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Moderating Role of Country Governance in the Relationship between Technological Innovation and Inward Foreign Direct Investment

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Abstract

Due to the significance of Foreign Direct Investment (FDI) in economic development, a growing body of literature aims to analyze its determinants. In this regard, this study examines the role of technological innovation in attracting FDI and explains how country governance affects this relationship. For empirical analysis, we analyzed panel data from a wide range of developed and emerging economies for a period of 24 years, stretching from 1993 to 2016. We used the random effect model to obtain results after applying the Hausman test. We examined the relationship between technological innovation, governance (by investigating governance indicators individually), FDI and how governance moderates the relationship between technological innovation and FDI in emerging and developed economies. The findings indicated that technological innovation in the host country is important for attracting inward FDI, regardless of the recipient country's developmental level. For developed economies, political stability showed a strengthening effect on inward FDI. However, for both emerging and developed economies, all the other governance indicators weakened the technological innovation and FDI nexus.

Introduction

In the aftermath of the Second World War (WWII), market deregulation and liberalization gave rise to the internationalization of firms. Consequently, over the course of time, the flow of Foreign Direct Investment (FDI) has

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risen to substantially higher levels, worldwide. In 2018, global inflows of FDI were 1.3 trillion US Dollars (United Nations, 2019). The fact that all countries, especially developing countries, consider FDI as an effective strategy for economic development elucidates its importance. It can be the source of increasing employment opportunities, expanding investment base, increasing efficiency in production through technological innovation, and introducing modern management techniques. It is evident from the literature that FDI successfully induces economic growth. Furthermore, researchers have also analyzed the channels through which FDI enhances growth.

There is ample literature available on how FDI can be the conduit of economic growth and also on the preconditions required for FDI to enhance growth in an economy. Ozturk (2007) suggested that FDI increases economic development through human capital enhancement, technological spillover effect and capital formation. Bosworth et al. (1999) stated that FDI channelizes growth through total factor productivity. Masso et al. (2010) suggested that FDI enhances productivity in the economy due to which it grows.

FDI has considerable importance for the economic growth of countries; however, not every country can attract FDI. To understand this failure to attract FDI, we must understand the motivation of investors and the preconditions required for attracting FDI in the host economy. Some researchers, such as Calvo (2000), believe that the host economy should meet a minimum threshold of development in order to attract FDI. Borensztein et al. (1998) suggested that a minimum level of human capital is a precondition to invite FDI. Others argued that the institutional quality of the host economy is the primary determinant of FDI. Ozturk (2007) argued that political and economic stability, trade regime and tax incentives are important determinants of FDI. Hyun (2006) suggested that FDI and the quality of institutions have a bidirectional cointegrating relationship in the long-run. Globerman and Shapiro (1999) also established that good governance is of immense importance for multinational corporations and further suggested that good governance plays a significant role in attracting inward FDI.

The capacity to sustain the benefits of FDI is enhanced with technological developments. Hence, technology may be the essential

driving force behind inward FDI (Borensztein et al., 1998). Country governance and institutional quality determine the level of technological innovation and the use of technology in the economy (Kayalvizhi & Thenmozhi, 2018). Hence, it is plausible to speculate that a country's level of technological innovation and governance is associated with the increasing inward flow of FDI.

In this study, our focus remains on the causal relationship between FDI and technological innovation and how technological innovation interacts with governance to affect the inward flow of FDI. We analyzed data from a wide range of developed and emerging economies over a period of 24 years and compared both sets of countries.

This study starts with the premise that technological innovation in host economies is the driving force behind inward FDI. Moreover, governance and cultural factors moderate this relationship. The current study proposes that governance structure in both developed and emerging economies influences the investment environment in them. We used interaction analysis to study the moderating effects of cultural factors and country governance on the relationship between technological innovation and inward FDI.

Motivation for the Study

An innovative environment in the country improves efficiency and encourages competitiveness. It is evident from the existing literature that firms look for a cost-effective and efficient production environment as well as the availability of skillful human capital before making the decision to invest in any country. Moreover, the ability to exploit technology might plausibly upsurge the capacity to innovate, further increasing the FDI inflow in the country. So, we can hypothesize that technological innovation in the host country will drive inward FDI flows.

Furthermore, there is considerable evidence available from the literature that the rule of law, control of corruption and other institutional factors lead to increased innovation. Progression in technology and the quality of innovation may be stimulated by an economy's ability to change. Therefore, inward FDI may well increase with better country governance, moderating the technological ability and the capacity for innovation in the host

economy. Moreover, good or bad governance may enhance or reduce the effect of technology and innovation on inward FDI in host economies. Hence, it is essential to investigate the moderating effect of governance on the relationship between inward FDI and technological innovation.

Literature Review

Role of Technological Innovation in Attracting Inward FDI

Technological innovation for designing new products, technologies and processes appeals to multinational corporations. Since production can be established abroad through various entry modes, hence a firm may originate direct investment, shift and transfer technologies through imitation carried out by the firms in foreign countries, or may license the technologies of foreign firms.

