Institutional quality and innovation: Some cross-country evidence

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Structured Abstract

Purpose
The purpose of this paper is to examine the cross-country variation in innovation and propose that it can be explained by the presence of market institutions using the Global Innovation Index (GII).

Design/methodology/approach
This paper uses ordinary least squares (OLS) with region and OECD fixed effects to test whether more economic freedom is associated with more innovation.

Findings
The findings reveal that the effect of market institutions on innovation is promoted by both knowledge and creativity. When innovation is broken down into its component measures, the results suggest that a high-quality legal system is associated with more creativity and free trade is associated with greater knowledge.

Originality/value
These findings provide evidence that economic freedom matters for innovation through both creativity and knowledge, particularly through the protection of property rights and the legal system and free trade. Policy makers desiring to spur innovation may want to examine the level of freedom in private ownership and the reduction of trade barriers as a prerequisite for innovation policy.

Keywords: Institutions, Innovation, Entrepreneurship, Creativity, Knowledge

INTRODUCTION

Innovation has been described as the single most important component for long-term economic growth (Rosenberg, 2004) and a country's largest source of competitive advantage (Baumol, 2002). Further, the importance of innovation is evidenced by the inclusion of a technological constant in economic growth models (Solow, 1956). However, since inputs may only explain about 15% of the growth of outputs in the U.S. economy between 1870 and 1950 (Abramovitz, 1956), there has been a demand to explain the remainder of the residual—with technological innovation as one potential answer. Recent research supports this notion as innovation is found to be vastly important when determining cross-country differences in efficiency (Lafuente, Szerb, & Acs, 2015). The importance of innovation is further emphasized in Schumpeter's (1942) theory of creative destruction, which explains how capitalism drives economic growth via innovation and entrepreneurship. Using Schumpeter's theory, the literature argues that market-based institutions are in better positions to promote growth and recent research supports this proposition (Aristizabal-Ramirez, 2015). For instance, Audretsch & Keilbach (2004) argue that entrepreneurship capital—the institutions that foster entrepreneurship—is an important determinant of economic growth and is found to facilitate regional growth in Germany. However, while innovation has been given a key role in determining growth, little has been written about the drivers of innovation.

The purpose of this article is to investigate the differences in the levels of innovation among countries. We argue that high quality market institutions may help explain this variation. By reducing transactions costs, high quality market institutions may foster an environment more nurturing of innovation. While we examine the linkage between institutions and innovation, there is a related literature that addresses the role of institutions in determining entrepreneurship. Yet,

the literature often assumes that entrepreneurs innovate in productive activities, which is not always true; entrepreneurs may innovate in unproductive activities or not innovate at all. Furthermore, innovation may come from sources besides the traditional entrepreneur, who exhibits awareness and seeks profit (Shah and Tripsas, 2007). Rather than assuming entrepreneurship leads to innovation, this study circumvents this relationship and looks directly at innovation using the Global Innovation Index (GII). This unique measure allows our study to complete a detailed analysis of the relationship between institutional quality and innovation. Moreover, the GII data allow us to examine innovation in much more detail as its components are characterized as knowledge and creation.

Using the newly created measures of innovation, a few conclusions are drawn. First, economic institutions are indeed highly correlated with innovation. A one unit increase in the Fraser Institute's Economic Freedom of the World Index (EFW) is associated with a 27% increase in innovation.[1] Second, this relationship is driven primarily by both creative and knowledge inputs. We find evidence to suggest that a high quality legal system is associated with more creativity, and free and open trade is associated with greater knowledge. Therefore, we conclude that market institutions do, in fact, promote more innovation.

INSTITUTIONS, ENTREPRENEURSHIP, and INNOVATION

Institutions are the "rules of the game" (North, 1990) that determine how societies function. These rules are largely created by government policies and altered by societal norms. Institutions can be classified as political, legal, and market institutions among others. In this study, we emphasize the importance of market institutions in determining innovation, and the Fraser Institute's Economic Freedom of the World Index (EFW) (Gwartney, Lawson, and Hall, 2015)

