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Small Business Activity Does not Measure Entrepreneurship

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Abstract: Entrepreneurship policy mainly aims to promote innovative “Schumpeterian” entrepreneurship. However, the rate of entrepreneurship is commonly proxied using quantity-based metrics, such as small business activity, the self-employment rate or the number of startups. We argue that those metrics give rise to misleading inferences regarding high-impact Schumpeterian entrepreneurship. In order to unambiguously identify high-impact entrepreneurs we focus on self-made billionaires (in USD) who appear in *Forbes Magazine’s* list and who became wealthy by founding new firms. We identify 996 such billionaire entrepreneurs in fifty countries in 1996–2010, a systematic cross-country study of billionaire entrepreneurs. The rate of billionaire entrepreneurs correlates *negatively* with self-employment, small business ownership and firm startup rates. Countries with higher income, higher trust, lower taxes, more venture capital investment and lower regulatory burdens have higher billionaire entrepreneurship rates but less self-employment. Despite its limitations, the number of billionaire entrepreneurs appears to be a plausible cross-country measure of Schumpeterian entrepreneurship.

Keywords: Entrepreneurship; Innovation; Institutions; Regulation; Self-employment.

JEL Codes: L5; M13; O31; P14.

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Introduction

Given the prominence of entrepreneurship, it may come as a surprise that there is no consensus on how it should be defined in empirical research. Sometimes entrepreneurship is used to refer to anyone operating a private business, regardless of size and activity. Driven by greater data availability, most empirical studies rely on definitions such as the self-employment rate, the number of startups and small business activity (1). In other contexts entrepreneurship refers to the subset of firms that are innovative and growth driven (2, 3). This Schumpeterian definition of the entrepreneur as an innovator and as a driver of growth dominates in theoretical entrepreneurship research and in entrepreneurship policy (4, 5). Thus, when academics and business leaders were asked to define entrepreneurship, the most common choices were the creation and growth of new ventures and innovation. By contrast, “the creation of a mom-and-pop business” was not viewed as entrepreneurship (6).

Leaving aside the semantic discussion of what exactly constitutes entrepreneurship, there is an important empirical issue of how well commonly used operationalizations capture the rate of Schumpeterian entrepreneurship. An implicit assumption appears to be that countries and industries with a large number of small firms and startups also tend to be those where most innovative high-growth firms emerge.

Yet, an overwhelming majority of the self-employed are not entrepreneurial in the Schumpeterian sense, as they never bring a new innovation to the market and do not plan to grow their business. In the U.S., the industries with the largest concentrations of self-employed men are construction, landscaping services, auto repair, restaurants, truck transportation, and farming. For women, the corresponding industries include private households (cooks, maids), child day care services, restaurants and beauty salons. The majority of small businesses in the U.S. have no employees other than the owner. Nor do most small businesses eventually grow large. Most small businesses are best described as permanently small rather than nascent entrepreneurial firms.

Shane (7) argues that opportunity entrepreneurs should be treated separately, documenting a negative cross-country correlation between having many high- and many low-expectation startups. Baumol (3) distinguishes between “innovative and “replicative” entrepreneurs, where the former are the type of entrepreneurs studied by Schumpeter (2). Hurst and Pugsley (8) forcefully argue against using self-employment as synonymous with entrepreneurship. They estimate that only 10–20% of small businesses report any innovative activity at all and point out that when new startups were asked about growth ambitions, 75% of respondents stated that “I want a size I can manage myself or with a few key employees”. Different types of business owners also differ in terms of personality traits (9).

Both types of businesses are important for a well-functioning economy, but their workings are entirely different. Innovative and replicative businesses operate in different ways, but are not easily distinguishable in statistics, which means that special approaches must be designed for empirical analysis.

One way through which scholars have attempted to distinguish the different classes of firms is by restricting attention to “high-impact entrepreneurs” (10,11), which is to say those that grow rapidly. The difficulty of estimating the rate of high-impact entrepreneurship in a standardized way across countries has thus far prevented cross-country comparisons.

We propose a new measure of high-impact Schumpeterian entrepreneurship across countries using information from the *Forbes Magazine* world-wide list of billionaires during two decades. Our measure of high-impact entrepreneurship is based on the accumulation of wealth for founders of new business ventures. We compare this new measure to quantity-based empirical proxies for entrepreneurship such as self-employment, small business ownership and number of startups. Henceforth in the paper for the sake of brevity “entrepreneurship” refers to billionaire entrepreneurship, the focus of this paper.

For each billionaire, the source of wealth was investigated, allowing us to identify 996 self-made billionaires who became rich by founding new firms. Using these individuals to construct a per capita rate of high-impact entrepreneurship, we show that this measure is robustly and negatively correlated with self-employment rates, small business ownership rates and the rate of startup activity.

Self-Made Billionaire Entrepreneurs in the United States

We begin by focusing on the U.S. sample to convey an impression of the *Forbes* billionaire entrepreneurs. Americans account for around four in ten global billionaires. Tab. 1 summarizes results regarding education, industry and region. The most important source of wealth is finance followed by manufacturing and information technology. Billionaire entrepreneurs are highly educated and tend to attend elite universities, indicating *ex ante* talent. While the 15 highest ranked U.S. colleges account for less than 1% of U.S. college enrollment, one third of the billionaires graduated from these elite universities (12). Demographically, merely 2% of American billionaire entrepreneur are female while eleven percent are foreign born. Of the largest entrepreneurial firms in the U.S. founded in the post-war era, one half was founded by billionaire entrepreneurs on our list, indicating that the billionaire measure manages to capture entrepreneurial activity.

California and Massachusetts are strongly overrepresented in billionaire entrepreneurship. Furthermore, Twelve out of 13 Massachusetts based billionaires live in the Boston Metropolitan region or have founded firms active in Boston. Fifty out of California’s 99 billionaires live in or founded firms in the Bay Area.

Table 1 Characteristics of American billionaire entrepreneurs.

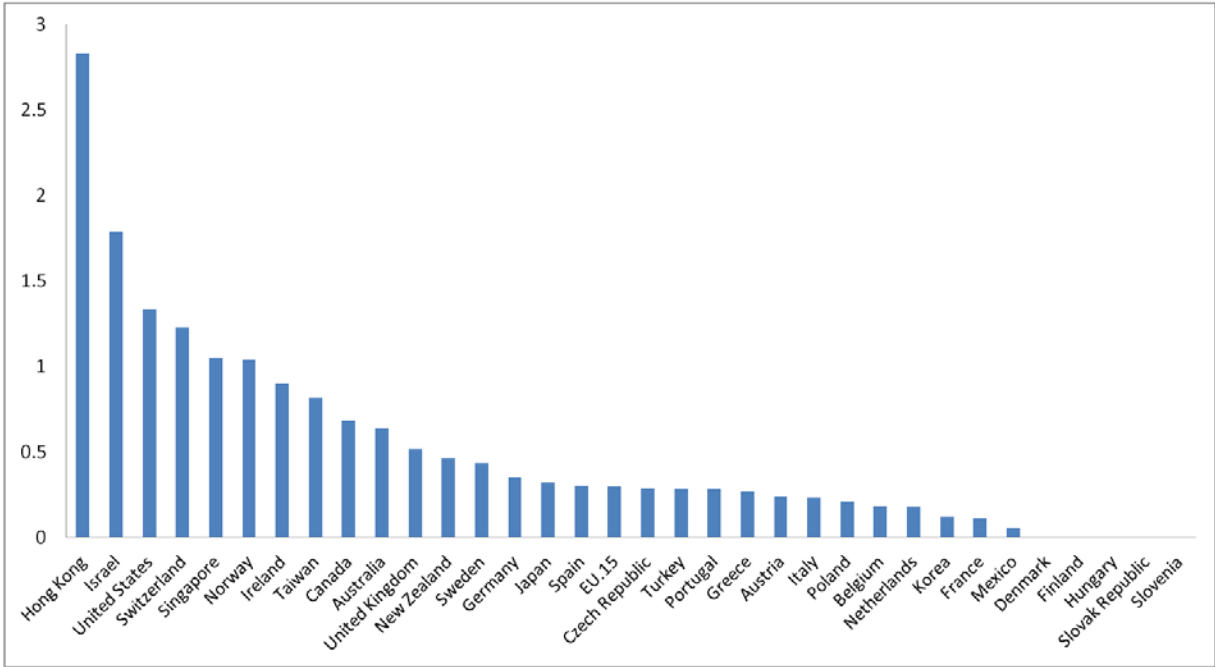
Educational attainment (%)		Billionaire entrepreneurs	Self-employed	Salaried workers	
High School or less		6.1	31.6	36.8	
Some college		10.4	17.6	17.1	
College degree		38.5	34.3	33.6	
Advanced Degree		45.0	16.5	12.5	
Source of wealth by industry (share in %)					
Finance	23.1	Real estate	10.5	Health Care	1.9
Manufacturing	18.5	Mining, oil & gas	6.1	Professional & technical services	1.9
<i>(of which IT)</i>	6.6	Art & entertainm.	3.6	Construction	1.2
Information	17.0	Accommodation & food services	3.2	Wholesale trade	1.2
<i>(of which IT)</i>	9.2	Transportation	2.9	Forestry & agricult.	1.0
Geographic region		No.	Relative to population		
Northeast		109	1.44		
<i>(of which New York)</i>		76	2.85		
<i>(of which Massachusetts)</i>		13	1.45		
Midwest		56	0.61		
South		104	0.71		
<i>(of which Texas)</i>		36	1.17		
West		137	1.48		
<i>(of which California)</i>		99	2.02		

