Economic Freedom and Entrepreneurship: A Panel Study of the United States

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ABSTRACT

We run panel regressions to test the impact of economic freedom in the 50 states on five different measures of Entrepreneurship. We find that higher average levels of economic freedom lead to higher average business birth rates and, in some cases, more patents per capita in a state. When we examine the subcomponents of the freedom index we find that smaller size of government is important for higher levels of business births and patents. We find no consistent significant connection between economic freedom and venture capital per capita, sole proprietorship rates, or the Kauffman index of entrepreneurship.

INTRODUCTION

This paper investigates the empirical relationship between economic freedom and entrepreneurship. Entrepreneurship involves taking actions to seize previously un-grasped profit opportunities. It requires entrepreneurs to "see" the situation differently than others and have the freedom to act on their vision. Absent either the vision or the freedom to act entrepreneurship can't occur. So almost by definition we should expect freedom and entrepreneurship to be strongly related. We exploit this close relationship to investigate the questions of which freedoms are important for what forms of entrepreneurship and to prompt a discussion of which measures of entrepreneurship are likely to be effective proxies of the fundamentally un-measurable concept of entrepreneurship.

We use the Economic Freedom of North America (EFNA) index (Ashby et al, 2011) which defines economic freedom as a lack of government interference in markets through taxation, spending, and regulation (the EFNA index focuses on labor market regulations and restrictions) to investigate how it effects five different measures of entrepreneurship. The index measures these freedoms at the state and local level. States that score high on the index have relatively low taxes, freeing individuals' savings to invest in new businesses; less government spending, releasing resources into the market to be used by entrepreneurs to serve customers; and fewer regulations limiting the transactions that entrepreneurs and workers can engage in.

Our five measures of entrepreneurship are business birth rates, patents, venture capital, sole-proprietorships, and the Kauffman Index of Entrepreneurial Activity (KIEA). All five of

these measures have served as proxies for entrepreneurship in the literature but none fully captures all entrepreneurial actions. The KIEA index investigates the proportion of the population involved in either running a young firm (less than 42 months old), or setting up a new firm. The KIEA measure as well as business birth rates involve seeing a profit opportunity and creating a new business to exploit it. But it leaves out entrepreneurial actions taken by existing firms. Patents involve seeing a profit opportunity by designing a new product. Inventions may be patented by new or existing firms but this hardly encompasses all entrepreneurial actions. Venture capital might be needed to fund new entrepreneurial actions but as we'll discuss below there are problems with using this as a measure of entrepreneurship. Finally the sole proprietorship rate is a common measure of entrepreneurship in the literature but it suffers from some problems as well.

We find some support for the view that economic freedom can be important for entrepreneurship but it depends on which aspect of entrepreneurship we look at. Business birth rates are both positively correlated with economic freedom but the relationship between economic freedom and Kauffman Economic Activity index and patents are mixed while the relationship between economic freedom venture capital and sole-proprietorships is insignificant.

The following section reviews the related literature. Section 3 describes the data. The fourth section contains our main results, robustness checks and analysis. The final section concludes.

LITERATURE REVIEW

There is an extensive literature investigating entrepreneurship, institutional quality, economic growth, and the relationships between them. This paper contributes the first panel study of economic freedom of the fifty U.S. states that uses all five major measures of entrepreneurship.

Bjørnskov and Foss (2008) offer the following primary conceptions of entrepreneurship in economics: innovations that create new products in new ways (Schumpeter 1911), alertness and discovery that drives the market's process of equilibration (Kirzner 1973), and judgment in making decisions while facing uncertainty (Knight 1921). Baumol (1990) distinguishes between productive entrepreneurship that creates wealth for society and unproductive and destructive entrepreneurship such as rent seeking. These seminal papers have formed the base of how empirical studies on entrepreneurship have been conducted.

Although the theory of entrepreneurship is well developed, measuring entrepreneurship is difficult. A few variables are accepted measures of entrepreneurship. Measures of business starts are common metrics of entrepreneurship, as are patents per capita and venture capital per capita, and the KIEA index. Sole-proprietorship rates have been used with mixed results[1].

Studies have found that a significant amount of the differences in economic development of different countries can be explained by differences in entrepreneurial activity. Reynolds et al. (1999) showed one third of growth being explained by entrepreneurship, while Zacharakis et al. (2000) showed one half of growth being explained by entrepreneurship. Sobel (2008) finds 34% of median household income being explained by differences in net entrepreneurial activity.

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[1] Although Kreft and Sobel (2005) found a positive relationship between institutions and sole-proprietorship growth rate, Blanchflower (2004) finds a negative relationship between growth and self-employment rates.

There is a huge literature investigating the effect of economic freedom on development[2]. The Economic Freedom of the World (EFW) index (Gwartney et al 2011) has been used in numerous studies to show a positive relationship between freedom and growth. The Economic Freedom of North America (EFNA) index (Ashby, Bueno, and McMahon, 2011) has allowed researchers to look at these same effects on the sub-national level.