FDI is an investment that allows ownership and control by a foreign firm of a business grounded in the host country. It is, therefore, different from the phenomenon of foreign portfolio investment from the point of view of direct control. FDI may be initiated through various entry modes, such as buying controlling ownership in an existing foreign firm, establishing an associate firm in a foreign country, or starting a subsidiary in a foreign (host) country. Empirical literature underpins the notion that R&D-intensive inward FDI institutes a strong system for the absorption and transfer of international technology. It authorizes the host countries to integrate value chain frameworks and advanced specialized clusters, globally (Audretsch, 2000; Cantwell & Piscitello, 2000). The widespread stream of FDI inflows to multinational corporations in emerging economies was generated by mergers and acquisitions. This caused the privatization of state-owned enterprises and their assets in various countries of Eastern Europe and Latin America. Moreover, after the crisis in Asia, several Asian economies initiated the acquisition of corporate assets (Brewer, 1993).

Among the most availed sources of international direct investment is to buy a business or part of a business abroad, accordingly, named as cross-border mergers and acquisitions (M&A). In cross-border M&A, the buying (acquiring) firm purchases a specific stance in the ownership of the seller (target) firm to procure the resources. According to Firer and Williams (2005), ownership comprises the relative percentage of equity

ownership claims held by foreign firms in the host firm during cross-border acquisitions. This internationalization strategy discusses and debates the complex interaction between technological innovation, imitation and FDI in the world economy. This debate focuses on answering how FDI influences imitation and technological innovation. Moreover, spillover relationships such as how imitation influences FDI and how technological innovation affects FDI are also debated. There is a consensus among scholars that technological innovation is the engine of economic development at the macro level. Moreover, incessant technological innovation is the engine that raises the profile/profitability of highly successful businesses at the micro level (Pai, 2016; Schumpeter, 1911). Consequently, inward FDI can be reflected upon at the micro level to explain how technological innovation motivates a foreign firm to instigate investment in the host country (Qu & Wei, 2017).

Since technological innovation is the key factor in attracting inward FDI, hence the Chinese government has been striving to create a formal institutional structure to ease domestic technological innovation. Authors define firm technological innovation as an object, idea, or practice that is perceived anew by an organization and the industry to which it belongs (Grawe, 2009; Daugherty et al., 2011). The use of new administrative and technical knowledge in an organization aimed to offer new goods and services to customers is referred to as firm technological innovation (Afuah, 1998). It can even include introducing new practices to an organization, including products, services, equipment, policies, projects and processes (Svetlik et al., 2007). According to the study of Villalonga and McGahan (2005), more than 9000 acquisition deals were made in the period 1990-2000. They concluded that the probability of acquisitions increases as compared to other forms of foreign entry when the seller / target has a higher potential for technological innovation. This shows that the leading growth strategy for firms regarding FDI is mergers and acquisitions (King et al., 2008). Hence, the most noteworthy attraction of inward FDI is the admittance to technology resources, knowledge and technological innovation. For example, Changqi and Ningling (2010) stated that some firms undertake FDI to reduce competitive pressures in the domestic market, while others are interested in inward FDI to avail crucial resources including technology resources and raw materials. Possibly, some are

stimulated by the policy measures of the state. Therefore, most of the acquisitions have been described as an opportunity to access new knowledge (Huber, 1991). The acquisition literature highlights the significance of the transfer of knowledge that adds value to the foreign firm's performance (Capron, 1999).

Further, technological acquisitions provide technological input to the foreign firm. These likely enhance the foreign firm's knowledge base through novel recombinations of knowledge and by extending the scope and scale of benefits (Henderson & Cockburn, 1993). Technological acquisition can influence the foreign firm's subsequent output in two possible ways. Firstly, technological acquisition of a host firm can be explained as the absorption and transfer of the host firm's knowledge resources Ahuja and Katila (2001) and country-level knowledge Dikova et al. (2010) into the foreign firm's knowledge base. This kind of union can likely enhance the foreign firm's knowledge resources and upsurge its technological innovation by providing the economies of scope and scale in research and development (R&D) and by enhancing the foreign firm's prospects for inventive recombinations (Fleming, 2001). According to the resource-based view (RBV), acquisition is a significant and easy business route of redeploying assets (tangible or intangible) into more creative uses (Anand & Singh, 1997). Therefore, some emerging economies are more involved in acquisition strategies supported by their government policies. For example, fast growth enabled the Chinese government to emphasize the outward-direct investment to procure strategic resources in which China domestically lacks, such as knowledge and technology (Kang & Jiang, 2012). China experienced rapid economic growth during the past thirty years which encouraged Chinese firms to procure scarce resources including technology (Changqi and Ningling, 2010). On the other hand, Russian firms seek technology resources and R&D units to fill their technological gaps (Andreff, 2016).

