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The Roles of Formal and Informal Institutions on Innovations Activity

(Peranan Institusi Formal dan Tidak Formal terhadap Inovasi)

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ABSTRACT

This paper analyses the impact of institutions on the innovation level of countries. This analysis is performed by segregating the dimension of institution into two, namely formal institutions and informal institutions. Using samples of 62 cross-section countries and employing robust standard error ordinary least squares (OLS) estimation, this study has found evidence that both formal and informal institutions affect the innovation level of countries. The results suggest that countries with higher formal institutions (institutional quality) and higher informal institutions (social capital) are associated with higher innovation levels. However, informal institutions demonstrate that at 10th percentile quantile estimations it exhibit a significant positive impact on innovation, while the formal institutions show such impact after exceeding the 50th percentile. Hence, this result suggests the formal institutions play important role when innovation level in a country is high. Both formal and informal institutions are crucial in influencing the level of country's innovation.

Keywords: Innovation; institutions; social capital

ABSTRAK

Kajian ini menganalisis impak institusi terhadap tahap inovasi dalam sesebuah negara. Analisis ini dijalankan dengan membahagikan dimensi institusi kepada dua, iaitu institusi formal dan institusi tidak formal. Dengan menggunakan sampel dari 62 buah negara keratan rentas dan ralat piawai mantap kuasa dua terkecil (OLS), hasil dapatan kajian menunjukkan bahawa institus rasmi dan institusi tidak rasmi mempengaruhi tahap inovasi sesebuah negara. Hasil dapatan kajian mencadangkan bahawa negara-negara yang mempunyai institusi formal (kualiti institusi) dan tidak formal (modal sosial) yang tinggi adalah berkaitan dengan tahap innovasi yang tinggi. Bagaimanapun, institusi tidak formal menunjukkan bahawa pada 10 anggaran kuantil persentil ia mempamerkan kesan positif yang signifikan kepada inovasi, manakala institusi formal menunjukkan kesan tersebut selepas melebihi persentil ke-50. Justeru, keputusan ini menunjukkan institusi formal memainkan peranan penting apabila tahap inovasi dalam sesebuah negara berada pada tahap yang lebih tinggi. Kedua-dua institusi formal dan tidak formal adalah penting dalam mempengaruhi tahap inovasi sesebuah negara.

Kata kunci: Inovasi; institusi; modal sosial

INTRODUCTION

In a capitalist economy, "change" is an everlasting evolution that never can be stationary. As Schumpeter (1942) wrote "This evolutionary character of market process is not merely motivated by the ever-changing social or natural environment such as wars, revolutions and changes in social structure which alters the economic action; nor due to quasi-automatic factors such as increase in population, capital or vagaries of monetary systems". Rather, the engine of market evolution comes from the intention of firms or enterprises in discovering new consumers, product, markets and methods of production". In simple words, market evolution is simply driven by firms' profit oriented behavior. This trait is clearer in modern day economies that are driven by the norm of globalization.

In micro perspective, competitiveness is the key for firms' survival and growth in modern economies. For that reason, developing new products and services becomes a regular activity for today's firms' in order to maintain their uniqueness and to keep their products heterogeneous from rival firms. Investment in innovation is indeed motivated by the desire of firms to secure higher market share, which may receive short-run monopoly profit. Besides that, continuous innovation becomes essential for continued viability as firms might become obsolete by the process of creative destruction. The interaction between firms is thus important to the nation's economic performance. For the economy as a whole, innovative activity such as research and development will boost technological advancement and hence productivity which is a crucial element for economic growth.

Up until recently, most of the previous literature on innovation has focused on its impact toward economic growth and its determinant factors such as foreign direct investment, trade openness and human capital (Cheung & Lin 2004; Dahlman 1994; Romer 1990; Blackburn, Hung & Pozzolo 2000; Tebaldi & Elmslie 2008). However, there is little discussion about the importance of the institutional environment on innovation. Undoubtedly, R&D expenditure and qualified labor are essential for initiating innovative activity. Nonetheless, equal amount of resources injected into different countries may yield different innovative gains. This is because the institutional framework and quality of R&D personnel can differ greatly between countries. On this matter, most current established institution-innovation empirical evidence is focused on formal institutions (governance) while little attention is given to informal institutions (social capital)[1]. Social capital such as trust, norms and networks are an important indicator for the initiation of innovative activity. Hence, further examination on the impact of different institutional dimensions (e.g. governance and social capital) on innovative activity might able to explain why some countries tend to have low innovation level.

In response to this, this paper attempts an empirical analysis on the relationship between institutions and innovation. Specifically, it serves two essential objectives. First, few studies have regressed the institutional quality factor on innovation especially with regards to social institutions because they are difficult to measure and quantify. Such rare literature includes Wang (2013) where they used the governance institution factor to explain cross-countries innovation differences. In this study, we extend this view by splitting the institutions into two, namely, governance institutions and social capital. The motivation of this research objective is to highlight that the impact of institutions on innovation occurs in two ways. While reputable law structure and efficient government are the factors that encourage innovative activity, social capital such as trust is also an informal institution that matters to the initiation of innovative activities. Comparing the formal and informal institution's impact will also extend the understanding on the role of social capital on innovation whether it compliments or substitutes the formal institution. Second, while most institutions-innovation analysis focuses on average effects, this study aims to examine whether the institutions-innovation relationship varies with different levels of innovational intensity. Overall, by examining the different dimensions of an institutions impact on innovation we will fortify the currently established institution-innovation framework.

The remainder of the paper is structured as follows. Section 2 provides a brief review of the literature. Section 3 specifies the empirical model, estimation methods and the data used in this study. Section 4 presents the estimated results and their discussion. Lastly, Section 5 concludes the main finding and policy implication from this study.

LITERATURE REVIEW

INSTITUTIONS AND INNOVATIONS

As one of the earliest works establishing the relationship between institutional quality and innovation, Freeman (1987) has shown that quality of institution is important in the process of creating and diffusing technology. In his words, he found that in some institutions, when firms are left alone, they will engage in myopic innovation process which will only maximize profit in the short-run. Hence, he suggests that suitable macro-institutions may provide proper incentives for innovation by changing a firms' innovation behavior which will then focus on long-term profit maximization. In his books, he further recites evidence from Japan in explaining the role of institutional quality with regards to technology policy. From his view, the superiority of Japan in innovation is due to its advantage of a "national system of innovation". This system was a set of complex factors ranging from industrial policy and science policy and included basic education, industry structures, the tax system and wage incentives. Besides effective policy measurement, social institutions in Japan also contribute to its success. For instance, the strength of belief that getting educated is a moral duty; the degree of preference for cooperation over competition; the willingness of professional labor to work 80-hours per week during peak innovation periods. Hence, he basically draws out the earliest framework regarding how formal and informal institutions matter for innovational intensity.

