Economic Freedom, Entrepreneurship, & Income Levels: Some US State-Level Empirics

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ABSTRACT

Recent literatures on entrepreneurship and economic growth estimate the empirical relationships between the following pairs of variables: (1) institutions and entrepreneurial activity; (2) institutions and economic growth; and (3) entrepreneurship and economic growth. This paper revisits each of these relationships using US state-level real GDP per capita, the Economic Freedom of North America index, and the state-level productive and unproductive entrepreneurship scores provided by Sobel (2008). We examine whether productive (unproductive) entrepreneurial activity is associated with higher (lower) levels or growth rates of income. Additionally, we aim to "connect the dots" by asking whether higher institutional quality (i.e., greater economic freedom) affects income primarily through its effects on entrepreneurial activity. We argue that, if this is true, economic freedom should be a good instrument for entrepreneurship in an income regression.

Keywords: productive entrepreneurship, unproductive entrepreneurship, rent-seeking, economic growth, US states, institutional quality

JEL Code: O10, O18, O40, O51, R11, L26

Introduction

The role of the entrepreneur in driving economic growth has long been thought critical, though the precise nature of that role has been the subject of much debate. Frank Knight (1921) conceived of the entrepreneur as a business owner and residual claimant whose bearing of risk encourages productive factors into novel endeavors while Joseph Schumpeter (1934 & 1942) viewed entrepreneurs as innovators who create new goods (or processes to produce existing goods) and open new markets. Alternatively, Israel Kirzner (1973 & 1979) stressed a characteristic alertness that allows entrepreneurs to identify and exploit novel profit opportunities.

Regardless of which characteristic warrants greater emphasis, each is undoubtedly descriptive of behavior we would empirically identify as entrepreneurial. Also, each can be discussed in terms of William Baumol's (1990) distinction between productive versus unproductive entrepreneurship. Whether we are considering an individual who is particularly willing to bear risk, particularly creative, or particularly alert to opportunities for gain, he or she will respond to the incentives defined by the institutional framework in which they operate. If the profitable risks, innovations, and opportunities are to be found in positive sum, wealth-generating activities, then entrepreneurship will contribute to higher incomes. If, however, those risks, innovations, and opportunities are associated with zero- or negative-sum rent-seeking, then the very same entrepreneurs can become drags or drains on an economy.

A number of recent studies have empirically explored the link between institutions and productive entrepreneurial activity. An index of economic freedom is often employed as a proxy for institutional quality based on the prior that an environment of smaller government and stronger property rights decreases the opportunities for rent-seeking and increases the profits available through productive activities. Hall and Sobel (2008) establish a positive link between the Economic Freedom of

North America (EFNA) index (Karabegovic and McMahon's (2005)) and the Kauffman Foundation's measure of entrepreneurial activity. Sobel et al. (2007) and Bjørnskov and Foss (2008) both establish a similar link using cross-country data from the Kauffman Foundation's Global Entrepreneurship Monitor (GEM). Nyström (2008) reports similar results for OECD countries using panel data.

The Kauffman measures, by construction, only attempt to measure productive entrepreneurial activity. For the US, Sobel and Garret (2002) propose measures of unproductive entrepreneurial activity and, based on these, Sobel (2008) constructs US state-level scores for both productive and unproductive entrepreneurial activities. He finds that they are, respectively, positively and negatively related to the EFNA state-level scores.

While the above-mentioned research concerns the link between institutions and entrepreneurship, numerous other studies (e.g., Farr et al. (1998), Gwartney et al. (1999), Heckelman and Stroup (2000), Cole (2003), and Powell (2003)) establish empirical links between institutions and economic growth. Furthermore, numerous studies also document an empirical link between entrepreneurship itself and economic growth (e.g., Zacharakis et al (2000), Ovaska and Sobel (2005), Berkowitz and DeJong (2005), Wong et al. (2005), and Valliere and Peterson (2009)). A reasonable interpretation of existing studies, taken together, is one where an institutional backdrop of economic freedom channels entrepreneurial spirits more towards productive activities; this in turn leads to increases in measures of economic well-being.

This paper revisits the issues described above using US state-level data on real GDP per capita, the state-level EFNA, and the Sobel (2008) entrepreneurial scores. In doing so, we make a number of contributions. First, we establish that entrepreneurial activity is strongly linked to income levels but not growth rates in the US. This is an interesting finding because it suggests which type of entrepreneurial activities the Sobel scores are best providing a proxy for. If, for example, entrepreneurial activities are

predominantly Schumpetarian (innovative; disruptive to the existing equilibrium) then endogenous growth theory suggests that they will be related to the rate of long-run economic growth (e.g., Segerstrom et al. (1990), Grossman and Helpman (1991) and Aghion and Howitt (1992)). Alternatively, if Kirznerian entrepreneurial activities are predominant, entrepreneurship is more likely related to income levels. This is because Kirzenrian entrepreneurs are alert to arbitrage opportunities and, in exploiting them, move markets towards their (predetermined) equilibria.

Second, we estimate separate effects of productive and unproductive entrepreneurship on per capita income levels. Third, we attempt to "connect the dots" provided by the existing literature and demonstrate that, in the US, entrepreneurial activity is the primary channel through which economic freedom leads to higher income levels.

This last contribution we find particularly interesting. Institutions are themselves not productive activities. Rather, they provide the incentives to which agents organize their productive activities. Without knowing which activities are modified, the estimated contribution of economic freedom to income levels is largely a measure of our ignorance and we are left the task opening the black box. Does economic freedom result in decreased efforts to defend against theft and expropriation? Does it increase supplies of productive inputs (labor and capital) generally? Or does economic freedom create incentives amenable to more productive – and less unproductive – entrepreneurial activities? All of the above are plausible and each may be true to a greater or lesser extent.

Hall et al. (2010) is an analysis that comes closest to addressing the above questions. They develop a growth model with capital (physical and human) that yields output only in relation to the quality of institutions. Based on data from 96 countries and using a "risk of appropriation" measure as a proxy for institutions, they find that "in countries with strong institutions, increases in human and physical capital have a larger effect on economic growth rates than in countries with bad institutions"

(p. 396). They attribute this finding to the fact that, where institutions are weak, "additions to the capital stock tend to be employed in rent-seeking" (p. 385) while, at some threshold of higher institutional quality, "the rewards to positive-sum activities begin to outweigh the rewards to zero- and negative-sum activities" (p. 389). This interpretation, though plausible, is not directly discernible from their results. Weak institutions may make capital less productive to the extent that more of it is allocated to avoiding expropriation of resources. Also, weak institutions may simply lead to the misallocation of resources generally (rather than specifically in the form of rent-seeking).