[1] Log-level elasticity estimates are calculated using the post-regression command in Stata: mfx, eydx

allows us to distinguish between measures of economic freedom and political freedom. The EFW classifies market institutions into five areas: (1) size of government, (2) legal system, (3) sound money, (4) free international trade, and (5) regulations. We use data from the year, 2013, as this is the latest data available.[2] Each category is scaled from 0 to 10 where 10 denotes completely free and 0 denotes not free at all. We argue that, when there is more freedom to conduct business, there will also be more innovation. This linkage works through the channel of reducing transactions costs or establishing good governance (Galindo-Martin and Ribeiro-Soriano, 2012). When entrepreneurs face higher regulations and higher costs of business, new ideas and business ventures are less likely to occur. Thus, the high business costs and regulatory environment present a drag on entrepreneurship, which should stymie research and innovation. It may help to think of innovation in two ways. First, innovation can describe something new. This can be a new product, service, or more generally, an idea. This is sometimes called invention rather than innovation. Second, innovation can also be a new way of reallocating existing resources. Both knowledge and creation may portray traits of either invention or innovation, but more importantly, reducing transactions costs (Coase, 1937; Williamson, 1979; 1980) makes the creation of either more likely.

Kirzner (1978) argues that entrepreneurs exhibit qualities of alertness that lead to innovation. These entrepreneurs engage in a market discovery process where previously undiscovered profit opportunities are exploited--- a view shared by many others (Venkataraman, 1997; Shane and Venkataraman, 2000; Eckhardt and Shane, 2003; Murphy and Marvel, 2007). Of central importance, is that the fundamental role of the entrepreneur is only made possible in the market process. Thus, institutions play a major role in supporting entrepreneurship. One key aspect that is implicitly assumed is that entrepreneurs are synonymous with innovation, but

[2] Our findings are not sensitive to the year chosen.

entrepreneurs need not be innovative in the typical sense. Entrepreneurs can be innovative and provide new goods and services to the market. Conversely, entrepreneurs can discern new ways to earn government favors and regulation, which is consistent with recent research that argues that corruption is tied to the regulatory role of government (Holcombe & Boudreaux, 2015). These alternative allocations of entrepreneurs are coined productive and unproductive (Baumol, 1990). Schumpeter (1942) argues that there are five different types of innovation: new products, new methods of production, new sources of supply, exploitation of new markets and new ways to organize business. Schumpeter stressed the role of the entrepreneur as one who implements change by introducing new products and new methods of production. Thus, while recognizing that entrepreneurs can innovate in many regards, he particularly emphasized new products and new methods of production above all else. In his theory of creative destruction, he argues that entrepreneurs can replace obsolete goods and services with superior versions, and this process generates drastic changes in the marketplace. In contrast, Kirzner (1978) recognizes the role of the entrepreneur but places the discovery process at the center of the discussion. Kirzner argues that entrepreneurs exhibit alertness to previously undiscovered profit opportunities. As Alvarez, Barney, & Anderson (2013) explain, opportunities are important for entrepreneurial visions, but efforts have shifted towards explaining the processes that form and exploit them.

One such process that helps form and exploits opportunities through the discovery process is the market structure; entrepreneurs depend on market institutions that facilitate entrepreneurship. For instance, without profit opportunities, entrepreneurs lack the incentive to innovate. In Schumpeter's world, entrepreneurs would not accept the additional risk and management of business organizations in order to bring the new products and methods to fruition. Similarly for Kirzner, entrepreneurs would no longer be alert to the discovery process since they cannot

benefit from unexploited profit opportunities. Thus, Innovation is reduced when entrepreneurs face substantial entry barriers. For example, De Soto (2000) finds enormous bureaucratic red tape and corruption in many developing countries. It took his team over 300 days working six hours a day to open a business in Peru. In Tanzania, it took over 379 days at a cost of $5,506 --- a figure more than 20 times the nation's per capita income. In contrast, opening a business enterprise takes a matter of days or a few weeks in the United States and many other developed economies. Therefore, it is argued that the extent of innovation depends on the underlying market institutions.

It is important to distinguish between different types of entrepreneurship. Baumol (1990) argued that institutions may affect entrepreneurship in different ways through various channels. For instance, entrepreneurs may find new ways to innovate by providing desirable goods and services or existing goods and services at low costs. Alternatively, entrepreneurs may engage in rent seeking behavior (Krueger 1974; Tullock 1967) in order to acquire preferential governmental treatment in the forms of subsidies and regulation. By using government policy, entrepreneurs can reduce the intensity of rivals and increase barriers to entry, which may be a successful strategy in acquiring a competitive advantage (Porter, 1979). This would suggest that some institutions may also foster unproductive entrepreneurship. Sobel (2008) presents evidence in the U.S. to support Baumol's conclusions. Following this logic, sound economic institutions can play a pivotal role in the development of innovation, creation, and knowledge. Conversely, poor economic institutions are expected to redirect the productive allocation of resources into unproductive channels.

