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# LAW, CULTURE, AND INNOVATION

Douglas Cumming
and Sofia Johan

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Douglas Cumming is professor and Ontario research chair of the Schulich School of Business, York University. Sofia Johan is extramural research fellow of the Tilburg Law and Economics Centre, University of Tilburg.



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Please contact the authors for information about this paper.

Email: dcumming@schulich.yorku.ca, sjohan@schulich.yorku.ca

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Asian Development Bank Institute
Kasumigaseki Building, 8th Floor
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

**Abstract**

This chapter reviews theoretical and empirical research on the relationship between legal systems and innovation and culture and innovation. We highlight legal and cultural forces that encourage innovation activities, including strong patent protection, entrepreneur-friendly bankruptcy laws, and strong labor laws, as well as policies that encourage risk taking and a long-term orientation. We provide a snapshot of recent cross-national data that confirms some of these lessons from prior studies. In the subset of Southeast Asian countries, the most recent data indicate that intellectual property rights are relatively more important and culture is relatively less important for patents. We discuss implications for future research, as well as lessons for policy makers.

**Keywords**: law, culture, innovation

**JEL Classification:** G12, G14, G18, K22

# Contents

# 1. INTRODUCTION

Many aspects of motivating innovation are painfully obvious, but much research on the topic is segmented depending on the particular issue of interest and the data available to examine that issue. In this chapter, we bring together topics concerned with national law and national culture and their impact on innovation. By "national law," we refer to legal standards across countries made popular by research papers such as La Porta et al. (1998) and practitioner and policy maker sources such as the World Bank webpage on doing business around the world.[1] National law refers to intellectual property rights, bankruptcy laws, labor laws, shareholder rights, and creditor rights, among other things discussed herein. By "national culture," we refer to Hofstede's cultural dimensions.[2] Specifically, national cultural dimensions include power distance, individualism, masculinity, uncertainty avoidance, long-term orientation, and indulgence.[3]

At the outset, it is important to note that many studies on factors that affect innovation in different countries do not account for both law and culture, even though there is a strong consensus that both law and culture affect innovation. Our review of the literature shows that national comparative studies in finance and economics journals focus on legal determinants of innovation, but tend not to account for culture in the impact on innovation. This focus on legal determinants of innovation in economics and finance research is likely due to the high correlation between national law and national culture, and due to the dearth of events that enable identification strategies associated with finding a causal link between culture and innovation. Put differently, legal factors that affect innovation change over time, while culture is rather static over time. The focus of legal systems on innovation is largely attributable to identification strategies that can be tied to legal policy changes over time and hence enable econometricians to establish causation. We do not present econometric estimates of such causal events in this paper, but do present a snapshot of recent data that confirm the importance of strong intellectual property rights in stimulating innovation. We identify policy instruments that can mediate the negative impact of weak intellectual property rights on innovation. In addition, we present data that show evidence of more innovation in societies with lower levels of uncertainty avoidance and longer-term orientations.

Unlike economics and finance journals, interdisciplinary journals and management journals more often consider cultural determinants of innovation, while paying less attention to specific events to econometrically identify factors that have a clear and clean causal impact on innovation. Because culture has not experienced major shifts over time, culture has received a comparative dearth of attention in the literature on factors that affect innovation. In this chapter, we do discuss the literature that has identified a relation between national culture and innovation, and we also do refer to some related literature on corporate culture and innovation, but our focus is on national culture and innovation. In addition, we present a snapshot of data that show a strong negative correlation between uncertainty avoidance and innovation and a positive correlation between long-term orientation and innovation.

[1] http://www.doingbusiness.org/

[2] https://geert-hofstede.com/national-culture.html.

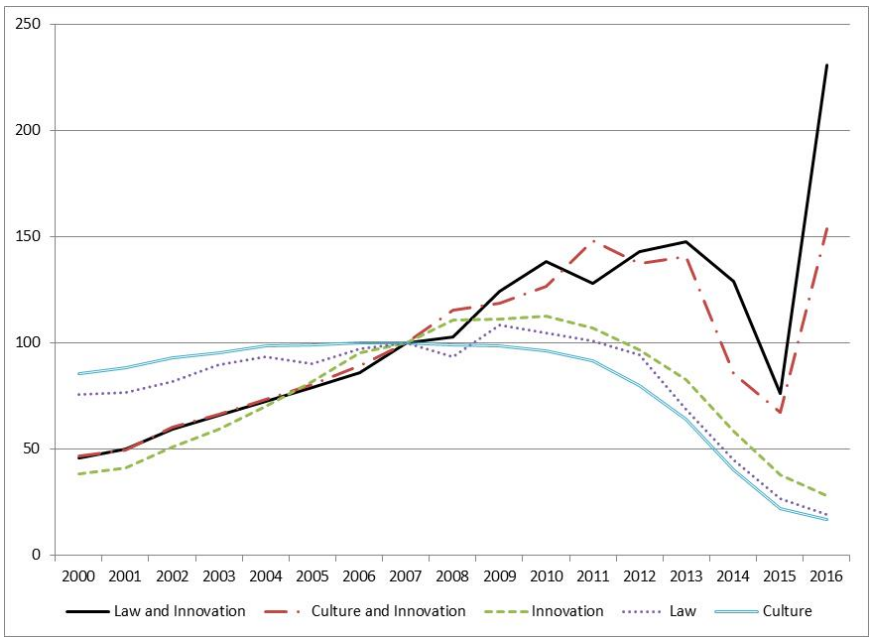
[3] These terms are defined in the Appendix to this chapter.

This chapter proceeds as follows. Section 2 describes research on the impact of law on innovation. The relationship between culture and innovation is reviewed in Section 3. Section 4 discusses interdisciplinary studies that examine both law and culture on innovation. Concluding remarks follow in Section 5, as well as suggestions for future research.

# 2. COMPARATIVE ACADEMIC INTEREST IN LAW, CULTURE, AND INNOVATION

There has been a long-standing interest in innovation in the literature. Google Scholar reveals 773,000 works that related to innovation in 2007, and this interest grew until 2010, but has fallen dramatically to about a quarter in terms of the number of studies up to 2016. See Figure 1. Similarly, Google Scholar reveals 1,050,000 scholarly works related to law in 2007, and similar to studies on innovation, this interest peaked in 2009, then steadily fell to about a quarter in terms of the number of studies up to 2016. And in 2007 there were 1,300,000 studies related to culture, but those studies peaked in that year and in 2016 were at about a quarter of the level of the number in 2007.

**Figure 1: Google Scholar Hits on Law and Innovation versus Culture and Innovation**




This figure presents the number of Google Scholar hits on various search terms. The search was carried out on January 4, 2017. 'Base' refers to the number of hits in the base year 2007 (normalized to 100). The base for law and innovation was 86,700. The base for culture and innovation was 123,000. The base for innovation was 773,000. The base for law was 1,050,000. The base for culture was 1,300,000.

By contrast, work at the intersection of law and innovation and culture and innovation has increased in recent years. See Figure 1. There were 86,700 studies related to law and innovation in 2007, and this number grew by almost 2.5 times leading up to 2016. In 2007, there were 123,000 studies related to culture and innovation, and this number had grown by just over 1.5 times leading up to 2016. This paper highlights some of the activity that explains this surge in focus on the role of law and culture in innovation.

# 3. LAW AND INNOVATION

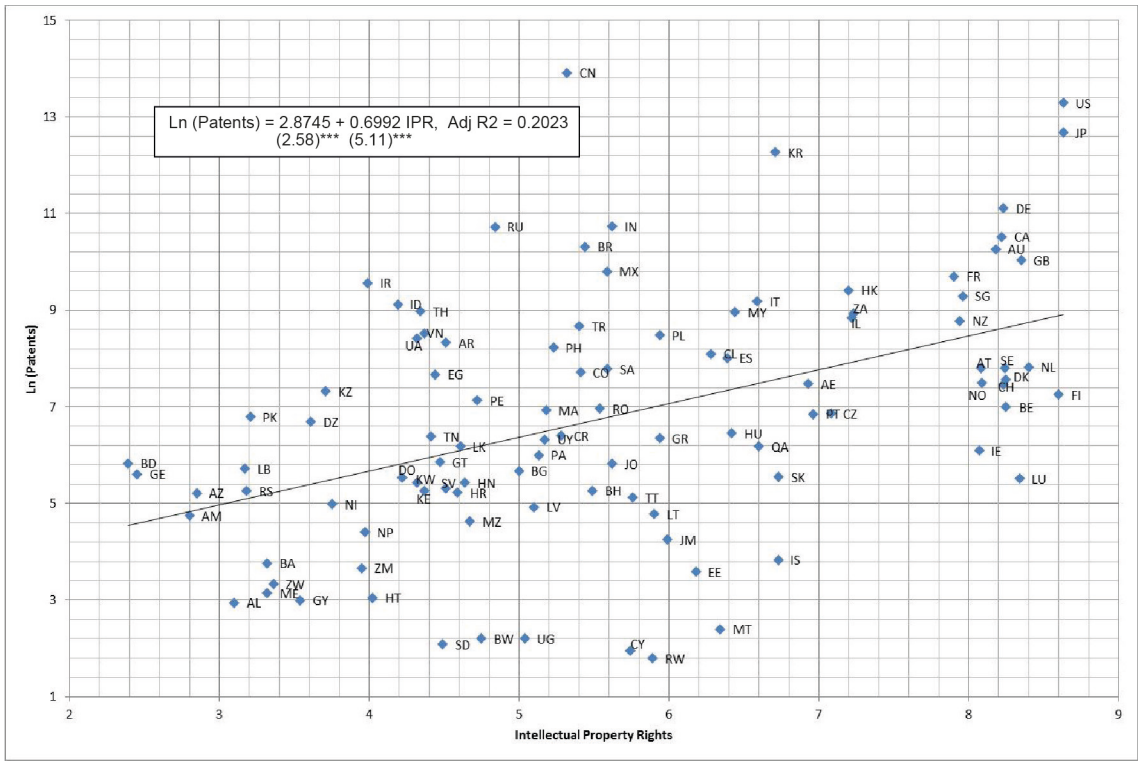
In this section, we begin with a review of some of the areas in which there is active research in law and innovation. Specifically, we focus on three areas of law: intellectual property rights, labor laws, and bankruptcy law. Also, we discuss factors that mediate the impact of these legal mechanisms on innovation.

