CORRUPTION TRAP: THE CASE OF COLOMBIAN REGIONS

LAURA URIBE
CAROLINA ISAZA
DANIELA FRANCO
PATRICIA GARCIA-MARQUEZ
LAURA SARMIENTO
UNIVERSIDAD EXTERNADO DE COLOMBIA

laura.uribegg@gmail.com
carolina.isaza@uexternado.edu.co
daniela.franco@uexternado.edu.co
patricia.garcia@uexternado.edu.co
laura.sarmiento@uexternado.edu.co

Key words: Corruption, development, institutions, regional indexes

Abstract

Since the 1990s, corruption has been increasingly studied from various disciplines and diverse theoretical approaches and perspectives all around the world. Nevertheless, until now, few are the studies that take regional or local views into consideration for understanding the behavior of this phenomenon within countries. This paper addresses corruption in the regions of Colombia in relation to their levels of development.

Literature points out that there are different ways in which corruption and development are related. Authors like Daniel Kaufmann (2002) establish a correlation between socioeconomic development, growth, inequality, poverty and corruption. Likewise, Gupta, Davoodi and Alonso-Term (1998) conclude that corruption increases income inequality and poverty by distorting the level and effectiveness of social spending. However, in these vicious cycles the causes and consequences are not yet clear.
Considering the above, this paper analyses the relationship between corruption and development in Colombia from a subnational perspective.

We claim that there is a *corruption trap* that makes it difficult to establish the dependent and independent variables between corruption and development. The question that guides our paper is: What are the dynamics between corruption and development at the state level in Colombia?

To answer it, we collected 22 indicators for the 32 states that make up the administrative division of Colombia. These data covered the period 2014-2017 in order to consider the last presidential term and the transition between two local administrations, as well as to address missing data problems.

These indicators were grouped into three dimensions: development, institutional capacity and transparency. To identify the relations between these categories we used a development proxy and we built an institutional capacity index and a corruption/transparency index.

From this, a scatter plot chart was built to categorize the different states of Colombia by their levels of corruption, institutional capacity and development. Also, the data obtained by the diagram was georeferenced to identify specific characteristics of each region. The conclusions include a categorization of the states of Colombia according to the existing links between corruption and development on each one of them with institutional capacity as an intervening variable.
The opinions expressed and arguments employed herein are solely those of the authors and do not necessarily reflect the official views of the OECD or of its member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

This paper was submitted as part of a competitive call for papers on integrity and anti-corruption in the context of the 2019 OECD Global Anti-Corruption & Integrity Forum.
Introduction

Corruption is considered one of the main governance problems in current times. Corruption is usually defined as abuse of power for private gain, but it is important to note that power can refer to both public and private actors and positions, and that are many definitions, different behaviors included under the general term and no real consensus on its precise meaning (Heywood, 2015; Isaza, 2018).

Among the many variables related to corruption in academic research, development has been singled out as one with a strong correlation. Authors like Daniel Kaufmann (2002) showed a relation between socio-economic development, inequality, poverty and corruption, while Uslaner and Glaesner talk about an inequality trap where countries with a worse Corruption Perception Index (CPI) are also those with the higher levels of inequality. (Ariely & Uslaner, 2016).

At the same time, there is strong evidence of the importance of institutions and a high bureaucratic capacity for development and good governance (Acemoglu, Johnson, & Robinson, 2005; Acemoglu & Robinson, 2013). But the type of relation between those variables is not at all clear. In other words,

“The data from TI’s CPI suggest that GDP per capita correlates negatively with corruption, a statistical finding that has led to the widely accepted causal hypothesis that good governance leads to, or is a predictor of, economic development. Although this has assumed an almost scholarly consensus (Mauro 2004), it has undergone surprisingly little empirical scrutiny, an examination that once again calls into question the basic assumptions of measuring corruption (Kurtz and Shrank 2007). There is a potential problem of circularity when exploring the relationship between ‘good governance’ and corruption.” (Heywood, 2015, p. 7).

Despite this, the view according to which there is some type of relation between development, good governance / institutions and corruption has enough support and theoretical basis to take it as a starting point. However, most if not all works on this problem take data at the national level and there is a need to understand the regional and local differences in subnational cases.

