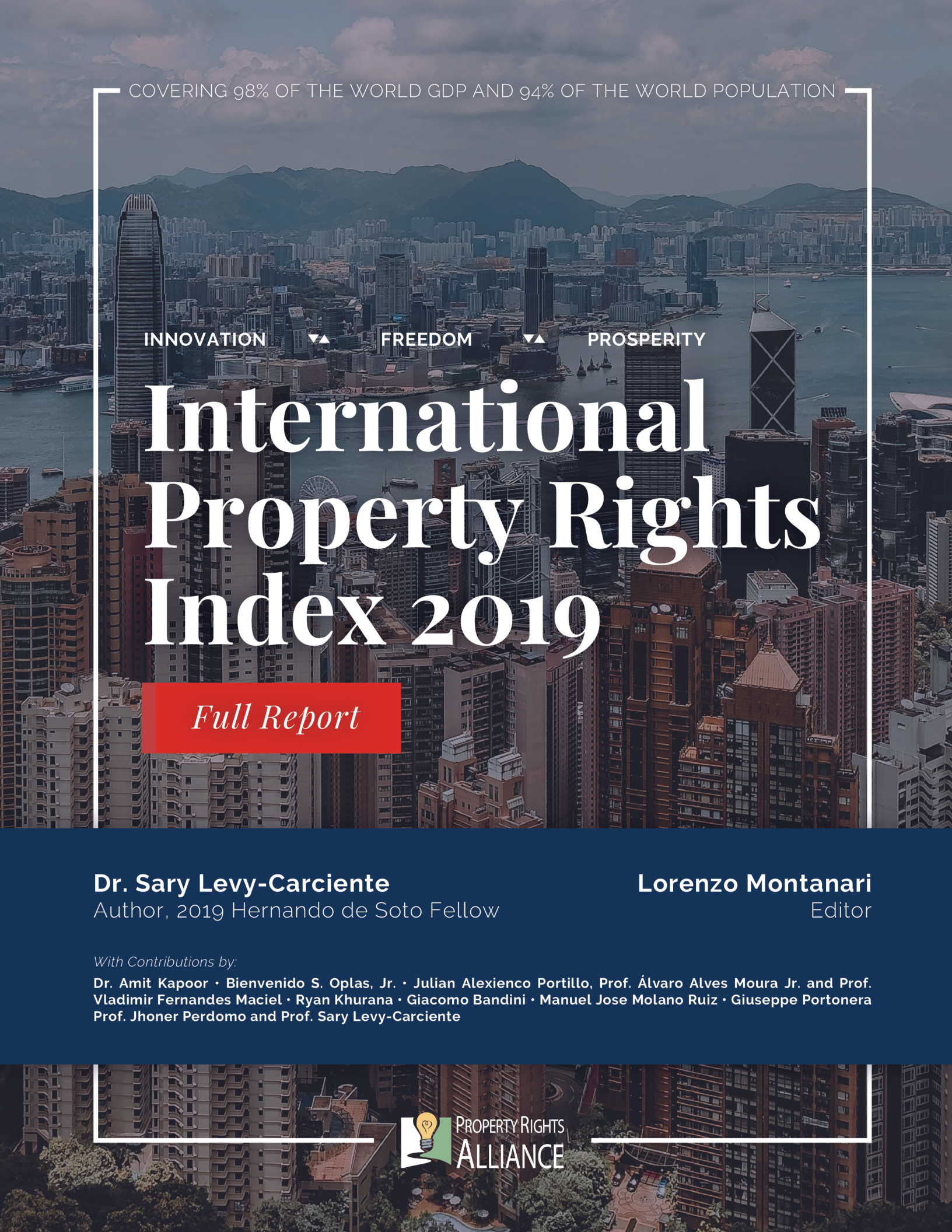

COVERING 98% OF THE WORLD GDP AND 94% OF THE WORLD POPULATION

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International Property Rights Index 2019

Full Report

Dr. Sary Levy-Carciente
Author, 2019 Hernando de Soto Fellow

Lorenzo Montanari
Editor

With Contributions by:

Dr. Amit Kapoor • Bienvenido S. Oplas, Jr. • Julian Alexienco Portillo, Prof. Álvaro Alves Moura Jr. and Prof. Vladimir Fernandes Maciel • Ryan Khurana • Giacomo Bandini • Manuel Jose Molano Ruiz • Giuseppe Portonera Prof. Jhoner Perdomo and Prof. Sary Levy-Carciente

PROPERTY RIGHTS ALLIANCE

PROPERTY RIGHTS & SOCIAL COMPLEXITY

Human practices in society are complex, multi-causal and dynamic, framed by their historical specificity. Certain concepts emerge as relevant. Since none of them has equal weight or influence at all times, although all being present, describing and analyzing human dynamics presents a challenge. Approaching the complex social world requires flexibility and allowance for a continuous process of social and individual learning, taking into account the unforeseen interruption of self-organization processes.

The development of Heisenberg's uncertainty principle and Einstein's theory of relativity transformed subject-object relationships and the point of view of a single coordinate center. Authors such as Atlan, Von Foerster and Prigogine reviewed the essence of the dominant paradigm and tried to create a new one, incorporating some absent elements: complexity, disorder, the idea of open and dynamic systems, the arrow of time, among others. Thus, the sciences of our times, recognize the impossibility of objectivity, claim distinctiveness, redeem complexity, elevate disorder and exalt the arrow of time.

The term "complexity", used frequently as a kind of "buzzword", has won a distinctive role in modern science and social practice, and it is characterized by multiple other ideas like self-organization, autopoiesis, bifurcations, edge of chaos, attractors, emerging behavior, fractality, sensitivity to initial conditions, instability and many others.

The concept of complex and open systems is clearly applicable to social practice, hence the importance of understanding its dynamics. From this new perspective, the local increase in order results in a global increase in entropy. Given the complexity of the systems and their evolution over time, chaos – defined as a stochastic behavior of a deterministic system – is of considerable value to social scientists. It highlights how the initial conditions of the system influence their eventual structure and behavior.

In the so-called 'talent society', production processes are materialized in intangible operations of information processing, symbolic analysis by expert systems, and with knowledge preeminence of traditional production factors. Faced with the blurring of traditional borders, globally ubiquitous talent makes its way into the individual through a node of a global network. However, territorial roots are mainly defined by the possibility of access to this dense web of links and information.

We are talking about the configuration of a new model of society, in which everyone and everything is connected, all over the world and all the time, creating millions of terabytes of data per second. The new appropriate models for looking at societies require reviewing the topological structure of these networks, evaluated as complex systems, shaped by the collective action of individuals and showing their emerging behaviors. Innovation is essential for this moment of transition: *when creative destruction threatens the past and promises a future*, as Schumpeter might well say. This is a moment to embrace the disruption instead of fighting it.

To enhance talent, it is necessary to emphasize the circumstances required for its stimulation: from the most elementary – like freedom for education and expression – through a stable and clear institutional environment – one that stimulates excellence and quality – to specific schemes that facilitate the concretion of new ideas and projects.

That is, it is required to rethink society, not to control it, but to allow its free projection. The challenge is to think in terms of free and responsible people, making each decision with the available information, to achieve their goals. Under this premise, minimum conditions are required (Rojas, 2015):

- Each person should be free to act for their own purposes, without being hindered by others
- Each person should be able to invoke their power to make exchanges
- Each person should be able to develop their long-term projects based on certain provisions or rules, generating the power to demand the respect of others.

One of the elements that continues to gain more relevance as a catalyst for prosperity is institutional quality. The literature of the new institutional economy insists on the importance of convenient 'rules of the game' to reduce transaction costs and to promote efficiency, thus achieving a better quality of life.

Institutions refer to norms, regulations and restrictions that exist in society, whether formal or informal. Therefore, they include: a) codes of conduct, norms of behavior and beliefs; b) written agreements and rules governing contractual relationships; and c) constitutions, laws and acts that govern politics and society.

Institutions are based on shared concepts, beliefs and expectations. Their existence is self-reinforced and persistent, and their transformation is slow. In addition, their interactions with agents are non-linear, that is, they display information feedback, providing the possibility of incorporating values progressively as an adaptation and improvement mechanisms (Eggertsson, 1990; Levy-Carciente, 2013).

Property rights are a decisive institution of the rule of law that maintains an unavoidable link with freedom. They are a complex legal institution that allows owners to use parts of nature and limit their use by others (Freyfogle, 2010). They are a condition for the exercise of other rights and freedoms. Property rights are a natural counterbalance to the exercise of power because they limit the power of the State and are fundamental for productive transformation in the knowledge society.

In short, property rights are an essential element for a free society based on the foundation of citizenship to control their own lives and build their own destiny. As Arthur Lee pointed out in Virginia (1775:14): "*The right of property is the guardian of every other right, and to deprive the people of this, is in fact to deprive them of their liberty.*"

There is an extensive and rich literature that reports the relationship between institutions and social welfare and particularly between property rights and social prosperity[1]. An effective system of property rights requires well-defined property structures – separating property from control – with the consequent positive effect on asset allocation, distribution of wealth and consumption and, therefore, showing their ability to favor the development of virtuous social circles.

The International Property Rights Index (IPRI), developed by the Alliance for Property Rights, has shown significant and positive correlations of this indicator with different variables that report on different edges or dimensions of development (economic growth, freedoms, human capacities, social capital, research and innovation, and ecological performance) conceptualized in a broad and comprehensive way with a multidimensional character.

Following this line of argument, it is not difficult to assume that relational success factors are the so-called innovation triangle (science-economy-society) and the knowledge triangle (education-research-innovation). As always in complex systems, there is no linear or simple relationship between these elements. Much remains to be deepened.

Information and knowledge have their own characteristics that make them distinctive from physical merchandise known and widely exchanged in the markets; therefore the property rights over them show particularities. Highlighting their non-rivalry use, they can be used by multiple people and at different times without being exhausted. Therefore, the assignment of intellectual property rights does not confer exclusive possession (such as physical property rights), but the benefits of its economic exploitation. This allows the generation of economic incentives towards research and innovation.

Similarly, intellectual property rights stimulate the open exposure of ideas and breaks with social secrecy, encouraging indirect effects of creativity (David and Foray, 2003). Or as Hayek (1997) pointed out:

> "*...in the case of material property, scarce goods are geared towards their most timely use; but in the case of the property of intangible assets, once made (literary works or discoveries) can be easily reproduced and unlimited, so it will only be through the law that they will become scarce and their production will be encouraged.*"

It is worth emphasizing that precisely these characteristics of non-rivalry of use and non-exhaustion, opens the space for criticism of intellectual property rights and their challenges (Kinsella, 2008). In this regard, the primary ethical and social function of property rights is to prevent conflict over scarce resources, as Hoppe (1989: 235) indicates:

[1] Among others: Hayek, 1960; Friedman, 1962; Rand, 1964; Demsetz, 1967; Alchian y Demsetz, 1973; Nozick, 1974; Epstein, 1985, 1995; Buchanan, 1993; Delong, 1997; North 1981, 1990; Pipes, 1999; Von Mises, 2002, De Soto, 2000; De Soto y Cheneval, 2006; Barzel, 1997, Knack y Keefer, 1995; Hall y Jones, 1999; Acemoglu et al. 2001, 2002, 2005; Johnson, McMillan y Woodruff, 2002; T. R. Machan, 2002; Easterly y Levine, 2003; Field y Torero, 2004; Rodrik et al. 2004; Galiani y Schargrodsky, 2005; Sandefur, 2006; Paldam y Gundlach, 2007; Wang 2008; Feyrer y Sacerdote, 2009; Hansson, 2009; Besley y Ghatak, 2010; Waldron, 2012

> "*Only because scarcity exists is there even a problem of formulating moral laws; insofar as goods are superabundant ("free" goods), no conflict over the use of goods is possible and no action-coordination is needed. Hence, it follows that any ethic, correctly conceived, must be formulated as a theory of property, i.e., a theory of the assignment of rights of exclusive control over scarce means. Because only then does it become possible to avoid otherwise inescapable and unresolvable conflict*."

It is worth insisting that since intellectual property is not equivalent to physical property ownership, its purpose is not equivalent. The objective of respecting intellectual property is the promotion of incentives to stimulate creation, innovation and its dissemination.

Other criticisms of intellectual property rights are presented, mainly, when it refers to knowledge associated with the generation of health-related products, their impact on competition, and their price. Collectively, they impact the final consumer or beneficiary. In this regard, it is worth reiterating that stimuli to innovation must be reviewed under a dynamic perspective of competition, which creates dynamic efficiency (creative capability) instead of static efficiency (under fixed technology). This dynamic approach shows not only short-term impacts (ambiguous or inconclusive), but positive ones in the medium and long term. These are not limited to a reduction in prices over time as a result of increased production, but also, they include the promotion of positive side effects on other social spheres such as education, research and innovation, and endogenous development of technologies. The issue is complex, with multiple interactions and multidimensional dependence, so the controversy is not easy to settle.

Meanwhile, researchers have shown that property rights nurture economic growth and social development. Property rights promote innovation and productivity and have been the most effective mechanism to guarantee civil rights and civil liberties, giving rise to what Pipes (1999) defines as the co-sovereign citizen. In modern democratic and liberal republics, sovereignty is also an attribute of citizenship and not only of the nation-state.

Last but not least, it should be noted that property rights are human rights. Private property rights are the rights of humans to use specified goods and to exchange them. Following Alchian: "Any restraint on private property rights shifts the balance of power from impersonal attributes toward personal attributes and toward behavior that political authorities approve" (http://www.econlib.org/library/Enc/PropertyRights.html). That is the fundamental reason for preference of a system with strong private property rights: private property rights protect individual liberty.

IPRI STRUCTURE AND METHODOLOGY

One of the most important things to achieve a goal is to evaluate its evolution in time and space; for that, measuring is a key tool. Since 2007, Property Rights Alliance (PRA) – dedicated to the protection

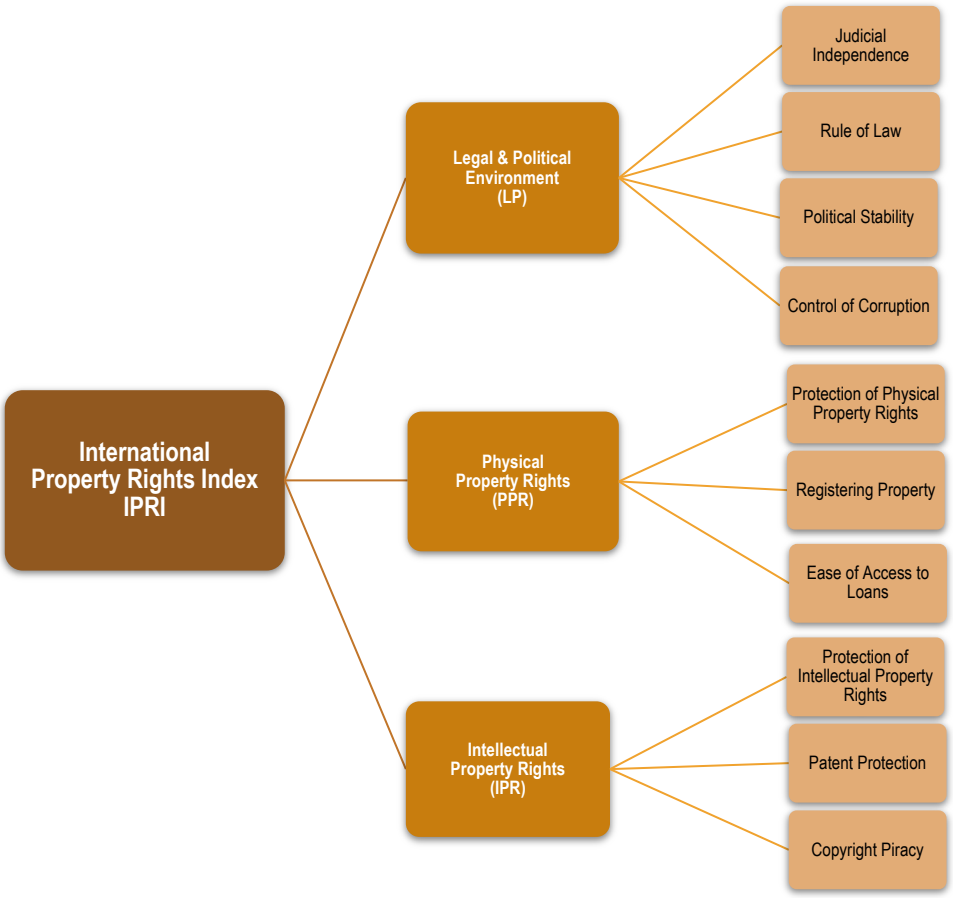
of property rights around the world – instituted the Hernando de Soto fellowship to produce a yearly edition of the International Property Rights Index (IPRI).

The IPRI was developed to serve as a barometer for the status of property rights around the world. A vast review of the literature on property rights was done in order to conceptualize and operationalize a comprehensive characterization of property rights. Following convention set in place by previously compiled indices, several experts and practitioners in the field of property rights were consulted setting the core categories (here-to referred as "components" or 'sub-indices') and its items.

The following are the three core components of the IPRI:

- Legal and Political Environment (LP)
- Physical Property Rights (PPR)
- Intellectual Property Rights (IPR)

FIGURE 1. INTERNATIONAL PROPERTY RIGHTS INDEX STRUCTURE



The Legal and Political Environment (LP) component provides information of the strength of a country's institutions, the respect for the 'rules of the game' among citizens. Therefore, the items included in the LP are wide-ranging. This component has a significant influence on the development and protection of physical and intellectual property rights. The other two components of the index, Physical Property Rights (PPR) and Intellectual Property Rights (IPR), reflect two forms of property rights crucial for countries' economic development. Items included in these two categories represent *de jure* rights and *de facto* results in each country. As a result, the IPRI is comprised of 10 items grouped under one of these three components: LP, PPR, or IPR.

While there are numerous items related to property rights, the final IPRI is specific to the core factors that are directly associated to the strength and defense of physical and intellectual property rights. Moreover, items for which data were available more regularly and in a greater number of countries were given preference, ensuring that scores were comparable across countries and years. The IPRI-2019 keeps the previous years' methodology to allow for a full comparison of its results with previous editions.

LEGAL AND POLITICAL ENVIRONMENT (LP)

The Legal and Political Environment component grasps the ability of a nation to enforce a *de jure* system of property rights. It comprises four (4) elements: the independence of its judicial system, the strength of the rule of law, the control of corruption, and the stability of its political system.

JUDICIAL INDEPENDENCE

This item examines the judiciary's freedom from political, individual or business groups' influence. The independence of the judiciary is a central underpinning for the sound protection and sovereign support of the court system with respect to private property.

For this item, the chosen source was the Global Competitiveness Index 4.0 2018 dataset (version Oct. 13, 2018) from the World Economic Forum's 2018 (http://reports.weforum.org/global-competitiveness-report-2018/). The original data scale is [1 - 7], where 7 is the best score. The full question and associated answers of the Executive Opinion Survey for this indicator was:

In your country, how independent is the judicial system from influences of the government, individuals, or companies? [1= not independent at all; 7 = entirely independent]

RULE OF LAW

This element measures the extent to which agents have confidence and stand by the rules of their society. Specifically, it measures the quality of contract enforcement, property rights, police, and courts, as well as the likelihood of crime and violence.

It combines several indicators, including fairness, honesty, enforcement, speed, affordability of the court system, protection of private property rights, and judicial and executive accountability. Rule of Law complements the Judicial Independence item.

The chosen data source is the World Bank Worldwide Governance Indicators, 2017 (http://info.worldbank.org/governance/wgi/index.aspx#home). The original data scale is [-2.5 to 2.5], where 2.5 is the best score.

POLITICAL STABILITY

Political stability endorses incentives to obtain or to extend ownership and/or management of properties. The higher the likelihood of government instability, the less likely people will be to obtain property and to develop trust in the soundness of the rights attached.

For this item, the chosen data source was the World Bank Worldwide Governance Indicators, 2017 (http://info.worldbank.org/governance/wgi/index.aspx#home). The original data scale is [-2.5 to 2.5], where 2.5 was the best score.

***NOTE**: A special notice has to be made regarding the Political Stability indicator for this year, as it displays a value outside of its normal range for one country (Yemen -2.961). Therefore, this country value was considered as the extreme of the range scale (minimum value) for the rescaling process. This situation happened also in the last two years, and we followed the same procedure.*

CONTROL OF CORRUPTION

This item combines several indicators that measure the extent to which public power is exercised for private gain. This includes petty and grand forms of corruption, as well as the 'capture' of the state by elites and particular interests. As with the other items in the LP component, corruption influences people's confidence in the existence of sound implementation and enforcement of property rights. Corruption reflects the degree of informality in the economy, which is a distracting factor to the expansion of respect for legal private property.

The data source chosen for this item is the World Bank Worldwide Governance Indicators, 2017 (http://info.worldbank.org/governance/wgi/index.aspx#home). The original data scale is [-2.5 to 2.5], where 2.5 was the best score.

PHYSICAL PROPERTY RIGHTS (PPR)

A strong property rights regime promotes the confidence of people in its effectiveness to protect private property rights. It also provides for integrated transactions related to the registry of property, and it allows access to the required credit to convert property into capital. For these reasons, the following items are used to measure private physical property rights protections (PPR).

PROTECTION OF PHYSICAL PROPERTY RIGHTS

The Protection of Physical Property Rights relates directly to the strength of a country's property rights system based on the expert's views of the quality of the judicial protection of private property, including financial assets. Additionally, it incorporates the expert's opinions on the precision of the legal definition of property rights.

The data source chosen for this item is the Global Competitiveness Index 4.0 2018 dataset (version Oct. 13, 2018) from the World Economic Forum's 2018 (http://reports.weforum.org/global-competitiveness-report-2018/). The original data scale is [1 - 7], where 7 is the best score. The full question and associated answers of the Executive Opinion Survey for this indicator was:

In your country, to what extent are property rights, including financial assets, protected? [1 = not at all; 7 = to a great extent].

REGISTERING PROPERTY

This item reflects businesses' point of view on the complexity of registering property in terms of the number of days and required procedures. It records the full sequence of procedures needed to transfer a property from seller to buyer when a business purchases land or a building. The criticality of this information derives from the fact that the more difficult property registration is, the more likely it is that assets stay in the informal sector, thus limiting the development of the broader public's understanding and support for a strong legal and sound property rights system. Moreover, registration barriers also discourage assets' movement from lower to higher prized uses.

The Registering Property indicator reflects one of the main economic arguments set forth by Hernando de Soto: "*what the poor lack is easy access to the property mechanisms that could legally fix the economic potential of their assets so they could be used to produce, secure or guarantee greater value in the extended market*" (2000:48). This item is calculated as:

Registering Property = (0.7 * number of days) + (0.3 * number of procedures)

The data source chosen for measuring this item was The World Bank Group's 2019 Doing Business Report (http://www.doingbusiness.org/custom-query). The original data scale is [1- ∞], where 1 is the best score.

EASE OF ACCESS TO LOANS

Access to bank loans without collateral serves as a proxy of the financial sector's development in a country. Financial institutions play a crucial complementary role – along with a strong property rights system – to bring economic assets into the formal economy. Credit facilities have always been an important channel trying to alleviate poverty.

The data chosen for this item is the Global Competitiveness Index 4.0 2018 dataset (version Oct. 28, 2018) from the World Economic Forum's 2018 (http://reports.weforum.org/global-competitiveness-report-2018/). The original data scale is [1 - 7], where 7 is the best score. The full question and associated answers of the Executive Opinion Survey for this indicator was:

In your country, how easy is it for businesses to obtain a bank loan? [1 = extremely difficult; 7 = extremely easy]

INTELLECTUAL PROPERTY RIGHTS (IPR)

The Intellectual Property Rights component evaluates the protection of this kind property. In addition to an opinion-based measure, it assesses protection of two major forms of intellectual property rights (patents and copyrights) from a *de jure* and a *de facto* perspective.

PROTECTION OF INTELLECTUAL PROPERTY RIGHTS

Capturing a nation's protection of intellectual property is a crucial element of the IPR.
The data source chosen is the Global Competitiveness Index 4.0 2018 dataset (version Oct. 13, 2018) from the World Economic Forum's 2018 (http://reports.weforum.org/global-competitiveness-report-2018/). The original data scale is [1 - 7], where 7 is the best score. Its Executive Opinion Survey used the following question and associated answers to raise the information:

In your country, to what extent is intellectual property protected? [1 = not at all; 7 = to a great extent]

PATENT PROTECTION

This item reflects the strength of a country's patent laws based on five extensive criteria: coverage of subject matter, membership in international treaties, restrictions on patent rights, enforcement mechanisms, and duration of protection.

The data used for this item is the Patent Rights Index (Park W. 2008, International Patent Protection: 1960-2005, Research Policy, Vol. 37 (4): 761-766) in its last update for 2015[2] (downloaded on April 26, 2019). This source is updated five-yearly. The original data scale is [0 - 5], where 5 is the highest score.

COPYRIGHT PIRACY

The level of piracy in the IP sector is an important indicator of the effectiveness of the intellectual property rights enforcement in a country.

The data source chosen for this item is the BSA Global Software Survey; The Compliance Gap (2018 edition, downloaded on April 10, 2019 at https://www.bsa.org/~/media/Files/StudiesDownload/2018_BSA_GSS_Report_en.pdf) which estimates the volume and value of unlicensed software installed on personal computers, and also reveals attitudes and behaviors related to software licensing, intellectual property and emerging technologies. The original data scale is [0 – 100%], where 0 was the best score.

METHODOLOGY

The IPRI's 2019 scores and rankings are based on data obtained from official sources made publicly available by established international organizations (see Appendix I). For this reason, data come in

[2] The updating of the Patent Rights Index for 2015 was a joint effort of PRA (in the person of Dr. Levy-Carciente) and Dr. Walter Park advanced on 2018. Following updates were completed by Dr. Park.

different styles and scales. Consequently, the data are rescaled in order to accurately compare among countries and within IPRI's individual components and the overall score.

The general grading scale of the IPRI ranges from [0 – 10], where 10 is the highest value for a property rights system and 0 is the lowest value (or most negative) for a property rights system within a country. The same interpretative logic is applied to the three components and to the 10 items or variables.

The average mechanisms applied assume equal importance for each component of the final IPRI score (and of each item of every component); however, if it were of any research interest, weights could be applied to evaluate the relative importance of the different aspects of a property rights system of a country.

The 2019 IPRI uses data from period 2017 – 2019. The 10 items are gathered from different sources, which imply that they have different accessibility times for the most updated data available. The applied logic in the analysis has been to include the latest available data sets for the IPRI. Most of the items present a lag of one year (see Appendix I), so the time difference among data should not affect our analysis.

Almost all the items needed to be rescaled to the IPRI range. The rescaling process was done as follows:

1. For bounded data series with same direction:

$$\left[\left(\frac{\text{Country Value} - \text{MIN Original Scale}}{\text{MAX Original Scale} - \text{MIN Original Scale}}\right) * (\text{MAX New Scale} - \text{MIN New Scale})\right] + \text{MIN New Scale}$$

2. For unbounded data series with same direction:

$$\frac{(\text{MAX Value of data serie} - \text{Country Value})}{(\text{MAX Value of data serie} - \text{MIN Value of data serie})} * 10$$

3. For bounded data series with inverse direction:

$$10 - \left[\left(\frac{\text{Country Value} - \text{MIN Original Scale}}{\text{MAX Original Scale} - \text{MIN Original Scale}}\right) * (\text{MAX New Scale} - \text{MIN New Scale})\right] + \text{MIN New Scale}$$

IPRI CALCULATIONS:

$$LP = \frac{\text{Judicial independence} + \text{Rule of Law} + \text{Political Stability} + \text{Control of Corruption}}{\#\ \text{Items}}$$

$$PPR = \frac{\text{Property Rights} + \text{ Registering Property} + \text{Ease Access Loans}}{\#\text{Items}}$$

$$IPR = \frac{\text{Intellectual Property Protection} + \text{Patent Protection} + \text{Copyright Piracy Level}}{\#\text{Items}}$$

$$\boldsymbol{IPRI = \frac{LP + PPR + IPR}{3}}$$

In addition to calculating the IPRI scores and its components, countries were ranked according to their scores. With some frequency, a few countries can exhibit almost the same score and they will be placed in the same rank. This way, i.e., Country A could be ranked #1, while Country B and Country C #2, and Country X, Country Y and Country Z are #3.

To minimize this situation and a diffusion bias, ranking calculations were made using IPRI scores with all their decimals, this way the final scores were differentiated, and such were the ranking positions.

COUNTRIES AND GROUPS

The 2019 IPRI ranks 129 countries. This year there are five (5) new countries included in the index: Angola, Bolivia, Burkina Faso, Cote D'Ivoire, and Macedonia; some of them were in previous editions, so they are returning countries. One (1) country that was part of the index last year is not included in this edition: Madagascar. It should be noted, Swaziland is now referred to as Kingdom of Eswatini.

