

Institutional quality and outward FDI in emerging economies: Principal components analysis and panel data evidence

Abstract

Although the internationalization of economies is driven by specific industry conditions or business-specific differences, the institutions that exist as background conditions directly determine the strategies and interactions of firms in the international environment. This paper contributes to the discussion on the relationship between institutional quality and outward FDI. We used a set of 40 proxies, in 48 emerging economies in the period 2007 - 2017; we collected the indicators from alternative secondary sources. After we applied Principal Component Analysis (PCA), four components were retained, according to the “elbow” point of the scree plot or *Cattell Criterion*. We named the components as follows: "Rule of Law" (PC1), "Government Efficiency" (PC2), "Regulatory Quality" (PC3), and "Innovation Environment" (PC4).

The outcomes of the panel data model suggest that property rights, intellectual property protection, and transparency of government promote outward FDI. On the other hand, indicators like economic inequality, state legitimacy, quality of the education and training, and availability of the latest technologies discourage it.

Keywords: Institutional quality, Outward FDI, PCA, panel data, emerging and developing economies

JEL classification: F55, P48, C33, C38

Introduction

Institutions are crucial for understanding the shape of human interaction. “In consequence, they structure incentives in human exchange, whether political, social, or economic” (North, 1990, p.3-4). After the publication of North’s work, the institutionalist literature raised exponentially, allowing the use and debate of the concept in many fields, from economics to politics and management. Many development economists and academics from sociology, anthropology, and political science recognized the consistency of North's arguments; they were sure of the value of their insights into the development process and, in particular, into the economic significance of institutions other than markets. The works of Ostrom, (1990) and Acemoglu, Johnson, & Robinson (2001) are under the influence of North’s work and are the basis of development analysis that influenced the literature in development, internationalization and competitiveness.

In this sense, it is widely acknowledged, both on empirical and theoretical discussions, that the institutional quality is closely related to growth and economic development, this set of institutions (inclusive and extractive) is called institutional framework (Acemoglu & Johnson, 2003, 2005; Acemoglu et al., 2001; Acemoglu, Johnson, & Robinson, 2002; Jan-Erik Lane, 2014). Also the internationalization of economies, is not only driven by specific industry conditions (Porter, 1990) or business-specific differences (Barney, 1991) but also by the institutions that exist as background conditions that directly determine the strategies and interactions of firms with the institutional environment (Cuervo-Cazurra & Dau, 2009; Cuervo-Cazurra & Ramamurti, 2017; Dunning, 1979, 1988; Dunning & McQueen, 1981; Hitt, 2016; Ingram & Silverman, 2002; Özçelik & Taymaz, 2004; Peng, Wang, & Jiang, 2008; Rodriguez, Uhlenbruck, & Eden, 2005; Wan & Hoskisson, 2003).

Nonetheless, there is significant literature focused on establishing the relation between institutional quality and OFDI (M. Ahmad & Hall, 2017; Buckley, Cross, Tan, Xin, & Voss, 2008; Gammeltoft, 2007, 2008; Goldstein & Pusterla, 2010; Narula & Kodiyat, 2013, 2016; Nayyar & Mukherjee, 2019; Peres, Ameer, & Xu, 2018; Rasiah, Gammeltoft, & Jiang, 2010; Sun, Peng, Lee, & Tan, 2015; Tan & Meyer, 2010; Tolentino, 2010); this paper contributes to the existing literature in at least three ways. First, our paper differs from previous studies in the data sources used and the indicators selected to measure institutional quality. Second, we propose a methodological approach that combines multivariate analysis

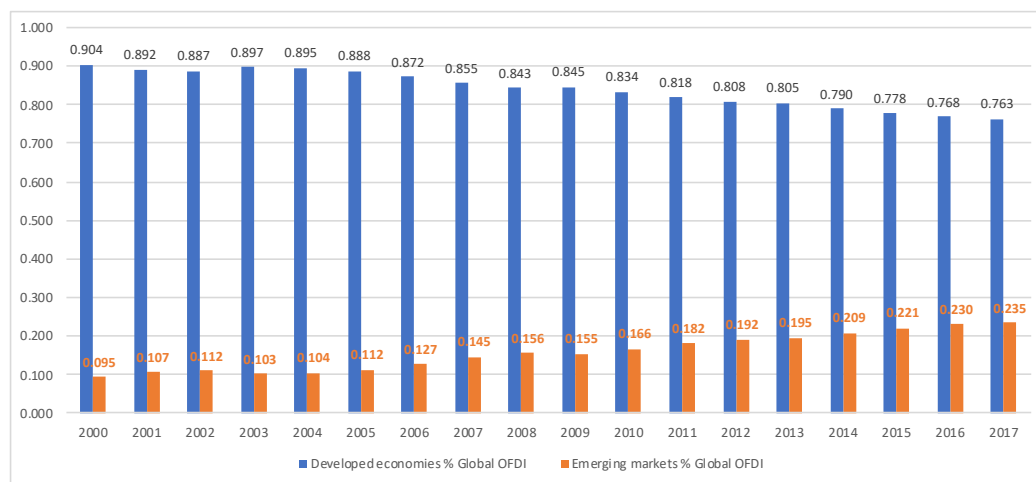
and panel data techniques, which allows us to reduce the number of variables as well as avoid collinearity problems keeping the most representative variables to explain how institutional framework affects OFDI. Third, we selected Emerging and Developing economies due to they are particularly useful for studying the causes and consequences of institutional variations, we built a data panel with 40 variables for 48 countries in the period 2007-2017.

This paper is structured as follows; section 2 briefly reviews the literature on the relationship between institutional quality and OFDI; sections 3 and 4 outline the empirical specification, the methodology, and the data; Section 5 presents the main findings and discussion and section 6 presents the conclusions.