The purpose of this research is to tackle the subnational realities of corruption and development for the case of Colombia and show the variations hidden under national averages, and propose a corruption trap, where some states mix low performance in development, institutional capacity and transparency. The question that guides our paper is: What are the dynamics between corruption and development at the state level in Colombia?

Colombia as a whole has a middle level of development and a middle-low level of transparency, with high inequality and violence. It is considered a middle-income country by the World Bank, with a GDP of $314.458 (thousand million) dollars for 2017 (World Bank, 2019). On a broader definition of development, UNDP classifies Colombia on the 90th position among 180 countries in the Human Development Index (UNITED NATIONS DEVELOPMENT PROGRAMME UNDP, 2019).
Regarding transparency, on the 2018 CPI, Colombia had a score of 36 / 100 and was 99th among 180 countries (Transparency International, 2019). In 2016, 7 out of 10 Colombians believed more than half the public servants were corrupt (Observatorio de la democracia, 2016).

On the other hand, it is also one of the world’s most unequal countries and in Latin America is second only to Haiti (World Bank, 2019): the country’s Gini was 50.8 in 2016 (World Bank) and the wealthier 1% of the population concentrates 20% of income (CEPAL, 2017). Institutions tend to be weak and a history of civil strife and drug-related violence completes this mixed picture (Ángel & Newman, 2017).

However, on the regional level, there are important differences. The country is unitary with decentralized characteristics. The regional administrative divisions (states) are called departments and have some fiscal and bureaucratic autonomy. The peripheral states (those on the territorial borders) concentrate 60% of the countries Unmet Basic Needs (NBI for its initials in Spanish) (Banco de la República, 2010). The highest per capita GDP is that of Casanare, equivalent in 2016 to $11,082 (constant prices) - similar to Russia or Turkey - and the lowest is that of Vaupés, which for the same year was $1,792 (constant prices) – similar to Nigeria or India -.

Institutional capacity for budget management is very low in 31.25% states. Information on the armed conflict shows a concentration of violence in peripheral states (Departamento Nacional de Planeación, 2016) (See Annex 1).

Considering strong regional variations for the relevant variables in Colombia, we analyze the relations between these three key aspects in the 32 states or departments in Colombia: development, corruption and institutions. We find evidence of a group of states that are caught in a corruption trap, while others have a much better performance in at least some of these analytical dimensions. This provides some reason to be optimistic on the possibility of a positive influence or example from the better performers, but the trap implies a dynamic that reinforces each weakness in a negative feedback loop.

I. Methods

We obtained 22 indicators for development, transparency and institutional capacity for individual Colombian states (See Annex 1). We left out of the final analysis those that were not available for all states. After obtaining z-scores by normalizing to the mean and dividing by the standard deviation, we performed pairwise correlation and principal component (PCA) analyses (See Annex 2). The PCA showed us that the main vector, which explained 35% of the variation, strongly combined indicators from all three categories, and that some indicators appeared to have similar information over the three main vectors.

1 10 out of 32 states.
The information from the PCA and the (linear) correlations indicated that a good index for institutional capacity could be constructed by projecting over the correlation between IDF (Fiscal performance index) and IGA (Open government index) z-scores. This procedure can be summarized as assuming there is an actual transparency level over which state by state variations in either score are added, obtaining the correlation between them using all states, and projecting each state’s data pair onto the line. This is better than simply averaging because it takes into account that states could have a large fluctuation in just one of the scores. Similarly, for transparency an index was constructed by projecting over the correlation between ITC (Transparency in the states’ Comptrollers Offices) and ITG (Transparency in the Governor Offices) z-scores. For the development index, there was a good (inverse) correlation between per capita GDP and NBI (Unmet Basic Needs Index), but given the uneven distribution of resource royalties (which had a negative impact on the main PCA vector) this seemed suspect, so the NBI z-score was used alone. This matched well with the National Planning Department (DNP)’s classification for local development.

We visualize the relation between these three indexes by making pairwise scatterplots between them, focusing on which quadrant each state was in. Finally, we looked at the classification of each state in the three dimensions, looking more in depth at those with the worst results in all three categories (what we call the corruption trap). The results from this global categorization were geo-referenced to obtain a visualization of state-level development and corruption dynamics for Colombia.