According to this framework, high quality market institutions that promote productive forms of entrepreneurship are also likely to spur innovation. This may occur directly through increased

emphasis on R&D patents (Tebaldi and Elmslie, 2013). However, this may also occur indirectly, as institutions facilitate productive forms of entrepreneurship, and entrepreneurship leads to innovation. However, innovation need not occur by entrepreneurs in the traditional sense of searching for new discoveries. Creative individuals may possess the entrepreneurial-discovery ability without actively attempting to innovate. These users of commercial goods and services may also innovate (Shah and Tripsas, 2007). Either way, we hypothesize that those who live and work in an economy that is less intrusive, protects property rights, maintains a stable currency, reduces barriers to trade, and reduces burdensome regulations are more able to reap the benefits of innovation. Therefore, we hypothesize that:

H1: *There is a positive relationship between the quality of market institutions and innovation.*

METHODOLOGY

Sample and data collection

The 2015 GII is based on 79 indicators and ranks the performance of 141 countries and economies around the world. This index has two components (6 and 7) that we use, which are of particular interest: (1) knowledge and technology outputs and (2) creative outputs. The category, knowledge and technology outputs, is comprised of: (i) knowledge creation, (ii) knowledge impact, and (iii) knowledge diffusion. Examples of knowledge creation include scientific articles, patents, software spending, new business creation, and royalty and license fees among others. Creative outputs are also comprised of three components: (i) intangible assets, (ii) creative goods & services, and (iii) online creativity. Examples of creativity include information and communications technology, trademark applications, national feature films, YouTube

uploads, Wikipedia edits, and printing and publishing output, among many others.[3] The knowledge and creative component measures are combined into one measure of innovation for this study and are also analyzed separately. The variables used in this study are summarized in Table I.

INSERT TABLE I ABOUT HERE

Using the GII allows us to avoid the discussion of whether entrepreneurs engage in productive or unproductive activities and focus on the role that market institutions play in fostering innovation. The GII is a much richer measure of innovation than merely looking at entrepreneurship through self-employment and new business creation under the assumption that entrepreneurship leads to innovation. Indeed, Figure 1 below illustrates a very strong relationship between market institutions (EFW) and innovation.

INSERT FIGURE 1 ABOUT HERE

The scatter plot places innovation on the horizontal axis and EFW on the vertical axis with country bubbles weighted according to population estimates. The 58% correlation is quite striking. However, because it is possible that all or some of this correlation can be explained by other omitted variables, we proceed to an empirical examination that analyzes the relationship between market institutions and innovation while controlling for these other factors that may affect innovation.

RESULTS AND ANALYSIS

[3] For a full list of measures, visit www.globalinnovationindex.org

The contribution of this study is to examine the link between institutions, entrepreneurship, and innovation. Following the framework that builds on a distinction between productive and unproductive entrepreneurship (Baumol 1990), we argue that high quality market institutions facilitate productive entrepreneurship and are likely to spur innovation. Support for this hypothesis (H1) is found when examining the simple correlation between EFW and innovation in Figure 1, and also when a more comprehensive analysis is undertaken.

Economic freedom and innovation

It has been argued that high quality market institutions spur innovation (H1). Table II begins the empirical analysis, which allows us to understand how innovation and market institutions are related. However, before we begin our analysis, it is important to mention the role that unobservable variables may play in determining innovation.

Typically, researchers might control for these time-invariant effects (e.g. culture) by performing a fixed or random effects regression model using a panel data format, which helps to remove these time-invariant effects. However, the GII data have only recently become available. While it is technically possible to conduct a fixed effects examination of the relationship between institutions and innovation, the data have only been available since 2012-2013, and this short time period will stymie any meaningful analysis, since variations in innovation and institutions happen rather slowly. Therefore, we conduct an Ordinary Least Squares (OLS) regression, and in all models specified region and OECD-classification dummy variables are included to control for these time-invariant differences between countries. Region dummies capture whether a country is located in North America, Europe and Central Asia, Latin America and Caribbean, Middle East & North Africa, South Asia, or Sub-Saharan Africa. OECD dummies capture where a

country is classified as a high income OECD member, high income non-OECD member, low income country, lower middle income country, or upper middle income country. For both the region and OECD classification dummies, we use the designations reported by the World Bank. It is also important to note that, while including these dummy measures and control variables helps to reduce concerns over omitted variable bias, the results from the model should be interpreted as correlation. No casual inferences should be made.