We attempt here to more formally evaluate the relative importance of an entrepreneurship channel for a specific measure of institutional quality (the EFNA). Our attempt is based on the following claim: if entrepreneurial activity is the primary channel through which institutions affect per capita incomes, then an index of economic freedom should be a strong and valid instrument for measures of productive and unproductive entrepreneurship. Instrument weakness and validity are both testable null hypotheses. The endogeneity of entrepreneurial activities has not been addressed in the previous studies by Sobel et al. (2007), Bjørnskov and Foss (2008), and Hall and Sobel (2008). Furthermore, in attempting to address the endogeneity problems, our identification strategy is chosen to explore one mechanism that may underlie the positive relationship between economic freedom and income detailed by Farr et al. (1998), Gwartney et al. (1999), Heckelman and Stroup (2000), Cole (2003), and Powell (2003).

The remainder of this paper is organized as follows: section 2 outlines the data and provides a cursory look at the relationships between our variables of interest. In section 3 we provide two models used to test the relationships between both state income levels and growth rates against state-level entrepreneurial activity. Results are provided in the same section. In section 4, we turn our attention to

the link between economic freedom and net entrepreneurship. Here, we explore entrepreneurial activity as a channel through which institutions operate. Section 5 concludes our analysis.

Income Levels, Entrepreneurship, and Economic Freedom

We begin by presenting some very basic looks at the US state-level data on income and entrepreneurship that motivate our study. Real per capita income levels will be based on GDP per capita from the US Bureau of Economic Analysis (BEA) that is deflated using the GDP deflator (2005=100). Entrepreneurship scores for each state are drawn from Sobel (2008).

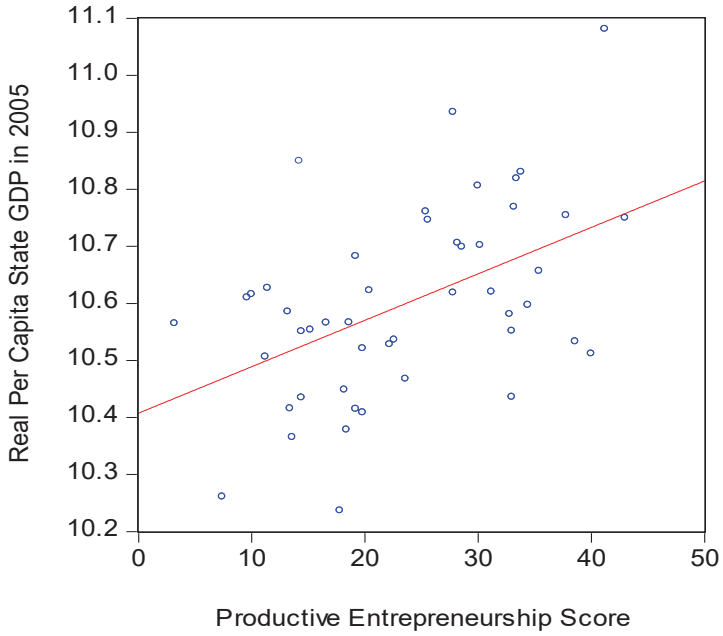
In Sobel (2008), productive entrepreneurship scores are based on per capita venture capital investments, patents per capita, the self-proprietorship growth rate, and establishment birth rates, and large (500 employees or more) establishment birth rates. Unproductive entrepreneurship scores are based on per capita lobbying establishments and (100 minus) an index of liability system quality. Net entrepreneurial activity is the difference between the productive and unproductive scores. The various data come from the years 1995 through 2002 and entrepreneurship scores are averages generally centered on the year 2000. For both productive and unproductive scores, the constituent state-level variables are ranked from 1 through 48 (representing the contiguous US states) from smallest to largest. A state's score is then the average of rankings across the constituent variables.

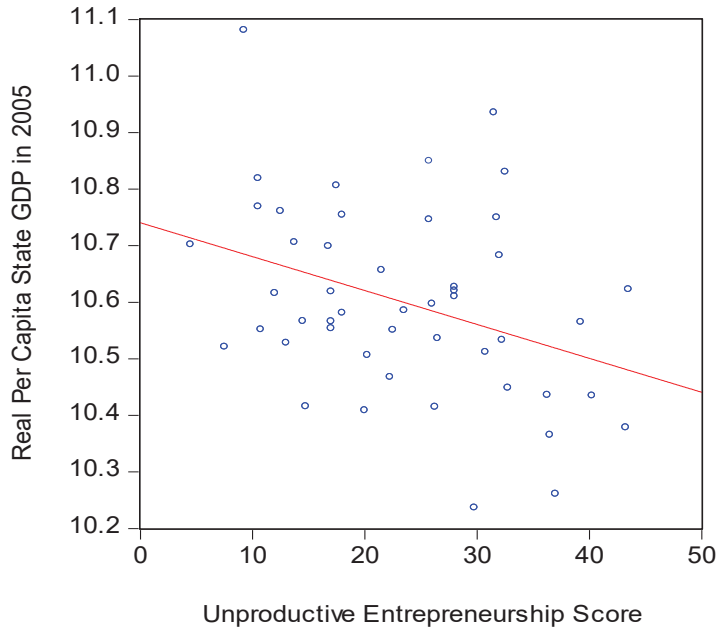
Figure 1 contains scatters of 2005 (log) real per capita income levels and the Sobel (2008) productive, unproductive, and net entrepreneurship scores. Positive and net entrepreneurship scores are both positively correlated with income levels (0.485 and 0.538, respectively). Unproductive entrepreneurship scores are negatively correlated (-0.359). These correlations are consistent with our priors. However, when we look at income growth rather than levels what we find is surprising. As demonstrated in figure 2, both productive and unproductive entrepreneurship scores are positively correlated with per capita income growth from 1990 to 2005. Furthermore, because the correlation is

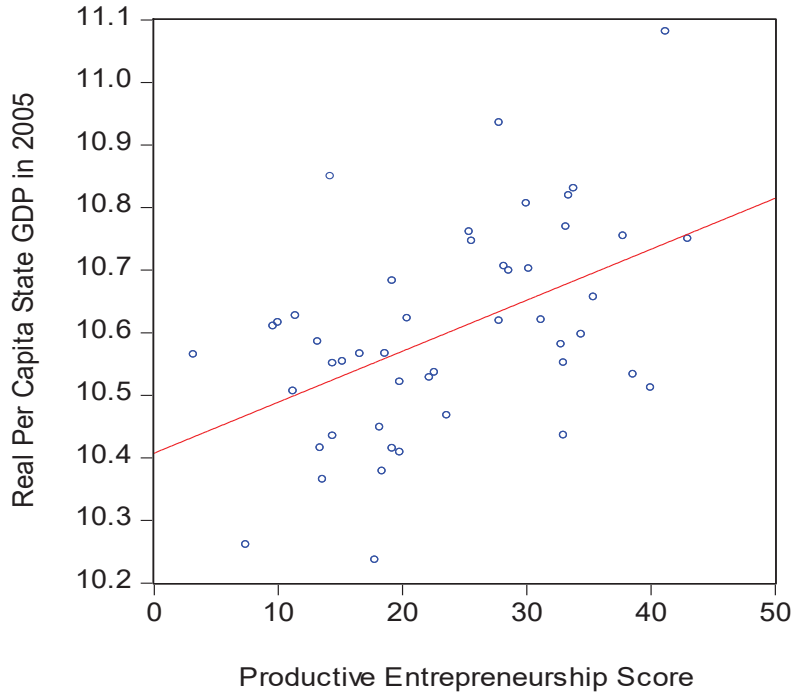
larger for the unproductive score (0.126 versus 0.043), income growth is negatively correlated with net entrepreneurial activity