Institutional quality and outward FDI

The stocks of outward foreign direct investment (OFDI) grew dramatically in recent years, from nearly one percent of global stocks in 2000 up to 23.5% in 2017, see Table 1. The rise of OFDI has different motivations, the need to develop new markets, the way to leverage capital, technology, and the way to gain knowledge in international markets (Gammeltoft, 2008; Luo & Tung, 2007; Mathews, 2006).

Table 1 Evolution of OFDI Stocks



Source: Authors based on United Nations Conference on Trade and Development (UNCTAD), 2019.

To better understand the link between OFDI and the competitiveness of emerging economies, it is necessary to consider the institutional framework that contributes to develop the ownership advantages of firms, as proposed by Dunning, this advantages include unique

assets relating to technological know-how, marketing expertise, and managerial skills that help the firm to compete in local and foreign markets (Dunning, 1979, 1988; Dunning & McQueen, 1981; Williamson & Wan, 2018). The location advantages are also proposed by Porter, (1990) and can be classified into six categories: “factor conditions”, “demand conditions”, “related and supporting industries”, “firm strategy, structure and rivalry”, “the role of chance”, and “the role of government”. These locational advantages (set of inputs, skills, and knowledge) set up the conditions that firms have available to compete.

According to Dunning, (1988) and (Narula & Kodiyat, 2013), firms require a good knowledge infrastructure to foster innovation and absorptive capacity, known as one of the ownership advantages required for a firm to pursue OFDI. An adequate home country knowledge environment ensures the creation and dissemination of knowledge, the protection of knowledge and the creation of a skilled workforce (Narula & Kodiyat, 2013).

One important component of the home country knowledge environment is the protection of intellectual property, the stronger the protection the better performance in research and development (R&D) of the firms (Lokesha & Leelavathy, 2012). A rule of law that protects intellectual property promotes the R&D endeavor of the firms at home, and foster them to engage in OFDI to gain ground-breaking capabilities (F. Ahmad, Draz, & Yang, 2018; Luo & Tung, 2007; Papageorgiadis, Mcdonald, Wang, & Konara, 2019) hence, strong intellectual property protection influences OFDI positively.

Another pillar of the home country knowledge environment is skilled human capital, a well-trained labor force is essential for a firm to deal with the complexities involved in managing and operating in international environments. The availability of a skilled workforce helps in the process of assimilation, adoption and, application of new knowledge also reduces the in-house training cost of the firms (Narula & Kodiyat, 2013, 2016). Therefore, home country policies oriented to the development of skilled human resources are likely to positively influence OFDI.

The country’s OFDI is related to the "stage of its economic development, the structure of its factor endowments and markets; its political and economic systems; and the nature and extent of market failure in the transaction of intermediate products across national boundaries." (Dunning, 1988, p.15) consequently, a high level of economic development

fosters the firms to develop ownership advantages, therefore, sustainable economic development is a prerequisite for OFDI.

Countries rarely succeed in the absence of state institutions that can establish and enforce the rules, raise revenue, and provide public goods and services. It is likely that those countries in which the institutions are strong, ensure the efficient allocation of factors and improve the economic performance, reduce uncertainty and friction, promoting the confluence and coordination of economic agents in the search for a general well being. On the contrary, those countries where institutions are weak, can have several economic problems such as lack of productivity, reduced rates of investment, and lower GDP growth (Acemoglu et al., 2001; Hall & Jones, 1999; Knack & Keefer, 1995; Mauro, 1995; Rodrik, Subramanian, & Trebbi, 2004).

According to Daron Acemoglu & Robinson (2012), institutions can be inclusive (strong) or extractive (weak). Inclusive institutions create incentives and opportunities necessary to harness the energy, creativity, and entrepreneurship in society, while extractive institutions generate an opposite effect. In that sense, there are many explanations for institutional failure, in general, could be classified into three categories for analysis (Graham & Naim, 1998).

- Resource-driven failures: related to the quantity, quality, and allocation of available resources to provide public goods and services. Indicators as public services access, capacity for innovation, infrastructure, higher education and training, technologies adaptation, among others make part of this group.

- Politically-driven failures: related to co-optation, corruption, and politicization in the allocation of resources. We found indicators as diversion of public funds, public trust in politicians, favoritism and transparency of government.

- Systemic failures: related to inadequate clarity in setting long-term goals, the concentration of power in economic agents and external state intervention. Economic inequality, state legitimacy, property rights, business impact of rules, among others, are indicators of systemic failures.

For the purpose of this paper, we classified the variables into the potential failures described above.

Variables and data

We constructed a strongly balanced panel of 48 emerging economies (8 countries in Latin America and the Caribbean (LAC); 17 countries in Europe / Eurasia; 9 countries in Asia; 8 countries in MENA; and 6 countries in Africa) over the period 2007-2017. We select 40 indicators to explain variance within institutional conditions recollected by secondary sources. Missing data were completed using linear interpolation. These collected data have been checked and normalized before conducting a multivariate statistical analysis. Table 5 in the Appendix provides the matrix of correlations of the indicators used in the empirical analysis.

We collected some indicators from the Fragile States Index (FSI) published by the Fund for Peace. This index combines cohesion, economic, political, social, and cross-cutting indicators (Fund for Peace, 2019), that we consider relevant for the aim of this research. We extracted six of them: factionalized elites, group grievance, uneven economic development, human flight and brain drain, state legitimacy and, public services.

From the global competitiveness index (GCI) published by the World Economic Forum (2018), we took 24 indicators from 7 pillars: institutions, infrastructure, higher education and training, goods market efficiency, financial market development, technological readiness and, innovation.

Moreover, we used variables of control, including the macroeconomic environment (GDP per capita and inflation), religion, culture, and legal tradition that were collected from several data sources. Table 2 presents the description, dimension, unit, and data source of indicators selected.