Note: Educational attainment refers to population aged 25+. Entrepreneurs are assigned to states based on *Forbes'* designation. If *Forbes* did not specify a state this is based on residence. Relative to population is defined as the share of total entrepreneurs divided by the population share of state/region 1996–2009.

Results

Cross-Country Evidence on Self-Employment and Entrepreneurship. Among OECD countries Mexico, Greece, Italy, South Korea, Turkey and Portugal stand out as the countries with the highest rates of self-employment. By contrast, the U.S. has the second lowest self-employment rate among developed nations. The average rate of self-employment in Western Europe is twice that of the U.S. Fig. 1 instead shows the number of billionaire entrepreneurs per million inhabitants (henceforth the rate of entrepreneurship). Hong Kong, Israel, the U.S., Switzerland and Singapore stand out as particularly entrepreneurial, while Western Europe and Japan have a comparatively low entrepreneurship rate. Considering the fact that self-employment is often used as a measure of entrepreneurship, the results in Fig. S1 and Fig. S2 in the SI Appendix, which plot the national self-employment rates against the entrepreneurship rates, are quite remarkable. Entrepreneurship and self-employment rates are negatively related.

Figure 1 Entrepreneurship Rate: Number of Billionaire Entrepreneurs per Million Inhabitants, 1996–2010.

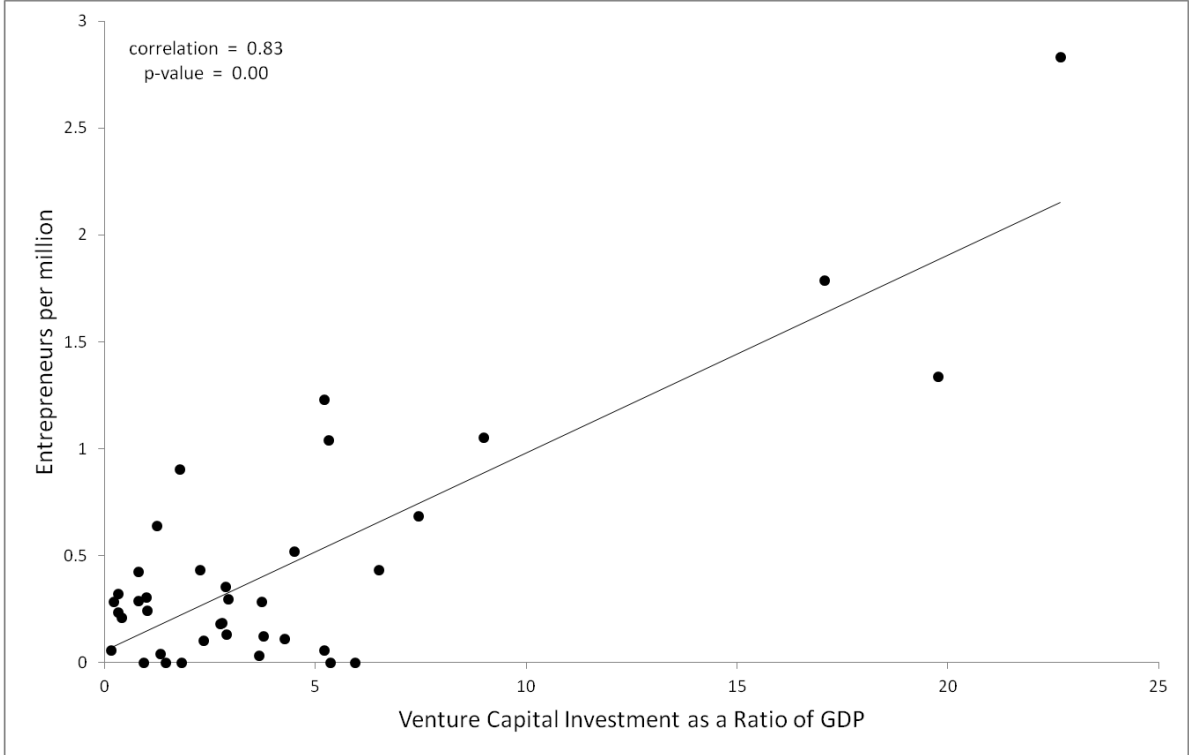


Entrepreneurship and small business activity relate in markedly different ways to the institutional environment. Countries with better institutions and more business friendly policies have fewer low-quality firms and more high-quality entrepreneurs. Self-employment is also strongly negatively linked to per capita income levels among the OECD countries (SI Appendix, Fig. S3).

The patterns observed for wealthy countries also hold for the full sample of nations: entrepreneurship is positively related to per capita income levels (SI Appendix, Fig. S4), whereas self-employment is negatively linked to per capita income levels (SI Appendix, Fig. S5 and Fig. S6).

One alternative when attempting to capture truly entrepreneurial activity, used increasingly by researchers, is to focus on VC-backed firms. Fig. 2 shows the correlation between VC investment as a share of GDP and the per capita number of billionaire entrepreneurs, which correlate positively. By contrast, there is a statistically significant negative correlation between self-employment rates and VC investment as a share of GDP (SI Appendix, Fig. S7).

Figure 2 Entrepreneurship and Venture Capital Investment as a Share of GDP.



When the level of trust in a society is low, it becomes more important to monitor employees closely or rely on your own or kin labor, which encourages self-employment. When hired employees cannot be trusted entrepreneurs will have a difficult time growing their firms rapidly around innovative ideas. In countries where trust is low, self-employment is high whereas entrepreneurship is low, and vice versa (SI Appendix, Fig. S8 and Fig. S9). Similarly, Sanandaji and Leeson (13) find that property rights protection and English legal origin are associated with many billionaire entrepreneurs per capita but fewer small firms.

Tab. 2 and Tab. 3 relate some of the correlations more systematically to self-employment and entrepreneurship rates, respectively, in the 90 countries for which we have data for all variables of interest. These countries represent over 80% of world GDP. Tab. 2 reports the association between entrepreneurship rates, population, per capita income, the corporate tax rate and the regulatory burden on firms. Higher numbers for regulation signify a less favorable regulatory environment. In Tab. 3 the citizenship of entrepreneurs is used to assign them to countries. In Tab. S1 and Tab. S2 in the SI Appendix the same regressions are run, but instead the entrepreneurs are assigned based on their country of residence and birth, respectively, producing similar results.

Table 2 Cross-Country Regressions of Self-Employment Rates.

