Factors of regional poverty in Colombia. Do institutions matter?

Summary

Colombia is a country with a particular history, conditioned by an armed conflict of more than fifty years. The present research focuses on the institutional and economic conditions for success and failure in reducing poverty in Colombia departments. This article uses the fuzzy set Qualitative Comparative Analysis (QCA) technique to identify the regional conditions that reduce poverty levels over time. It is concluded that the pathways for poverty reduction are pluri-dimensional, and many of them include attributes such as institutional transparency, absence of violence and people's participation in the democratic system. The method can be used to monitor necessary and sufficient pathways in different Colombian regional clusters.

Introduction

The discussion about poverty in the academic literature has been carried out from different perspectives, from its conceptualization to its measurement (Sen, 2000; Deaton, 2010; Alkire and Santos, 2013; Ele-Ojo, *et al.*, 2013). However, it has not usually considered the conditions for regions to determine success or failure in reducing poverty rates over time. We could ask then, which changes have occurred in regions where poverty reduction has been substantial or where it has been less significant over time? Which are the key pathways for poverty reduction and which role have institutions and governance conditions been playing?

Poverty is a complex phenomenon that needs to be described on a broader level than that of a single condition (Betti, *et al.,* 2006; Belhadj and Limam, 2012). For example, the Human Development Index developed by the United Nations Development Program (UNDP) is based on three dimensions: child mortality (life expectancy at birth), education (coverage) and standard of living (GDP per capita) (UNDP, 2015). Likewise, the Social Progress Index, based on the notions of Amartya Sen, Douglass North and Joseph Stiglitz, is an indicator that measures the welfare of society through social and environmental factors, separately from economic factors.

Conceptualizing poverty requires to incorporating more than one dimension in order to establish a relationship closer to the regional context in which poverty occurs (Neff, 2013). Our concern here is that analysis of poverty must take into account institutional variables and even their political context that allow understanding the power relations that are configured in the territory. Mwangi and Markelova (2009) emphasize that the poorest tend to show less capacity

to influence policy and practice. The power relations and governance have a direct influence on poverty. These relationships and their context differ from one region to another, making relevant a territorial approach to better understand this phenomenon within a country.

Our focus is on aspects such as governance, institutions and peace, which could help to better understand the conditions involved, to lesser or greater extent, in poverty in the territories. Some authors estimate that the phenomenon of poverty is a consequence of social conflicts (Richani, 2013; Bretthauer, 2014) What is the influence of conflicts and democracy on poverty? Caruso and Schneider (2011) suggest that political violence can feed the relative disadvantage of a region and turn it into a vicious circle. On the other hand, the absence of transparent institutions does not contribute to effective governance.

This work aims to identify necessary and sufficient institutional factors that support the reduction of regional poverty over time. We adopt a dynamic approach, which contributes to explain how changes in key institutional indicators were associated to changes in regional poverty during a crucial period for Colombia. This approach is applied to 24 Colombian regions, highlighting the institutional changes between 2003 and 2014, including a period of conflict resolution in the country.

We hypothesize that the sustainable reduction of poverty depends on the quality of governance and on how people are represented. In fact, average national poverty rates moved from 48% in 2003 to 28.5% in 2014 according to the Household Surveys (DANE). The continuous political dispute has sparked a war of more than 50 years between the government and various armed groups. Visibly, conflict and lack of institutional quality have had detrimental effects on poverty (Gates, *et al,.* 2012). Indeed, violence, the absence of effective institutions and of people's participation in the political system could partly explain the uneven development of the Colombian regions, which is the main research question of the present study and that has been approached from different perspectives in the literature (March and Olsen, 1989; North, 1991, 1993; Krugman, 1997; Thelen, 2004; Hegre, *et al.,* 2009; Tebaldi & Mohan, 2010, Steele, 2011; Acemoglu and Robinson, 2012, Bara, 2013; Flores, 2014). We consider here institutional conditions, which can be measured in Colombia from different regional databases, such as forced displacement, the transparency index of regional institutions and the electorate turnout.