Availability of required data is the only factor that determines countries' inclusion in the IPRI. In order to keep the meaningfulness of the data and analysis, only country-year combinations respecting specific rules have been considered.

Since the 2013 IPRI, such rule is to have at least 2/3 of the data required for each component, or more specifically, if a country does not have data available for at least 3 items for LP, 2 items for PPR and 2 items for IPR, will not be included in the analysis.

All countries were grouped following different criteria (Appendix II):

1. Regions: Africa (A), Australia & Oceania (AO), Central and Eastern Europe & Central Asia (CEECA), Latin America & the Caribbean (LAC), Middle East & North Africa (MENA), North America (NA), and Western Europe (WE).
2. Geographical regions: Western Europe, North America, Latin America & the Caribbean, South America, Middle East and North Africa, Africa, East Asia, South Asia and Pacific, Central and Eastern Europe, and Central Asia.

3. Income classification (World Bank, July 2016): High income, Upper Middle income, Lower Middle income, and Low income.
4. Regional and Development classification (International Monetary Fund, April 2016): Advanced Economies; Commonwealth of Independent States; Emerging & Developing Asia; Emerging and Developing Europe; Latin America & the Caribbean; Middle East, North Africa & Pakistan; and Sub-Saharan Africa.
5. Economic and Regional Integration Agreements (acronyms): OECD, EU, SADC, ECOWAS, ASEAN, PARLACEN, GCC, AP, MERCOSUR, SAARC, CEMAC, MCCA, CIS, ARAB M UNION, CARICOM, CAN, EFTA, IGAD, NAFTA, OPEC, CEEAC, TPP-11, PROSUR.

2019 IPRI COUNTRY RESULTS

This section presents the results of the 2019 IPRI. Starting with the scores of the overall IPRI and its three (3) components, we follow showing countries' rankings. Variations between 2018 and 2019 of both individual IPRI components and of the overall IPRI score were considered. This chapter also includes an analysis of the IPRI for groups of countries.

TABLE 1. AVERAGE SCORE: IPRI AND ITS COMPONENTS. 2015 - 2019.

	IPRI	LP	PPR	IPR
Average 2015	5.301	4.993	5.767	5.142
Average 2016	5.446	5.130	5.875	5.333
Average 2017	5.634	5.172	6.227	5.503
Average 2018	5.741	5.216	6.464	5.542
Average 2019	**5.726**	**5.160**	**6.474**	**5.553**

As an average, the sample of the 129 countries showed a score of 5.73, where the Legal and Political Environment (LP) was the weakest component with a score of 5.16, followed by the Intellectual Property Rights (IPR) component with a score of 5.55; Physical Property Rights (PPR) was the strongest component with a score of 6.47. This year there is a small set back of the average score of the IPRI and the LP component, while the PPR and IPR scores keep improving for a continuous fifth year (see Table 1).

We run a normality test for IPRI and its components, showing a Gaussian behavior. All of them showed unimodal distributions (see Table 2, Table 3 and Figure 1).

TABLE 2. STATISTICS: 2019 IPRI AND ITS COMPONENTS.

		IPRI	LP	PPR	IPR
N	Valid	129	129	129	129
	Missing	0	0	0	0
Mean		5.72882946	5.15999225	6.47384496	5.55266667
Std. Error of Mean		.125818593	.157640945	.106105035	.142528909
Median		5.40600000	4.79100000	6.47900000	5.36700000
Std. Deviation		1.429024515	1.790456962	1.205121535	1.618817225
Variance		2,042	3,206	1,452	2,621
Range		6.042000	7.502000	7.427000	7.151000
Minimum		2.671000	1.390000	1.286000	1.753000
Maximum		8.713000	8.892000	8.713000	8.904000
Percentiles	25	4.77200000	3.80550000	5.80550000	4.41500000
	50	5.40600000	4.79100000	6.47900000	5.36700000
	75	6.62300000	6.47100000	7.23300000	6.62200000

TABLE 3. TESTS OF NORMALITY: ONE-SAMPLE KOLMOGOROV-SMIRNOV TEST

		IPRI	LP	PPR	IPR
N		129	129	129	129
Normal Parameters [a,b]	Mean	5.72882946	5.15999225	6.47384496	5.55266667
	Std. Deviation	1.429024515	1.790456962	1.205121535	1.618817225
Most Extreme Differences	Absolute	,104	,090	,060	,084
	Positive	,104	,090	,037	,084
	Negative	-,064	-,061	-,060	-,074
Kolmogorov-Smirnov Z		1,180	1,021	,685	,953
Asymp. Sig. (2-tailed)		,123	,248	,736	,324

a. Test distribution is Normal. b. Calculated from data

FIGURE 2. HISTOGRAM: 2019 IPRI AND ITS COMPONENTS.

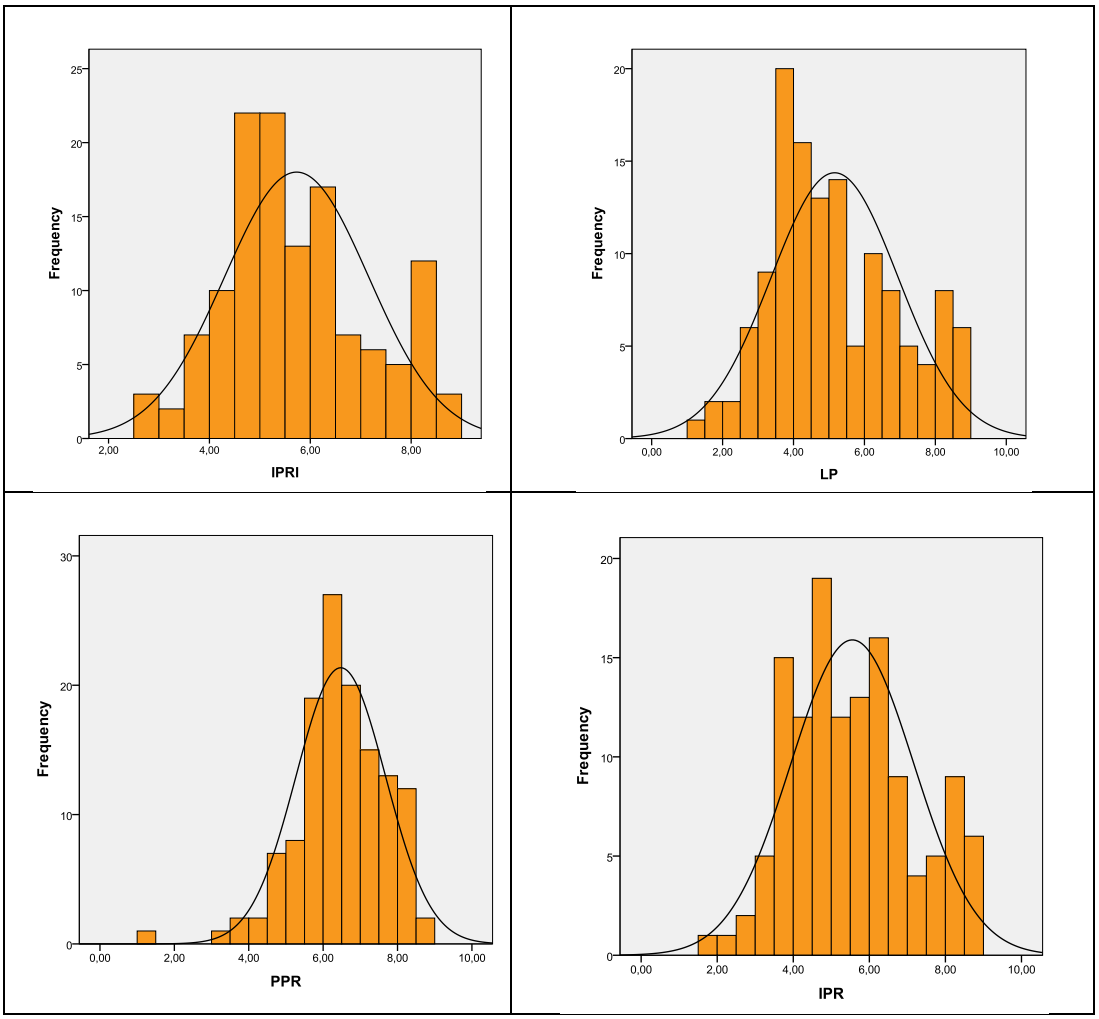


Table 4 shows, in alphabetical order, the score value of the 129 countries included in the 2019 IPRI and of its components. Figure 3a displays countries organized by their IPRI scores from top to bottom, showing their IPRI rankings. Figures 3b, 3c and 3d display countries organized by IPRI components' scores (LP, PPR, IPR) from top to bottom, showing their rankings.

Table 5 shows the IPRI 2019 rankings by quintile for all the 129 countries in our sample. In general, the number of countries belonging to each quintile increases from the top 20% to the bottom 20% (1st quintile 17 countries, 2nd quintile 22 countries, 3rd quintile 25 countries, 4rd quintile 29 countries and 5th quintile 36 countries). Hence, the forth and the fifth quintiles include 65 countries which is a 50.4% of our sample, while the first three quintiles include almost the same amount countries, 64 countries, being the 49.6% of the sample.

TABLE 4. IPRI 2019 AND ITS COMPONENTS: SCORES BY COUNTRY

COUNTRY	IPRI 2019	LP	PPR	IPR	COUNTRY	IPRI 2019	LP	PPR	IPR	COUNTRY	IPRI 2019	LP	PPR	IPR
ALBANIA	4.546	4.201	6.046	3.392	GERMANY	7.850	7.662	7.596	8.293	NIGERIA	3.788	2.884	4.707	3.772
ALGERIA	4.436	3.763	5.549	3.994	GHANA	5.748	5.315	5.898	6.032	NORWAY	8.280	8.599	8.258	7.983
ANGOLA	3.116	2.822	3.595	2.930	GREECE	5.208	4.862	5.142	5.619	OMAN	6.730	6.498	7.821	5.870
ARGENTINA	5.087	4.552	5.407	5.303	GUATEMALA	5.013	3.687	6.771	4.582	PAKISTAN	3.875	3.175	4.801	3.649
ARMENIA	4.812	4.223	6.856	3.358	HAITI	2.703	2.873	1.286	3.950	PANAMA	5.687	4.450	7.245	5.367
AUSTRALIA	8.363	8.154	8.280	8.656	HONDURAS	4.836	3.532	6.497	4.478	PARAGUAY	4.569	3.593	6.277	3.837
AUSTRIA	8.090	7.928	7.907	8.435	HONG KONG	7.903	8.057	8.166	7.486	PERU	5.140	3.976	6.461	4.982
AZERBAIJAN	5.120	4.206	7.055	4.098	HUNGARY	6.218	5.397	6.532	6.726	PHILIPPINES	5.309	3.674	6.548	5.705
BAHREIN	6.195	5.280	7.541	5.764	ICELAND	7.566	8.120	7.954	6.624	POLAND	5.997	5.436	6.425	6.130
BANGLADESH	3.313	3.482	3.568	2.889	INDIA	5.820	4.877	6.608	5.975	PORTUGAL	6.977	6.948	6.892	7.091
BELGIUM	7.670	7.444	7.371	8.195	INDONESIA	5.406	4.737	7.066	4.415	QATAR	6.923	6.549	7.955	6.266
BENIN	4.525	4.163	4.415	4.997	IRAN	4.579	3.720	5.609	4.408	ROMANIA	6.028	5.434	6.413	6.239
BOLIVIA	3.930	2.843	4.826	4.122	IRELAND	7.613	7.893	7.040	7.905	RUSSIA	4.990	3.663	5.914	5.391
BOSNIA & HERZEGOVINA	4.419	3.905	5.787	3.566	ISRAEL	7.181	6.384	7.512	7.647	RWANDA	6.266	5.916	7.079	5.802
BOTSWANA	5.964	6.370	6.884	4.637	ITALY	6.126	5.474	6.137	6.768	SAUDI ARABIA	6.278	5.626	7.359	5.850
BRAZIL	5.564	4.352	6.082	6.259	JAMAICA	5.999	5.398	6.434	6.166	SENEGAL	5.132	4.777	6.019	4.600
BRUNEI DARUSSALAM	4.759	6.297	3.358	4.622	JAPAN	8.323	8.031	8.318	8.621	SERBIA	4.785	4.442	6.023	3.891
BULGARIA	5.570	4.837	6.184	5.688	JORDAN	6.182	5.520	7.304	5.722	SIERRA LEONE	4.861	4.104	5.221	5.257
BURKINA FASO	5.355	4.257	6.463	5.345	KAZAKHSTAN	4.855	4.391	6.381	3.794	SINGAPORE	8.462	8.509	8.713	8.164
BURUNDI	3.799	2.138	5.225	4.033	KENYA	5.147	4.064	6.486	4.892	SLOVAKIA	6.387	5.388	7.097	6.676
CAMEROON	4.307	3.080	5.426	4.415	KOREA, REP	6.622	6.058	6.942	6.866	SLOVENIA	6.103	6.251	5.990	6.067
CANADA	8.265	8.403	8.271	8.122	KUWAIT	5.571	5.237	6.794	4.680	SOUTH AFRICA	6.071	5.149	6.348	6.717
CHAD	3.887	2.354	4.800	4.506	LATVIA	5.937	5.922	6.443	5.445	SPAIN	6.453	6.024	6.611	6.724
CHILE	6.881	6.674	7.558	6.410	LEBANON	4.387	3.074	6.582	3.503	SRI LANKA	5.164	4.791	6.182	4.518
CHINA	6.034	4.930	7.149	6.022	LIBERIA	4.653	3.858	5.558	4.541	SWEDEN	8.281	8.307	8.166	8.370
COLOMBIA	5.560	3.886	6.479	6.314	LITHUANIA	6.461	6.345	6.936	6.102	SWITZERLAND	8.572	8.602	8.425	8.689
CONGO, DEM. REP.	3.546	1.805	5.065	3.767	LUXEMBURG	8.275	8.516	8.134	8.176	TAIWAN (China)	7.307	6.754	8.228	6.938
COSTA RICA	6.489	6.167	6.821	6.479	MACEDONIA, FYR	4.704	4.025	6.550	3.537	TANZANIA, UNITED REP	5.193	4.250	5.637	5.691
CôTE D'IVOIRE	4.785	3.383	6.888	4.084	MALAWI	4.785	4.421	5.467	4.468	THAILAND	5.456	4.619	6.982	4.767
CROATIA	5.162	5.097	5.599	4.792	MALAYSIA	6.624	5.817	7.814	6.239	TRINIDAD & TOBAGO	5.817	5.198	6.021	6.231
CYPRUS	6.407	6.559	6.436	6.227	MALI	4.569	3.143	5.775	4.788	TUNISIA	5.142	4.571	6.197	4.659
CZECH REP	7.029	6.650	7.037	7.401	MALTA	6.756	6.728	7.308	6.233	TURKEY	5.263	3.578	6.634	5.576
DENMARK	8.174	8.423	7.854	8.246	MAURITANIA	4.172	3.364	4.087	5.066	UGANDA	5.053	3.895	6.138	5.125
DOMINICAN REP	4.894	3.931	6.241	4.511	MAURITIUS	6.298	6.444	7.221	5.228	UKRAINE	4.433	2.971	5.748	4.579
ECUADOR	4.803	3.543	5.618	5.248	MEXICO	5.229	3.592	6.149	5.945	UNITED ARAB EMIRATES	7.348	6.904	8.118	7.022
EGYPT	5.282	4.405	6.123	5.318	MOLDOVA	4.221	3.669	5.966	3.029	UK	8.044	7.791	7.869	8.473
EL SALVADOR	4.707	3.968	5.826	4.328	MONTENEGRO	4.817	5.007	5.818	3.628	USA	8.203	7.483	8.344	8.781
ESTONIA	7.173	7.279	7.620	6.620	MOROCCO	5.763	4.730	6.847	5.711	URUGUAY	6.330	7.134	6.531	5.324
ESWATINI	5.111	4.588	6.327	4.419	MOZAMBIQUE	4.387	3.122	5.300	4.740	VENEZUELA, BOL. Rep	2.896	1.567	4.734	2.387
ETHIOPIA	4.393	3.696	5.913	3.569	NEPAL	4.843	3.848	6.563	4.118	VIETNAM	5.085	4.743	5.956	4.556
FINLAND	8.713	8.841	8.393	8.904	NETHERLANDS	8.273	8.338	7.929	8.554	YEMEN, REP.	2.671	1.390	4.871	1.753
FRANCE	7.384	7.073	7.150	7.930	NEW ZEALAND	8.514	8.892	8.711	7.939	ZAMBIA	4.592	4.323	5.793	3.660
GEORGIA	5.247	5.286	7.184	3.273	NICARAGUA	4.337	3.342	5.734	3.935	ZIMBABWE	3.738	2.979	4.833	3.403