Table 2 Description of indicators

Indicators	Description	Dimension	Unit	Data source
fsi_fe	Factionalized Elites	Systemic	Scale 1-10 (worst)	Fragile States Index (The fund for peace)
fsi_gg	Group Grievance	Systemic	Scale 1-10 (worst)	
fsi_ei	Economic Inequality	Systemic	Scale 1-10 (worst)	
fsi_bd	Human Flight and Brain Drain	Resource	Scale 1-10 (worst)	
fsi_sl	State Legitimacy	Systemic	Scale 1-10 (worst)	
fsi_ps	Public Services	Resource	Scale 1-10 (worst)	
gci_pr	Property rights protected	Systemic	Scale 1-7 (best)	Global Competitiveness Index, 1st pillar: institutions (World Economic Forum)
gci_ipp	Intellectual property protection	Systemic	Scale 1-7 (best)	
gci_dpf	Diversion of public funds	Political	Scale 1-7 (best)	
gci_ptp	Public trust in politicians	Political	Scale 1-7 (best)	

gci_fdg	Favoritism in decisions of government officials	Political	Scale 1-7 (best)	
gci_bgr	The burden of government regulation	Systemic	Scale 1-7 (best)	
gci_tgp	Transparency of government policymaking	Political	Scale 1-7 (best)	
gci_ci	Capacity for innovation	Resource	Scale 1-7 (best)	Global Competitiveness Index, 12th pillar: innovation (World Economic Forum)
gci_qri	Quality of scientific research institutions	Resource	Scale 1-7 (best)	
gci_csr	Company spending on R&D	Resource	Scale 1-7 (best)	
gci_uic	University-industry collaboration in R&D	Resource	Scale 1-7 (best)	
gci_ase	Availability of scientists and engineers	Resource	Scale 1-7 (best)	
gci_qi	Quality of overall infrastructure	Resource	Scale 1-7 (best)	Global Competitiveness Index, 2nd pillar: infrastructure (World Economic Forum)
gci_qes	Quality of the education system	Resource	Scale 1-7 (best)	Global Competitiveness Index, 5th pillar: higher education and training (World Economic Forum)
gci_qms	Quality of math and science education	Resource	Scale 1-7 (best)	
gci_art	Availability of research and training services	Systemic	Scale 1-7 (best)	
gci_eap	Effectiveness of anti-monopoly policy	Systemic	Scale 1-7 (best)	Global Competitiveness Index, 6th pillar: goods market efficiency (World Economic Forum)
gci_tax	Total tax rate	Systemic	% of profits	
gci_pfo	Prevalence of foreign ownership	Systemic	Scale 1-7 (best)	
gci_bir	Business impact of rules on FDI	Systemic	Scale 1-7 (best)	Global Competitiveness Index, 8th pillar: financial market development (World Economic Forum)
gci_flm	Financing through the local equity market	Resource	Scale 1-7 (best)	
gci_vca	Venture capital availability	Resource	Scale 1-7 (best)	
gci_alt	Availability of latest technologies	Resource	Scale 1-7 (best)	Global Competitiveness Index, 9th pillar: technological readiness (World Economic Forum)
gci_ftf	FDI and technology transfer	Resource	Scale 1-7 (best)	
wbi_gdppck	GDP per capita	Control	PPP (constant 2011 international \$)	World development indicators (World Bank)
inflation	Inflation, GDP deflator	Control	% (annual)	World development indicators (World Bank)
legor_uk	Legislation Origin UK	Control	Dichotomous	Harvard university
legor_ge	Legislation Origin GE	Control	Dichotomous	Harvard university
rel_mu	Religion Muslim	Control	Dichotomous	Pew research center
rel_norel	No Religion	Control	Dichotomous	Pew research center
rel_hi	Religion Hinduism	Control	Dichotomous	Pew research center
rel_bud	Religion Buddhism	Control	Dichotomous	Pew research center
hft_pd	High Power Distance	Control	Dichotomous	Hofstede's data and GLOBE study
hft_ua	High Uncertainty Avoidance	Control	Dichotomous	Hofstede's data and GLOBE study

Source: Authors

A brief of the rationale for selecting all these institutional environment indicators is given in Table 3.

Table 3 The rationale for selecting indicators

Code	Indicators	Rationale
fsi_fe	Factionalized Elites	Measures power struggles, political competition, political transitions, and where elections occur will factor in the credibility of electoral processes (or in their absence, the perceived legitimacy of the ruling class).
fsi_gg	Group Grievance	Indicator focuses on divisions and schisms between different groups in society – particularly divisions based on social or political characteristics – and their role in access to services or resources, and inclusion in the political process.
fsi_ei	Economic Inequality	The indicator looks at structural inequality that is based on a group (such as racial, ethnic, religious, or other identity groups) or based on education, economic status, or region (such as urban-rural divide).
fsi_bd	Human Flight and Brain Drain	Indicator considers the economic impact of human displacement (for economic or political reasons) and the consequences this may have on a country's development
fsi_sl	State Legitimacy	The Indicator takes into account openness of government, specifically the openness of ruling elites to transparency, accountability and, political representation, or conversely, the levels of corruption, profiteering, and marginalizing, persecuting, or otherwise excluding opposition groups. The Indicator also considers the ability of a state to exercise basic functions that infer a population's confidence in its government and institutions
fsi_ps	Public Services	The Indicator further considers to whom – whether the state narrowly serves the ruling elites, such as security agencies, presidential staff, the central bank, or the diplomatic service, while failing to provide comparable levels of service to the general populace. The Indicator also considers the level and maintenance of general infrastructure to the extent that its absence would negatively affect the country's actual or potential development.
gci_pr	Property rights	A high degree of protected property rights includes financial assets, influences investment decisions and, competitiveness
gci_ipp	Intellectual property protection	A great extent in intellectual property protection plays a role in investment decisions and competitiveness
gci_dpf	Diversion of public funds	Common illegal diversion of public funds to companies, individual or groups, discourage trust in business and government
gci_ptp	Public trust in politicians	High rates from the ethical standards of politicians promote credibility in government
gci_fdg	Favoritism in decisions of government officials	If government officials show favoritism to well-connected firms and individuals when deciding upon policies and contracts, have relevance for preventing fraud and mismanagement
gci_bgr	The burden of government regulation	Extremely burdensome reporting for companies comply with public administration's requirements (e.g., permits, regulations) discourage business and competitiveness

