regression techniques, as Barnett and Lewis (1995) T_n and Dixon's Q outlier identification tests did not show any statistically significant results for any of these regression equations.

The evidence presented in Table 1 uniformly supports the first part of Baumol's hypothesis—that better institutional quality results in a higher level of productive entrepreneurial activity. The second part of Baumol's theory would suggest that due to the nature-imposed constraint of scarcity, these additional resources flowing toward productive entrepreneurship should also be reflected in a negative relationship between institutional quality and measures of unproductive entrepreneurship. Table 2 presents similar regressions as in Table 1, but here the dependent variables are the measures of unproductive entrepreneurship.

Again the measure of institutional quality is uniformly significant, both statistically and economically, and with the expected sign. A state with a one unit higher score on institutional quality would have fewer measured political interest group organizations (by 1.7, 6.4, and 13.9 per 1,000,000 residents depending on the measure). While these numbers may differ, they convert to roughly equal predictions of the percentage reduction in unproductive entrepreneurial activity of 67, 60, and 56% respectively. Examining the measure of unproductive legal entrepreneurship, the coefficient would suggest that unproductive entrepreneurship is lower by 6.2 units on the legal index, or around 11%, in a state with a one unit higher institutional quality score.

5.1. Robustness checks

Several techniques were employed to check for the robustness of these estimates. Specifications were run including additional variables, such as the percent voting republican among the population, and using lagged values for institutional quality to check for potential problems of endogeneity. In all specifications, the results remained robust to these changes, and the full estimates from these models are included as Appendix B. The only noteworthy result is that the percent voting republican was sometimes negatively associated with productive entrepreneurship and positively associated with unproductive entrepreneurship.

As an additional check of robustness, Spearman's rank correlation tests were run among all variables in Tables 1 and 2 with the institutional quality score. This is worthwhile because of the non-continuous nature of the institutional quality score. The results of the rank tests universally supported the findings in Tables 1 and 2. When converted to rankings, however, the measures of unproductive entrepreneurship seemed more subject to outlier issues, although because this is a simple two-variable correlation, there are no additional control variables to help explain outlier observations. The full results from these rank correlation tests are presented in Appendix C.

Thus, the data support both predictions of Baumol's theory. Institutional quality is found to be highly correlated with all of the measures and proxies for both the amounts of productive and unproductive entrepreneurship. However, it is