FIGURE 3A. IPRI 2019: SCORES AND RANKINGS

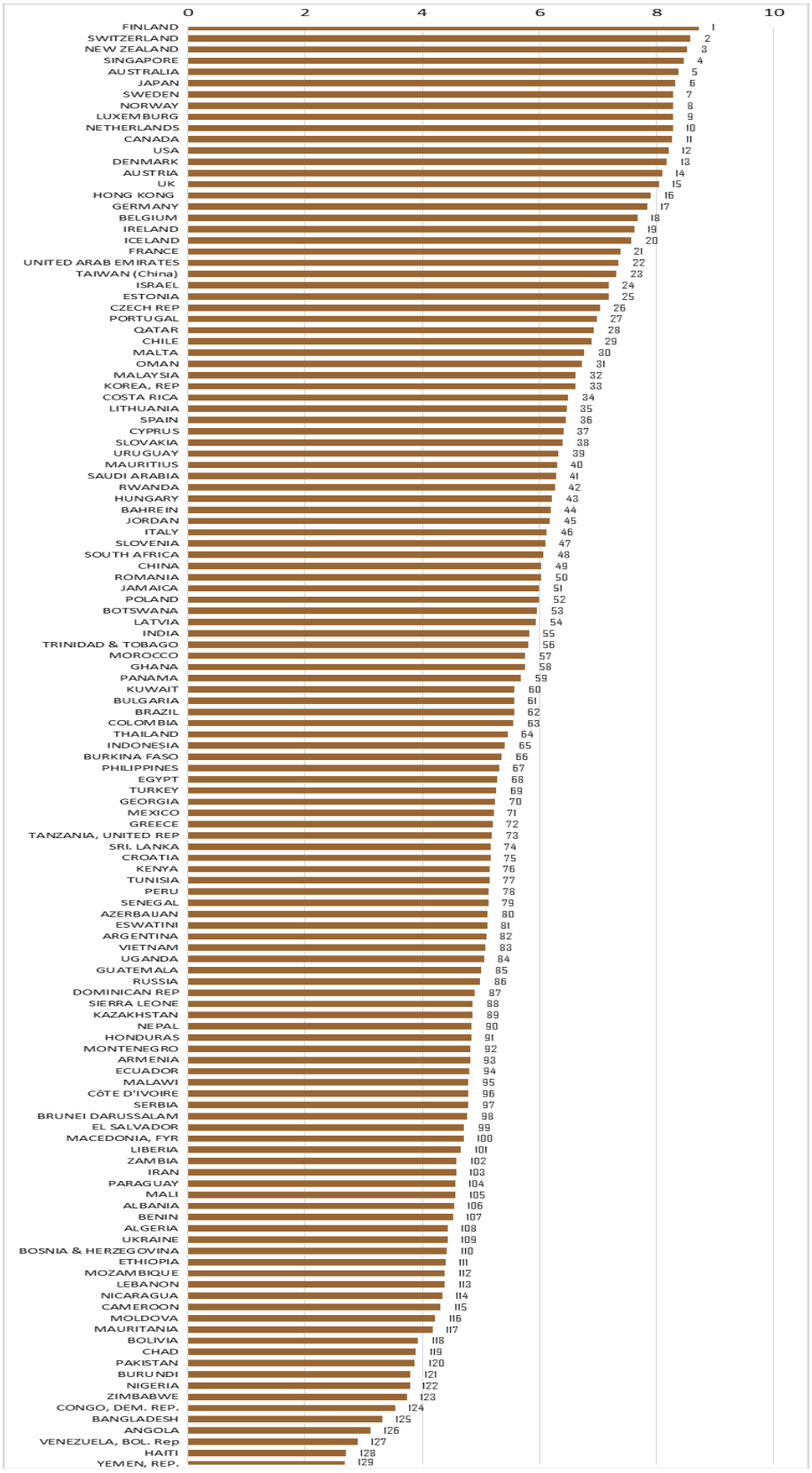


FIGURE 3B. LP 2019: SCORES AND RANKINGS

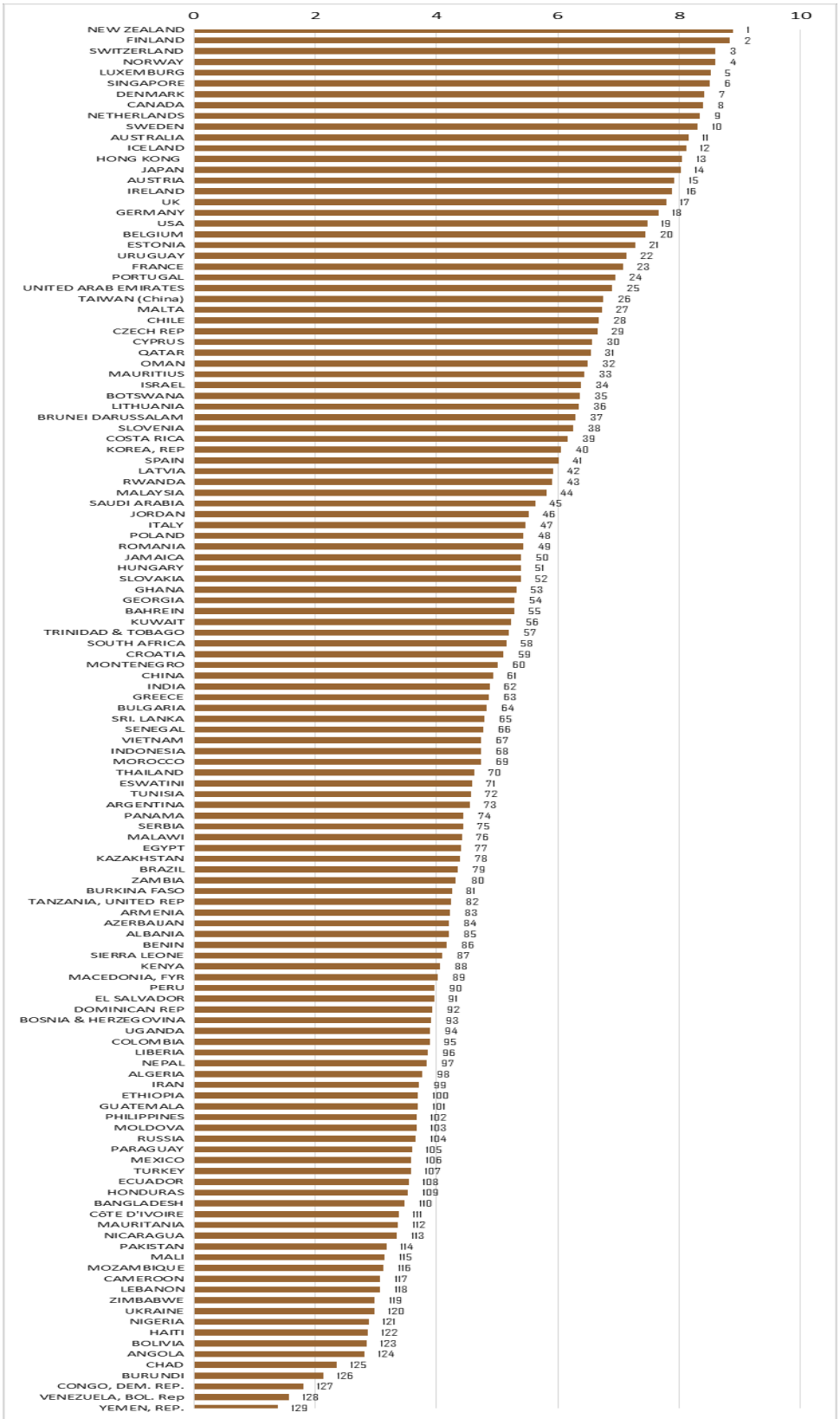


FIGURE 3C. PPR 2019: SCORES AND RANKINGS

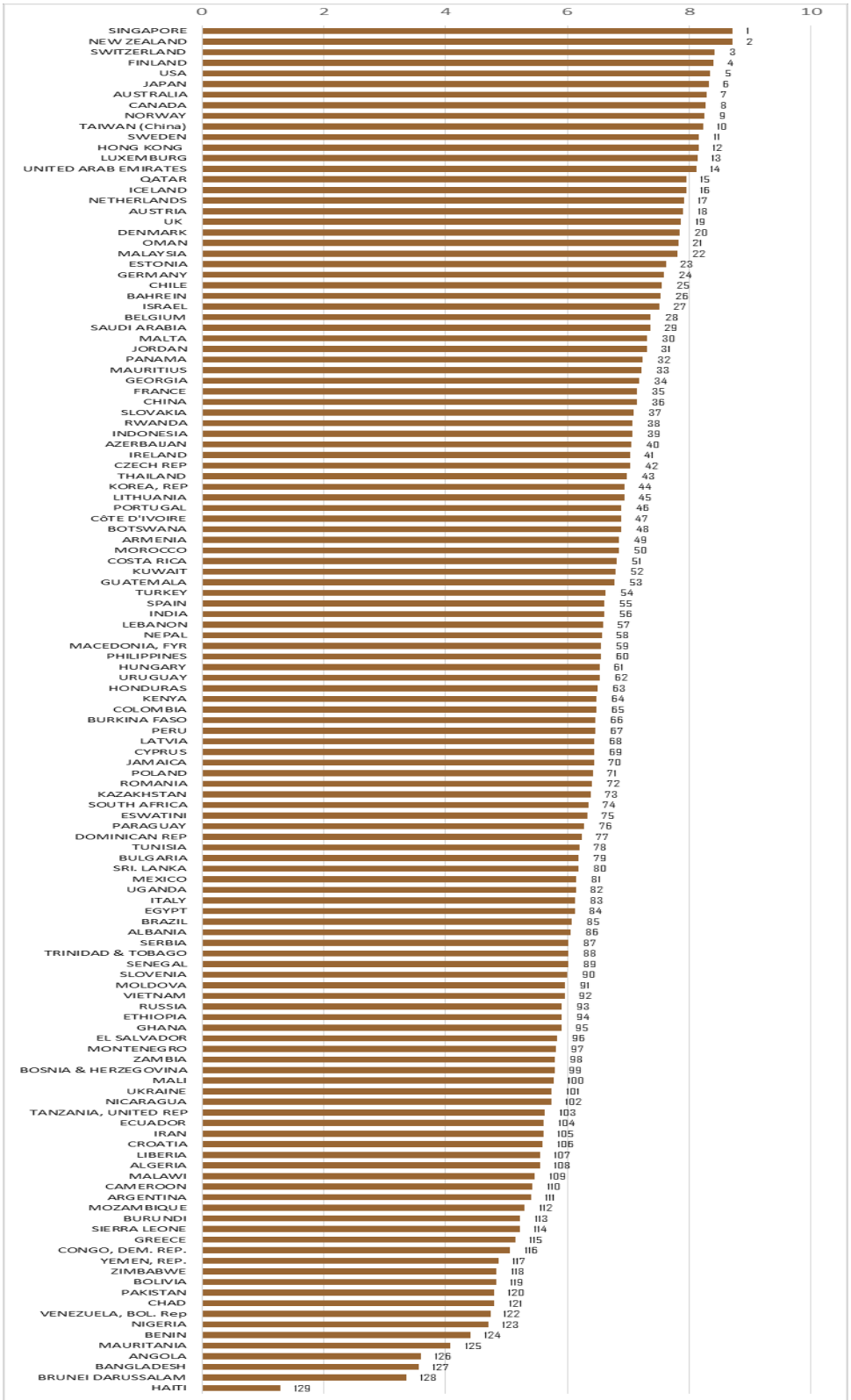


FIGURE 3D. IPR 2019: SCORES AND RANKINGS

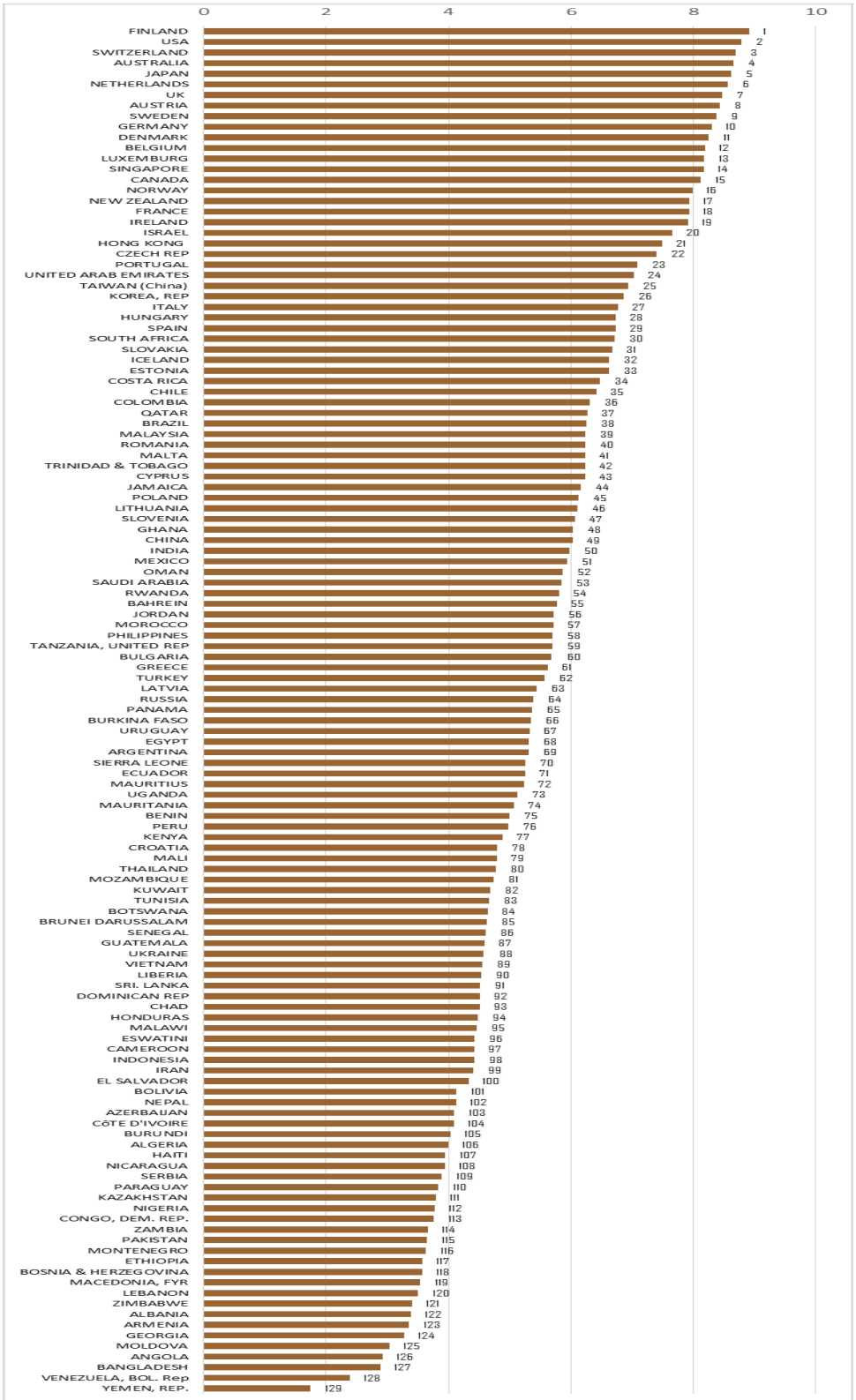


TABLE 5. 2019 IPRI: RANKINGS BY QUINTILES

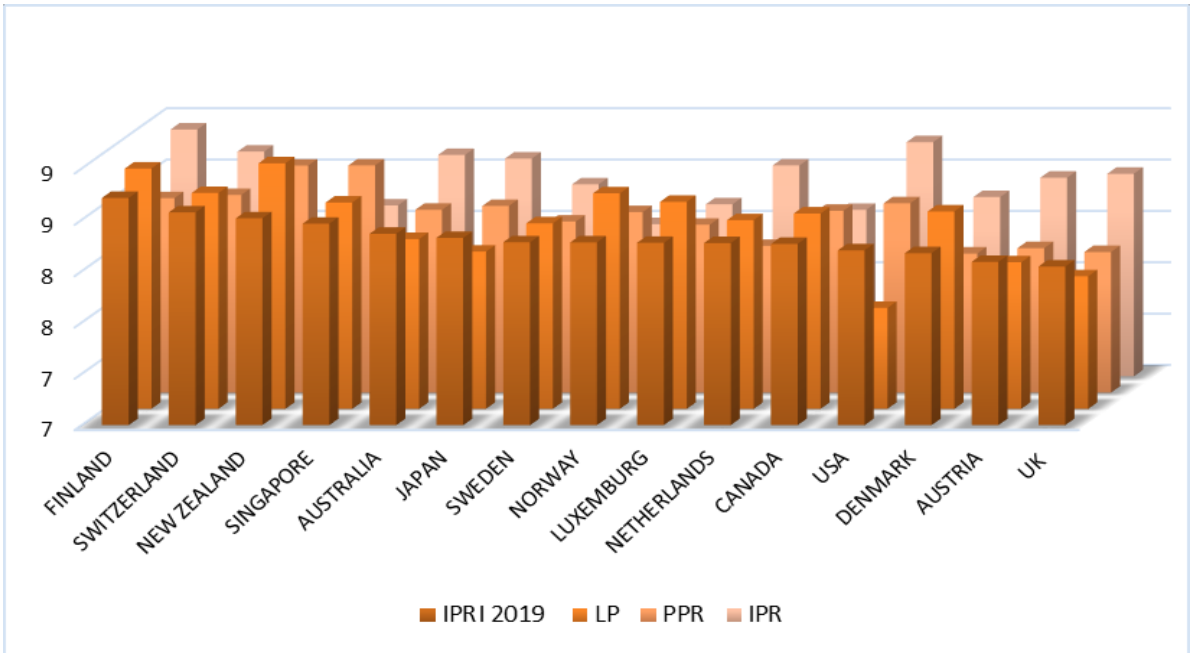
Strongest

Top 20 Percent	2nd Quintile	3rd Quintile	4th Quintile	Bottom 20 Percent
FINLAND	BELGIUM	MAURITIUS	INDONESIA	ECUADOR
SWITZERLAND	IRELAND	SAUDI ARABIA	BURKINA FASO	MALAWI
NEW ZEALAND	ICELAND	RWANDA	PHILIPPINES	CÔTE D'IVOIRE
SINGAPORE	FRANCE	HUNGARY	EGYPT	SERBIA
AUSTRALIA	UNITED ARAB EMIRATES	BAHREIN	TURKEY	BRUNEI DARUSSALAM
JAPAN	TAIWAN (China)	JORDAN	GEORGIA	EL SALVADOR
SWEDEN	ISRAEL	ITALY	MEXICO	MACEDONIA, FYR
NORWAY	ESTONIA	SLOVENIA	GREECE	LIBERIA
LUXEMBURG	CZECH REP.	SOUTH AFRICA	TANZANIA, UNITED REP.	ZAMBIA
NETHERLANDS	PORTUGAL	CHINA	SRI. LANKA	IRAN
CANADA	QATAR	ROMANIA	CROATIA	PARAGUAY
USA	CHILE	JAMAICA	KENYA	MALI
DENMARK	MALTA	POLAND	TUNISIA	ALBANIA
AUSTRIA	OMAN	BOTSWANA	PERU	BENIN
UK	MALAYSIA	LATVIA	SENEGAL	ALGERIA
HONG KONG	KOREA, REP	INDIA	AZERBAIJAN	UKRAINE
GERMANY	COSTA RICA	TRINIDAD & TOBAGO	ESWATINI	BOSNIA & HERZEGOVINA
	LITHUANIA	MOROCCO	ARGENTINA	ETHIOPIA
	SPAIN	GHANA	VIETNAM	MOZAMBIQUE
	CYPRUS	PANAMA	UGANDA	LEBANON
	SLOVAKIA	KUWAIT	GUATEMALA	NICARAGUA
	URUGUAY	BULGARIA	RUSSIA	CAMEROON
		BRAZIL	DOMINICAN REP.	MOLDOVA
		COLOMBIA	SIERRA LEONE	MAURITANIA
		THAILAND	KAZAKHSTAN	BOLIVIA
			NEPAL	CHAD
			HONDURAS	PAKISTAN
			MONTENEGRO	BURUNDI
			ARMENIA	NIGERIA
				ZIMBABWE
				CONGO, DEM. REP.
				BANGLADESH
				ANGOLA
				VENEZUELA, BOL. REP.
				HAITI
				YEMEN, REP.

Weakest

Figure 4 shows the top 15 countries for the 2019 IPRI edition. Finland leads the 2019 IPRI (8.713) as well as the IPR component (8.904), followed by the USA (8.781) in IPR. Switzerland ranks 2nd overall (8.572) followed by New Zealand (8.514) who additionally leads the LP component (8.892). Singapore ranks 4th place overall (8.462) and leads the PPR component (8.713). The following countries continue the overall rankings: Australia, Japan, Sweden, Norway, Luxemburg, Netherlands, Canada, USA, Denmark, Austria and the UK. The IPRI scores of these countries come in a range of 8.044 to 8.713.

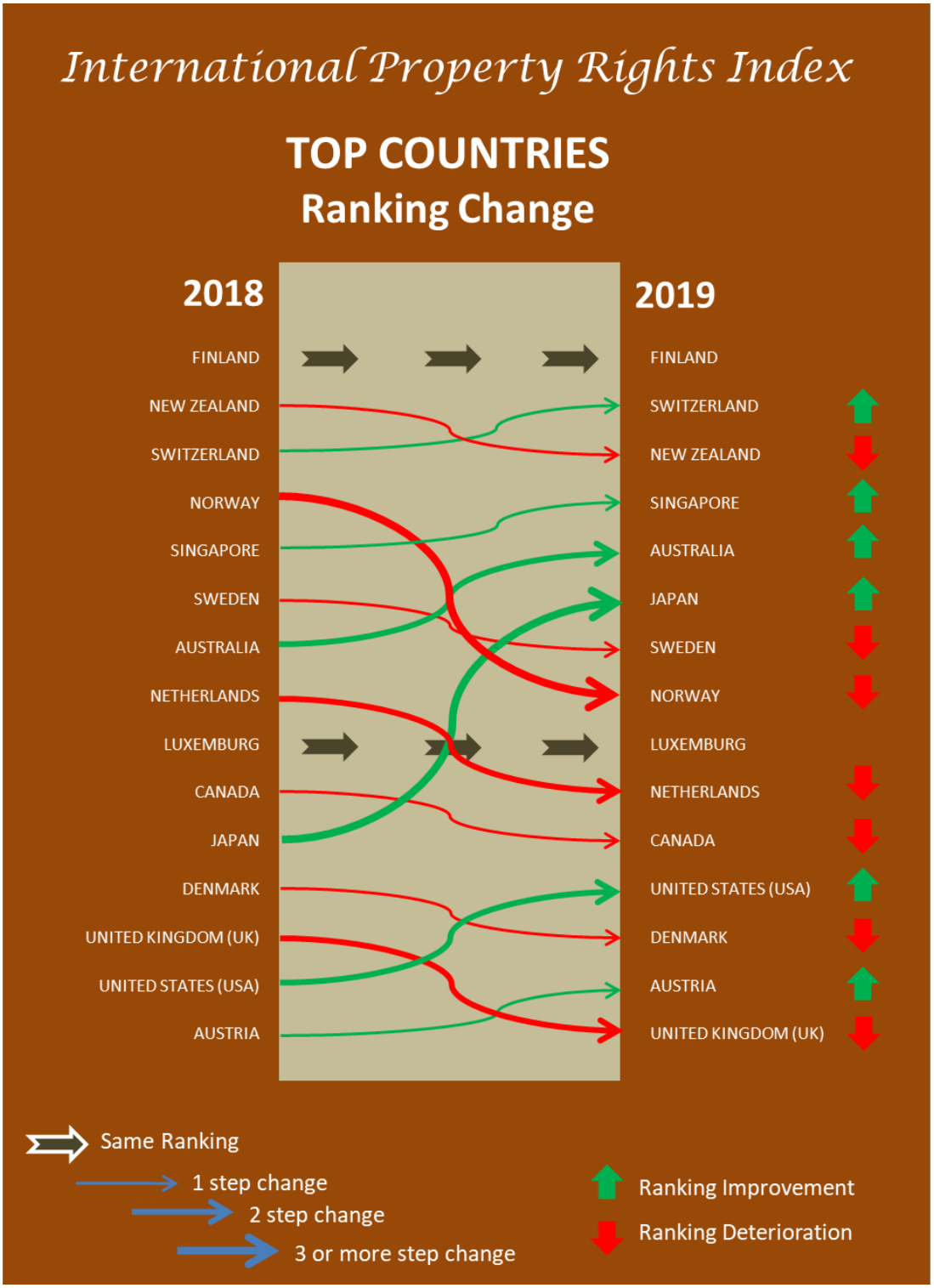
FIGURE 4. 2019 IPRI: TOP 15 COUNTRIES



It is worth noting that the 2019, 2018 and 2017 IPRI top countries are the same, with a different lineup (see Figure 5). The maximum value of the 2019 IPRI score is higher than previous years (8.713 vs 8.6924 in 2018, and 8.6335 in 2017) and is also higher the minimum IPRI score of the top 15, which is 8.044 (in 2018 was 8.005).

Of these 15 countries, nine (9) of them show the IPR as their strongest component (Finland, Switzerland, Australia, Japan, Sweden, Netherlands, USA, Austria, UK); five (5) of them show the LP (New Zealand, Norway, Luxemburg, Canada, Denmark) and only one (1) show the PPR component (Singapore).

FIGURE 5. 2018 IPRI VS. 2019 IPR: TOP COUNTRIES RANKING CHANGE

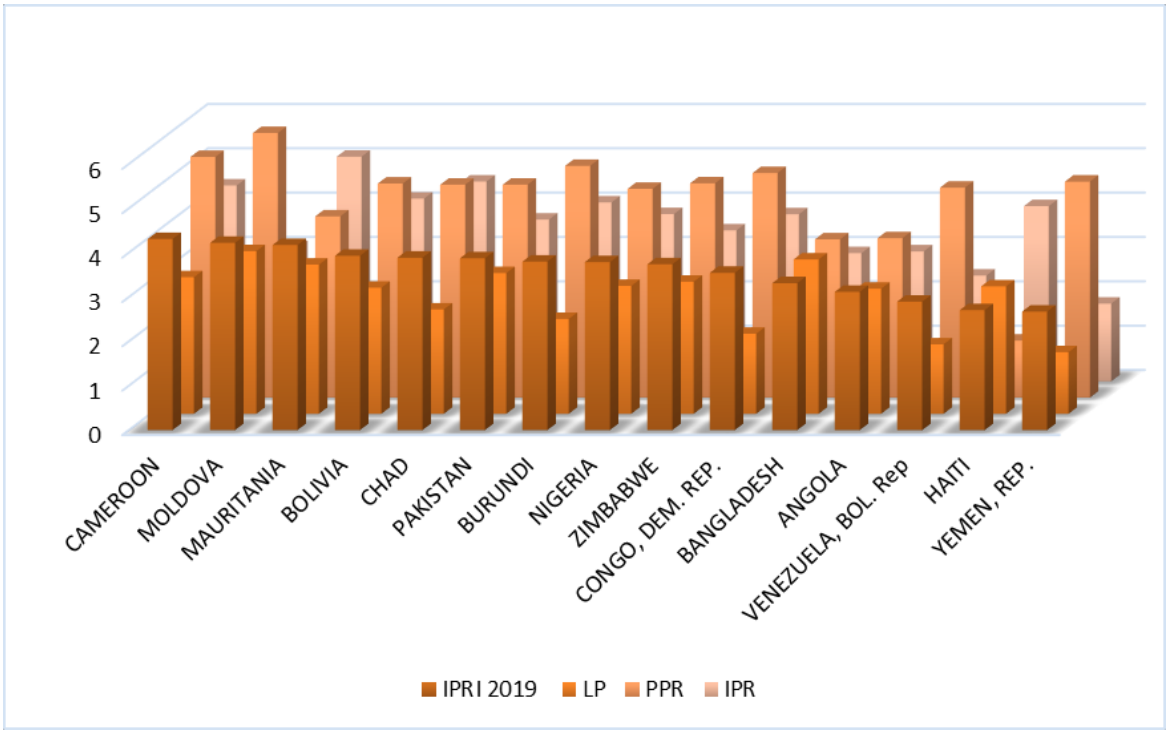


As shown in figure 6, the bottom 15 countries of this 2019 IPRI edition are: Rep. of Yemen (2.671), Haiti (2.703), Bolivarian Rep. of Venezuela (2.896), Angola (3.116), Bangladesh (3.313), Democratic Rep. of Congo (3.546), Zimbabwe (3.738), Nigeria (3.788), Burundi (3.799), Pakistan (3.875), Chad (3.887), Bolivia (3.930), Mauritania (4.172), Moldova (4.221) and Cameroon (4.307).
Considering the IPRI components, we find the following bottom countries:

- LP: Rep. of Yemen (1.390), Bolivarian Rep. of Venezuela (1.567) and Democratic Rep. of Congo (1.805).
- PPR: Haiti (1.286), Bangladesh (3.568) and Angola (3.595)
- IPR: Rep. of Yemen (1.753), Bolivarian Rep. of Venezuela (2.387), Bangladesh (2.889) and Angola (2.930)

Most of the bottom countries show the PPR as their strongest component; just Mauritania and Haiti show the IPR as the country's more robust sub-index. On the other hand, most of these countries display the LP as its weakest sub-index, just Moldova and Bangladesh show the IPR; and in Haiti the PPR is the most fragile component.

FIGURE 6. 2019 IPRI: BOTTOM 15 COUNTRIES



This year, five countries show the highest relative improvement in their IPRI score: Algeria (7.14%), Pakistan (6.53%), Oman (6.28), Eswatini (5.61) and Moldova (5.48); while the four with the highest relative decreases in their 2019 IPRI scores are Democratic Rep. of Congo (-5.32%) Rwanda (-4.52%), South Africa (-4.37%) and Yemen (-0.22). See Figure 7.

Looking at these comparisons of the IPRI components, we find:

- LP: the highest relative improvements were in Ukraine (10.66%), Sierra Leone (9.71%), Pakistan (9.25%), Moldova (7.93%) and Eswatini (7.26%); while the countries showing the most significant relative decreases were Rep. of Yemen (-6.85%), Brazil (-6.2%) and Costa Rica (-6.12%). Changes in LP component scores 2019-2018 are shown in Figure 8.
- PPR: the highest relative improvements were shown by Malawi (7.54%), Egypt (6.47%) and Israel (6.06%); while Bangladesh (-7.27%) and Nigeria (-5.58) showed the deepest relative declines. Changes in PPR component scores 2019-2018 are shown in Figure 9.
- IPR: The most significant relative increases in the IPR component were reported by Algeria (17.92%), Oman (13.02%), Uganda (11.62%) and Uruguay (9.65%); while the most relevant relative decreases were shown by Rep. of Yemen (-8.43%), Democratic Rep. of Congo (-8.26%), Bolivarian Rep. of Venezuela (-8.03%) and Zimbabwe (-7.21%). Changes in IPR component scores 2018-2017 can be seen in Figure 10.

FIGURE 7. IPRI SCORE 2019-2018 AND VARIATION (%)

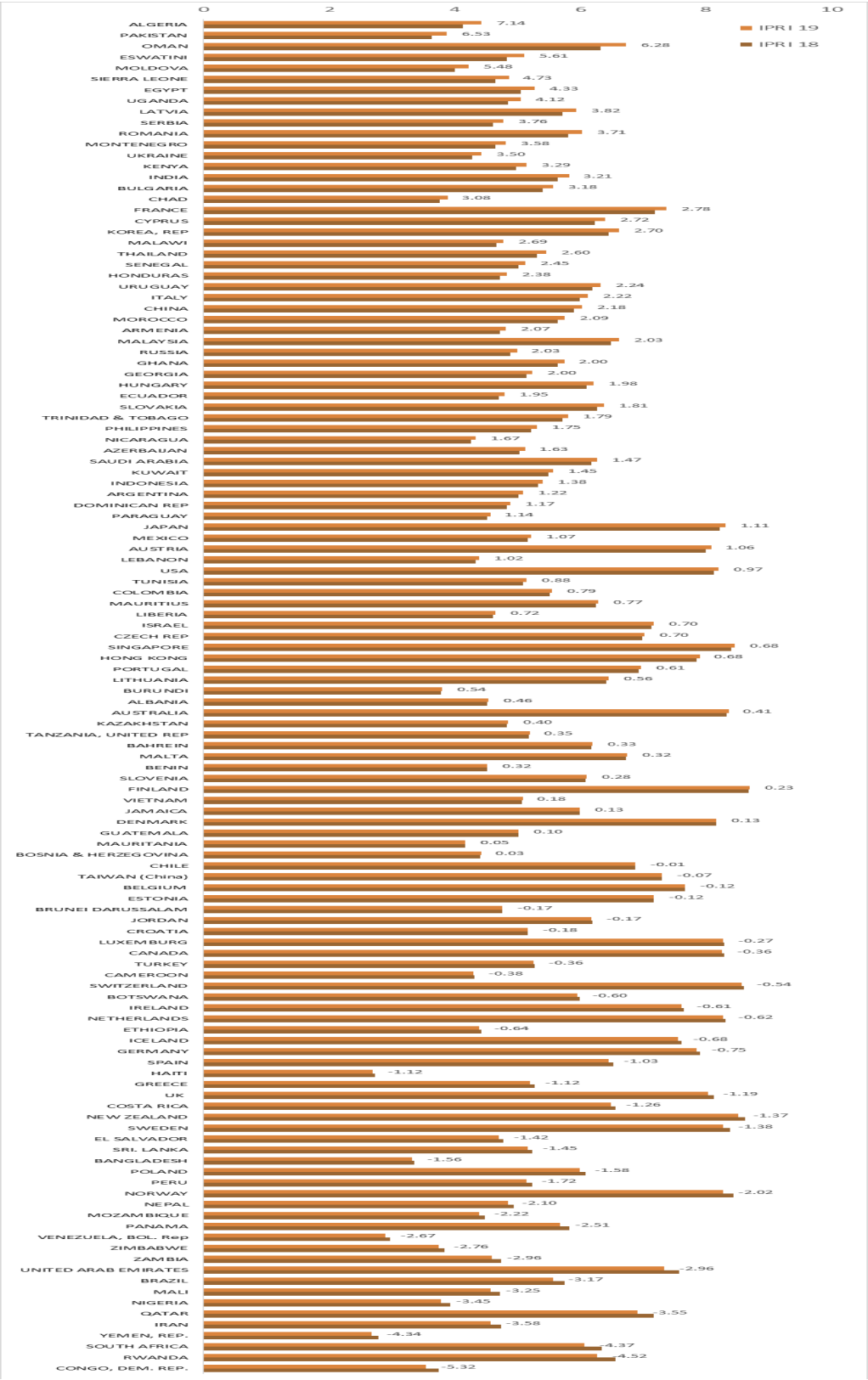


FIGURE 8. LP SCORE 2019-2018 AND VARIATION (%)

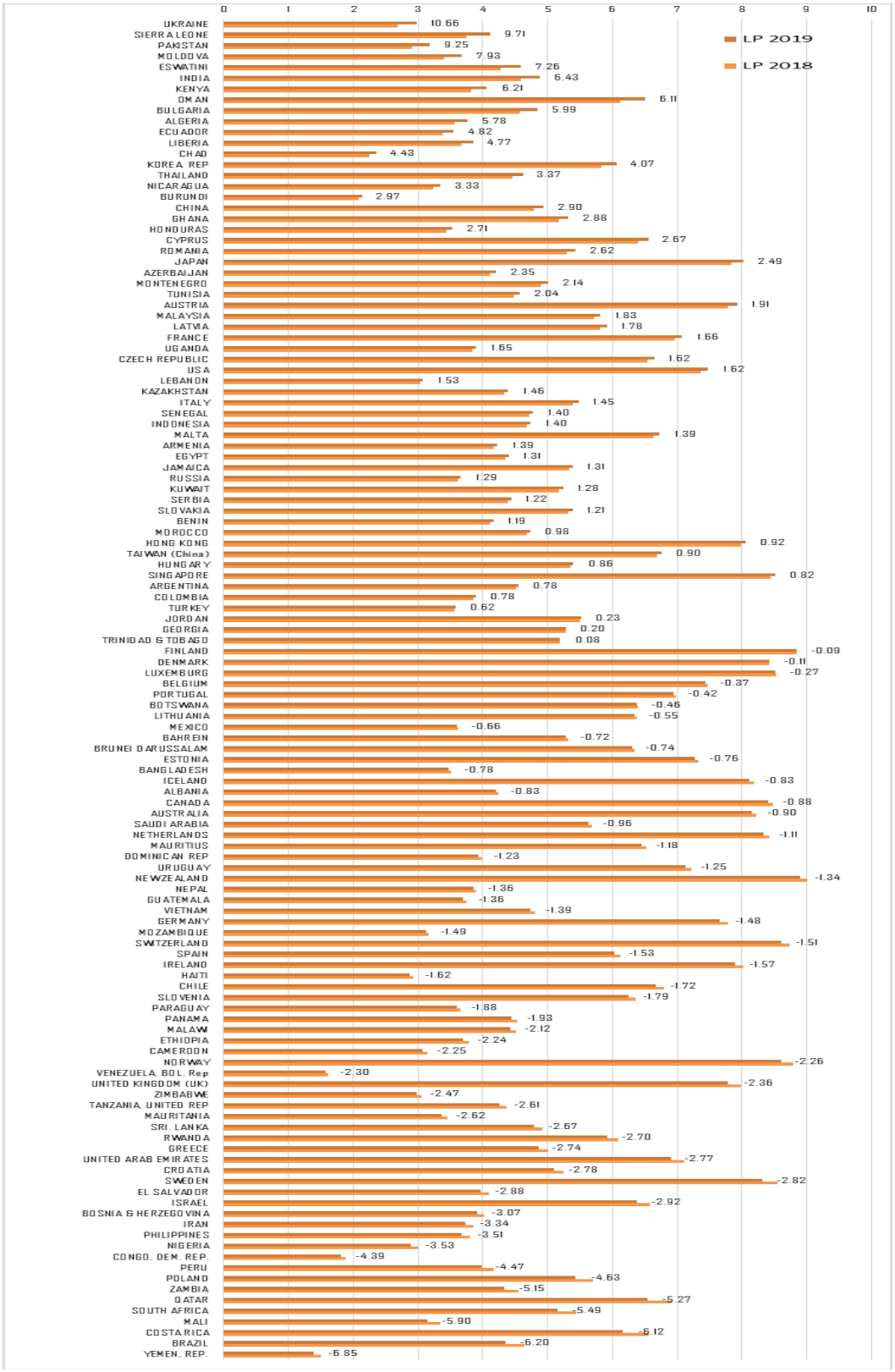


FIGURE 9. PPR SCORE 2019-2018 AND VARIATION (%)