In response to this, Kostova (1997) introduced the concept of a three-dimensional country institutional profile to explain how a country's governmental policies (regulatory dimension), widely shared social knowledge (cognitive dimension) and value systems (normative dimension) affect domestic business activities. Her works were later used by Busenitz, Gomez and Spencer (2000) to answer the question of entrepreneurial phenomena differences across countries. Here, we adopted Kostova's approach to differentiate different institutional effect (e.g. formal and informal) to innovation.

First, the regulatory dimension of institution consists of laws, regulations and government policies that provide support to new businesses, thus, reducing risks for individuals to start a business, and facilitating entrepreneur's efforts to acquire resources such as grants and government sponsored programs. This dimension represents the ability of law and regulation to protect the interests of inventors such as enforcement efficiency and copyright protection (Ginarte & Park 1997; Blind 2012). On a broader prospect, the regulatory dimension

also relates to governance indicators such as government stability, corruption control and bureaucratic quality which are essential for the efficiency of enforcement of established law and regulation.

Second, the cognitive dimension of institution consists of social shared knowledge or experience of society regarding the process of entrepreneurship. Specifically, particular issues and knowledge sets become institutionalised and certain information becomes part of a shared social knowledge (Busenitz & Barney 1997; Lau & Woodman 1995). In adopting this view to innovation theory, it is necessary to study the ability of knowledge to spread within a society. Firms need prior related knowledge to assimilate and use new knowledge that is critical for innovative capability (Cohen & Levinthal 1990). The diffusion of new knowledge then relies on the established social networks and structures to determine the speed and to what extent information is shared within a community.

Lastly, the normative dimension of institution is related to the value placed by a society in defining entrepreneurship. This value then depends on norm, culture and belief of a particular society (Busenitz & Lau 1996; Knight 1997; Tiessen 1997). Normative dimension institution is enforced by the normative mechanism regulating individual behaviour. The normative mechanisms explicitly or implicitly force entrepreneurs to adhere to the code of conduct that is set out by a specific community such as industries, business associations, families and ethnic groups. The normative dimension can be applied through informal mechanisms such as trust (Welter 2005). To this extent, trust fosters cooperation between individuals (Fukuyama 1995) and enables information sharing via network (Tsai & Ghoshal 1998). Thus, trust lubricates knowledge sharing via network and hence, the creation of new ideas.

From the above discussion, the regulatory dimension of institution refers to formal institutions that matter to innovation. On the other hand, the cognitive-normative dimension of institution is intrinsically social capital. Since our major concern in this study is to examine how governance and social capital influence innovative activity, we will narrow our scope by reviewing existing literature on the proposed issue in the following section.

FORMAL INSTITUTIONS AND INNOVATIONS

In view of the influence of the regulatory framework on innovation, the effects of regulation on innovation take two forms. First, compliance with regulations (like tax) reduces the available resources for investment in research and development (Craft 2006). Second, regulation changes firms' incentive to invest in research and development. Here, a regulation scheme such as patent protection might motivate a firm to invest in R&D (Carlin & Soskiuce 2006), whereas schemes such as price restrictions and product market rules may reduce firms' incentive for innovative activities. As for empirical works, Van Waarden (2001) analysed both direct and indirect effects of formal regulation and litigation on innovation in the United States and the Netherlands. Based on his findings, economies with legal systems that are more effective in reducing risk and uncertainty are more innovative.

Blind (2012) extended regulatory theory by differentiating the regulatory effect into economic regulation, social regulation, and institutional regulation. First, economic regulation focuses on the influence of competition policies, price regulation, natural monopoly regulation, market entry regulations, and public utilities on firms' innovation decisions. He argued that although competition encourages innovation, this statement is valid only when optimal competition exists in the market. When competition becomes so intense that imitation activities become more attractive than innovation activities, the positive impact may change to negative.[2] Second, Blind used environmental regulation to describe the influence of social regulation on firms' innovation. Here, the social perceptions of environmental issues that later form new environmental regulations are a factor that motivates firms' innovation (Kemp 1998). New environmental regulations have resulted in improvements in machinery and equipment that enable firms to introduce new production techniques into the industry.

Finally, institutional regulation refers to the institutional framework that is implemented by authorities. Blind defined institutional regulation as the effectiveness of the enforcement of intellectual property rights (IPR), which secures the interests of innovators.[3] Blind's proposition regarding the regulation of innovation is indeed groundbreaking. However, the use of IPR as a proxy for the institutional framework that determines innovation is statutory. IPR alone is inadequate to eliminate all risk and uncertainty for firms to invest in R&D.[4] Given that R&D is a form of firm investment that anticipates future profit from a successful innovation, a firm's decisions on innovation should also be influenced by other countries' institutional profiles, such as governance quality.[5]

Specifically, the fundamental role of a patent protection framework is to promote the creation and diffusion of technology by granting limited monopoly power to an innovator over a technological solution. However, although many countries have adopted a sufficient patent protection framework, its implementation in terms of protecting the benefits of an innovator is far from effective (Ginarte & Park 1997). A country's ability to enforce a law depends on the quality of its government agencies, such as its political stability and judiciary system. That is, a better judiciary system leads to better implementation of patent law and, hence,

promotes innovation.[6] In addition, political stability, government accountability, and control of corruption should also have a positive impact on patent law and, subsequently, innovative activities (Varsakelis 2006). The relationship between corruption and innovation was also explored by Prashanth (2008), who found that corruption has a negative effect on product innovation in African firms. Later, Anokhin and Schulze (2009) proposed that efforts to control corruption increase firms' level of trust in the government's ability to enforce the laws and rules of trade. Thus, better control of corruption also promotes higher levels of innovation and entrepreneurship. An absence of such trust will limit a firm's ability in terms of trade, productivity, and innovation investment because it will need to direct more resources to monitoring and other transaction costs.

The empirical analysis on the role of formal institutions on innovation has been done. In the case of China, Kafouros, Piperropoulos and Zhang (2015) highlight that uneven institutional evolution affects the enforcement of intellectual property rights (IPRs), the level of international openness, the quality of universities and research institutes across regions and thus the degree to which Chinese emerging market enterprises (EMEs) benefit from academic collaborations. Their findings demonstrate that sub-national institutional variations have a profound impact on the relationship between academic collaborations and firms' innovation performance. The findings suggest that institutional development evolves in different ways across sub-national Chinese regions because the assumption of institutional homogeneity within a given country is invalid. On the other hand, Robin and Schubert (2013) investigate the impact of cooperation with public research on firms' product and process innovations in France and Germany using Community Innovation Survey data from 2004 and 2008. They find that cooperating with public research increases product innovation but has no effect on process innovation, which depends more on firms' openness. Their finding also suggests that the increase in product innovation is much higher in Germany than in France.