Table 3
State productive and unproductive entrepreneurship scores

Rank	State	Net entrepreneurial productivity (NEP) score ($e_p - e_u$): (scale −47 to +47)	(e_p) Productive entrepreneurship score (Borda Count avg. points: scale 1–48)	(e_u) Unproductive entrepreneurship score (Borda Count avg. points: scale 1–48)	Institutional quality score (scale 1–10)
1	Delaware	+31.95	41.20	9.25	7.8
2	Washington	+25.70	30.20	4.50	6.2
3	New York	+22.90	33.40	10.50	6.4
4	Nevada	+22.70	33.20	10.50	7.3
5	Florida	+22.25	33.00	10.75	6.7
6	California	+19.80	37.80	18.00	6.7
7	Oregon	+14.80	32.80	18.00	6.7
8	Illinois	+14.45	28.20	13.75	6.9
9	Texas	+13.90	35.40	21.50	7.2
10	Virginia	+12.90	25.40	12.50	6.8
11	New Jersey	+12.50	30.00	17.50	6.7
12	Michigan	+12.30	19.80	7.50	6.5
13	Maryland	+11.85	28.60	16.75	6.3
14	Colorado	+11.25	43.00	31.75	7.6
15	North Carolina	+10.80	27.80	17.00	7.1
16	Utah	+9.25	40.00	30.75	7.0
17	Missouri	+9.20	22.20	13.00	6.8
18	Georgia	+8.40	34.40	26.00	7.3
19	Arizona	+6.35	38.60	32.25	7.1
20	Pennsylvania	+4.10	18.60	14.50	6.7
21	New Hampshire	+3.20	31.20	28.00	7.3
22	New Mexico	+1.35	23.60	22.25	6.2
23	Massachusetts	+1.30	33.80	32.50	7.1
24	Minnesota	−0.15	25.60	25.75	6.8
25	Alabama	−0.20	19.80	20.00	6.8
26	Ohio	−0.40	16.60	17.00	6.5
27	Kentucky	−1.35	13.40	14.75	6.5
28	Kansas	−1.80	15.20	17.00	6.8
29	South Dakota	−2.00	10.00	12.00	7.3
30	Idaho	−3.25	33.00	36.25	6.6
31	Connecticut	−3.70	27.80	31.50	7.1
32	Tennessee	−3.90	22.60	26.50	7.2
33	South Carolina	−7.05	19.20	26.25	6.9
34	Indiana	−8.10	14.40	22.50	7.0
35	Vermont	−9.05	11.20	20.25	6.3
36	Wisconsin	−10.30	13.20	23.50	6.5
37	Wyoming	−11.55	14.20	25.75	6.9
38	Mississippi	−11.95	17.80	29.75	6.2
39	Louisiana	−12.80	19.20	32.00	7.2
40	Maine	−14.55	18.20	32.75	5.9
41	Nebraska	−16.60	11.40	28.00	6.8
42	Iowa	−18.40	9.60	28.00	6.5
43	Arkansas	−22.90	13.60	36.50	6.2
44	Rhode Island	−23.10	20.40	43.50	6.1
45	Montana	−24.85	18.40	43.25	5.7
46	Oklahoma	−25.85	14.40	40.25	6.4
47	West Virginia	−29.60	7.40	37.00	5.4
48	North Dakota	−36.05	3.20	39.25	6.2

important to note that both in Baumol's theory and in the Karabegovic and McMahon institutional quality index, institutional quality has a very specific meaning. It reflects the extent to which states have secure private property rights, a fair and balanced judicial system, contract enforcement, small government sectors, and effective limits on

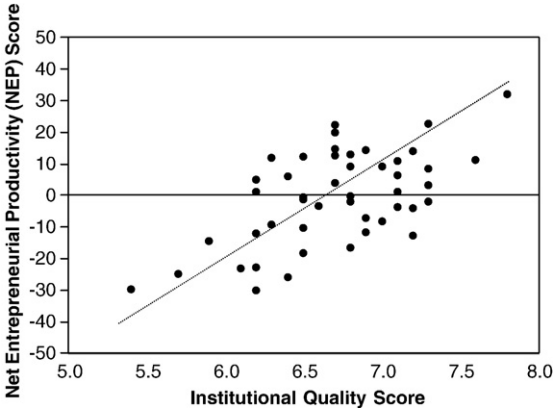

Fig. 2. Institutional quality and the productivity of entrepreneurship.

government's ability to transfer wealth through taxation and regulation. These are precisely the institutional structures that lower the relative reward to unproductive entrepreneurship.

6. Income and the level of productive and unproductive entrepreneurship

While the previous section examined both productive and unproductive entrepreneurship separately, this section calculates an index of *net* entrepreneurial productivity across U.S. states. This index will then be examined to see how closely it correlates with both institutional quality and with measures of state income.

Because the scales of the five measures of productive entrepreneurship and of the four measures of unproductive entrepreneurship vary considerably, they cannot simply be averaged or summed. In order to compute a single index number we must employ an index classification system, such as the Borda Count, that normalizes all variables over the same range, and weights them equally. Table 3 presents these index measures for both the level of productive entrepreneurial activity (column 2) and the level of unproductive entrepreneurial activity (column 3).[10] Column 1 of the table presents Baumol's overall net entrepreneurial productivity (NEP) score that, recall from earlier, is given by: $NEP = e_p - e_u$. A positive NEP score ($NEP > 0$) means the state has relatively more productive than unproductive entrepreneurship, while a NEP score of zero reflects roughly equal proportions of the two. A negative NEP score means the state has relatively more unproductive entrepreneurship than productive entrepreneurship.