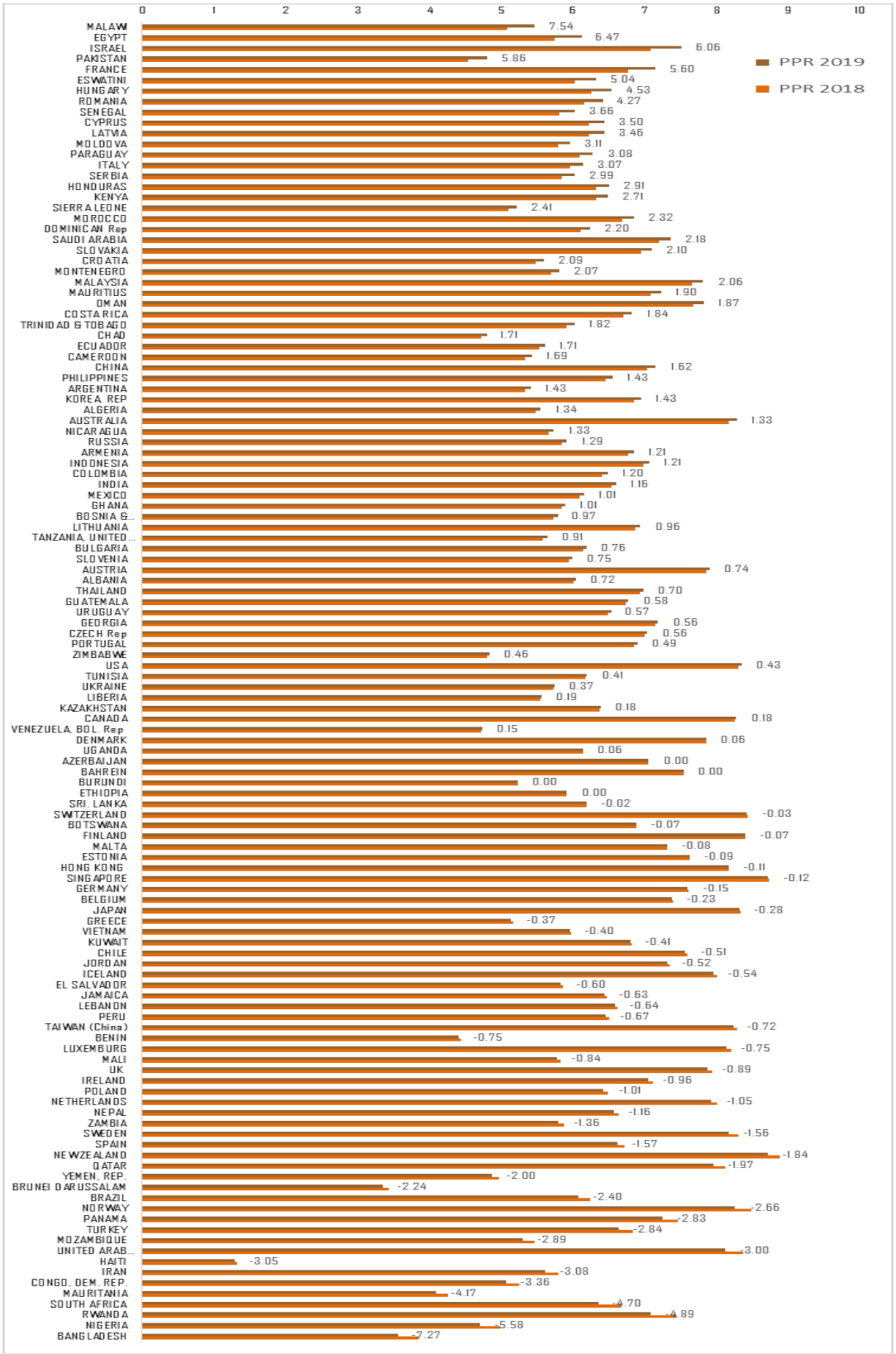
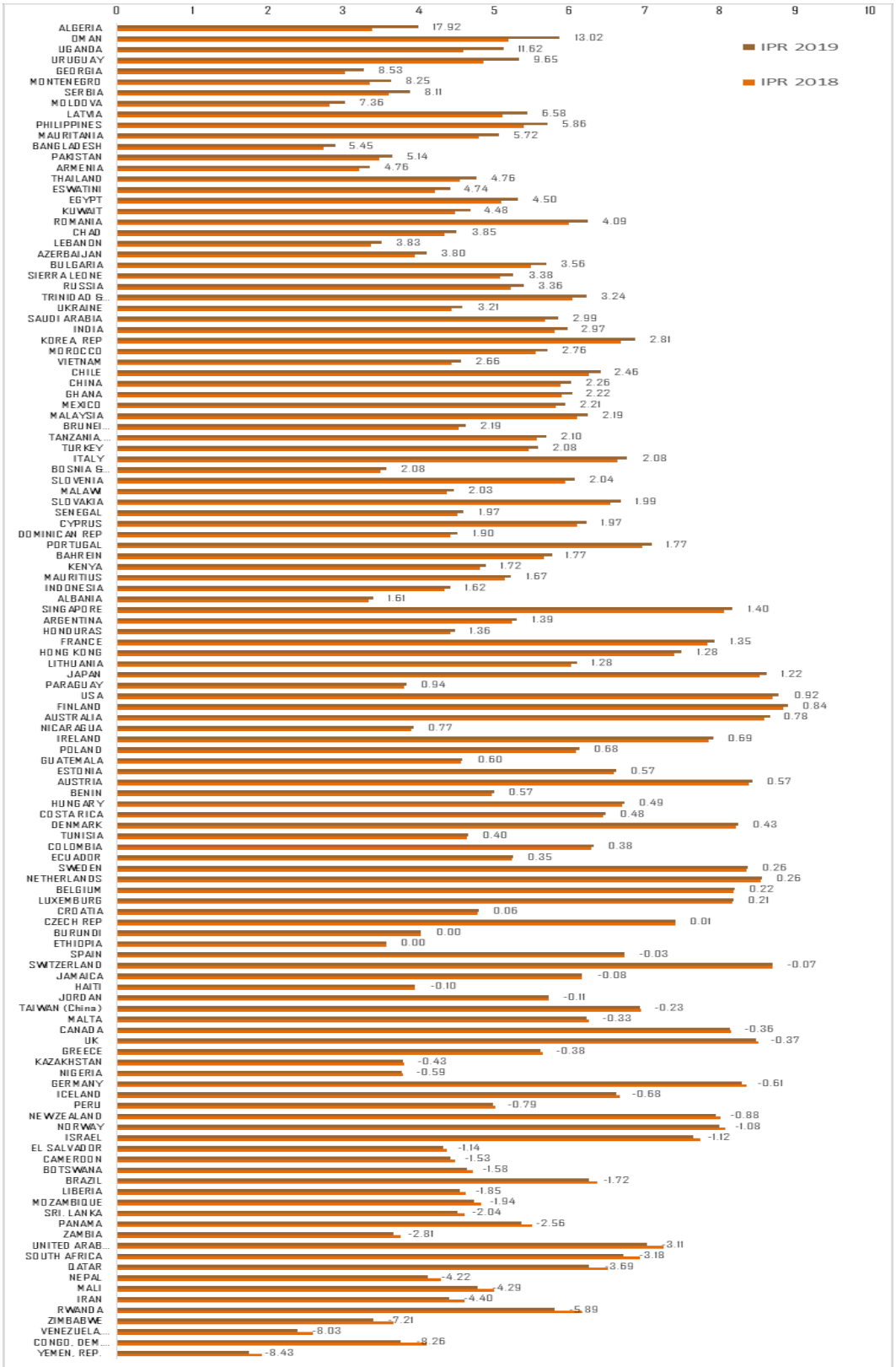


FIGURE 10. IPR SCORE 2019-2018 AND VARIATION (%)



IPRI 2019 GROUPS RESULTS

Following different criteria, groups were conformed: geographical regions, income level, degree of development and participation in economics, and regional integration agreements. For each group the IPRI score and the score of its components were calculated. Former years' classifications (Regional) were also kept for comparison purposes (see Table 6 and Figures 11-15).

a. If compared with 2018, we find mixed results, some groups improved their average IPRI score while other decreased; the same if we evaluate the subcomponents of the index:

b. Regional Groups: most of them improved their IPRI score, the most relevant one being the CEECA (0.1%), Australia & Oceania (0.09%) and MENA countries (0.07%), while showing little drops for Latin America & the Caribbean (-0.1%), Africa (-0.03%) and Western Europe (-0.02%). The results for Latin America & the Caribbean are due to decreases in all the three components of the index, mainly to the backlash of the LP sub-index (-2.8%).

c. Geographical groups: at the top we find Oceania (8.44), North America (7.23) and European Union (6.941), while at the bottom are Africa (4.81), Central America and the Caribbean (5.05) and South America (5.076). Most of the groups improved their IPRI score, but slightly, while the most relevant decrease was shown by South America (-0.123 in absolute terms or -0.24%). South America shows reduction in all the indices' components specially LP (-0.214 or 4.84%). The regional groups that showed decreases in their IPRI score were mainly dragged by the LP component reduction.

d. Regional & Development groups (IMF classification): Advanced Economies (7.47) leads the group followed by MENA & Pakistan (5.35), Emerging and Developing Asia (5.26), Emerging and Developing Europe (5.23), Latin America and the Caribbean (5.07), CIS (4.81), ending with the Sub-Saharan Africa (4.78). Five of the seven groups improved in their IPRI score. The Commonwealth of Independent States leads the improvements by a 0.234%. The relevant improvement of the LP component should be noted in Advanced Economies (2.752 or 59.7%) and Emerging & Developing Europe (1.07 or 29.68%). Decreases of the IPRI scores are shown by Latin America & the Caribbean (-0.1%) and Sub-Saharan Africa (-0.03%), however the most relevant decreases in the components are shown by Emerging and Developing Asia (LP -32.78%, IPR -30.16% and PPR -15.56%).

e. Income group (WB classification): as in previous editions, this year the income classification groups have the same display of the IPRI score. High Income (7.13) remains at the top, followed by Upper Middle (5.18), lower Middle (4.7) and Low Income (4.54) countries. The highest improvement is shown by the Low Income group (0.065 or 0.145%) while the only decrease is shown by the Upper Middle Income group (-0.08%).

f. Integration Agreements: As in 2017, the five top groups are EFTA (8.14), OECD (7.27), NAFTA (7.23), EU (6.94) and TPP-11 (6.88). Of these top 5 groups, just the OECD showed a decrease in its IPRI score (-0.011 or -0.015%) due to the LP component. At the bottom, we find CEMAC (4.1),

CEEAC (4.6), SAARC (4.6), CIS (4.74) and OPEC (4.76) showing the highest decline in the IPRI and its components' scores.

TABLE 6. 2019 IPRI AND COMPONENTS: GROUPS SCORE

Regional	IPRI 2019	LP	PPR	IPR
A	4.759	3.952	5.663	4.660
AO	6.167	5.760	6.840	5.902
CEECA	5.467	4.967	6.427	5.009
LAC	5.070	4.203	5.952	5.055
MENA	5.645	4.910	6.812	5.211
NA	8.234	7.943	8.308	8.451
WE	7.595	7.556	7.481	7.748
Geographical	**IPRI 2019**	**LP**	**PPR**	**IPR**
Africa	4.808	4.004	5.728	4.693
Asia	5.811	5.239	6.795	5.398
Central America & Caribe	5.048	4.255	5.888	5.003
European Union	6.941	6.744	7.007	7.072
North America	7.232	6.493	7.588	7.616
Oceania	8.439	8.523	8.496	8.297
Rest of Europe	5.475	5.021	6.654	4.751
South America	5.076	4.212	5.997	5.019
Regional & Development	**IPRI 2019**	**LP**	**PPR**	**IPR**
Advanced economies	7.471	7.353	7.533	7.527
Commonwealth of Independent States	4.811	4.059	6.444	3.932
Emerging & Developing Asia	5.256	4.710	6.163	4.893
Emerging & Developing Europe	5.228	4.669	6.183	4.833
Latin America & the Caribbean	5.070	4.203	5.952	5.055
Middle East, North Africa & Pakistan	5.346	4.613	6.472	4.952
Sub-Saharan Africa	4.780	3.974	5.722	4.645
Income	**IPRI 2019**	**LP**	**PPR**	**IPR**
High income	7.126	6.980	7.322	7.075
Upper middle income	5.183	4.406	6.314	4.830
Lower middle income	4.695	3.845	5.874	4.367
Low income	4.538	3.644	5.375	4.595

Integration Agreement	IPRI 2019	LP	PPR	IPR
OECD	7.269	7.021	7.379	7.408
EU	6.941	6.744	7.007	7.072
SADC	4.800	4.207	5.679	4.515
ECOWAS	4.824	3.987	5.661	4.824
ASEAN	5.871	5.485	6.634	5.495
PARLACEN	4.912	3.818	6.386	4.533
GCC	6.508	6.016	7.598	5.909
AP	5.702	4.532	6.662	5.913
MERCOSUR	5.388	4.908	6.074	5.181
SAARC	4.603	4.035	5.544	4.230
CEMAC	4.097	2.717	5.113	4.460
MCCA	5.076	4.139	6.330	4.760
CIS	4.739	3.854	6.320	4.041
ARAB M UNION	4.878	4.107	5.670	4.858
CARICOM	4.840	4.489	4.580	5.449
CAN	4.858	3.562	5.846	5.166
EFTA	8.139	8.440	8.212	7.765
IGAD	4.864	3.885	6.179	4.529
NAFTA	7.232	6.493	7.588	7.616
OPEC	4.757	4.007	5.787	4.477
CEEAC	4.153	3.019	5.198	4.242
TPP-11	6.877	6.644	7.235	6.750
PROSUR	5.372	4.368	6.269	5.479

Group members were updated by May 4th, 2019; and it is worth highlighting the following:

- United Kingdom will remain in the EU, according to note in the following link: https://europa.eu/european-union/about-eu/countries_en#tab-0-0
- Bolivarian Republic of Venezuela is not included in Mercosur, according to note in the following link: http://www.mercosur.int/innovaportal/v/7823/4/innova.front/paises-del-mercosur
- Republic of Congo is now a member of OPEC, following: http://www.opec.org/opec_web/en/about_us/25.htm
- Qatar is no more a member of OPEC, following: http://www.opec.org/opec_web/en/about_us/25.htm
- Comoros, is a member of the Southern African Development Community, since 2018.
- Costa Rica keeps as observer member of the Pacific Alliance, following: https://alianzapacifico.net/paises-observadores/

- Panama keeps as observer member of the Pacific Alliance, following: https://alianzapacifico.net/paises-observadores/
- Lithuania is a member of the OCDE, since 2018.

This year we included a new regional agreement: PROSUR (Forum for the progress of South America). It is worth mentioning that some groups are in different classifications and they report different score values. That is the case of Commonwealth of Independent States or Latin America and the Caribbean. This is because in some of the classifications they include/exclude some countries.

FIGURE 11. 2019 IPRI AND COMPONENTS: REGIONAL GROUPS SCORE

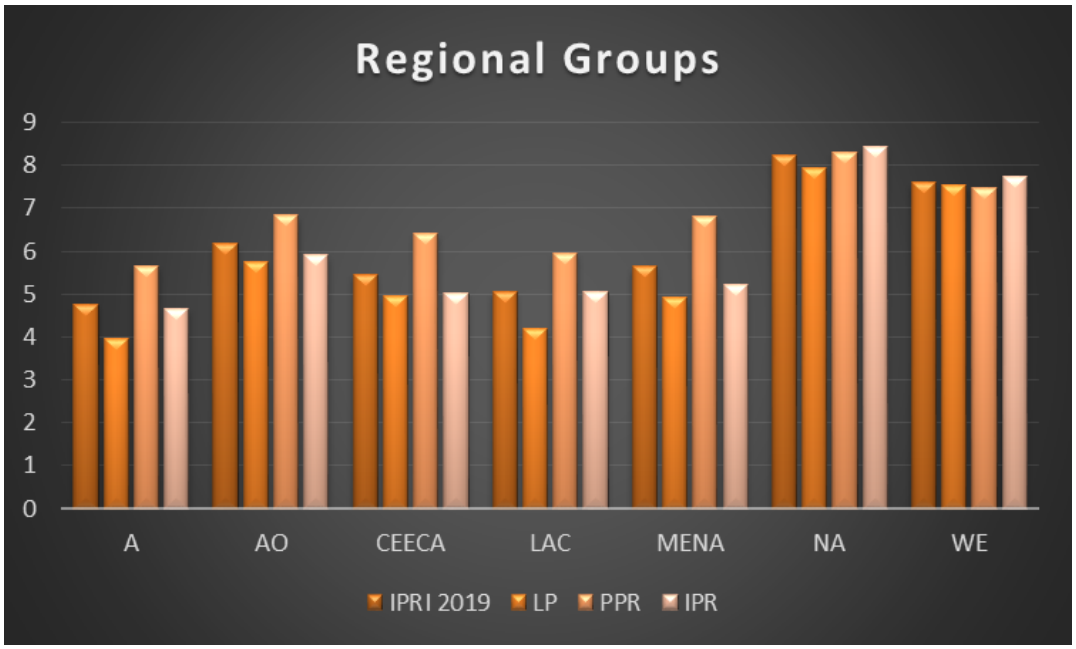


FIGURE 12. 2019 IPRI AND COMPONENTS: GEOGRAPHICAL GROUPS SCORE

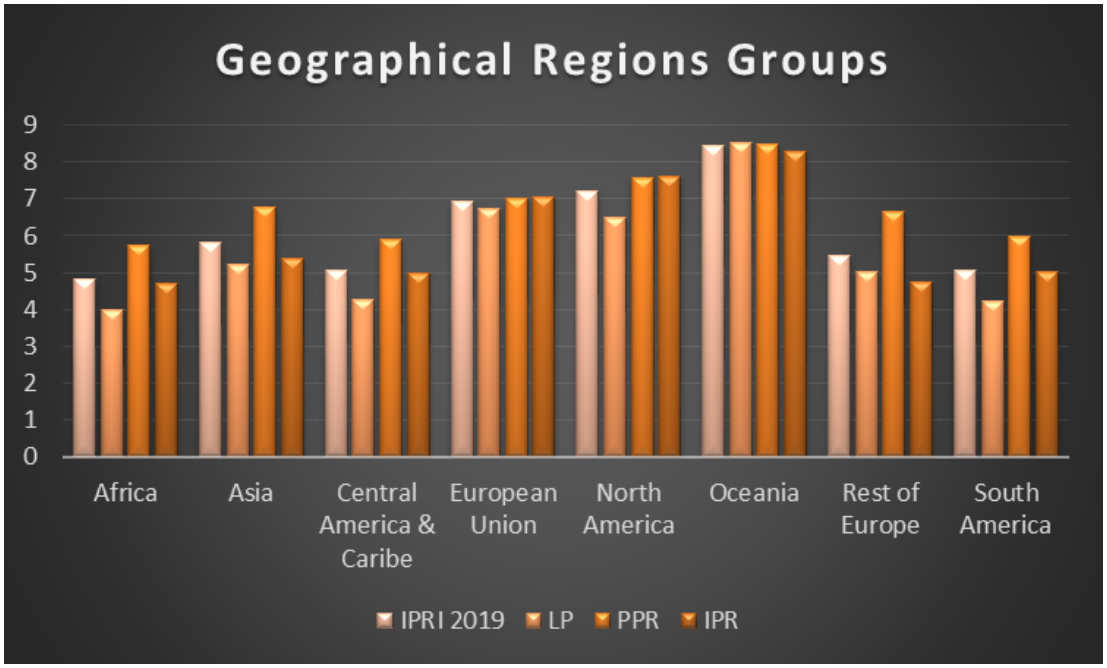


FIGURE 13. 2019 IPRI AND COMPONENTS: DEVELOPMENT GROUPS SCORE

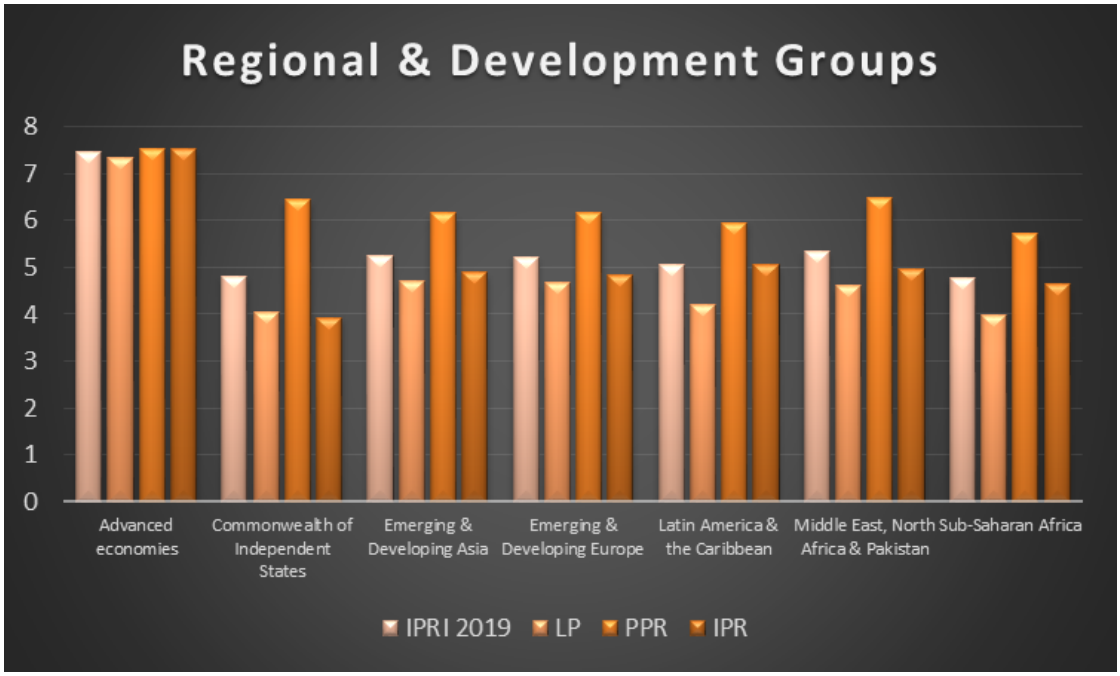


FIGURE 14. 2019 IPRI AND COMPONENTS: INCOME GROUPS SCORE

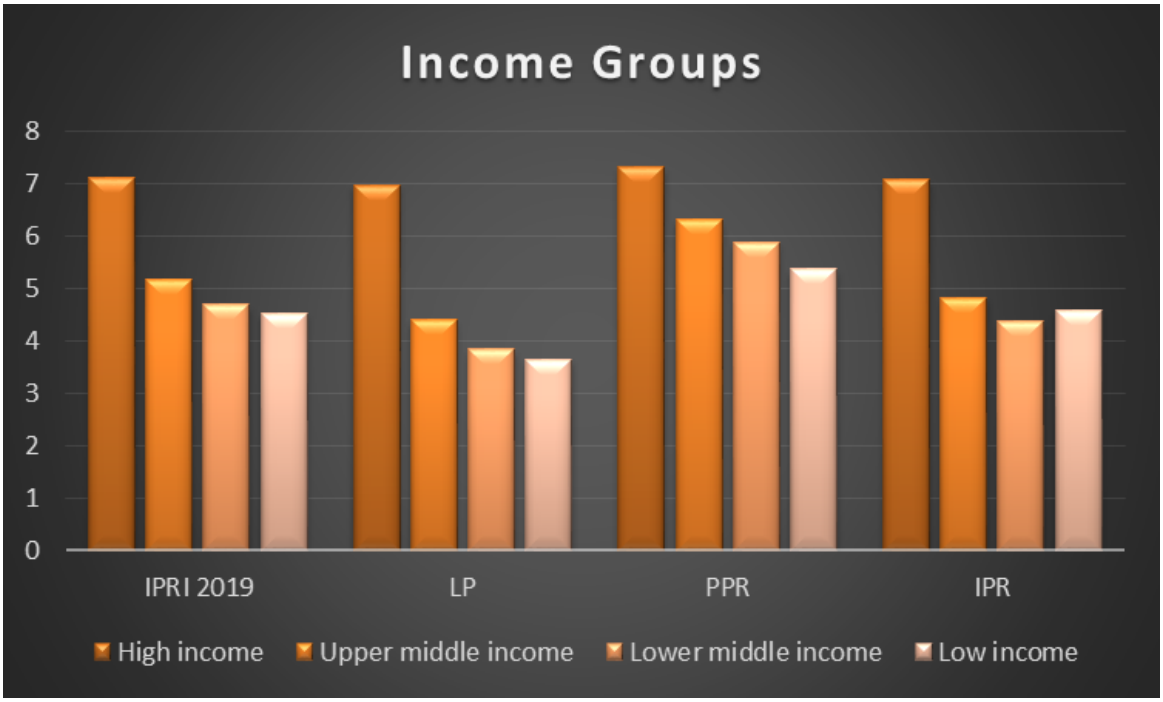
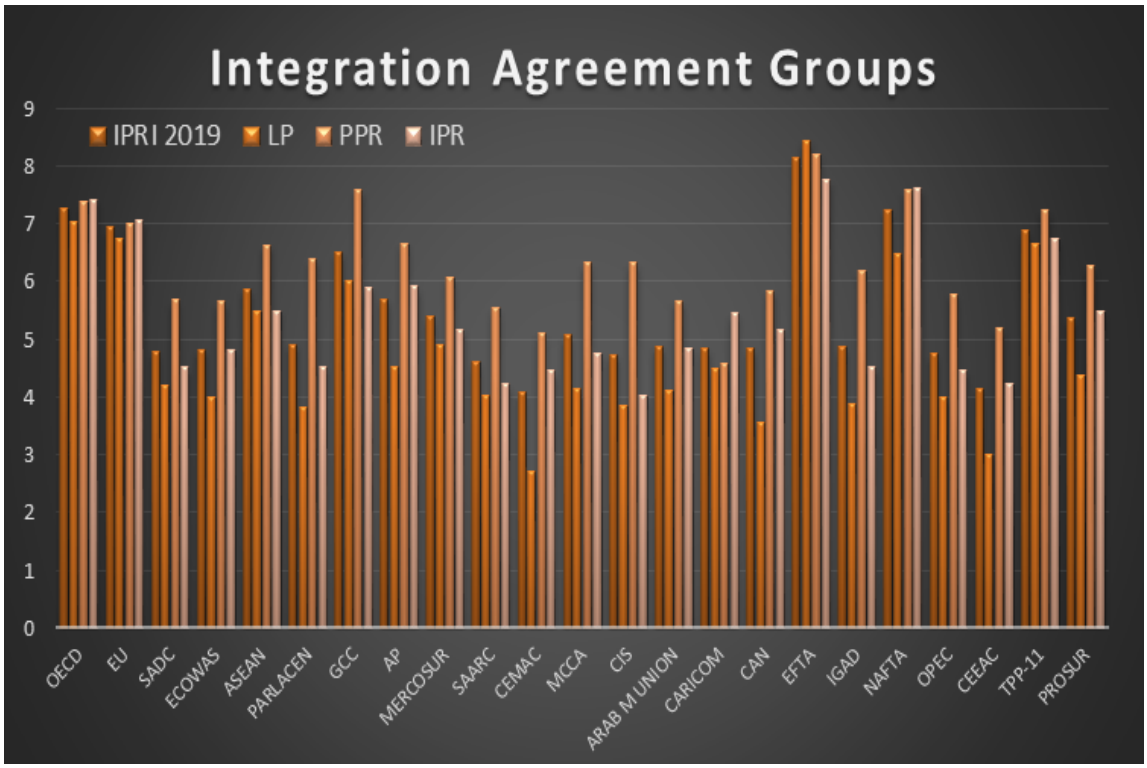


FIGURE 15. 2019 IPRI AND COMPONENTS: INTEGRATION AGREEMENT GROUPS SCORE



IPRI 2019 POPULATION

A demographic perspective is very important for an index such as the IPRI, which aims to assess the level of property rights that people enjoy, regardless of whether measurements are taken by countries.

For that reason, since 2015 we included a population incidence to the index. In this respect, we note that although the 2019-IPRI average score is 5.729, when population weighs in, it reduces to 5.7086. However, there is an improvement if compared to 2018 IPRI-population (5.645) and 2017 IPRI-population (5.522) presenting a positive scenario where more people around the world enjoy property rights protection.

Even with an improvement from the previous years, there is still much room for upgrading the property rights systems in highly populated countries. With this approach, the IPRI becomes an even more powerful tool for policy makers.

This year's sample of 129 countries has a population of 6.93 thousand millions people3-representing 93.83% of world population – and it shows that 71.17% sample population live in 74 countries with an IPRI between 4.5 and 6.4.

More specifically, almost half the sample population (48.36%) live in 30 countries with a middle range of this index: [5.5-6.4]. On the two extremes of the sample, we find that 14.19% enjoys higher levels of property rights protection in 33 countries [6.5-9.4]; and 14.64% sample population live in 22 countries with lower levels of property rights [2.5-4.4].