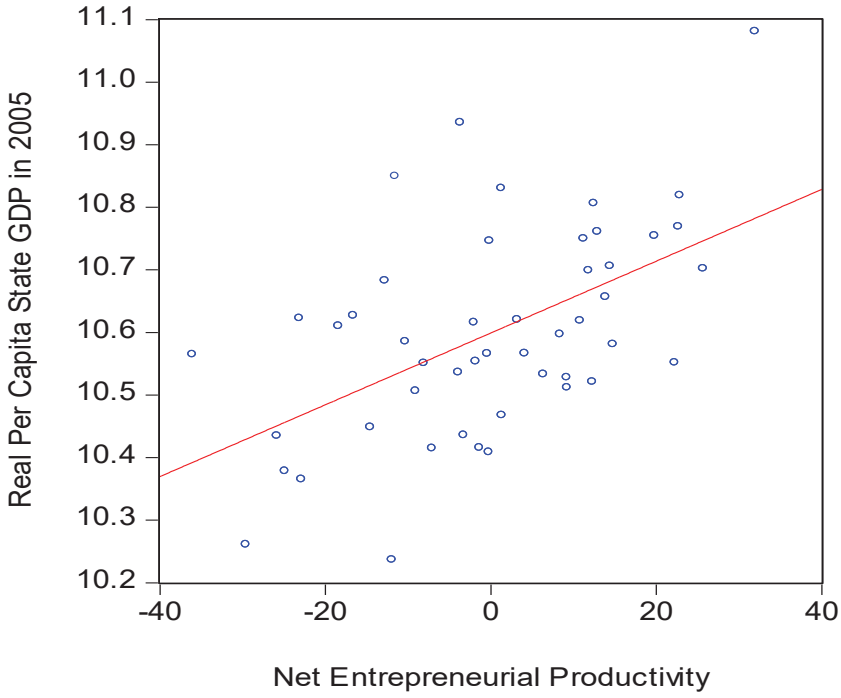
(-0.056). All of these correlations are small in absolute value.

Figure 1. Relationships between Per Capita Income and Entrepreneurship Scores with OLS Regression Lines Included



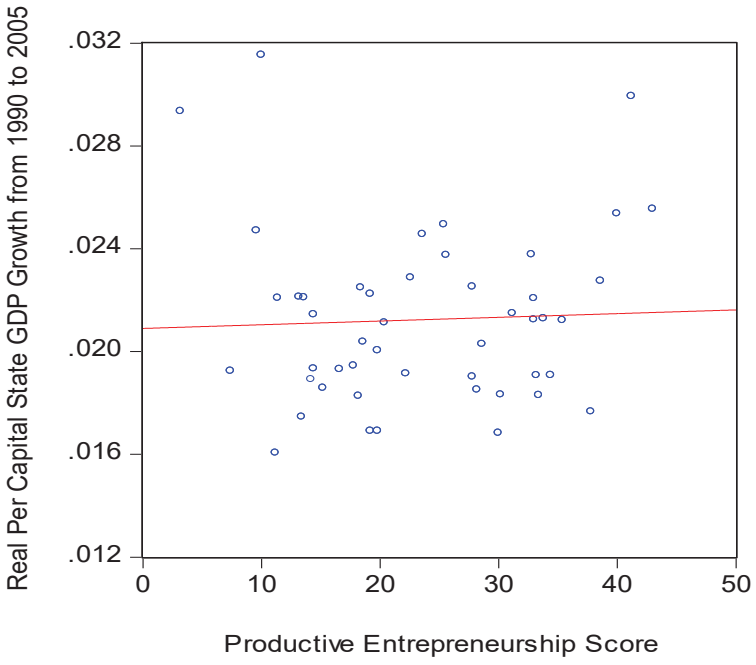


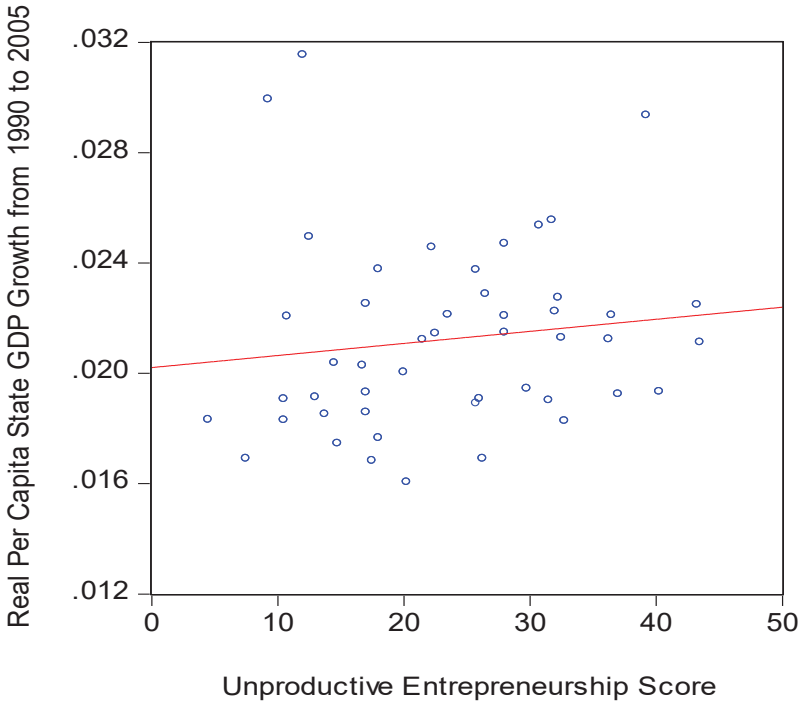

Real Per Capita State GDP in 2005
11.1
11.0
10.9
10.8
10.7
10.6
10.5
10.4
10.3
10.2
0
10
20
30
40
50
Productive Entrepreneurship Score


Real Per Capita State GDP in 2005
11.1
11.0
10.9
10.8
10.7
10.6
10.5
10.4
10.3
10.2
-40
-20
0
20
40
Net Entrepreneurial Productivity

Now we introduce some measures of economic freedom into the picture. The most popular measure is probably the Economic Freedom of North America (EFNA) score from the Fraser Institute. We take the 1990 values from Karabegović et al. (2006). The EFNA is based on indicators of the size of government and tax rates; the extent of regulation in the economy; also the definition of private property rates and their enforcement according to the rule-of-law. A higher EFNA score (out of 10) indicates, all else equal, smaller government, lower taxes, less regulation, and/or stronger property rights and rule-of-law – i.e., greater economic freedom. With greater economic freedom, the returns to creating and/or exploiting profit opportunities are more fully internalized by entrepreneurs; we therefore expect that, all else equal, greater productive entrepreneurial activity occurs. Alternatively, less economic freedom implies larger government; more redistribution and bureaucracy. In a less economically free environment, there are greater opportunities for rent seeking and, therefore, we would expect to see more unproductive entrepreneurship.