Another popular strategy used to attract FDI is the creation of International Joint Venture (IJV). Buchel (2003) stated that between the years 1991 and 2001, the average number of jointventure deals announced each year increased dramatically from 1,000 to 7,000. IJV is a form of partnership among companies operating in both developed and emerging

markets. It remains an important tool for corporations following strategies for beating into innovative growth opportunities. This includes retrieving novel technologies and entering new markets by foreign firms that do not pursue business in the host country entirely on their own (Globalization, 2020). For instance, many Chinese corporations have matured and achieved competitiveness even though few have been involved in IJVs while searching for new resources and growth opportunities. Isobe et al. (2000) claimed that China is the fastest growing market among the emerging economies and has received more than $50 billion per annum in FDI since 2002. IJVs comprise one-third of these direct investments. Therefore, IJV comprise another prevalent entry mode (Isobe et al., 2000). Buccieri et al. (2020) found that the International Entrepreneurship Culture (IEC) influences dynamic marketing capabilities and ambidextrous technological innovation. Together, these affect International New Venture (INV) performance gains. Further, they found that dynamic marketing capabilities and ambidextrous technological innovation mediate the relationship between IEC and INV performance.

Extensive FDI inflows have been witnessed Wei and Wang (2009) and priority is given to the role of domestic technology base in attracting for various entry modes (such as cross border acquisitions and international joint ventures) under the definition of Foreign Direct Investment (FDI) by Multinational Enterprises (MNEs) (Arora et al., 2014). Kayalvizhi and Thenmozhi (2018) investigated 22 emerging economies and found that technology is the foremost factor in attracting FDI inflows. FDI increases with the increase in the capacity for technological innovation and technology absorption. It also increases the innovation of the foreign firms who invest in host countries such as China (Hanif et al., 2021). Moreover, the ability to adapt and adopt technology may reasonably enhance the capacity to innovate, which might further upsurge FDI inflows in the country.

Thus, emerging and developed economies may adapt and adopt technology that becomes the key in attracting inward FDI. Moreover, their ability to exploit technology might plausibly increase the capacity to innovate, further increasing the flow of FDI in the country.

Moderating Role of Regulatory Institutions

The existing literature explores the influence of various factors on the individual phases of the process of technological innovation, such as investment in R&D. For enhancing technological innovation, R&D investment may lead to the invention of new processes and products. In contrast, institutional quality may affect total factor productivity and technological innovation or patenting activities. Indeed, institutional theory suggests that exogenous institutional factors may influence the process of technological innovation. Fang et al. (2018) applied a difference-in-differences method. They found that the 'anti-corruption' and 'reduction in bureaucracy' movement instigated in China in 2012 was responsible for strengthening technological innovation. This campaign bolstered the firms' innovative productivity, which further reduced corruption related expenses. Dabla-Norris et al. (2012) found that financial market development positively influences the marginal effect of technological innovation. Financial markets spur economic growth and technological innovation (Schumpeter, 1911). Therefore, less developed financial markets constrain technological innovation due to low R&D investment (Howell, 2016).

Berger and Luckmann (1991) were the first to elucidate the institutional theory. It comprises the rules, regulations and classifications built into the society as common interpretations and typifications. Such practices might be taken for granted or reinforced through public opinion or the force of law (Starbuck, 1983). Scott (1995) categorized the three pillars of institutions as regulative rules and laws, normative and cultural perspectives. Institutions not only include legal regulations and the rule of law that sanction the relationship between social entities and people that form a social structure such as a corporation or a state, but also government agencies and the enabling self-governing process. Moreover, the role of social capital, trust, and freedom in institutions should be considered from a broader perspective (Ünsal, 2007). The cultural aspect of institutions refers to the shared concepts of social reality and the frames through which meaning is constructed (Scott, 1995). Previous studies have argued that cultural institutions are most closely related to innovation (Alexander, 2012). The normative pillar of institutions is described as 'a prescriptive, evaluative and obligatory dimension into social life'. It assists in recognizing how 'values

and normative frameworks structure choice' (Scott, 1995). Normative institutions are informal rules such as codes of behavior, habits and conventions that enable, underlie and govern the shared action of the members of a group (North, 1990). Normative perspectives are associated with procedural legitimacy and require an organization to conform to socially accepted behaviors and norms. Kshetri (2010) stated that professional associations and trade associations are components of the normative institutional pillar that can regulate behavior in e-commerce by complying with the requirements to fulfill social obligations for gaining legitimacy. The regulatory pillar is formal and coercive and consists of legal rules, laws, governmental regulations, and stakeholders' expectations (DiMaggio & Powell, 1983). Regulatory institutions recognize opportunities for organizations, identify the cost of transactions, and are responsible for creating an environment that identifies organizations' relational behavior.

According to the institutional theory, conformity to these institutional factors by organizations makes them similar. Activities and structures created during the harmonization process in an institutional environment lead to similarity (DiMaggio & Powell, 1983). Organizational structure is formulated by the isomorphic pressure exerted by the organization's internal activities and routine, mainly influenced by their external environment (Scott, 1995). The idea that firms are structured by rules and norms used in their external environment, which leads to organizational isomorphism, is not new (Meyer & Rowan, 1977). For example, isomorphic pressure to harmonize with their external environment is evident in exchange and technical interdependencies of multinational corporations.