It is important to note that corruption is difficult to measure directly (González-Espinosa & Boehm, 2011; Heywood, 2015) and available indicators for international comparisons are mainly based on perception. The transparency indicators we use for this paper are not perception-based, but are an objective measure made by that Colombian chapter of Transparency International (Transparencia por Colombia) where the actual transparency or publicness of information of public organizations is observed. This is an imperfect invert measure of corruption but was the only one available for the state level and the PCA analysis showed they worked well in the main vector to explain the corruption trap we wanted to show.

II. Results

The resulting pairwise scatterplot graphs between development, transparency and institutional capacity are shown below. Quadrants group states according to their position in each pair of dimensions. The states are classified according to their quadrant in all three graphs and the analysis is conducted over that final classification.

Graph 1: Development vs. transparency
In Graph 1, the first quadrant shows states with high development and high transparency, quadrant II shows low development and high transparency, III is low on both counts and IV shows low transparency and high development states. It is noteworthy that in quadrant I there are 11 states, in quadrants II and IV combined there are also 11, and in quadrant III there are 10 states, so that roughly 1/3 of states are either in high, low or mixed performance levels for development and transparency.

Graph 2: Development vs. institutional capacities

Graph 2 displays a similar exercise with development and institutional capacity indexes. Compared to
graph 1, there are 8 states that again classify in the third quadrant, indicating low performance on all three dimensions of analysis. These are the states that we characterize as being in a corruption trap with low transparency, low development and no institutional capacity to fix those problems. On the other hand, quadrant I has more states in this graph compared to graph I, due to a higher institutional capacity.

**Graph 3: Transparency vs Institutional capacity**

Finally, graph 3 complements the previous ones with an analysis of states’ transparency level compared to their institutional capacity. The states with a low performance in both dimensions are 9 and in a medium performance (quadrants II and IV) are also nine, due to the already noted better performance in general in the institutional capacity index that moves more states to quadrant I.

The following maps show the results for each dimension to have a geographical representation of the regional differences. On the first three maps, a darker color indicates a better performance. Map 1 shows our transparency index for all states, map 2 our institutional capacity index, map 3 our development proxy based on the NBI indicator and map 4 shows the official government’s classification of states by their development level.

Source: Our construction with publicly available indicators. See Annex 1.
The maps show a clear tendency of center states with higher performance on all dimensions and periphery states with lower scores than the rest.

### III. Analysis

To combine the data presented in the results section, we created in table 1 a categorization of states on the three dimensions and included DNP’s development categories in order to create our own grouping of states according to their combined performance on all relevant aspects. Table 1 contains this first level of analysis.

---

2 This map uses an inverse of the Unmet Basic Needs (NBI) Indicator, so darker blue means more met basic needs as a percentage of the population.
We used a color code to indicate the better performers (green), medium (yellow) and worse (red). Each resulting category is described in the following lines.
Green category (1)

This first category groups states with high development levels, high capacity and transparency. They are the ones that are not caught in a trap, and while there is always room for improvement, they seem to be going well, trying their best to put to good use their resources and being accountable to the people. Antioquia is one of these states and ranks among the highest on all dimensions. Its capital city, Medellin, was recently described by the Brookings Institute as one of the 300 most developed cities in the world (Parrilla, Leal, Berube, & Ran, 2014).

Because they have a good institutional capacity, these states receive more resources from the National government. They are closer to the capital, Bogota, and to the Andean mountain chain. One of them receives important revenues from oil royalties (Meta), but contrary to others that also receive them, it appears to put them to good use for the public interest.

Yellow category (2)

This category groups 13 states in different, intermediate situations. Some of them are not doing bad on some of our analytical dimensions, but they struggle with others. Those states that are at least above average in one dimension could probably use it to tackle the other ones, so they have options to improve. We identify three kinds of states in this group: those that despite low transparency manage to get adequate levels of development, like Valle del Cauca, where the city of Cali is the capital. Those that, on the contrary, have above-average transparency but low development (like in a popular saying in Colombia, they are “poor but honest”); like Magdalena, in the Caribbean coast, where the capital is Santa Marta. The rest are a puzzle, somewhere in between, like Atlántico with a medium level in development, high capacity but low transparency.