Table 3 presents states ranked by their level of net entrepreneurial productivity. The first column shows the state's NEP score, and the second and third columns show the underlying e_p and e_u subcomponent scores. Each state's institutional quality score is presented for comparison in the final column. First, it is worthwhile to note that the states ranked as having the top five NEP scores are: Delaware, Washington, New York, Nevada, and Florida. These five states have the most productive entrepreneurship in comparison with their levels of unproductive entrepreneurship. The five states ranking the lowest were North Dakota, West Virginia, Oklahoma, Montana, and Rhode Island. These states have the highest levels of unproductive entrepreneurship relative to their levels of productive entrepreneurship. Even from the raw data presented in the table, a clear correlation with institutional quality is present. Delaware, the state with the best institutional quality score, also tops the list of having the highest level of net entrepreneurial productivity. West Virginia, the state with the worst institutional quality score, ranks 47th out of 48 in net entrepreneurial productivity. Fig. 2 shows the high correlation between the NEP and institutional quality scores.

[10] With 48 states in the sample, the range of the computed index for both e_p and e_u is from one to 48. Because $NEP = e_p - e_u$, its range is from −47 to +47. The Borda Count sorts each variable from smallest to largest. One point is given to the state with the smallest value, two points to the state with the second smallest value, and so forth, until the state with the largest value is given 48 points. An average Borda score is found across the five productive entrepreneurship measures to arrive at e_p and an average Borda score is found across the four unproductive entrepreneurship measures to arrive at e_u. The net entrepreneurial productivity (NEP) is computed as: $NEP = e_p - e_u$.

