

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.

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1. 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) viewed entrepreneurs as innovators who create new goods (or processes to produce existing goods) and open new markets. Alternatively, Israel Kirzner (1973) 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)).¹ 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.

¹ Ovaska and Sobel (2005) and Berkowitz and DeJong (2005) focus on post-soviet economies; Valliere and Peterson (2009) and Wong et al. (2005) both find that the GEM measures of "high-growth potential" entrepreneurial activity (i.e., that associated with fast-growing new firms in particular) is the type most strongly associated with economic growth. Audretsch and Keilbach (2008) present evidence from German regions that entrepreneurship positively affects economic growth by serving as a conduit of knowledge spillovers. Their results are interesting in terms of adding an additional (to the Knightian, Schumpeterian, and Kirznerian) channel through which entrepreneurship may drive growth.

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. 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 proxying for institutions with a “risk of appropriation” measure, 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 discernable 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).²

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 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.

2. Income Levels, Entrepreneurship, and Economic Freedom

² As an extreme example, many economists would agree that rent-seeking is not a necessary condition for socialist planning result in very unproductive allocations of resources. For information problems as an alternative sufficient condition see, of course, Hayek (1945).

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.³ (*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 2000.⁴ 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.⁵

Figure 1 contains scatters of 2005 (log) real per capita income levels and the Sobel (2008) productive, unproductive, and net entrepreneurship scores.⁶ 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

³ This index is the "Harris Poll" published by the Institute for Legal Reform and the US Chamber of Commerce in its *State Liability Systems Ranking*.

⁴ For details see Sobel (2008, pp. 646-647; Appendix A).

⁵ For example, a state ranked 23, 45, 20, 25, and 38 in terms of, respectively, per capita venture capital investments, patents per capita, sole-proprietorship growth rates, establishment birth rates, and large establishment birth rates would have a productive entrepreneurship score of $(23 + 45 + 20 + 25 + 38)/5 = 30.20$.

⁶ We limit ourselves to the 48 contiguous states that Sobel's (2008) scores are available for. All results reported below using 2005 real per capita GDP are essentially unchanged if we use the 2009 level (including results based on income growth rates from 1990).

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.

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).⁷ **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.

3. 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

⁷ Since we look at income growth rates from 1990 to 2005, using the 1990 (initial) score for the EFNA seemed preferable. However, all of our results are essentially unchanged if, instead, the 1999 or 2005 EFNA scores are used. This is not surprising because institutions change slowly and the correlations of the 1999 and 2005 scores with the 1990 score are, respectively, 0.824 and 0.823.

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.⁸ 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:

$$(1) \quad \begin{aligned} RGDP05 = & \beta_0 + \beta_1 EPROD + \beta_2 EUNPROD \\ & + \beta_3 LESSHS + \beta_4 BAPLUS + \beta_5 FEDEMP + \beta_6 LOCEMP \end{aligned} \quad \text{and}$$

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

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

⁸ These variables are all drawn from the US census. Higgins et al. (2010) consider an extreme bounds analysis (Leamer (1985), Levine and Renelt (1992)) of income growth determinants using county-level data and 11 control variables of interest suggested by the county-level study of Higgins et al. (2006).

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.

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).⁹ 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

⁹ Higgins et al. (2009) focuses exclusively on federal, state, and local government employment shares and their role in income determination.

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:

- entrepreneurial activities have a statistically significant association with US state per capita real income levels;
- there is no evidence of 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

qualitative 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.

4. Does Economic Freedom Affect Income Primarily through 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).

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.

5. 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*. This, of course, does not rule out new technologies being the product of entrepreneurial activity; only that those technologies then become common and the benefits are largely external to the particular state where they are 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 extend 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.