gci_tgp	Transparency of government policymaking	For companies, to obtain information about changes in government policies and regulations affecting their activities to maintain investor confidence
gci_ci	Capacity for innovation	Firms must design and develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities
gci_qri	Quality of scientific research institutions	The presence of high-quality scientific research institutions that can generate the basic knowledge needed to build the new technologies
gci_csr	Company spending on R&D	Sufficient investment in research and development (R&D) supported, especially by the private sector drives innovate activity
gci_uic	University-industry collaboration in R&D	Extensive collaboration between business and universities on research and development (R&D) promotes innovation and competitiveness
gci_ase	Availability of scientists and engineers	Scientists and engineers should be able to perform complex tasks and adapt rapidly to their changing environment and the evolving needs of the production system.
gci_qi	Quality of overall infrastructure	The extensive and efficient general state of infrastructure (e.g., transport, communications, and energy) facilities international trade and competitiveness
gci_qes	Quality of the education system	A good education system satisfies the needs of a competitive economy
gci_qms	Quality of math and science education	Excellent quality of math and science education is an indicator of the possibility of generating more value and transfer and adaptive knowledge to promote competitiveness
gci_art	Availability of research and training services	High-quality professional training services are taken into consideration because of the importance of vocational and continuous on-the-job training—which is neglected in many economies—for ensuring a constant upgrading of workers' skills.
gci_eap	Effectiveness of anti-monopoly policy	Extremely effective anti-monopoly policies at ensuring fair competition
gci_tax	Total tax rate	The total tax rate measures the amount of taxes and mandatory contributions payable by a business in the second year of operation, expressed as a share of commercial profits.
gci_pfo	Prevalence of foreign ownership	Prevalent foreign ownership of companies shows efficiency in international trade policy
gci_bir	Business impact of rules on FDI	Rules and regulations on foreign direct investment (FDI) are important to create competitive as it forces companies to be more innovative
gci_flm	Financing through the local equity market	Companies raise money by issuing shares and/or bonds on the capital market, therefore is required financial markets that can make capital available for investment
gci_vca	Venture capital availability	It for start-up entrepreneurs with innovative but risky projects to obtain equity funding is necessary a financial sector allocates the resources to those investment projects
gci_alt	Availability of latest technologies	A great extent are the latest technologies available shows the agility which an economy adopts technologies to enhance the productivity of its industries for competitiveness
gci_ftf	FDI and technology transfer	Foreign direct investment (FDI) often plays a key role, especially for countries at a less advanced stage of technological development, the firms to have access to advanced products and blueprints and the ability to absorb and use them.
wbi_gdppck	GDP per capita	PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. It is an important indicator of the growth economy.

inflation	Inflation, GDP deflator	The stability of the macroeconomic environment is important for business and, therefore, is significant for the overall competitiveness of a country. Firms cannot operate efficiently when inflation rates are out of hand.
legor_uk	Legislation Origin UK	The common-law legal tradition includes the law of England and its former colonies. The common law is formed by appellate judges who establish precedents by solving specific legal disputes. Dispute resolution tends to be adversarial rather than inquisitorial. Judicial independence from both the executive and legislature are central.
legor_ge	Legislation Origin GE	The German legal tradition has its basis in Roman law, and it is influenced by the civil law tradition. Dispute resolution tends to be inquisitorial rather than adversarial.
rel_mu	Religion Muslim	A high percentage of the population is Muslim. Religion can affect the way to do business
rel_norel	No Religion	There is no greater percentage of the population with a specific religion. Religion can affect the way to do business
rel_hi	Religion Hinduism	A high percentage of the population has religion Hinduism. Religion can affect the way to do business
rel_bud	Religion Buddhism	A high percentage of the population Buddhism. Religion can affect the way to do business
hft_pd	High Power Distance	Indicator of culture, the power distance has been defined as the extent to which the less powerful members of organizations and institutions accept and expect that power is distributed unequally.
hft_ua	High Uncertainty Avoidance	Indicator of culture related to the level of stress in a society in the face of an unknown future. Uncertainty avoidance cultures try to minimize the possibility of surprising or unusual situations by strict behavioral codes.

Source: Authors, descriptions taken from Fragile States Index and Global Competitiveness Index.

Methods

To explore the linkage between institutional quality and OFDI, we applied two techniques of data analysis. First, we used a principal component analysis (PCA) to reduce the dimensionality of the data set while preserving as much statistical information as possible. Second, we used a panel data estimation to determine how institutional quality, measured through the dimensions identified through PCA, affects OFDI.

1. Principal component analysis

We conducted a PCA to find out if we can capture most of the variation between countries using a smaller number of new variables (principal components), where each of these new variables is a linear combination of all or some of the 40 variables included in the original data set. To be sure that the data was suited for factor analysis, we used the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, the result was close to 1, indicating that the data is adequate for PCA (Kaiser, 1974).

To determine the number of principal components that should be retained, there are many methods; we considered the three most used. The first criterion is PVA that consider to set a percentage of variance to account for, usually at least 90% (Pires, Pereira, Alvim-Ferraz, & Martins, 2009). The second, is Kaiser's criteria, which only consider retained components where the eigenvalues are greater than one (Jolliffe, 2002); and the third criteria is a scree plot to observe a significant drop in the singular values right after the correct dimension or "elbow" point of the plot (Cattell, 1966; Vidal, Yi Ma, & Sastry, 2003).