	(1)	(2)	(3)	(4)
GDP per capita	-0.645** (0.085)	-0.654** (0.083)	-0.415** (0.105)	-0.445** (0.105)
Taxes		0.373* (0.161)		0.286** (0.156)
Regulations			0.119* (0.035)	0.107* (0.035)
Constant	36.49** (2.08)	26.93** (4.58)	24.11** (4.16)	18.03** (5.28)
R-squared	0.40	0.43	0.47	0.49
No. of obs.	90	90	90	90

This table reports standard cross-sectional regressions where the dependent variable is the self-employment rate. Taxes refer to the corporate income tax rate as measured by the World Bank. Regulations refer to the ease of doing business, again as measured by the World Bank. Two stars (**) denote statistical significance at the 1% level, one star (*) denote statistical significance at the 5% level.

Table 3 Cross-Country Regressions of Entrepreneurship Rates.

	(1)	(2)	(3)	(4)
Population	0.014** (0.0003)	0.015** (0.0004)	0.013** (0.0003)	0.014** (0.0004)
GDP per capita	0.037** (0.002)	0.039** (0.002)	0.024** (0.003)	0.027** (0.003)
Taxes		-0.027* (0.007)		-0.024** (0.007)
Regulations			-0.007** (0.001)	-0.007** (0.001)
Constant	0.159* (0.78)	0.750** (0.174)	0.893** (0.150)	1.393** (0.212)
R-squared	0.79	0.79	0.80	0.80
No. of obs.	90	90	90	90

This table reports coefficients from a Poisson Event Count Model where the dependent variable represents the number people who become billionaire entrepreneurs in each country. Taxes refer to the standard statutory corporate income tax rate as measured by the World Bank. Regulations refer to the ease of doing business, again as measured by the World Bank. Two stars (**) denote statistical significance at the 1% level and one star (*) denote statistical significance at the 5% level.

Tab. S3 in the SI Appendix relates VC investment as a share of GDP to per capita income, tax rates and regulations on business. Like our main measure of entrepreneurship, VC-investments are positively and statistically significantly related to per capita income. VC-investments are also negatively associated with tax rates and the regulatory burden. However, the associations are not statistically significant.

One concern is that the number of billionaire entrepreneurs merely reflects affluence. One way to avoid this issue is instead to measure the fraction of billionaires in each country who are entrepreneurs. The share of entrepreneurs among total billionaires in each country correlates in a statistically significant way with the self-employment rate (-0.24).

Entrepreneurship rates correlate positively with triadic patents per capita (+0.31), while self-employment correlates negatively (-0.35). Entrepreneurship rates correlate positively with the Global Innovation Index estimated by Cornell/INSEAD/WIPO (+0.59), while self-employment correlates negatively (-0.65). All correlations are statistically significant.

Silicon Valley and Boston are often identified as having above average rates of entrepreneurial activity (14). It is therefore interesting to investigate how common metrics of entrepreneurship perform in identifying entrepreneurial activity in these areas. Compared to the national average these regions had a lower self-employment rate, lower firm density, a lower share of employment in firms with less than 20 employees and a higher share of employment in firms with more than 500 employees (15 and 16). In the U.S. industries that produce more entrepreneur billionaires tend to have a lower share of employees working in firms with less than 20 employees, with a statistically significant correlation (-0.51).

Other Quantity-Based Measures. The problems with using self-employment to measure entrepreneurship have been recognized. In response researchers have devised new empirical measures, such as the rate of small business ownership or participation in startups. A prime example is the Global Entrepreneurship Monitor, which provides detailed cross-country data on recent startup participation. The GEM figures can be interpreted as the flow into the stock of self-employment. The GEM startup rates correlate strongly and positively ($r = 0.72$) with the non-agricultural self-employment rate. By contrast, the GEM measure correlates negatively with our measure of high-impact entrepreneurship ($r = -0.32$).

Table 4 The Correlation between Self-Employment and Other Entrepreneurship Proxies

Entrepreneurship Proxies	
Small business ownership rate	0.69
Small firm employment share	0.30
Startup rate (GEM TEA)	0.72
Billionaire entrepreneurs per capita	-0.33
VC investment as a share of GDP	-0.21
GDP per capita	-0.63

Sources and definitions: See main text.

Tab. 4 shows correlations between the self-employment rate and five different proxies for entrepreneurship plus GDP per capita. The alternative measures of entrepreneurship includes: (i) the small business ownership rate, defined as the share of the workforce who owns a business for the year 2007 (17); (ii) employment in firms with less than 10 employees as a share of total employment in 2007 (17); (iii) the widely used GEM Total Entrepreneurial Activity (TEA) measure for the years

2001–2010; (iv) the rate of billionaire entrepreneurship per capita; and (v) VC investment as a share of GDP.

Tab. 4 shows that the measures can be grouped into two categories. The rate of billionaire entrepreneurship per capita, VC investment as a share of GDP and per capita GDP are negatively related to self-employment. The second category consists of three conceptually related measures: the business ownership rate, the small firm employment share and the GEM measure of startup activity. They all correlate positively with self-employment. Thus the problem of self-employment being a poor proxy for high-impact Schumpeterian entrepreneurship is not solved by using empirical metrics conceptually close to the self-employment rate such as startup rates or the small business ownership rate. Focusing on VC investments is a useful way to isolate Schumpeterian entrepreneurship. However VC investments are sensitive to how advanced financial markets are; many OECD countries and most developing countries still lack a mature VC sector.

Implications

How Entrepreneurship Reduces Small Business Ownership and Self-Employment. Former JC Penney employee and retail franchise operator Sam Walton founded Walmart in 1962, when his idea for establishing discount stores in small town America was rejected by his employer. Walmart grew to be the largest private employer in the world. The story illustrates the impact that creative entrepreneurship can have on self-employment and small business. The growth of Walmart was accompanied by, and required, the replacement of thousands of smaller retail operations (18, 19).

This pattern is not unique to Walmart; firms such as Home Depot, Gap, Ikea, H&M and Amazon have similarly reduced the number of self-employed and small business owners in their industry. Nor is the process unique to the retail sector. Even the growth of firms such as Intel, Microsoft and Google, which do not directly compete with a large number of small businesses, reduce self-employment. In their case the mechanism is offering better career prospects for employees, thus raising the opportunity cost of self-employment. It is natural that entrepreneurship reduces the small-business share of employment, since each successful entrepreneurial venture results in an increase in the number of large firms. In the process of bringing new innovations to the market, entrepreneurs typically create entirely new organizations with thousands of new high paying jobs, some of which are filled by people who otherwise would work for themselves. The effect is even stronger if the entrepreneurial firm directly competes with small businesses and reduces their market share.

Entrepreneurship is one of the mechanisms through which firms with valuable innovations or firms that are more efficiently organized than their competitors in the product and labor markets grow their share of the economy. As these firms expand they replace and absorb the previously self-employed by providing better options. This simultaneously results in a more prosperous economy and a lower rate of self-employment. Cross-country comparisons confirm this pattern (20).

Asymmetric Policy Effects on Self-Employment and Entrepreneurship. Policymakers generally aim to encourage firms that grow, create many jobs and contribute to innovation, that is to say high-impact Schumpeterian entrepreneurs.

In most studies entrepreneurship is operationalized using one or more of the following measures: self-employment, small business ownership and the startup rate. Even studies that are theoretically

interested in the effect of taxes on Schumpeterian entrepreneurship often empirically rely on these metrics. In fact, the empirical literature on taxation of entrepreneurship has principally relied on self-employment as its empirical measure (21).

A crucial assumption required for this empirical strategy to be valid is that the quantity and quality of entrepreneurship are affected in a similar way by taxes or regulations.

The study of taxes and entrepreneurship is complicated by the well documented ability of small businesses to evade taxes (22, 23). Tax evasion is closely related to firm size. As the company grows an ever smaller share of firm income can be used for personal consumption, while the probability of tax audits increases. Several studies find that taxes increase self-employment, either because the self-employed face lower taxes than employees or because self-employment makes it easier to evade taxes (24, 25). There is little evidence, however, that large, successful entrepreneurial firms evade taxes at above average rates; the reverse is more likely (26). It is therefore possible that taxes, combined with the differential opportunities for evasion, increase small scale self-employment while reducing innovative entrepreneurship. Since small firms constitute the overwhelming majority of the observations in micro and macro datasets, they will dominate the result of any empirical estimation that does not distinguish between the self-employed and high-impact entrepreneurs, giving rise to spurious results for that subsample.