Intellectual property rights vary substantially across countries. Using data from the World Intellectual Property Index, Figure 2a presents the relationship between intellectual property rights and patent applications for 100 countries around the world in 2016.[4] A simple regression model that explains the natural log of the number of patent applications from a country with only intellectual property rights as an explanatory variable explains over 20% of the variability across the 100 different countries in the sample. The coefficient on intellectual property rights is 0.6992 and significant at the 1% level. In Figure 2b for the subset of Southeast Asian countries, the coefficient is 0.9423 and significant at the 5% level, which suggests an economic significance for the effect of intellectual property rights on patents that is stronger by about one-third in Asia.

The evidence in Figures 2a and 2b, however, is only cross-sectional, and does not offer any causal assessment between intellectual property rights and innovation. Nevertheless, prior work has well established such a causal link based on changes in intellectual property rights over time. Some of the key studies in the literature on law and innovation, or outcomes related to innovation, are identified in Table 1. Factors that explain which countries have higher patent rights or intellectual property protection were examined by Ginarte and Park (1997) over a 30-year period from 1960–1990 across 110 countries. Ginarte and Park (1997) show that countries with higher levels of R&D, market activity, internationalization and economic development tend to have better patent rights, although these relations are positive and significant only after a country reaches a size threshold. Moser (2005) takes a more historical view from 1871–1876, and shows changes in prior patent rights have a positive effect on subsequent period patent applications. Similar evidence with more recent data are found in Qian (2007) and Lerner (2009).

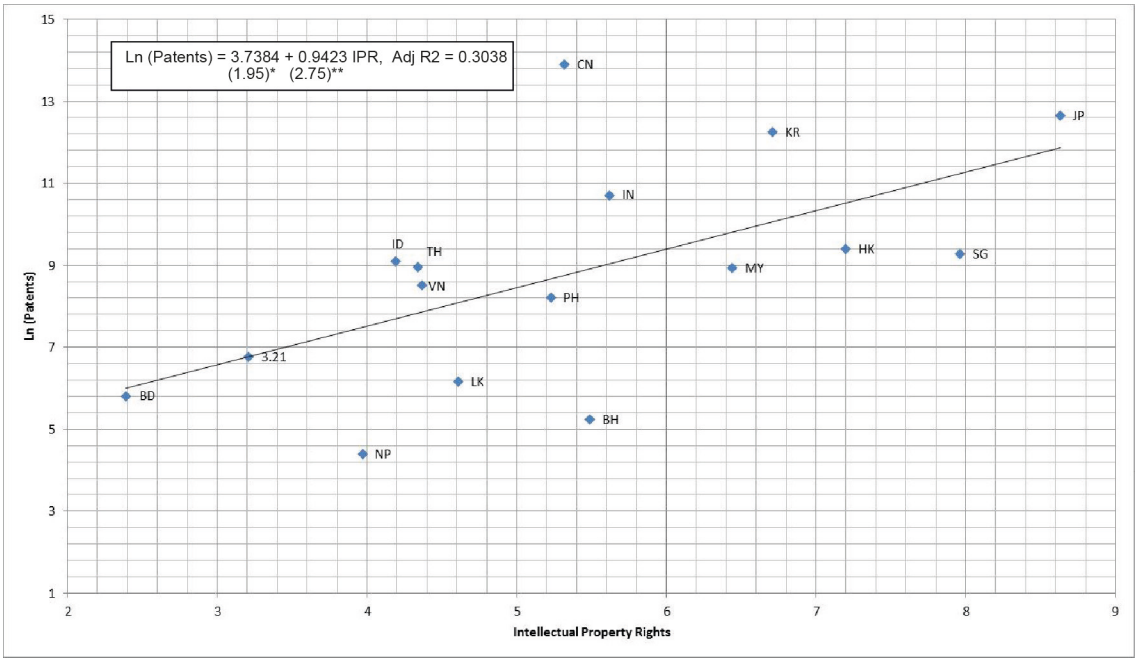
[4] The country codes are as follows: Albania (AL); Algeria (DZ); Argentina (AR); Armenia (AM); Australia (AU); Austria (AT); Azerbaijan (AZ); Bahrain (BH); Bangladesh (BD); Belgium (BE); Bosnia and Herzegovina (BA); Botswana (BW); Brazil (BR); Bulgaria (BG); Canada (CA); Chile (CL); Hong Kong, China (HK); Colombia (CO); Costa Rica (CR); Croatia (HR); Cyprus (CY); Czech Republic (CZ); Denmark (DK); Dominican Republic (DO); Egypt (EG); El Salvador (SV); Estonia (EE); Finland (FI); France (FR); Georgia (GE); Germany (DE); Greece (GR); Guatemala (GT); Guyana (GY); Haiti (HT); Honduras (HN); Hungary (HU); Iceland (IS); India (IN); Indonesia (ID); Iran, Islamic Republic of (IR); Ireland (IE); Israel (IL); Italy (IT); Jamaica (JM); Japan (JP); Jordan (JO); Kazakhstan (KZ); Kenya (KE); Kuwait (KW); Latvia (LV); Lebanon (LB); Lithuania (LT); Luxembourg (LU); Malaysia (MY); Malta (MT); Mexico (MX); Montenegro (ME); Morocco (MA); Mozambique (MZ); Nepal (NP); Netherlands (NL); New Zealand (NZ); Nicaragua (NI); Norway (NO); Pakistan (PK); Panama (PA); People's Republic of China; Peru (PE); Philippines (PH); Poland (PL); Portugal (PT); Qatar (QA); Korea, Republic of (KR); Romania (RO); Russian Federation (RU); Rwanda (RW); Saudi Arabia (SA); Serbia (RS); Singapore (SG); Slovakia (SK); South Africa (ZA); Spain (ES); Sri Lanka (LK); Sudan (SD); Sweden (SE); Switzerland (CH); Thailand (TH); Trinidad and Tobago (TT); Tunisia (TN); Turkey (TR); Uganda (UG); Ukraine (UA); United Arab Emirates (AE); United Kingdom (GB); United States (US); Uruguay (UY); Viet Nam (VN); Zambia (ZM); Zimbabwe (ZW).

**Figure 2a: Intellectual Property Rights Index and Patent Applications by All Countries, 2016**




Patent Application data source: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_943_2016.pdf. IPR data source: http://s3.amazonaws.com/ipri2016/IPRI+2016+Full+Report.pdf. Footnote 4 lists the country name abbreviations.

**Figure 2b: Intellectual Property Rights Index and Patent Applications by Southeast Asian Countries, 2016**




Patent Application data source: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_943_2016.pdf. IPR data source: http://s3.amazonaws.com/ipri2016/IPRI+2016+Full+Report.pdf. Footnote 4 lists the country name abbreviations.