More recently a few papers have investigated the relationship between economic freedom and entrepreneurship.[3] Kreft and Sobel (2005) found a positive correlation between economic freedom across the states and sole-proprietorship growth rates in a cross sectional study.[4] Sobel (2008) empirically investigates Baumol's hypothesis in the U.S. states and finds that not only is productive entrepreneurship enhanced by economic freedom, but destructive entrepreneurship is reduced. He measures productive entrepreneurship using business birthrates, patents, venture capital, and sole proprietorship growth rates.[5] He also shows that while variation in EFNA scores explains 12-16% of differences in per capita income, net entrepreneurial activity explains 30-34% of differences. Hall and Sobel (2008) use the Kauffman Index of Entrepreneurial Activity, a new measure of entrepreneurship available for the United States. It uses data from the Current Population Survey to calculate the proportion of non-business owners who start a business during a given month. They find a positive relationship between economic freedom and the subsequent growth of entrepreneurship.

Hall, Pulito, and VanMetre (2012) investigate the relationship between freedom (using Ruger and Sorens's *Freedom in the 50 States* index which includes both economic and personal freedom) and entrepreneurship. They find that economic freedom is more important than personal freedom, and that fiscal policy is more important than regulatory policy in affecting entrepreneurship.

There are a few panel studies of the 50 U.S. States. Hall, Pulito, and Van Metre (2012) technically falls into this category, but only covers two time periods which are two years apart. Kreft and Mafi-Kreft (2007) use a Granger causality method to test if economic freedom causes increases entrepreneurship (as measured by sole proprietorship rates and patent activity); they answer in the affirmative. Campbell and Rogers (2007) use a pooled OLS model (but include a fixed-state-effects panel model)[6] of net business formation as a function of economic freedom

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[2] See Berggren (2003) for a dated survey of the early literature on the topic and
http://www.freetheworld.com/papers.html for more recent papers. We focus this discussion on studies of the United States. For international studies looking at entrepreneurship and economic freedom see Sobel, Clark, and Lee (2007), and Bjørnskov and Foss (2008) for cross-sectional studies; Nyström (2008) for the only international panel study we know of; and Powell and Rodet (2012) for a study that incorporates the effects of both economic freedom and social approval of entrepreneurial activity as measured by the World Values Survey.

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[4] Powell (2008) contains a series of case studies illustrating how entrepreneurship better promotes development when countries evolve their institutions towards those that better support economic freedom.

[5] He measures unproductive entrepreneurship using counts of lobbies and interest groups with offices in state capitals, as well as the Harris Judicial Index, which measures the quality and fairness of states' legal and liability systems.

[6] In this paper, we use a fixed-time-effects model to account for autocorrelation.

from 1990 to 2001, and find results consistent with previous literature: more economic freedom is associated with more entrepreneurship. They also investigate the possibility that freedom affects business formation indirectly by increasing income which then leads to greater net business formation. They conclude that the primary effects of freedom are direct.

We build on this literature by conducting the first panel study on the relationship between economic freedom and entrepreneurship across the 50 U.S. states to use all five of the primary measures of entrepreneurship and to use the full 28 years of data available from the *Economic Freedom of North America* index.

DATA

Our main explanatory variable of interest is economic freedom for which we use the Economic Freedom of North America index (Ashby et al, 2011). This index is available for each year from 1981 through 2009 for all 50 states. The index measures freedom at the state and local level and is comprised of three sub-indices which measure the size of government, the level of taxes, and labor market freedom.

We measure entrepreneurship five ways. While all five are measures of entrepreneurship, they measure different aspects of entrepreneurial activity. Each covers the entire range of years we have economic freedom data except venture capital which is available from 1985 forward and the Kauffman index which is available from 1996 onward.

Table 1- Summary Statistics

variable		mean	standard deviation	number of observations
Business birth rates	all	1.969304	1.233126	1250
	small	1.863527	1.445077	1250
	large	2.280933	1.074447	1250
KIEA		0.2973242	0.0776783	500
Patents per 100,000 population		20.2415	15.73085	1250
Venture Capital per 100,000 population		233.1964	752.8537	1050
Sole Proprietorship Rate		17.70555	3.352159	1250
EFNA		7.09152	0.6478169	1250
Size of Government		7.354864	0.9174903	1250
Taxation		7.252704	0.6618734	1250
Labor Market Freedom		6.666496	0.8689193	1250
GSP per capita		34926.82	8079.256	1250
Unemployment rate		5.591872	1.673803	1250
Percent of population over 24 with a bachelor's degree		21.29968	5.219233	1250
Population Density		175.2155	242.4134	1250
Percent of population who is white		0.8328423	0.1231484	1250
Median age		34.14166	2.678531	1250

The data on business startups and closures is from the Census Bureau's Business Dynamics Statistics program which is itself created from the Longitudinal Business Database. The Longitudinal Business Database covers businesses with paid employees in the Census Bureau's business register. We use this data to ca'culate a net business birthrate (accounting for new establishments and establishments that close shop) for each state in each year.