The relationship between regulations and entrepreneurship has parallels to taxation. The self-employed and small firms can more easily evade regulations than employees of large firms. In most countries small firms below a certain threshold are exempt from many burdensome regulations. In particular, the strict employment protection legislation many countries impose on firms larger than a certain size. A heavy regulatory burden can thus reduce innovative entrepreneurship while making non-entrepreneurial self-employment more attractive than working as an employee of a regulated firm.

Conclusions

Despite decades of academic research Schumpeterian entrepreneurship remains an elusive concept, difficult to define exactly and harder yet to measure. Researchers have therefore relied on a number of easily available and well-defined quantity-based metrics such as self-employment and the business ownership rate to proxy for entrepreneurship. We show that this empirical practice can result in misleading inferences not just about the magnitude of statistical relationships, but also about their signs. We show that the *Forbes* billionaire count offers an alternative – albeit imperfect – cross-country measure of Schumpeterian entrepreneurship with more intuitive results than small business activity.

The different – indeed opposite – expected impact of policy variables on rates of self-employment and Schumpeterian entrepreneurship is likely to produce misleading results if such proxies are used. For example, the empirical finding that tax rates can increase self-employment (e.g., 21) does not tell us how tax policy affects innovative entrepreneurship. The self-employed tend to earn less than their salaried counterparts, while entrepreneurs earn more (18, 27). Immigrants tend to have higher rates of self-employment than natives, but similar rates of entrepreneurship (28). Education is not a robust determinant of self-employment but it is a strong determinant of entrepreneurship.

When entrepreneurship is defined as self-employment or small business ownership, it makes sense to view entrepreneurship policy and so called SME policies – which seek to encourage the formation of small and medium-sized enterprises – as essentially interchangeable terms. We argue that such an approach obscures a potentially important policy tradeoff; some policies may well encourage the formation of small businesses, whilst simultaneously *dampening* entrepreneurship rates. What policymakers generally hope will emerge from the academic study of entrepreneurship is knowledge about how to spur technological progress through entrepreneurship policies.

These findings suggest that small business activity and Schumpeterian entrepreneurship are two distinct phenomena, explained by different forces and associated with different outcomes. Schumpeterian entrepreneurship is fundamentally related to innovation and an ambition to grow a business. Small business activity is instead associated with flexible employment forms, mitigation of agency problems and a safety valve from dysfunctional economic systems. Recognizing the differences between the two concepts, more effort should go into analyzing them separately. Future work aimed at better elucidating these distinctions is likely to lead to a better understanding of how entrepreneurship ought to be understood, measured and ultimately promoted.

Method

Data: *Forbes* annually compiles “The World’s Billionaires”. We identify 1,723 unique billionaires who appeared on the annual list at least once between 1996 and 2010. Excluding individuals who did not acquire their wealth by starting a company leaves 996 billionaire entrepreneurs in 53 countries.

Firms founded by the billionaires in our sample include many of today’s most well-known entrepreneurial firms, such as Intel, Microsoft, Google, Apple, Yahoo, Oracle, Cisco, Bloomberg, PayPal, Facebook, E-bay, Dell, Amazon, Home Depot, Best Buy, Family-Dollar stores, GAP, Urban Outfitters, Ralph Lauren, Nike, Trader Joe’s, Starbucks, Subway, Blackstone, Bridgewater, KKR, CNN, Fox News, Univision, HBO, The Weather Channel, Black Entertainment Television, DreamWorks, Enterprise Rent-A-Car, Bose, University of Phoenix and FedX. European firms include IKEA, Aldi, Zara, Red Bull and Virgin Group. Billionaire wealth in western economies is largely based on the creation of economically valuable firms. We interpret this as indirect evidence that the acquisition of private entrepreneurial wealth often coincides with social value creation.

To establish whether or not each of these individuals is a self-made entrepreneur, a number of distinct sources were used. *Forbes* provides a brief description of the source of wealth of each billionaire. In many cases, this allowed us to exclude individuals with inherited wealth, or non-entrepreneurial billionaires from the sample. If the *Forbes* description was insufficient to determine the entrepreneurial status, online sources, usually *Wikipedia*, were consulted. If necessary, additional library and internet searches were carried out. Out of the 1,723 billionaires, we were unable to find sufficient information on 29 individuals. These individuals were classified as non-entrepreneurs. *Forbes* also reports the country of citizenship for each individual. See p. 1 in the SI Appendix for further details. This data is available to other scholars and can be obtained by contacting the authors.

A majority of the world’s entrepreneurs, 58%, did in fact acquire their wealth by starting a business. The figure is lower in Europe, 42%, than in the U.S., where 65% of the billionaires are entrepreneurs. Most of the billionaires who were not categorized as entrepreneurs acquired their wealth through bequests. Other non-entrepreneurial billionaires includes traders in the financial sector, employees

of entrepreneurial startups, corporate CEOs, law firm partners and entertainers/writers whose wealth exceeds the one billion dollar threshold, constituting 6% of billionaires.

To examine the robustness of the results, we also consider another cross-country measure of entrepreneurship: VC investment as a share of GDP, calculated by Lerner and Tåg (29). VC investments typically go to innovative and growth oriented firms (30). Therefore VC investment as a share of GDP can be used to approximate how entrepreneurial a country is. VC investment as a share of GDP strongly correlates with per capita billionaire entrepreneurs ($r = 0.83$).

Our measure of entrepreneurship has a number of limitations. Due to data availability we have to use a one billion dollar threshold; a lower threshold would have been preferable. The assumption is that the extreme tail of the distribution likely tells us something also about the mean; a country with many exceptional entrepreneurs is also likely to have more “ordinary” entrepreneurs.

Forbes reports wealth in nominal dollars. One concern is that the valuation of currencies may overstate wealth in countries with high price levels. We therefore recalculate the wealth of billionaires using Purchasing power parity (PPP)-adjusted wealth combined with a \$1.5 billion or \$2 billion threshold. The main results are unchanged as shown in Tab. S4 and Tab. S5 in the SI Appendix. The coefficient for regulatory burden becomes smaller and is no longer statistically significant in most PPP-adjusted specifications.

Although billionaire entrepreneurs are rare, they constitute a substantial share of the founders of the largest entrepreneurial firms. Similarly, a mere 0.1–0.2% of American firms receive VC funding. However, among the firms that are so successful that they are able to go public through an IPO, roughly two thirds received VC funding (30, 31). The tiny subsample of firms that receive VC funding thus includes the majority of high-potential entrepreneurial firms.

We are only able to measure entrepreneurship *ex post* in the form of successful entrepreneurship. We cannot observe how many individuals attempted to start new firms. From the point of view of policymakers, the end results in the form of large new firms is likely more important than the number of failed attempts, though for other purposes both may be equally important.

For all countries in our dataset with more than one million inhabitants we gather data on per capita income, business regulation and taxes. Data on population and purchasing power adjusted per capita income rates for the year 2009 were obtained from IMF (32). National self-employment is defined as the non-agricultural self-employment (33) for the year 2000. Since self-employment tends to be stable over time our estimates are not sensitive to the exact year used. The data on trust levels are from World Value Survey. The data on business regulation is based on the World Bank ranking of “the ease of doing business” (34). The tax burden imposed on firms is measured by the standard statutory corporate tax rate in 2009 (34).

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SI Appendix (Supporting Information)

On the Representativeness of the *Forbes* list of the Population of Billionaires

It is possible to avoid being on the *Forbes* list by hiding wealth and staying under the radar, though it is not possible to avoid being on *Forbes*' list for privacy reasons if the magazine estimates your wealth as at least one billion dollars.

Since valuing privately held assets is inherently challenging, *Forbes* refers to its estimates as “highly educated guesses”. As a check, the estimates are reviewed by a panel of business and financial experts. External evaluations indicate that the list is surprisingly accurate. McCubbin (1) found that the wealth estimated by *Forbes* strongly corresponded to estate tax returns of the deceased.