In all models in Table II, Innovation is treated as the dependent variable, as measured by the GII. This variable is defined as the simple average of the creativity and knowledge components taken from the GII. To examine directly whether market institutions facilitate innovation, where innovation is denoted by I and EFW is a continuous variable for the Economic Freedom of the World Index (EFW), regression 1 uses Ordinary Least Squares (OLS) to estimate

$$I = \alpha + \beta EFW + \varepsilon \qquad (1)$$

and the results provide support for the hypothesis that market institutions promote innovation using a dataset of 135 countries.

INSERT TABLE II ABOUT HERE

The positive sign on EFW in regression 1 indicates that higher quality market institutions are associated with more innovation. This regression yields a t-statistic of 3.13 and an adjusted R^2 of 0.686 indicating that economic freedom, the measure of market institutions, explains roughly 70% of the variation in innovation across countries. Of course, there are many other potential explanatory variables that may also drive innovation, and it is important to include these variables in order to avoid spurious correlation resulting in omitted variable bias. The first control variable we include is GDP per capita, as measured by the World Bank in 2014.

Theory suggests that developed economies emphasize activities that promote the expansion of capital, human capital, and more importantly, entrepreneurial capital (Heckscher and Ohlin, 1991). Thus, the structure of developed economies should promote innovation much more ~~so~~ than developing economies, where labor-intensive goods and services are emphasized. Following this theory, regression 2 estimates

$$I = \alpha + \beta_1 EFW + \beta_2 GDP + \varepsilon \qquad (2)$$

and finds that GDP per capita (log) is highly correlated with innovation.

Because a large literature establishes that economic freedom and income are closely related (see, e.g. Berggren, 2003; Gwartney, Lawson, & Holcombe 1999; De Haan & Sturm, 2000; Faria & Montesinos, 2009; Hall & Lawson, 2014) we include a measure of GDP per capita that is unrelated to economic freedom.[4] Still, high quality institutions remain an important determinant of innovation, even after accounting for differences in living standards. Another potentially important driver of innovation may be the extent of democracy.

Perhaps market institutions are actually capturing the importance of a free democracy. Research argues that democracy leads to higher rates of economic growth (Acemoglu et al. 2014). However, this is a highly debated concept, where scholars continually point out the economic successes of countries like Singapore and Hong Kong, which might score high on economic freedoms but low on political freedoms. Other studies argue that too much democracy might be a bad thing as democracy may lead to a larger public sector over time (Olson 1982/2008; Boudreaux 2015). Arguments that democracy might assist growth center around general discussions of freedom, particularly through various civil liberties. It is argued that civil liberties promote growth by providing opinions from a larger mass of citizens. Citizens might

4 We compute this measure by regressing GDP (log) on EFW and netting out the residuals post-estimation. This is then saved as a new measure of GDP (log).

voice their opinions through free and open elections, or they might utilize free media and speech in order to express their beliefs. Therefore, greater political freedoms should be associated with more creative thinking and increase the knowledge of society---both of which comprise our measures of innovation from the GII. Political freedom, as measured by the polity2 measure of the Polity IV index (Marshall & Jaggers, 2013) is used to capture the quality of democracy in a given country. It captures the freedom of civil and political liberties, the extent of fair and open elections, and other important political values. Polity2 combines two measures, Autoc and Democ, and the score is assigned on a scale of -10 to 10, where -10 indicates a strongly autocratic country and 10 indicates a strongly democratic country. Strong democracies are indicative of more fairness, voice, and accountability, and moreover, several studies have illustrated a relationship between economic and political freedom (De Haan & Sturm, 2003; Dawson, 2003). Thus, it is important to control for the quality of political institutions in order to avoid omitted variable bias. Regression 3 estimates

$$I = \alpha + \beta_1 EFW + \beta_2 GDP + \beta_3 Polity2 + \varepsilon \qquad (3)$$

and finds a positive yet statistically insignificant relationship between polity2, our measure of political freedom, and innovation. More importantly, the coefficient on EFW remains positive and statistically significant suggesting that market institutions promote innovation. Another possibility is that investment, particularly foreign direct investment (FDI), may play an important role in supporting innovation.