We propose to use the methodology of Qualitative Comparative Analysis (QCA) as a multidimensional approach to measure the factors that determine regional poverty (Ragin 1987, 2000, 2006, 2008; Collier, 1993; Fiss, 2011; Schneider and Wagemann, 2010). The QCA is a fuzzy-set and qualitative methodology that does not intend to establish linear relationships

between independent variables and poverty. Rather it allows to categorizing regions by certain parameters that lead us to indicate whether pathways for success or failure exist and include the presence or absence of certain attributes. It is also possible to check whether the combination of presences or absences of the selected attributes form necessary or sufficient pathways for poverty to be present or absent. To do this a dynamic QCA was formulated to understand which combination of circumstances favored or impeded poverty reduction in Colombian regions.

This study is structured as follows. In the second section, there is brief description of conceptual framework that introduces the institutional perspective. Section 3 provides a background of the regional poverty in Colombia and its historical context. Section 4 explains the QCA approach and its application to poverty. Section 5 supplies main findings and discussion, and section 6 concludes with final remarks and recommendations.

An institutional approach to poverty

It seems that some regions are always poor while others move in and out of poverty. Therefore, determining the causes of this phenomenon in a territory becomes relevant, since the context and dynamics of it may differ from one region to another. Poverty varies through time and space, which requires a plausible explanation (Neff, 2013). The present research focuses on aspects whose relevance has been difficult to assess in regional contexts, including the influence of the conflict, the quality of existing institutions and peoples's participation in the political system.

Institutions can be considered the set of rules that articulate human and political interactions between individuals and social groups (North, 1993). Their influence on poverty and inequality is profound. Amin (2008) defines "economics ... as a composition of collective influences that shape individual action and as a diversified entity that follows a historical trajectory inherited by society and the institution formed by cultural influences." Sen (1983) advocates for social agreements in terms of transparent institutions, which are relevant as long as people have the right conditions to make use of them. Institutions are thus conceived as stabilizing entities that play a key role in economic development and in the spread or elimination of poverty.

Institutions are not only the foundation of economic activity, but also the means whereby conflicts and economic contradictions are resolved (March and Olsen, 1989; Thelen, 2004). Control of corruption, together with a stable political system and effective government, can lead to economic growth, which in turn can reduce conflicts over income distribution, exerting a positive influence on poverty (Tebaldi and Mohan 2010). Unequal territorial

development is due in part to the actions of institutions (Krugman, 1997; Massey, 1985; World Bank, 2009).

Institutions determine economic growth and influence the distribution of resources (Acemoglu and Robinson, 2012; North, 1991). Institutions are thus the backbone of regional development. By focusing on the institutional factors of poverty, we could understand the collective inefficiencies related to the "frontier of possibilities". In Colombia, this frontier is reduced in those regions where the confrontations are more resistant to the capacity that the institutions have to fight them. The institutional landscape, as a product of different historical periods based on different systems, rules and actors, is determined by the people and the role they play or that prevents them from playing in the political arena (Bastiaensen, *et al*., 2005).

In Colombia, where the armed conflict has displaced, in the last fifteen years, about 6.6 million people (according to figures from RUV, 2016) we could ask ourselves: do they have people from a region in conflict the same rights and opportunities as another in which the conflict does not persist? Gates, *et al.,* (2012) conclude that an armed conflict leads to forced displacement, flight of capital, destruction of infrastructure, as well as generates uncertainty in investors and paralysis in the territory. Conflicts have a causal effect on levels of poverty and also "[...] wreak havoc on the economy" (Gates, *et al.,* 2012: 1715).

Steele (2011) finds empirical evidence that highlights the historical relationship between armed conflicts and "strategic displacement," which defines the expulsion of the civilian population from a territory by an armed group. He estimates that strategic displacement is explained through local politics and war. In Colombia, the victims reported by the armed conflict, in 50 years, amount to 8.8 million people.

Local people's involvement in the political system also provides information on the quality of governance and institutions. Elections allow the identification of those people who are not in agreement with the predominant group, especially in the electoral contexts with low turnout. It is believed that, in some regions, violence has not been generalized but targeted selectively to certain groups with a specific ideology. As a result, the holding of elections allows the political wills and affinities of the inhabitants of a region to be traced to be controlled and, therefore, can determine their course.