The Kaufman Index of Entrepreneurial Activity (KIEA) uses data from the Current Population Survey. It is similar to business start-ups but rather than measuring the number of starts it estimates the proportion of the population who start businesses who weren't already business owners.

Patent activity (per 100,000 population) allows a rough view of the creation of new products and hence entrepreneurial activities. This data, from the U.S. Patent and Trademark Office, gives us a measure of entrepreneurial activity regardless of whether it is occurring within an established firm or in a new firm.

Venture capital under management (per 100,000 population) is available in the National Venture Capital Association's annual yearbook. This data gives us insight into the creation of

new businesses with growth potential. Our sole-proprietorship data is from the Bureau of Economic Analysis.

Entrepreneurship is affected by a variety of factors in addition to economic freedom. Nyström includes only GDP per capita and unemployment as control variables in her panel study. Sobel (2008) includes median age, population density, percent of population with a college degree, and percent of population that is male in his cross sectional study of the U.S. states. Kreft and Sobel include percent of population with high school diploma and percent with a college degree. They also include demographic controls: percent of the population that is male, percent of the population that is white, median age, and economic controls: unemployment rate, percent of the labor force in service industries, and the property crime rate.

Hall and Sobel in their 2008 cross-sectional study of the states include demographic controls including percentage of the population of Hispanic descent, percent male, median age and population density. They also include the percentage of the population with a college degree, and a measure of homestead exemptions in different states[7], GDP per capita, and unemployment rate.

We follow the literature in including the following control variables: unemployment rate, gross state product per capita, population density, percent of population that is white, median age, and the percent of the population with a high school diploma or a bachelor's degree or higher.[8]

RESULTS

We test both the contemporaneous and lagged effects of economic freedom on five measures of entrepreneurship. As anticipated, we find that increased economic freedom leads to a higher business birthrate; however, results are less clear when using the other measures of entrepreneurship. We use multi-year averages in our regressions because it can take time to start a business and also because entrepreneurs may care about long run trends in freedom and not just momentary levels of freedom.[9] So in the contemporaneous regressions EFNA scores (as well as the control variables) are averaged over rolling five year periods and regressed on the rolling five year averages of our measures of entrepreneurship. We also run other regressions that lag the right hand side variables by five years so that we are calculating the relationship between the average EFNA over a five year period and entrepreneurship over the next five year period (this specification posits, for example, that the average level of economic freedom in a state between 1981 and 1985 affects the average level of entrepreneurship in that state from 1986 through 1990). Tables 2 and 3 contain our main results.

Table 2- Contemporaneous Effects

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[7] Their measure of homestead exemptions is from Garrett and Wall (2006) and looks at the proportion of an entrepreneur's home's value that is protected in bankruptcy proceedings.

[8] The data for these variables are collected from the Bureau of Economic Analysis (BEA) for unemployment rates and GSP, and the Census Bureau for the rest.

9 For example, with 29 data points per state (for each year from 1981 to 2009), we calculate 25 5-year averages for each variable (i.e. we have the mean for each state for the period from 1981-1985, 1982-1986, and so on through 2005-2009).

Table 3- Lagged Effects

		Contemporaneous Effects			
Independent Variables	Kauffman Index	net business birthrate	patents per capita	venture capital per capita	sole proprietorship rate
EFNA	5e-05	1.8538**	1.03074	69.33438	0.01415
	(8e-04)	(0.9311)	(1.6689)	(108.3405)	(0.028)
GSP	-0.00114***	1.5681**	0.00019	0.00659	-0.06296***
	(4e-04)	(0.7174)	(4e-04)	(0.0087)	(0.0169)
unemployment rate	0.00011**	-0.16306*	0.58966	73.04173**	-0.00137
	(1e-04)	(0.0843)	(0.7754)	(30.9523)	(0.0013)
bachelor's degree	8e-05***	-0.03304	1.23018***	56.70931**	0.00305***
	(0)	(0.0336)	(0.3667)	(23.8407)	(7e-04)
population density	-0.00042***	-0.13139***	0.0166**	0.78694	-0.01667***
	(0)	(0.062)	(0.0071)	(0.5829)	(0.0017)
percent white	0.00033	-0.37511	50.70464***	1094.08671*	0.07133***
	(5e-04)	(0.6322)	(7.1974)	(625.1537)	(0.0119)
median age	-0.00024	-3.00495	-0.55261	11.29774	0.09433***
	(0.0013)	(2.3426)	(1.1215)	(22.2438)	(0.0333)
Adj. R2	0.57907	0.20597	0.31974	0.25337	0.64815
F statistic	103.26	46.64	84.981	51.379	345.68
p-value	8.564e-92	8.9741e-59	1.1254e-100	7.6445e-63	4.1048e-284
# of observations	500	1250	1250	1050	1250