FDI may affect innovation by providing more resources to entrepreneurs and innovators. The measure of foreign direct investment is taken from the World Bank in 2014 and records the total amount of FDI inflows for each country. Because the variable is recorded in total dollar

amounts, we transform this variable using the natural logarithm. Augmenting our current model with FDI, regression 4 estimates

$$I = \alpha + \beta_1 EFW + \beta_2 GDP + \beta_3 Polity2 + \beta_4 Ln(FDI) + \varepsilon \qquad (4)$$

and finds a positive relationship between FDI and innovation. In model 4, FDI possesses a very strong and statistically significant relationship with innovation. With the inclusion of FDI, EFW becomes insignificant at the 5% level and is only statistically significant at the 10% level. Another possibility worth considering is the role that education plays in supporting innovation.

As previously mentioned, developed economies are expected to emphasize innovation more than developing economies. An additional reason may be due to the relative importance of human capital, a measure of skilled-based labor, which often emphasizes formal education. When societies emphasize formal education, it allows for a shift from labor-intensive to capital-intensive resources. It can be argued, therefore, that highly educated societies with more human capital have a larger capacity for innovation. Thönnessen & Gundlach (2013) provide estimates of large human capital externalities. For instance, they argue that human capital can be transformed into social capital. Similarly, these human capital spillovers should foster creativity and knowledge---two components of our measure of innovation. The measure of human capital is the gross amount of students in secondary education from the World Bank. The gross measures allow for students from different cohorts to be included in the measure. It measures all students attending secondary education and divides this amount by the number of school aged children. Because of a lack of secondary education data from the World Bank, a five year average of data is taken for years 2010 to 2014. Augmenting the model with secondary education data, regression 5 estimates

$$I = \alpha + \beta_1 EFW + \beta_2 GDP + \beta_3 Polity2 + \beta_4 Ln(FDI) + \beta_5 SecondaryEducation + \varepsilon \qquad (5)$$

and finds no statistically significant relationship between education and innovation. Interestingly, political freedom, which was statistically insignificant in the previous two models, possesses a positive and statistically significant relationship with innovation, after controlling for the education levels in a country. More importantly for our analysis, economic freedom maintains a positive and significant relationship with innovation.

In addition, it may also be important to control for demographics such as country populations. Population has been linked to economic development and growth dating all the way back to Thomas Malthus. Moreover, population size may be linked to innovation since more individuals can be involved in the creation of new knowledge. However, with the exception of the United States, the largest populations in the world are developing countries such as China, India, and Indonesia. Nonetheless, as long as GDP per capita is included as an additional measure, we expect a positive relationship between population and innovation. Combining education and population data, regression 6 estimates

$$I = \alpha + \beta_1 EFW + \beta_2 PCI + \beta_3 PoliticalFreedom + \beta_4 Ln(FDI) + \beta_5 SecondaryEducation + \beta_6 Ln(Population) + \varepsilon \quad (6)$$

and finds no correlation between population sizes, derived from data at the World Bank and measured as the natural log of population, and innovation. The full model in regression 6 explains a considerable amount of cross-country variation in innovation (adjusted R^2=0.79) and the coefficient on EFW remains positive and statistically significant (β_1=8.496, t-statistic = 4.20). The model suggests that a one unit increase in EFW is associated with more than an 8 unit increase in innovation. Alternatively, log-level elasticity estimates suggest this is roughly a 27% increase in innovation.[5]

[5] log-level elasticity estimates are calculated post-regression. They explain the magnitude of the effect in the following manner: a one unit increase in the explanatory variable corresponds to a percentage change in the dependent variable.

Analysis of the components of economic freedom

Because the findings suggest that higher quality market institutions are associated with more innovation, it is important to ask the following question: which of the channels of economic freedom are driving these results? Table III addresses this question by analyzing the first component of innovation, creativity, and its relationship with each of the five components of EFW.

INSERT TABLE III ABOUT HERE

As column 1 of Table III suggests, EFW is highly correlated with measures of creativity. In addition, an examination of the channels of EFW reveals a very interesting finding. The effect of market institutions on innovation is being driven primarily by the strength of the legal system. The strength of the legal system is the second component of the EFW index and captures the following measures of the legal system: the protection of property rights, judicial independence, impartial courts, military interference, integrity of the legal system, legal enforcement of contracts, regulatory restrictions on the sale of real property, reliability of police, and the business costs of crime. The finding that high quality enforcement of the legal system is associated with more creativity supports previous findings that have suggested opportunity-motivated entrepreneurship is determined by the protection of property rights (McMullen, Bagby, and Palich, 2008). The only other area of EFW that is associated with creativity is the regulatory environment.