Several studies have explained how cultural and normative institutions affect technological innovation and patenting activities (Shane, 1993) through various factors. These factors include attitudes and behaviors Shane et al. (1995), the protection of Intellectual Property Rights (IPR) (Teece, 1986), collaborations and partnerships Barros (2015), and social capital (Chang, 2016). Papageorgiadis and Sharma (2016) posited that the enforcement and strength of IPRs is significantly associated with increased technological innovation. However, Allred and Park (2007) found that increased IPRs are negatively related to the amount of technological

innovation in developing countries. Broberg et al. (2013) investigated how national institutional structures influence two kinds of technological innovation. These include the counts of patent applications and the number of scientific articles published. Underdeveloped countries, where the institutions, legislation and rules are frequently reformed, are risky places to invest. Keefer and Knack (1997) concluded that firms invest less in technological improvements and R&D projects in countries where the risk of expropriation is high and the rule of law is weak. Similarly, there is considerable evidence in the literature that corruption negatively (De Waldemar, 2012) as well as positively Rock and Bonnett (2004) influences technological innovation. Therefore, in the absence of institutional enforcement, informal institutional factors such as governance mechanisms Zaheer and Venkatraman (1995) and technological innovation-based collaborations (Belderbos et al., 2004) may lead to increased technological innovation (Sherwood & Covin, 2008).

The current study uses insights from the institutional theory to examine how governance affects technological innovation at the national level which, in turn, influences the inward FDI. Therefore, from the previous literature, we created the following research framework (depicted in Figure 1).

Figure 1
Framework
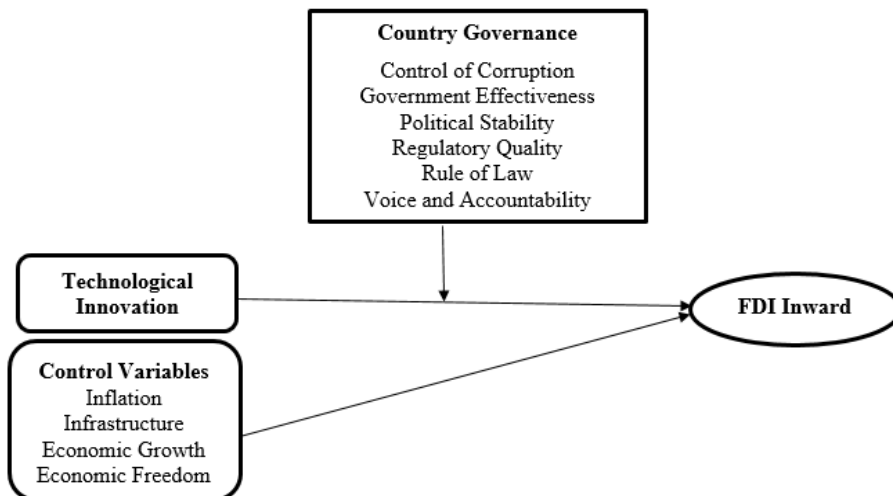
Methodology

Statistical Model

This study examines the influence of technological innovation, country governance, and culture on inward FDI for developed and emerging economies, over the years 1993-2016, using the random-effect model. We investigated the matter using three models for both developed and developing economies. Model 1 is the base model through which we examined the influence of technological innovation on inward FDI. In contrast, Model 2 was used to examine the moderating role of country governance in the relationship between technological innovation and inward FDI. For the analysis of the moderation effect, we used the hierarchical regression technique. Hausman test was performed. The results revealed that panel random-effect is more consistent than panel fixed-effect estimators. Following are the models of the current study.

$$FDII_i = \alpha_{11} + \beta_{11}TI_i + \gamma Controls + \mu_{1i} \tag{1}$$

$$FDII_i = \alpha + \beta_{21}TI_i + \beta_{22}TI_{\dot{i}} * CC_i + \beta_{23}TI_{\dot{i}} * GE_i + \beta_{24}TI_{\dot{i}} * PS_i + \beta_{25}TI_{\dot{i}} * RQ_i + \beta_{26}TI_{\dot{i}} * RL_i + \beta_{27}TI_{\dot{i}} * VA_i + \gamma Controls + \mu_i \tag{2}$$

where FDII represents *inward FDI*, TI is *technological innovation*, CC is *control of corruption*, GE is *government effectiveness*, PS is *political stability*, RQ is *regulatory quality*, RL is *rule of law* and VA is *voice and accountability*. Lastly, μ is the *residual term*.

Experimental Procedure

In this study, panel data was used. It consisted of observations collected from several countries in a time series manner. Since panel data includes observations for the same cross-sectional units at different points in time, there may be present a cross-sectional influence of countries on other countries or groups of countries. There are numerous techniques used to control these problems. Two critical tools suggested are the fixed-effect model and the random-effect model.