We retained the principal components using Catell criteria and we selected the main indicators applied the criteria proposed by (Jolliffe, 2002) where the variables that present the greater eigenvalue within last components are dismissed.

2. Panel data

We used 48 emerging and developing economies and 11 years that correspond to 528 observations. The dependent variable used is the logarithm of OFDI stocks in each country. We used as a proxy of institutional quality the four principal components retained from previous analysis as independent variables, considering that PCA transformation is conducted in such a way that the first principal accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible.

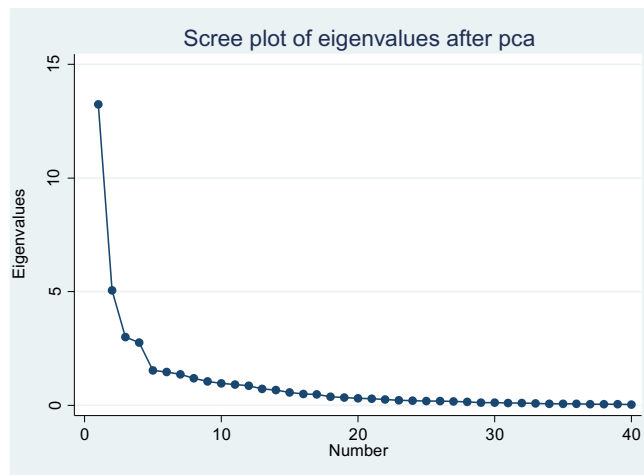
Additionally, given the longitudinal nature of our data, to determine whether to use fixed or random-effects specifications, we ran a Hausman (1978) test standard and the test type Wald proposed by Wooldridge, (2002) for standard robust errors. Moreover, we estimated several panel data models. We began with an OLS robust model (1), followed by between estimator (2) to represent variation between countries, and fixed and random effects models to compare coefficients and significances. Standard errors adjusted for clustered heteroscedasticity are used too.

Results and discussion

To decide if apply o not principal components analysis, we calculated KMO using the Kaiser (1974) levels. Our KMO value is 0.8541, which corresponds to the range of 0.8-0.89, so it is declared by "meritorious." Table 7 in the Appendix shows the results.

Followed criteria explained in section methods, we found that at least 90% of the variance is explained by 17 components, while only 9 of them have the eigenvalues greater than unit (View Appendix, table 8). However, the scree plot shows that the most significant change in the slope occurs at component five; therefore the first four components should be retained. Around 60% of the total variation can be captured by the first four components.

Figure 1 Scree plot



Source: Authors

Our empirical results show that the common factors obtained are identified by four institutional quality indicators. The dimensions were classified as rule of law, government efficiency, regulatory quality, and innovation — the results found in table 4.

Table 4. Variables retained for principal components analysis

Variable	Comp1	Comp2	Comp3	Comp4
fsi_ei	-0.3324	0.7699	0.2351	0.0251
fsi_sl	-0.3649	0.7017	-0.3572	0.0830
gci_pr	0.8125	0.1423	0.1818	-0.3225
gci_ipp	0.8795	-0.0390	0.0720	-0.0728
gci_bir	0.5137	0.4880	0.3708	-0.2928
gci_tgp	0.7814	0.1677	0.0399	-0.2395
gci_ci	0.6252	0.0223	0.0361	0.4693
gci_ase	0.5590	0.1783	-0.2217	0.2476
gci_qes	0.7062	0.1695	-0.2635	0.3508
gci_flm	0.4865	0.5852	0.1811	-0.1056
gci_alt	0.7094	-0.1637	0.0883	-0.0896
rel_norel	0.1964	-0.1304	0.1244	-0.0006

Source: Authors

Contributions of each variable change a few in all components. The first component represents “the rule of law”. These indicators evidence the institutional capability to secure the rules of the game, in particular, the quality of intellectual property protection, property rights and transparency of government policymaking; which captures perceptions of the extent to which agents have confidence in and abide by the rules of society and have credibility in the government and public-sector development.

The second and third components can be interpreted as indicators of economic policy and government efficiency respectively. In the second component, the primary variable is economic inequality, but it also includes state legitimacy and financing through the local equity market. In general, it needs to be trustworthy and transparent, as well as the markets need appropriate regulation to protect investors and other actors in the economy, to sum up, this dimension represents the ability of a state to exercise basic functions.

On the other hand, into the third component, we can appreciate the business impact of rules on FDI like the most relevant variable. Thus, it takes into account the openness of government and explains the regulatory quality of the government to formulate and implement policies and regulations that permit promote private sector development.

The last component is centered on innovation and technology adaptation. “Innovation is particularly important for economies as they approach the frontiers of knowledge, and the possibility of generating more value by merely integrating and adapting exogenous technologies tends to disappear” (The Global competitiveness report, 2017, p.319). Both the capacity for innovation and quality higher education work jointly. Also, it includes indicators as availability of scientists and engineers, availability of latest technologies and property rights, those last show inverse relation. It can exhibit that innovation required supported by technological readiness as patents and new invents are more expensive while people can have universal access.

Then those four first principal components are extracted and subsequently used as new variables to represent institutional conditions. Table 5 presents estimates in the country-pair sample that covers OFDI stocks from 48 emerging economies in the 2007–2017 period.

Standard errors adjusted for clustered heteroskedasticity at the recipient country are reported in parenthesis below coefficient estimates.

Table 5 shows the results of the estimations. Both the Hausman test standard and the test type Wald proposed by Woolridge (2002) for standard robust errors reject Ho (p-values least than 5%), hence we concluded that the random effects model is not appropriated.

As can be seen in Table 5, the first principle component of the rule of law has a positive and statistically significant effect on outward foreign investment (OFDI). In contrast, the indicators of government efficiency and innovation have negative and statistically significant effects. The third principle component results statistically insignificant.