Therefore, the quality of institutions is a relevant factor for political and economic action. The reduction of poverty necessarily requires a change in the existing power structures that improve the opportunities of the most disadvantaged (Bardhan 2002, Bastiaensen, *et al*., 2005; Sen, 2008). Regional poverty is conditioned by a series of factors that occur in a specific historical context and under clearly differentiated circumstances, such as the scarcity of

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resources, armed conflicts, freedom of choice, forced displacement and inequality, among others (Belhadj 2011; Buzzoli and Brück, 2009; Steele, 2011; Zukerman 2012).

Some approaches to measure multidimensional poverty have used fuzzy sets theory (Cerioli and Zani, 1990; Lemmi and Betti, 2006). This has allowed us to reflect the interrelation of different factors to explain the phenomenon of poverty. In the present research, we consider three main factors: peace, transparent institutions and people's participation. The dimensions are introduced in a fuzzy set QCA to try to provide a better explanation on how institutional change has affected the evolution of poverty, in a region or a group of regions (Ele-Ojo, *et al.*, 2013).

We thus expect transparent, decentralized, responsible institutions to determine economic and political outcomes in Colombian regions. Conversely, institutional weakness is expected to be a factor of poverty. The above does not mean that there is a single pattern and that a single factor is necessary or sufficient for this result to occur. We hypothesize that success in reduction of poverty over time only occurs under the combination of several institutional and economic factors.

In the present research we have considered five attributes whose presence or absence can appear as necessary or sufficient for the presence or absence of regional poverty. Three conditions are of institutional nature: personal safety (as measured by lack of forced displacement) transparent institutions and peoples' participation in political processes.

Two other conditions are considered of economic nature (per capita GDO and trade openness). Regional economic conditions appear to be a standard consideration for analyzing the presence or absence of poverty. They found that growth is not enough to reduce poverty, a finding consistent with the empirical literature on growth and poverty in developing countries (Guiga and Rejeb, 2012; Iniguez-Montiel, 2014). Trade is another positive driver of development (Charlton and Stiglitz 2004). Hegre, *et al.* (2009) showed that trade reduces the risk of conflict between states. Glick and Taylor (2010) also underline the relationship between market disruption and peace. The link between trade openness and economic growth, however, is far from clear (Rodrik, 2005).

Historical context

The figures show that Colombia is an unequal country with a marked concentration of wealth. In 2003, the departments with poverty rates above 60% were according to DANE figures: Nariño (70), Chocó (69.2), Huila (66.8), Boyacá (64.6), Córdoba (64), Cauca (62) and Cesar (60.1). On the other hand, the rates of poverty of Bogotá (32.1), Risaralda (34.6) and Quindío (38.8) were below 40%. It was not until 2008 that the situation in Colombia began to show signs of improvement, despite some departments lying behind and presenting high levels of Poverty (e.g. Chocó, 65%).

In 2014, some regions have reached poverty levels below 20%, as in the case of Bogotá (10.1), Cundinamarca (16.9) and Santander (19.6). The fact that Colombian regions have endured high levels of poverty over long periods of time has put considerable pressure on society and originated many conflicts. This situation has constantly hindered the development and economic growth of the country. According to DANE statistics between 2000 and 2013, the incidence of poverty in Colombia averaged 40.8%, well above the Latin American average (33.7). Likewise, the inequality in the Colombian regions (0.55) is still very high, scoring 5 (out of six) in the UN-Habitat classification (2008).

The period 2003 and 2014 was taken as a reference for the present study. This period coincides with relevant milestones that have directly and indirectly influenced changes in the institutional set up. Similarly, they correspond to dramatic political changes in the country. The historical evidence allows a frame of reference to contextualize and better understand the phenomenon of regional poverty in Colombia.

In the period immediately preceding 2003, Colombia was governed by President Andrés Pastrana Borrero of the Conservative Party (presidential period 1998-2002). In this stage, the national government initiated peace talks with the Revolutionary Armed Forces of Colombia (FARC). The peace negotiations did not have the reach nor the expected results. In particular, the intentions of both the national government and the FARC were constantly questioned. In this sense, "both actors simultaneously deployed a political logic and a military logic as a way of making war in the midst of peace" (CNMH, 2013).