Sample Construction

The current study empirically investigates the relationship between technological innovation and inward FDI in both developed and emerging

economies. Furthermore, it investigates the moderating / interacting role of country governance and culture in determining the relationship between technological innovation and inward FDI. For analysis, we collected data from various sources for all the variables for the years 1993-2016. The list of countries chosen is as follows:

List of Emerging Countries

Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungry, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Thailand, Turkey and the United Arab Emirates.

List of Developed Countries

Australia, Austria, Belgium, Bulgaria, Canada, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Latvia, Luxemburg, Lithuania, Malta, Netherlands, New Zealand, Norway, Portugal, Romania, Spain, Sweden, Switzerland, United Kingdom and United States (Yoo & Reimann, 2017).

Variables and their Measurements

Technological Innovation

One way to define technological innovation is the "country's capacity to put new ideas into practice by developing new products and processes" (Márquez-Ramos & Martínez-Zarzoso, 2010). We measured technological innovation through a composite measure produced by taking the average of patent applications submitted by non-residents and residents, taken in log specifications.

Inward Foreign Direct Investment (Inward FDI)

According to the International Monetary Fund (IMF), Foreign Direct Investment (usually abbreviated as FDI) "can be described as an investment made to gain long-term or lasting relationship in corporations working outside of the country of the financier." The investment is direct because the investor, who might be an overseas corporation or a group of companies or a person, is looking to manage, control or exercise significant power over the host corporation (IMF Report 2006). We measured inward FDI through Foreign direct investment, net inflows (% of GDP).

Country Governance is calculated through the governance indicators operationalized by the government of a country and obtained from Worldwide Governance Indicators (WGI) (Kaufmann et al., 2005). We used six indicators that included *political stability* (measuring the possibility of changes in or violent threat to the government, politically driven violence, political instability, and terrorism), *voice and accountability* (measuring the degree to which the citizens of a country are allowed to participate in choosing their government, including freedom of association, freedom of expression, and an open media), *government effectiveness* (measuring the quality of civil service, public services, and the extent of their independence from political influence, it also measures the quality of policy design and execution and the reliability of government's obligations in the light of these policies), *regulatory quality* (measuring the capability of the government to formulate and execute strong regulations that promote private sector development), *rule of law* (measuring the degree to which managers have confidence in rules and abide by them, particularly the quality of property rights, contract enforcement, the courts and the police, over and above the probability of crime and violence) and *corruption control* (measuring the level to which political power is used to obtain personal gains).

The composite of these six measures ranged between -2.5 to 2.5, with higher scores referring to higher institutional advancement. We chose this measure for various reasons. Firstly, to date, this is the most comprehensive measure available to gauge regulatory institutions that covers a maximum number of years (from 1996 to 2016). Secondly, this measure has been used by a wide range of researchers in their studies to measure regulatory distance as an indicator of regulatory institutional advancement (Ang et al., 2015). Lastly, these indicators were calculated from 352 separate variables that measured the perceptions of governance based on the data collected from 37 diverse data sources assembled by 31 separate organizations. Dikova and Van Witteloostuijn (2007) stated that this composite measure is best suited to capture the variations over time in the relative institutional position of countries. Besides, the data on this measure is available since 1996. Data entry in WGI began in 1996 and has missing values for alternate years, such as data is available for 1996 and missing for 1997 and again available for 1998. This trend exited until the year 2002, whereas for all the subsequent years data is available for each year. For this reason, the odd

year observations were matched by even years to draw the institutional estimate as operationalized by (Siegel & Larson, 2009).

Table 1

Variables and Measurements

Variables	Measurement	Data Source	References
FDI Inward	Foreign direct investment, net inflows (% of GDP).	WDI	(Uppenberg & Riess, 2004; Zhang & Song, 2001)
Technological Innovation	Total patent applications count (natural log)	WDI	(Anand & Kogut, 1997; Shaver & Flyer, 2000)
Country Governance	Governance dimension of a country	WGI	Dikova & Van Witteloostuijn, (2007)
Inflation	Consumer price index (2010 = 100) in natural log specification	WDI	Hanif & Arshed (2016)
Infrastructure	Gross fixed capital formation (% of GDP)	WDI	Hanif & Noman (2016)
Economic Growth	GDP growth (annual %)	WDI	Hanif & Noman (2016)
Economic Freedom	Overall score from world economic freedom index	Heritage foundation	Şenalp (2019)

Results

Table 1 shows the descriptive statistics of the study model. Table 2 states the values of the correlation analysis between various variables.

Table 2 shows the results of Equation 1 for emerging economies. Model 1 depicts the effect of control variables on inward FDI. Whereas, Model 2 shows the effect of technological innovation on inward FDI after controlling for variables shown in Model 1. Lastly, Models 3 and 4 represent the same variables as in previous models using the random-effect model.