Figure 2. Relationships between Per Capita Income Growth and Entrepreneurship Scores with OLS Regression Lines Included




Real Per Capita State GDP Growth from 1990 to 2005
.032
.028
.024
.020
.016
.012
0
10
20
30
40
50
Unproductive Entrepreneurship Score

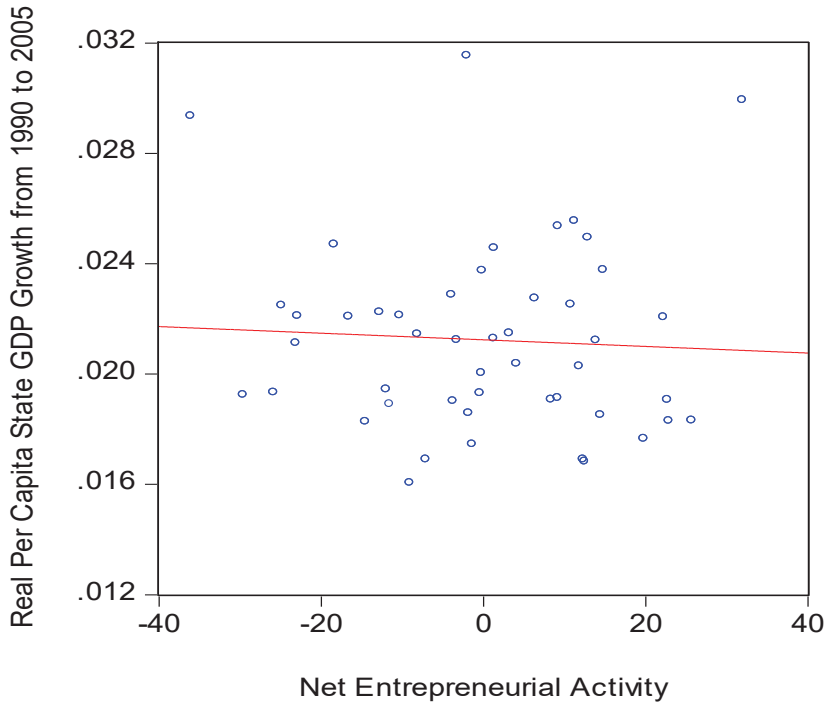
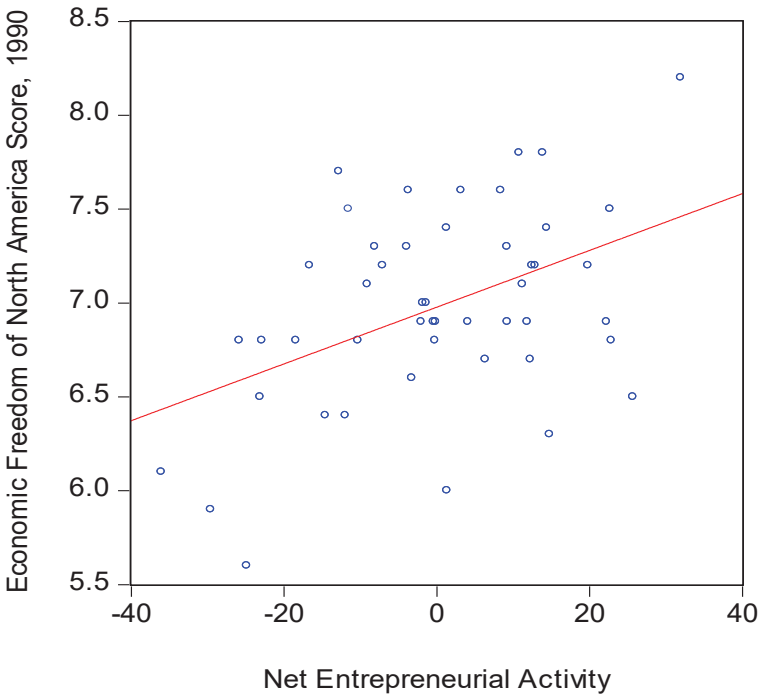
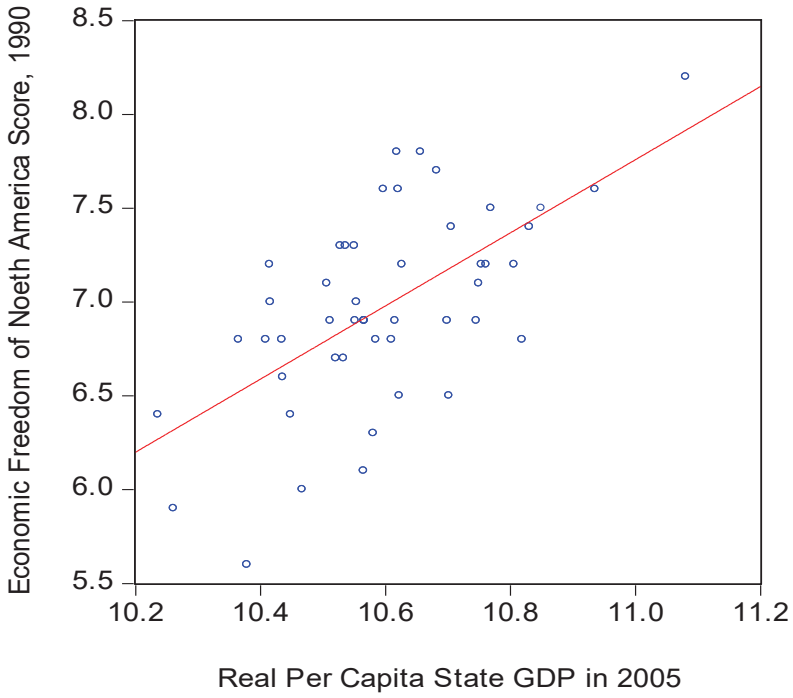

Real Per Capita State GDP Growth from 1990 to 2005
.032
.028
.024
.020
.016
.012
-40
-20
0
20
40
Net Entrepreneurial Activity