The Survey of Consumer Finances (SCF) relies in part on tax returns to identify wealthy Americans. As a testament to the comprehensiveness of the *Forbes* list the SCF only tends to find a small number of individuals with assets above the threshold that *Forbes* missed (2). Rankings of billionaires by other bodies such as Bloomberg and Chinese Hurun Report tend to obtain similar findings. The 2012 *Forbes* global list included 1,426 billionaires while Hurun Report independently identified 1453 billionaires, with few exceptions the same individuals.

Forbes undoubtedly misses some billionaires and includes some false billionaires. There is a risk for bias should they systematically miss more billionaires in certain types of countries, notably third world countries. This cannot be ruled out, but we believe that this bias is unlikely to be important. In the case of less developed countries, *Forbes* works with local partners (such as banks and analytics firms) in order to locate and assess the wealth of the local business elite. The annual list has become a major news story among the public and among the wealthy, and in many countries there is an active debate regarding who should and should not be on the list. *Forbes* solicits “tips” from the public about hidden billionaires. Over time this has improved the quality of the list, since even in less developed countries people who are suspected to be around the one billion dollar threshold tend to be locally known.

Forbes' journalists also rely on several methods to attempt to locate the rich, one of which is to start with the large firms (both public firms and large private firms) and determine their owners. While individuals can more easily hide inherited, illicit or financial wealth, it is much more difficult to hide one's ownership of large new firms. Since entrepreneurial firms are our focus this limits the problem of this potential bias.

Because an analysis including third world countries cannot entirely avoid concerns of mis-measurement, we also conduct our analysis separately for wealthy OECD-countries, where this type of bias is less likely.

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Supporting Figures

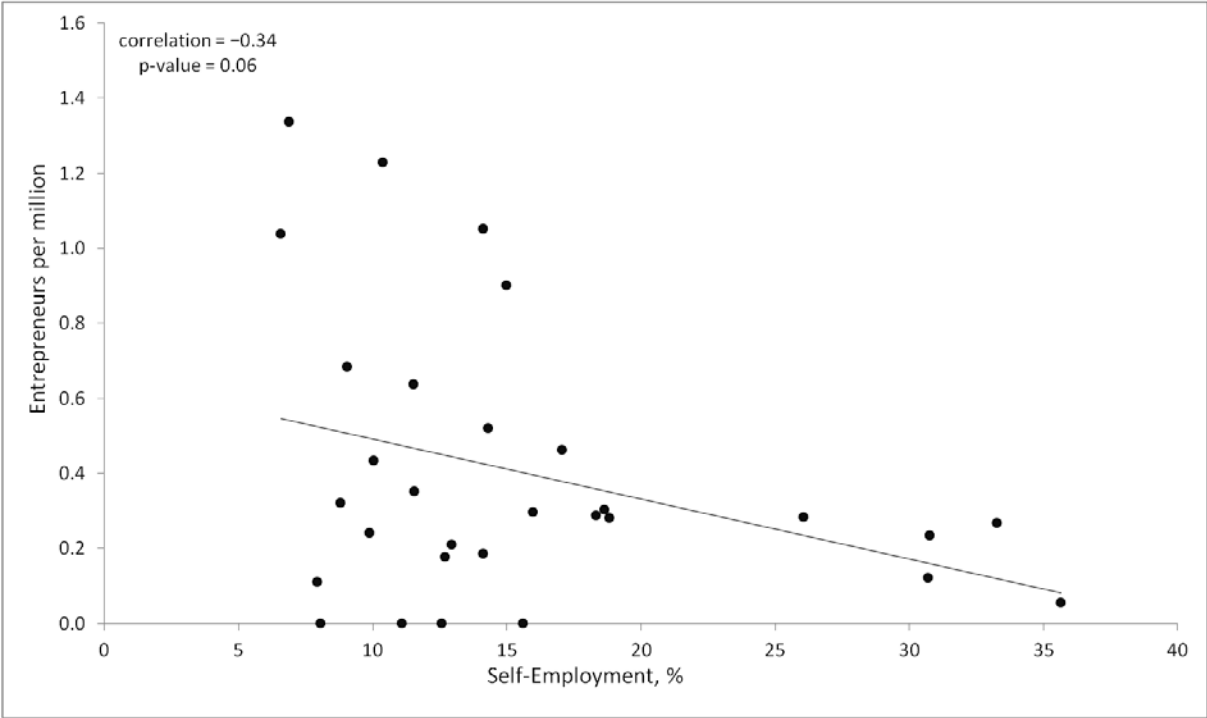


Fig. S1 Entrepreneurship and Self-Employment, OECD countries.

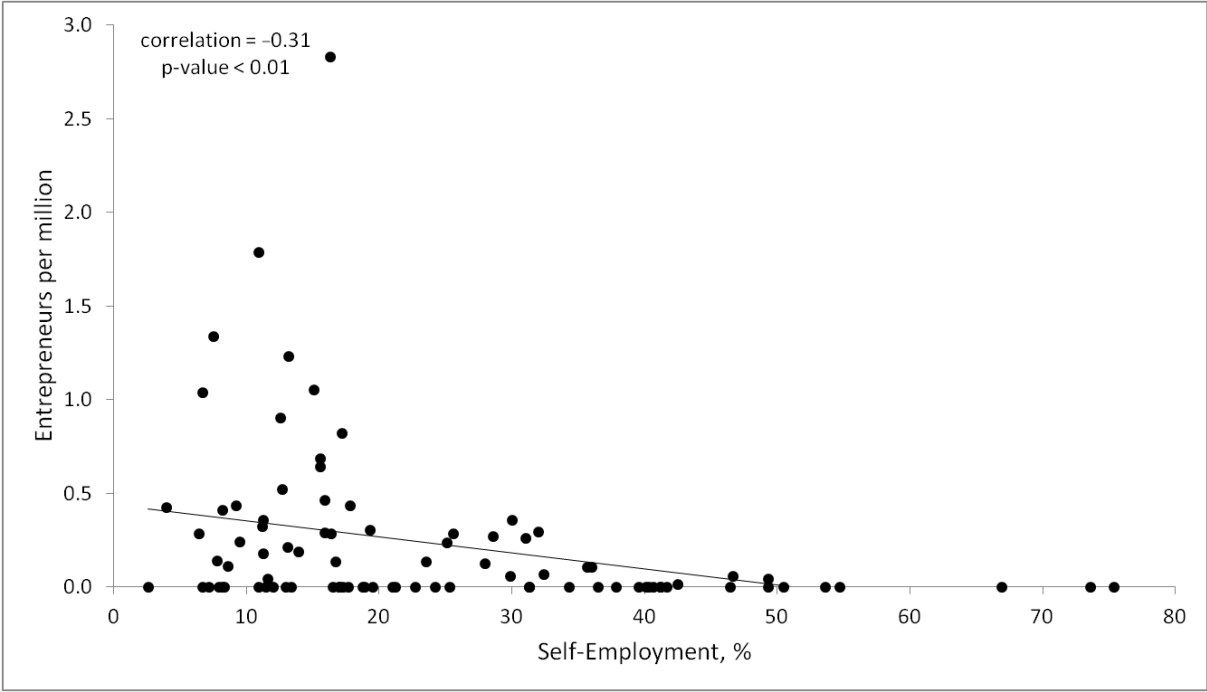


Fig. S2 Entrepreneurship and Self-Employment, All Countries.