Red category (3): the corruption trap

This last category we find those 13 states that can be said to be in a corruption trap. Although it is not possible to establish which of the three variables, transparency, development or corruption, positively or negatively impacts the others, the states in this group show a dynamic confirming the theory that establishes a relationship between low transparency and low development.

In general terms, the states that are under this corruption trap present high levels of Unmet Basic Needs. Taking into account that in Colombia the average population with NBI is 38%, it is interesting to note that all departments in this category have an index above the national average. For example, in Vichada 67% of its population has unmet basic needs while in Chocó this indicator reaches 79%.

The states that are in this category reflect the high inequalities of the country. The states of Cesar and Chocó report Gini coefficients of 0.5 and 0.6 respectively. It should be noted that 5 of the 8 states that fall into this category do not report inequality data, which reflects on their low institutional capacity to generate and maintain accurate statistics about their populations. There is also a low or limited capacity of its institutions to effectively combat acts of corruption as reflected on corruption sanction data.
From another perspective, a study conducted by the National Planning Department on the Incidence of the Armed Conflict (carried out between 2002 and 2013) identified that 15 regions of the country have had a greater impact due to this conflict. That study considers the following variables: armed actions, homicides, kidnapping, antipersonnel mines, forced displacement and crops of coca. Of those states, four are in this category: Cesar, Choco, Guaviare and Putumayo. According to the DNP there is a relationship between the territories most affected by the armed conflict, low economic dynamics and higher levels of poverty. Additionally, this study shows how in these territories there are no effective guarantees for access to public goods. Likewise, a report from the Ombudsman’s Office indicates that the states of Cesar, Chocó, Putumayo and Guaviare used to be territories with a strong presence of the FARC before the recent peace agreement (Defensoría del Pueblo, 2017).

It is also important to consider how drug trafficking impacts the departments that fall into this category. SIMCI\(^3\) reports that 1% of the total hectares of coca grown in Colombia were found in Bolívar, followed by Chocó with 2%, Guaviare with 6%, and Putumayo being one of the departments that reports the most with 21% of the total (Secretary of Health for Guaviare, 2016).

Considering that the cooptation of the institutions can distort not only the political and cultural reality of the territory, but also the formulation of rules and regulations there has been a history of different illegal groups “influencing public decisions, in different areas of state action and levels of public administration” (Garay, Salcedo-Albarán, León Beltrán, & Guerrero, 2008, page 54). This phenomenon has affected the institutional and corruption dimensions of these states (Defensoría del Pueblo, 2017).

The data on corruption sanctions, both criminal and disciplinary, are very low for this category of states. It can be considered that a high number of sanctions would indicate a more active justice administration, but for example Vichada had on average 33 criminal complaints related to corruption during the last 4 years and 0 sanctions were reported. The numbers are similar for Guainía and Guaviare with an average 0,25 criminal sanctions for 51,5 and 45,5 complaints respectively.

On other departments, there are not even corruption complaints, but the data shows that there is corruption and transparency is low. For example, Amazonas, Arauca and Caquetá had less than 4 complaints on average. They were also former theaters of war, so it is possible that the citizens were intimidated by armed actors for too long and do not file complaints for this reason. This is related to a low level of access to justice in these states too (less than 50 on a 100 scale). Not only do they have a low capacity of the judicial system, but the citizens have a negative perception of justice.

Thus, eight states in Colombia (Chocó, Vichada, Guainía, Amazonas, Putumayo, Guaviare, Cesar and Bolívar) are in a corruption trap. They have low performance in the three dimensions included in this study, so that any efforts to improve in one of them is thwarted by the other two. For example, an effort

\(^3\) UNODC’s Project for illicit crop monitoring, initials stand for “Sistema Integrado de Monitoreo de Cultivos Ilícitos”.
to improve the level of development is constrained by institutional weakness, resources can be diverted to private hands by corruption, etc. Or an effort to improve transparency may fall short of the low institutional capacity to manage transparency mechanisms and not have the necessary financial resources to complete it. Indeed, it should be noted that the behavior of these departments has not had significant changes in the four years that this study contemplated.