## Table 1: Overview of Select Studies on Law and Public Policy and Innovation

| Author(s) | Data Source(s) | Country Samples | Time Period | Dependent Variables | Explanatory Variables |
|---|---|---|---|---|---|
| Ginarte, and Park (1997) | Various data sources listed in section 3.2, page 296. | 110 countries | 1960–1990 | Patent Rights | GDP/Capita, R&D/GDP, Education, Political Freedom, Openness, Market Freedom |
| Moser (2005) | World Fair 1851; Ventenial Exhibition 1876; Annuaure Statistique | 15 countries in Europe | 1851, 1876 | Patents | Intellectual Property Rights |
| Qian (2007) | WIPO and numerous other sources listed at the back of the paper | 26 countries in Continental Europe | 1978–2002 | Log (citation weighted patent counts); Log (R&D Expenses) | Intellectual Property Rights |
| Lerner (2009) | Guidebooks to the world's patent systems, publications of the world patent offices, and legal documents | 60 countries | 150 years | Patent Applications | Intellectual Property Rights – Major Changes |
| Mowery et al. (2001) | Patent and licensing data from the University of California, Stanford University, and Columbia University | US | 1970–1995 | Not applicable | Bayh–Dole Act |
| Armour and Cumming (2006) | CVCA, EVCA, Venture Economics, Various Bankruptcy Law Legal Sources | 15 countries: Canada, Western Europe, US | 1990–2002 | Venture Capital | Bankruptcy Codes |
| Armour and Cumming (2008) | Eurostat, OECD, Armour and Cumming (2006) | 15 countries: Canada, Western Europe, US | 1990–2002 | Entrepreneurship and Self- Employment | Bankruptcy Codes |
| Acharya and Subramanian (2009) | USPTO | 85 countries | 1978–2002 | Patents, Patent Citations | Bankruptcy Codes and Creditor Rights |
| Cumming and Fischer (2012) | Innovation Synergy Center | Canada | 2006–2009 | Patents, Angel Finance, Sales, Strategic Alliances | Innovation Hubs/ Publicly Funded Business Advisory Services |
| Choi, Lee and Williams (2011) | SIPO | the People's Republic of China | 2001 | Patents | State Ownership |
| Cumming and Johan (2013) | Survey Data | 13 countries (8 developed, 5 developing) | 2005 | Entrepreneurial Firm Formation, Growth, Financing out of Technology Parks | Country Level Legal Protections, Economic Conditions, Services Provided by Tech Parks, Entrepreneurial Firm Characteristics |
| Cumming and Li (2013) | US Census, US Patent and Trademark Office, and various other sources listed in the paper. | United States | 1995–2010 | Business Starts, Business Deaths, VC/ Population, Patents/Population | Size of Government, Taxation, Labor Law, Bankruptcy Law, SBIR Awards, Economic Conditions |
| Acharya, Baghai and Subramanian (2013, 2014) | Deakin, Lele and Siems (2007) Labor Law Data; NBER Patent Data | US, UK, France, Germany, and India | 1970–1995 | Patents, Patent Citations | Labor Laws |
| Tan et al. (2015) | SIPO and CSMAR | the People's Republic of China | 2000–2011 | Innovation (Patents) | State Ownership, Split-Share Structure Reform |
| Cao et al. (2016) | SIPO and CSMAR | the People's Republic of China | 2002–2013 and focus on 2008–2013 for R&D Data | Innovation Efficiency (Patents/R&D) | State Ownership, Split-Share Structure Reform |
| Cumming and Johan (2016) | AVCAL | Australia | 1990–2010 | R&D/Sales, R&D/Assets, Patents, Patent Citations, Time to IPO, Market Capitalization | Government Venture Capital Programs |

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**Table 1** *continued*

| Author(s) | Main Findings |
|---|---|
| Ginarte, and Park (1997) | Countries with better patent protection include those with a higher country level of R&D, market activity, international operation, and economic development. R&D only influences patent protection after a nation's research sector reaches a critical size. |
| Moser (2005) | Analyses of exhibition data for 12 countries in 1851 and 10 countries in 1876 indicate that inventors in countries without patent laws focused on a small set of industries where patents were less important, while innovation in countries with patent laws appears to be much more diversified. These findings suggest that patents help to determine the direction of technical change and that the adoption of patent laws in countries without such laws may alter existing patterns of comparative advantage across countries. |
| Qian (2007) | National patent protection alone does not stimulate domestic innovation, as estimated by changes in citation-weighted US patent awards, domestic R&D, and pharmaceutical industry exports. However, domestic innovation accelerates in countries with higher levels of economic development, educational attainment, and economic freedom. Additionally, there appears to be an optimal level of intellectual property rights regulation above which further enhancement reduces innovative activities. |
| Lerner (2009) | I examine the changes in patent applications by residents of the nation undertaking the policy change. While I tabulate domestic filings by residents and nonresidents alike, confounding factors may influence this measure. Thus, I also examine filings made by residents of the nation undertaking the policy change in a nation with a relatively constant patent policy, Great Britain. |
| Mowery et al. (2001) | The evidence suggests that Bayh–Dole was only one of several important factors behind the rise of university patenting and licensing activity. Bayh–Dole also appears to have had little effect on the content of academic research at these universities. A comparison of three universities reveals remarkable similarities in their patent and licensing portfolios 10 years after the passage of the Bayh–Dole Act. |
| Armour and Cumming (2006) | Legal environments, including temperate bankruptcy laws, matter as much as the strength of stock markets for stimulating investment in innovative start-up firms, while government programs more often hinder than help such investment. |
| Armour and Cumming (2008) | We compile a new index of the level of how 'forgiving' personal bankruptcy laws are, reflecting the time to discharge. This measure varies over time and across the countries studied. We show that personal bankruptcy law has a more statistically and economically significant effect on self-employment rates than GDP growth, MSCI stock returns, and a variety of other legal and economic factors. |
| Acharya and Subramanian (2009) | We argue that when bankruptcy code is creditor-friendly, excessive liquidations cause levered firms to shun innovation, whereas by promoting continuation upon failure, a debtor-friendly code induces greater innovation. We provide empirical support for this claim by employing patents as a proxy for innovation. Using time-series changes within a country and cross-country variation in creditor rights, we confirm that a creditor-friendly code leads to a lower absolute level of innovation by firms as well as relatively lower innovation by firms in technologically innovative industries. When creditor rights are stronger, technologically innovative industries employ relatively less leverage and grow disproportionately slower. |
| Cumming and Fischer (2012) | Given the mixed evidence for the impact of various publicly funded initiatives that aim to foster entrepreneurial activity, this paper empirically examines the efficacy of publicly funded business advisory services in relation to entrepreneurial outcomes. Based on a sample of 228 early-stage firms, of which 101 used business advisory services focused on helping companies secure 1st rounds of financing and start generating revenues, we examine the firm-level impact such services can have on sales growth, innovation, finance and alliances. We find services are positively associated with firms' sales growth, patents, finance and alliances. We assess statistical and economic significance, and assess robustness to controls for the nonrandomness of a firms use of a business advisory service program, as well as endogeneity of advisors' hours spent with firms. Other robustness checks are also included. We find significant robustness of hours spent on sales and finance, but sensitivity of the effect of hours on patents and alliances after controlling for endogeneity. |
| Choi, Lee and Williams (2011) | We examine innovation performance of firms in a transition economy from an ownership perspective. We focus specifically on the relationship between ownership structures and firm innovation performance. Drawing on data from 548 PRC firms we find volume of patent registration to be most strongly influenced by foreign ownership in the firm along with firm affiliation within a business group. The influence of state and institutional ownership on innovation performance is positive but lagged. |
| Cumming and Johan (2013) | The data indicate entrepreneurial success is more likely to be facilitated when there is better legal protection offered to companies in the jurisdiction within which the tech park is located, when there is a greater presence of foreign university- and government-affiliated companies in tech parks, and a smaller presence of foreign private companies in tech parks, particularly foreign subsidiaries. The data further indicate entrepreneurial success is more likely when tech park tenants have greater testing/analysis focus, and when tenants have less assembly- and service-focused activities. Also, entrepreneurial success is more likely to be facilitated by tech parks with on- and off-site technology licensing offices that promote trade shows, provide access to funds for commercialization and distribute information on the R&D outcomes of tech park tenants. |

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**Table 1** *continued*

| Author(s) | Main Findings |
|---|---|
| Cumming and Li (2013) | Lower levels of labor frictions and higher levels of SBIR awards are associated with more business starts and higher levels of venture capital per population. Counter to expectations, the data indicate a positive impact from the homestead exemption on new start-up rates only among the bottom quartile homestead exemption states, and otherwise a negative impact.<br><br>Higher levels of patenting are found in states with higher homestead exemptions, more academic and science engineering R&D, and more SBIR awards, but those effects on patents are not robust in multivariate panel regressions. In multivariate regressions, the data indicate that states with a higher presence of labor unions, higher minimum wages, and higher levels of government employment have higher levels of patents. |
| Acharya, Baghai and Subramanian (2013, 2014) | Using patents and citations as proxies for innovation and a time-varying index of labor laws, we find that innovation is fostered by stringent labor laws, especially by laws governing dismissal of employees. We provide this evidence using levels-on-levels, changes-on-changes, and finally difference-in-difference regressions that exploit staggered country-level law changes. We also find that stringent labor laws disproportionately influence innovation in the more innovation-intensive sectors of the economy. Finally, we find that while the overall effect of stringent labor laws is to dampen economic growth, laws that govern dismissal of employees are an exception: stringent laws governing dismissal promote economic growth, consistent with the evidence that they encourage firm-level innovation. |
| Tan et al. (2015) | We examine the real effect of privatization in terms of technological innovation. To establish causality, we explore plausibly exogenous variation in privatization generated by a quasi-natural experiment – the People's Republic of China's split-share structure reform, which mandatorily converts nontradable shares to be freely tradable and opens up the gate to the privatization of state-owned enterprises (SOEs). Using a difference-in-differences approach, we find that the expectation of privatization has a positive, causal effect on firm innovation. We further show that better interest alignments between controlling and minority shareholders, enhanced stock price informativeness, and improved risk sharing are three plausible underlying mechanisms through which privatization prospects promote innovation. Our paper sheds new light on the real effect of privatization prospects and has important implications for policy makers who aim to promote innovation. |
| Cao et al. (2016) | The conventional wisdom is that state ownership may hinder patenting through reduced incentives and pronounced agency problems associated with state-owned enterprises (SOEs). Empirical evidence from a variety of contexts, including the US, Europe, and the People's Republic of China, is consistent with this view, including evidence that shows that reductions in state ownership are associated with an increase in patent counts. In this paper, we investigate the innovative efficiency of SOEs in the PRC. Innovative efficiency refers to patents/R&D expenditure, and not patent counts. The data indicate that SOEs, and especially central government SOEs, are substantially more innovatively efficient than non-SOEs. The relative innovative efficiency of SOEs is more pronounced amongst firms with high financial constraints, those removed from financial centers, and those in high-technology industries. The data are consistent with the view that in the PRC context, there are favorable benefits to state ownership through access to talent, connections, and technological resources that enable a sustained commitment to R&D to enable efficient patent outcomes relative to R&D expenditure. |
| Cumming and Johan (2016) | We empirically compare the contributions of venture capital- (VC) and private equity- (PE) backed firms, including those backed by government subsidized Innovation Investment Funds (IIFs), in the Australian economy by analyzing employment, R&D, patents, time to IPO, and market capitalization from market inception to August 2012. Overall, the data highlight a central role for VC and IIF investment in facilitating R&D, innovation, and economic growth. Our IIF findings highlight the success of government sponsorship of venture capital under the Australian program design, which is sharply in contrast with the lack of success of government venture programs in other countries. |