Wang (2013) investigates the influence of institutional quality, particularly political risk indicators, on innovation intensity. He used five instrumental variables (latitude, ethnolinguistic diversity, crops, mortality, and engfrac) for institutions. This setting of the econometric model implies that the institutions are endogenous in nature. Based on his empirical analysis, he reported a significant direct effect of institutions on countries' innovation intensity. However, the author's works suggested that there are no unique differences between formal and informal institutions in influencing countries' innovation. In the following section, we will review how social capital influences innovative activities and why its impact might differ from that of formal institutions.

INFORMAL INSTITUTIONS AND INNOVATIONS

The original concept of social capital can be traced back to the work of Hanifan (1916). In his work, social capital was defined as "those tangible assets that count for most in daily lives of people: namely goodwill, fellowship, sympathy, and social intercourse among the individuals and families who make a social unit". Works using a modern concept of social capital were popularized in the 1980s and accelerated in the 1990s. Such works include Bourdieu and Wacquant (1992), who related social capital to actual or potential resources within a social structure that collectively supports each of its members and is linked to the possession of a durable network of institutionalized relationships of mutual acquaintance and recognition. Additionally, Coleman (1990) argued that social capital is defined by its function. He suggested that social capital is not a single entity, but a variety of different entities. These entities share two common characteristics: They all consist of some aspect of a social structure and they all facilitate certain actions of individuals who are within that structure. In contrast, Putnam (1993) suggested three specific components within social capital: moral obligations and norms, social values (especially trust), and social networks that facilitate coordination and cooperation for mutual benefit. Fukuyama (1995) later simplified the term and defined social capital as people's ability to work together for common purposes in groups and organizations. Overall, all these previous works defined social capital as links, shared values, and understandings in society that foster trust and, ultimately, cooperation within a community.[7] In other words, social capital entails values that promote cooperation within society.[8]

How does social capital influence innovation? Because innovation diffusion and firm cooperation are crucial to the creation of new ideas, social capital should have a major impact on innovation. The underlying theory for the social capital-innovation relationship is based on notable network theory. As a beginning, we refer to Cohen and Levinthal (1990), who reported that firms' absorptive capacity is critical for innovation capabilities. In other words, the adoption of prior related knowledge is a source for the creation of new knowledge. However, how fast is the innovation diffusion process within a community? The structure of social networks fills the role that determines the extent of information spread within a community; Abrahamson and Rosenkopf (1997) explored the social network effect on the extent of innovation diffusion. A positive feedback loop increased the number of adopters and created stronger bandwagon pressure. Stronger bandwagon pressure then encouraged more adopters. The authors proposed that both the number of network links and the idiosyncrasies of network structures can have very large effects on the extent of innovation diffusion among members of a social network.[9] The transfer of new knowledge among organisations then facilitates the

creation of new knowledge within organisations (Kogut & Zander 1992; Tsai 2000). Tsai (2001) found that the interaction between absorptive capacity and network position has significant positive effects on the innovation and performance of food manufacturing companies.

Previous literature has highlighted the importance of social networks in facilitating the creation of new knowledge, but the transfer of knowledge will not happen without trust (Tsai & Ghoshal 1998). Trust can influence innovation through several mechanisms. First, trust reduces monitoring costs for possible malfeasance and non-compliance by partners and reduces the need for written contracts (Knack & Keefer 1997; Tamaschke 2003). Lower monitoring costs will enable firms to allocate more resources to innovative activity. Second, members of a society, including investors, become less risk averse in a society with higher trust. Thus, higher trust encourages investors to invest more in R&D projects (Akcomak & Bass terWeel 2006). Third, trust enables information sharing and cooperation between firms in initiating innovative cooperation projects. Repeated cooperation that develops trust then encourages firms to engage in riskier and more radical innovative projects. Finally, high trust in an established institution, such as the government and the legal system, motivates innovative activity. This trust ensures that inventors invest in innovative efforts because they trust that their benefit from a successful innovation will be protected (Dakhli & de Clercq 2004; Tabellini 2006). A norm is treated as an element that fosters trust. Shared norms lubricate the function of a society by fostering trust and reducing the incentive of its members to cheat (Lee, Jeong & Chae 2011).

As for empirical works, Landry et al. (2002) investigated the effects of networks and trust on the likelihood of innovation and innovation radicalness. In their findings, an innovation-increasing effect of the network was detected, whereas the effect of trust was insignificant. In contrast, in a firm-level analysis, Tsai and Ghoshal (1998) found that both social interaction and trustworthiness increased the number of innovations. Similarly, Ackomak and terWeel (2006) found that trust has a positive influence on the number of patent applications by analyzing European region-level data. Finally, Kaasa, Kaldaru and Parts (2007) examined the different dimensions of social capital and institutional quality in innovation activity. They employed cluster analysis of 29 European countries and concluded that different dimensions of social capital have different impacts on innovative activity.

This study contributes to the literature in three important aspects. First, this study adopts network theory as the fundamental theory to explain the effect of institutional quality through the social dimension, which is currently underutilized in the current literature. Second, this work focuses on comparing the effect of governance quality and social capital on innovation. Social networks that determine the degree of firms' absorptive capacity might be a complement for good governance in encouraging innovative activity. Hence, governance quality might not fully explain innovation phenomena because social capital affects the speed of innovation diffusion, which is fundamental for the creation of new ideas. Third, whereas most institution-innovation literature has focused on the average impact of institutions on innovation, we aim to examine whether the role of institutions differs by country, based on different initial levels of innovation. We hope to explain why improving the law structure in certain countries fails to promote the country's innovation activity.

The main differences between this study and the cited works are: 1) This study adopted network theory as fundamental theory to explain the effect of institutional quality through a social dimension which is currently underutilized by current literature. 2) This work focuses on comparing the effect of governance quality and social capital on innovation. Social networks that determine the degree of firms' absorptive capacity might be a compliment for good governance to encourage innovative activity. Hence, governance quality might not be able to fully explain innovation phenomena as social capital influences the speed of innovation diffusion that is fundamental for creation of new ideas. 3) While most institution-innovation literature focuses on the average impact of institutions on innovation, we aim to examine whether the role of institutions behave differently on a country by country basis with different initial innovation intensity. This is to explain why even if law structure is improved in a country; it may fail to promote innovation activity.