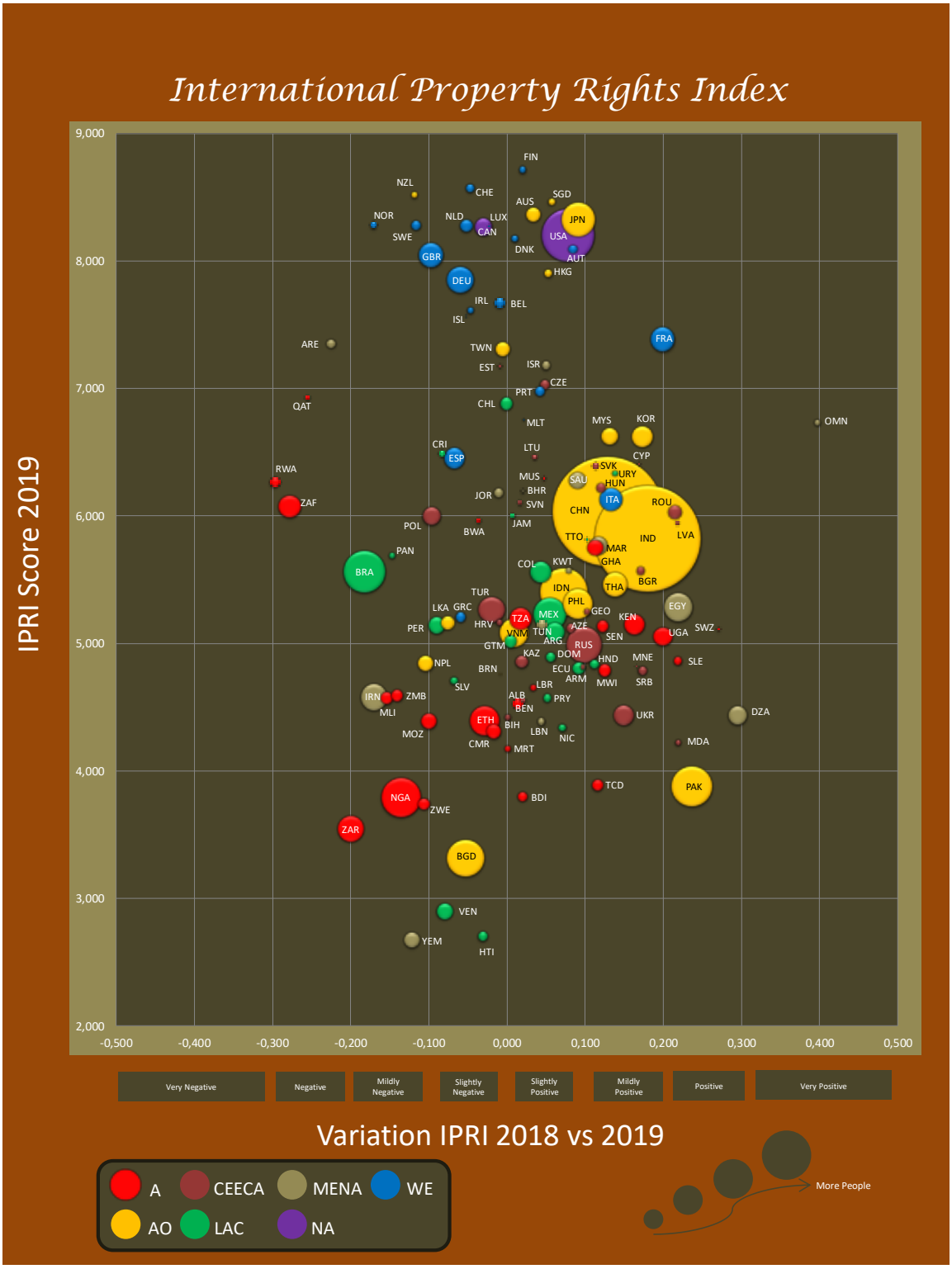
TABLE 7. 2019 IPRI: POPULATION

2019 IPRI (Ranges)	Number of Countries	Population (000)	Population (%)	Incidence (%)	IPRI-Population
2.5 a 3.4	5	257,843	3.72	1.99	2.05
3.5 a 4.4	17	756,435	10.92	9.48	7.64
4.5 a 5.4	44	1,580,393	22.81	29.58	20.51
5.5 a 6.4	30	3,350,118	48.36	24.54	**50.16**
6.5 a 7.4	13	233,688	3.37	12.30	4.14
7.5 a 8.4	17	730,694	10.55	18.62	15.09
8.5 a 9.4	3	18,416	0.27	3.49	0.40
	129	**6,927,586**	**100.00**	**100.00**	**100.00**

[3] Source: United Nations. Population Division. World Population Prospects: The 2017 Revision. http://esa.un.org/unpd/wpp/Download/Standard/Population/ (downloaded on April 10, 2019)

Figure 16 shows a combination of elements while analysing changes in the IPRI scores: country, population, and belonging to particular group. It's positive news to see that most of the countries have improved their scores, particularly those densely populated.

FIGURE 16. 2019 IPRI: COUNTRY SCORE CHANGES (POPULATION AND GROUPS)



IPRI AND GENDER EQUALITY

Gender Equality refers to the equal rights, responsibilities and opportunities for women and men, girls and boys; this means that the interests, needs and priorities of both, female and male, are taken into consideration, recognizing the diversity of these different groups. Being a subject of human rights and social justice, it is a goal in itself. At the same time, its relevance has been demonstrated in fostering development, particularly in some areas like health, education, agriculture and unbiased access to credit for reducing poverty. This way, gender equality plays a decisive role for less developed and developing countries.

Although the unit of analysis of the IPRI are countries, it shows the property rights protection of people, so its gender component grasps possible bias due to this condition. We used the Social Institutions and Gender Index, SIGI (by OECD), to calculate the Gender Equality component for the IPRI, using those items more closely related to property rights and its impact in economic development. The SIGI is composed of five sub-indices, each representing a separate dimension of discrimination: Discriminatory Family Code, Restricted Physical Integrity, Son Bias, Restricted Resources and Assets, and Restricted Civil Liberties.

To account for gender equality, this chapter extends the standard IPRI measure to include a measure of gender equality (GE) concerning property rights. The IPRI formula was modified to incorporate gender equality as following:

$$IPRI\text{-}GE = IPRI + 0.2^{*}GE$$

A weight of 0.2 for the gender equality measure is arbitrary. We varied the weight to 0.5 or according to the female/male population in each country, but scores were highly correlated. We decided to keep the weight of 0.2 for comparison purposes with previous data series.

DATA & METHODOLOGY

The GE component is calculated using the following indicators (Source: OECD Gender, Institutions, and Development Database 2019 (GID-DB) details in Appendix III):

1. **Women's Access to Land**: estimates whether women and men have equal and secure access to land use, control and ownership.
2. **Women's Access to Credit**: measures whether women and men have equal access to financial services.
3. **Women's Access to Property Other than Land**: determines whether women and men have equal and secure access to non-land assets use, control and ownership.
4. **Inheritance Practices**: measures whether women and men have the same legal rights to inheritance of land and non-land assets. Previous edition of this database used to have two items:

Inheritance Practice to Daughters and Inheritance Practice to Widows, however these details are not shown this year, and there is only one item.

5. **Women's Social Rights**: covers broader aspects of women's equality, and it is a composite of six other items crucial to equal standing in society. This year there have been several changes in the information available: parental authority in marriage, parental authority after divorce, access to public space, and son preference in education They are not available in the 2019 edition. However, they were substituted by:

    i. *Divorce*: Measures whether women and men have the same legal rights to initiate divorce and have the same requirements for divorce or annulment.

    ii. *Household responsibilities*: Measures whether women and men have the same legal rights, decision-making abilities and responsibilities within the household.

    iii. *Female genital mutilation*: Measures the occurrence of female genital mutilation.

    iv. *Violence against women*: Measures whether the legal framework protects women from violence – including intimate partner violence, rape, and sexual harassment – without legal exceptions and in a comprehensive approach.

    v. *Freedom of movement*: Measures whether women and men have the same rights to apply for national identity cards (if applicable) and passports and travel outside the country.

    vi. *Citizenship rights*: Measures whether women and men have the same citizenship rights and ability to exercise their rights.

The original data has three levels: 0 (Best), 0.5 (Average) and 1 (Worst). All data series were rescaled to the IPRI scale of (0-10). The final GE score is an index based on the average of the five equally weighted variables. Those variables with more than one item where calculated also as equally weighted. A minimum score (0) means complete discrimination against women, while maximum score (10) is given to countries with gender equality. Therefore, the IPRI-GE scale is (0-12). As the GE data source is discrete, equal outcomes are likely to be found. That will be minimized in the IPRI-GE thanks to the variability of the IPRI scores.

IPRI-GE AND GE: COUNTRY RESULTS

For the first time, this year the IPRI-GE shows results for all the 129 countries included in the 2019 IPRI. As an average, the 129 countries show a GE score of 7.243 which is lower by 2.88% than last year (7.458). The average 2019 IPRI-GE score is 7.177 showing a slight decrease (in 2018 was 7.228) of 0.71%. However, it should be highlighted that, as noted in the previous section (*VI.1. Data & Methodology*), there are important changes in the items included for the calculations[4]. See Figures 17a and 17b for scores and rankings.

Looking into details of the GE components, we find that of the five components, Women's Social Rights is the weaker, showing an average score of 5.28, followed by Inheritance Practices (6.744),

4 2017 IPRI-GE= 7.118; 2016 IPRI-GE=6.933; 2015 IPRI-GE= 6.76

Women's Access to Land Ownership (7.558), Women's Access to Property other than Land (7.888); and the stronger one is Women's Access to Bank Loans (8.682).

Among the Women's Social Rights sub-components, the best scored item was Freedom of Movement (8.411), followed by Citizens Rights (7.403), Divorce (6.589), Household Responsibilities (4.302), Violence against Women (4.244), Workplace Rights (3.527) and Female Mutilation (2.539).

Fifteen countries, show a range of [9.5-9.786] for the GE score: Austria, Malta, Sweden, Belgium, Portugal, Norway, Australia, New Zealand, Denmark, Estonia, Iceland, Ireland, Netherlands, Switzerland and USA. Seventeen other countries score from [9-9.5] for a total of 32 [9-top].

Twenty countries show scores lower than 5: Kuwait (1.357), Mauritania (2.929), Egypt (2.929), Philippines (3.143), Eswatini (3.143), Uganda (3.5), Cameroon (3.643) and Pakistan (3.929).

Finland leads the IPRI-GE (10.584), followed by Switzerland (10.472), New Zealand (10.428), Australia (10.278), Sweden (10.238), Norway (10.208) Netherlands (10.173), Singapore (10.148), Luxemburg (10.147), USA (10.103), Denmark (10.074), Austria (10.047) and Canada (10.008). All of them are very close in their score values and are over 10.

On the other extreme of the IPRI-GE, with scores below five (5), we find Yemen Rep. (3.786), Bangladesh (4.113), Haiti (4.175), Angola (4.202), Pakistan (4.661), Chad (4.701), Bolivarian Rep. Venezuela (4.710), Democratic Rep. Congo (4.746), Mauritania (4.758) and Nigeria (4.816).

Some of these countries report this low value due to their low IPRI scores and not their GE scores, which is the case for Bolivarian Rep. Venezuela, with GE=9.071, Haiti with GE=7.357, and Democratic Rep. Congo with GE=6.

Analyzing the IPRI-GE by groups, we found the following results (see Figure18):

- Geographical Regions: at the top we find Oceania (10.353), North America (8.956), European Union (8.744), Rest of Europe (7.11), and Asia (7.036); while at the bottom are Africa (5.94), South America (6.627), and Central America & Caribbean (6.648).
- Regional and Development criteria (IMF): Advanced Economies (9.28) is leading the group followed by Emerging and Developing Europe (7.82), Latin America and the Caribbean (6.64), Emerging and Developing Asia (6.45), CIS (6.41), MENA & Pakistan (6.27), ending with Sub-Saharan Africa (5.97).

  CIS countries show a high GE score (8.0) but the IPRI pulls down their IPRI-GE, similarly with Latin America and the Caribbean, and Emerging and Developing Europe; while the opposite happens with MENA & Pakistan (GE= 4.6) and Emerging and Developing Asia (GE=5.99), where the GE score is low.
- Income classification (World Bank): this year the IPRI-GE and the GE display the same pattern as the IPRI, holding the relationship between property and economic strength.

- Economic and Regional Integration Agreements: As in the IPRI, the five top groups are EFTA (10.05), OECD (9.04), NAFTA (8.96), EU (8.74) and TPP-11 (8.42). The bottom groups are CEMAC (4.87), CEEAC (5.26), SAARC (5.65) and Arab Monetary Union (5.79). It should be noted that CIS, CAN, PARLACEN, MERCOSUR, PROSUR and CARICOM show high GE scores, but their IPRI scores reduce their IPRI-GE values.

FIG. 17A. 2019 IPRI-GE: SCORES & RANKINGS

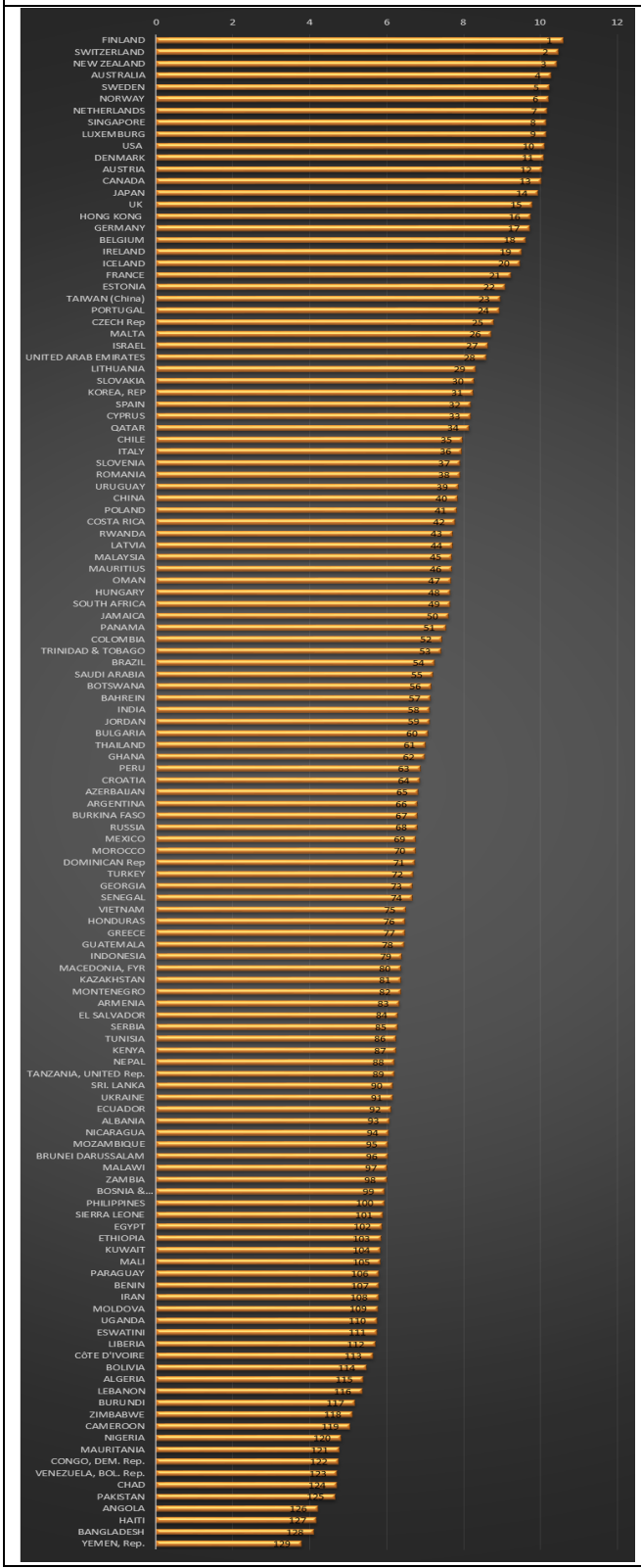


FIG. 17B. 2019 GE: SCORES & RANKINGS

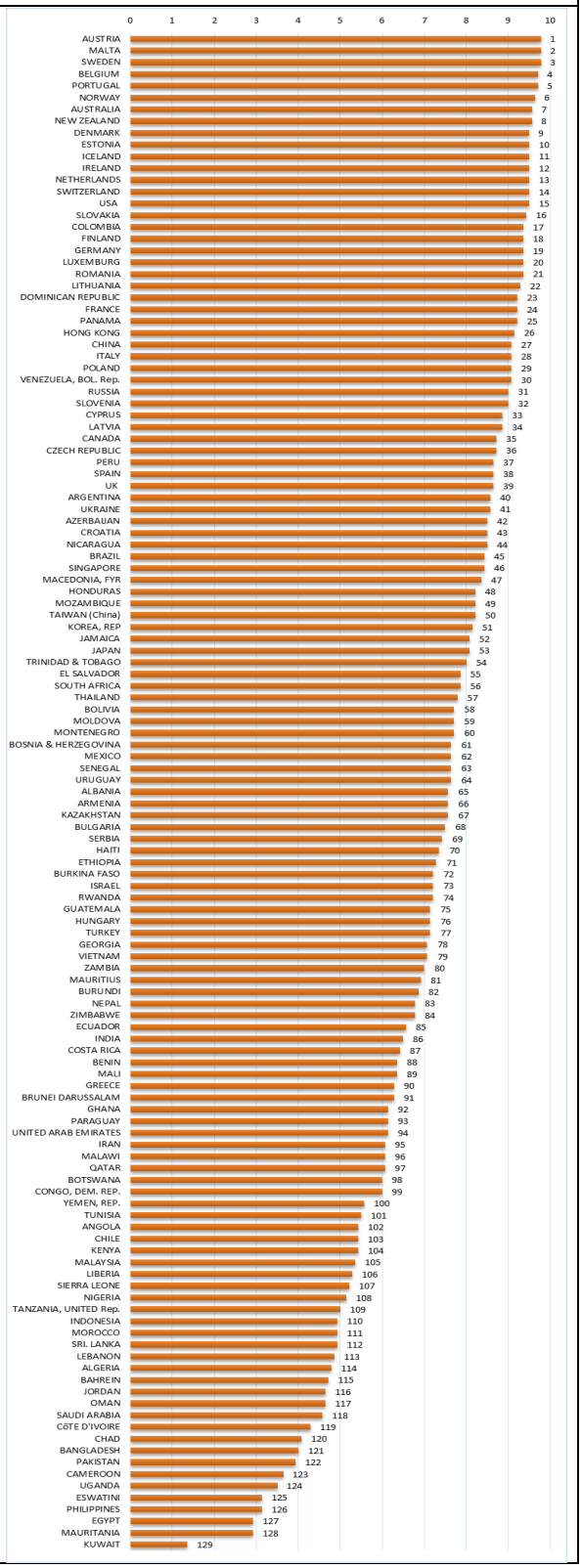


FIGURE18. 2019 IPRI-GE AND GE: GROUPS.

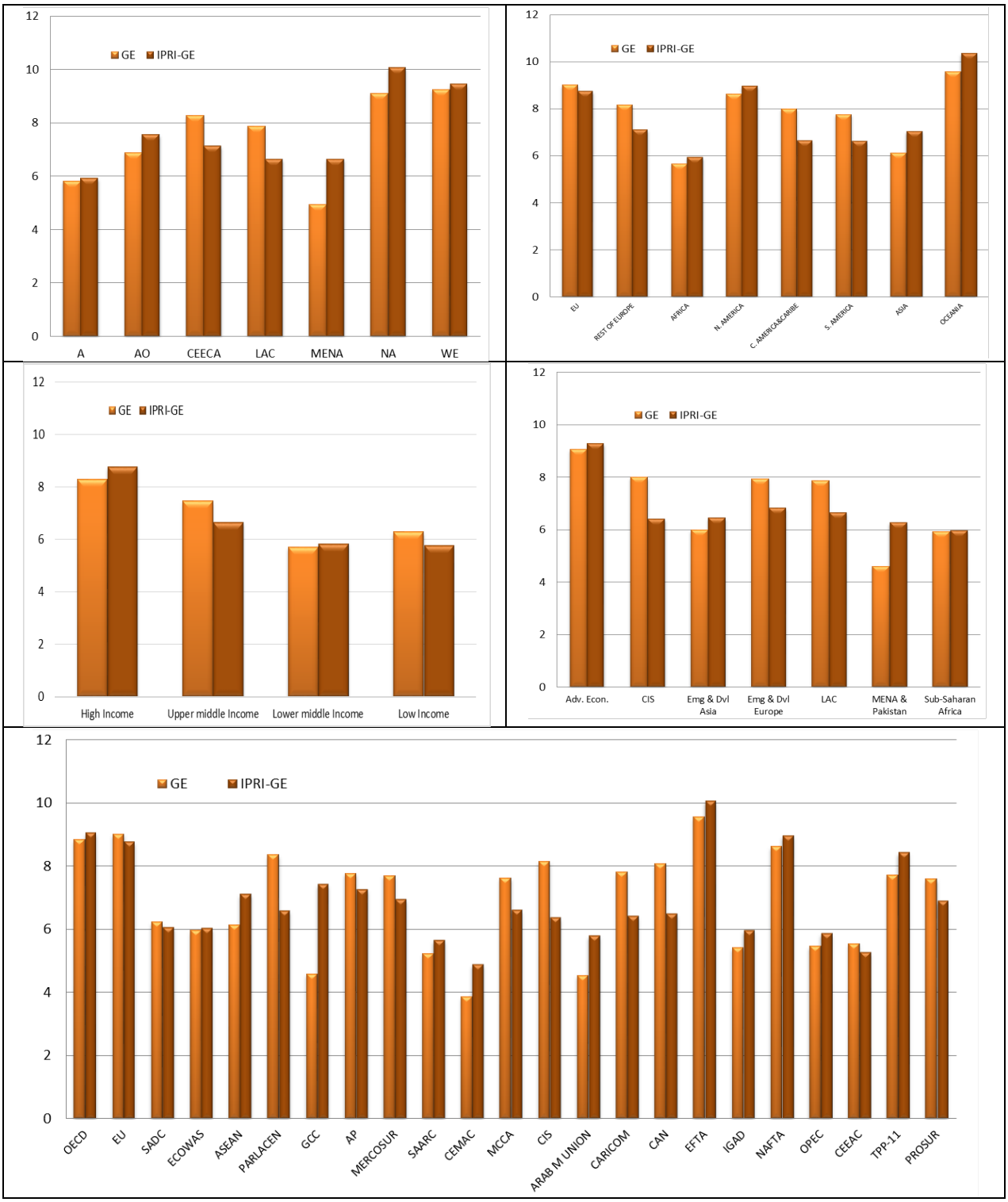


Table 8 shows the 2019 IPRI-GE rankings by quintile for the 129 countries in the sample. As in the IPRI, the number of countries belonging to each quintile increases from the top 20% to the bottom

20% (1st quintile 18 countries, 2nd quintile 22 countries, 3rd quintile 25 countries, 4th quintile 29 countries, and 5th quintile 35 countries). Hence, the fourth and the fifth quintiles include 49.6% of the countries (64 countries) of the sample.

TABLE 8. 2019 IPRI-GE RANKING BY QUINTILES

Strongest

Weakest

Top 20 Percent	2nd Quintile	3rd Quintile	4th Quintile	Bottom 20 Percent
FINLAND	IRELAND	POLAND	ARGENTINA	MOZAMBIQUE
SWITZERLAND	ICELAND	COSTA RICA	BURKINA FASO	BRUNEI DARUSSALAM
NEW ZEALAND	FRANCE	RWANDA	RUSSIA	MALAWI
AUSTRALIA	ESTONIA	LATVIA	MEXICO	ZAMBIA
SWEDEN	TAIWAN (China)	MALAYSIA	MOROCCO	BOSNIA & HERZEGOVINA
NORWAY	PORTUGAL	MAURITIUS	DOMINICAN REP.	PHILIPPINES
NETHERLANDS	CZECH REP.	OMAN	TURKEY	SIERRA LEONE
SINGAPORE	MALTA	HUNGARY	GEORGIA	EGYPT
LUXEMBURG	ISRAEL	SOUTH AFRICA	SENEGAL	ETHIOPIA
USA	UNITED ARAB EMIRATES	JAMAICA	VIETNAM	KUWAIT
DENMARK	LITHUANIA	PANAMA	HONDURAS	MALI
AUSTRIA	SLOVAKIA	COLOMBIA	GREECE	PARAGUAY
CANADA	KOREA, REP	TRINIDAD & TOBAGO	GUATEMALA	BENIN
JAPAN	SPAIN	BRAZIL	INDONESIA	IRAN
UK	CYPRUS	SAUDI ARABIA	MACEDONIA, FYR	MOLDOVA
HONG KONG	QATAR	BOTSWANA	KAZAKHSTAN	UGANDA
GERMANY	CHILE	BAHREIN	MONTENEGRO	ESWATINI
BELGIUM	ITALY	INDIA	ARMENIA	LIBERIA
	SLOVENIA	JORDAN	EL SALVADOR	CÔTE D'IVOIRE
	ROMANIA	BULGARIA	SERBIA	BOLIVIA
	URUGUAY	THAILAND	TUNISIA	ALGERIA
	CHINA	GHANA	KENYA	LEBANON
		PERU	NEPAL	BURUNDI
		CROATIA	TANZANIA, UNITED REP.	ZIMBABWE
		AZERBAIJAN	SRI. LANKA	CAMEROON
			UKRAINE	NIGERIA
			ECUADOR	MAURITANIA
			ALBANIA	CONGO, DEM. REP.
			NICARAGUA	VENEZUELA, BOL. REP.
				CHAD
				PAKISTAN
				ANGOLA
				HAITI
				BANGLADESH
				YEMEN, REP.

IPRI: BUILDING BLOCK OF QUALITY OF LIFE

Given the extensive literature that informs of important interactions between property rights and the quality of life of citizens, we examined different items to evaluate their correlations with the IPRI and straight on, extracting empirically based conclusions. Those indices were gathered in three groups or dimensions:

- Economic outcomes
- Institutions
- Innovations

ECONOMIC OUTCOMES

Trying to grasp development, economic outcomes obviously do not capture everything, and many other aspects are likely to influence it; however it is a first step to approach to it. Four economic elements were evaluated with the IPRI and its components (for source details see Appendix IV):

- Production: using the Gross Domestic Product (GDP)[5] in constant USD in *per capita* terms and also adjusted by the Gini Coefficient[6]. Adjusting the GDP by the Gini coefficient was considered to capture income inequality (Data Source: World Bank and UNDP).
- Domestic investment: using the Gross Capital Formation in current *per capita* terms, which consists of outlays in addition to the fixed assets of the economy plus net changes in the level of inventories (Data Source: World Bank and UNDP).
- Entrepreneural ecosystem: using the Global Entrepreneurship Index of GEDI that measures the health of the entrepreneurship ecosystems in countries, and ranks the performance of these countries against each other, providing a picture of how each of them performs in both the domestic and international context (Data Source: The Global Entrepreneurship and Development Institute).
- Composition of production: using the Index by the Atlas of Economic Complexity. The complexity of an economy is related to the multiplicity of useful knowledge embedded in it. We can measure economic complexity by the mix of products that countries are able to make (Data Source: The Observatory of Economic Complexity, MIT).

Then we used the Pearson Correlation Coefficient, which is a measure of the linear dependence between two variables, to evaluate their correlations with the IPRI and its components. We found that these correlations were significant and strong[7] (see Table 9).

5 GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It was calculated without making deductions for depreciation or for depletion and degradation of natural resources.
6 The Gini Coefficient is a statistical measure of the degree of variation represented in a set of values.
7 Correlation theory is aimed to show the possible relationship, association or dependence between two or more observed variables. Besides it allows for the analysis of the type of association (direct or indirect) and the level or degree of intensity between them.

The tranches or correlation ranges are as follow: None [0], Weak (0 - 0.3), Soft [0.3 - 0.5), Moderate [0.5 - 0.6), Good [0.6 - 0.8), Strong [0.8 – 1), Perfect [1]. The direction of the correlations were as expected.

	Table 9. Pearson Correlation Coefficients				
		IPRI	LP	PPR	IPR
Production	GDP *per capita* (constant 2010 USD)	0.816	0.822	0.629	0.781
	GDP *per capita* * GINI (constant 2010 USD)	0.817	0.823	0.628	0.783
Investment	Gross Capital Formation *per capita* (current USD)	0.743	0.752	0.602	0.687
Entrepreneurship	Global Entrepreneurship Index	**0.901**	0.886	0.766	0.836
Prod. Composition	Economic Complexity Index	0.789	0.741	0.686	0.789

GDP per capita correlations increased slightly when adjusted by the Gini Coefficient, which is a measure of dispersion or inequality, giving to the GDP per capita a more adjusted measure in each country. This situation is valid for the IPRI as for LP and IPR components.
The highest correlation was found for the LP component, followed by the IPRI itself, then the IPR and the PPR component.

The relationship with domestic investments (Gross Capital Formation) showed for the LP a Pearson's of 0.752 followed by the IPRI (0.743), the IPR (0.687) and the PPR (0.602) component.

Domestic production composition (Economic Complexity) also exhibited a high Pearson's (0.789), then IPR (0.789), followed by the LP (0.741) and the PPR (0.686) component.

Of all the items, the entrepreneurial environment was the one with the highest correlations (0.901) and its components in this order: LP (0.886), IPR (0.836) and PPR (0.766). This finding points to entrepreneurship and property rights sharing positions as building blocks of a healthy economy and a better quality of life for citizens.

Figures 19a and 19b show the best-fit curve for the IPRI and its components with each economic item and the coefficients of determination8 (R2). Figure 19a displays the relationship IPRI-economic outcomes showing countries with a demographic perspective. The relevant proportion of population (represented by the radius of each circle) live in countries of middle level IPRI and low to mid economic outcomes.

[8] The coefficient of determination (R^2) represent the proportion of the variance in the dependent variable that is predictable from the independent variable. It ranges from 0 to 1.

Figure 20 shows that, on average, countries in the top quintile of IPRI scores (i.e. top 20%) show a per capita income almost 16 times that of the countries in the bottom quintile. Even though it is an important disparity, it has improved in time as in 2015 it was almost 24 times. Statistics are based on the averages of IPRI-2019 scores and corresponding data on average GDP per capita in USD constant terms (2010=100, source: World Bank data) for the last available year. These results reinforce the significant and positive relationship between prosperity and a property rights system, measured at an individual level.