This table summarizes various papers that focus on the impact of law on innovation. The authors, data sources, countries, time periods, variables, and main findings are summarized. The main findings are largely paraphrased and/or copied from the abstracts of the papers to best and succinctly represent the authors' contributions, but are not meant to exhaustively represent all of the findings from the papers.

Mowery et al. (2001) examine the 1980 US Bayh–Dole Act, which changed policies from requiring innovations from research derived from federal funding to be transferred to the federal government, and enabled universities, small businesses, or nonprofits to pursue ownership of such inventions. Mowery et al. show that The Bayh–Dole Act in part gave rise to an increase in university patenting and licensing activity, but it operated alongside several other factors that spurred such changes, and did not affect the content of university research. This work is connected to a broader literature about whether or not government ownership or private ownership spurs innovation. For example, in the People's Republic of China, there is evidence that partial privatization

of state-owned enterprises through the 2005 split-share structure reform can stimulate innovation (Tan et al. 2015; Cao et al. 2016). However, there is still a role for state-owned enterprises in fostering innovation in countries such as the People's Republic of China (Choi, Lee, and Williams 2011), and in particular there is substantially higher innovative efficiency among state-owned enterprises in terms of patents per R&D expenses (Cao et al. 2016).

In addition to intellectual property protection and government versus private ownership, there are numerous other legal mechanisms that can impact innovation. For instance, labor laws have an important impact on innovation. Consistent with Manso's (2011) theory on tolerance for failure and patience in enabling innovation, patience in respect of not firing employees for not showing immediate results can encourage innovation. For example, in the case of venture capital (VC) backed start-ups, VC funds that wait a longer time before writing-off portfolio companies tend to have investee firms that are more innovative (Tian and Wang 2014). Cumming and Li (2013) show that US states with a high presence of labor unions, higher minimum wages, and higher levels of government employment are more innovative. The importance of labor protection at the US state level is seen in patent activity in different states even despite the fact that these labor restrictions are negatively related to new start-up firm entry rates (Cumming and Li 2013). Similarly, the cross-country evidence from Acharya, Baghai, and Subramanian (2013, 2014) shows that stringent labor laws in terms of protection against firing encourages innovation.

Entrepreneur-friendly bankruptcy laws encourage start-up activity in the US (Fan and White 2003)[5] and across countries (Armour and Cumming 2008). Entrepreneur-friendly bankruptcy laws in turn encourage VC activity across countries (Armour and Cumming 2006). Acharya and Subramanian (2009) show that entrepreneur-friendly bankruptcy codes across countries induce greater innovation. However, cross-state differences in bankruptcy codes do not appear to be correlated with innovation rates in the US (Cumming and Li 2013), and differences in labor regulations appear to be more pertinent for innovation in the US (Cumming and Li 2013).

Of course, legal systems by themselves are not determinative of innovative activity. A number of policy variables can further stimulate or mitigate innovation. Previous work on US state-level data shows that government awards such as SBIR awards (Cumming and Li 2013) help innovation. Further, there is evidence of the importance of innovation centers in stimulating entrepreneurial firm growth and innovation (Cumming and Fischer 2012; Cumming and Johan 2013; Cumming and Li 2013). Cumming and Johan (2013) show in a 13-country sample that entrepreneurial success is more likely to be facilitated from technology parks when there is better legal protection offered to companies in the jurisdiction within which the tech park is located, when there is a greater presence of foreign university- and government-affiliated companies in tech parks, and a smaller presence of foreign private companies in tech parks, particularly foreign subsidiaries. Cumming and Johan (2013) also show that entrepreneurial success is more likely when tech park tenants have greater testing/analysis focus, and when tenants have less assembly- and service-focused activities. Also, entrepreneurial success is more likely to be facilitated by tech parks with on- and off-site technology licensing offices that promote trade shows, provide access to funds for commercialization, and distribute information on the R&D outcomes of tech park tenants. Finally, there is evidence that VC can help innovation (Kortum and

[5] The impact of the homestead exemption on entrepreneurial activity in different US states, however, depends on the level of the exemption, and is positive and stronger for low levels of the exemption (see Cumming and Li 2013).

Lerner 2000), particularly when it is accompanied by properly structured government programs with the right incentive structures (Cumming and Johan 2013, 2016). Successful venture capital government programs are typically structured as limited partnerships with the government as a limited partner; unsuccessful government VC programs typically have tax subsidies towards one type of fund in the market (Cumming 2007; Cumming and Johan 2016).

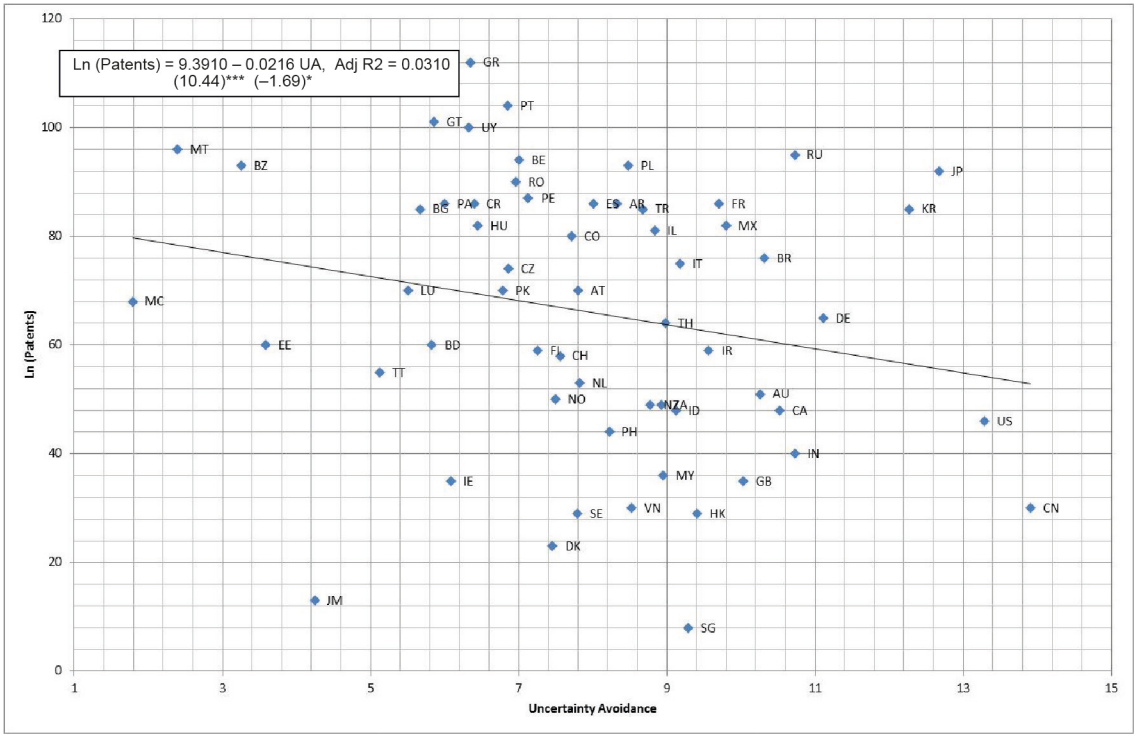
It remains open as to which of these policy mechanisms are most efficient in different institutional contexts. Further research on this topic is warranted, particularly as policy changes offer empirical scholars more opportunities to conduct studies with econometric tools such as difference-in-differences tests and other methods to identify causal mechanisms. Further research could likewise study specific types of innovation, such as basic research or platform technologies that enable other types of innovation to follow, or more applied innovation to specific uses. In addition, further research could identify specific industries such as the cleantech and fintech industries. In the biotech industry, for example, there are sometimes problems with the development of controversial innovations that involve genetically modified foods, as firms in that industry sometimes prefer to be the second to invent and not the first, to avoid any consumer backlash (Cumming and MacIntosh 2000).

# 4. CULTURE AND INNOVATION

We now turn to studies on culture and innovation. Culture matters for innovation at the firm level and the national level. At the firm level, there is theory (Manso 2011) and evidence (Tian and Wang 2014) that show corporate cultures that are more patient and tolerant of failure encourage more innovation. At the national level, previous evidence has shown that cultures that are ambiguity-averse are more likely to prefer bank-oriented financial systems (Aggrawal and Goodell 2016) and rely less on equity incentives for riskier start-ups (Cumming, Johan, and Zhang 2014).