Table IV repeats this exercise but replaces the creativity component of innovation with the knowledge component. In this case, EFW is ~~un~~related to knowledge, but the effect is driven

primarily by the fourth component of EFW, the freedom to trade internationally. It is positively correlated with knowledge, which suggests that free and open trade promotes greater knowledge. This is a logical finding since an openness of ideas and exchange is likely to promote an exchange of knowledge.

INSERT TABLE IV ABOUT HERE

We also discover other interesting findings when analyzing the differences between Table III and Table IV. While the evidence suggests that the quality of market institutions, particularly the strength of the legal system, and economic development are important determinants of creativity, the evidence suggests that these variables do not affect knowledge. In contrast, FDI possesses no relationship with creativity, but it is strongly correlated with the knowledge component of innovation. Interestingly, our findings suggest that political freedoms matter for innovation, particularly through the creativity component but not through the knowledge component of innovation.

CONCLUSIONS

Innovation has been a central concept in growth theory. Understanding the driving force of innovation is a priority for those wanting to increase economic development, but very little empirical research has been conducted on the determinants of innovation. This study used the Global Innovation Index (GII) to undertake an empirical examination of the relationship between the quality of market institutions and innovation. This measure emphasizes inputs that are creative and increase knowledge. A few conclusions are drawn.

First, high quality market institutions are indeed highly correlated with innovation. A one unit increase in the Fraser Institute's economic freedom of the world index (EFW) is associated with a 27% increase in innovation. Second, we find that the creativity component of innovation is driven by the strength of the legal system while the knowledge component of innovation is driven by free trade.

It is important to mention that the findings only imply correlation not causation. To aid in this endeavor, future research would benefit by extending the research on market institutions and innovation using other methods of analysis (e.g., two-stage least squares, difference-in-differences, etc.). Another possibility, would be to compare the innovation between countries as a quasi-field experiment in settings such as: North and South Korea, West and East Germany, Taiwan, Hong Kong, and Continental China.

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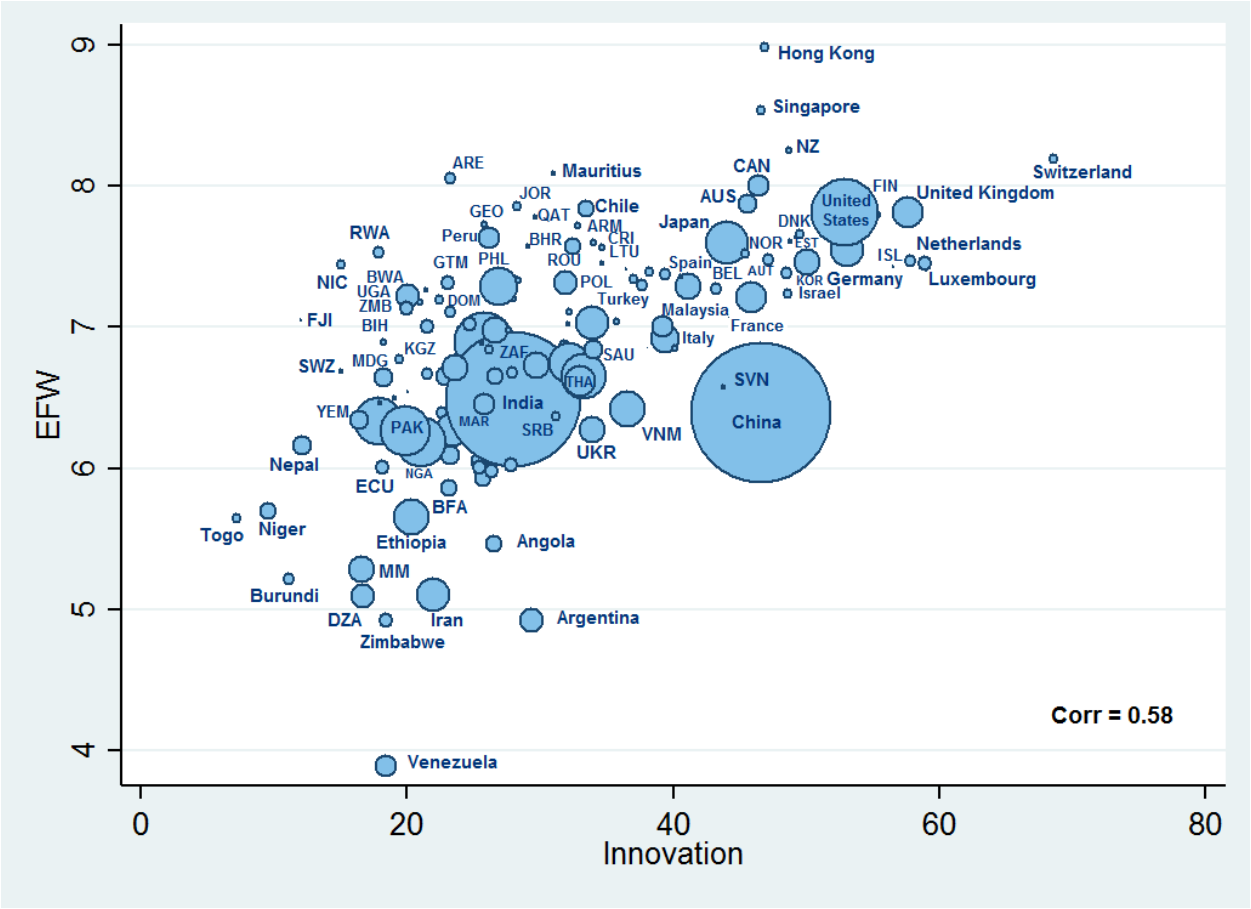