* $p < 0.10$
** $p < 0.05$
*** $p < 0.01$

Robust standard errors in parentheses

		Lagged Effects			
Independent Variables	Kauffman Index	net business bithrate	patents per capita	venture capital per capita	sole proprietorship rate
EFNA	0.00038	1.77895**	0.26107	87.42756	0.0072
	(7e-04)	(0.8891)	(1.8948)	(113.7601)	(0.0277)
GSP	-0.00105***	1.2077	0.00031	0.0031	-0.05446***
	(4e-04)	(1.0319)	(4e-04)	(0.01)	(0.0166)
unemployment rate	1e-04	0.12264*	0.4939	82.35171**	-0.00205**
	(1e-04)	(0.0647)	(0.9014)	(35.0277)	(0.001)
bachelor's degree	9e-05***	0.00092	1.2723***	70.37975**	0.0032***
	(0)	(0.0437)	(0.4381)	(28.6071)	(7e-04)
population density	-0.00041***	-0.20624**	0.01625**	0.94447	-0.01592***
	(0)	(0.0857)	(0.0073)	(0.6553)	(0.0017)
percent white	0.00039	0.62206	56.34881***	1289.60053*	0.06331***
	(5e-04)	(0.6834)	(9.1067)	(722.3796)	(0.0106)
median age	0	-3.05009	-0.72481	9.72812	0.08814***
	(0.0014)	(2.8437)	(1.2392)	(24.8799)	(0.0328)
Adj. R2	0.5705	0.22735	0.31803	0.2714	0.64472
F statistic	99.531	42.381	67.493	53.77	272.98
p-value	1.6357e-89	2.515e-52	2.3209e-79	5.3022e-65	1.5562e-224
# of observations	500	1000	1000	1000	1000

* p < 0.10
** p < 0.05
*** p < 0.01

Robust standard errors in parentheses

Our baseline regressions are fixed time-effects models[10] and include EFNA score, gross

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[10] Diagnostic tests confirm that fixed-time-effects is the appropriate model. Due to cross-sectional correlation and heteroskedacticity we calculate robust standard errors.

state product per capita, unemployment rate, percentage of population over 24 with a bachelor's degree, population density, and percentage of population that is white and median age as independent variables. For regressions on KIEA, business birthrates and sole-proprietorship we take the log of any variable that is not already a percentage.

We can see in Tables 2 and 3 that a one standard deviation increase in average E?NA score for a given five year period increases business birthrates by 1.2% over that period (0.65 * 1.85%), and 1.15% in the next five year period. For all the other measures of entrepreneurship economic freedom has the expected sign but is insignificant. Higher GSP per capita is associated with higher business birth rates in contemporaneous regressions, lower scores on the KIEA, and lower levels of sole-proprietorship. A higher unemployment rate is associated with higher levels of venture capital per capita and a higher KIEA score. In the lagged regressions, higher GSP per capita is associated with lower scores on KIEA and lower levels of sole-proprietorship. A higher unemployment rate is associated with higher business birthrates and venture capital, but lower levels of sole-proprietorship.

A higher proportion of a population with bachelor's degrees is associated with an increase in each of our measures except business birthrates. Higher population density decreases business birthrates, KIEA, and sole-proprietorship, but increases patents per capita. The percentage of the population that is white affects patents, venture capital, and sole proprietorship positively.

The fact that economic freedom wasn't a significant determinant of all five proxies for entrepreneurship needn't be troubling. Each represents a different aspect of entrepreneurship that might not be equally sensitive to changes in freedom. Net business starts had the expected effect, with greater freedom leading to higher entrepreneurial activity.

For sole proprietorships the effect was insignificant. This is consistent with the fact that other studies have found conflicting results on economic freedom's effect on sole proprietorships. The reason is likely that some sole proprietorships are probably created in response to economic opportunities along the lines of the standard story where greater freedom gives greater flexibility and higher rewards while others are created precisely because there is little economic freedom. If there is little freedom and low economic growth that might lead one to be forced to be self-employed and creating a sole proprietorship. This is consistent with some of the work on global 'necessity' entrepreneurship done with the GEM.

Although venture capital is sometimes used as a proxy for entrepreneurship in the literature, it's not clear that the existence of venture capital is a measure of entrepreneurship. Instead, acts of entrepreneurship might attract venture capital (Kreft and Sobel 2005). Another possibility may be that venture capital is flowing primarily into subsidized industries. Another possibility is that the venture capital industry is just too small for us to pick up significant effects. In 2011 there were 173 firms raising venture capital, in 1991 that number was just 40 (National Venture Capital Association, 2012). Yet another possibility is that because venture capital goes to specific industries that tend to make location decisions based on proximity to research centers, the location of which is unaffected by economic freedom, or is slow to change after setting up in an area. Nearly half of venture capital investment in 2011 went to software (24%), biotechnology (17%), and IT services (8%); more than half of 2011 total investment was in California (51%)(National Venture Capital Association, 2012).