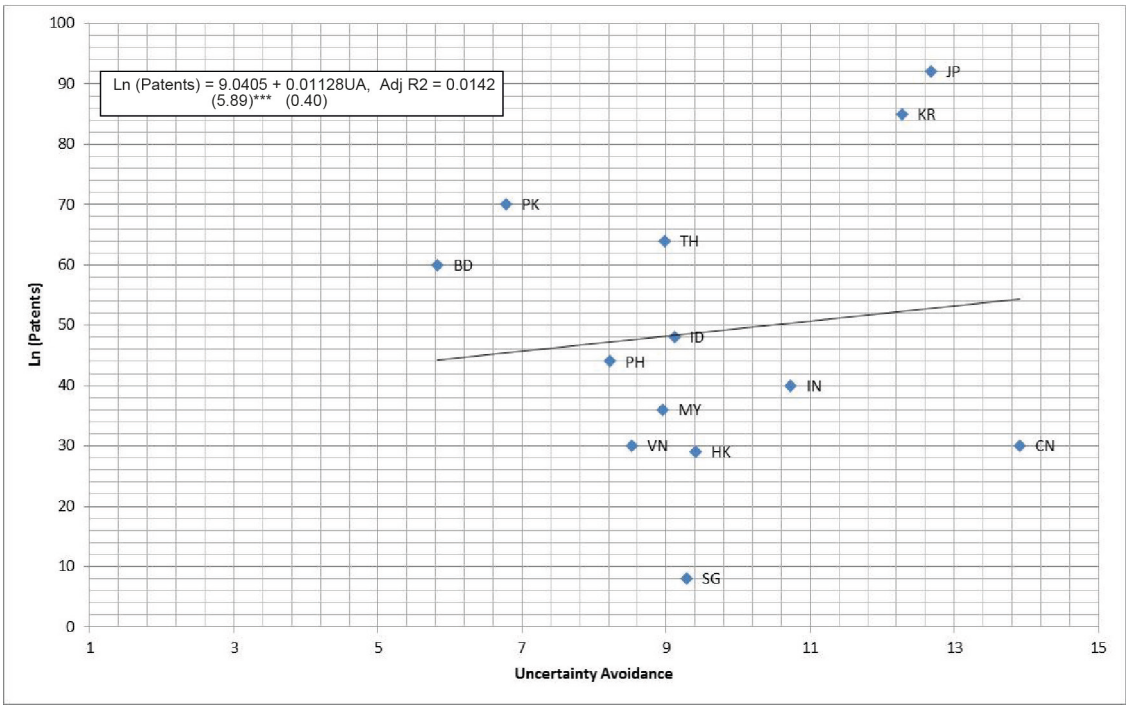
Using data from the World Intellectual Property Index, Figures 3a and 3b, and Figures 4a and 4b present the relationship between uncertainty avoidance and patent applications, and long-term orientation and patent applications, respectively, for 2016. A simple regression model that explains the natural log of the number of patent applications from a country with only uncertainty avoidance as an explanatory variable explains roughly 3% of the variability across countries (Figure 3a), and this effect is insignificant in the subsample of Southeast Asian countries. A simple regression model that explains the natural log of the number of patent applications from a country with only a long-term orientation variable explains over 20% of the variability across countries (Figure 4a), and this effect is similar for the subset of Southeast Asian countries (Figure 4b). The coefficient on uncertainty avoidance in Figure 3a is –0.0216, and significant at the 10% level (and insignificant in Figure 3b), and the coefficient on long-term orientation is 0.0411 and significant at the 1% level in Figure 4a (and very similar in Figure 4b). The other types of cultural variables are statistically insignificant for the 2016 snapshot of data; and these 2016 results showing the importance of uncertainty avoidance and long-term orientation are very consistent with time-series studies over the past decade (Cumming, Johan, and Zhang 2014).

**Figure 3a: Uncertainty Avoidance and Patent Applications by All Countries, 2016**



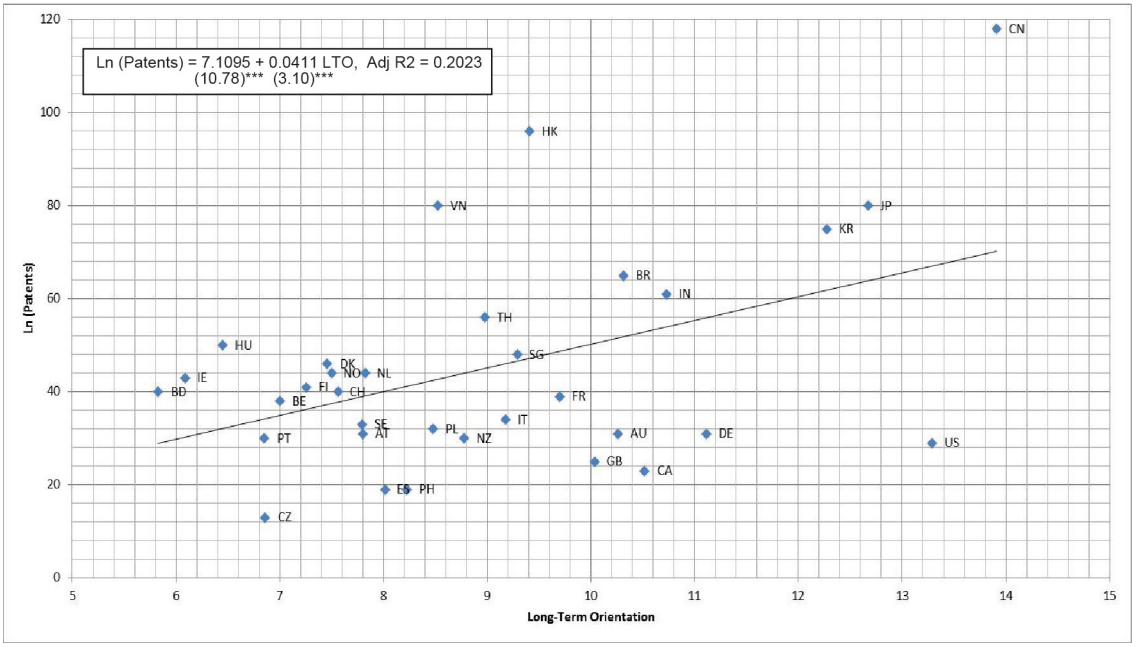

Patent Application data source: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_943_2016.pdf. Hofstede Indices Source: http://www.harzing.com/download/hgindices.xls. Footnote 4 lists the country name abbreviations.

**Figure 3b: Uncertainty Avoidance and Patent Applications by Southeast Asian Countries, 2016**



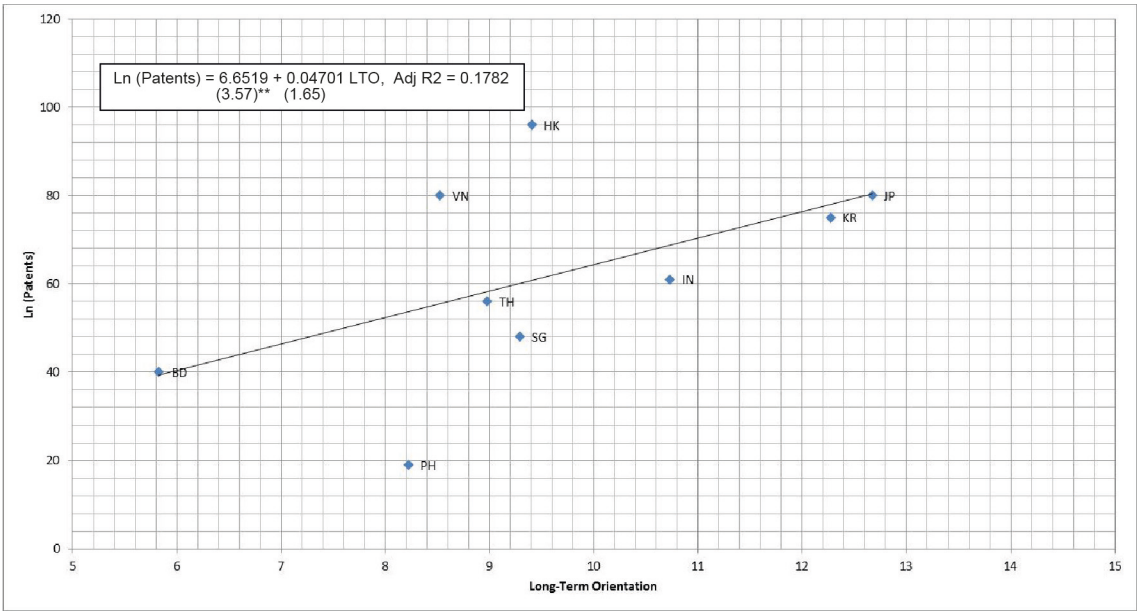

Patent Application data source: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_943_2016.pdf. Hofstede Indices Source: http://www.harzing.com/download/hgindices.xls. Footnote 4 lists the country name abbreviations.