Table 5. Results of estimate models

Variable	OLS_rob (1)	BE (2)	FE (3)	FE_rob (4)	RE (5)	RE_rob (6)
factor1	0.1537*** (0.0364)	0.1751*** (0.047)	0.1195*** (0.0173)	0.1195*** (0.0351)	0.1162*** (0.0151)	0.1162*** (0.0266)
factor2	-0.2852*** (0.0552)	-0.2673*** (0.0712)	-0.3726*** (0.0442)	-0.3726*** (0.0815)	-0.3543*** (0.0358)	-0.3543*** (0.0548)
factor3	0.0516 (0.0859)	0.0609 (0.0924)	-0.0291 (0.0453)	-0.0291 (0.0569)	-0.0173 (0.0394)	-0.0173 (0.0495)
factor4	0.0557 (0.069)	0.0912 (0.0997)	-0.1267*** (0.0347)	-0.1267** (0.0581)	-0.1002*** (0.0323)	-0.1002* (0.0517)
_cons	1.4923*** (0.1453)	1.4923*** (0.1507)	1.4923*** (0.0215)	1.4923*** (0)	1.4923*** (0.1513)	1.4923*** (0.1562)
N	528	528	528	528	528	528
r2	0.3747	0.4278	0.1753	0.1753		
r2_overall	0.3697	0.3087	0.3087	0.3195	0.3195	
r2_between	0.4278	0.3305	0.3305	0.343	0.343	
r2_within	0.0608	0.1753	0.1753	0.1744	0.1744	
sigma_u	1.0976	1.0976	1.0334	1.0334		
sigma_e	0.493	0.493	0.493	0.493		
rho	0.8321	0.8321	0.8146	0.8146		

Notes: Standard errors are in parentheses.

***, **, and * indicate that the coefficient is significant at the 1, 5 and 10% levels, respectively.

The specification allows for the possibility that the effect of innovation and technological adaptation is negative in outward FDI. It occurs when home country institutional conditions don't permit that companies develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities.

On the other hand, the negative effect of government efficiency in outward FDI can be because of the structural inequality based on group (such as racial, ethnic, religious, or another identity group) or based on education, economic status, or region that don't allow improve productivity and competitiveness; as well as, low-levels of confidence in state institutions and processes or corruption weaken both the ability of a state to exercise basic functions and investment decisions and the organization of production in the firms.

Conclusions

Our study provides evidence on the effects that institutional quality has on outward FDI as a measure for international competitiveness in emerging and developing economies. For this, we adopted three categories for institutional failures: resource, political and systemic (Graham & Naim, 1998), which represent the possibility that institutions can be inclusive or extractive (Acemoglu & Robinson, 2013).

Furthermore, the empirical findings suggest that we can group institutional quality into four dimensions: Rule of law (PC1), Government efficiency (PC2), Regulatory quality (PC3), and Innovation (PC4). In line with institutional failures, the first component includes political indicators, the second and third components contain systemic failures, and the four-component has resource variables.

On top of that, the outcomes for a panel data models suggest that property rights, intellectual property protection and transparency of government promote outward FDI (positive effect), while both indicators as economic inequality, state legitimacy, financing through local equity market and capacity for innovation, quality of the education and training, availability of latest technologies discourage it because the possibility of generating more value is difficult if not integrating and adapting exogenous technologies in context with deep inequalities.