IV. Conclusion

After collecting data on the three dimensions of development, institutions and transparency for the 32 Colombian departments, we analyzed them to identify their behavior and grouped them into three categories, according to their performance. These analyses were geo-referenced for greater clarity and this allowed us to identify a center-periphery dynamic for all the relevant dimensions. Our initial question was: What are the dynamics between corruption and development at the state level in Colombia?

As the literature suggests (Ariely & Uslaner, 2017; Isaza, 2018; Muir & Gupta, 2018), there is a correlation between development and corruption, even at the state level. But we also found evidence of a correlation with institutional capacity, as literature on development and institutions proposes (Acemoglu & Robinson, 2013; Basu & Cordella, 2018; Isaza, Herrera Kit, Lozano, & Balanzó, 2015). We found states in the same country having different behaviors in transparency, development and institutional capacity and we described three different dynamics according to a categorization led by our data.

This analysis allowed us to build categories, in which the states that are good in most aspects make up group 1, those that have an intermediate and mixed behaviors in these group 2 and the states of group 3 are those that seem caught in a trap of poor performance in all the dimensions and are those we classified as caught in a corruption trap, with low development and low institutional capacity.

The good news is that 6 Colombian states are in a good place and have at least some of the necessary elements to continue improving on these dimensions. Another 13 are in an intermediate stage but have also something to work on to avoid falling in a corruption trap. But there are 13 states in a corruption trap. In this last group, states are on the periphery of the country, on the borders and far from the center (the capital, Bogotá), as can be seen in the maps. Some of these have high levels of violence and they have been particularly affected by the presence of illegal armed groups and drug trafficking. Additional proof of their low capacity is that it is in these states there are no complete data for development indicators such as Gini or poverty.

The question that remains to be answered is how to break this trap. With the evidence we have, we can suggest that it would be possible to improve the situation of these states starting with the institutional capacity and the presence of the State, because more development on its own would not guarantee a decrease in corruption and on the contrary could feed it. Further study is needed to find specific
solutions to this corruption trap, but it is clear that there are no easy fixes.

There were some limitations to our study. Although we managed to make a consistent analysis from a statistical point of view, it is also true that in contexts such as Colombia, studies at the territorial level may present limitations such as missing data and under-report by states or local authorities. Even with open data and e-government initiatives present in Colombia, access to complete and high-quality datasets for understanding local governance remains a challenge.

The quality of the available indicators is also a constraint, especially for corruption measures. It is fortunate that Colombia has at least some state-level data on transparency and corruption that we were able to use. For other developing countries there is no disaggregate data at all. In any case, the indicators do not measure corruption directly, as it is by nature a hidden behavior that breaks laws and social rules, so we had to adopt transparency measures created by NGO Transparency for Colombia.

Future research on this subject could dig deeper into the regional characteristics and specific dynamics of the corruption trap, with qualitative studies complementing the general analysis we did. Comparative analyses between different countries where subnational data are available could be of interest. The role of technologies for integrity management is also an interesting research avenue, with new developments in big data, artificial intelligence and analytics to help governments and society gather information, monitor and nudge behaviors. The risks of such technologies are also worthy of looking into, in relation with new possibilities for integrity breaches and ethical conundrums.

There is probably a corruption trap for many countries and regions of the world. While not all of those are necessarily underdeveloped, it is clear that lower socio-economic and human development and lower institutional capacity reduce the probabilities of getting out of that trap, as the necessary resources are not present to take action on corruption, improve accountability, sanction wrongdoers and put in place more transparency and integrity tools.
## Annexes