**Figure 4a: Long-Term Orientation and Patent Applications by All Countries, 2016**




Patent Application data source: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_943_2016.pdf. Hofstede Indices Source: http://www.harzing.com/download/hgindices.xls. Footnote 4 lists the country name abbreviations.

**Figure 4b: Long-Term Orientation and Patent Applications by Southeast Asian Countries, 2016**




Patent Application data source: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_943_2016.pdf. Hofstede Indices Source: http://www.harzing.com/download/hgindices.xls. Footnote 4 lists the country name abbreviations.

There are two major problems with the use of national culture in studies of international differences in rates of innovation. First, the cultural variables tend to be correlated with one another, which make simultaneous assessment as to which of the cultural variables is most important a difficult task. Second, there are problems with identification insofar as culture does not change much over time; put differently, there

are no national experiments that enable an empirical study to specifically draw causal inference from national culture to innovation. As many leading journals require some form of empirical identification strategy that enables causal assessments and rules out other explanations, these limitations render studies on culture a more difficult area of research that many folks do not want to engage in.

Nevertheless, there are some key studies and some evidence that link culture and innovation, or innovation-related outcomes. Some of these studies are identified in Table 2. Herbig and Dunphy (1998) and Jones and Davis (2000) provide early discussions, albeit without empirical evidence, that we would expect international differences in culture to affect innovation. Some cultures encourage creativity, and have a long tern orientation with tolerance for failure that enables more creative thinking and innovative activities. Similarly, national culture can influence the extent to which innovation is stolen, as shown from data on software piracy (Husted, 2000). Gudmundson et al. (2003) provide survey evidence consistent with the view that culture within a firm affects innovation, including a positive impact of individual empowerment and innovation support, particularly for non-family firms.

**Table 2: Overview of Select Studies on National Culture and Innovation**

| Author(s) | Data Source(s) | Country Samples | Time Period | Dependent Variables | Explanatory Variables |
|---|---|---|---|---|---|
| Herbig and Dunphy (1998) | Not applicable | Not applicable | Not applicable | Not applicable | Not applicable |
| Husted (2000) | Business Software Alliance, World Bank, Hofstede | 39 countries | 1996 | Piracy cases | National Culture |
| Jones and Davis (2000) | Not applicable | Not applicable | Not applicable | Not applicable | Not applicable |
| Stulz and Williamson (2003) | La Porta et al. (1998) | 49 countries | 1993 | Creditor rights | Religion, Language, Openness to Trade, Income per Capita, Legal Origin |
| Gudmundson, Tower and Hartman (2003) | Survey | Small and Medium-Sized Enterprises, Midwestern US | Not reported | Innovation activities, self-reported | Organizational support, cultural support |
| Zheng et al. (2013) | Hofstede | 3,835 firms across 38 countries | | Bank lending; Lending corruption | National Culture |
| Karolyi (2016) | Hofstede, FactSet | 62 countries | 2001–2012 | Excess investment (difference between the ratio of market capitals between each source and target country pair and the ratio of source country investment over total target country foreign investment in each year) | National Culture |
| Cumming, Rui and Yu (2016) | 2010 Survey of China's Private Enterprises | the People's Republic of China | 2007–2009 | Innovation Investment Dummy; Log (R&D Expenditure/ Employee) | Political Connections and Political Instability |

*continued on next page*

**Table 2** *continued*

| Author(s) | Main Findings |
|---|---|
| Herbig and Dunphy (1998) | Explores the relationship between culture and innovation. Discusses culture at some length, noting some differences between national behaviors – such as the relative importance of a group versus an individual. Infers that existing cultural conditions determine the way in which innovations are adopted. Indicates that cultures that value creativity, technical ability and higher education are more successful at adopting innovations. Identifies a relationship between innovation and the status given to entrepreneurial efforts. Suggests that cultures emphasizing individualism and freedom are more likely to be creative and, therefore, to benefit more from innovative ideas. Refers to previous studies on culture and innovation (mentioning Hofstede's work). Investigates the role religion plays, in particular the cultural bias against technology that is prevalent in traditionalist religious countries. Concludes that strongly religious countries are not receptive to innovation. |
| Husted (2000) | The more individualistic (less collective) a society, the less software piracy. Piracy is also less common in countries with higher economic development and lower levels of income inequality. |
| Jones and Davis (2000) | The authors review the literature, and conclude that for multinational companies, local culture affects where R&D is carried out. Lower power distance, low uncertainty avoidance, high individualism, high masculinity, and long-term orientation are associated with high levels of innovation. |
| Stulz and Williamson (2003) | A country's principal religion predicts the cross-national variation in creditor rights better than its language, openness to trade, income per capita, and legal origin. Openness to trade mitigates the impact of the influence of religion on creditor rights. Cultural proxies also help in understanding how investor rights are enforced across countries. |
| Gudmundson, Tower and Hartman (2003) | Innovation is positively affected by an innovation culture: individual empowerment, innovation support, non-family firm. |
| Zheng et al. (2013) | This paper examines how national culture, and collectivism in particular, influences corruption in bank lending. We hypothesize that interdependent self-construal and particularist norms in collectivist countries lead to a higher level of lending corruption through their influence both on the interactions between bank officers and bank customers and on the dynamics among bank colleagues. We find strong evidence that firms domiciled in collectivist countries perceive a higher level of lending corruption than firms domiciled in individualist countries. In terms of economic magnitude, the effect of collectivism is substantially larger than the effects of other cultural dimensions (uncertainty avoidance, masculinity, and power distance) and institutional factors identified in prior studies (bank supervision, bank competition, information sharing, and media monitoring). We further find that the positive relationship between collectivism and lending corruption is not driven by endogeneity, and that it is robust to different measures of bank corruption, different measures of collectivism, and different estimation methods. Finally, we find that the link between collectivism and lending corruption cannot be explained by the role of the government in the economy, political connections, biased responses from disgruntled borrowers, or relationship lending. |
| Karolyi (2016) | I conduct an empirical analysis of the role of cultural distance in explaining the foreign bias in international portfolio holdings using traditional gravity models in international economics. I affirm the statistical explanatory power of culture for these investment biases and outline several new potential directions for research. |
| Cumming, Rui and Yu (2016) | In this paper we provide evidence from the People's Republic of China that access to loans positively affects the probability that a firm will invest in innovation. However, the positive effect of private debt on innovation investment is significantly moderated by political instability. The cost of political instability on innovation is less severe when the entrepreneur has political connections to party leaders. Furthermore, we show that political connections increase the probability that an entrepreneur has access to direct governmental support for innovation investment. These findings are more pronounced for technology intensive industries. |

This table summarizes various papers that focus on the impact of culture on innovation. The authors, data sources, countries, time periods, variables, and main findings are summarized. The main findings are largely paraphrased and/or copied from the abstracts of the papers to best and succinctly represent the authors' contributions, but are not meant to exhaustively represent all of the findings from the papers.

There is some evidence that national culture has a causal connection to international differences in legal rules that are in turn connected to innovation. For example, Stulz and Williamson (2003) show that international differences in religion can explain international variation in creditor rights (see Appendix) better than other candidate explanations, such as language, openness to trade, income per capita, and legal origin; and creditor rights strongly affect innovation, as discussed above (Acharya and Subramanian 2009). Culture also explains investment bias (Karolyi 2016). Zheng et al. (2013) show that national culture has a strong impact on bank lending and lending corruption (see Appendix). Access to debt finance, corruption, and political connections in turn can strongly affect innovation expenditures and outcomes (Cumming, Rui and Yu 2016). Other related studies that jointly examine the impact of law and culture on innovation are examined separately in the next section immediately below.

# 5. LAW, CULTURE, AND INNOVATION

In this section, we look at select studies that shed light on the intersection or interaction of law and culture on innovation. Table 3 summarizes some of the papers in the literature that consider both the impact of law and culture on innovation, or innovation-related outcomes.

**Table 3: Overview of Select Studies on both Law and Culture and Innovation**

| Author(s) | Data Source(s) | Country Samples | Time Period | Dependent Variables | Law and Culture Variables |
|---|---|---|---|---|---|
| Oxley (1999) | Cooperative Agreements and Technology Indicators | 27 countries, 727 alliances | 1980–1989 | Equity versus Joint Venture versus Contractual Alliance | Patent Protection, Hofstede Power Distance, Education, Foreign Direct Investment, Other Variables |
| McGaughey, Liesch and Poulson (2000) | Semi-structured interviews | Australia, the People's Republic of China | 1997–1999 | Not applicable | Not applicable |
| Varsakelis (2001) | UNESCO, Ginarte and Park (1997), Hofstede | 50 countries | 1998 | Log(R&D/GDP) | Power Distance, Intellectual Property Protection |
| Shao, Kwok and Zhang (2013) | Compustat | 68,329 firm-year observations from 44 countries | 1991–2010 | R&D Expenditures | National Culture, Shareholder and Creditor Rights |
| Cumming, Johan and Zhang (2014) | World Bank, the OECD, Compendia, Hofstede, La Porta et al. (1998), doingbusiness.org | 125 countries | 2004–2011 | GDP/capita, exports/GDP, patents/population, and unemployment. | Creditor Rights, Risk Taking Cultural Variables |
| Boubakri et al. (2016) | Compustat | 605 firms in 48 countries | 1995–2010 | Residual State Ownership | Hofstede Cultural Variables, Legal Rights |