Figure 1

Market Institutions and Innovation

Table I
Sample Statistics and Correlations

Variable	N	Mean	SD	Min	Max		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Innovation	135	31.2	12.2	7.2	68.6	[1]	1													
Knowledge	135	28.7	12.2	3.2	72.4	[2]	0.87	1												
Creativity	151	31.6	13.4	0.5	72.4	[3]	0.87	0.60	1											
EFW	152	6.9	0.8	3.9	9.0	[4]	0.56	0.42	0.59	1										
Government Size	152	6.5	1.3	3.2	9.4	[5]	-0.44	-0.42	0.32	0.16	1									
Legal System	152	5.5	1.5	2.2	8.9	[6]	0.76	0.63	0.70	0.71	-0.39	1								
Sound Money	152	8.1	1.3	4.7	9.8	[7]	0.58	0.46	0.59	0.83	-0.02	0.53	1							
Free Trade	152	7.0	1.1	2.6	9.4	[8]	0.56	0.42	0.56	0.86	-0.01	0.57	0.72	1						
Regulation	152	7.1	0.9	3.9	9.0	[9]	0.33	0.22	0.35	0.76	0.00	0.56	0.46	0.61	1					
PCI ($ thousands)	138	14.5	19.3	0.25	97.4	[10]	0.73	0.60	0.66	0.47	-0.46	0.76	0.46	0.40	0.33	1				
Population (log)	151	16.2	1.6	12.7	21.0	[11]	0.02	0.13	-0.17	-0.26	0.03	-0.18	-0.16	-0.28	-0.34	-0.09	1			
Political Freedom	141	5.0	5.9	-10	10	[12]	0.44	0.30	0.46	0.29	-0.01	0.14	0.40	0.37	0.04	0.20	-0.03	1		
Secondary Education	133	81.0	27.6	15.7	133.8	[13]	0.66	0.51	0.66	0.51	-0.35	0.67	0.54	0.45	0.30	0.62	-0.16	0.26	1	
FDI (log)	140	21.3	2.03	15.1	26.4	[14]	0.58	0.58	0.40	0.27	-0.21	0.42	0.33	0.21	0.04	0.43	0.54	0.20	0.42	1

Table II - Market Institutions and Innovation

	Dependent Variable = Innovation					
Variable	(1)	(2)	(3)	(4)	(5)	(6)
EFW	2.651***	8.444***	8.415***	7.181***	8.988***	8.496***
	(3.13)	(5.56)	(5.45)	(4.36)	(4.60)	(4.20)
GDP (log)		6.797***	7.413***	6.274***	7.647***	7.327***
		(4.59)	(4.96)	(4.03)	(4.39)	(4.03)
Polity2			0.264	0.309	0.521**	0.525**
			(1.18)	(1.46)	(2.24)	(2.20)
FDI (log)				1.034***	0.946**	1.305***
				(2.66)	(2.10)	(2.67)
Education (secondary)					-0.0768	-0.0803*
					(-1.63)	(-1.70)
Population (log)						-0.521
						(-0.92)
Constant	27.92***	-21.94*	-24.53*	-39.22***	-46.77***	-41.89**
	(3.89)	(-1.67)	(-1.81)	(-2.64)	(-3.15)	(-2.45)
N	126	126	119	114	100	100
adj. R^2	0.686	0.738	0.764	0.762	0.791	0.791

Note – Model estimated using OLS. *t* statistics in parentheses with robust standard errors. The dependent variable is a simple average of the creation and knowledge sub-component measures from the Global Innovation Index. Regional and OECD dummies are included in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed test).