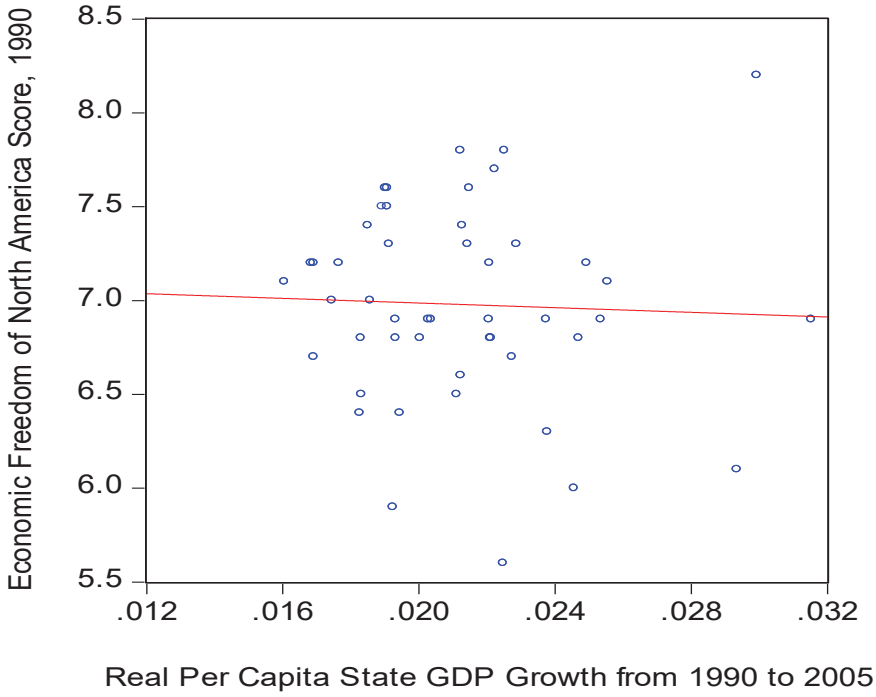
Figure 3 contains scatters of EFNA with net entrepreneurial activity, per capita income levels, and income growth rates. Economic freedom is positively correlated with both net entrepreneurial activity and income levels. However, as in the case of net entrepreneurial activity, the economic freedom's correlation with income is weak and has a negative sign (-0.040).

The characteristics of the data reported here motivate our analysis of economic freedom and entrepreneurship primarily in relation to income levels. In the following section, we also present the results of a more formal econometric analysis as evidence supporting this focus.

Figure 3. Relationships between Economic Freedom and (a) Entrepreneurship Scores, (b) Income Levels, and (c) Income Growth with OLS Regression Lines Included




Economic Freedom of Noeth America Score, 1990
8.5
8.0
7.5
7.0
6.5
6.0
5.5
10.2
10.4
10.6
10.8
11.0
11.2
Real Per Capita State GDP in 2005


Economic Freedom of North America Score, 1990
8.5
8.0
7.5
7.0
6.5
6.0
5.5
.012
.016
.020
.024
.028
.032
Real Per Capita State GDP Growth from 1990 to 2005

Is Entrepreneurial Activity Related To Income Levels Or Growth Rates?

The raw correlations reported above suggest a link between entrepreneurial activity and income levels rather than growth rates. The correlations between entrepreneurship scores and 1990 to 2005 per capita income growth are all weak. Notably, the correlation with net entrepreneurial activity is actually negative. The correlations with income levels, alternatively, are larger in absolute value and always the "right" sign.

Here we take a closer look at these relationships while controlling for various other potential determinants of income (levels and growth rates). Specifically, we consider a set of controls that Higgins et al. (2010) find to be robust correlates with economic growth in the US. These controls are percents of a state's adult population in 1990 that (i) do not have a high school diploma, (ii) have at least a bachelor's degree, (iii) are employed (as a civilian) by the federal government, and (iv) are employed by local government. While the dependent variable in Higgins et al. (2010) is always the income growth rate, controls in growth regressions are often interpreted as having temporary (or transitional) effects on growth rates by determining the balanced growth path level of income (e.g., Temple (1999, pp. 122-125)). Therefore, it is also reasonable to include them as controls in a regression of income levels. For growth rate regressions we also include the initial (1990) level of per capita income as a control as is standard. Table 1 contains summary statistics for these controls and the other variables included in our analysis.

We begin with two empirical models:

$$RGDP05 = \beta_0 + \beta_1 EPROD + \beta_2 EUNPROD + \beta_3 LESSHS + \beta_4 BAPLUS + \beta_5 FEDEMP + \beta_6 LOCEMP \quad (1)$$

$$GR9005 = \beta_0 + \beta_1 EPROD + \beta_2 EUNPROD + \beta_3 LESSHS + \beta_4 BAPLUS + \beta_5 FEDEMP + \beta_6 LOCEMP + \beta_7 RGDP90 \quad (2)$$

.

RGDP05 and GR9005 are, respectively, the 2005 real per capita income level and the growth rate from 1990 to 2005. The right-hand-side variables of interest are the productive and unproductive entrepreneurship scores (EPROD and EUNPROD). The only difference between the level and growth rate specifications is that the latter, (2), controls for the initial income level (RGDP90). This is standard and the coefficient, if negative, can be interpreted as a conditional convergence effect.

Table 1. Summary Statistics of Variables Included in Regression Analysis

	Description	Mean	Std. Dev.
RGDP05	Real Per Capita GDP in 2005	40,684.57	7,057.69
GR9005	Real Per Capita GDP Growth from 1990 to 2005	0.021	0.003
EPROD	Productive Entrepreneurship Score	23.583	23.505
EUNPROD	Unproductive Entrepreneurship Score	23.505	10.000
ENET	Net Entrepreneurial Activity	0.078	15.666
EFNA	Economic Freedom of North America Score, 1990	6.979	0.524
LESSHS	% of Pop. over 16 without High School Diploma, 1990	0.088	0.019
BAPLUS	% of Pop. over 16 with Bachelor's Degree or More, 1990	0.196	0.038
FEDEMP	Per Capita Federal Govt. (Civilian) Employment, 1990	0.014	0.011
LOCEMP	Per Capita Local Govt. Employment, 1990	0.042	0.009
RGDP90	Real GDP Per Capita in 1990	29,576.48	5,041.45

Notes: real per capita GDP level statistics are given in dollar terms. However, income levels enter regressions as natural logs of values.