**Annex 1. Data sheet.**

<table>
<thead>
<tr>
<th>Index</th>
<th>Index Description</th>
<th>Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Unmet Basic Needs NBI</td>
<td>Departamento Nacional de Planeación (DNP): <a href="https://bit.ly/2oCIthK">https://bit.ly/2oCIthK</a></td>
<td>Unmet Basic Needs Indicator is a direct method used to identify critical deficiencies in a population and characterize poverty. The UBN methodology seeks to determine, if the basic needs of the population are met. It measures: Inadequate housing, Housing with critical overcrowding, Housing with inadequate services, Housing with high economic dependence, Housing with school-age children who do not attend school. The closer this index is to 0 the lower UBN a territory has.</td>
</tr>
<tr>
<td>2</td>
<td>GDP</td>
<td>Departamento Administrativo Nacional de Estadística (DANE): <a href="https://bit.ly/2jmZeg">https://bit.ly/2jmZeg</a></td>
<td>GDP measures the productive activity of a state, it also establishes its behavior, evolution and economic structure useful for analysis and regional decision making.</td>
</tr>
<tr>
<td>3</td>
<td>GDP per capita</td>
<td>DANE: <a href="https://bit.ly/2jmZeg">https://bit.ly/2jmZeg</a></td>
<td>Per capita income is a macroeconomic indicator of productivity and economic development, used to measure economic performance and social conditions.</td>
</tr>
<tr>
<td>4</td>
<td>GINI Index</td>
<td>DANE: <a href="https://bit.ly/2RM4bi1">https://bit.ly/2RM4bi1</a></td>
<td>GINI index measures inequality and wealth distribution</td>
</tr>
<tr>
<td>5</td>
<td>Employment Rate</td>
<td>DANE: <a href="https://bit.ly/2kv8uRV">https://bit.ly/2kv8uRV</a></td>
<td>Ratio between the number of people who are looking for work, and the number of people that make up the workforce.</td>
</tr>
<tr>
<td>6</td>
<td>Extreme Monetary poverty Incidence</td>
<td>DANE: <a href="https://bit.ly/2Kkhfrx">https://bit.ly/2Kkhfrx</a></td>
<td>A person is considered to be in extreme poverty if the per capita income of their household is less than the value of a basic food basket. Also measures if the income is lower than the value of a broader basket.</td>
</tr>
<tr>
<td>7</td>
<td>Monetary Poverty Incidence</td>
<td>DANE: <a href="https://bit.ly/2Kkhfrx">https://bit.ly/2Kkhfrx</a></td>
<td>Compares the income of households with respect to the value of a normative basket.</td>
</tr>
<tr>
<td>8</td>
<td>Multidimensional Poverty</td>
<td>DNP: <a href="https://bit.ly/2zsCxPO">https://bit.ly/2zsCxPO</a></td>
<td>The absence of opportunities or access to a minimum set of &quot;capacities&quot;, considered necessary to reach human development.</td>
</tr>
<tr>
<td>9</td>
<td>Control / States Transparency Index</td>
<td>Transparencia por Colombia: <a href="https://bit.ly/2WLDM7D">https://bit.ly/2WLDM7D</a></td>
<td>Evaluates the 32 States and 32 departmental control Institutions. It measures: Risks associated with, visibility, institutions, control and sanctions. Where 100 is very transparent.</td>
</tr>
<tr>
<td></td>
<td><strong>Index</strong></td>
<td><strong>Website</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Fiscal Performance Index</td>
<td>DNP: <a href="https://bit.ly/2wKvYcs">https://bit.ly/2wKvYcs</a></td>
<td>Measures the degree of management that states give to their public finances. Where 100 is a solvent entity.</td>
</tr>
<tr>
<td>14</td>
<td>Access to Effective Justice Index</td>
<td>DNP: <a href="https://bit.ly/2GixdEj">https://bit.ly/2GixdEj</a></td>
<td>Measures the consecutive stages that a citizen must overcome to achieve the resolution of their conflicts.</td>
</tr>
<tr>
<td>15</td>
<td>Education Coverage Rate</td>
<td>DANE: <a href="https://bit.ly/2I4qPT0">https://bit.ly/2I4qPT0</a></td>
<td>Ratio of school-age population that is in the educational system at the corresponding level. Where 100% is full coverage.</td>
</tr>
<tr>
<td>16</td>
<td>Health System Coverage</td>
<td>Ministry of Health and Social Protection: <a href="https://bit.ly/2wPFpEs">https://bit.ly/2wPFpEs</a></td>
<td>Ratio of the number of people affiliated to the health system with respect to the total population.</td>
</tr>
<tr>
<td>17</td>
<td>Electoral Results in Colombia 2014</td>
<td>Misión de Observación Electoral: <a href="https://bit.ly/2Bm4AIn">https://bit.ly/2Bm4AIn</a></td>
<td>Ratio between the number of people qualified to vote and the number of voters who voted.</td>
</tr>
<tr>
<td>18</td>
<td>Electoral Results in Colombia 2015</td>
<td>Misión de Observación Electoral: <a href="https://bit.ly/2E1cWBA">https://bit.ly/2E1cWBA</a></td>
<td>Ratio between the number of people qualified to vote and the number of voters who voted.</td>
</tr>
<tr>
<td>19</td>
<td>Political Culture Survey</td>
<td>DNP: <a href="https://bit.ly/2E0qeNY">https://bit.ly/2E0qeNY</a></td>
<td>Gathers information on the perception’s citizens have of their political environment.</td>
</tr>
<tr>
<td>20</td>
<td>Central State Transferences Systems</td>
<td>DNP: <a href="https://bit.ly/2tdatgs">https://bit.ly/2tdatgs</a></td>
<td>The financial resources that are distributed from the central government to states.</td>
</tr>
</tbody>
</table>
Annex 2. PCA analysis methods