Table 2

Descriptive Statistics

Variables	Emerging Economies				Developed Economies			
	Mean	SD	Min	Max	Mean	SD	Min	Max
FDI	22.465	1.477	16.239	26.396	22.553	2.083	12.260	27.322
Technological innovation	7.776	1.391	4.969	13.414	6.993	2.428	0.405	12.621
GDP	4.225	3.518	-13.127	14.232	2.501	3.226	-14.814	25.163
Trade	61.211	40.650	12.315	192.123	64.491	33.446	13.557	182.085
Inflation	4.212	0.737	-1.091	5.184	4.405	0.496	-0.669	4.786
Infrastructure	23.384	6.312	12.446	45.690	22.090	3.739	4.493	37.287
Eco. freedom	61.374	7.126	45.1	79	70.409	7.076	42.9	83.1
Control of corruption	-0.095	0.640	-1.220	1.592	1.394	0.789	-0.615	2.470
Govt. effectiveness	0.200	0.559	-0.877	1.509	1.385	0.621	-0.569	2.354
Political stability	-0.402	0.929	-2.810	1.261	0.931	0.460	-0.474	1.760
Regulatory quality	0.261	0.578	-0.923	1.543	1.328	0.441	-0.184	2.098
Rule of law	0.001	0.627	-1.098	1.433	1.366	0.592	-0.345	2.100
Voice and accountability	-0.025	0.751	-1.749	1.293	1.247	0.318	0.286	1.800
Power distance	72.556	14.351	46	104	44	17.178	11	90
Individualism	33.667	17.956	13	80	64.143	17.458	27	91
Masculinity	53.389	14.116	28	88	45.714	23.079	5	95
Uncertainty avoidance	68.889	20.020	30	95	66.036	22.955	23	112
Long-term orientation	42.2	20.899	7	87	53.241	20.071	21	88
Indulgence	42.2	23.711	0	97	52.283	20.386	13	93

Table 3

Correlation Analysis of Emerging Economies

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
FDI	1.000												
Technological innovation	0.610	1.000											
GDP	0.191	0.150	1.000										
Trade	0.447	0.102	0.135	1.000									
Inflation	-0.204	-0.113	-0.031	0.067	1.000								
Infrastructure	0.405	0.456	0.375	0.188	0.095	1.000							
Eco. freedom	-0.090	-0.411	-0.194	0.357	0.244	-0.047	1.000						
Control of corruption	0.021	-0.176	-0.018	0.396	0.142	0.055	0.674	1.000					
Govt. effectiveness	0.050	-0.066	-0.034	0.624	0.212	0.156	0.668	0.873	1.000				
Political stability	0.078	-0.015	-0.040	0.568	0.125	0.197	0.498	0.761	0.783	1.000			
Regulatory quality	0.018	-0.273	-0.105	0.474	0.134	0.044	0.790	0.875	0.864	0.768	1.000		
Rule of law	-0.053	-0.212	-0.048	0.534	0.130	0.167	0.608	0.864	0.850	0.825	0.822	1.000	
Voice and accountability	-0.064	-0.241	-0.222	0.166	0.042	-0.131	0.430	0.566	0.500	0.486	0.636	0.626	1.000

Table 4

Correlation Analysis of Developed Economies

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1 FDI	1.000												
2 Innovation	0.520	1.000											
3 GDP	-0.079	-0.151	1.000										
4 Trade	-0.189	-0.538	0.140	1.000									
5 Inflation	0.390	0.102	-0.078	-0.166	1.000								
6 Infrastructure	-0.024	-0.005	0.308	0.078	0.142	1.000							
7 Eco. freedom	0.324	0.224	0.002	-0.022	0.393	0.140	1.000						
8 Control of corruption	0.398	0.328	0.001	-0.116	0.335	0.024	0.641	1.000					
9 Govt. effectiveness	0.414	0.302	-0.006	-0.073	0.348	-0.008	0.597	0.948	1.000				
10 Political stability	-0.002	-0.006	0.137	0.174	0.146	0.109	0.329	0.662	0.640	1.000			
11 Regulatory quality	0.416	0.209	0.075	0.008	0.415	0.103	0.770	0.868	0.856	0.574	1.000		
12 Rule of law	0.417	0.308	-0.027	-0.126	0.396	0.033	0.641	0.952	0.947	0.680	0.864	1.000	
13 Voice and accountability	0.352	0.185	0.010	-0.023	0.358	0.007	0.548	0.920	0.910	0.688	0.839	0.927	1.000

Model 4 illustrates a positive relationship between technological innovation and inward flows of FDI in both emerging and developed economies, as depicted in Table 5. Economies that enhance their efficiency have a higher technological readiness and attract more FDI. Thus, both emerging and developed economies can attract more FDI by improving their capability to adopt the latest technology. Advancement in technology helps emerging economies to increase their competency and leads them to entice more investment. Furthermore, increased growth in the economy tends to attract more FDI. Trade negatively influences inward FDI, and the results are significant for both sets of economies. Whereas inflation and economic freedom also positively affect the inward FDI of both emerging and developed economies. The results of control variables in terms of significance and direction are consistent for all the models.