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Figures

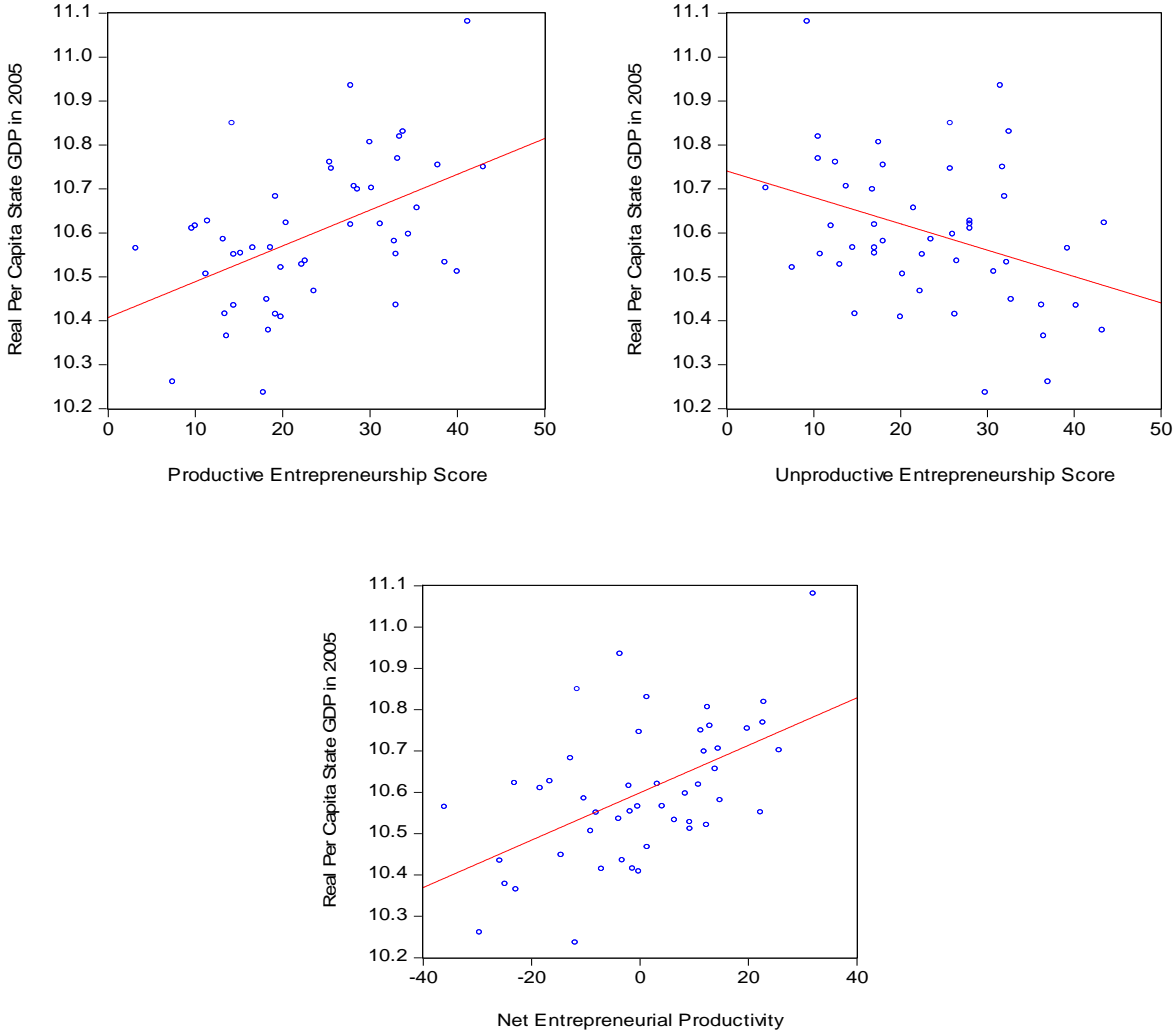


Figure 1. Relationships between Per Capita Income and Entrepreneurship Scores with OLS Regression Lines Included

Figures (cont.)