Table III
Market Institutions and Creativity

	Dependent Variable = Creativity Component					
Variable	(1)	(2)	(3)	(4)	(5)	(6)
GDP (log)	9.205***	0.751	2.624**	2.339	2.496	2.940**
	(4.84)	(0.60)	(2.56)	(1.40)	(1.65)	(2.23)
Polity2	0.712***	0.728***	0.645**	0.753***	0.614**	0.829***
	(2.76)	(2.63)	(2.41)	(2.83)	(2.22)	(2.85)
FDI (log)	-0.141	1.185*	0.217	1.062*	0.867	0.894
	(-0.25)	(1.79)	(0.42)	(1.72)	(1.37)	(1.46)
Education (Secondary)	-0.101	-0.00777	-0.0589	-0.0189	-0.0343	-0.0450
	(-1.39)	(-0.10)	(-0.79)	(-0.24)	(-0.46)	(-0.61)
Population (log)	-0.876	-2.110**	-1.450**	-2.005**	-1.751*	-1.537*
	(-1.17)	(-2.37)	(-2.09)	(-2.30)	(-1.85)	(-1.92)
EFW	10.96***					
	(5.52)					
Size of Government		-0.142				
		(-0.14)				
Property Rights			4.149***			
			(5.01)			
Sound Money				1.142		
				(1.45)		
Free Trade					2.862*	
					(1.81)	
Regulation						2.973**
						(2.36)
Constant	-21.00	49.97***	33.33*	39.51*	31.36	24.39
	(-1.00)	(3.03)	(1.86)	(1.88)	(1.31)	(1.24)
N	104	104	104	104	104	104
adj. R^2	0.697	0.617	0.685	0.625	0.636	0.639

Note – Model estimated using OLS. *t* statistics in parentheses with robust standard errors. The dependent variable is the creation sub-component measure from the Global Innovation Index. Regional and OECD classification dummies are included in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed test).

Table IV
Market Institutions and Knowledge

	Dependent Variable = Knowledge Component					
Variable	(1)	(2)	(3)	(4)	(5)	(6)
GDP (log)	4.732**	0.446	0.755	1.623	1.861*	0.384
	(2.06)	(0.30)	(0.62)	(1.10)	(1.71)	(0.24)
Polity2	0.293	0.301	0.279	0.315	0.192	0.307
	(0.96)	(0.99)	(0.88)	(1.11)	(0.69)	(0.94)
FDI (log)	2.128***	2.865***	2.461***	2.723***	2.584***	2.842***
	(3.18)	(3.98)	(3.36)	(3.89)	(3.64)	(4.02)
Education (Secondary)	-0.0978	-0.0455	-0.0628	-0.0575	-0.0719	-0.0480
	(-1.46)	(-0.75)	(-0.97)	(-0.92)	(-1.34)	(-0.68)
Population (log)	-0.186	-0.890	-0.566	-0.780	-0.539	-0.838
	(-0.26)	(-1.15)	(-0.77)	(-1.05)	(-0.68)	(-1.19)
EFW	5.906**					
	(2.17)					
Size of government		0.239				
		(0.21)				
Property Rights			1.413			
			(1.20)			
Sound Money				1.028		
				(1.25)		
Free Trade					2.823**	
					(2.28)	
Regulation						0.196
						(0.12)
Constant	-43.00*	-6.919	-10.63	-13.14	-23.45	-7.069
	(-1.95)	(-0.52)	(-0.76)	(-0.87)	(-1.33)	(-0.41)
N	100	100	100	100	100	100
adj. R^2	0.633	0.603	0.612	0.611	0.627	0.603

Note – Model estimated using OLS. *t* statistics in parentheses with robust standard errors. The dependent variable is the knowledge sub-component measure from the Global Innovation Index. Regional and OECD classification dummies are included in all specifications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ (two-tailed test).