Table 6 shows that the random-effect model is more appropriate to examine the effect of independent variables on inward FDI in both emerging and developed economies. Besides, Breusch-Pagan Lagrange Multiplier test is significant and suggests that OLS is not a suitable technique for the current study.

Model 2 shows the role of governance indicators for both emerging and developed economies in moderating the relationship between technological innovation and inward FDI, as depicted in Table 7. Model 1 is linear regression analysis, while using the random-effect method. From Model 2 to Model 7 of emerging economies, the results showed that all the individual indicators of country governance negatively influenced the positive relationship of technological innovation and inward FDI. It gives us evidence that *control of corruption* negatively moderates the relationship between inward FDI and technological innovation.

Table 7 shows how governance indicators individually moderate the relationship between technological innovation and inward FDI in emerging economies. The coefficients of interaction between technological innovation and inward FDI are negative and statistically significant. This signifies the fact that governance indicators in emerging economies lower the effect of technological innovation on inward FDI. The current study showed that governance structure in emerging economies is not mature.

Table 5

Results of The Relationship Between Inward FDI and Innovation

VARIABLES	Emerging Economies				Developed Economies			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
GDP	0.034***	0.029**	0.032**	0.028**	0.021	0.022	0.021	0.028*
	(0.013)	(0.013)	(0.013)	(0.013)	(0.017)	(0.017)	(0.017)	(0.017)
Trade	-0.011***	-0.012***	-0.010***	-0.010***	-0.009***	-0.009**	-0.009**	-0.003
	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)	(0.005)	(0.004)	(0.004)
Inflation	1.017***	0.958***	1.021***	0.950***	1.029***	1.106***	1.029***	1.240***
	(0.072)	(0.074)	(0.071)	(0.073)	(0.210)	(0.214)	(0.206)	(0.211)
Infrastructure	0.051***	0.045***	0.056***	0.045***	0.016	0.021	0.016	0.011
	(0.011)	(0.012)	(0.010)	(0.011)	(0.018)	(0.018)	(0.018)	(0.018)
Economic freedom	0.009	0.004	0.007	0.009	0.044***	0.032*	0.044***	0.039**
	(0.013)	(0.013)	(0.011)	(0.011)	(0.016)	(0.018)	(0.016)	(0.016)
Technological innovation		0.181**		0.251***		0.032		0.248***
	(0.013)	(0.077)	(0.011)	(0.065)	(0.016)	(0.109)	(0.016)	(0.073)
Constant	16.98***	16.43***	16.95***	15.47***	15.32***	15.52***	15.32***	12.65***
	(0.876)	(0.932)	(0.785)	(0.84)	(1.125)	(1.591)	(1.125)	(1.330)
					544	530	544	530
					28	28	28	28
Country FE	YES	YES			YES	YES		
Country RE			YES	YES			YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Table 6

Hausman and Breusch Pagan Test of Independence

	Emerging Economies		Developed Economies	
	Chi	Sig	Chi	Sig
Hausman	7.09	0.312, insignificant	57	0.732, insignificant
Breusch Pagan	457.71	0.001 level of significant	912.69	0.01 level of significance

Table 7

Results of Country Governance Moderation of the Relationship Between Inward FDI and Technological Innovation

VARIABLES	Emerging Economies							Developed Economies						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Economic Growth	0.025*	0.027**	0.024*	0.026**	0.034***	0.023*	0.026**	0.041**	0.043*	0.040**	0.044**	0.041**	0.050***	0.0443**
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.0172)
Trade	-0.010***	-0.009***	-0.009***	-0.008***	-0.006**	-0.007***	-0.009***	-0.001	0.001	-8.040	-0.001	-4.010	0.001	0.00161
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.00373)
Inflation	0.947***	0.900***	0.914***	0.955***	0.929***	0.929***	0.933***	0.989***	1.004***	0.969***	0.946***	1.008***	1.075***	1.056***
	(0.076)	(0.074)	(0.074)	(0.075)	(0.073)	(0.074)	(0.076)	(0.213)	(0.213)	(0.214)	(0.217)	(0.214)	(0.213)	(0.214)
Infrastructure	0.040***	0.034***	0.037***	0.036***	0.026**	0.037***	0.034***	0.020	0.021	0.019	0.018	0.021	0.021	0.0166
	(0.012)	(0.012)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.0179)
Economic Freedom	-0.007	-0.001	-0.005	-0.005	-0.001	-0.001	-0.003	0.017	0.017	0.019	0.019	0.016	0.017	0.0141
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)	(0.018)	(0.0172)
Control of Corruption	0.274***	0.185***	0.425***	0.184***	0.387***	0.257***	0.248***	0.293	1.471**	0.182	0.218	0.243	0.307	0.252
	(0.066)	(0.068)	(0.074)	(0.071)	(0.069)	(0.066)	(0.066)	(0.356)	(0.744)	(0.361)	(0.355)	(0.358)	(0.353)	(0.353)
Govt. Effectiveness	-0.321	3.678***	-0.275	-0.200	-0.186	-0.205	-0.227	0.243	0.380	-0.998	0.271	0.238	0.269	0.320
	(0.222)	(0.886)	(0.219)	(0.226)	(0.218)	(0.222)	(0.220)	(0.359)	(0.366)	(0.873)	(0.359)	(0.360)	(0.357)	(0.362)
Political Stability	0.116	-0.088	3.841***	-0.166	-0.294	-0.134	-0.004	-1.104***	-1.162***	-1.079***	-2.265***	-1.099***	-1.133***	-1.204***