METHODOLOGY

EMPIRICAL MODEL, ESTIMATION METHODS AND THE DATA

In the first part of this study, we aim to distinguish the impacts of formal and informal institutions on innovation. Therefore, the empirical specification is focused on the determinant of innovation by testing the roles of formal institution (governance) and informal institution (social capital). Hence, this study attempts to estimate the following Ad-hoc equation;

$$A_i = \beta_0 + \beta_1 INS_i + \beta_2 X_i + \varepsilon_i \quad (1)$$

$$A_i = \gamma_0 + \gamma_1 SC_i + \gamma_2 X_i + \varepsilon_i \quad (2)$$

where A is innovation, INS is ICRG institution index, SC is social capital, X is vector of exogenous control variables (i.e. human capital, trade openness, FDI and GDP per capita), ε is the random error term represents natural logarithm. The focus in this study is to examine the size, sign and significance of the coefficients β_1 and γ_1 in determining whether formal and informal institutions

yield a varied impact on innovation. As for the expected sign, both β_1 and γ_1 are expected to be positive to show that higher institutional quality and stronger social ties promote innovation activity. Specifically, higher institutional quality minimises the distortion in patent law enforcement and hence encourages innovative activity (Freeman 1987; Van Waarden 2001; Blind 2012; Wang 2013). On the other hand, stronger social ties help to diffuse frontier innovation and later promote innovative activity in the industry (Cohen & Levinthal 1990; Abrahamson & Rosenkopf 1997; Tsai 2001; Kaasa et al. 2007). Similarly, all control variables are also expected to have a positive impact on innovation. Hence, Equations (1) and (2) serve as a baseline specification in this part of the study. The above equation will be estimated by robust standard error OLS estimator.

QUANTILE ESTIMATION

In the second part of this study, we adopted quantile regression to estimate the effect of explanatory variables on the dependent variable at different points of the dependent variable's conditional distribution. Quantile regressions were first introduced by Koenker and Bassett (1978) as a 'robust' regression technique which allows for estimation where typical assumption of normality of the error term that might not be strictly satisfied. It was later used to get information about points in the distribution of the dependent variable other than the conditional mean (Buchinsky 1994, 1995; Eide & Showalter 1997; Koenker 2005). Here, the quantile regression model in our study can be written as:

$$A_i = Z_i'\beta_\theta + \mu_{0i}; Q_\theta (A_i|Z_i) = Zi'\beta_\theta \quad (3)$$

Where A_i denotes innovation intensity and the vector of explanatory variables. β_θ is the vector of parameters to be estimated for a given value of the quantiles θ. is the θ^{th} quantile of the conditional distribution of the innovation intensity given the vector of explanatory variables Z_i. The estimation of the quantile parameters is done by solving a minimisation problem where the corresponding residuals have to be weighted. In this application, we use a simultaneous quantile regression model which allows us to test whether the coefficients are similar across the conditional quantiles. Standard errors are obtained by using the bootstrap method suggested by Gould (1997). Finally, our regression estimates at five different quantiles ranging from 0.10 to 0.90.

THE DATA

For the purpose of empirical analysis, data from several sources were extracted. First, the formal institutions dataset employed was from the International Country Risk Guide – a monthly publication of Political Risk Services (PRS). Following Seldadyo, Nugroho and Haan (2007), five PRS indicators were used to measures overall formal institutions environment. 1) Democratic accountability (6 point scale) – measures how responsive government is to its people. Governments' that are less responsive will be more likely to fail, peacefully under a democratic society but possibly violently in a non-democratic one. 2) Government stability (12 point scale) which is an assessment of the government's ability to carry out its declared programs and stay in office. It's assigned based on three components: government unity, legislative strength and popular support. 3) Bureaucratic quality (4 point scale) – which represents the bureaucratic strength and expertise to govern without drastic changes in policy or interruptions in government services and where it has an established mechanism for recruitment and training. 4) Corruption (6 point scale) – which reflects the likelihood of an official to demand an illegal payment or use their position or power to their own advantage. 5) Law and order (6 point scale) – which measure the strength and impartiality of a legal system as well as popular observance of the laws. These five variables are normally scaled from 0 to 10 where higher value implies better institutions. The formal institutional quality variable was obtained by summing the five PRS indicators.

On the other hand, the social capital index employed was assembled by Lee et al. (2011). The data was extracted from the principal component of 44 variables covering 72 countries. The index includes 4 main components of social capital namely social trust, norms, networks and social structure. Due to the limitations of the social capital index which covers only a 72 cross sectional unit, we perform cross sectional analysis in this section to enable comparison between formal and informal institutions effect to innovation[10].

For the measurement of innovation, we used patent application from World Intellectual Property Organisation (WIPO). For estimation purposes, patent application is transformed into patent application per total labor (P/L). As for control variables, total population in tertiary schooling was proxied as human capital which is assembled by Barro and Lee (2000). National import and export ratio is proxied as trade openness. The data together with FDI inflows and GDP per capita was extracted from World Development Indicator (WDI). For the purpose of cross-sectional analysis, the above mentioned data was averaged from year 2006 to 2010 and 62 developed and developing countries were selected as the sample set. The descriptive statistic for the data used in this study is presented in Table 1. As shown in Table 1, standard deviation for social capital is higher than institutions. This suggests that the divergence on social structure is greater than legal structure in our sample. Hence, our core interest in this study is to examine whether a cross-country variation in social capital yields a better understanding in explaining the institution-innovation relationship.

TABLE 1. Descriptive statistic for cross-countries data

	Mean	Std. dev	Min	Max	Obs
Innovation (P/L)	-3.605	0.669	-6.521	-2.164	62
Institution index (INS)	1.368	0.068	1.255	1.492	62
Social capital index (SC)	0.697	0.143	0.314	0.919	62
GDP (LGDP)	4.004	0.581	2.565	5.163	62
FDI (LFDI)	5.707	5.769	0.256	31.599	62
Import (LIM)	10.886	0.648	9.530	12.319	62
Human capital (secondary) (LHCS)	30.617	13.363	0.91	61.33	62
Human capital (tertiary) (LHCT)	11.030	6.671	0.5	26.13	62
Religion	13.955	24.839	0	96.6	62
Latitude	0.415	0.183	0.011	0.722	62
English origin	0.210	0.410	0	1	62

Note: (P/L) is measured in percentage point. GDP, FDI, import, human capital, religion and latitude are measured in levels. ICRG and social capital are the overall measures of relevant sub-component of institutions indicators. English legal origin is a dummy variable. All variables are transformed into natural logarithm except English origin.

Figure 1 displays the correlation between innovation intensity (P/L) and formal institutions proxy by institutional quality index (INS) for the covered sample cross-countries. From Figure 1, the institutions data indicate a strong correlation with innovation intensity ($R^2 = 0.258$). Meanwhile, Figure 2 illustrate a relatively stronger correlation between innovation and informal institutions (social capital) ($R^2 = 0.461$). The simple correlation test hints that social capital somehow has a greater explanatory power over institutions in explaining countries innovation level. However, note that correlation does not imply causation but as a preliminary examination on the relationship between both variables. Overall, both figures suggest countries with better institutions and social capital tend to have intense innovation activity.