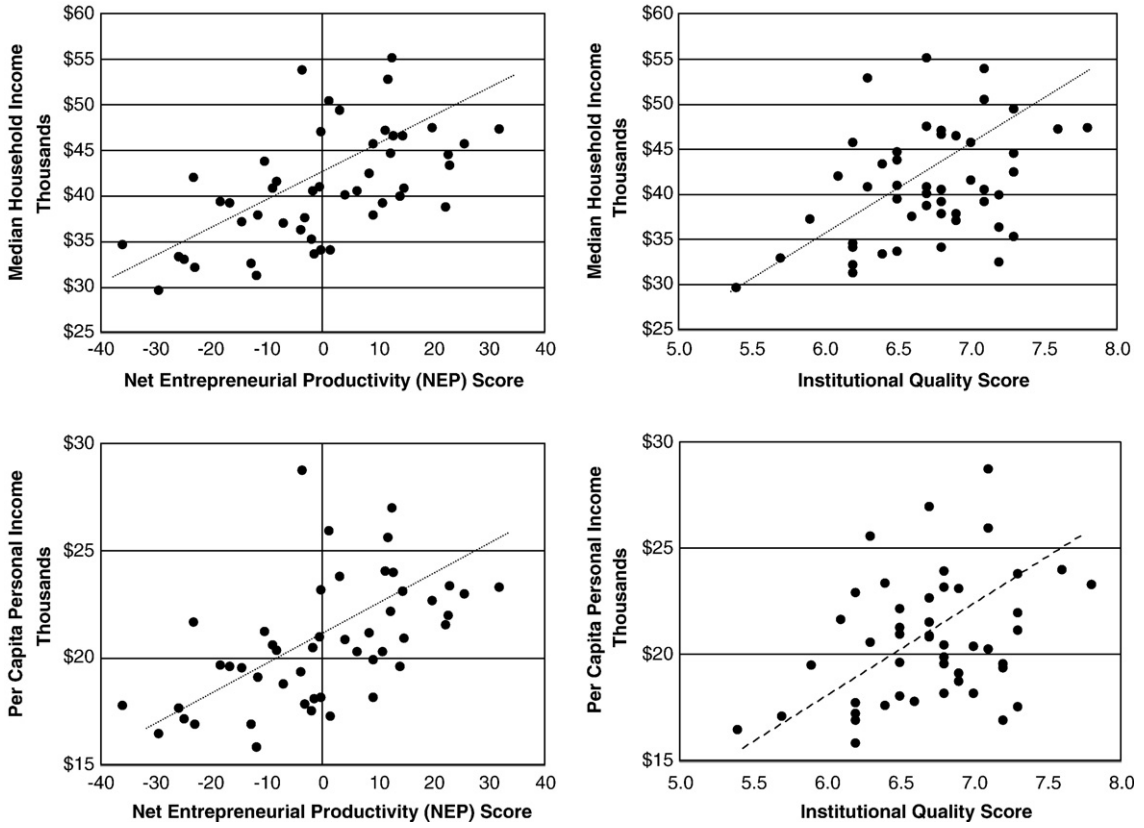

Fig. 3. State income, institutional quality, and net entrepreneurial productivity.

As is clear in Fig. 2, states with better institutional quality tend to have higher levels of net entrepreneurial productivity. This is perhaps the most direct test of Baumol's theory yet, as it simultaneously looks at the relative amounts of productive and unproductive entrepreneurship as compared to institutional quality, rather than examining the two separately. A simple regression line, illustrated in Fig. 2, confirms the statistical relation is highly significant. The slope coefficient has a t-ratio of 4.112, which is significant at the 1% level, and the *R*-squared is 0.27. A Spearman's rank correlation test confirms a 1% significance level of this correlation even when only using the ranks of the two variables.[11] States with better institutional quality clearly have entrepreneurial efforts channeled relatively more toward productive entrepreneurship.

The four panels in Fig. 3 show how both the net entrepreneurial productivity and institutional quality scores relate to two different measures of state income, median household income and average per capita personal income. In the figures, both appear to be highly correlated with either measure of economic well-being in the state, but simple regressions suggest that net entrepreneurial productivity is a much closer correlate than institutional quality. The slope coefficients in all four regressions are significant at the 1% level.[12] However, the *R*-squares from the regressions using net entrepreneurial productivity to predict income are 0.34 (median household) and 0.30 (per capita personal) relative to 0.16 and 0.12 *R*-squares when using institutional quality to predict income. Thus, even though the net entrepreneurial productivity score I calculate is based on methodologically simplifying assumptions and averages, it is more closely related to the level of state income

[11] Appendix B contains the results of the Spearman's rank correlation tests for all of the variables in this paper.

[12] Letting (D) indicate the dependent variable, and (I) the independent variable, the respective slope coefficients, with absolute t-ratios in parenthesis, are: (D) Median Household Income and (I) Institutional Quality: 5137.888 (2.959), (D) Median Household Income and (I) NEP Score: 229.899 (4.871), (D) Per Capita Personal Income and (I) Institutional Quality: 2060.659 (2.471), (D) Per Capita Personal Income and (I) NEP Score: 101.846 (4.484).

Table 4
Reforms that increase the reward to productive (market) entrepreneurship relative to unproductive (political and legal) entrepreneurship

Specific policy reforms that increase the reward to productive entrepreneurship and/or decrease the reward to unproductive entrepreneurship in a state
Reducing or eliminating state personal and corporate income taxes
Reducing or eliminating state turnover or business and occupation taxes
Workers compensation reform (privatization, damage caps, rule enforcement)
Medical malpractice reform (privatization, damage caps, rule enforcement)
Judicial reform (eliminating partisan elections for state courts, liability limits)
Eliminating state minimum and maximum price and wage limits and restrictions
Reducing occupational licensing restrictions (and enacting right-to-work laws)
Constitutional limits on eminent domain and environmental property takings
Reducing government ownership of productive resources (e.g., land holdings)
Broad reductions in government employment, expenditures, and levels of taxation
Broadly applied, simplified tax codes that reduce the ability of groups to lobby for specific exemptions, credits, and rate reductions
Reduce the returns to lobbying by eliminating state 'budget digests' and other forms of pork-barrel legislation that use state money to fund local pet projects
Increased use of market-based reforms such as medical savings accounts, school vouchers,[1] and privatized retirement funds

Notes: [1]For evidence that school choice reforms increase youth entrepreneurship, see Sobel and King (in press).

than is the measure of institutional quality. The method by which the score is constructed might seem somewhat simplifying, but it passes the test of predictive validity in the state income data. The Spearman's rank correlation tests provided in Appendix B, also show that the correlation among the rankings of these two measures of income and the rankings of states on the net entrepreneurial productivity index is greater than it is for the institutional quality measure.