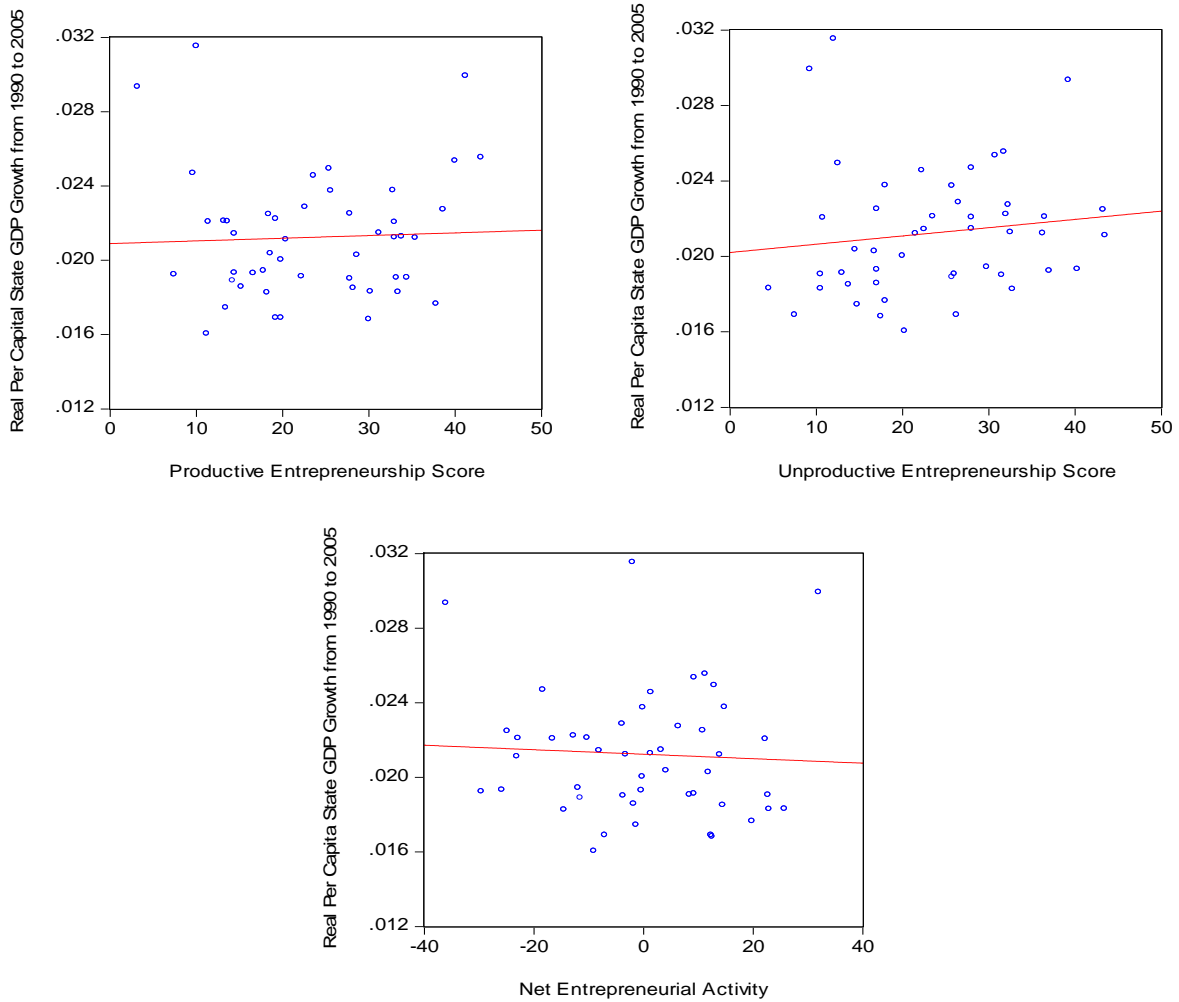


Figure 2. Relationships between Per Capita Income Growth and Entrepreneurship Scores with OLS Regression Lines Included

Figures (cont.)