EMPIRICAL RESULTS

RESULT OF THE ROLE OF INSTITUTIONS ON INNOVATIONS

This section presents the empirical findings using the econometric approaches discussed in Section 3. The main empirical results are presented in Table 2 while Tables 3 and 4 report the estimation of related sub-indicator on innovation[11]. In particular, Model (1) and Model (3) present the bivariate analysis of institutions-innovation relationship. Model (2) and Model (4) extend the analysis by incorporating other control variables into Model (1) and Model (3). A subsequent endogeneity test is performed to test the endogeneity of variables e.g. formal and informal institutions. The test adopted the Wu-Hausman approach discussed in Section 3 where the

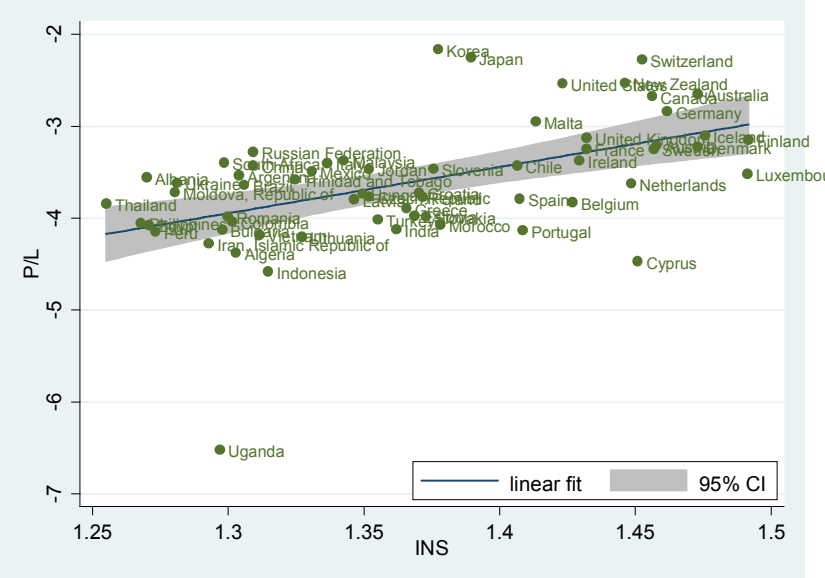

FIGURE 1. Scatter Plot of Innovation (P/L) and Formal Institutions (INS)

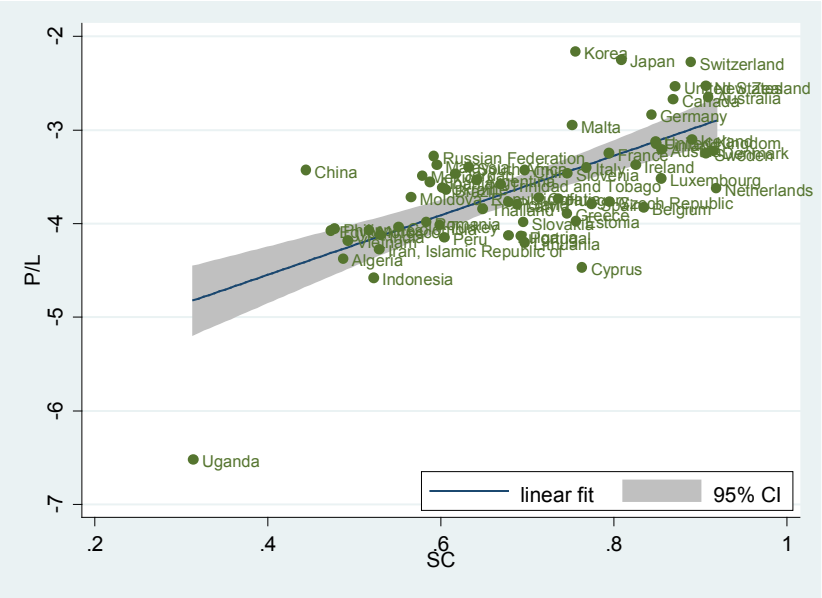

FIGURE 2. Scatter Plot of Innovation (P/L) and Informal Institutions (SC)

null hypothesis of this test indicates proposed variable to be exogenous in nature.

From Table 2, Model (1) and Model (2) present the estimated result of Equation (1) using robust standard error OLS estimator. In Model (1), the result suggests that the overall measure of formal institutions (ICRG) exhibits a strong effect on innovation. Specifically, a 1% increase in an institutions quality is associated with an increase of 5% in innovation. In Model (2), other determinants of innovation such as GDP, FDI, import and human capital are included into the Model (1) to serve as control variables. Again, formal institutions are suggested to have a significant positive impact to innovation even after controlling from the control variables. This finding is consistent with recent studies which have also found a positive relationship between institutions and innovations. Therefore, the finding supports the view that an improvement on institutional quality, e.g. legal framework is needed to encourage innovation activity. However, the subsequent endogeneity test shows that the institutional quality is exogenous with the endogeneity test failing to reject null hypothesis of exogenous. Thus, OLS coefficients on institutional quality are suggested to

TABLE 2. OLS Estimate on the Impact of Institutions on Innovations

Dependent variable: Innovation (P/L)				
	Formal Institutions		Informal Institutions	
	Model 1	Model 2	Model 3	Model 4
Formal Institutions (ICRG)	5.034 (4.57)***	3.047 (2.53)**	-	-
Informal Institutions (Social Capital)	-	-	3.177 (7.16)***	2.802 (4.63)***
GDP percapita	-	0.165 (1.30)	-	-0.037 (-0.29)
FDI	-	-0.006 (-0.49)	-	-0.011 (-0.99)
Imports (IM)	-	0.270 (2.24)**	-	0.224 (2.07)**
Human Capital (HCT)	-	0.023 (2.04)**	-	0.009 (0.86)
Observations	62	62	62	62
R^2	0.246	0.377	0.452	0.498
Endogeneity Test ρ-value	0.130	0.215	0.550	0.789

Notes: Figure in parentheses is t statistics produced by using OLS estimators. *, ** and *** indicate significant at 10%, 5% and 1% levels, respectively.

be exogenous and relieve from omitted variable bias or measurement errors.[12]

Next, Model (3) and Model (4) present the estimated result of Equation (2). The results show that the informal institutions (social capital) also exhibit a significant positive impact on innovation. The results are robust even after including control variables into the model. The findings are also consistent with previous literature which suggests a positive impact of social capital on innovation. Specifically, higher social capital will foster trust and hence, promote knowledge sharing and cooperation which is essential in initiating innovation activity. The subsequent Wu-Hausman endogeneity test also suggested that social capital is exogenous and the OLS coefficient is consistent. Thus, the finding suggests a revival of conventional wisdom that institutions are exogenous or at least not correlated with the error term in the model in econometric sense.