The procedure for the PCA analysis was as follows: First, a table of the z-scores of the variables for which there was data for all states was constructed. This was then analyzed using the pca function of Matlab (Mathworks, 2015). This function returns the principal component coefficients, the principal component scores and the percentage of the total variance explained by each principal component. The percentages were 35%, 14%, 12%, 8%, 6%, and smaller than 5% for the remaining components. We therefore focused on the first three, and especially the first.

The procedure for obtaining the Capacity index was as follows: From a scatter plot of IGA and IDF (blue points in Figure S1), a linear fit was obtained (pink line in Figure S1), with a slope of m=0.76 with P<0.0001. Next, the coordinates of the projection of each data point (orange points in Figure S1) onto the fit line were obtained using the formula

\[
\begin{pmatrix}
  x \\
  y
\end{pmatrix} = \begin{pmatrix}
  x + \frac{(mx - y)(\frac{1}{m}y - x)}{(mx - y)^2 + (\frac{1}{m}y - x)^2} \\
  y + \frac{(mx - y)(\frac{1}{m}y - x)}{(mx - y)^2 + (\frac{1}{m}y - x)^2}
\end{pmatrix},
\]

where x is the IGA z-score and y the IDF z-score for each state. The joint index is then the (signed) distance from the origin for each projection point. This represents the assumption that there is a common variable (institutional capacity) underlying both measures, and that on top of it there are uncorrelated variations between the two measures. The procedure used here corresponds to minimizing the uncorrelated variation and keeping only the correlated component.
Figure S1. The data for the z-scores of the Transparency index from the governor’s (IGA) and Comptroller’s (IDF) offices (blue points) are used to obtain a linear fit (pink line) on which each point is projected (orange points). The (signed) distance along the projection axis is the combined index. For the Transparency index the procedure is the same, but with the TC and TG z-scores. The linear fit gives a slope of \( m = 0.55 \) with \( P = 0.00116 \). This is illustrated in Figure S2.

Figure S2. The data for the z-scores of the Transparency index from the governor’s (TG) and Comptroller’s (TC) offices (blue points) are used to obtain a linear fit (pink line) on which each point is projected (orange points). The (signed) distance along the projection axis is the combined index.
Annex 3. Armed conflict vs rural multi-dimensional poverty

![Map of Colombia showing conflict zones and rural poverty levels. Source: Departamento Nacional de Planeación, 2016.]

Bibliography


Departamento Nacional de Planeación. (2016). Departamento Nacional de Planeación. In: Índice de incidencia del conflicto armado: https://colaboracion.dnp.gov.co/CDT/Poltica%20de%20Victimas/Construcci%C3%B3n%20de%20Paz/Documento%20de%20indice%20de%20incidencia%20del%20conflicto%20armado.pdf


Ministerio de Justicia. (s.f.). Índice de Acceso Efectivo a la Justicia.