The insignificance of the KIEA index is likely related to the insignificance of sole-proprietorships. A Pearson product-moment correlation yields a correlation between KIEA and sole-proprietorship of 0.724; given this, it is likely that the KIEA index is measuring sole-proprietorship and so facing the same problems discussed above.

We next break down the economic freedom index into its components to see which aspects of freedom are more important for entrepreneurship. Tables 4 and 5 contain our results.

Table 4- Contemporaneous Effects (by component)

Independent Variables	Contemporaneous Effects				
	Kauffman Index	net business bithrate	patents per capita	venture capital per capita	sole proprietorship rate
Size of government	0.00065	0.73421	2.9126*	160.87606*	0.02638
	(6e-04)	(0.7751)	(1.5926)	(90.3794)	(0.0183)
Taxation	-0.00099	0.0337	-0.99367	-103.67299	-0.00232
	(9e-04)	(1.0627)	(2.947)	(84.7772)	(0.0307)
Labor market freedom	0.00016	0.90775	-1.35296	-29.24176	-0.01136
	(8e-04)	(1.0454)	(1.2252)	(62.145)	(0.0248)
GSP	-0.00093*	1.68936**	0.00017	0.00878	-0.06356***
	(5e-04)	(0.7382)	(4e-04)	(0.0084)	(0.0185)
unemployment rate	0.00016**	-0.15597*	1.18101*	115.22229**	-0.00067
	(1e-04)	(0.085)	(0.6127)	(45.2325)	(0.0014)
bachelor's degree	8e-05***	-0.03455	1.23549***	55.8149**	0.00307***
	(0)	(0.0329)	(0.3756)	(23.942)	(7e-04)
population density	-0.00044***	-0.13663**	0.01713***	0.78274	-0.01675***
	(0)	(0.0641)	(0.0066)	(0.5989)	(0.0017)
percent white	0.00037	-0.29105	50.17836***	1145.55488*	0.06996***
	(5e-04)	(0.6714)	(9.942)	(622.1314)	(0.0105)
median age	3e-05	-2.96046	-0.5069	14.00986	0.09748***
	(0.0012)	(2.3712)	(1.1075)	(20.975)	(0.034)
Adj. R2	0.58572	0.20675	0.32927	0.26535	0.65093
F statistic	83.191	36.466	69.132	42.592	273.24
p-value	3.0881e-92	1.7711e-57	8.565e-103	6.1358e-65	1.0609e-284
# of observations	500	1250	1250	1050	1250

* p < 0.10
** p < 0.05
*** p < 0.01

Robust standard errors in parentheses

Table 5- Lagged Effects (by component)

Independent Variables	Kauffman Index	net business birthrate	patents per capita	venture capital per capita	sole proprietorship rate
			Lagged Effects		
Size of government	0.00133**	2.28114***	2.92682	131.45215	0.02068
	(6e-04)	(0.7093)	(2.4486)	(102.091)	(0.0215)
Taxation	-0.00167**	-1.71229*	-2.68546	-89.08092	-0.00464
	(8e-04)	(0.948)	(3.8588)	(82.6324)	(0.0306)
Labor market freedom	0.00021	0.62962	-0.7034	14.75124	-0.00912
	(7e-04)	(0.7034)	(1.2923)	(58.3853)	(0.0217)
GSP	-0.00074	1.53362	0.00035	0.0057	-0.05449***
	(5e-04)	(0.9838)	(4e-04)	(0.01)	(0.0182)
unemployment rate	0.00016**	0.18251***	1.13708	105.63707**	-0.00146
	(1e-04)	(0.07)	(0.8787)	(48.0224)	(0.001)
bachelor's degree	8e-05***	-0.00126	1.26773***	69.81185**	0.00324***
	(0)	(0.0408)	(0.4679)	(28.8169)	(8e-04)
population density	-0.00045***	-0.21641***	0.01691**	0.96672	-0.01595***
	(0)	(0.0746)	(0.0073)	(0.6821)	(0.0017)
percent white	5e-04	0.90806	58.36547***	1390.99491*	0.06325***
	(5e-04)	(0.6061)	(11.8217)	(722.7132)	(0.0094)
median age	0.00023	-2.77948	-0.67355	11.53231	0.09108***
	(0.0012)	(2.9408)	(1.193)	(24.9822)	(0.0333)
Adj. R2	0.59898	0.25773	0.32803	0.27802	0.64615
F statistic	88.182	38.984	55.043	43.285	214.6
p-value	5.9754e-96	1.9724e-59	6.0337e-81	2.1111e-65	7.1029e-224
# of observations	500	1000	1000	1000	1000