FIG. 19A. IPRI CORRELATIONS WITH ECONOMIC OUTCOMES VARIABLES INCLUDING DEMOGRAPHIC IMPACT

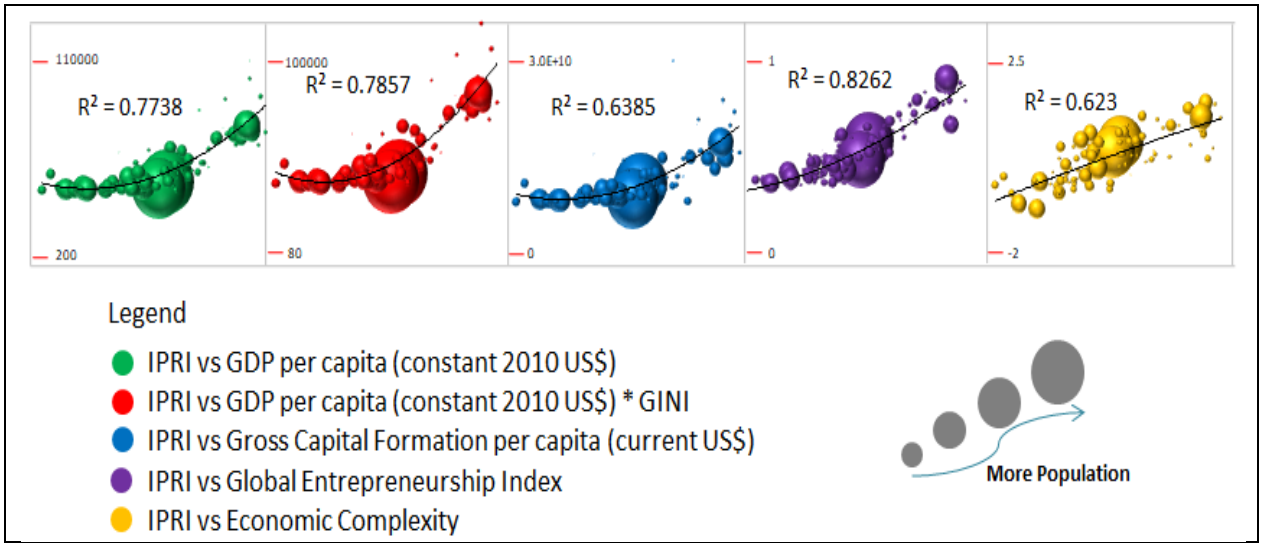


FIGURE 19B. IPRI COMPONENTS CORRELATIONS WITH ECONOMIC OUTCOMES

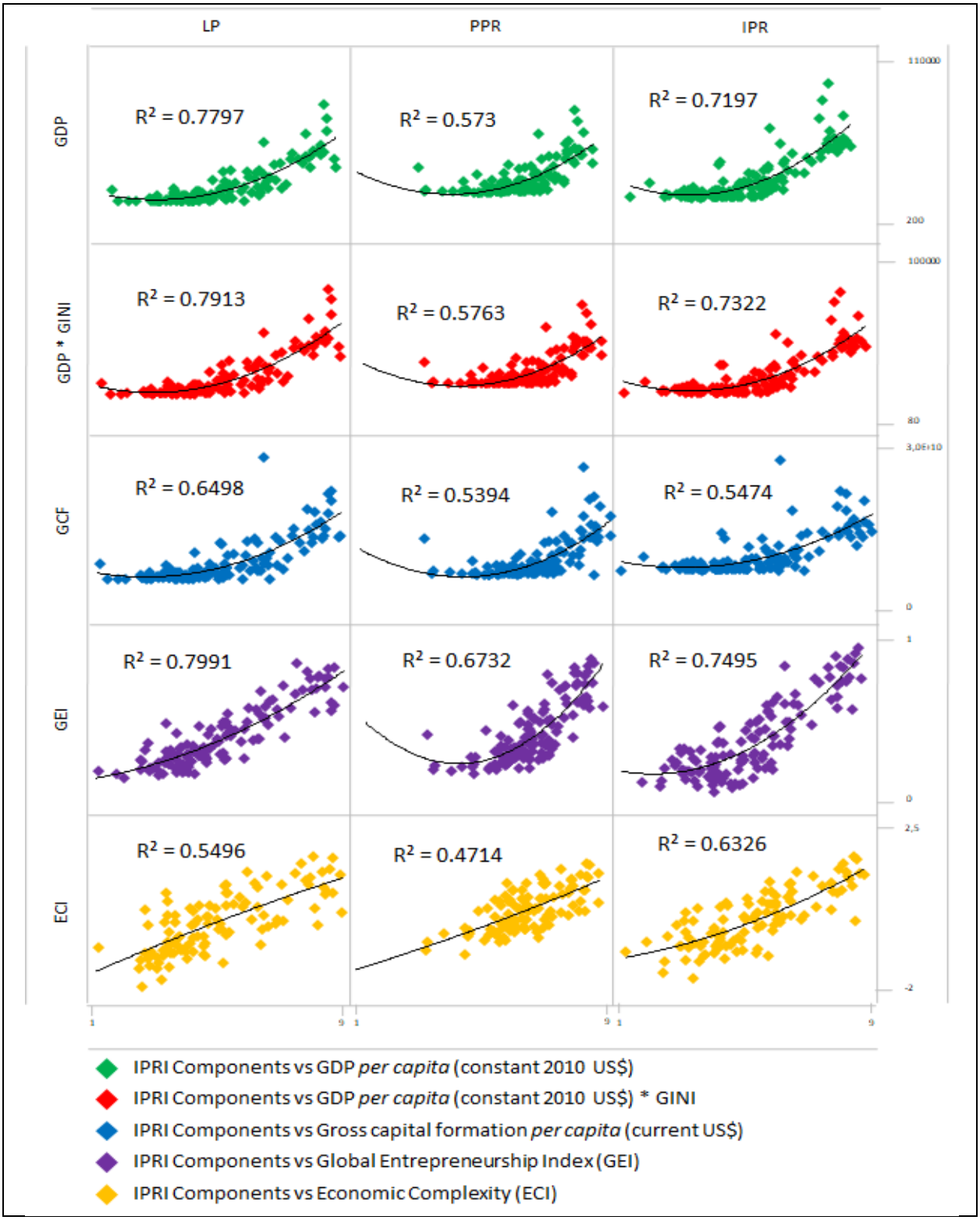
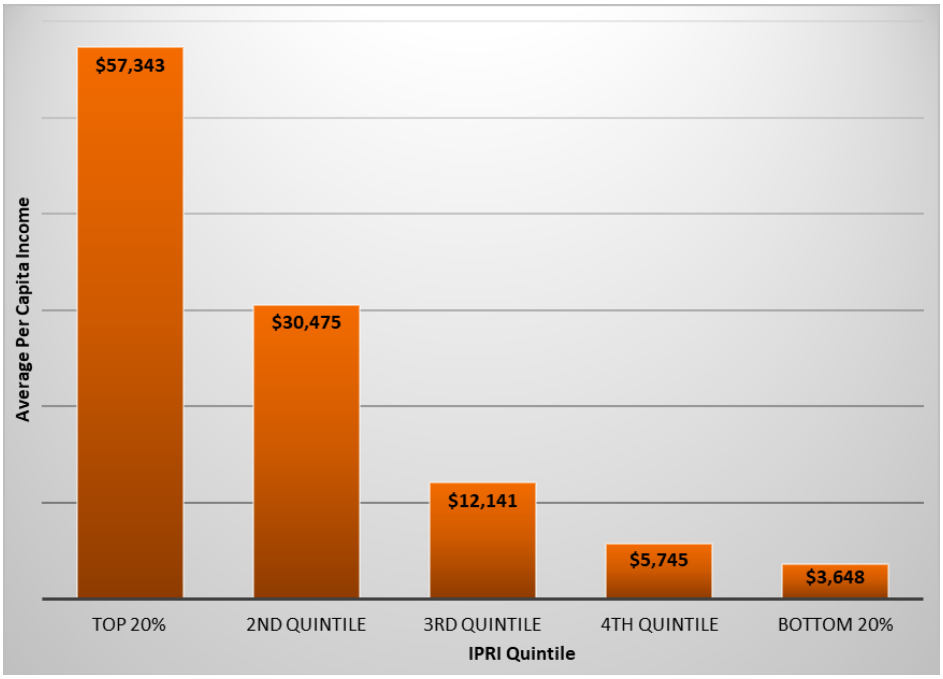


FIGURE 20: AVERAGE *PER CAPITA* INCOME BY 2019-IPRI QUINTILES



INSTITUTIONS

Institutions or 'rules of the game' are fundamental in structuring incentives, favoring or discouraging behaviors, determining irreconcilable conflicts of interest, or inspiring to cooperate in a society. To the extent that institutions are adequate, known, transparent and fair, they will allow economic processes – investment, production, trade, consumption – to materialize, driving innovation and social learning.

Institutions are based on shared conceptions, beliefs, and expectations, therefore their existence is self-reinforced and persistent. Consequently their transformation is slow. In addition, the interaction generated among agents is non-linear, that is, with information feedback, offering a constant normative evaluation scheme, and allows it to incorporate values progressively as an adaptation and improvement mechanism.

Three elements were included in the evaluation of the IPRI and its components (for source details see Appendix IV):

- Strength of Institutions: measured by three indices:
    - *Institutional Quality Index* – a relative index that compares the quality of institutions of countries. It has two dimensions: (1) political (including rule of law, voice & accountability,

corruption perception and freedom of the press) and (2) economic (including economic freedom and competitiveness).

- *Corruption Perception Index* – classifies the way analysts, executives and experts perceive if corruption exists in their country's public sector.
- *The Illicit Trade Environment Index* – (commissioned by the Transnational Alliance to Combat Illicit Trade, TRACIT, and produced by The Economist Intelligence Unit, EIU), measures the enabling environment for illicit trade that economies create through both action and inaction across four categories. The 2018 index covers 84 countries across the world. The objective of the index is to improve the knowledge and understanding of the regulatory environment and economic circumstances that enable illicit trade.

- Risk Alerts: measured by the *INFORM Index* which identifies countries at a high risk of humanitarian crisis. The INFORM Index goal is to establish a common evidence-base for global humanitarian risk analysis. INFORM identifies the countries at a high risk of humanitarian crisis that are more likely to require international assistance. The INFORM model is based on risk concepts published in scientific literature and envisages three dimensions of risk: Hazards & Exposure, Vulnerability, and Lack of Coping Capacity. The INFORM model is split into different levels to provide a quick overview of the underlying factors leading to humanitarian risk. The INFORM Index supports a proactive crisis management framework. It is helpful for an objective allocation of resources for disaster management as well as for coordinated actions focused on anticipating, mitigating, and preparing for humanitarian emergencies. This index follows a decreasing direction, meaning that the lower the score, the better situation of the country. In Appendix V, Cluster 1 countries show higher average score than those of Cluster 3.
- Civic Activism: measured by the *Civic Activism* measure of the International Institute of Social Studies (http://www.indsocdev.org). Civic Activism refers to the social norms, organizations, and practices that facilitate greater citizen involvement in public policies and decisions. These include access to civic associations, participation in the media, and the means to participate in civic activities such as nonviolent demonstrations or petitions.

	Table 10. Pearson Correlation Coefficients				
		IPRI	LP	PPR	IPR
Strength	Institutional Quality Index	0.916	0.927	0.791	0.826
	Corruption Perception Index	**0.934**	0.971	0.740	0.849
	The Illicit Trade Environment Index	0.891	0.880	0.737	0.865
Risk Alerts	INFORM Index	-0.761	-0.826	-0.615	-0.642
Civic Activism	Civic Activism	0.837	0.812	0.697	0.816

As shown in table 10, the highest correlation coefficient is with the Corruption Perception Index followed by the Institutional Quality Index, the Illicit trade Environment the Civic Activism and the Inform Index. The correlation for all the indices is always higher in the LP component than for the IPRI, followed by the IPR and the PPR components.

FIGURE 21A. IPRI CORRELATIONS WITH INSTITUTIONS (WITH POPULATION INFORMATION)

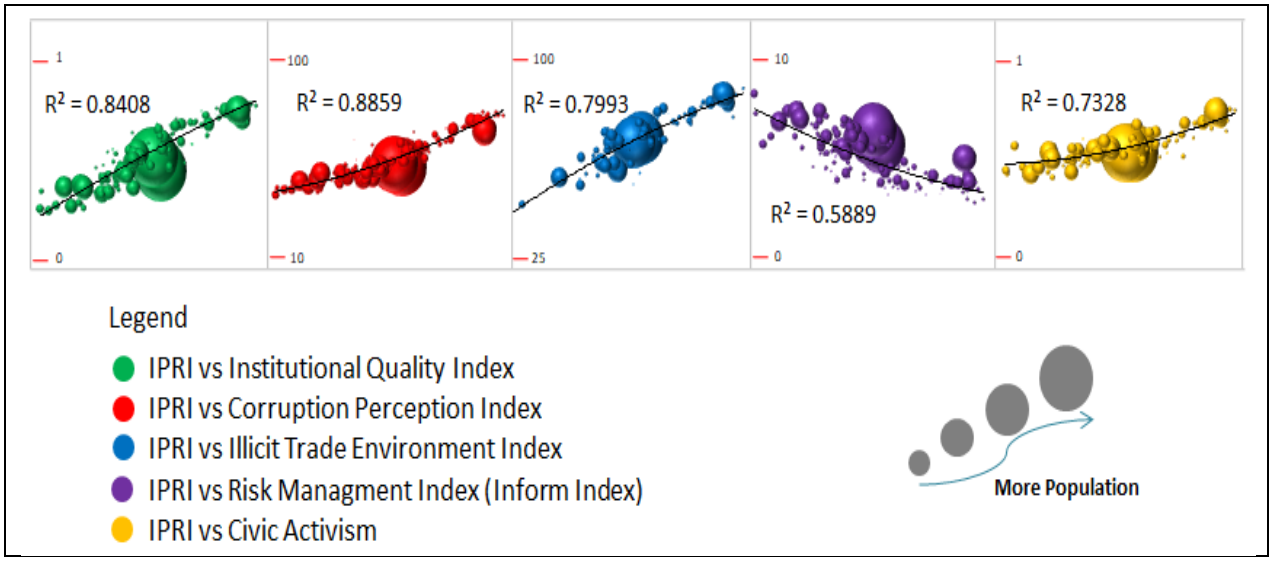
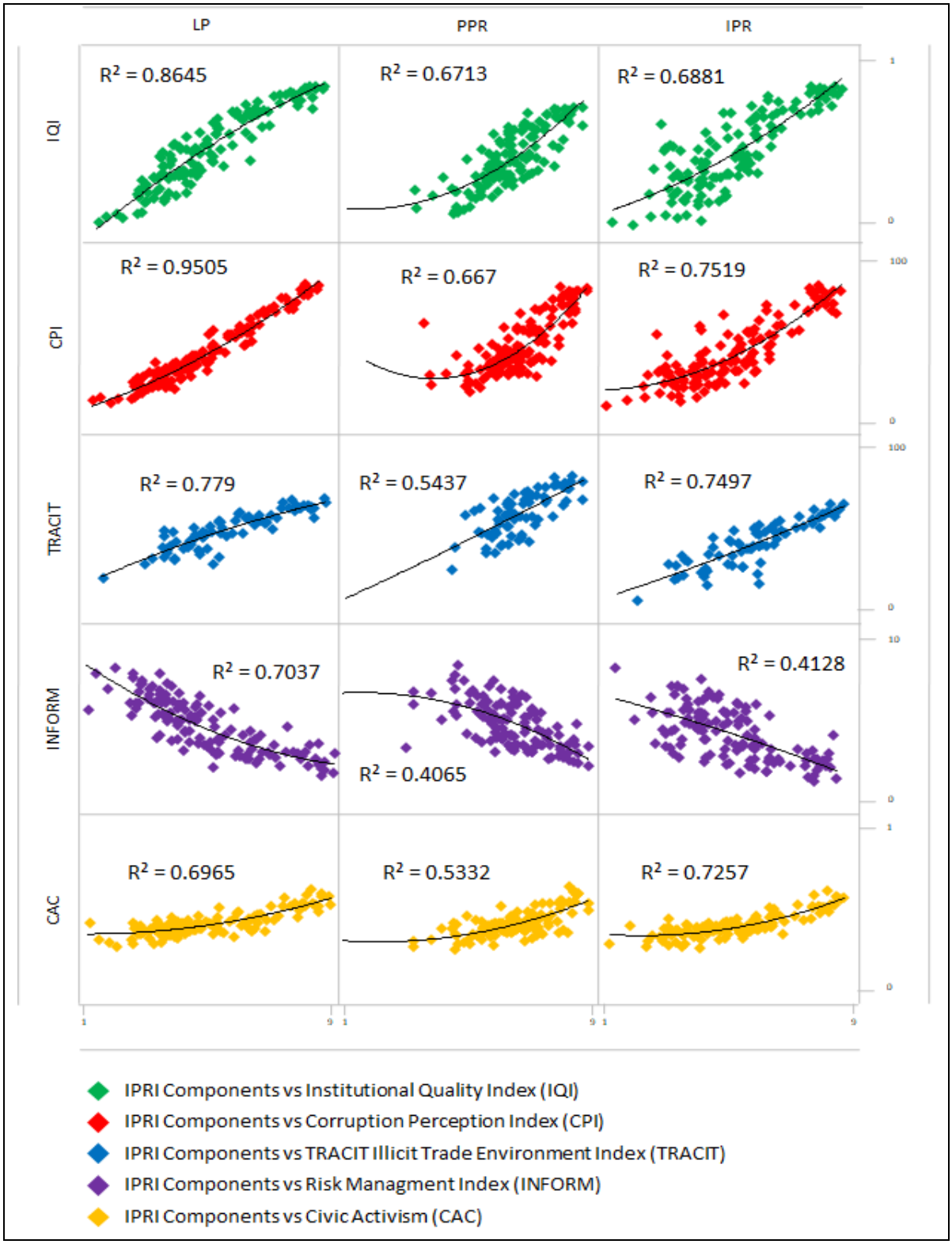


FIGURE 21B. IPRI COMPONENTS CORRELATIONS WITH INSTITUTIONS



INNOVATIONS

The 21st century society develops itself over a net of high quality institutions and services in which new information and telecommunication technologies are fundamental.

Capacity, speed, robustness, and access are some of the requirements of citizens who are almost all avid consumers. In addition, competition between bidding companies allows an increasingly convenient price / value ratio and, if possible, decreasing. At the same time, competition allows a series of transformations and innovations in the most diverse economic sectors and services: finance, health, education, art and entertainment, news, business management, etc. This generates a kind of positive feedback between the sectors. The demands of one generate innovations in others, showing a dynamic century that many have already predicted. Everything indicates that we are in the presence not of an era of changes, but a change of era.

This leads us to evaluate the soundness of property rights under the dynamics imposed by new technologies and the future that they open to us. With this in mind, we examined the relationship of the IPRI and its components with (for source details see Appendix IV):

- Connectivity Infrastructure, using three indices:
  - *Telecommunication Infrastructure Index*, TII, (UN Dpt. of Economic and Social Affairs): a composite-weighted average index of six primary indices based on basic infrastructural indicators which define a country's ICT infrastructure capacity.
  - *ICT Development Index*, IDI (UN International Telecommunication Union): a standard tool that governments, operators, development agencies, researchers and others can use to measure the digital divide and compare ICT performance within and across countries. The IDI is based on 11 ICT indicators grouped in three clusters: access, use, and skills.
  - *Internet Speed* (Average Connection Speed, Mbps): given the accelerated path of the new society and the relevance of connectivity, the speed of the connection becomes crucial.
- Connectivity Practice, using three indices:
  - *The Networked Readiness Index,* NRI, by The World Economic Forum, INSEAD, measures the propensity for countries to exploit the opportunities offered by information and communications technology (ICT). It is a composite index made up of four main categories, 10 subcategories, and 53 individual indicators, as follows: [1] Environment (political and regulatory environment, and business and innovation environment); [2] Readiness (infrastructure, affordability, and skills); [3] Usage (individual usage, business usage, and government usage) and [4] Impact (economic impact, and social impact).
  - *Global Connectivity Index*, GCI was created by Huawei to analyze a broad spectrum of indicators for ICT infrastructure and digital transformation to provide a comprehensive map of the global digital economy.
  - *Smartphone Penetration* (%). In this increasingly interconnected world, both economically and socially, technology adoption defines progress, and smartphones are the most

representative image of this interconnectedness. This measure includes the top 50 countries in terms of smartphones users, defined as anyone using a smartphone at least once a month. It should be noted that this measure is updated quarterly. We are using the information available by June 01, 2019.

- Future Oriented
  - *The Indigo Score* provides insight into the current state of a country's socio-economic infrastructure that will shape and influence its economic performance in the future. It is based on five measures: stability & legal framework, creativity & innovation, economic diversity, digital economy, and freedom.
  - *Global Biotech Innovation* (by ThinkBiotech): Given the relevance of biotechnology and its broad impact in economies and policies, it can impact quality of life. We included this measure of innovation in biotech for 54 countries (53 are included in this IPRI edition). Its methodology includes seven (7) categories (productivity, intellectual property protection, intensity, enterprise support, education/workforce, foundations, and policy & stability).

TABLE 11. PEARSON CORRELATION COEFFICIENTS

		IPRI	LP	PPR	IPR
Future Oriented	Global Biotech Innovation	**0.920**	0.873	0.811	0.900
	Indigo Scores	0.842	0.832	0.671	0.808
Infrastructure	ICT Development Index	0.783	0.789	0.673	0.695
	Internet Speed (Mbps)	0.736	0.732	0.640	0.705
	Telecom. Infrastructure Index	0.794	0.803	0.684	0.703
Practice	Smartphone Penetration (%)	0.775	0.742	0.727	0.745
	Networked Readiness Index	0.899	0.879	0.825	0.803
	Global Connectivity Index	0.894	0.862	0.779	0.884

As shown in table 11, the highest correlation coefficient is with the Global Biotech Innovation, followed by the Networked Readiness Index, the Global Connectivity Index, the Indigo Scores, Telecom. Infrastructure Index, ICT Dev. Index, Smartphone Penetration, and Internet Speed.

FIGURE 22A. IPRI CORRELATIONS WITH INNOVATION, WITH DEMOGRAPHIC IMPACT

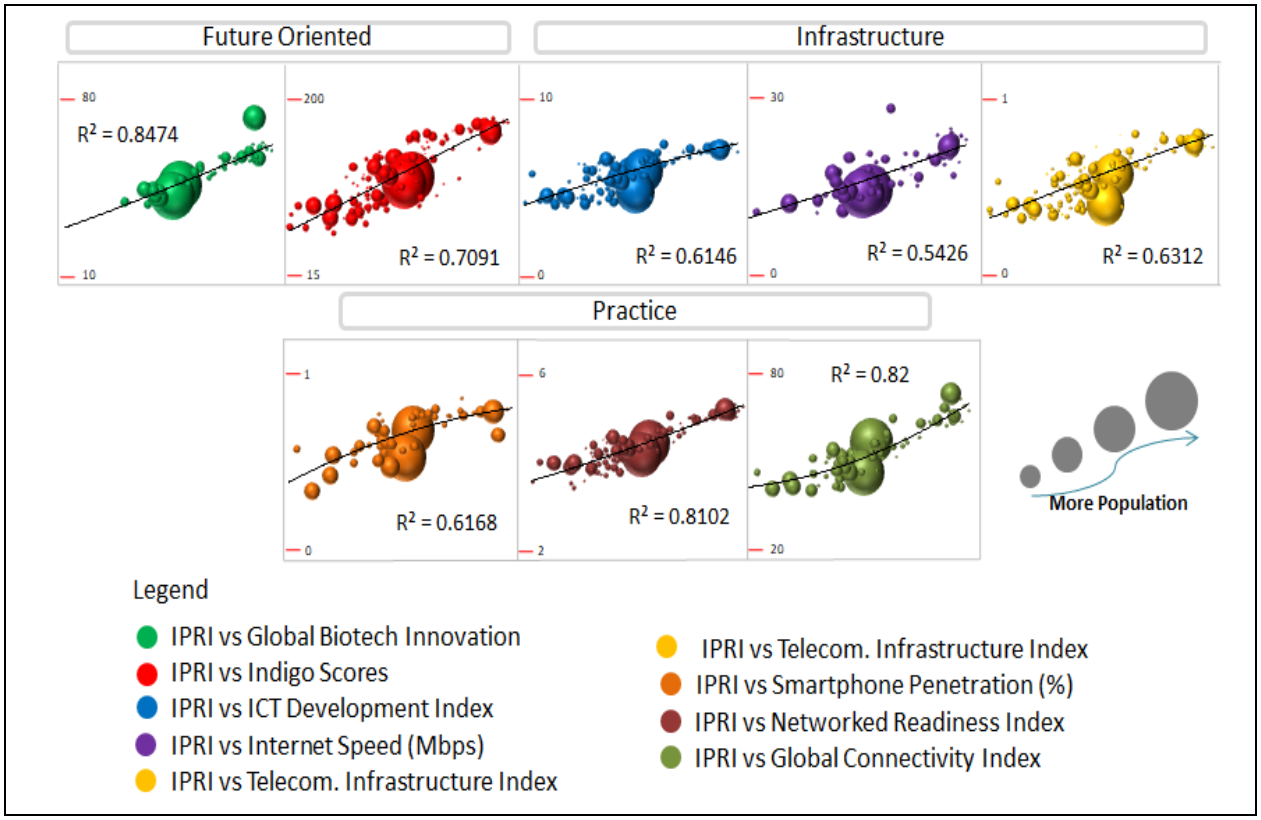
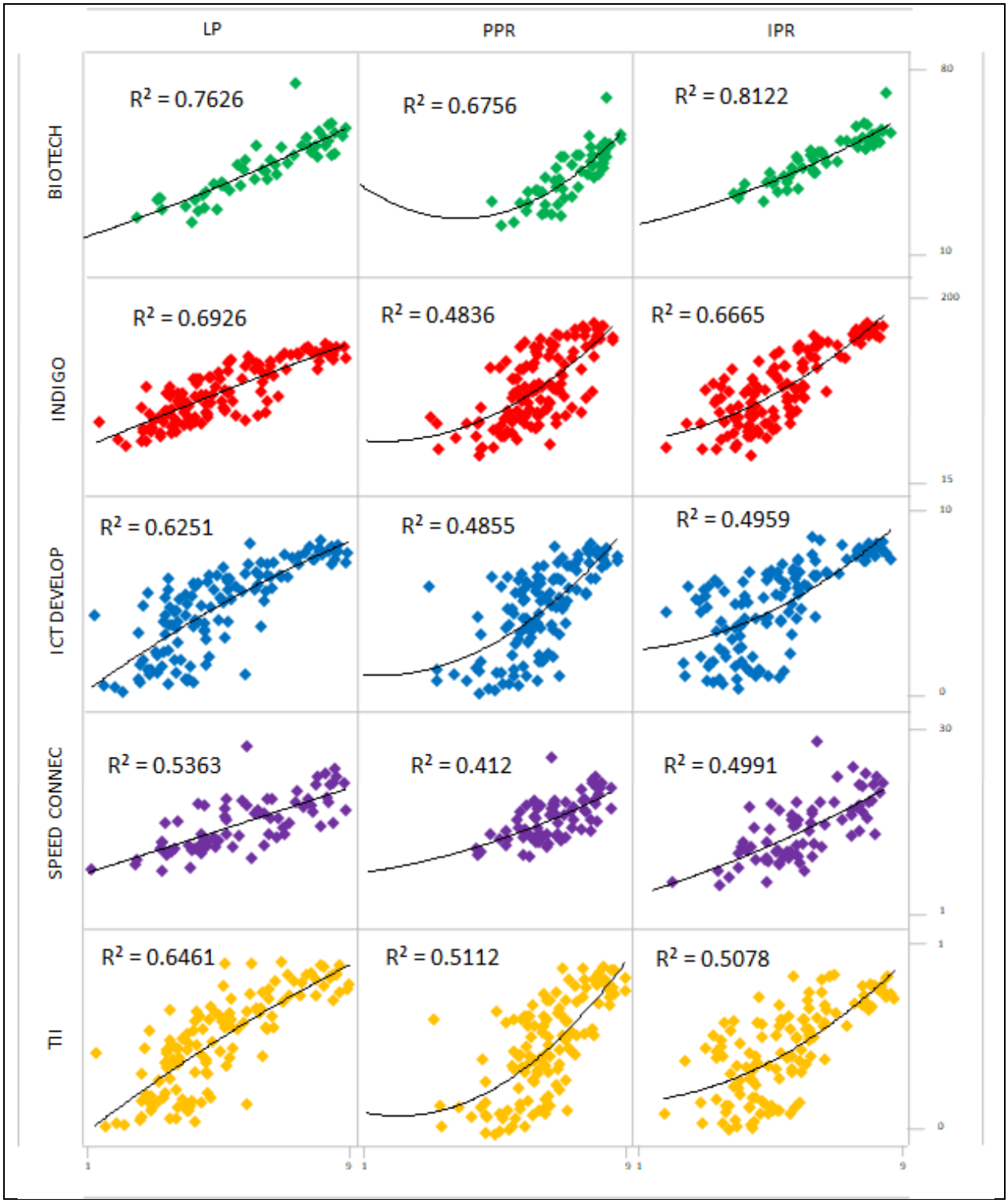
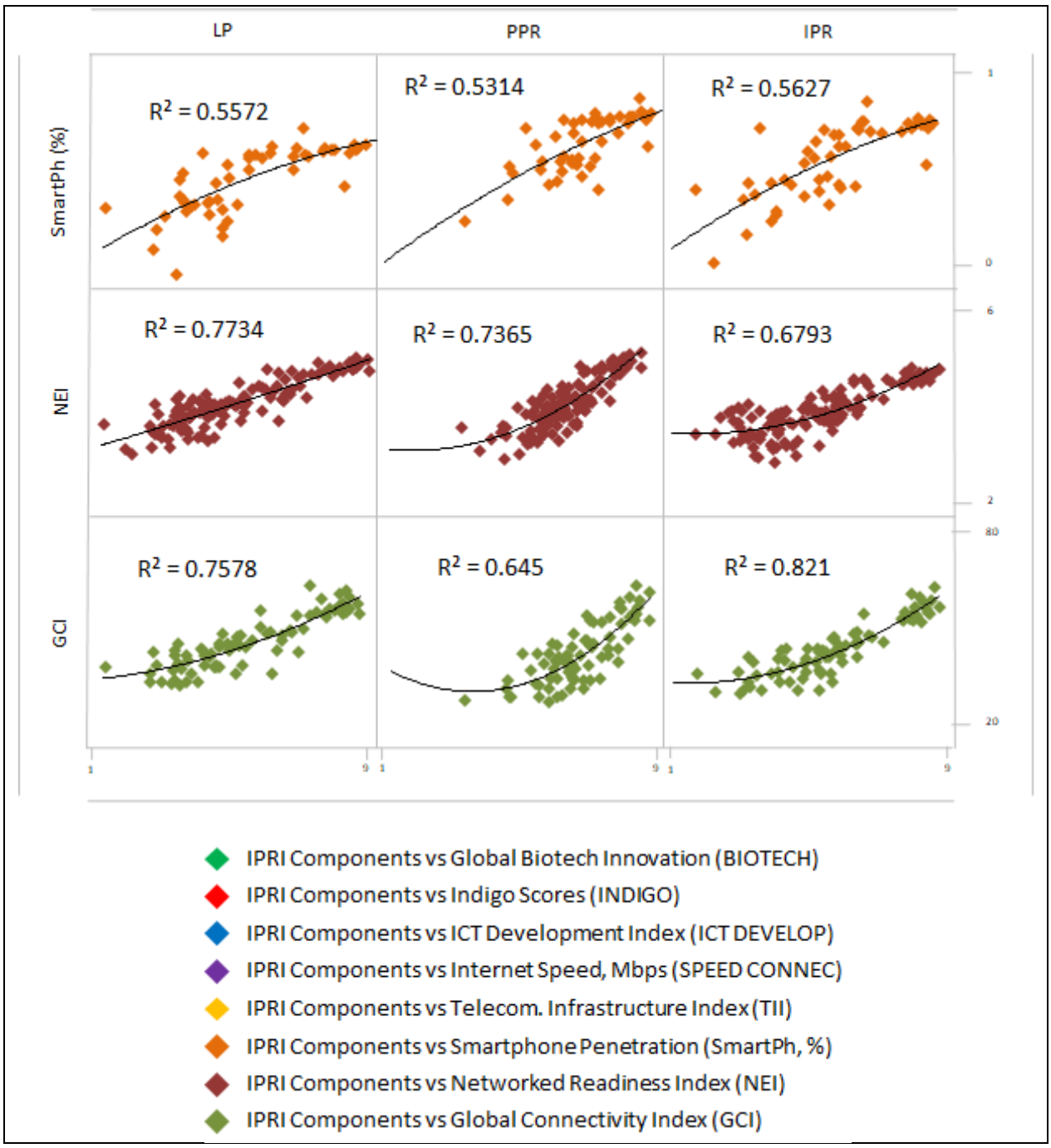


FIGURE 22B. IPRI COMPONENTS CORRELATIONS WITH INNOVATION





CLUSTER ANALYSIS

Cluster analysis aims to group similar entities into clusters. It classifies individuals into groups as homogeneous as possible based on observed variables.