In conjunction with the finding from Fig. 2 that institutional quality is highly correlated with net entrepreneurial productivity, these results would seem to confirm my hypothesis that institutional quality creates wealth primarily because it promotes productive entrepreneurship, which in turn creates wealth and income. This finding explains why researchers have found separately that both institutional quality and entrepreneurship each largely explain the different growth paths of economies. They both do explain it, but the causal link flows from institutions through entrepreneurship to wealth.

To grow richer, states and nations need more productive entrepreneurship and less unproductive entrepreneurship. The specific reforms necessary are those that: (a) increase the relative reward to productive market entrepreneurship, and/or (b) decrease the relative reward to unproductive political and legal entrepreneurship. Repealing state income taxes would be one way to accomplish (a), and it is interesting to note that 3 of the top 5, and 4 of the top 10 states in the net entrepreneurial productivity index were ones who do not have a state income tax.[13] The reward to unproductive entrepreneurship can be reduced through reforms that increase the security of private property rights, create a fairer and more balanced judicial and liability system, strengthen contract enforcement, lessen government pork-barrel spending, and more effectively limit government's ability to transfer wealth through taxation, regulation, and subsidies. Table 4 lists some specific programmatic reforms that could accomplish these goals. All of the reforms listed in the table either lower the reward to political/legal entrepreneurship or increase the reward to productive market entrepreneurship.

As one will notice by looking at the table, the real contribution of Baumol's theory, returning to the framework presented in Fig. 1 depicting the entire entrepreneurial process, is that it shifts attention toward institutional reform, and constrained government, as the way to promote entrepreneurship. This is a rather large change in thinking given the conventional wisdom in the 1990s advocated promoting entrepreneurship through enacting additional government education programs, or subsidies and interventions in venture capital markets. Given the failure of these types of government programs in practice, and the ever continuing search for new ways to promote entrepreneurship, Baumol's theory and its policy implications could potentially form the foundation of 21st century

[13] Although, as a counter example, note that Wyoming also has no state income tax and it ranks 37th, so clearly other factors are important as well.

economic development policy. After all, good institutional reforms have already allowed Ireland to increase significantly its rate of economic growth, and have allowed some of the former Soviet republics, like Estonia, to rival the success of Western economies in less than two decades after abandoning complete central planning. At the same time, states like West Virginia, whose economic freedom ranks lower than that of Estonia, have struggled economically and will continue to do so without significant institutional reform.

The policy implications of Baumol's theory are clear; rather than focusing on expanding government programs like subsidized loans, workforce education, or programs aimed at increasing 'entrepreneurial inputs' as a way to foster entrepreneurship, the better path is through institutional reform that constrains or minimizes government's role, lowering the return to unproductive entrepreneurship. Government programs too often encourage entrepreneurial individuals to devote effort toward figuring out how to obtain the transfers, rather than devoting those efforts toward satisfying consumers and creating wealth.