Furthermore, Table 3 and 4 shows the estimation of related institutions sub-indicator on innovation. Here, Table 3 shows the estimated results on the impact of five ICRG sub-indicators on innovation. Out of these indicators, corruption controls are worth examining with others indicators failing to individually demonstrate a convincing impact toward innovation. It shows that corruption control which is viewed as a distortion factor in legal structure has a positive significant impact on country innovation. This implies that higher corruption control will encourage innovation activity. Nevertheless, all social capital sub-indicators except social networks are suggested to have a positive significant impact on a country's innovation level as shown in Table 4. The implication of these findings suggests that a combination of the institutions sub-components is more viable in explaining cross-countries innovation compared to examining each sub-component individually.

TABLE 3. Result of formal institutions sub-indicators on innovation

Dependent variable: Innovation (P/L)					
	Control of Corruption (CORR)	Democratic Accountability (DA)	Government Stability (GS)	Bureaucracy Quality (BQ)	Law and Order (ROL)
Formal Institutions	1.174 (2.41)**	0.581 (1.09)	1.087 (0.83)	0.866 (1.80)*	0.694 (1.07)
LGDP	0.199 (1.60)	0.212 (1.58)	0.273 (2.12)**	0.215 (1.69)*	0.207 (1.53)
FDI	-0.005 (-0.42)	0.002 (0.18)	0.001 (0.09)	-0.001 (-0.10)	-0.001 (-0.00)
Imports (IM)	0.256 (2.07)**	0.358 (2.96)***	0.355 (2.93)***	0.293 (2.36)**	0.337 (2.75)***
Human Capital (HCT)	0.024 (2.22)**	0.025 (2.17)**	0.031 (2.65)**	0.025 (2.27)**	0.025 (2.17)**
Observations	62	62	62	62	62
R^2	0.371	0.320	0.314	0.343	0.254

Notes: Figure in parentheses is t statistics produced by using OLS estimators. *, ** and *** indicate significant at 10%, 5% and 1% levels, respectively.

TABLE 4. Result of informal institutions sub-indicators on innovation

Dependent variable: Innovation (P/L)				
	Trust	Norm	Network	Structure
Social Capital	3.254 (4.68)***	1.979 (2.96)***	0.764 (1.27)	3.001 (4.73)***
LGDP	-0.060 (-0.47)	0.110 (0.85)	0.259 (2.05)**	-0.045 (-0.36)
FDI	-0.008 (-0.73)	-0.008 (-0.61)	0.003 (0.22)	-0.012 (-1.05)
Imports (IM)	0.199 (1.82)*	0.254 (2.14)**	0.339 (2.80)***	0.261 (2.48)**
Human Capital (HCT)	0.010 (0.98)	0.023 (2.16)**	0.024 (2.08)**	0.008 (0.79)
Observations	62	62	62	62
R^2	0.501	0.399	0.325	0.504

Notes: Figure in parentheses is t statistics produced by using OLS estimators. *, ** and *** indicate significant at 10%, 5% and 1% levels, respectively.

QUANTILE REGRESSION APPROACH

In this section we present our quantile regression estimates of the effect of institutions on innovation level. We compare the OLS estimates with the 0.10, 0.25, 0.50, 0.75, and 0.90 quantiles estimates. The results are presented in the following table and figures.

In Table 5, OLS result suggests that institutional quality, volume of import and human capital is found to have significant positive impact toward innovation level. However, the quantile regression suggests that there are some important differences across different points in the conditional distribution of institutions index. At the lower end of the distribution, the coefficients of institutional quality are positive and insignificant; but, they are positive and significant after median quantiles. Besides that, the coefficient of institutional quality increases significantly at higher quantiles. This suggests that a country beyond 50th percentile of the conditional distribution of innovation level is benefiting from a stronger formal institution and the effect is magnified for a country with higher innovation level.

On the other hand, Table 6 presents the OLS and quantile results for the social-innovation framework. From the table, OLS results found that social capital and import have significant impact on country innovation level. As for quantile regression, social capital shows a significant positive impact even at the lowest end of the distribution. Surprisingly, the coefficient is highest amongst other quantiles. Nonetheless, the coefficient is not significantly different between the 25th percentiles to 90th percentile. This finding implies that country innovations can benefit from social capital improvement even when the initial innovation level is low. Hence, a country with low initial innovation level is advised to focus on improving social capital to promote the innovation level. However, formal institutions should be improved as a measurement for long term innovation stimulus policy.

TABLE 5. Comparison of OLS and quantile regression results using ratio of patent application per worker as the dependent variable

Sample: 62	OLS	Quantile				
		0.10	0.25	0.50	0.75	0.90
LINS	3.047**	1.443	2.309	3.194***	3.832***	6.397**
	(1.203)	(2.626)	(2.195)	(0.804)	(1.420)	(2.639)
LGDP	0.165	0.055	0.042	0.120	0.090	-0.188
	(0.127)	(0.305)	(0.211)	(0.131)	(0.159)	(0.263)
LFDI	-0.006	-0.014	0.007	-0.014	-0.023	-0.035
	(0.013)	(0.028)	(0.019)	(0.017)	(0.021)	(0.034)
LIMPORT	0.270**	0.523*	0.514*	0.197	0.035	-0.124
	(0.121)	(0.296)	(0.283)	(0.173)	(0.141)	(0.201)
LHCT	0.023**	0.023	0.016	0.031**	0.019	0.017
	(0.011)	(0.018)	(0.018)	(0.015)	(0.016)	(0.018)

Note: Asymptotic standard errors are given below each parameter estimate (heteroskedasticity robust for OLS; bootstrapped for quanties). ***, ** and * denotes statistical significance at 1%, 5% and 10% respectively.

TABLE 6. Comparison of OLS and quantile regression results using ratio of patent application per worker as the dependent variable

Sample: 62	OLS	Quantile				
		0.10	0.25	0.50	0.75	0.90
LSC	2.802***	3.255**	2.163**	2.840***	2.073**	2.532**
	(0.605)	(1.382)	(0.916)	(0.775)	(0.865)	(1.156)
LGDP	-0.037	-0.015	-0.077	-0.153	0.030	-0.059
	(0.126)	(0.272)	(0.159)	(0.185)	(0.226)	(0.310)
LFDI	-0.011	-0.025	0.001	-0.013	-0.018	0.028
	(0.012)	(0.019)	(0.016)	(0.018)	(0.028)	(0.031)
LIMPORT	0.224**	0.513*	0.358*	0.178	0.073	0.276
	(0.108)	(0.263)	(0.211)	(0.152)	(0.163)	(0.190)
LHCT	0.009	-0.001	0.018	0.015	0.016	0.022
	(0.011)	(0.020)	(0.018)	(0.013)	(0.012)	(0.018)

Note: Asymptotic standard errors are given below each parameter estimate (heteroskedasticity robust for OLS; bootstrapped for quanties). ***, ** and * denotes statistical significance at 1%, 5% and 10% respectively.