We performed a cluster analysis for all the 129 countries according to their values in LP, PPR and IPR. Additionally, we included illustrative variables that do not influence the formation of the cluster

but will bring an important contribution to describe them. Those variables were the ones we used to calculate correlations (section VII), mainly to expose the conditions or features in the resulting clusters[9].

In order to seize the variability in the analysis – given the great differences among countries in the IPRI – we used Ward's Method with squared Euclidean distance that groups countries with minimal loss inertia.

In a first moment, a Principal Component Analysis (PCA) was applied with the aim of handling variables by factors, given the high correlation among them. The results of the PCA express that the three components of the IPRI (LP, PPR, IPR) define a dimension called IPRI, which collects 85.42% of the inertia. The second and third factors – with inertias of 10.29% and 4.29% respectively – are the residue of the inertia. These entities do not contribute to the first factor inertia and are generally very close to the origin of the first factor. They could be subdivided into groups more associated to the PPR dimension, defining the second factor, and those more associated to LP and IPR defining the third factor.

Next, we used the mobile centers algorithm to show inertia within groups and the criteria to decide the optimal number of classes or clusters (see Table 12).

TABLE 12. CLUSTER ANALYSIS

Cluster	Inertia	Countries	Distance of Centroids to Origin	Coordinates of Centroids		
				Factor 1	Factor 2	Factor 3
Inter-classes	2.16354					
Intra-classes						
Class 1 / 3	0.56886	62	1.76285	-1.32699	0.04031	-0.01790
Class 2 / 3	0.18664	42	0.20468	0.44994	0.02732	0.03858
Class 3 / 3	0.08097	25	6.44812	2.53504	-0.14587	-0.02041

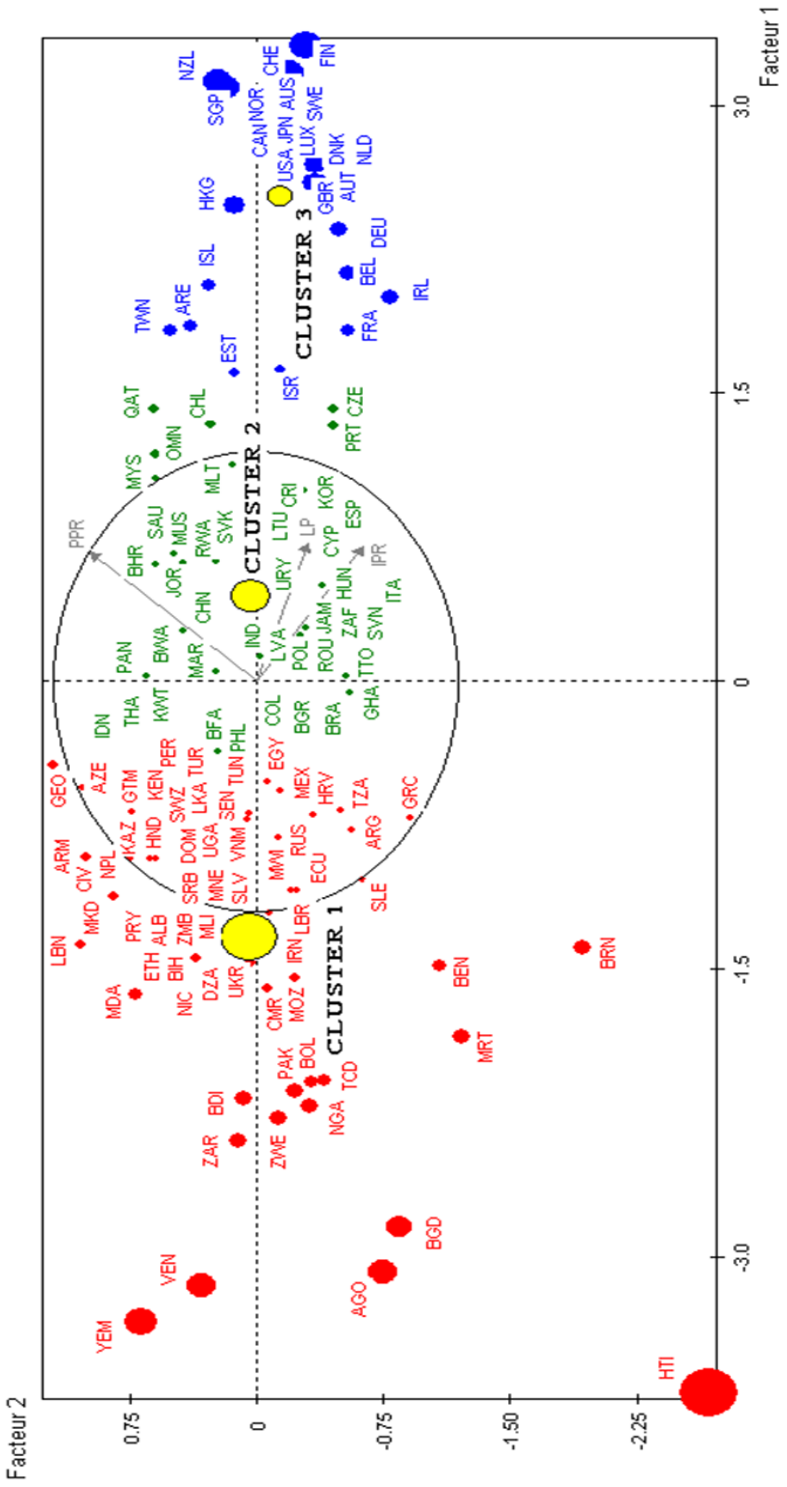
The analysis showed that the three clusters were sufficient to explain the grouping of countries; more specifically, the observed inertia within each group does not exceed the inertia among groups. In this sense, the clusters are as shown in Table 13 and illustrated in Figure 23.

9 Technical note: for the cluster analysis by means of the PCA, the direction of the INFORM index was adjusted to follow the same one of the rest of the indicators, to prevent any skew of the distances.

TABLE 13. CLUSTERS' MEMBERS (COUNTRIES ORDERED ALPHABETICALLY)

Countries		
Cluster 1	Cluster 2	Cluster 3
ALBANIA	BAHREIN	AUSTRALIA
ALGERIA	BOTSWANA	AUSTRIA
ANGOLA	BRAZIL	BELGIUM
ARGENTINA	BULGARIA	CANADA
ARMENIA	BURKINA FASO	DENMARK
AZERBAIJAN	CHILE	ESTONIA
BANGLADESH	CHINA	FINLAND
BENIN	COLOMBIA	FRANCE
BOLIVIA	COSTA RICA	GERMANY
BOSNIA & HERZEGOVINA	CYPRUS	HONG KONG
BRUNEI DARUSSALAM	CZECH REPUBLIC	ICELAND
BURUNDI	GHANA	IRELAND
CAMEROON	HUNGARY	ISRAEL
CHAD	INDIA	JAPAN
CONGO, DEM. REP.	INDONESIA	LUXEMBURG
CÔTE D'IVOIRE	ITALY	NETHERLANDS
CROATIA	JAMAICA	NEW ZEALAND
DOMINICAN REP.	JORDAN	NORWAY
ECUADOR	KOREA, REP	SINGAPORE
EGYPT	KUWAIT	SWEDEN
EL SALVADOR	LATVIA	SWITZERLAND
ESWATINI	LITHUANIA	TAIWAN
ETHIOPIA	MALAYSIA	UNITED ARAB EMIRATES
GEORGIA	MALTA	UNITED KINGDOM
GREECE	MAURITIUS	UNITED STATES
GUATEMALA	MOROCCO	
HAITI	OMAN	
HONDURAS	PANAMA	
IRAN	PHILIPPINES	
KAZAKHSTAN	POLAND	
KENYA	PORTUGAL	
LEBANON	QATAR	
LIBERIA	ROMANIA	
MACEDONIA, FYR	RWANDA	
MALAWI	SAUDI ARABIA	
MALI	SLOVAKIA	
MAURITANIA	SLOVENIA	
MEXICO	SOUTH AFRICA	
MOLDOVA	SPAIN	
MONTENEGRO	THAILAND	
MOZAMBIQUE	TRINIDAD & TOBAGO	
NEPAL	URUGUAY	
NICARAGUA		
NIGERIA		
PAKISTAN		
PARAGUAY		
PERU		
RUSSIA		
SENEGAL		
SERBIA		
SIERRA LEONE		
SRI. LANKA		
TANZANIA, UNITED REP. OF		
TUNISIA		
TURKEY		
UGANDA		
UKRAINE		
VENEZUELA, BOLIVARIAN REP. OF		
VIETNAM		
YEMEN, REP.		
ZAMBIA		
ZIMBABWE		

FIG. 23. CLUSTERS' MEMBERS AND CENTROIDS: FACTOR 1 & FACTOR 2



Although the first factor contains 85.42% of inertia, which is enough to illustrate the formation of the clusters, Fig. 23 illustrates Factors 1 and 2 as well as the three clusters' centroids (yellow). Cluster 1

displays countries (red) located in the negative coordinates of the first factor; this includes countries with low values of the LP, PPR and IPR. Cluster 2 includes countries (green) placed very close to the origin, showing average values of the LP, PPR and IPR. Cluster 3 (blue) contains countries located in the positive coordinates of the first factor, and its members are linked to high values of the LP, PPR and IPR.

The second factor consists mostly of countries in Cluster 2, including those whose scores are very close to the average neighboring between Cluster 2 and Cluster 1, and those neighboring Cluster 2 and Cluster 3. Cluster 1 and Cluster 3 are outright opposites, and their individuals are not directly associated with each other.

In comparison with clusters from the previous edition (2018) we found a very slight movement of countries between Clusters 1 and 2, while countries of Cluster 3 are the same.
Besides the clusters, Figure 23 also shows the contribution of each country explaining the inertia gathered by the factors: the bigger the dot size representing the country, the higher its contribution. Very close countries show how they are similar and how they differ as the distance increases between them.

In the central circle are those countries that have no-statistically significant contribution to the definition of the factors, and, as it has already been mentioned, they are close to the average and are mostly members of Cluster 2. In addition, arrows represent each of the three dimensions of the IPRI. Their definite direction indicates the direct relationship with the individuals, i.e. as countries are in the same direction of the vector, countries tend to have a higher relationship with this dimension; and as a country direction diverts from the vector, the relationship between the country decreases to the point of being contrary to it.

Subsequently, clusters composition using income, population, participation in economic and regional integration agreements, and regional and development criteria are shown in Fig. 24a-d, where font size represents the frequency of the groups in the cluster.

The analysis of each cluster can describe the internal characteristics of the countries within it. In this regard, Table 14 exhibits the features that are statistically significant in each group. Additional statistics are shown Appendix V, VI and VII.

FIGURE 24A. CLUSTERS COMPOSITION BY INCOME CLASSIFICATION

FIGURE 24B. CLUSTERS COMPOSITION BY REGIONAL AND DEVELOPMENT CRITERIA

FIGURE 24C. CLUSTERS COMPOSITION BY ECONOMIC AND REGIONAL INTEGRATION AGREEMENTS

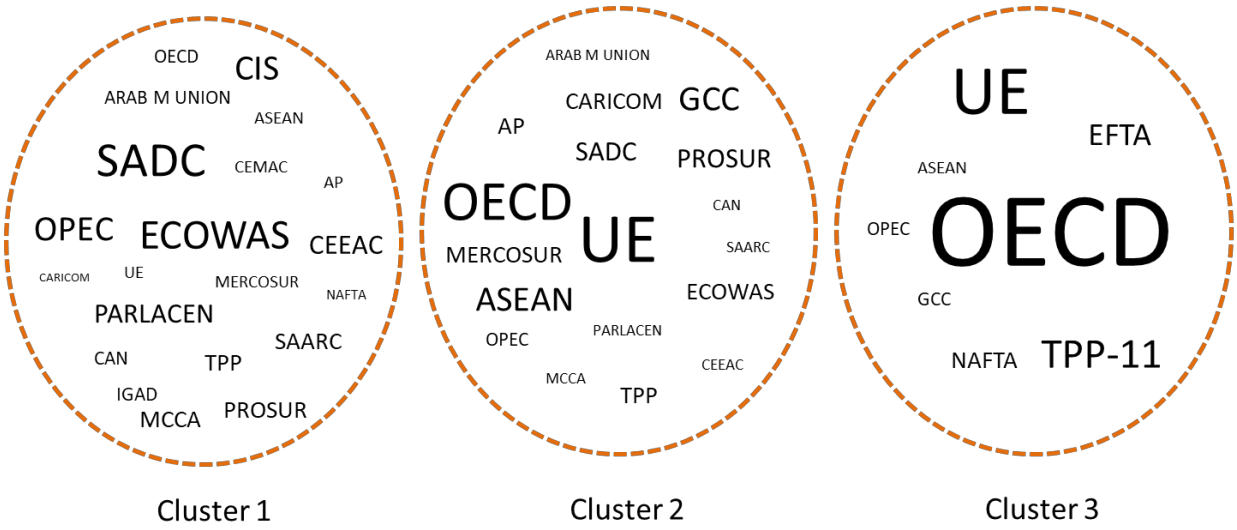


FIGURE 24D. CLUSTERS COMPOSITION AND POPULATION WEIGHT (THOUSANDS)

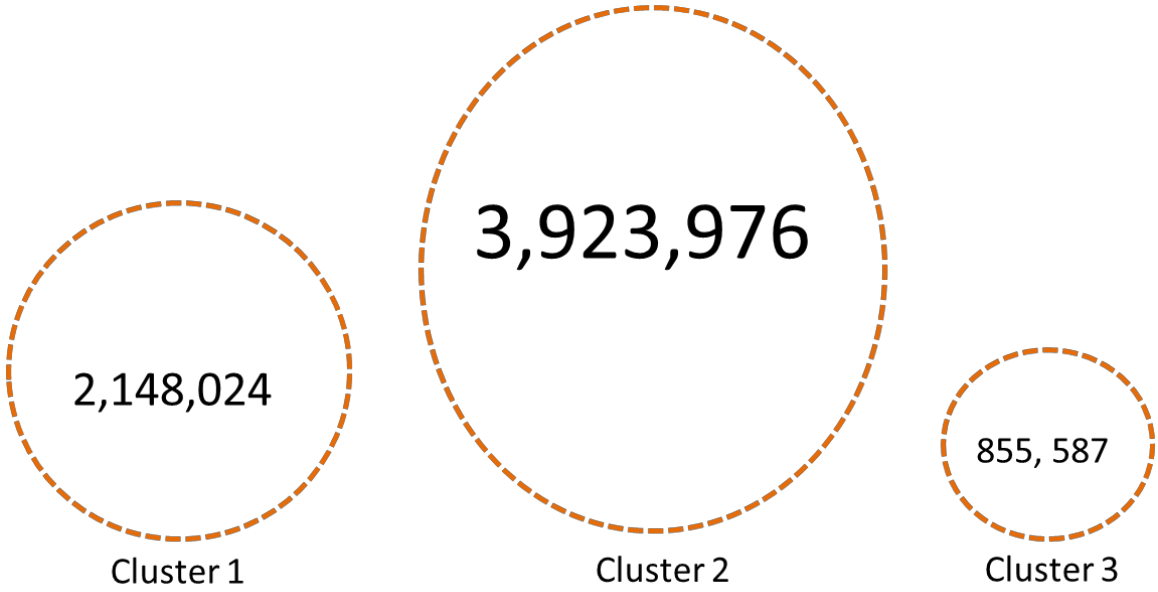


TABLE 14. CLUSTER STATISTICS

Characteristic Variables	Value-Test	Probability	Characteristic Variables	Value-Test	Probability	Characteristic Variables	Value-Test	Probability
Popul	-1.21	0.113	INFOR	2.77	0.003	GDPGINI	9.36	0.000
BIO	-3.32	0.000	IQI	2.45	0.007	GDP	9.23	0.000
Smar	-3.56	0.000	PPR	2.19	0.014	CPI	8.98	0.000
Gen	-4.17	0.000	TII	2.19	0.014	IPRIGE	8.84	0.000
SPE	-4.33	0.000	INDIGO	2.18	0.015	GEI	8.72	0.000
TRAC	-5.28	0.000	ECI	2.14	0.016	LP	8.65	0.000
GCI	-5.35	0.000	IPR	2.13	0.017	IPR	8.52	0.000
CAC	-5.87	0.000	IPRIGE	1.91	0.028	NEI	8.23	0.000
GCFPPC	-6.05	0.000	Popul	1.83	0.034	GCFPPC	8.10	0.000
GDPGINI	-6.41	0.000	LP	1.82	0.035	CAC	7.96	0.000
GDP	-6.50	0.000	ICT	1.78	0.037	IQI	7.79	0.000
ICT	-6.94	0.000	NEI	1.30	0.097	INDIGO	7.26	0.000
ECI	-6.96	0.000	CPI	1.14	0.128	PPR	7.14	0.000
INFOR	-7.12	0.000	GEI	0.38	0.353	GCI	7.01	0.000
GEI	-7.32	0.000	Smar	0.15	0.442	TII	6.95	0.000
TII	-7.42	0.000	Gen	-0.01	0.498	ICT	6.62	0.000
PPR	-7.70	0.000	GCFPPC	-0.38	0.353	ECI	6.24	0.000
INDIGO	-7.76	0.000	CAC	-0.54	0.293	TRAC	6.09	0.000
NEI	-7.87	0.000	TRAC	-0.75	0.227	BIO	5.95	0.000
CPI	-8.17	0.000	GDP	-0.75	0.226	INFOR	5.86	0.000
IQI	-8.49	0.000	GDPGINI	-0.96	0.170	Gen	5.27	0.000
LP	-8.55	0.000	SPE	-0.98	0.163	SPE	4.94	0.000
IPR	-8.74	0.000	GCI	-1.26	0.104	Smar	3.68	0.000
IPRIGE	-8.78	0.000	BIO	-3.90	0.000	Popul	-0.63	0.264

Statistically significant only if Value-Test ≥ |1.96|

CLUSTER DESCRIPTION

CLUSTER 1

Cluster 1 is composed of 62 countries with a combined population of more than 2.1 billion people. The country closest to its centroid is Iran, followed by Liberia, Algeria, El Salvador, Nicaragua and Malawi. Haiti is by far the most remote country of the cluster's centroid, followed by Brunei Darussalam, Rep. of Yemen, Angola, Bangladesh, and Bolivarian Rep. of Venezuela.

A close look at Cluster 1 countries' coordinates reveals that Egypt is the closest to cluster's 2 centroid. Looking simultaneously at cluster 1 and cluster 2, the closest countries from Cluster 1 to Cluster 2 are Tunisia and Turkey to Burkina Faso and Philippines respectively, meaning similarity in conditions (see Fig. 23).

Countries in Cluster 1 are statistically significant for low scores in LP, PPR and IPR components. The same is true for the IPRI-GE. Cluster 1 countries also show low levels in all the dimensions we analyzed; that is, they show poor performances in Economic outcomes, Institutions, and Innovation.

This is the result of a lack of policies or inappropriate ones to improve key elements for progress and development.

Using the regional and development criteria of the IMF and the income criteria of the World Bank, the Sub-Saharan Africa group and the Lower-Middle Income countries are highly represented in this cluster.

The Southern African Development Community (8/11 members) is the most common economic and regional integration agreement in this cluster, followed by the Southern African Development Community (7/9 members), Commonwealth of Independent States (6/6 members), and the Economic Community of West African States (6/7 members).

CLUSTER 2

Cluster 2 is composed of 42 countries with a combined population of more than 3.9 billion people. The country closest to its centroid is Rwanda, followed by Poland, Jamaica, Romania, India, Lithuania and China. Qatar is the farthest country from the centroid, followed by Indonesia, Philippines, Czech Rep., Portugal, Uruguay and Colombia. Figure 23 illustrates that Burkina Faso and Philippines are the closest countries to the Cluster 1 centroid, and Chile, Qatar and Czech Republic are the closest countries to Cluster 3. The closest countries between cluster 2 and 3 are Chile (Cluster 2) and Estonia (Cluster 3).

It is important to highlight that the most populous countries in the world, India and China, are included in this cluster, both very close to its centroid (0.17124 and 0.20257 respectively).
Since cluster 2 is very close to the origin of the factors' axes, this produces results that are not significant for most of the variables. In this sense, they are countries whose results are very close to the average in the indicators.

Using the regional and development criteria of the IMF, Advanced Economies and Latin America and the Caribbean are highly represented in this cluster, whereas by the income criteria of the World Bank, the High Income and Upper Middle Income countries exhibit the highest frequency in the cluster.

Following the perspective that focuses on economic and regional integration agreements, we can see that the European Union (with 14/28 members) and the Organization for Economic Co-operation and Development (12/36 members) have the highest frequency in cluster 2.

CLUSTER 3

Cluster 3 is composed of 25 countries showing a combined population of more than 855 million people. The closest country to its centroid is Austria, followed by Denmark, United Kingdom, Luxembourg and Sweden. The farthest country of the group is Estonia, followed by Israel, Taiwan, Iceland and United Arab Emirates. Estonia, Israel and France are the closest countries to cluster 2.

Compared to cluster 1, countries belonging to cluster 3 exhibit opposite results: all the variables are significant, but with positive and high values, showing good performances in economic outcomes, institutions and innovation.

Using the regional and development criteria of the IMF, Advanced Economies is highly represented in this cluster. By the Income criteria of the World Bank, High Income group is the only one represented in this cluster. Looking at economic and regional integration agreements, the Organization for Economic Co-operation and Development (21/36 members) and the European Union are highly represented in cluster 3 (12/28 members). They are followed by the Trans-Pacific Partnership (5/11 members) and all the EFTA members (3/3).

The data suggest that most of the chosen integration agreements demonstrate some level of heterogeneity in terms of strength of the property rights systems among their members. In presence of homogeneity it would be easier for an integration agreement to promote common policies to enhance the strength of property rights. Simultaneously, heterogeneity could be also seen as an opportunity, as policies could be targeted to specific members of the agreement.

On the other hand, the integration agreements showing members in just one cluster reveal homogeneity amongst their countries' property rights systems. Even those agreements participating in two clusters show members in cluster boundaries and could be seen as a possible transition from one cluster to the other.

As conclusions of the cluster analysis, we found that:

- Each cluster represents more than a grouping by variables directly associated with property rights. They are groups with common characteristics within them and with different features among clusters. This confirms the consistency of the IPRI and the relevance of property rights systems influencing societies.

- Cluster 1 and Cluster 3 are two extreme poles in terms of the performance of their economies, their institutions, and their innovation, as well as their IPRI scores.
- Cluster 2 statistical values reflected its intermediate positions and depending on the decisions taken in the present and near future of each country, will be inclined to one of the two polar classes. Those countries that keep their position very close to Cluster 1 should revise their policies regarding property rights; but as had been shown, also in other dimensions to improve their performance and the well-being of their citizens.

- Countries in Cluster 1 should make particular efforts to strengthen their legal and political environment to protect physical and intellectual properties, which are still weak, in order to improve the quality of life in their societies.

- Countries in the boundaries between two clusters have to make special efforts to mind the gap, which will place them in a higher level.

- The observed positive displacement of clusters' centroids between the 2018 and 2019 editions demonstrates the importance of each country to have a long-term view of property rights reform policies. They must be able to continue reaching higher levels of property rights protection to avoid being left behind in the near future by world progress in this matter.

	Factor 1	
Intra-Classes	2018	2019
Class 1/3	-1.38382	-1.32699
Class 2/3	0.33847	0.44994
Class 3/3	2.48702	2.53502

- Specific analyses of countries and of groups of them related to their cluster are a rich open vein for future investigations.

FINAL REMARKS

The 2019 edition of the International Property Rights Index shows regularity with previous ones, allowing us to say that it has a proper structure for monitoring the performance of property rights systems and its relationship to societies' prosperity globally, regionally and within countries.

This year the IPRI edition included 129 countries representing the 93.83% of world population and 97.72% of world GDP, with an average score of 5.73, showing a slight decrease from the previous edition. Results keep suggesting that countries with high IPRI scores and its components also show high income and high development levels indicating the positive relationship between property rights regime and quality of life.

This edition includes 18 indicators gathered in 3 groups (economic outcomes, institutions, and innovation) that were contrasted with the IPRI and its components. Results show a strong association with all of them and with correlations over 0.9 with Corruption Perception Index, Global Biotech Innovation, Institutional Quality Index, and Global Entrepreneurship Index. By this means, the IPRI results can be used as guidelines for policy makers in different countries – as in multilateral or integration agreements, to which they belong – to enhance their policies aimed at fostering development defined as a multidimensional and synergic term.

IPRI-2019 keeps the calculations of IPRI-GE and IPRI-POP given the importance of showing the impact of gender equality and countries' demographic weight in analyzing property rights systems.

We also included a cluster analysis in order to gather countries in groups by their homogeneity. Therefore, the 129 countries were classified according to their values in the IPRI and its three components in three clusters. The analysis of clusters' centroids and the countries by the boundaries between groups provides important information about their characteristics and challenges. Cluster

analysis also confirmed the consistency of the IPRI, since the assembled countries exhibited a high degree of homogeneity, showing the relevance of property rights systems in shaping societies.