Table 2. Regression Results: Income Levels and Growth Rates on Entrepreneurship Scores

	1	2	3	4	5	6	7	8
	OLS		OLS		GMM		GMM	
Control	*RGDP05*	*GR9005*	*RGDP05*	*GR9005*	*RGDP05*	*GR9005*	*RGDP05*	*GR9005*
EPROD	0.003	0.000			0.005	0.000		
	(0.002)	(0.000)			(0.005)	(0.000)		
EUNPROD	-0.005***	0.000			-0.018*	0.000		
	(0.002)	(0.000)			(0.010)	(0.000)		
ENET			0.004***	0.000			0.008**	0.000
			(0.001)	(0.000)			(0.003)	(0.000)
LESSHS	-0.065	-0.099***	-0.840	-0.087***	-2.636	-0.063**	-2.666*	-0.069**
	(1.147)	(0.030)	(1.110)	(0.030)	(1.902)	(0.030)	(1.351)	(0.026)
BAPLUS	2.204***	-0.031	1.976***	-0.014	0.701	0.017	0.774	0.024
	(0.674)	(0.021)	(0.592)	(0.019)	(1.256)	(0.036)	(0.922)	(0.026)
FEDEMP	-2.896*	0.060	-2.892*	0.054	-3.753*	0.025	-2.361**	-0.010

	(1.700)	(0.047)	(1.690)	(0.048)	(1.984)	(0.085)	(1.020)	(0.040)
LOCEMP	0.563	-0.063	0.541	-0.059	1.507	-0.056	1.126	-0.033
	(2.019)	(0.053)	(2.001)	(0.054)	(2.460)	(0.066)	(2.346)	(0.038)
RGDP90		-0.001		-0.002		-0.013		-0.019**
		(0.004)		(0.576)		(0.016)		(0.009)
Adj. R^2	0.477	0.132	0.483	0.099				
"First Stage" F-stats								
EPROD					8.332***	8.332***		
EUNPROD					0.533	0.533		
ENET							3.152***	3.152***
J-stat test					0.492	0.441	0.415	0.596
p-value								

Notes: *, **, and *** denote, respectively, significance at the 10, 5, and 1 percent levels. GMM results are based on the White heteroscedasticity-consistent covariance matrix estimate. *LESSHS, BAPLUS, FEDEMP,* and *LOCEMP* are assumed exogenous and 1980 values of those variables are used as additional instruments. F-stats are from regressions of entrepreneurial scores on IVs.

Columns 1 and 2 of table 2 contain the results of OLS regressions of (1) and (2). In the level specification, EPROD and EUNPROD coefficients both have the anticipated signs (positive and negative, respectively). However, only the estimate for unproductive entrepreneurship scores is significant (at the one percent level). It implies that a standard deviation increase (10.000) in the unproductive entrepreneurship score corresponds to a decrease in the real income level by about five percent. The standard deviation of (log) per capita income is about 16 percent. Alternatively, neither entrepreneurship score is significant in the growth specification and coefficient point estimates are essentially zero.

For the level specification (column 1), the OLS results also indicate that the percent of the population with a bachelor's degree or higher correlates positively with income levels; the federal government employment share correlates negatively. (Both estimated effects are statistically significant at the 10 percent level or better.) These results are qualitatively consistent with those previously reported by Higgins et al. (2006, 2009, & 2010). They are not the focus of this paper, but it is worth mentioning these effects are present and are statistically significant in all estimations of the level specification that follow.

Columns 3 and 4 of table 2 report the results of OLS regressions that include ENET rather than EPROD and EUNPROD but are otherwise identical to those of columns 1 and 2. Net entrepreneurial activity is positively and significantly (at the one percent level) correlated with income levels. A standard deviation increase (15.666) is associated with about a six percent increase in the real income level. In the growth specification the ENET coefficient is not significant and has a point estimate near zero. Summarizing results from columns 1 through 4:

- net entrepreneurial activities have a statistically significant association with US state per capita real income levels;
- there is no evidence of net entrepreneurial activities having an effect on income growth rates;
- taken separately, only unproductive (rather than productive) entrepreneurial activity has a statistically significant association with income levels.

This last point deserves some further consideration. Unproductive entrepreneurial activity, at first blush, seems more deleterious than productive entrepreneurial activity is beneficial. Undoubtedly economists have paid more attention to the latter in their research, so this finding is somewhat remarkable. One may suggest that the finding is an artifact of collinearity. The point estimate of EPROD is not particularly small (0.003 as opposed to -0.005 on EUNPROD; the standard deviation of EPROD is also more than twice that of EUNPROD). Perhaps an inflated standard error is to blame. Two facts belie this explanation. First, the correlation between EPROD and EUNPROD is not large in absolute value (-0.231). Second, when the column 1 regression is re-run using only EPROD the coefficient estimate does not become significant at conventional levels (0.004 with a standard error of 0.003).

Another concern might be endogeneity. For example, perhaps the insignificance of productive entrepreneurial scores is due to some omitted variables that bias the coefficient estimate to zero. A straightforward solution is to instrument (provided that strong, valid instruments can be found). Also, since we are dealing with cross-section data heteroscedasticity is a likely concern. Columns 5 and 6 of table 2 report results from GMM estimation of (1) and (2) including both EPROD and EUNPROD. Our identification strategy is to, first, assume that LESSHS, BAPLUS, FEDEMP, and LOCEMP are exogenous variables and, second, include the 1980 values of these same variables as additional instruments. With the 1990 values as exogenous regressors, it is plausible that the 1980 values are correlated with EPROD

and EUNPROD but otherwise not correlated with income levels or growth rates. Using the 1980 values also creates overidentifying restrictions that can be tested to evaluate instrument validity.

The notable result in columns 5 and 6 is that very little changes qualitatively. Entrepreneurial activity is still insignificant with near zero point estimates for coefficients in the growth specification. Only unproductive entrepreneurship scores are statistically significant (at the one percent level) in the level specification. Quantitatively, the coefficient on EUNPROD increases in absolute value by more than a factor of three (-0.018). This estimate implies that a one standard deviation increase in EUNPROD is associated with about an 18 percent lower income level (which is more than a standard deviation decrease).

Toward the bottom of columns 5 and 6 are "first stage" F-statistics associated with regressions of EPROD and EUPROD on the instruments and a test that the regression coefficients are jointly zero. Interestingly, the instrument set is considerably "stronger" for EPROD (in the sense that we can easily reject the instruments being jointly uncorrelated with the dependent variable). In the case of EUPROD we cannot reject the null at conventional significance levels. Furthermore, the p-values associated with J-statistic of Sargan tests of the overidentifying restrictions indicate that we cannot reject the instrument set as valid. These results support the case that, taken separately, unproductive entrepreneurial activity is more deleterious than productive entrepreneurial activity is beneficial. Columns 7 and 8 of table 2 report the GMM regressions using ENET. Compared to OLS (columns 3 and 4) the results are qualitatively similar but the size of the ENET coefficient in the level specification is doubled (from 0.004 to 0.008). The "first stage" F-statistics provide evidence that we are using strong instruments for net entrepreneurial activity while the J-statistics provide no evidence that the instruments are invalid.