* p < 0.10
** p < 0.05
*** p < 0.01

Robust standard errors in parentheses

In the contemporaneous regression we find positive and significant (at the 10 percent level) coefficients for the size of government impacting patent and venture capital activity; a one standard deviation increase in this component of freedom is associated with 2.68 more patents per 100,000 state residents (2.91 * 0.92) and an additional $148 million of venture capital investment per 100,000 state residents. We find insignificant results for the remaining measures of freedom on the various measures of entrepreneurship. In the lagged regressions, we find that the size of government coefficient is significant and positive for KIEA and business birthrates, while the taxation coefficient is significant and negative for these measures. These coefficients imply that a standard deviation increase in a state's score for size of government would increase its KIEA score by 0.0012 (indicating an increase of 1.2 entrepreneurs per 100,000 people) and its net business birthrate by 2.09%, while a standard deviation in a state's taxation score would decrease KIEA by 0.0011 and net business birthrates by 1.13%. The other EFNA coefficients are insignificant and, except for one coefficient (labor market freedom for venture capital), retain the same signs as in the contemporaneous regression. A smaller government leaves more opportunities for businesses to pursue resulting in slightly higher KIEA scores and higher business birthrates. We find the unexpected result that lower taxes in one five-year period is associated with lower KIEA scores and lower business birthrates in the following five years. One reason could be that people are starting businesses in order to take tax breaks and avoid higher standard tax rates. Another possibility is that a progressive tax system acts as a form of business income insurance because losses in one year can be written off against gains in other years (Bacher and Brulhart, 2012).

Robustness Checks

We include a series of robustness checks described below. Select tables are available in Appendix B.

Including regional dummies increases the significance and magnitude of the freedom coefficient for business birthrates in both the contemporaneous and lagged regressions from 1.85 and 1.78 to 2.22 and 2.03 respectively, representing an increase of 1.44% and 1.32% for a one standard deviation increase in economic freedom. When freedom is broken-down into its components, the regional dummies increase the magnitude and significance of the size of government coefficient in the contemporaneous regression from 0.73 to 1.31 (which implies an increase in birthrates of 1.2% for a standard deviation increase in this component of freedom). In the lagged regression, all three components of economic freedom become significant in explaining business birth rates (with a standard deviation increase in each component of freedom associated with an increase birthrates by 2.13%, for size of government, a decrease by 1.17%, for taxation, and an increase by 1.07%, for labor market freedom). The taxation coefficient remains negative, and increases in significance. Our results for business birthrates are robust to including regional dummies and positively correlated with economic freedom (with the counter-intuitive caveat remaining that higher taxes are at least weakly correlated with higher business birth rates).

Adding regional dummies also yields a positive and significant (at the 10% level) EFNA coefficient of 3.24 for patents in the contemporaneous regression (implying 2.1 additional patents per 100,000 population for a standard deviation increase in freedom), but this significance goes away in the lagged regression. Venture capital's size of government coefficient in the contemporaneous regression is positive and significant (with a value of 175, implying $160.73 million additional venture capital investment for a standard deviation increase in this

EFNA component). The size of government coefficient is positive and highly significant for patent activity in both the contemporaneous regression (where it's magnitude increases from 2.91 in the baseline to 4.31, implying 2.67 and 3.95 additional patents per 100,000 residents, respectively, for a standard deviation increase in this EFNA component) and the lagged regression (where it's magnitude increases from 2.92 to 4.69; implying 2.68 and 4.30 additional patents per 100,000 residents, respectively, for a standard deviation increase in this EFNA component). Regional dummies have little impact on KIEA, where our only significant freedom coefficients are size of government and taxation in the lagged regression; the magnitude of these coefficients changes very little (from 0.00133 to 0.00114 for size of government, each implying little more than one additional entrepreneur per 100,000 residents for a standard deviation increase in this EFNA component, and -0.00167 to -0.00184 for taxation, implying just over 1.5 fewer entrepreneurs).

To further check the robustness of our model we run regressions excluding outliers and using an alternate educational variable (percent of adult population with a high school diploma). The alternate education variable has no significant impact on the results and so will not be discussed further. Nevada, Arizona, and Utah had high business birthrates over this period; excluding these states leads to little change over the baseline regressions. The taxation coefficient in the contemporaneous regression becomes positive, but is still insignificant, while it remains negative in the lagged regression but loses statistical significance. The contemporaneous regression's EFNA coefficient of 1.85 falls to 1.60 (implying an increase of 1.03% for a standard deviation increase in EFNA) and its significance falls to the 10% level. For the lagged regression, the reverse occurs; the coefficient increases from 1.78 to 1.86 (an increase of 1.2% in birthrates for a standard deviation increase in EFNA) and significance increases to the 1% level. Breaking down EFNA doesn't change the significance of any coefficient although values fluctuate somewhat. The lone significant freedom coefficient, size of government in the lagged regression shrinks from 2.28 to 1.74 (implying 1.6% higher birthrates for a standard deviation increase in EFNA) and continues to be highly significant.

In short, our most consistent result, that economic freedom increases business birth rates, is robust to including regional dummies, an alternative measure of education, and excluding outliers. Furthermore, the inclusion of regional dummies gives some evidence that economic freedoms might be important for other measures of entrepreneurship as well.