Appendix A. Data description and sources

Variable name (source)	Description	Mean	S.D.
Measures of productive entrepreneurship			
Venture capital investment per capita (1)	Average annual venture capital investment (from all sources) per capita (1995–2001 period)	81.56	120.04
Patents per capita (2)	Average annual number of utility patents granted (1995–2001 period) per 100,000 population	22.34	16.02
Sole proprietorship growth rate (1)	Cumulative percent change in nonfarm proprietor employment as percent of labor force (NPE), as calculated as: ((NPE2000–NPE1996)/NPE1996)*100	11.03	4.85
Total establishment birth rate (3)	Average annual number of new establishment births as % of existing firms (1999–2002 period)*100	11.54	1.68
Large firm establishment birth rate (3)	Average annual number of new 500+employee establishment births as % of existing large firms (1999–2002 period)*100	10.94	1.37
Measures of unproductive entrepreneurship			
Unproductive political entrepreneurship (lobbying measure 1) (4)	Number of establishments in SIC code 8650 (Political Orgs.) in state capital per 1,000,000 population (1995)	2.57	2.29
Unproductive political entrepreneurship (lobbying measure 2) (4)	Number of establishments in SIC codes 8650 and 8690 (Political Orgs. and Membership Orgs., n.e.c.) in state capital per 1,000,000 population (1995)	10.75	8.40
Unproductive political entrepreneurship (lobbying measure 3) (4)	Number of establishments in SIC codes 8650, 8690, and 8390 (Political Orgs., Membership Orgs., and Social Services Orgs., n.e.c.) in state capital per 1,000,000 population (1995)	24.86	20.63
Unproductive legal entrepreneurship (5)	100 minus the Harris Poll score measuring the quality of a state's liability system on a 100 point scale (2002)	57.34	8.94
Other variables used			
Median household income (6)	Median household income (2000)	40,982	6,174
Per capita personal income (6)	Per capita personal income (2000)	20,712	2,893
Institutional quality score (6)	All government economic freedom index score (1995 used for political orgs. regressions, 2001 for all others)	6.71	0.48
Median age (6)	Median age of state population (2000)	35.59	1.89
Population density (6)	Population density in state per unit of land area (2000)	185.52	254.03
Percent college degree (6)	Percent of population with a Bachelor's degree or higher (%*100 for year 2000)	23.71	4.35
Percent male (6)	Percent of population male (%*100 for year 2000)	50.90	0.67
Percent voting bush in 2004 (7)	Percent of popular vote for Bush in 2004 Presidential Election (%*100)	53.14	8.36

Sources:

1. U.S. Department of Commerce, Bureau of Economic Analysis, *State and Local Area Data*, Washington, D.C.
2. U.S. Patent and Trademark Office, *Utility Patent Counts by Country/State and Year*, Washington, D.C. (2001).
3. Office of Advocacy, U.S. Small Business Admin., from U.S. Census Bureau, Statistics of U.S. Business.
4. Sobel and Garrett (2002) and *County Business Patterns*, U.S. Census Bureau, Washington, D.C.
5. Institute for Legal Reform and U.S. Chamber of Commerce, *State Liability Systems Ranking*, Wash. D.C.
6. U.S. Department of Commerce, Census Bureau, *Census 2000*, Washington, D.C.
7. Federal Election Commission, Federal Elections 2004, Washington, DC, May 2005.

Appendix B. Institutional quality and entrepreneurship: extended regression results

	Dependent variable								
	Measures of productive entrepreneurship					Measures of unproductive entrepreneurship			
Independent variable	Venture capital investment per capita	Patents per capita	Sole proprietorship growth rate	Total establishment birth rate	Large firm establishment birth rate	Unproductive political entrepreneurship (lobbying orgs. per capita measure 1)	Unproductive political entrepreneurship (lobbying orgs. per capita measure 2)	Unproductive political entrepreneurship (lobbying orgs. per capita measure 3)	Unproductive legal entrepreneurship (100 minus Harris judicial index)
Constant	−496.621 (0.603)	160.075 (0.926)	166.855** (2.548)	79.023*** (3.171)	67.891*** (4.489)	35.372 (1.093)	87.212 (0.682)	293.653 (0.924)	177.16 (1.423)
Lagged institutional quality	22.757* (1.764)	5.807* (1.794)	3.984*** (3.130)	0.660* (1.749)	0.663** (2.254)	−2.073*** (3.573)	−6.291*** (2.746)	−14.367** (2.523)	−4.189* (1.724)
Median age	−3.173 (0.670)	−1.774* (1.801)	−0.734* (1.937)	−0.384*** (2.940)	−0.277*** (3.171)	0.241 (1.272)	0.406 (0.542)	−0.005 (0.003)	1.057 (1.462)
Population density	−0.009 (0.207)	0.018** (2.058)	−0.001 (0.329)	0.001 (1.027)	0.003*** (3.486)	0.003 (1.642)	0.011 (1.532)	0.038** (2.200)	−0.002 (0.288)
Percent college degree	12.289*** (5.339)	0.876* (1.856)	−0.373* (2.000)	−0.007 (0.096)	0.003 (0.081)	0.069 (0.737)	0.406 (1.099)	0.743 (0.808)	1.086*** (3.046)
Percent male	5.254 (0.350)	−1.971 (0.625)	−2.587** (2.120)	−1.108** (2.389)	−0.947*** (3.360)	−0.701 (1.149)	−1.612 (0.669)	−4.600 (0.768)	−4.154* (1.784)
Percent voting bush in 2004	−0.611 (0.470)	−0.716** (2.616)	−0.286*** (2.785)	−0.036 (1.005)	−0.073*** (3.059)	0.124** (2.440)	0.441** (2.200)	0.773 (1.551)	0.005 (0.024)
Observations	48	48	48	48	48	48	48	48	48
R-squared	0.869	0.684	0.423	0.498	0.615	0.355	0.253	0.234	0.382