*continued on next page*

**Table 3** *continued*

| Author(s) | Main Findings |
|---|---|
| Oxley (1999) | Firms adopt more hierarchical governance modes when intellectual property protection is weak. The impact of culture on alliances is ambiguous. |
| McGaughey, Liesch and Poulson (2000) | In a different cultural environment, protection of intellectual property was not through formal legal rights across borders, but instead it was through firm-specific resources and capabilities that enhance its ability to continuously innovate and market the product. Trust helped form the joint venture, but the bundle of resources was more important – that is, combinative competency. |
| Varsakelis (2001) | National culture (low power distance), patent protection, and openness of an economy are determinants of R&D intensity. |
| Shao, Kwok and Zhang (2013) | We explore the relation between individualism and horizons and types of corporate investment, based on individualism's implications for risk taking. We find that firms in individualistic countries invest more in long-term (risky) than in short-term (safe) assets. Moreover, the effect of individualism on long-term investment hinges on R&D: firms in individualistic countries invest more in R&D projects but not more in physical assets. To test whether risk taking is the channel through which individualism works, we employ two-stage ordinary least squares and other analyses to nullify alternative explanations, such as: (1) uncontrolled institutions determine both individualism and R&D; and (2) firms in individualistic countries invest more in R&D because they have higher investment efficiency, or pick less-risky R&D projects. We further find that individualistic firms tend to employ excess cash to increase R&D rather than increase dividends, and R&D decisions are less reliant on internal financing but more responsive to growth opportunities in individualistic countries. |
| | Stronger creditor protection deters corporate risk taking. Shareholder protection is associated with more cash holding, while creditor protection is associated with less cash holding. |
| Cumming, Johan and Zhang (2014) | Based on a comprehensive sample of all available countries and years, with the World Bank data being the most comprehensive, we find entrepreneurship has a significantly positive impact on GDP/capita, exports/GDP, and patents per population, and a negative impact on unemployment. Inferences from the Compendia data are very consistent. By contrast, inferences from the OECD data are not supportive of any of these propositions. |
| | Our findings point to institutional and cultural impediments to the effectiveness of entrepreneurship. Most notably, the impact of entrepreneurship is significantly mitigated by excessively strong creditor rights that limit entrepreneurial risk taking. Furthermore, the data indicate that cultural attitudes associated with low risk taking limit the effectiveness of entrepreneurship. By contrast, the impact of entrepreneurship on exports/GDP does not appear to be directly tied to costs of exporting, which is perhaps best explained by the new economy goods and services created by entrepreneurs that depend less on such costs. For some subsets of the data we find evidence consistent with the view that top-tier venture capital funds enhance the impact of entrepreneurship on GDP/capita. Finally, our results show how different definitions of new business entry matter for empirical analysis of entrepreneurship across countries. |
| | The data highlight the importance of access to finance without downside costs so that entrepreneurs are encouraged to take risk. Further, the data highlight institutional differences in risk attitudes that more generally inhibit risk taking and thereby limit the effectiveness of entrepreneurship. Moreover, the data highlight a central role for careful measurement of entrepreneurial activities and for inclusion of as many countries and years as possible in order to effectively analyze the impact of entrepreneurship. |
| Boubakri et al. (2016) | We examine the relationship between the collectivism measure of culture and residual state ownership in privatized firms. We find that the continued role of government in privatized firms is positively related to collectivism. This result is robust to using alternative measures of collectivism and government control, as well as when we address the endogeneity of collectivism. Finally, we examine the economic outcomes of culture at the firm level, focusing primarily on performance, efficiency, risk taking, and valuation measures. We report that privatized firms with high residual state ownership exhibit lower performance, valuation, efficiency, and risk taking in collectivist societies. Our results suggest that formal institutions are not, as sustained by previous studies, the main/exclusive constraints on the privatization reform. |

This table summarizes various papers that focus on both the impact of law and culture on innovation. The authors, data sources, countries, time periods, variables, and main findings are summarized. The main findings are largely paraphrased and/or copied from the abstracts of the papers to best and succinctly represent the authors' contributions, but are not meant to exhaustively represent all of the findings from the papers.

One set of studies compares the role of intellectual property and culture to stimulate joint ventures in international innovation contexts. Oxley (1999) studies equity joint venture versus contractual alliances, and finds evidence that firms adopt more hierarchical governance modes when patent protection is weak. Oxley also finds that the impact of culture on alliances is at best ambiguous. By contrast, McGaughey, Liesch and Poulson (2000) carry out semi-structured interviews in a case study involving Australia and the People's Republic of China, and find that intellectual property protection did not directly matter in trading across borders, but instead rights were bundled with trust, capabilities, and competency as a way to effectively carry out an international joint venture.

Another set of studies directly compares the role of intellectual property protection versus culture in stimulating innovation. Varsakelis (2001) uses the patent protection indices from Ginarte and Park (1997) and compares them to the Hofstede indices to examine which is more important for determining Log(R&D/GDP) across 50 countries in 1998, and finds that low power distance, patent protection, and openness of an economy are all important determinants of R&D intensity.

Using a 20-year sample from 1991–2010 and across 44 countries, Shao, Kwok and Zhang. (2013) show that individualism positively affects investment in R&D, but individualism does not affect investment in physical assets. The association between individualism and R&D is not related to investment efficiency or the riskiness of the R&D projects. Individualism does positively affect cash levels, and individualism-oriented countries are less reliant on external financing, and more responsive to growth opportunities. Legal conditions also matter for risk taking: shareholder (creditor) protection is associated with more (less) cash holding.

Boubakri et al. (2016) show that culture can significantly affect privatization around the world. They show that a continued role of government in privatized firms is more likely in countries with higher levels of collectivism cultural scores. In turn, this continued role of government in privatized firms negatively affects a firm's economic performance, including valuation, risk taking, and efficiency. The evidence from the People's Republic of China (Tan et al. 2015) is consistent.

Cumming, Johan and Zhang (2014) examine the role of law and culture in terms of the impact of entrepreneurship on economic outcomes, such as GDP/capita, exports/GDP, patents per population, and unemployment. They uncover institutional impediments to the positive impact of entrepreneurship on each of these economic outcomes. Consistent with Shao et al. (2013), the impact of entrepreneurship is significantly mitigated by excessively strong creditor rights and cultural attitudes that limit entrepreneurial risk taking. Further, they find evidence that access to equity finance enables more efficient and higher growth entrepreneurship, particularly where it is available from top-tier VC funds. Top-tier VC funds enhance the impact of entrepreneurship on GDP/capita by providing superior due diligence, screening, monitoring, value-added strategic, finance, administrative, and human resource advice, as well as a network of contacts for entrepreneurs. The reputation of top tier venture capital funds further enables more successful IPO exits (Nahata, 2008), although cultural forces in different countries may inhibit this impact (Nahata, Hazaruka and Tandon 2014). Cumming, Johan and Zhang (2014) are cautious about acknowledging that the inferences drawn on the role of entrepreneurship in economic growth and innovation are sensitive to the use of different data sets on topics that measure entrepreneurship.

There are components of culture that are not picked up in the Hofstede indices. For example, a country's openness to immigration is arguably part of a country's culture. There is evidence that immigration is closely tied to international movements in capital, and innovation capital in particular (Madhavan and Iriyama 2009; Iriyama, Li and Madhavan 2010). Also, ethnic and cultural diversity within a nation can have a strong impact on entrepreneurship and innovation, as shown by a number of studies in the US (Fairlie 2008; Fairlie and Krashinsky, 2008; Fairlie and Robb, 2007a,b, 2008; Fairlie and Woodruff, 2009, 2010). Diversity in a firm can likewise mitigate rates of fraud (Cumming, Leung and Rui, 2015), which in turn may have consequences for a firm's level of innovation in the future.

# 6. CONCLUSIONS

This chapter reviews research on the relationship between legal systems and innovation and culture and innovation. There is strong evidence that drivers of innovation around the world include patent protection, labor laws, creditor and shareholder rights, and bankruptcy protection, as each of these legal mechanisms facilitates risk taking, a tolerance for failure, and a long-term orientation. In the subset of Southeast Asian countries, intellectual property rights appear to be relatively more important than across other countries, based on the most recent data. Similarly, cultural attitudes by themselves that encourage risk taking and a long-term orientation directly positively impact innovation. However, in the most recent data, there is less support for the importance of culture in the subset of Southeast Asian countries. Other policy mechanisms are important as well, including access to capital, publicly funded innovation hubs, university research, and government awards.

Future research is needed on the role of organizational culture within a firm in different national cultural environments, and the differential impact on innovation. Does corporate culture become irrelevant in the presence of a strong national culture? Or does the impact of national culture become mitigated in the presence of a strong corporate culture? For example, is the impact of tolerance for failure within a firm or its investments on innovation (Tian and Wang 2014) mitigated in the presence of national cultures with short-term orientation? Does national culture have a causal influence on corporate culture? Does culture get transferred across borders in multinational firms in different ways, depending on the national and corporate cultural environment? And how do these interactions affect innovation? These and other related questions would shed light on the importance of national public policies that try to shift culture, and the role of policy makers in encouraging international transmission of culture through policies related to immigration and exporting.