CONCLUSSION

In this paper, we aim to distinguish between the impacts of formal and informal institutions when viewed against a country's innovation level. By employing robust standard error OLS and quantile regression analysis in cross-country specification, we examine current institutions-innovation framework.

Based on the conventional average estimator, the findings conclude the following; First, institutional quality and social capital have a direct impact on innovation level. The relationships are robust even after controlling for the effects of others innovation determinants. The findings suggest that social capital compliments institutional quality in determining countries innovation level. This implies that although sound legal structures are a condition that encourage innovation, strong social capital that promotes knowledge sharing and creation of ideas is equally important in promoting innovation. Second, institutional quality and social capital are suggested to be exogenous in nature. Contrary to other literature, our findings indicate that both the formal and informal institutions in our study are exogenous as a result of failing to reject null hypothesis of endogeneity test. This provides an insight of reviving the conventional idea where institutions are exogenous rather than endogenous. Third, a combination of institutions sub-indicator is more viable in explaining cross-countries innovation diversity as compared to examining each indicator individually. This implies that the impact of institutions on innovation is the result of a combination of sub-indicators combination rather than effecting innovation separately.

In addition, we used the quantile approach to examine the differences in the institutions-innovation relationship at different points of conditional distribution of innovation level. The findings have some important implications for innovation policy. First, strengthening institutional quality is only beneficial to those countries with high innovation levels. A country with a low innovation level does not benefit much from it. Improvement of institutional quality is conditionally meaningful to countries with a high innovation level or long-run innovation stimulus policy. Second, countries with weak initial innovation are better-off improving social capital to promote innovation activity. Thus, high social capital, which is the essence of creation of ideas is important as the initial stage for countries to promote innovation activity. The role of institutional quality only comes later when the respective countries have accumulated adequate intellectual property that aims to protect the well-being of inventor. This implies that country with relatively low innovation level (mostly developing countries) should focus more on the development of social capital in stimulating innovation activities.

ENDNOTES

1 Such works include Wang (2013) which investigated the influence of institutional quality particularly political risk indicator to innovation intensity. In his works, he used informal institutions indicator such as latitude, ethnolinguistic diversity, crops, mortality and engfrac as instrument for institutions. This setting of econometric model implies that the impact of informal institutions on innovation only through formal institutions. Based on his empirical analysis, he found a significant direct effect of institutions on R&D.

2 The inverse U-shaped relationship between competition and innovation was empirically proven by Aghion et al. (2005).

3 Similar work has been done by Berkowitz, Lin and Ma (2015), who found that property rights have a significant impact on firm value. Thus, a sound legal framework would encourage innovation activities.

4 Jorde and Teece (1990) and VanWaarden (2001) discussed the risk and uncertainty in innovation.

5 Busse and Hefeker (2007) found that political risk-based indicators such as government stability, internal-external conflict, corruption and ethnic tension, law and order, democratic accountability, and bureaucracy quality are significant determinants for foreign direct investment inflow, especially for developing countries.

6 However, Balsmeier and Delanote (2015) find that only young innovative firms benefit from stronger property rights protection.

7 Here, Nurullah and Christian (2016) found that social trust has a positive effect on delegation. Hence, higher social trust could minimize monitoring costs in an innovative project.

8 The OECD defined social capital as "networks together with shared norms, values and understandings that facilitate co-operation within or among groups". The networks can be real-world links between groups or individuals, i.e., networks of friends, networks of families, networks of former colleagues, etc. Our shared norms, values and understandings are less concrete than our social networks.

9 Works such as Galbraith (1977) and Gresov and Stephens (1993) have also suggested that inter-unit links among organisations enable the transfer of knowledge.

10 Among 72 countries social capital assembled, we only select 62 countries due to data unavailability in others variables.

11 This includes the sub-indicator of formal institutions namely democratic accountability, government stability, bureaucracy quality, corruption and law and order. For the sub-indicator of social capital are trust, norm, network and social structure.

12 Instrumental variable (IV) estimator is employed in this study to test the endogeneity of institutions variables. However, the results are not shown as the endoegeneity test fail to reject null hypothesis of endogeneity which implies that the institutions variables are exogenous in nature.

REFERENCES

Abrahamson, E., & Rosenkopf, L. 1997. Social network effects on the extent of innovation diffusion: A computer simulation. *Organization Science* 8(3): 289-309.

Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. 2005. Competition and innovation: An inverted - U relationship. *The Quanterly Journal of Economics* 120(2) 701-728.

Akcomak, I. S., & Bas ter Weel, B. 2006. Social capitalm innovation and growth: Evidence from Europe. *UNU-MERIT Working Paper, 2006-040*.

Akcomak, I. S., & ter Weel, B. 2006. Social capitalm innovation and growth: Evidence from Europe. *UNU-MERIT Working Paper, 2006-040*.

Anokhin, S., & Schulze, W. S. 2009. Entrepreneurship, innovation and corruption. *Journal of Business Venturing* 24(5): 465-476.

Balsmeier, B., & Delanote, J. 2015. Employment growth heterofeneity under varying intellectual property rights regimes in European transition economies: Young vs. mature innovators. *Journal of Comparative Economics* 43(4): 1069-1084.

Barro, R. J., & Lee, J.-W. 2000. International data on educational attainment updates and implications. *NBER Working Papers 7911, National Bureau of Economic Research, Inc.*

Berkowitz, D., Lin, C., & Ma, Y. 2015. Do property rights matter? Evidence from a property law enactment. *Journal of Financial Economics* 116(3): 583-593.

Blackburn, K., Hung, V. T., & Pozzolo, A. F. 2000. Research, development and human capital accumulation. *Journal of Macroeconomics* 22: 189-206.

Blind, K. 2012. The influence of regulations on innovation: A quantitative assessment for OECD countries. *Research Policy* 41: 391-400.

Bourdieu, P., & Wacquant, L. J. 1992. *An Invitation to Reflexive Sociology.* Chicago: University of Chicago Press.

Buchinsky, M. 1994. Changes in the U.S. wage structure 1963-1987: Application of quantile regression. *Econometrica* 62: 405-458.

Buchinsky, M. 1995. Quantile regression, Box-Cox transformation model, and the U.S. wage structure, 1963-1987. *Journal of Econometrics* 65: 109-154.

Busenitz, L. W., & Barney, J. B. 1997. Biases and heuristics in strategic decision making: differences between entrepreneurs and managers in large organizations. *Journal of Business Venturing* 12: 9-30.

Busenitz, L. W., & Lau, C. M. 1996. A cross-cultural cognitive model of new venture creation. *Entrepreneurship Theory and Practice* 20(4):25-39.

Busenitz, L. W., Gomez, C., & Spencer, J. W. 2000. Country institutional profiles: Unlocking entrepreneurial phenomena. *Academy of Management Journal* 43(5): 994-1003.