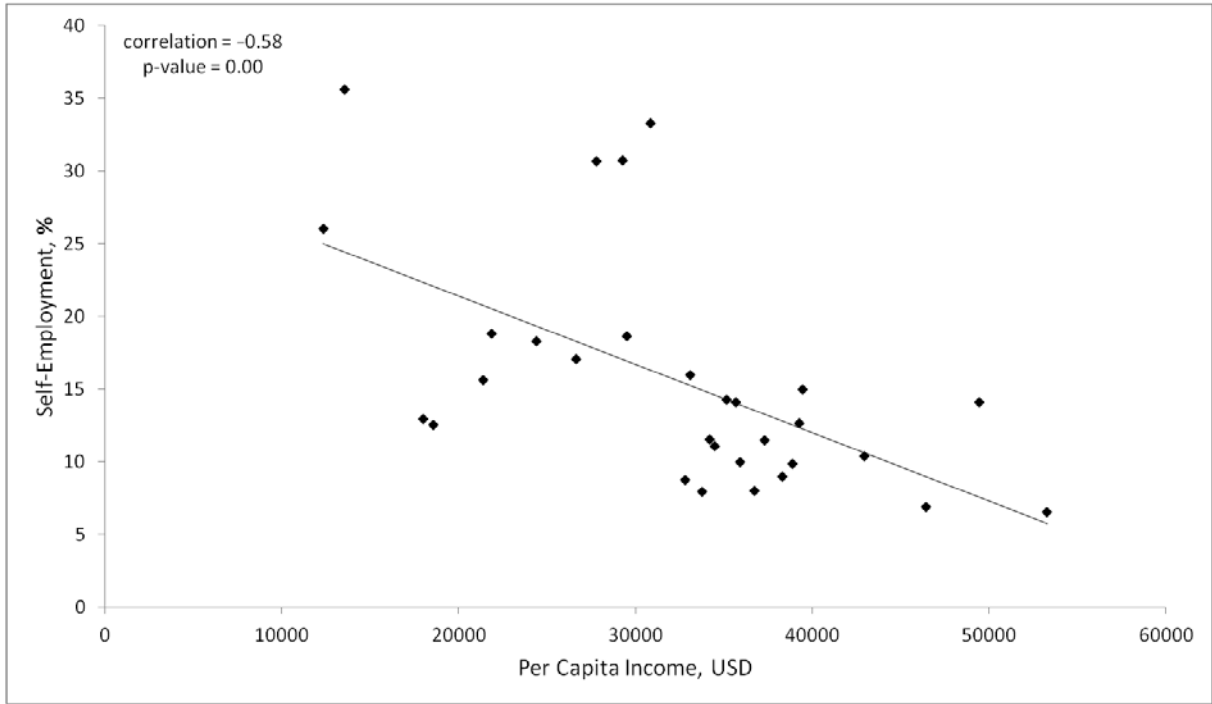


Fig. S3 Self-Employment and Per Capita Income, OECD countries.

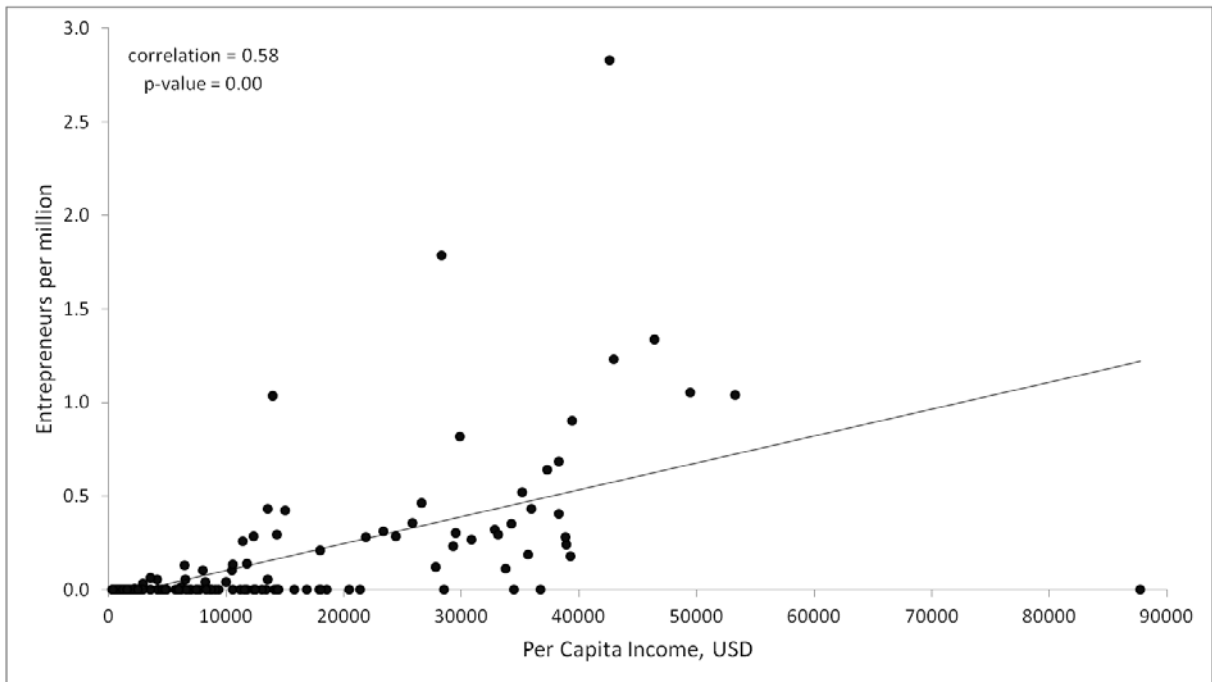


Fig. S4 Entrepreneurship and Per Capita Income, All Countries.

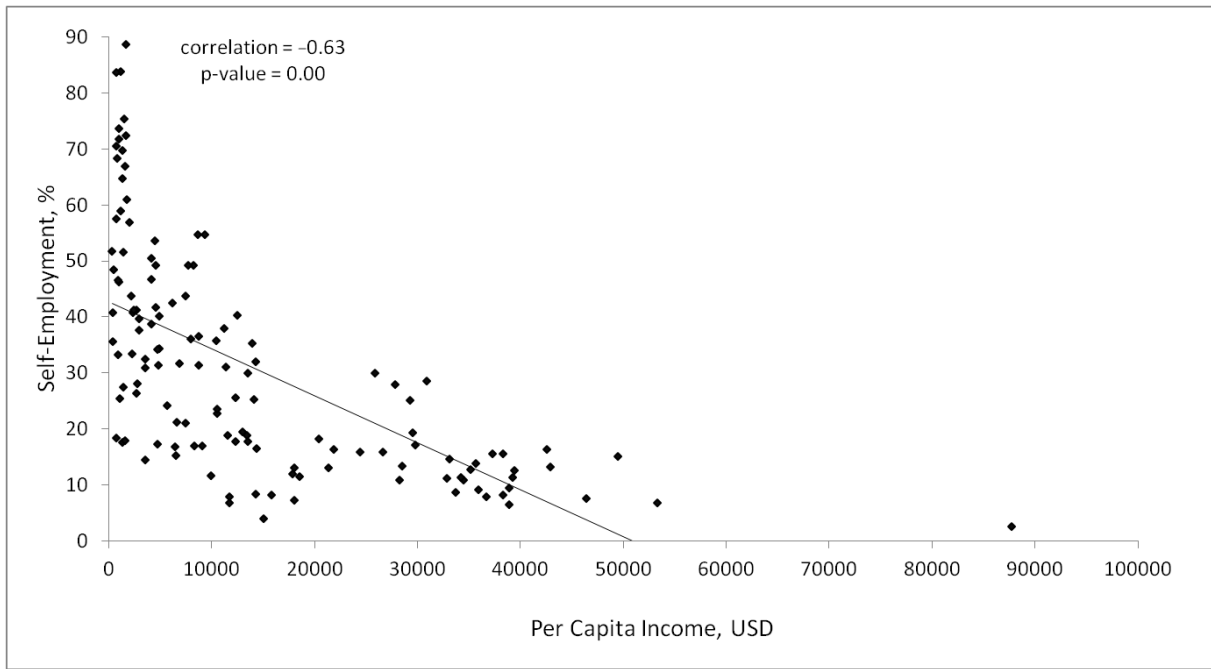


Fig. S5 Self-Employment and Per Capita Income, All Countries.