Notes: Absolute *t*-statistics in parentheses; asterisks indicate significance as follows: ***=1%, **=5%, *=10%. All regressions identical to those in Tables 1 and 2 except lagged institutional quality (1995 replaces 2001 and 1990 replaces 1995) and percent Bush vote are included in these specifications. See notes accompanying Tables 1 and 2.

Appendix C. Spearman's rank correlation tests

Spearman rank correlation test of each variable against economic freedom ranking (except where noted in parenthesis)		Using all 50 observations		Without outliers	
		R^2	*P*-value	R^2	*P*-value
Measures of productive entrepreneurship	Venture capital investment per capita	0.1180	0.0168**	0.1146	0.0214**
	Patents per capita	0.0699	0.0693*	0.0897	0.0432**
	Sole proprietorship growth rate	0.1709	0.0035***	n/a	n/a
	Total establishment birth rate	0.0866	0.0424**	0.0810	0.0552*
	Large firm establishment birth rate	0.1746	0.0031***	n/a	n/a
Measures of unproductive entrepreneurship	Unproductive political entrepreneurship (lobbying orgs. per capita measure 1)	0.0103	0.4921	0.0700	0.0865*
	Unproductive political entrepreneurship (lobbying orgs. per capita measure 2)	0.0107	0.4849	0.0850	0.0578*
	Unproductive political entrepreneurship (lobbying orgs. per capita measure 3)	0.0095	0.5093	0.0667	0.0945*
	Unproductive legal entrepreneurship (100 minus Harris judicial index)	0.0982	0.0301**	n/a	n/a
Other measures	Net entrepreneurial productivity score	0.1452	0.0075***	n/a	n/a
	Median household income (w/EF)	0.1210	0.0154**	n/a	n/a
	Median household income (w/NEP)	0.3734	0.0000***		
	Per capita personal income (w/EF)	0.0843	0.0453**	n/a	n/a
	Per capita personal income (w/NEP)	0.3953	0.0000***		

Notes: Asterisks indicate significance as follows: ***=1%, **=5%, *=10%. Outliers excluded from regressions were: CA and MA in the venture capital equation; CA and ID in the patent equation; MT and WV in the total establishment birth rate equation, and CO, WA, MI, KY, NY in the unproductive entrepreneurship regressions. See note to Table 1 for more information on outlier detection.

References

Barnett, V., Lewis, T., 1995. Outliers in Statistical Data. John Wiley and Sons, Chichester.

Baumol, W.J., 1990. Entrepreneurship: productive, unproductive and destructive. Journal of Political Economy 98 (5), 893–921.

Baumol, W.J., 1993. Entrepreneurship, Management, and the Structure of Payoffs. MIT Press, Cambridge, MA.

Baumol, W.J., 2002. The Free-Market Innovation Machine: Analyzing the Growth Miracle of Capitalism. Princeton University Press, Princeton.