Busse, M., & Hefeker, C. 2007. Political risk, institutions and foreign direct investment. *European Journal of Political Economy* 23: 397-415.

Carlin, W., & Soskice, D. 2006. *Macroeconomics: Imperfections, Institutions and Policies.* Oxford: Oxford University Press.

Cheung, K.-Y., & Lin, P. 2004. Spillover effects of FDI on innovation in China: Evidence from the provincial data. *China Economic Review* 15: 25-44.

Cohen, W. M., & Levinthal, D. A. 1990. Absorptive capasity: A new perspective on learning and innovation. *Administrative Science Quaterly* 35: 128-152.

Coleman, J. S. 1990. *Foundations of Social Theory.* Cambridge, MA: Harvard University Press.

Craft, N. 2006. Regulation and productivity performance. *Oxford Review of Economic Policy* 22(2): 186-202.

Dahlman, C. J. 1994. Technology strategy in East Asian developing economies. *Journal of Asian Economics* 5: 541-572.

Dakhli, M., & de Clercq, D. 2004. Human capital, social capital and innovation: A multi-country study. *Entrepreneurship & Regional Development* 16: 107-128.

Eide, E., & Showalter, M. H. 1998. The effect of school quality on student performance: A quantile regression approach. *Economic Letters* 58(3): 345-350.

Freeman, C. 1987. *Technology Policy and Economic Performance: Lessons from Japan*. London: Pinter Publishers.

Fukuyama, F. 1995. *Trust: The Social Virtues and the Creation of Prosperity.* New York: Free Press.

Galbraith, J. R. 1977. *Organization design.* Addison-Wesley Pub. Co.

Ginarte, J. C., & Park, W. G. 1997. Determinants of patent rights: A cross-national study. *Research Policy* 26: 283-301.

Gould, W. W. 1997. Interquantile and simultaneous quantile regression. *Stata Technical Bulletin* 38: 14-22.

Gresov, C., & Stephens, C. 1993. The context of interunit influence attempts. *Administrative Science Quarterly* 38: 252-276.

Hanifan, L. J. 1916. The rural school community center. *Annals of the American Academy of Political and Social Science* 67: 130-138.

Jorde, T. M., & Teece, D. J. 1990. Inovation and cooperation: Implications for competition and antitrust. *Journal of Economic Perspectives* 4(3): 75-96.

Kaasa, A., Kaldaru, H., & Parts, E. 2007. *Social Capital and Institutional Quality as Factors of Innovation: Evidence from Europe*. Tartu University Press.

Kafouros, M., Wang, C., Piperopoulos, P., & Zhang, M. 2015. Academic collaborations and firm innovation performance in China: The role of region-specifc institutions. *Research Policy* 44: 803-817.

Kemp, R. 1998. Environmental regulation and inovation: Key issues and questions for research. In *The Impact of EU Regulation on Inovation of European Industry*, edited by F. Leone, & J. Hemmelskamp, 12-39. Seville: IPTS.

Knack, S., & Keefer, P. 1997. Does social capital have an economic payoff? A cross-country investigation. *Quarterly Journal of Economics* 112(4): 1251-1288.

Knight, G. A. 1997. Cross-cultural reliability and validity of a scale to measure firm entrepreneurial orientation. *Journal of Business Venturing* 12: 213-225.

Koenker, R. 2005. *Quantile Regression.* Cambridge: Cambridge University Press.

Koenker, R., & Bassett, G. 1978. Regression quantiles. *Econometrica* 46: 33-50.

Kogut, B., & Zander, U. 1992. Knowledge of the firm, combinative capacities and the replication of technology. *Organization Science* 3: 383-397.

Kostova, T. 1997. Country institutional profiles: Concept and measurement. Academy of Management Best Paper Proceedings, 180-189.

Landry, R., & Amara, N. L. 2002. Does social capital determine innovation? To what extent? *Technological Forecasting and Social Change* 69: 681-701.

Lau, C. M., & Woodman, R. W. 1995. Understanding organizational change: A schematic perspective. *Academy of Management Journal* 38: 537-554.

Lee, D., Jeong, K.-Y., & Chae, S. 2011. Measuring social capital in East Asia and other world regions: Index of social capital for 72 countries. *Global Economic Review: Perspectives on East Asian Economies and Industries* 40(4): 385-407.

Nurullah, G., & Christian, B. 2016. Trust and delegation: Theory and evidence. *Journal of Comparative Economics*.

Prashaanth, M. 2008. Corruption and innovation: A grease or sand relationship? *Jena Economic Research Paper*.

Putnam, R. D. 1993. *Making Democracy Work: Civic Traditions in Modern Italy.* Princeton, NJ: Princeton University Press.

Robin, S., & Schubert, T. 2013. Cooperation with public research institutions and success in innovation: Evidence from France and Germany. *Research Policy* 42(1): 149-166.

Romer, P. M. 1990. Endogenous technological change. *Journal of Political Economy* 98(5).

Schumpeter, J. A. (1994) [1942]. *Capitalism, Socialism and Democracy.* London: Routledge.

Seldadyo, H., Nugroho, E. P., & Haan, J. D. 2007. Governance and growth revisited. *Kyklos* 60(2): 279-290.

Tabellini, G. 2006. *Culture and Institutions: Economic Development in the Region of Europe*. *IGIER, Bocconi University*.

Tamaschke, L. 2003. The role of social capital in regional technological innovation: Seeing both the wood and the trees. In *Communities and Technologies*, edited M. Huysman, E. Wenger, & W. Wulf , 241-264.

Tebaldi, E., & Elmslie, B. 2008. Institutions, innovation and economic growth. *Journal of Economic Development* 33: 1-27.

Tiessen, J. H. 1997. Individualism, collectivism, and entrepreneurship: A framework for international comparative research. *Journal of Business Venturing* 12: 367-384.

Tsai, W. 2000. Social capital, strategic relatedness and the formation of intraorganizational linkages. *Strategic Management Journal* 21: 925-939.

Tsai, W. 2001. Knowledge tranfer in intraorganizational networks: Effects of network position and absorptive capasity on business unit inovation and performance. *The Academy of Management Journal* 44(5): 996-1004.

Tsai, W., & Ghoshal, S. 1998. Social capital and value creation: The role of intrafirm network. *Academy of Management Journal* 41(4): 464-476.

Van Waarden, F. 2001. Institutions and inovation: The legal environment of inovating firms. *Organization Studies* 22(5): 765-795.

Varsakelis, N. C. 2006. Education, political institutions and innovative activity: A cross country empirical investigation. *Research Policy* 35: 1083-1090.

Wang, G. 2013. Can institutions explains cross country differences in innovative activity? *Journal of Macro Economics* 37: 128-145.

Welter, F. 2005. Entrepreneurial behavior in differing environments. *International Studies in Entrepreneurship* 7: 93-112.

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