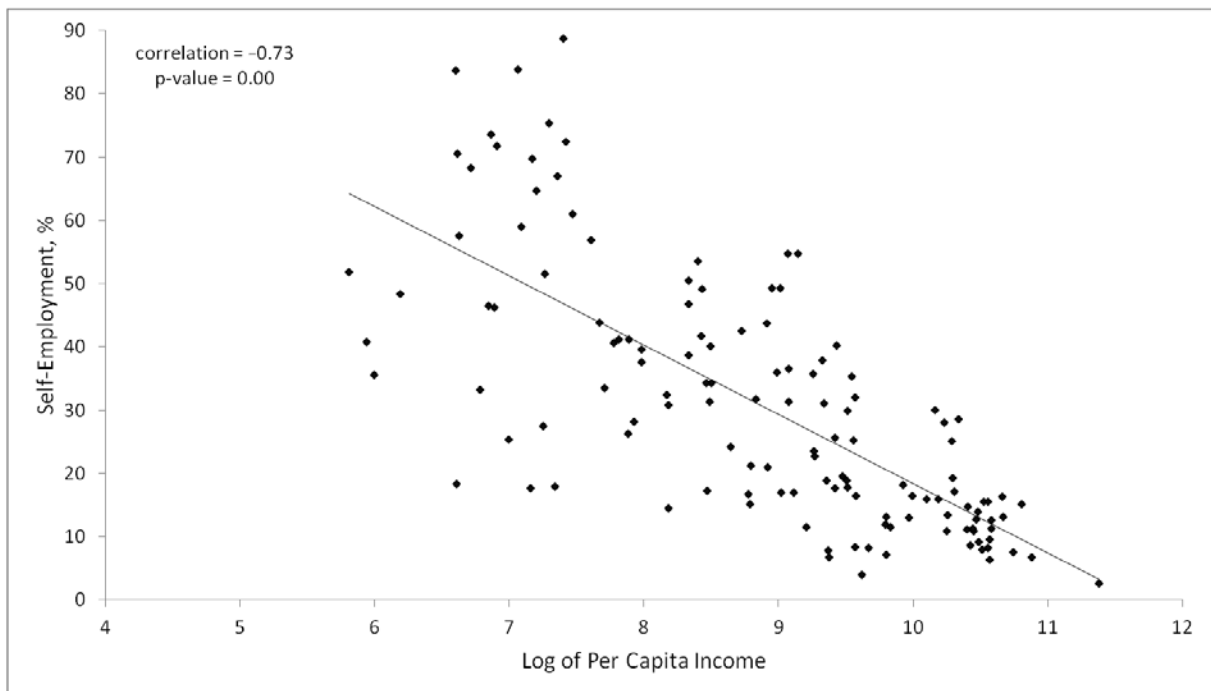


Fig. S6 Self-Employment and the log of Per Capita Income, All Countries.

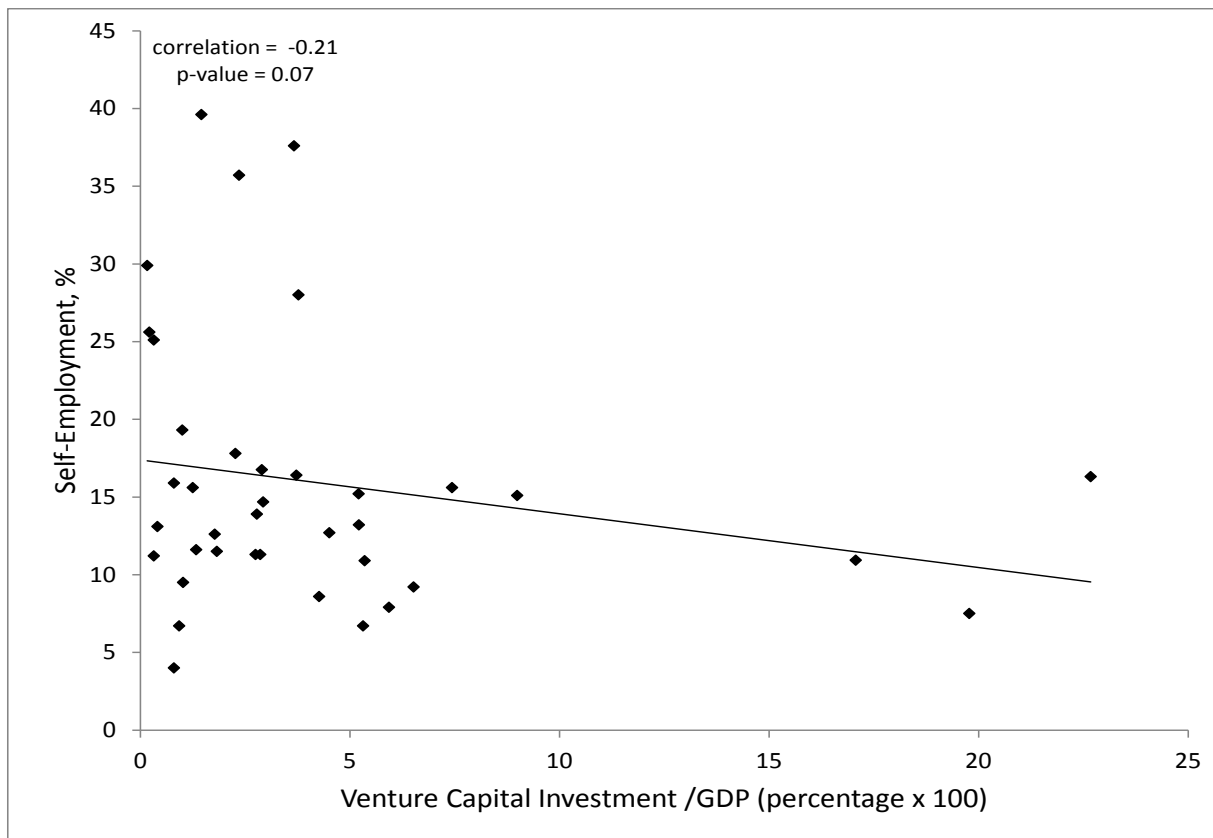


Fig. S7 Self-Employment and Venture Capital Investment as a Share of GDP.

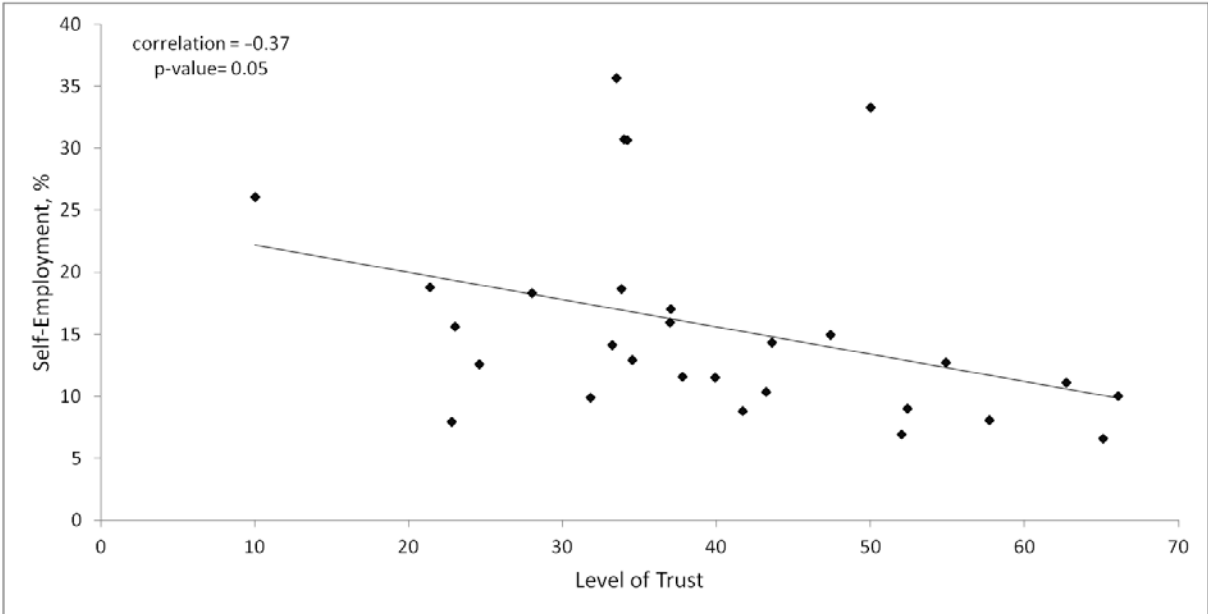


Fig. S8 Self-Employment and Trust, OECD Countries.