The combination of this double logic brought with it "[...] violent interactions that caused the erosion of the legitimacy of the negotiated political solution and the consequent deepening of the war" (CNMH, 2013). Therefore, the result was contrary to the intentions of peace. As a result, the armed conflict reached levels never before seen in history and forced displacement acquired a massive nature (CNMH, 2013). Between 1996 and 2002, according to figures from the Unified Victim Registry (RUV), people displaced by the armed conflict amounted to 3.1 million people.

The subsequent presidential periods, 2002-2006 and 2006-2010, were led by President Álvaro Uribe Vélez of the Social Unity Party known as the "Partido de la U". It broke with the bipartisanship that presided over the country for more than 50 years between the Conservative and Liberal Parties. This period was characterized by an active military offensive. During the 8 years of President Uribe's term, the Military Forces discharged important high-ranking guerrilla commanders. The figures of the armed conflict continued to be huge. According to information from the Uppsala Conflict Data Program (UCPD), the highest number of deaths recorded in Colombia due to the armed conflict since 1989, occurred in 2002 with a total of 3,427 deaths -of which 2,268 corresponded to violence based on the State, 581 to violence not based on the State and 578 to unilateral violence. In the two presidential terms of Álvaro Uribe Vélez, 10,163 people lost their lives according to UPCD figures (2017). The forced displacement, in this same period, registered a total of 4.9 million people.

President Juan Manuel Santos Calderon assumed the two following presidential terms. During the first months of the mandate, President Santos embarked on a path towards peace. In 2011, an exploratory phase began with delegated members of the FARC-EP (the most important armed group in the Colombian armed conflict). After this first phase, the "Mesa de Conversaciones" with the FARC-EP was installed in Havana (Cuba) and ended up with the signing of the document "General Agreement for the termination of the conflict and the construction of a stable and lasting peace" on August 26, 2012.

Four years after the process began, on September 26, 2016, in the city of Cartagena-Colombia, the National Government and the FARC-EP signed the Final Agreement. Later it would be presented at the polls through a plebiscite, on October 2, 2016. The plebiscite had a low participation. According to the official data of the National Registry of Civil Status, 37.43% of the people qualified to vote participated. Another revealing data is given to the rural regions where the majority endorsed the agreement against the majority of the vote at central Departments, which concentrate most of the wealth of the country.

After the plebiscite, the Government and the FARC-EP began a second phase of negotiations where the opposition played a fundamental role. This phase involved a renegotiation of the six main points established in the General Agreement. Finally, the new Final Peace Agreement was signed in the city of Bogotá, on November 24, 2016.

The figures of the conflict have decreased in recent years. Between 2010 and 2015, forced displacement represented 20% of those displaced in 15 years of conflict, compared to 35% in the previous five-year period. Specifically, deaths from state-based violence increased from 3,693 in the 2004-2009 period to 1,108 in 2010-2015, according to UPCD figures. The

improvement in security in the territory brought better prospects and business opportunities that could allow the country, in the medium and long term, to regain confidence in the institutions. During the last 5 years the economy of the country showed signs of recovery. According to data from the World Bank, Colombia had a growth of 4.6% in 2014.

Methodology

Factors influencing the dynamics of regional poverty reduction were evaluated through the application of a QCA in 24 Colombian regions. The unit of analysis of this study is the department (that is, the administrative division of the country). Specifically, understanding regional poverty requires a comparative analysis that allows a clearer vision, in qualitative and quantitative terms, of the factors that promote and mitigate poverty in the Colombian departments. The dynamic QCA model, therefore, aims at identifying the conditions that allow regions to reduce or not reduce levels of poverty over time.

Table 1 shows the definition of the outcome and the different conditions selected including three institutional attributes and two economic attributes. fsQCA will be later introduced as a method to assess how changes in those attributes are necessary or sufficient conditions for changes in the presence of poverty in Colombian regions. It is worth noting that our approach is dynamic in the sense that we take, as a main outcome, the relative change of poverty rates between 2003 and 2014; and the attributes are also measured in terms of relative changes between 2003 and 2014. Then we can categorize regions by indicating in which of them the relative changes have been of higher intensity. We insert the logical operator ~ for the variables ΔPOVERTY and ΔDISPLACE given that we consider absence of poverty and forced displacement as positive attributes.