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Appendix

Table 6. Matrix of correlations between 40 independent variables

Variable	fsi fe	fsi gg	fsi ei	fsi sl	gci pr	gci ipp	gci bgr	gci art	gci eap	gci tax	gci pfo	gci bir	gci dpf	gci ptp	gci fdg	gci tgp	fsi bd	fsi ps	gci ci	gci qri
fsi_fe	1																			
fsi_gg	0.863	1																		
fsi_ei	0.529	0.579	1																	
fsi_sl	0.846	0.703	0.567	1																
gci_pr	-0.339	-0.319	-0.081	-0.302	1															
gci_ipp	-0.384	-0.347	-0.291	-0.357	0.839	1														
gci_bgr	0.027	0.045	-0.028	0.056	0.562	0.583	1													
gci_art	-0.326	-0.291	-0.298	-0.345	0.486	0.635	0.389	1												
gci_eap	-0.263	-0.216	-0.011	-0.261	0.747	0.712	0.552	0.641	1											
gci_tax	0.033	0.108	0.147	0.03	-0.334	-0.318	-0.381	0.03	-0.203	1										
gci_pfo	-0.325	-0.25	0.035	-0.274	0.461	0.368	0.29	0.358	0.51	-0.036	1									
gci_bir	-0.003	0.021	0.187	0.016	0.598	0.394	0.527	0.294	0.58	-0.185	0.74	1								
gci_dpf	-0.272	-0.298	-0.259	-0.231	0.762	0.748	0.702	0.469	0.624	-0.381	0.243	0.449	1							
gci_ptp	-0.112	-0.152	-0.179	-0.03	0.642	0.689	0.793	0.413	0.545	-0.411	0.12	0.361	0.865	1						
gci_fdg	-0.157	-0.178	-0.148	-0.095	0.697	0.691	0.771	0.489	0.639	-0.343	0.223	0.45	0.904	0.9	1					
gci_tgp	-0.202	-0.156	-0.089	-0.18	0.757	0.703	0.694	0.509	0.663	-0.359	0.375	0.538	0.71	0.724	0.726	1				
fsi_bd	0.519	0.517	0.687	0.522	-0.226	-0.359	-0.106	-0.379	-0.198	0.075	0.014	0.143	-0.324	-0.311	-0.275	-0.242	1			
fsi_ps	0.578	0.635	0.835	0.604	-0.224	-0.377	-0.017	-0.354	-0.097	0.071	0.035	0.162	-0.381	-0.251	-0.256	-0.165	0.771	1		
gci_ci	-0.124	-0.078	-0.244	-0.174	0.375	0.616	0.385	0.689	0.472	-0.013	0.088	0.179	0.401	0.41	0.429	0.365	-0.223	-0.195	1	
gci_qri	-0.367	-0.37	-0.291	-0.384	0.453	0.625	0.306	0.716	0.548	0.033	0.298	0.231	0.447	0.355	0.421	0.415	-0.399	-0.405	0.642	1
gci_csr	-0.117	-0.105	-0.04	-0.093	0.501	0.638	0.51	0.727	0.64	-0.046	0.227	0.345	0.52	0.536	0.577	0.489	-0.168	-0.109	0.801	0.722
gci_uic	-0.217	-0.205	-0.171	-0.229	0.415	0.606	0.439	0.739	0.607	-0.035	0.245	0.199	0.413	0.475	0.491	0.563	-0.341	-0.239	0.657	0.783
gci_ase	-0.032	-0.064	-0.144	0.013	0.371	0.344	0.39	0.473	0.427	0.011	0.139	0.306	0.508	0.428	0.519	0.317	-0.177	-0.197	0.341	0.434
gci_qi	-0.398	-0.355	-0.416	-0.399	0.641	0.758	0.504	0.569	0.586	-0.302	0.229	0.22	0.666	0.65	0.619	0.681	-0.492	-0.503	0.413	0.502
gci_qes	-0.03	-0.093	-0.181	-0.035	0.389	0.507	0.647	0.577	0.481	-0.164	0.133	0.296	0.611	0.588	0.614	0.47	-0.133	-0.209	0.517	0.596
gci_qms	-0.167	-0.219	-0.439	-0.208	0.239	0.363	0.363	0.429	0.237	-0.072	-0.026	0.099	0.486	0.397	0.418	0.24	-0.281	-0.487	0.379	0.537
gci_flm	0.083	0.041	0.327	0.11	0.609	0.409	0.408	0.277	0.57	-0.175	0.341	0.594	0.498	0.38	0.488	0.393	0.18	0.213	0.242	0.293
gci_vca	-0.068	-0.125	-0.032	-0.068	0.615	0.623	0.608	0.518	0.605	-0.19	0.261	0.457	0.725	0.684	0.722	0.513	-0.191	-0.165	0.518	0.492
gci_alt	-0.347	-0.29	-0.323	-0.373	0.578	0.675	0.409	0.62	0.636	-0.286	0.306	0.246	0.499	0.487	0.495	0.615	-0.373	-0.369	0.373	0.479
gci_fff	-0.188	-0.172	0.042	-0.158	0.572	0.449	0.426	0.444	0.597	-0.146	0.706	0.77	0.432	0.345	0.479	0.487	-0.078	-0.063	0.207	0.411

wbi_gdppck	-0.306	-0.42	-0.463	-0.223	0.316	0.42	0.241	0.277	0.19	-0.284	-0.037	-0.027	0.477	0.483	0.425	0.256	-0.573	-0.64	0.178	0.349
inflation	0.176	0.141	0.241	0.225	-0.414	-0.379	-0.235	-0.237	-0.334	0.34	-0.191	-0.288	-0.301	-0.221	-0.296	-0.342	0.161	0.255	-0.196	-0.189
legor_uk	0.134	0.131	0.227	0.179	-0.044	-0.145	-0.151	-0.072	-0.056	0.093	-0.046	-0.024	-0.148	-0.156	-0.128	-0.11	0.178	0.211	-0.049	-0.205
legor_ge	-0.164	-0.192	-0.082	-0.262	0.056	0.17	-0.101	0.189	0.142	0.149	0.055	-0.008	-0.052	-0.107	-0.093	0.059	-0.125	-0.143	0.181	0.372
rel_mu	0.273	0.174	0.006	0.282	0.209	0.153	0.394	-0.008	0.127	-0.283	-0.123	0.155	0.373	0.456	0.427	0.214	-0.102	-0.031	-0.015	-0.104
rel_norel	-0.035	-0.05	-0.192	-0.2	0.165	0.179	0.213	0.124	0.11	0.05	0.126	0.145	0.185	0.107	0.161	0.195	-0.133	-0.17	0.09	0.203
rel_hi	0.035	0.121	0.161	-0.09	0.019	0.027	0.038	0.074	0.147	0.153	-0.007	0.045	0.024	0.003	0.055	0.029	0.07	0.157	0.076	0.145
rel_bud	0.277	0.28	0.114	0.194	-0.008	-0.019	0.074	-0.001	0.013	0.085	0.008	0.12	-0.009	-0.069	0.001	-0.038	0.051	0.023	0.018	0.012
hft_pd	0.237	0.228	0.058	0.216	-0.145	-0.036	0.084	0.03	-0.107	-0.045	-0.215	-0.087	0.036	0.117	0.046	-0.038	0.064	0.024	0.073	0.059
hft_ua	0.094	0.102	0.263	0.095	0.239	0.208	0.201	0.078	0.266	0.092	0.076	0.209	0.129	0.202	0.203	0.136	0.238	0.276	0.215	0.149