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APPENDICES

APPENDIX I. DATA SOURCE: IPRI 2019

IPRI-2019	Data	Download Date	Original Scale	Year	Source	Link
Legal and Political Environment (LP)	Judicial Independence	April 10, 2019	[1-7](best)	2018	World Economic Forum. The Global Competitiveness Index 4.0 2018 dataset (vesion 13 October 2018). 2018.	http://reports.weforum.org/global-competitiveness-report-2018/
	Rule Law	April 10, 2019	[(-2,5) - (2,5)]best	2017	The Worldwide Governance Indicators	http://info.worldbank.org/governance/wgi//index.aspx#home
	Political Stability	April 10, 2019	[(-2,5) - (2,5)]best	2017	The Worldwide Governance Indicators	http://info.worldbank.org/governance/wgi//index.aspx#home
	Control Corruption	April 10, 2019	[(-2,5) - (2,5)]best	2017	The Worldwide Governance Indicators	http://info.worldbank.org/governance/wgi//index.aspx#home
Physical Property Rights (PPR)	Property Rights	April 10, 2019	[1-7](best)	2018	World Economic Forum. The Global Competitiveness Index 4.0 2018 dataset (vesion 13 October 2018). 2018.	http://reports.weforum.org/global-competitiveness-report-2018/
	Registering Property	April 10, 2019	1-infinite Worst	2019	World Bank Group. Doing Business	http://www.doingbusiness.org/custom-query
	Ease of Access to Loans	April 28, 2019	[1-7](best)	2017-2018	The Global Competitiveness Index Historical Dataset © 2007-2017 World Economic Forum	http://reports.weforum.org/global-competitiveness-index/downloads/
Intellectual Property Rights (IPR)	Intellectual Property Protection	April 10, 2019	[1-7](best)	2018	World Economic Forum. The Global Competitiveness Index 4.0 2018 dataset (vesion 13 October 2018). 2018.	http://reports.weforum.org/global-competitiveness-report-2018/
	Patent Protection	April 26, 2019	[0-5](best)	2015	Patent Index 2015. Walter Park	http://fs2.american.edu/wgp/www/ (Data)
	Copyright Piracy Level	April 10, 2019	[0-100%]Worst	2017	BSA Global Software Survey 2018	https://www.bsa.org/~/media/Files/StudiesDownload/2018_BSA_GSS_Report_en.pdf

XI.2. APPENDIX II. GROUPS CONFORMATION: IPRI 2019

	Group	#	Countries
Regional Group	A	28	ANGOLA;BENIN;BOTSWANA;BURKINA FASO;BURUNDI;CAMEROON;CHAD;CONGO, DEM. REP.;CÔTE D'IVOIRE;ESWATINI;ETHIOPIA;GHANA;KENYA; LIBERIA;MALAWI;MALI;MAURITANIA; MAURITIUS;MOZAMBIQUE;NIGERIA; RWANDA;SENEGAL;SIERRA LEONE; SOUTH AFRICA;TANZANIA, UNITED REPUBLIC OF;UGANDA;ZAMBIA;ZIMBABWE
	AO	19	AUSTRALIA;BANGLADESH;BRUNEI DARUSSALAM;CHINA;HONG KONG (SAR of China);INDIA;INDONESIA;JAPAN;KOREA, REP;MALAYSIA;NEPAL;NEW ZEALAND;PAKISTAN; PHILIPPINES;SINGAPORE; SRI. LANKA; TAIWAN (China);THAILAND;VIETNAM
	CEECA	25	ALBANIA;ARMENIA;AZERBAIJAN;BOSNIA AND HERZEGOVINA;BULGARIA;CROATIA;CYPRUS;CZECH REPUBLIC; ESTONIA;GEORGIA; HUNGARY; KAZAKHSTAN; LATVIA; LITHUANIA; MACEDONIA, FYR; MOLDOVA; MONTENEGRO ;POLAND; ROMANIA; RUSSIA; SERBIA; SLOVAKIA;SLOVENIA;TURKEY;UKRAINE
	LAC	21	ARGENTINA;BOLIVIA;BRAZIL;CHILE;COLOMBIA;COSTA RICA;DOMINICAN REPUBLIC;ECUADOR;EL SALVADOR;GUATEMALA; HAITI;HONDURAS; JAMAICA;MEXICO;NICARAGUA; PANAMA;PARAGUAY; PERU;TRINIDAD AND TOBAGO;URUGUAY;VENEZUELA, BOLIVARIAN REPUBLIC OF
	MENA	15	ALGERIA;BAHREIN;EGYPT;IRAN;ISRAEL;JORDAN;KUWAIT;LEBANON;MOROCCO;OMAN;QATAR;SAUDI ARABIA;TUNISIA;UNITED ARAB EMIRATES;YEMEN, REP.
	NA	2	CANADA;UNITED STATES (USA)
	WE	19	AUSTRIA;BELGIUM;DENMARK;FINLAND;FRANCE;GERMANY;GREECE;ICELAND;IRELAND;ITALY;LUXEMBURG;MALTA;NETHERLANDS;NORWAY;PORTUGAL; SPAIN; SWEDEN; SWITZERLAND; UNITED KINGDOM (UK)
Geographical Regions	EUROPEAN UNION	28	AUSTRIA;BELGIUM;BULGARIA;CROATIA;CYPRUS;CZECH REPUBLIC;DENMARK;ESTONIA; FINLAND;FRANCE;GERMANY;GREECE;HUNGARY; IRELAND; ITALY;LATVIA;LITHUANIA; LUXEMBURG;MALTA;NETHERLANDS; POLAND;PORTUGAL;ROMANIA;SLOVAKIA;SLOVENIA;SPAIN;SWEDEN;UNITED KINGDOM (UK)
	REST OF EUROPE	14	ALBANIA;ARMENIA;BOSNIA AND HERZEGOVINA;GEORGIA;ICELAND;MACEDONIA, FYR;MOLDOVA;MONTENEGRO;NORWAY;RUSSIA;SERBIA;SWITZERLAND;TURKEY;UKRAINE
	AFRICA	32	ALGERIA;ANGOLA;BENIN;BOTSWANA;BURKINA FASO;BURUNDI;CAMEROON;CHAD;CONGO, DEM. REP.;CôTE D'IVOIRE; EGYPT; ESWATINI;ETHIOPIA; GHANA; KENYA;LIBERIA; MALAWI; MALI;MAURITANIA ;MAURITIUS;MOROCCO; MOZAMBIQUE; NIGERIA;RWANDA;SENEGAL;SIERRA LEONE;SOUTH AFRICA;TANZANIA, UNITED REPUBLIC OF; TUNISIA;UGANDA; ZAMBIA; ZIMBABWE
	NORTH AMERICA	3	CANADA;MEXICO;UNITED STATES (USA)
	CENTRAL AMERICA&CARIBE	10	COSTA RICA;DOMINICAN REPUBLIC;EL SALVADOR;GUATEMALA;HAITI;HONDURAS;JAMAICA;NICARAGUA;PANAMA;TRINIDAD AND TOBAGO
	SOUTH AMERICA	10	ARGENTINA;BOLIVIA;BRAZIL;CHILE;COLOMBIA;ECUADOR;PARAGUAY;PERU;URUGUAY;VENEZUELA, BOLIVARIAN REPUBLIC OF
	ASIA	30	AZERBAIJAN;BAHREIN;BANGLADESH;BRUNEI DARUSSALAM;CHINA;HONG KONG (SAR of China);INDIA;INDONESIA;IRAN;ISRAEL;JAPAN;JORDAN;KAZAKHSTAN;KOREA, REP; KUWAIT; LEBANON; MALAYSIA;NEPAL;OMAN;PAKISTAN;PHILIPPINES;QATAR;SAUDI ARABIA;SINGAPORE;SRI. LANKA;TAIWAN (China);THAILAND;UNITED ARAB EMIRATES;VIETNAM;YEMEN,
	OCEANIA	2	AUSTRALIA;NEW ZEALAND
Income Classification	High income	49	AUSTRALIA;AUSTRIA;BAHREIN;BELGIUM;BRUNEI DARUSSALAM;CANADA;CHILE;CROATIA;CYPRUS;CZECH REPUBLIC;DENMARK;ESTONIA;FINLAND;FRANCE;GERMANY;GREECE;HONG KONG (SAR of China);HUNGARY;ICELAND;IRELAND;ISRAEL;ITALY;JAPAN;KOREA, REP;KUWAIT;LATVIA;LITHUANIA;LUXEMBURG;MALTA;NETHERLANDS;NEW ZEALAND; NORWAY;OMAN; POLAND; PORTUGAL; QATAR; SAUDI ARABIA; SINGAPORE;SLOVAKIA;SLOVENIA;SPAIN;SWEDEN;SWITZERLAND;TAIWAN (China);TRINIDAD AND TOBAGO;UNITED ARAB EMIRATES;UNITED KINGDOM (UK);UNITED STATES (USA);URUGUAY
	Low income	18	BENIN;BURKINA FASO;BURUNDI;CHAD;CONGO, DEM. REP.;ETHIOPIA;HAITI;LIBERIA;MALAWI;MALI;MOZAMBIQUE;NEPAL;RWANDA;SENEGAL;SIERRA LEONE;TANZANIA, UNITED REPUBLIC OF;UGANDA;ZIMBABWE
	Lower middle income	27	ARMENIA;BANGLADESH;BOLIVIA;CAMEROON;CôTE D'IVOIRE;EGYPT;EL SALVADOR; ESWATINI; GHANA; GUATEMALA; HONDURAS; INDIA;INDONESIA; KENYA;MAURITANIA;MOLDOVA;MOROCCO; NICARAGUA;NIGERIA;PAKISTAN;PHILIPPINES;SRI. LANKA;TUNISIA;UKRAINE;VIETNAM;YEMEN, REP.;ZAMBIA
	Upper middle income	35	ALBANIA;ALGERIA;ANGOLA;ARGENTINA;AZERBAIJAN;BOSNIA AND HERZEGOVINA;BOTSWANA;BRAZIL;BULGARIA;CHINA;COLOMBIA;COSTA RICA;DOMINICAN REPUBLIC; ECUADOR; GEORGIA; IRAN;JAMAICA; JORDAN;KAZAKHSTAN;LEBANON;MACEDONIA, FYR;MALAYSIA;MAURITIUS;MEXICO;MONTENEGRO;PANAMA;PARAGUAY;PERU;ROMANIA;RUSSIA;SERBIA;SOUTH AFRICA; THAILAND; TURKEY; VENEZUELA, BOLIVARIAN REPUBLIC
Region Classification	Advanced economies	36	AUSTRALIA;AUSTRIA;BELGIUM;CANADA;CYPRUS;CZECH REPUBLIC;DENMARK;ESTONIA;FINLAND;FRANCE;GERMANY;GREECE;HONG KONG (SAR of China); ICELAND; IRELAND; ISRAEL; ITALY; JAPAN; KOREA, REP; LATVIA; LITHUANIA; LUXEMBURG;MALTA;NETHERLANDS;NEW ZEALAND; NORWAY; PORTUGAL;SINGAPORE; SLOVAKIA;SLOVENIA;SPAIN; SWEDEN;SWITZERLAND;TAIWAN (China);UNITED KINGDOM (UK);UNITED STATES (USA)
	Commonwealth of Independent States	7	ARMENIA;AZERBAIJAN;GEORGIA;KAZAKHSTAN;MOLDOVA;RUSSIA;UKRAINE
	Emerging and Developing Asia	11	BANGLADESH;BRUNEI DARUSSALAM;CHINA;INDIA;INDONESIA;MALAYSIA;NEPAL;PHILIPPINES;SRI. LANKA;THAILAND;VIETNAM
	Emerging and Developing Europe	11	ALBANIA;BOSNIA AND HERZEGOVINA;BULGARIA;CROATIA;HUNGARY;MACEDONIA, FYR;MONTENEGRO;POLAND;ROMANIA;SERBIA;TURKEY
	Latin America and the Caribbean	21	ARGENTINA;BOLIVIA;BRAZIL;CHILE;COLOMBIA;COSTA RICA;DOMINICAN REPUBLIC;ECUADOR;EL SALVADOR;GUATEMALA;HAITI;HONDURAS;JAMAICA;MEXICO; NICARAGUA; PANAMA;PARAGUAY; PERU; TRINIDAD AND TOBAGO;URUGUAY;VENEZUELA, BOLIVARIAN REPUBLIC OF
	Middle East, North Africa, and Pakistan	16	ALGERIA;BAHREIN;EGYPT;IRAN;JORDAN;KUWAIT;LEBANON;MAURITANIA;MOROCCO;OMAN;PAKISTAN;QATAR;SAUDI ARABIA;TUNISIA;UNITED ARAB EMIRATES;YEMEN, REP.
	Sub-Saharan Africa	27	ANGOLA;BENIN;BOTSWANA;BURKINA FASO;BURUNDI;CAMEROON;CHAD;CONGO, DEM. REP.;CôTE D'IVOIRE; ESWATINI;ETHIOPIA;GHANA;KENYA; LIBERIA;MALAWI;MALI;MAURITIUS;MOZAMBIQUE;NIGERIA;RWANDA;SENEGAL;SIERRA LEONE;SOUTH AFRICA;TANZANIA, UNITED REPUBLIC OF;UGANDA;ZAMBIA;ZIMBABWE
Regional Integration Agreements	OECD	36	AUSTRALIA;AUSTRIA;BELGIUM;CANADA;CHILE;CZECH REPUBLIC;DENMARK;ESTONIA;FINLAND;FRANCE;GERMANY;GREECE;HUNGARY;ICELAND;IRELAND;ISRAEL;ITALY;JAPAN;KOREA, REP; LATVIA; LITHUANIA; LUXEMBURG; MEXICO; NETHERLANDS; NEW ZEALAND;NORWAY;POLAND;PORTUGAL;SLOVAKIA;SLOVENIA;SPAIN;SWEDEN;SWITZERLAND;TURKEY;UNITED KINGDOM (UK);UNITED STATES (USA)
	EU	28	AUSTRIA;BELGIUM;BULGARIA;CROATIA;CYPRUS;CZECH REPUBLIC;DENMARK;ESTONIA;FINLAND;FRANCE; GERMANY;GREECE;HUNGARY;IRELAND;ITALY; LATVIA;LITHUANIA; LUXEMBURG;MALTA; NETHERLANDS;POLAND;PORTUGAL;ROMANIA;SLOVAKIA;SLOVENIA;SPAIN;SWEDEN;UNITED KINGDOM (UK)
	SADC	11	ANGOLA;BOTSWANA;CONGO, DEM. REP.;ESWATINI;MALAWI;MAURITIUS;MOZAMBIQUE;SOUTH AFRICA;TANZANIA, UNITED REPUBLIC OF;ZAMBIA;ZIMBABWE
	ECOWAS	9	BENIN;BURKINA FASO;CôTE D'IVOIRE;GHANA;LIBERIA;MALI;NIGERIA;SENEGAL;SIERRA LEONE
	ASEAN	7	BRUNEI DARUSSALAM;INDONESIA;MALAYSIA;PHILIPPINES;SINGAPORE;THAILAND;VIETNAM
	PARLACEN	6	DOMINICAN REPUBLIC;EL SALVADOR;GUATEMALA;HONDURAS;NICARAGUA;PANAMA
	GCC	6	BAHREIN;KUWAIT;OMAN;QATAR;SAUDI ARABIA;UNITED ARAB EMIRATES
	AP	4	CHILE;COLOMBIA;MEXICO;PERU
	MERCOSUR	4	ARGENTINA;BRAZIL;PARAGUAY;URUGUAY
	SAARC	5	BANGLADESH;INDIA;NEPAL;PAKISTAN;SRI. LANKA
	CEMAC	2	CAMEROON;CHAD
	MCCA	5	COSTA RICA;EL SALVADOR;GUATEMALA;HONDURAS;NICARAGUA
	CIS	6	ARMENIA;AZERBAIJAN;KAZAKHSTAN;MOLDOVA;RUSSIA;UKRAINE
	ARAB M UNION	4	ALGERIA;MAURITANIA;MOROCCO;TUNISIA
	CARICOM	3	HAITI;JAMAICA;TRINIDAD AND TOBAGO
	CAN	4	BOLIVIA;COLOMBIA;ECUADOR;PERU
	EFTA	3	ICELAND;NORWAY;SWITZERLAND
	IGAD	3	ETHIOPIA;KENYA;UGANDA
	NAFTA	3	CANADA;MEXICO;UNITED STATES (USA)
	OPEC	9	ALGERIA;ANGOLA;ECUADOR;IRAN;KUWAIT;NIGERIA;SAUDI ARABIA;UNITED ARAB EMIRATES;VENEZUELA, BOLIVARIAN REPUBLIC OF
	CEEAC	6	ANGOLA;BURUNDI;CAMEROON;CHAD;CONGO, DEM. REP.;RWANDA
	TPP-11	11	AUSTRALIA;BRUNEI DARUSSALAM;CANADA;CHILE;JAPAN;MALAYSIA;MEXICO;NEW ZEALAND;PERU;SINGAPORE;VIETNAM
	PROSUR	7	ARGENTINA;BRAZIL;CHILE;COLOMBIA;ECUADOR;PARAGUAY;PERU

XI.3. APPENDIX III. GE DATA SOURCE: 2019 IPRI

IPRI	OCDE GID-DB	SIGI
Women´s Access to Bank Loans	Secure access to formal financial services	Restricted access to productive and financial resources
Women´s Access to Land Ownership	Secure access to land assets	Restricted access to productive and financial resources
Women´s Access to Property Other than land	Access to non-land assets	Restricted access to productive and financial resources
Inheritance Practices	Inheritance	Discrimination in the family
Women Social Rights	Divorce	Discrimination in the family
	Household responsibilities	Discrimination in the family
	Female genital mutilation	Restricted Physical Integrity
	Violence against women	Restricted Physical Integrity
	Freedom of movement	Restricted civil liberties
	Citizenship rights	Restricted civil liberties
Source: https://www.genderindex.org/data/		

XI.4. APPENDIX IV. CORRELATIONS DATA SOURCES

Dimention	Data / Indicator	Source	Link
Economic outcomes	1. GDP per capita (constant 2010 US$)	World Development Indicators. World Bank	http://data.worldbank.org/indicator/NY.GDP.PCAP.KD
	2. GDP per capita (constant 2010 US$) * GINI	GINI from PNUD. Own calculations	http://hdrstats.undp.org
	3. Gross capital formation (current US$) per capita	UN Population. Own calculations	http://esa.un.org/unpd/wpp/Download/Standard/Population/
	4. Global Enterpreneurship Index	The Global Entrepreneurship and Development Institute	https://thegedi.org/global-entrepreneurship-and-development-index/
	5. Economic Complexity	The Observatory of Economic Complexity	https://atlas.media.mit.edu/en/
Institutions	6. TRACIT Illicit Trade Environment Index	Transnational Alliance to Combat Illicit Trade (TRACIT)	https://www.tracit.org/global-illicit-trade-index.html and http://illicittradeindex.eiu.com/
	7. Risk Mangement index (INFORM Index)	Inter-Agency Standing Committee (IASC) & the European Commission	http://www.inform-index.org/Portals/0/InfoRM/2018/INFORM%20Annual%20Report%202018%20Web%20Spreads%20v2.pdf?ver=2017-12-20-144446-540
	8. Corruption Perception Index	Transparency International	http://www.transparency.org/research/cpi/overview
	9. Civic Activism	International Institute of Social Studies	http://www.indsocdev.org
	10. Institutional Quality Index	Fundación Libertad	http://en.libertadyprogreso.online.org/files/2018/05/IQI-2018.pdf
Innovation	11. Think Biotech Innovation	ThinkBiotech	http://www.thinkbiotech.com/globalbiotech/country/United-States
	12. Indigo Scores	Global Perspectives	http://global-perspectives.org.uk/volume-one/table/
	13. ICT Development Index	UN-International Telecommunication Union (ITU)	https://www.itu.int/net4/ITU-D/idi/2017/index.html
	14. Internet Speed (Average Connection Speed, Mbps)	Akamai	https://www.akamai.com/us/en/multimedia/documents/state-of-the-internet/q1-2017-state-of-the-internet-connectivity-report.pdf
	15. Networked Readiness Index	The World Economic Forum	http://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/
	16. Global Connectivity Index	Huawei	https://www.huawei.com/minisite/gci/en/index.html
	17. Telecommunication Infrastructure Index	United Nations E-Government Survey	https://publicadministration.un.org/egovkb/Portals/egovkb/Documents/un/2018-Survey/E-Government%20Survey%202018_FINAL%20for%20web.pdf
	18. Smartphone Penetration (%)	Wikipedia (Newzoo)	https://en.wikipedia.org/wiki/List_of_countries_by_smartphone_penetration

XI.5. APPENDIX V. ILLUSTRATIVE VARIABLE:. AVERAGES BY CLUSTERS

	Cluster 1	Cluster 2	Cluster 3
Total Countries	62	42	25
Total Population (000)	2,148,024	3,923,976	855,587
Average IPRI	4.55	6.13	7.99
Average LP	3.76	5.58	7.94
Average PPR	5.62	6.82	8.01
Average IPR	4.26	5.99	8.03
Average Gen	6.51	7.24	9.06
Average IPRIGE	5.85	7.58	9.80
Average GDP	4,680.96	15,283.62	53,505.06
Average GDP GINI	3,564.03	12,787.36	49,417.72
Average GCF PPC (10^6)	1,118.24	3,850.71	11,963.38
Average GEI	0.22	0.37	0.67
Average ECI	-0.53	0.44	1.33
Average TRACIT	50.35	61.71	77.71
Average INFORM	4.65	2.92	1.60
Average CPI	32.23	49.36	77.56
Average CAC	0.49	0.52	0.60
Average IQI	0.35	0.63	0.89
Average BIOTECH	19.33	28.64	50.48
Average INDIGO	73.73	122.88	174.94
Average ICT VELOP	4.13	6.07	8.26
Average SPEED CONNEC	6.40	11.05	16.68
Average NEI	3.53	4.39	5.60
Average GCI	33.80	43.87	65.00
Average TII	0.32	0.54	0.77
Average SmartP (%)	0.42	0.55	0.71

XI.6. APPENDIX VI. REGIONAL INTEGRATION AGREEMENTS AND CLUSTER

Regional Integration Agreements	Total	Cluster 1	%	Cluster 2	%	Cluster 3	%
Organisation for Economic Co-operation and Development	36	3	8.33	12	33.33	21	58.33
European Union	28	2	7.14	14	50.00	12	42.86
Southern African Development Community	11	8	72.73	3	27.27		0.00
Economic Community Of West African States	9	7	77.78	2	22.22		0.00
Association of Southeast Asian Nations	7	2	28.57	4	57.14	1	14.29
Central American Parliament	6	5	83.33	1	16.67		0.00
Gulf Cooperation Council	6		0.00	5	83.33	1	16.67
Pacific Alliance	4	2	50.00	2	50.00		0.00
Southern Common Market	4	2	50.00	2	50.00		0.00
South Asian Association for Regional Cooperation	5	4	80.00	1	20.00		0.00
Central African Economic and Monetary Community	2	2	100.00		0.00		0.00
Central American Common Market	5	4	80.00	1	20.00		0.00
Commonwealth of Independent States	6	6	100.00		0.00		0.00
Arab Mahgreb Union	4	3	75.00	1	25.00		0.00
Caribbean Community	3	1	33.33	2	66.67		0.00
Andean Community	4	3	75.00	1	25.00		0.00
European Free Trade Association	3		0.00		0.00	3	100.00
Intergovernmental Authority on Development	3	3	100.00		0.00		0.00
North American Free Trade Agreement	3	1	33.33		0.00	2	66.67
Organization of the Petroleum Exporting Countries	9	6	66.67	2	22.22	1	11.11
La Communauté Economique des Etats de l'Afrique Centrale	6	5	83.33	1	16.67		0.00
Trans-Pacific Partnership	11	4	36.36	2	18.18	5	45.45
Foro para el Progreso de América del Sur	7	4	57.14	3	42.86		0.00

XI.7. APPENDIX VII. REGIONAL INTEGRATION AGREEMENTS AND CLUSTER

Country	Cluster	Distance to Centroid	Country	Cluster	Distance to Centroid	Country	Cluster	Distance to Centroid
IRAN	1	0.00938	RWANDA	2	0.10803	AUSTRIA	3	0.06301
LIBERIA	1	0.02916	POLAND	2	0.12756	DENMARK	3	0.08859
ALGERIA	1	0.03566	JAMAICA	2	0.14003	UNITED KINGDOM	3	0.10092
EL SALVADOR	1	0.04130	ROMANIA	2	0.14003	LUXEMBURG	3	0.11657
NICARAGUA	1	0.12052	INDIA	2	0.17124	SWEDEN	3	0.11850
MALAWI	1	0.16133	LITHUANIA	2	0.17847	CANADA	3	0.12574
CAMEROON	1	0.17914	CHINA	2	0.20257	HONG KONG	3	0.13926
BOSNIA & HERZEGOVINA	1	0.19458	JORDAN	2	0.20343	GERMANY	3	0.16591
ETHIOPIA	1	0.22164	COSTA RICA	2	0.22548	NETHERLANDS	3	0.17706
UKRAINE	1	0.23268	SAUDI ARABIA	2	0.25928	JAPAN	3	0.18312
ZAMBIA	1	0.23332	SLOVAKIA	2	0.26476	NORWAY	3	0.19518
DOMINICAN REP.	1	0.26242	HUNGARY	2	0.26872	AUSTRALIA	3	0.25170
MALI	1	0.27423	MOROCCO	2	0.27141	UNITED STATES	3	0.34526
SERBIA	1	0.27790	LATVIA	2	0.28067	BELGIUM	3	0.36479
MOZAMBIQUE	1	0.28426	SPAIN	2	0.28208	SWITZERLAND	3	0.41501
ECUADOR	1	0.36455	BAHREIN	2	0.37163	SINGAPORE	3	0.43573
PARAGUAY	1	0.40929	KOREA, REP	2	0.41453	NEW ZEALAND	3	0.62336
VIETNAM	1	0.42363	SOUTH AFRICA	2	0.44166	FINLAND	3	0.63025
UGANDA	1	0.44003	CYPRUS	2	0.46434	FRANCE	3	0.68785
ALBANIA	1	0.44344	BULGARIA	2	0.47291	IRELAND	3	0.72167
SENEGAL	1	0.48598	TRINIDAD & TOBAGO	2	0.50935	UNITED ARAB EMIRATES	3	0.75017
TUNISIA	1	0.53105	MAURITIUS	2	0.56378	ICELAND	3	0.79375
ESWATINI	1	0.55060	MALTA	2	0.58875	TAIWAN	3	0.92022
RUSSIA	1	0.55921	GHANA	2	0.59025	ISRAEL	3	0.99883
SIERRA LEONE	1	0.57724	ITALY	2	0.59941	ESTONIA	3	1.03249
HONDURAS	1	0.58151	SLOVENIA	2	0.62075			
SRI. LANKA	1	0.59654	PANAMA	2	0.67402			
KAZAKHSTAN	1	0.63092	KUWAIT	2	0.68231			
MONTENEGRO	1	0.67231	MALAYSIA	2	0.71979			
ARGENTINA	1	0.67439	BURKINA FASO	2	0.75632			
NEPAL	1	0.67595	BRAZIL	2	0.81414			
CROATIA	1	0.67908	THAILAND	2	0.86740			
EGYPT	1	0.70790	CHILE	2	0.90492			
MOLDOVA	1	0.70933	OMAN	2	0.96089			
PAKISTAN	1	0.73022	BOTSWANA	2	0.96457			
KENYA	1	0.73277	COLOMBIA	2	0.98264			
BOLIVIA	1	0.76577	URUGUAY	2	0.98333			
PERU	1	0.76796	PORTUGAL	2	1.03882			
MACEDONIA, FYR	1	0.77542	CZECH REP.	2	1.19549			
TANZANIA, UNITED REP.	1	0.86323	PHILIPPINES	2	1.20055			
NIGERIA	1	0.89952	INDONESIA	2	1.27080			
ZIMBABWE	1	0.93012	QATAR	2	1.29878			
GUATEMALA	1	1.01207						
BURUNDI	1	1.01732						
LEBANON	1	1.02425						
CHAD	1	1.07211						
CôTE D'IVOIRE	1	1.18650						
MEXICO	1	1.20820						
GREECE	1	1.29064						
BENIN	1	1.30333						
TURKEY	1	1.36924						
ARMENIA	1	1.47900						
CONGO, DEM. REP.	1	1.47989						
AZERBAIJAN	1	1.58852						
MAURITANIA	1	1.91396						
GEORGIA	1	2.82916						
VENEZUELA, BOL. REP.	1	3.38512						
BANGLADESH	1	3.55423						
ANGOLA	1	3.82407						
YEMEN, REP.	1	4.43961						
BRUNEI DARUSSALAM	1	5.48905						
HAITI	1	13.18110						