Since business birth rates are our most consistent result we also break them down by firm size (see Appendix B for tables). We split the data for business birth rates into two groups: businesses with 50 or more employees and businesses with fewer than 50 employees. For the contemporaneous regressions, we find that excluding small businesses increases the magnitude and significance of our EFNA and size of government coefficients. For the lagged regressions excluding small businesses the EFNA coefficient is smaller but more significant, the size of government coefficient is smaller and less significant, and the taxation coefficient is smaller (but still negative) and more significant. This indicates that small businesses are less sensitive to changes in overall freedom, but over time are more sensitive to increases in the size of government.

CONCLUSION

One conception of entrepreneurship makes it omnipresent in market economies. Ludwig Von Mises defined the entrepreneur not as a particular man but as a particular function. For him

entrepreneurship "is inherent in every action and burdens every actor" because the term entrepreneur means "acting man exclusively seen from the aspect of the uncertainty inherent in every action....every action is embedded in the flux of time and therefore speculation. The capitalists, the landowners, and the laborers are by necessity speculators" (1949: 252-253). In his conception, and Kirzner's, as long as there is freedom to choose, entrepreneurship will be present in market economies. In this sense entrepreneurship and freedom are inseparable.

Our empirical examination finds that economic freedom is consistently associated with a higher rate of business births. Other measures of entrepreneurship are not clearly associated with economic freedom. In some specifications economic freedom generally, and the size of government in particular, are positively associated with a larger number of patents per capita. In one instance, a smaller size of government was associated with more venture capital per capita. Sole-proprietorship is simply too messy to be used as a proxy for entrepreneurship without more detailed micro data. The Kauffman Index appears to capture a good deal of sole-proprietorship activity, which confounds its use as a proxy for entrepreneurship.

There are many types of freedom and many aspects of entrepreneurship. We have looked at the relationship between economic freedom and five measures of entrepreneurial activity in the United States between 1981 and 2009. We find that greater economic freedom increases business birth rates and in some cases patents. Specifically it appears that freedom from a large governmental sector is most important. Economic freedom does not appear to be important in explaining the presence of venture capital though we don't believe that venture capital is a particularly good measure of entrepreneurship. Economic freedom doesn't consistently impact the number of sole proprietorships or scores on the Kaufman Index of Entrepreneurial Activity. Overall our results support the view that economic freedom is important for promoting some aspects of entrepreneurship.

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APPENDIX A: DATA SOURCES

Variable	Source
EFNA score	Economic Freedom of North America: 2011 Annual Report
Business birthrates	Business Dynamics Statistics, United States Census Bureau
Patents	Extended Year Set - Patents By Country, State, and Year Utility Patents (December 2011), U.S. Patent and Trademark Office
Venture Capital	2011 NVCA Yearbook, National Venture Capital Association.
Sole-proprietorship rate	U.S. Department of Commerce, Bureau of Economic Analysis, State and Local Area Data
Gross state product	U.S. Department of Commerce, Bureau of Economic Analysis, State and Local Area Data
Unemployment rate	U.S. Department of Commerce, Bureau of Economic Analysis, State and Local Area Data
Percentage of population over age 24 with high school diploma or equivalent	Statistical Abstract of the United States, United States Census Bureau
Percentage of population over age 24 with bachelor's degree or higher	Statistical Abstract of the United States, United States Census Bureau
Population density	Statistical Abstract of the United States, United States Census Bureau
Percentage of population that is white	Statistical Abstract of the United States, United States Census Bureau
Median Age	Statistical Abstract of the United States, United States Census Bureau

APPENDIX B: TABLES FROM ROBUSTNESS CHECKS
Table 6 - Business Birthrates by Firm Size

Independent Variables	Contemporaneous Effects			Lagged Effects		
	net business birthrate by establishment size			net business birthrate by establishment size		
	all	small	large	all	small	large
EFNA	1.8538**	1.72844*	2.31106***	1.77895*	1.75548	1.59865**
	(0.9311)	(1.0301)	(0.6479)	-0.8891	-0.9985	-0.59
GSP	1.5681**	1.67497**	1.12039	1.2077	1.29599	0.84594
	(0.7174)	(0.731)	(0.7016)	-1.0319	-1.0686	-0.9558
unemployment rate	-0.16306*	-0.18188**	-0.08257	0.12264	0.15096*	0.01399
	(0.0843)	(0.0919)	(0.0585)	-0.0647	-0.0701	-0.0486
bachelor's degree	-0.03304	-0.0242	-0.04897	0.00092	0.01869	-0.04433
	(0.0336)	(0.0351)	(0.0302)	-0.0437	-0.0453	-0.0407
population density	-0.13139**	-0.15985**	-0.03173	-0.20624*	-0.24099*	-0.08301
	(0.062)	(0.0661)	(0.0585)	-0.0857	-0.0954	-0.064
percent white	-0.37511	-0.27617	-0.56276	0.62206	0.87489	0.00101
	(0.6322)	(0.6977)	(0.4543)	-0.6834	-0.7564	-0.4728
median age	-3.00495	-3.29047	-1.83927	-3.05009	-3.4178	-1.50684
	(2.3426)	(2.7218)	(1.3022)	-2.8437	-3.3255	-1.3912
Adj. R2	0.20597	0.20172	0.17841	0.22735	0.24253	0.11832
F statistic	46.64	45.425	38.999	42.381	46.151	19.243
p-value	8.9741e-59	2.46e-57	1.31186e-49	2.52E-52	1.33E-56	3.42E-24
# of observations	1250	1250	1250	1000	1000	1000