VARIABLES	Emerging Economies							Developed Economies						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Regulatory Quality	0.026	-0.034	-0.101	-0.045	1.619***	-0.061	0.055	0.112	0.210	0.045	0.192	-0.550	0.197	0.211
	(0.116)	(0.115)	(0.117)	(0.113)	(0.516)	(0.116)	(0.114)	(0.364)	(0.366)	(0.367)	(0.365)	(0.941)	(0.362)	(0.365)
Rule of Law	0.798***	0.788***	0.807***	0.798***	0.768***	5.352***	0.780***	1.085**	0.872*	1.318***	1.121**	1.193**	3.676***	0.950**
	(0.259)	(0.254)	(0.254)	(0.257)	(0.255)	(0.829)	(0.256)	(0.461)	(0.477)	(0.482)	(0.460)	(0.477)	(0.969)	(0.473)
Voice and Accountability	-0.119	-0.119	0.026	-0.065	-0.061	-0.056	1.027**	-1.395**	-1.447**	-1.234**	-1.171*	-1.317**	-1.527**	1.135
	(0.288)	(0.285)	(0.286)	(0.289)	(0.282)	(0.282)	(0.463)	(0.597)	(0.599)	(0.601)	(0.600)	(0.598)	(0.596)	(1.545)
Technological innovation	-0.069	0.028	-0.084	-0.064	-0.056	-0.031	0.220***	0.220***	0.452***	0.017	0.101	0.122	0.814***	0.659***
	(0.152)	(0.154)	(0.153)	(0.154)	(0.151)	(0.153)	(0.072)	(0.072)	(0.137)	(0.152)	(0.106)	(0.157)	(0.205)	(0.252)
Technological innovation*control of corruption		-0.516***							-0.165*					
		(0.110)							(0.090)					
Technological innovation*Govt. effectiveness			-0.512***							0.164				
			(0.110)							(0.105)				
Technological innovation*political stability				-0.220***							0.147*			
				(0.069)							(0.0853)			
Technological innovation*regulatory quality					-0.591***							0.0857		
					(0.102)							(0.110)		
Technological innovation*rule of law						-0.438***							-0.404***	
						(0.103)							(0.134)	
Technological innovation*voice and accountability							-0.135**							-0.328*
							(0.0534)							(0.198)
Constant	16.18***	16.61***	14.96***	16.66***	14.98***	15.90***	16.27***	15.49***	13.88***	16.57***	16.12***	15.97***	11.31***	12.05***
	(0.903)	(0.890)	(0.926)	(0.909)	(0.901)	(0.893)	(0.892)	(1.482)	(1.639)	(1.661)	(1.558)	(1.696)	(1.962)	(2.236)
Country RE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

The results of developed economies showed that political stability is improving the relationship between technological innovation and inward FDI. This is an indication that developed economies have a strong and stable political environment. In contrast, *control of corruption*, *voice and accountability* and the *rule of law* weakened the relationship of technological innovation and inward FDI in emerging economies.

Conclusion

This study argues that technological innovation in emerging and developed economies is a significant determinant of inward FDI. Further, we analyzed how country governance moderates the relationship between technological innovation and inward FDI. For this purpose, we explored panel data from 20 emerging and 30 developed economies for the period 1993-2016.

Besides macroeconomic factors, technological innovation is an essential determinant for attracting inward FDI in both types of economies. Those emerging and developed economies that improve their efficiency and innovative capacity can entice more inward FDI. Advancement in technological innovation helps these economies to enhance their competency and leads them to attract more investment. All the results of moderation analysis showed the weakening effect of country governance on the technological innovation and FDI nexus for emerging economies. Since political environment in developed economies is stable, it improves the relationship between technological innovation and inward FDI. *Control of corruption*, *rule of law*, and *voice and accountability* negatively interact with technological innovation and reduce inward FDI in developing economies. Prior literature suggests the impact of good country governance on enticing inward FDI. We discovered that country governance indicators weaken the technological innovation and inward FDI nexus in emerging economies.

Like all other studies, this study also has certain limitations. We investigated the moderating impact of country governance on the technological innovation and FDI nexus. Future research can explore the role of corporate culture, practices and standards in identifying the factors that need to be addressed. Furthermore, scholars can investigate the impact

of technological innovation on trade and also how it impacts exports. Moreover, future research can examine how technological innovation affects outward FDI and its implication for developed and developing countries.

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