Future research could examine the differential role of law and culture on innovation for public versus private firms. Also, future research could examine the extent to which the political environment mediates any connection between law, culture, and innovation. For example, as the 2016 US election has shown, legal institutions are subject to some instability, which may affect innovation efforts and expenditures in different industries and in different ways. These topics are likely to be the subject of active research in the coming years.

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# APPENDIX 1: SUMMARY OF SELECT NATIONAL CULTURAL AND LEGAL MEASURES

| | |
|---|---|
| Power distance index (PDI) | This dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. The fundamental issue here is how a society handles inequalities among people. People in societies exhibiting a large degree of power distance accept a hierarchical order in which everybody has a place and which needs no further justification. In societies with low power distance, people strive to equalize the distribution of power and demand justification for inequalities of power. |
| Individualism (IDV) | The high side of this dimension, called individualism, can be defined as a preference for a loosely knit social framework in which individuals are expected to take care of only themselves and their immediate families. Its opposite, collectivism, represents a preference for a tightly knit framework in society in which individuals can expect their relatives or members of a particular in-group to look after them in exchange for unquestioning loyalty. A society's position on this dimension is reflected in whether people's self-image is defined in terms of "I" or "we." |
| Uncertainty avoidance index (UAI) | The uncertainty avoidance dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. The fundamental issue here is how a society deals with the fact that the future can never be known: Should we try to control the future or just let it happen? Countries exhibiting strong UAI maintain rigid codes of belief and behavior and are intolerant of unorthodox behavior and ideas. Weak UAI societies maintain a more relaxed attitude in which practice counts more than principles. |
| Masculinity Index (MAS) | The masculinity side of this dimension represents a preference in society for achievement, heroism, assertiveness, and material rewards for success. Society at large is more competitive. Its opposite, femininity, stands for a preference for cooperation, modesty, caring for the weak, and quality of life. Society at large is more consensus-oriented. In the business context, masculinity versus femininity is sometimes also referred to as "tough versus tender" cultures. |
| Long-term orientation (LTO): | Every society has to maintain some links with its own past while dealing with the challenges of the present and the future. Societies prioritize these two existential goals differently.<br>Societies who score low on this dimension, for example, prefer to maintain time-honored traditions and norms while viewing societal change with suspicion. Those with a culture that scores high, on the other hand, take a more pragmatic approach: they encourage thrift and efforts in modern education as a way to prepare for the future.<br>In the business context this dimension is related to as "(short term) normative versus (long term) pragmatic" (PRA). In the academic environment the terminology monumentalism versus flexhumility is sometimes also used. |
| Indulgence vs. restraint (IND): | Indulgence stands for a society that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun. Restraint stands for a society that suppresses gratification of needs and regulates it by means of strict social norms. |
| Creditor rights | An index aggregating creditor rights, following La Porta et al. (1998); this index ranges from 0 to 4, with higher values implying stronger creditor rights. A score of one is assigned when each of the following rights of secured lenders are defined in laws and regulations: First, there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization. Second, secured creditors are able to seize their collateral after the reorganization petition is approved, i.e., there is no automatic stay or asset freeze. Third, secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as government or workers. Finally, management does not retain administration of its property pending the resolution of the reorganization. |
| Corruption | Transparency International Corruption Perceptions Index, which ranks countries in terms of the degree to which corruption is perceived to exist among public officials and politicians (Source: http://www.transparency.org/policy_research/surveys_indices/cpi/2008); this index ranges from 0 to 10 and varies over time and across countries, with higher values implying less corrupt countries. |

Source: Copied from https://geert-hofstede.com/national-culture.html

## Summary Statistics for Bankruptcy Indices

| | Discharge: Concerns discharge from pre-bankruptcy indebtedness available for an entrepreneur who has either been trading as a sole proprietor or guaranteed debts of a closely held private company. | | |
|---|---|---|---|
| | **Discharge Available? Takes value 0 if discharge available, 1 if not available.** | **Discharge Years: If discharge available, value is number of years until typical discharge; if discharge unavailable, value is life expectancy minus 40.** | **Minimum capital to form private company, in 2005 Euros (1/E).** |
| Austria | 1990–1994: 1; 1995–2005: 0 | 1990–1994: 37; 1995–2005: 7 | 1990–2005: €35,000 |
| Belgium | 1990–1997: 1; 1998–2005: 0 | 1990–1997: 37; 1998–2005: 0 | 1990–1998: €6,174; 1999–2005: €18,500 |
| Canada | 1990–2005: 0 | 1990–1992: 1; 1993–2005: 0.75 | 1990–2005: €0 |
| Denmark | 1990–2004: .5; 2005: 0 | 1990–2004: 5; 2005: 3 | 1990–1991: €10,732; 1992–1996: €26,831; 1997–2005: €16,769 |
| Finland | 1990–1992: 1; 1993–2005: 0 | 1990–1992: 37; 1993–2005: 5 | 1990–2005: €2,500 |
| France | 1990–1993: 0; 1994–2005: .5 | 1990–2005: 0 | 1990–2002: €7,500; 2003–2005: €0 |
| Germany | 1990–1998: 1; 1999–2005: 0 | 1990–1998: 37; 19992000: 7; 2001–2005: 6 | 1990–2005: €25,000 |
| Greece | 1990–2005: 1 | 1990–2005: 20 | 1990–1992: €587; 1993–1998: €8,804; 1999–2002: €17,608; 2003–2005: €18,000 |
| Ireland | 1990–2005: 0 | 1990–2005: 12 | 1990–2005: €0 |
| Italy | 1990–2005: 1 | 1990–2005: 38 | 1990–2003: €10,300; 2004–2005: €10,000 |
| Netherlands | 1990–1998: 1; 1999–2005: 0 | 1990–1998: 38; 1999–2005: 3 | 1990–2005: €18,000 |
| Spain | 1990–2005: 1 | 1990–2005: 15 | 1990–2005: €3,000 |
| Sweden | 1990–2005: 1 | 1990–2005: 10 | 1990–2005: €10,749 |
| UK | 1990–2005: 0 | 1990–2003: 3; 2004–2005: 1 | 1990–2005: €0 |
| USA | 1990–2005: 0 | 1990–2005: 0 | 1990–2005: €0 |
| | **Exemptions: This relates to pre-bankruptcy assets that are exempted from the bankrupt estate and so retained by the debtor. Takes value 1 if exemptions of assets from the bankruptcy estate cover only personal items, tools of trade, etc. Takes value 0 if exemptions are more generous. Takes value 2 if exemptions are 'negative", i.e. spousal property can be pulled into the estate.** | **Disabilities: This relates to restrictions on the debtor's civil and economic rights related to bankruptcy. Takes value 0 if no disabilities other than loss of power to deal with assets in bankrupt estate; Takes value 1 for civic disabilities (i.e. loss of right to vote, hold elected office, membership of professional groups); Takes value 2 for economic disabilities (i.e. restrictions on obtaining credit, being involved in the management of a company); Takes value 3 for interference with mail and/or travel (i.e. prohibition on travel without consent, mail opened by trustee); Takes value 4 if debtor may be incarcerated for nonpayment of debts.** | **Composition: This relates to the possibility of agreeing a composition with creditors as a means of terminating an existing bankruptcy proceeding. The variable takes a value between 0 and 2, and is the sum of (v + c), where v is the proportion of face value of existing creditors' claims and c is the proportion of number of creditors, who must vote in favor to effect a compromise.** |
| Austria | 1990–2005: 2 | 1990–2005: 0 | 1990–2005: 1.25 |
| Belgium | 1990–2005: 1 | 1990–2005: 3 | 1990–1997: 1.25; 1998–2005: 1 |
| Canada | 1990–2005: 0 | 1990–2005: 2 | 1990–2005: 1.16 |
| Denmark | 1990–2005: 1 | 1990–2005: 3 | 1990–2004: 1.4; 2005: 1.35 |
| Finland | 1990–2005: 1 | 1990–2005: 3 | 1990–2005: 0.8 |
| France | 1990–2005: 2 | 1990–1994: 1; 1995–2005: 2 | 1990–2005: 0 |
| Germany | 1990–2005: 0 | 1990–1998: 3; 1999–2005: 1 | 1990–1998: 1.25; 1999–2005: 1 |
| Greece | 1990–2005: 1 | 1990–1997: 4; 1998–2005: 3 | 1990–2005: 1.46 |
| Ireland | 1990–2005: 1 | 1990–2005: 2 | 1990–2005: 1 |
| Italy | 1990–1992: 2; 1993–2005: 1 | 1990–2005: 3 | 1990–2005: 1.16 |
| Netherlands | 1990–2005: 2 | 1990–2005: 0 | 1990–1994: 1.46; 1995–2005: 1 |
| Spain | 1990–2005: 1 | 1990–2005: 3 | 1990–2003: 1.1; 2004–2005: 0.5 |
| Sweden | 1990–2005: 1 | 1990–2005: 2 | 1990–2005: 2 |
| UK | 1990–2005: 1 | 1990–2005: 2 | 1990–2005: 1 |
| USA | 1990–2005: 0 | 1990–2005: 1 | 1990–2005: 1 |

This table summarizes the bankruptcy indices used in the empirical analyses in the subsequent tables for each country and each years.

Sources: Armour and Cumming (2008).