Boettke, P.J., 2001. Calculation and Coordination: Essays on Socialism and Transitional Political Economy. Routledge, New York.

Boettke, P.J., Coyne, C.J., 2003. Entrepreneurship and development: cause or consequence? Advances in Austrian Economics 6, 67–87.

Cole, J.H., 2003. The contribution of economic freedom to world economic growth, 1980–99. Cato Journal 23, 189–198 (Fall).

Coyne, C.J., Leeson, P.T., 2004. The plight of underdeveloped countries. Cato Journal 24 (3), 235–249.

Dorn, J.A., 2002. Economic development and freedom: the legacy of Peter Bauer. Cato Journal 22 (2), 355–371.

Farr, W.K., Lord, R.A., Wolfenbarger, J.L., 1998. Economic freedom, political freedom, and economic well-being: a causality analysis. Cato Journal 18 (2), 247–262.

Gwartney, J.D., Lawson, R.A., 2005. Economic Freedom of the World: 2005 Annual Report. The Fraser Institute, Vancouver.

Gwartney, J.D., Lawson, R.A., Holcombe, R.G., 1999. Economic freedom and the environment for economic growth. Journal of Institutional and Theoretical Economics 155 (4), 1–21.

Henderson, J., 2002. Building the rural economy with high-growth entrepreneurs. Federal Reserve Bank of Kansas City Economic Review 87 (3), 45–70.

Holcombe, R.G., 1998. Entrepreneurship and economic growth. The Quarterly Journal of Austrian Economics 1, 45–62 (Summer).

Karabegovic, A., McMahon, F., 2005. Economic Freedom of North America: 2005 Annual Report. The Frasier Institute, Vancouver.

Kirzner, I.M., 1973. Competition and Entrepreneurship. University of Chicago Press, Chicago.

Kirzner, I.M., 1997. Entrepreneurial discovery and the competitive market process: an Austrian approach. Journal of Economic Literature 35 (1), 60–85.

Kreft, S.F., Sobel, R.S., 2005. Public policy, entrepreneurship, and economic growth. Cato Journal 25 (3), 595–616.

McChesney, F.S., 1987. Rent extraction and rent creation in the economic theory of regulation. The Journal of Legal Studies 16, 101–118 (January).

Ovaska, T., Sobel, R.S., 2005. Entrepreneurship in post-socialist economies. Journal of Private Enterprise 21 (1), 8–28.

Powell, B., 2003. Economic freedom and growth: the case of the Celtic tiger. Cato Journal 22, 431–448 (Winter).

Reynolds, P.D., Hay, M., Camp, S.M., 1999. Global Entrepreneurship Monitor. Kauffman Center for Entrepreneurial Leadership, Kansas City.

Schumpeter, J.A., [1911] 1934. The Theory of Economic Development. Harvard University Press, Cambridge.

Schumpeter, J.A., 1942. Capitalism, Socialism, and Democracy. Harper, New York.

Sobel, R.S., 2008. Entrepreneurship. In: Henderson, D.R. (Ed.), The Concise Encyclopedia of Economics. Liberty Fund, Indianapolis.

Sobel, R.S., Garrett, T.A., 2002. On the measurement of rent seeking and its social opportunity cost. Public Choice 112, 115–136 (July).

Sobel, R.S., King, K.A., in press. Does school choice increase the rate of youth entrepreneurship? Economics of Education Review.

Sobel, R.S., Hall, J.C., 2007. The effect of judicial selection processes on judicial quality: the role of partisan politics. Cato Journal 27, 69–82 (Winter).

Tollison, R.D., 1982. Rent seeking: a survey. Kyklos 35, 575–602.

Tullock, G., 1967. The welfare cost of tariffs, monopolies, and theft. Western Economic Journal 5, 224–232 (June).

Zacharakis, A.L., Bygrave, W.D., Shepherd, D.A., 2000. Global Entrepreneurship Monitor: National Entrepreneurship Assessment: United States of America. Kauffman Center for Entrepreneurial Leadership, Kansas City.