Table 1. Regional conditions influencing poverty

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Attribute		Concept (~ means "absence")
Outcome	Absence of	~ΔPOVERTY: Decrease in the proportion of the population living under the poverty line in a particular Department.
Institutional conditions	Absence of forced displacement	~ΔDISPLACE: Decrease in the number of forced displaced people in a particular Department. In Colombia, a displaced person is a person who has been forced to migrate within the national territory, abandoning his or her place of residence or usual economic activities because his or her life, physical wellbeing, safety, or personal freedom has been violated or is directly threatened by violations of international humanitarian law or serious, blatant violations of international standards of human rights due to internal armed conflict (Paragraph 2, Article 60, Law 1448 of 2011).
	Transparency	ΔTRANS: Improvement in transparency measures including corruption risks in the entities. Three factors are indicative of transparent management: visibility, sanction and institutionality (Transparencia por Colombia).
	Electoral Turnout	ΔTURNOUT: Increase in the percentage of population voting in electoral processes over the population called to vote.
Economic conditions	Trade openness	ΔTRADE: Increase in trade liberalization of the economy, referencing the size of the commercial exchange in Colombian economy: Exports + Imports / PIB.
	Income	ΔINCOME: Increase in per capita GDP

Source: Authors' elaboration.

The standard statistical analysis based on correlations has focused on a single form of causality, identifying single conditions that are necessary and at the same time sufficient. We argue that combined conditions in terms of pathways or recipes can be also relevant. Schneider and Eggert (2014) argued that four forms of causality of combined pathways can be identified with the method Comparative Qualitative Analysis (QCA in its acronym in English).

The four causality profiles defined for single or combined conditions are the following:

1. Condition necessary but not sufficient.

2. Sufficient but not necessary condition.

3. Necessary and sufficient condition,

4. Combination of sufficient conditions without a single condition being sufficient or necessary.

We are interested in the last profile, without disregarding the other three. For that, when need to select an outcome, which in our dynamic context, is the success or failure of significant reductions in regional poverty: ~ΔPOVERTY or ΔPOVERTY, where Δ refers to the relative change between 2003 and 2014 and ~ means "absence".

As for the 5 conditions reflected in Table 1 (DISPLACE, TRANS, TURNOUT, TRADE and INCOME) we can define 2^5 cases with significant relative positive changes in causal conditions (~ΔDISPLACE, ΔTRANS, ΔTURNOUT, ΔTRADE and ΔINCOME) or with negative changes: ΔDISPLACE, ~ΔTRANS, ~ΔTURNOUT, ~ΔTRADE and ~ΔINCOME. The QCA here is proposed to analyze causal patterns and see how the selected institutional and economic conditions can act together, as sufficient or necessary conditions, on the phenomenon of poverty and its reduction over time.

The QCA will allow, for the purposes of this study, to understand which association patterns or pathways validate the existence of these relationships and assess how their presence or absence affect regional poverty changes in a selected period (Schneider and Wagemann, 2010). The QCA methodology was proposed by Charles Ragin in 1987 on the basis of Boolean logic. This technique is based on the creation of two groups of "variables": on the one hand, the explanatory factors or causal conditions and, on the other, the phenomenon to be explained, that is to say, the result or outcome. Then in Table 1 the outcome is regional poverty or, from a dynamic perspective, relative changes in regional poverty. The causal conditions present in the pathways for success or failure in poverty reduction are changes in institutional and economic variables.

We need criteria to assess whether a particular region belongs to the set of regions where the outcome or the conditions are present or absent. The crisp-set QCA was based on the dichotomization of the cases distinguishing those that "belong fully" {1} or "do not belong" {0} to a set. Another approach is the fuzzy-set QCA, which is followed in the present research. Ragin developed the fsQCA as an alternative to this methodology. The fsQCA method does not try to force cases into one of the two categories {0,1} but allows the scaling of explanatory factors or conditions in that interval. To define the different cut points within these ordinal or continuous values, a calibration of the conditions and the outcome is made. For variables that take ordinal or continuous values, as it happens with the variables used in the present study, the fsQCA technique is the most appropriate (Ragin, 2000).