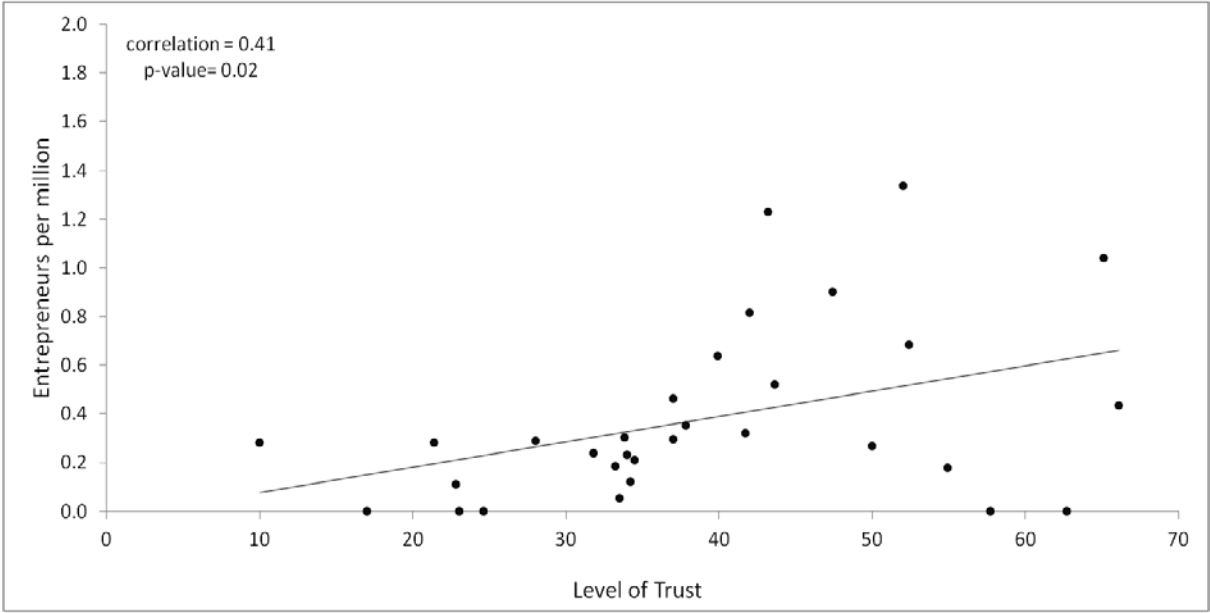


Fig. S9 Entrepreneurship and Trust, OECD Countries.

Supporting Tables

Table S1 Cross-Country Regressions of Entrepreneurship Rates Based on Entrepreneur's Country of Residence.

	(a)	(b)	(c)	(d)
Population	0.013** (0.0003)	0.015** (0.0004)	0.013** (0.0003)	0.014** (0.0005)
GDP per capita	0.034** (0.002)	0.037** (0.002)	0.024** (0.003)	0.027** (0.003)
Taxes		-0.031* (0.007)		-0.028** (0.007)
Regulations			-0.006** (0.001)	-0.005** (0.001)
Constant	0.278** (0.76)	0.945** (0.170)	0.842** (0.149)	1.431** (0.209)
<i>R</i> -squared	0.76	0.76	0.76	0.79
No. of obs.	90	90	90	90

This table reports coefficients from a Poisson Event Count Model where the dependent variable represents the number people who become billionaire entrepreneurs in each country. Entrepreneurs are coded based on country of residence rather than nationality. Taxes refer to the standard statutory corporate income tax rate as measured by the World Bank. Regulations refer to the ease of doing business, again as measured by the World Bank. Two stars (**) denote statistical significance at the 1% level and one star (*) denote statistical significance at the 5% level.

Table S2 Cross-Country Regressions of Entrepreneurship Rates, Immigrant Entrepreneurs Excluded.

	(a)	(b)	(c)	(d)
Population	0.013** (0.0003)	0.015** (0.0004)	0.013** (0.0003)	0.014** (0.0005)
GDP per capita	0.037** (0.002)	0.041** (0.002)	0.026** (0.003)	0.029** (0.003)
Taxes		-0.033* (0.007)		-0.029** (0.007)
Regulations			-0.008** (0.001)	-0.007** (0.001)
Constant	0.145** (0.78)	0.858** (0.170)	0.889** (0.149)	1.489** (0.209)
<i>R</i> -squared	0.77	0.78	0.78	0.79
No. of obs.	90	90	90	90

This table reports coefficients from a Poisson Event Count Model where the dependent variable represents the number people who become billionaire entrepreneurs in each country. Entrepreneurs are coded based on country of residence rather than nationality. Immigrant billionaires are excluded from the analysis. Taxes refer to the standard statutory corporate income tax rate as measured by the World Bank. Regulations refer to the ease of doing business, again as measured by the World Bank. Two stars (**) denote statistical significance at the 1% level and one star (*) denote statistical significance at the 5% level.

Table S3 Cross-Country Regressions of Venture Capital Investment Rates.

	(a)	(b)	(c)	(d)
GDP per capita	0.160** (0.058)	0.191** (0.063)	0.129* (0.064)	0.146** (0.066)
Taxes		-0.005 (0.160)		-0.0006 (0.163)
Regulations			-0.014 (0.018)	-0.031 (0.020)
Constant	-0.125 (1.21)	-1.102 (4.131)	1.313 (2.140)	0.922 (4.652)
<i>R</i> -squared	0.18	0.22	0.19	0.23
No. of obs.	36	36	36	36

This table reports standard cross-sectional regressions where the dependent variable is VC investment as percentage of GDP. The investment ratio will have the value 100 if VC investment totals one percent of GDP in a given year. Taxes refer to the corporate income tax rate as measured by the World Bank. Regulations refer to the ease of doing business, again as measured by the World Bank. Two stars (**) denote statistical significance at the 1% level.

Table S4 Cross-Country Regressions of Entrepreneurship Rates Using PPP-adjusted Wealth and 1.5 Billion Dollar Threshold.

	(a)	(b)	(c)	(d)
Population	0.013** (0.0004)	0.016** (0.0006)	0.013** (0.0004)	0.016** (0.0006)
GDP per capita	0.028** (0.002)	0.034** (0.003)	0.023** (0.004)	0.029** (0.004)
Taxes		-0.053** (0.009)		-0.052** (0.009)
Regulations			-0.003 [#] (0.002)	-0.002 (0.002)
Constant	-0.028 (0.091)	1.137** (0.203)	0.313 [#] (0.189)	1.372** (0.259)
<i>R</i> -squared	0.70	0.72	0.71	0.72
No. of obs.	90	90	90	90

This table reports coefficients from a Poisson Event Count Model where the dependent variable represents the number people who become billionaire entrepreneurs in each country. The wealth of each entrepreneur is adjusted for the purchasing power of the resident country and year. Taxes refer to the standard statutory corporate income tax rate as measured by the World Bank. Regulations refer to the ease of doing business, again as measured by the World Bank. Two stars (**) denote statistical significance at the 1% level, one star (*) denote statistical significance at the 5% level and ([#]) denotes significance at the 10% level..

Table S5 Cross-Country Regressions of Entrepreneurship Rates Using PPP-Adjusted Wealth and 2 Billion Dollar Threshold.

	(a)	(b)	(c)	(d)
Population	0.013** (0.0004)	0.016** (0.0007)	0.013** (0.0005)	0.016** (0.0007)
GDP per capita	0.023** (0.003)	0.029** (0.003)	0.019** (0.005)	0.026** (0.005)
Taxes		-0.060** (0.011)		-0.059** (0.011)
Regulations			-0.002 (0.002)	-0.001 (0.002)
Constant	-0.150 (0.103)	1.128** (0.231)	1.060** (0.223)	1.264** (0.302)
<i>R</i> -squared	0.63	0.65	0.63	0.65
No. of obs.	90	90	90	90

This table reports coefficients from a Poisson Event Count Model where the dependent variable represents the number people who become billionaire entrepreneurs in each country. The wealth of each entrepreneur is adjusted for the purchasing power of the resident country and year. The threshold used in this specification is \$2 billion rather than \$1 billion. Taxes refer to the standard statutory corporate income tax rate as measured by the World Bank. Regulations refer to the ease of doing business, again as measured by the World Bank. Two stars (**) denote statistical significance at the 1% level and one star (*) denote statistical significance at the 5% level.