Discussion of Results

Based on our results, net entrepreneurial scores are positively and significantly correlated with income levels. However, there is no statistically significant relationship between the net entrepreneurial scores and income growth rates across the US states. We interpret this as indicating that the entrepreneurship scores are proxies for, primarily, Kirznerian-type entrepreneurial activities (as opposed to the Schumpetarian-type).

The entrepreneur described by Kirzner is characterized by alertness to existing (but hitherto unnoticed) profit opportunities; he moves markets and economies towards an already-defined equilibrium. The equilibrium itself is a function factors other than entrepreneurial choices, e.g., the existing technologies. Our results suggest that entrepreneurs affect income levels relative to the pre-determined equilibrium levels.

Alternatively, Schumpeter's entrepreneur is a creative and disruptive agent; he creates new profit opportunities via innovation, e.g., the development and/or introduction of new activities. Innovations contribute to the creation of series of (increasingly higher) income equilibria over time; in other words, Schumpetarian entrepreneurship helps to determine an economy's growth path. We find no evidence that the activities represented by the entrepreneurship scores are statistically significant determinants of such paths in the US states.

The fact that it is, for income levels, the unproductive (rather than productive) entrepreneurial activities that correlate significantly also supports to Kirznerian interpretation. Rent-seeking activities are not innovative in the sense of creating a new series of income equilibria over time. Rather, it is more straightforward to think of unproductive activities as exploiting zero-/negative-sum profit opportunities at the expense of existing positive-sum opportunities. Exploiting the positive sum profit opportunities would move an economy towards its equilibrium income level; rent-seeking presumably moves the

economy away from that equilibrium and towards an income level lower than feasible given existing technologies and available labor and capital.

Even though productive entrepreneurship scores do not enter significantly into our estimations in and of themselves, net entrepreneurship scores do. One straightforward interpretation is that introducing the productive scores' variance does not create enough noise to drown out the significant correlation associated with that of the unproductive scores. However, another interpretation is that the effect of unproductive entrepreneurship dominates up until a certain point; from that point on productive entrepreneurial activities are abundant enough relative to activities focused on rent-seeking to have a positive effect. This would be analogous to Hall et al.'s (2010) findings regarding the cross-country relationship between (human and physical) capital stocks and economic growth rates, conditional on institutional quality.

Does Economic Freedom Affect Income Primarily Throughout Net Entrepreneurship

When regressions like those reported on in table 2 are run with the Economic Freedom of North America (EFNA) 1990 state scores in place of the entrepreneurship variables, the EFNA coefficient is large, positive and statistically significant. For example, if the exact GMM estimation associated with column 7 is run, replacing ENET with EFNA, the coefficient estimate is 0.127 and significant at the one percent level. This implies that a standard deviation increase in a state's economic freedom score is associated with about a 6.7 percent increase the real per capita income level. The question we wish to ask in this section is: does economic freedom primarily affect incomes through its effects on entrepreneurial activity?

To get at this question we are going to consider whether or not economic freedom is a strong and valid instrument for net entrepreneurial activity. A good instrument will be correlated with a regressor of interest (strong) while being otherwise uncorrelated with the dependent variable (valid).

If economic freedom only affects income levels indirectly via changes in net entrepreneurial activity, then we would expect that its co-movements with income to all correspond to co-movements in net entrepreneurship. Once those are taken into account, other changes in economic freedom will be uncorrelated with income. Alternatively, if economic freedom affects income through both net entrepreneurship and some other variable outside of our data (e.g., time taken up trying to protect against expropriation) then we would expect freedom to correlate with income even after taking into account freedom's co-movements with net entrepreneurial activity.

Of course, it is implausible that economic freedom affects income levels only through net entrepreneurial activity. However, validity is the null hypothesis with available tests. Our claim is that if economic freedom acts primarily through net entrepreneurial activity then it will be difficult to reject that null. Put differently, it would be suggestive of the primacy of the entrepreneurship channel if we cannot reject economic freedom as being otherwise correlated with net entrepreneurial activity.

Column 1 of table 3 reports results from GMM estimation of the level specification when EFNA is added as an additional instrument. Column 2 reports the GMM results when EFNA is not added (and are the same as those of column 7 in table 2). Adding EFNA as an instrument increases the point estimate on ENET from 0.008 to 0.011 (and decreases the significance level from five to one percent).

Table 3. Regression Results: Income Levels on Entrepreneurship Scores

	1	2		3
	GMM	GMM		
Control		(no *EFNA*)		
ENET	0.011***	0.008**	t-statistic from regression of *ENET* on *EFNA*	3.434***
	(0.004)	(0.003)		
			J-stat test (with *EFNA* instrument) p-value	0.302
LESSHS	-0.034**	-0.027**	J-Stat test (without *EFNA* instrument) p-value	0.415
	(0.0156)	(0.014)		
BAPLUS	0.000	0.008	Hausman test (based on estimation with versus without *EFNA* instrument) p-value	
	(0.010)	(0.009)		0.603
FEDEMP	-3.425*	-2.361**		
	(1.086)	(1.020)		
LOCEMP	1.142	1.126		
	(2.510)	(2.346)		

Notes: *, **, and *** denote, respectively, significance at the 10, 5, and 1 percent levels. GMM results are based on the White heteroscedasticity-consistent covariance matrix estimate. The Hausman test is based on the coefficient and covariance matrix estimates from column 1 and column 2 estimations.

Column 3 of table 3 reports the results of various tests evaluating economic freedom as an instrument of net entrepreneurial activity. First there is the t-statistic from a regression of ENET on EFNA and a constant. The coefficient estimate on EFNA is significant at the one percent level, so instrument strength does not seem to be a concern. Next there is p-value from a test based on the J-statistic of the column 1 GMM estimation. The four overidentifying restrictions cannot be rejected at a conventional level of significance. There is no evidence that EFNA is an invalid instrument. An additional test that we can consider is based on considering EFNA as a suspect instrument amongst the set of otherwise non-

suspect instruments (i.e., the 1980 and 1990 values of LESSHS, BAPLUS, FEDEMP, and LOCEMP). We perform a Hausman test based on the column 1 and column 2 GMM coefficient and covariance matrix estimates. Under the null, both column 1 and column 2 estimates are consistent but the column 1 estimates are more efficient for having an additional valid instrument. The p-value for the test is 0.603; we cannot reject the null with any high level of confidence.

Conclusion

This paper explores important links established in the economic growth and entrepreneurship literatures – those between: (1) institutions and entrepreneurial activity; (2) institutions and economic growth; and (3) entrepreneurship and economic growth. We find that entrepreneurial activity shares a strong and statistically significant relationship with US state per capita real income levels. We find no evidence, however, of a relationship between entrepreneurial activity and US state-level economic growth.