QCA combines detailed analyzes within each case and systemic comparisons between formalized cases. The QCA research process is iterative, as it involves several rounds of

analysis during the research process. The first results obtained, through the QCA, induce a greater selection of cases and/or redefinition of the fuzzy-set that describe the conditions and the outcome. The fsQCA methodology is appropriate to analyze small or medium databases - eg, between 15 and 50 individuals- (Collier, 1993; Fiss, 2011) as it happens in our study where we consider changes in selected variables for 24 Colombian departments.

Applying a fsQCA to our context is useful, since it allows to identify how the attributes of the regions and their change can be combined in different ways to respond to the phenomenon of poverty and its reduction over time. As we selected 5 conditions, which can be present in terms of presence or absence, we can see which of 32 possible configurations or pathways are necessary or sufficient to produce the outcome.

Sources and estimation

The basic information used to classify the Colombian departments into different fuzzy sets was taken from National Administrative Department of Statistics (DANE), the Ministry of Finance and Public Credit of Colombia, Transparencia por Colombia, the Unit for Attention and Reparation of Victims (RUV), the Comptroller of Bogotá, the National Registry of Civil Status and the Financial Superintendence of Colombia (see Table 2).

As indicated by Ragin (2008), the calibration consists of transforming raw data into values belonging to the set. Particularly for this study the direct method of calibration proposed by Ragin defines three thresholds (Totally inside the 0.95 set; Totally outside the 0.05 set, and; Maximum ambiguity point 0.5).

Table 2. Indicators and Sources

Attribute		Indicator
Outcome	POVERTY	Proportion of the population living under the poverty line in a particular Department. Source: Household Survey (DANE).
Conditions	DISPLACE	Number of displaced people from the Unique Victims Registry (RUV) 1985-2015. National Information Network (RNI).
	TRANS	Corruption risk index from Transparencia por Colombia. Low risk between 89.5 and 100 Moderate risk between 74.5 and 89.4 Average risk between 60.0 and 74.4 High risk between 44.5 and 59.9 Very high risk between 0 and 44.4
	TURNOUT	Percentage of turnout from Registraduría Nacional del Estado Civil. Elecciones Presidenciales períodos 2002 y 2014.
	TRADE	Exports + Imports / PIB. Authors' calculations from DANE.
	INCOME	Per capita GDP. Authors' calculations from DANE (population) and Superintendencia Financiera. (GDP at constant prices 2005).

Source: Authors' elaboration.

The cut points of the dynamic model have been established from the rates of change of the indicators shown in Tables 1 and 2, taking the national averages as the maximum ambiguity points. Table 3 shows the calibrated values of the rate of changes (for the totally inside, totally outside the set values and for the maximum ambiguity point) and descriptive statistics considered for each condition. The calibration allows to make a first categorization of Colombian Departments (Map 1) between those Departments which have reduced poverty in a significant way between 2003-2015 (Bogotá, Cundinamarca, Santander, Antioquia, Atlántico, Valle del Cauca, Meta, Boyacá, Nariño, Caldas, Tolima, Huila) and those Departments which have failed to do it above the maximum ambiguity level (Cauca, La Guajira y Chocó).

Table 3. Calibration and descriptive statistics (percentage rate of change 2003-2014)