* p < 0.10
** p < 0.05
*** p < 0.01

Robust standard errors in parentheses

Table 7- Business Birthrates by Firm Size (By Component)

Independent Variables	Contemporaneous Effects			Lagged Effects		
	net business birthrate by establishment size			net business birthrate by establishment size		
	all	small	large	all	small	large
Size of government	0.73421	0.63704	1.36735**	2.28114**	2.45606**	1.6154*
	(0.7751)	(0.8563)	(0.648)	(0.7093)	(0.8245)	(0.6967)
Taxation	0.0337	0.07332	-0.3052	-1.71229	-1.86083	-1.33479*
	(1.0627)	(1.2161)	(0.6154)	(0.948)	(1.1182)	(0.5806)
Labor market freedom	0.90775	0.87172	0.90521	0.62962	0.55956	0.79162
	(1.0454)	(1.1164)	(0.8482)	(0.7034)	(0.7664)	(0.6304)
GSP	1.68936**	1.78389**	1.30016*	1.53362	1.63481	1.13369
	(0.7382)	(0.7628)	(0.8827)	(0.9838)	(1.0153)	(0.9146)
unemployment rate	-0.15597*	-0.17678*	-0.05877	0.18251**	0.21701**	0.05336
	(0.085)	(0.0922)	(0.0629)	(0.07)	(0.0755)	(0.0549)
bachelor's degree	-0.03455	-0.02552	-0.05123*	-0.00126	0.01671	-0.04727
	(0.0329)	(0.0347)	(0.028)	(0.0408)	(0.0426)	(0.037)
population density	-0.13663**	-0.16456**	-0.04028	-0.21641**	-0.25171**	-0.09115
	(0.0641)	(0.0678)	(0.0604)	(0.0746)	(0.083)	(0.0589)
percent white	-0.29105	-0.19742	-0.45775	0.90806	1.17463	0.24588
	(0.6714)	(0.7402)	(0.4575)	(0.6061)	(0.673)	(0.4294)
median age	-2.96046	-3.25226	-1.72861	-2.77948	-3.11547	-1.34448
	(2.3712)	(2.7447)	(1.3588)	(2.9408)	(3.4266)	(1.4919)
Adj. R2	0.20675	0.20223	0.18389	0.22735	0.24253	0.11832
F statistic	36.466	35.459	31.493	42.381	46.151	19.243
p-value	1.7711e-57	5.8633e-56	6.8841e-50	2.52E-52	1.33E-56	3.42E-24
# of observations	1250	1250	1250	1000	1000	1000

* p < 0.10
** p < 0.05
*** p < 0.01

Robust standard errors in parentheses

Table 8- Baseline Model Excluding Outliers - Contemporaneous Effects

Independent Variables	Business birthrates excluding outliers			
	contemporaneous	lagged	contemporaneous	lagged
EFNA	1.59967*	1.85521***	—	—
	(0.8686)	(0.6841)		
Size of Government	—	—	0.07733	1.73652***
			(0.7108)	(0.5715)
Taxation	—	—	0.98498	-0.94946
			(1.1303)	(0.9081)
Labor market freedom	—	—	0.59754	0.71884
			(1.0121)	(0.6106)
GSP	0.88933*	0.31177	0.81222	0.65266
	(0.4849)	(0.589)	(0.5898)	(0.5966)
unemployment rate	-0.15203**	0.13769***	-0.16961**	0.18175***
	(0.0769)	(0.0497)	(0.0805)	(0.0544)
bachelor's degree	-9e-04	0.04492*	0.00024	0.0397
	(0.0222)	(0.0269)	(0.0227)	(0.0269)
population density	-0.1241**	-0.20601***	-0.11966*	-0.22295***
	(0.058)	(0.049)	(0.0617)	(0.046)
percent white	-0.56363	0.28229	-0.58741	0.42226
	(0.7857)	(0.6375)	(0.7929)	(0.6504)
median age	0.08021	1.46997	-0.11582	1.97273
	(3.256)	(2.6465)	(3.295)	(2.3695)
EFNA				
Adj. R2	0.14408	0.17634	0.14358	0.15779
F statistic	22.089	22.514	28.274	25.299
p-value	8.0936e-35	8.7496e-35	4.6926e-36	1.0536e-31
# of observations	1175	940	1175	940

* p < 0.10

** p < 0.05

*** p < 0.01

Robust standard er