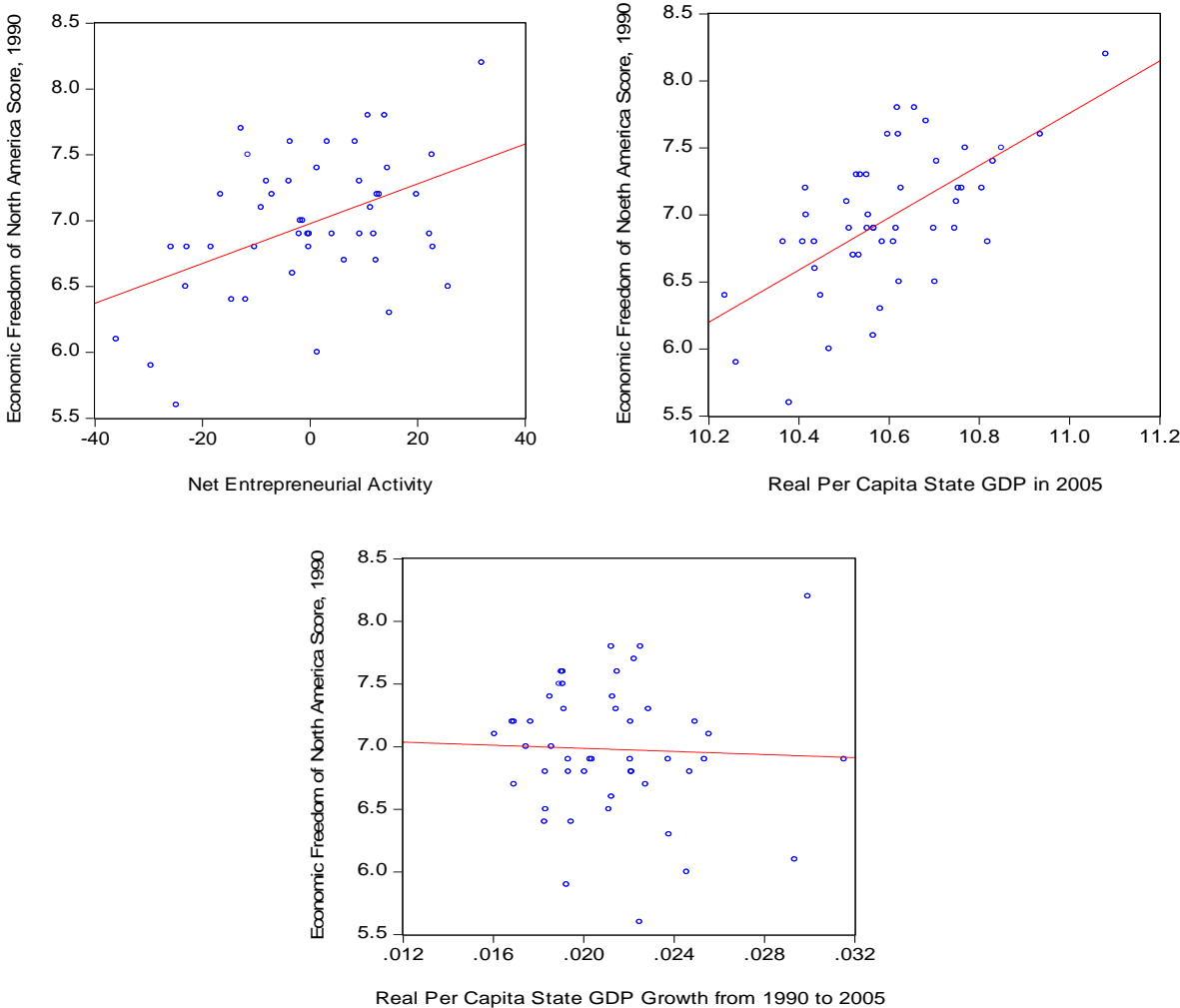


Figure 2. Relationships between Economic Freedom and (a) Entrepreneurship Scores, (b) Income Levels, and (c) Income Growth with OLS Regression Lines Included

Tables

Table 1. Summary Statistics of Variables Included in Regression Analysis

	Description	Mean	Std. Dev.
<i>RGDP05</i>	Real Per Capita GDP in 2005	40,684.57	7,057.69
<i>GR9005</i>	Real Per Capita GDP Growth from 1990 to 2005	0.021	0.003
<i>EPROD</i>	Productive Entrepreneurship Score	23.583	23.505
<i>EUNPROD</i>	Unproductive Entrepreneurship Score	23.505	10.000
<i>ENET</i>	Net Entrepreneurial Activity	0.078	15.666
<i>EFNA</i>	Economic Freedom of North America Score, 1990	6.979	0.524
<i>LESSHS</i>	% of Pop. over 16 without High School Diploma, 1990	0.088	0.019
<i>BAPLUS</i>	% of Pop. over 16 with Bachelor's Degree or More, 1990	0.196	0.038
<i>FEDEMP</i>	Per Capita Federal Govt. (Civilian) Employment, 1990	0.014	0.011
<i>LOCEMP</i>	Per Capita Local Govt. Employment, 1990	0.042	0.009
<i>RGDP90</i>	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	<i>RGDP05</i>	<i>GR9005</i>	<i>RGDP05</i>	<i>GR9005</i>	<i>RGDP05</i>	<i>GR9005</i>	<i>RGDP05</i>	<i>GR9005</i>
<i>EPROD</i>	0.003 (0.002)	0.000 (0.000)			0.005 (0.005)	0.000 (0.000)		
<i>EUNPROD</i>	-0.005*** (0.002)	0.000 (0.000)			-0.018* (0.010)	0.000 (0.000)		
<i>ENET</i>			0.004*** (0.001)	0.000 (0.000)			0.008 (0.003)**	0.000 (0.000)
<i>LESSHS</i>	-0.065 (1.147)	-0.099*** (0.030)	-0.840 (1.110)	-0.087*** (0.030)	-2.636 (1.902)	-0.063** (0.030)	-2.666* (1.351)	-0.069** (0.026)
<i>BAPLUS</i>	2.204*** (0.674)	-0.031 (0.021)	1.976*** (0.592)	-0.014 (0.019)	0.701 (1.256)	0.017 (0.036)	0.774 (0.922)	0.024 (0.026)
<i>FEDEMP</i>	-2.896* (1.700)	0.060 (0.047)	-2.892* (1.690)	0.054 (0.048)	-3.753* (1.984)	0.025 (0.085)	-2.361** (1.020)	-0.010 (0.040)
<i>LOCEMP</i>	0.563 (2.019)	-0.063 (0.053)	0.541 (2.001)	-0.059 (0.054)	1.507 (2.460)	-0.056 (0.066)	1.126 (2.346)	-0.033 (0.038)
<i>RGDP90</i>		-0.001 (0.004)		-0.002 (0.576)		-0.013 (0.016)		-0.019** (0.009)
Adj. R ²	0.477	0.132	0.483	0.099				
“First Stage” F-stats								
<i>EPROD</i>					8.332***	8.332***		
<i>EUNPROD</i>					0.533	0.533		
<i>ENET</i>							3.152***	3.152***
J-stat test p-value					0.492	0.441	0.415	0.596

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.

Table 3. Regression Results: Income Levels and Growth Rates on Entrepreneurship Scores

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