If entrepreneurial activity is related to income levels rather than growth rates, this is consistent with income levels being accounted for by total factor productivity (TFP); a theory advanced by Parente and Prescott (2000) for cross-country data. Applying this theory to US states, available technologies are basically common across US states; entrepreneurial activity is indicative of to what extent those technologies are being (productively or unproductively) employed. As such, the entrepreneurial activity represented by Sobel's (2008) scores appears to be of the equilibrating type described by Kirzner (1973 & 1979).

Our findings, of course, do not rule out new technologies being the product of entrepreneurial activity. First, the Sobel (2008) scores may simply not be a good proxy for Schumpetarian (1934 & 1942) entrepreneurial activity. Second, it could be that, when entrepreneurship leads to innovation, the innovations quickly become common and the benefits are largely external to the particular state where

they were developed. A fruitful extension of the current research is to test for these spillover-based links between entrepreneurial activity and economic growth.

We also present evidence that economic freedom is a strong instrument for entrepreneurship; one for which validity cannot be rejected. If economic freedom is a good instrument for entrepreneurial activity in income regressions then this suggests that freedom affects income primarily through changes in entrepreneurial activity. Unfortunately, instrument validity is a null hypothesis. We cannot formally claim to have found evidence of the primacy of the entrepreneurship channel. Rather, we cannot reject its primacy. We still believe that this approach can be useful. Future research can pursue whether freedom instruments well for other channels. To the extent that validity can be rejected in other cases, this would strengthen the case for the entrepreneurship channel.

Another limitation of our study concerns the small degrees of freedom available for the US cross-section. Another avenue for future research would be to extent the analysis to a cross-country sample. This would increase the power of validity tests and, if the results hold, reinforce the arguments put forth above.

References

Audretsch, D. B., and M. Keilbach. 2008. "Resolving the knowledge paradox: knowledge spillover entrepreneurship and economic growth." *Research Policy,* 37(10): 1697-1705.

Aghion, P., and P. Howitt. 1992. "A model of growth through creative destruction." *Econometrica,* 60: 323-351.

Baumol, W. J. 1990. "Entrepreneurship: Productive, unproductive and destructive." *Journal of Political Economy,* 100(2): 223-251.

Berkowitz, D., and D. DeJong. 2005. "Entrepreneurship and post-socialist growth." *Oxford Bulletin of Economics and Statistics,* 67(1): 25-46.

Bjørnskov, C., and N. J. Foss. 2008. "Economic freedom and entrepreneurial activity: Some cross-country evidence." *Public Choice,* 134(3-4): 307-328.

Cole, J. H. 2003. "The contribution of economic freedom to world economic growth. *Cato Journal,* 22: 189-198.

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

Grossman, G. M. and E. Helpman. 1991. "Quality ladders in the theory of growth." *Review of Economic Studies,* 58: 43-61.

Gwartney, J. D., R. A. Lawson, R. A., and R. G. Holcombe. 1999. "Economic freedom and the environment for economic growth." *Journal of Institutional and Theoretical Economics* 155: 1-21.

Hall, J. C., and R. S. Sobel. 2008. "Institutions, entrepreneurship, and regional differences in economic growth." *Southern Journal of Entrepreneurship,* 1(1): 69-96.

Hall, J. C., R. S. Sobel, and G. R. Crowley. 2010. "Institutions, capital, and growth." *Southern Economic Journal,* 77(2): 385-405.

Hayek, F. A. 1945. "The use of knowledge in society." *American Economic Review,* 35(4): 519-530

Heckelman, J.C., and M.D. Stroup. 2000. "Which economic freedoms contribute to growth?" *Kyklos,* 53(4): 527–544.

Higgins, M.J., D. Levy, and A. T. Young. 2006. "Growth and convergence across the U.S.: Evidence from county-level data." *Review of Economics and Statistics,* 88: 671-681.

Higgins, M.J., A. T. Young, and D. Levy. 2009. "Federal, state, and local governments: Evaluating their separate roles in U.S. growth." *Public Choice,* 139(3-4): 493 -507.

Higgins, M.J., A. T. Young, and D. Levy. 2010. "Robust correlates of county-level growth in the United States." *Applied Economics Letters,* 17: 293-296.

Karabegović, A., F. McMahon, and C. G. Black. 2006. *Economic Freedom of North America: 2006 Annual Report*. Fraser Institute: Vancouver, BC.

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

Kirzner, I. 1979. *Perception, Opportunity and Profit*. University of Chicago Press: Chicago.

Kirzer, I. M. 1999. "Creativity and/or alertness: a reconsideration of the Schumpetarian entrepreneur." *Review of Austrian Economics,* 11: 5-17.

Knight, F. 1921. *Risk, Uncertainty, and Profit*. Houghton Mifflin: Boston.

Leamer, E. 1985. "Sensitivity analysis would help." *American Economic Review,* 75: 308-313.

Levine, R., and D. Renelt. 1992. "A sensitivity analysis of cross-country growth regressions." *American Economic Review,* 82: 942-963.

Nyström, K. 2008. "The institutions of economic freedom and entrepreneurship: Evidence from panel data." *Public Choice,* 136(3-4): 269-282.

Ovaska, T., and R. Sobel. 2005. "Entrepreneurship in postsocialist economies." *Journal of Private Enterprise,* 21(1): 8-28.

Parente, S. L., and E. C. Prescott. 2000. *Barriers to Riches*. MIT University Press: Cambridge.

Powell, B. 2003. "Economic freedom and growth: the case of the Celtic tiger." *Cato Journal* 22: 431-448.

Schumpeter, J. A. 1934. *The Theory of Economic Development*. Harvard University Press: Cambridge, MA.

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

Segerstrom, P. S., T. C. A. Anant, and E. Dinopoulos. 1990. "A Schumpetarian model of the product life cycle." *American Economic Review,* 80: 1077-1091.

Sobel, R. S. 2008. "Testing Baumol: Institutional quality and the productivity of entrepreneurship." *Journal of Business Venturing,* 23: 641-655.

Sobel, R. S., J. R. Clark, and D. R. Lee. 2007. "Freedom, barriers to entry, entrepreneurship, and economics progress." *Review of Austrian Economics,* 20: 221-236.

Sobel, R. S., and T. A.Garret. 2002. "On the measurement of rent-seeking and its social opportunity cost." *Public Choice*, 112: 115-126.

Sorens, J., and W. Ruger. 2009. *Economic Freedom in the 50 States: An Index of Personal and Economic Freedom*. Mercatus Center: Arlington, VA.

Temple, J. 1999. "The new growth evidence." *Journal of Economic Literature,* 37: 112-156.

Valliere, D., and R. Peterson. 2009. "Entrepreneurship and economic growth: Evidence from emerging and developed countries." *Entrepreneurship & Regional Development,* 21(5-6): 459-480.

Wong, P. K., Y. P. Ho, and E. Autio. 2005. "Entrepreneurship, innovation and economic growth: Evidence from GEM data." *Small Business Economics,* 24(3): 335-350.

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