	gci csr	gci uic	gci ase	gci qi	gci qes	gci qms	gci flm	gci vca	gci alt	gci ftf	wbi ~ck	infla~n	legor~k	legor~e	rel mu	rel n~l	rel hi	rel bud	hft pd	hft ua
gci_csr	1																			
gci_uic	0.747	1																		
gci_ase	0.468	0.311	1																	
gci_qi	0.445	0.588	0.317	1																
gci_qes	0.662	0.567	0.588	0.446	1															
gci_qms	0.428	0.367	0.601	0.377	0.759	1														
gci_flm	0.508	0.178	0.415	0.152	0.33	0.029	1													
gci_vca	0.719	0.462	0.488	0.422	0.569	0.364	0.655	1												
gci_alt	0.415	0.628	0.272	0.802	0.402	0.286	0.148	0.319	1											
gci_ftf	0.43	0.392	0.374	0.302	0.348	0.185	0.532	0.52	0.383	1										
wbi_gdppck	0.224	0.285	0.235	0.392	0.336	0.34	0.081	0.378	0.324	0.178	1									
inflation	-0.164	-0.209	-0.13	-0.333	-0.178	-0.225	-0.108	-0.187	-0.353	-0.295	-0.187	1								
legor_uk	-0.089	-0.165	-0.118	-0.165	-0.085	-0.263	0.129	-0.167	-0.043	-0.078	-0.115	0.106	1							
legor_ge	0.128	0.24	-0.051	0.088	0.02	0.065	-0.048	0.05	0.105	0.043	0.014	-0.121	-0.329	1						
rel_mu	0.057	-0.06	0.293	0.174	0.189	0.09	0.234	0.292	0.11	0.094	0.302	-0.05	0.021	-0.313	1					
rel_norel	0.05	0.11	-0.061	0.133	0.119	0.152	-0.015	0.109	0.129	0.092	0.05	-0.048	-0.094	0.284	-0.089	1				
rel_hi	0.138	0.054	0.2	-0.065	0.148	0.121	0.131	0.175	0.035	0.064	-0.101	-0.003	-0.094	0.284	-0.089	-0.021	1			
rel_bud	0.035	0.006	0.073	0.068	0.075	0.055	0.164	0.03	-0.013	0.072	-0.074	-0.042	0.096	-0.107	-0.127	-0.03	-0.03	1		
hft_pd	0.15	0.052	0.183	-0.063	0.267	0.289	-0.015	0.142	-0.055	-0.093	0.206	0.01	-0.222	-0.06	0.098	-0.134	0.159	0.017	1	
hft_ua	0.352	0.191	0.066	0.058	0.164	0.024	0.343	0.224	0.087	0.146	-0.248	-0.028	0.086	-0.036	0.002	-0.08	0.268	0.134	0.195	1

Table 7. Kaiser-Meyer-Olkin measure of sampling adequacy

Variable	kmo
fsi_fe	0.7223
fsi_gg	0.7975
fsi_ei	0.7909
fsi_sl	0.7883
gci_pr	0.8865
gci_ipp	0.9119
gci_bgr	0.8976
gci_art	0.9503
gci_eap	0.9622
gci_tax	0.664
gci_pfo	0.7855
gci_bir	0.8192
gci_dpf	0.9342
gci_ptp	0.8983
gci_fdg	0.9249
gci_tgp	0.9321
fsi_bd	0.8695
fsi_ps	0.8134
gci_ci	0.8304
gci_qri	0.889
gci_csr	0.9059
gci_uic	0.857
gci_ase	0.8622
gci_qi	0.9305
gci_qes	0.8762
gci_qms	0.8105
gci_flm	0.8105
gci_vca	0.9236
gci_alt	0.9033
gci_ftf	0.894
wbi_gdppck	0.7862
inflation	0.8558
legor_uk	0.5633
legor_ge	0.6051
rel_mu	0.6743
rel_norel	0.4399
rel_hi	0.4282
rel_bud	0.3094
hft_pd	0.4846
hft_ua	0.5538
Overall	0.8541

Table 8. Eigenvalues and accumulated variance

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	13.2398	8.1844	0.331	0.331
Comp2	5.05541	2.06126	0.1264	0.4574
Comp3	2.99415	0.226859	0.0749	0.5322
Comp4	2.76729	1.23117	0.0692	0.6014
Comp5	1.53613	0.0654022	0.0384	0.6398
Comp6	1.47072	0.11429	0.0368	0.6766
Comp7	1.35643	0.169064	0.0339	0.7105
Comp8	1.18737	0.131575	0.0297	0.7402
Comp9	1.05579	0.0942171	0.0264	0.7666
Comp10	0.961577	0.0476061	0.024	0.7906
Comp11	0.913971	0.0582217	0.0228	0.8135
Comp12	0.855749	0.125409	0.0214	0.8349
Comp13	0.73034	0.0520387	0.0183	0.8531
Comp14	0.678302	0.107494	0.017	0.8701
Comp15	0.570808	0.0747221	0.0143	0.8843
Comp16	0.496086	0.0156434	0.0124	0.8967
Comp17	0.480442	0.0953994	0.012	0.9088
Comp18	0.385043	0.0469418	0.0096	0.9184
Comp19	0.338101	0.0315762	0.0085	0.9268
Comp20	0.306525	0.00820615	0.0077	0.9345
Comp21	0.298319	0.0358706	0.0075	0.942
Comp22	0.262448	0.0437189	0.0066	0.9485
Comp23	0.218729	0.0117947	0.0055	0.954
Comp24	0.206935	0.0101149	0.0052	0.9592
Comp25	0.19682	0.00921481	0.0049	0.9641
Comp26	0.187605	0.0150714	0.0047	0.9688
Comp27	0.172534	0.0240376	0.0043	0.9731
Comp28	0.148496	0.02318	0.0037	0.9768
Comp29	0.125316	0.00832697	0.0031	0.9799
Comp30	0.116989	0.00574512	0.0029	0.9829
Comp31	0.111244	0.0144639	0.0028	0.9856
Comp32	0.09678	0.00312474	0.0024	0.9881
Comp33	0.0936552	0.0231029	0.0023	0.9904
Comp34	0.0705523	0.00063663	0.0018	0.9922
Comp35	0.0699157	0.0076756	0.0017	0.9939
Comp36	0.0622401	0.0103094	0.0016	0.9955
Comp37	0.0519307	0.00197028	0.0013	0.9968
Comp38	0.0499604	0.00586982	0.0012	0.998
Comp39	0.0440906	0.00870927	0.0011	0.9991
Comp40	0.0353814	.	0.0009	1