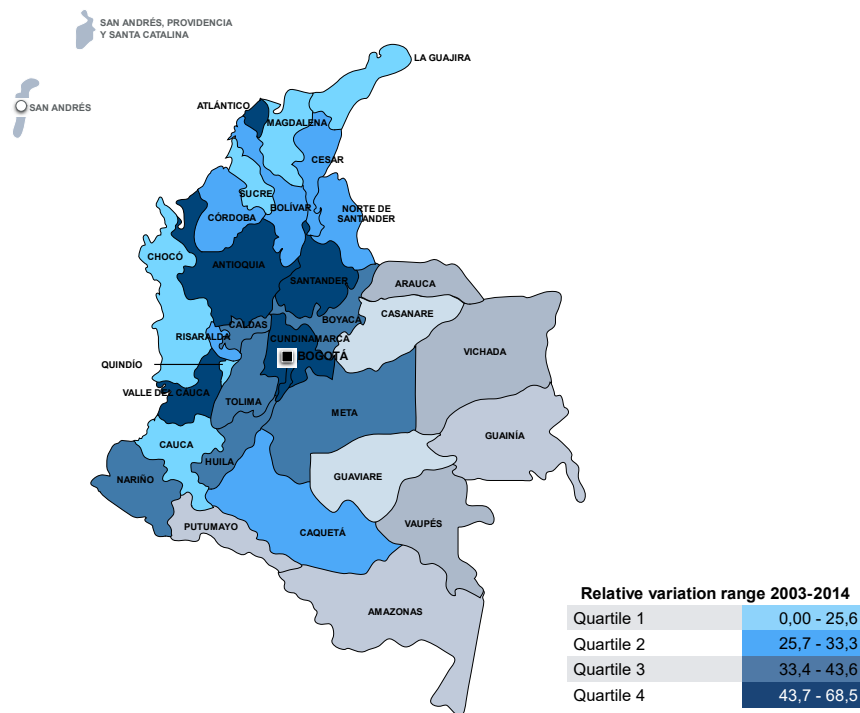| Condition	Calibration	Statistics

	TOTALLY INSIDE	MAXIMUM AMBIGUITY	TOTALLY OUTSIDE	MAX	MIN	AVERAGE (STANDARD DEVIATION)
~ΔPOVERTY	50	25	5	68.5	4.8	34.4 (16.14)
ΔTURNOUT	20	0	-5	67.1	-9.4	10.9 (16.0)
ΔINCOME	150	100	75	323,3	61,9	116.7 (48.8)
ΔTRADE	200	0	-200	113661.7	-99.8	5193.0 (23151.8)
~ΔDISPLACE	100	0	-50	94.7	-142.2	34.5 (67,3)
ΔTRANS	50	0	-20	69.2	-45.2	17.5 (27.8)

Source: Authors' elaboration.
Note: See Annex 1

Consistency and coverage are indicators useful to evaluate model solutions. As indicated Legewie (2013), "Consistency measures the degree to which a relation of necessity or sufficiency between a causal condition (or combination of conditions) and an outcome is met within a given data set" (p.7). Coverage is given by the degree to which the solution formula explains the scores of each region of the sample. In the case of the fsQCA analysis, a condition is considered necessary if it has a consistency of 0.9 or higher (Schneider and Wagemann, 2010).

It is worth noting that the QCA does not assume symmetry in causality, so although the presence of certain conditions can explain success in reducing poverty over time, in contrast, the absence of these conditions does not necessarily indicate that in a region or group of regions poverty reduction has failed. Therefore, separate analyzes are required to evaluate the outcome: success or failure in reducing poverty over time.

Map 1. Categorization of Colombian Departments by poverty reduction

Relative variation range 2003-2014	
Quartile 1	0,00 - 25,6
Quartile 2	25,7 - 33,3
Quartile 3	33,4 - 43,6
Quartile 4	43,7 - 68,5

Source: Authors' elaboration from DANE.

Findings and discussion

Analysis of necessity

We assess the necessity of significant changes in the explored conditions, where Δ means significant positive relative changes above the ambiguity threshold and ~Δ means relative changes below the ambiguity threshold. We assess separately the conditions necessary for a significant decrease in poverty (~ΔPOVERTY) and for a non- significant decrease or failure in reducing poverty (ΔPOVERTY).

As Schneider and Wagemann (2012) suggest high values of consistency may appear that do not necessarily indicate that the condition is relevant. Therefore, the Relevance of Necessity indicator (RoN) has been calculated, which allows detecting whether a condition previously classified as necessary can be considered relevant or, on the contrary, trivial. In our investigation, we have not found any variable that can be considered trivial. However, Schneider and Wagemann (2012) and Ragin (2008) suggest that the consistency threshold should be above 0.90. As Table 3 indicates there is no condition that alone seems necessary for regions to reduce poverty.

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Tabla 3. Analysis of necessary conditions

Conditions tested:	Significant poverty reduction ~ΔPOVERTY			Failure in reducing poverty ΔPOVERTY		
	Consistency	Coverage	RON	Consistency	Coverage	RON
ΔTURNOUT	0.737	0.715	0.625	0.847	0.426	0.452
~ΔTURNOUT	0.409	0.838	0.929	0.434	0.460	0.796
ΔINCOME	0.716	0.819	0.803	0.733	0.434	0.566
~ΔINCOME	0.506	0.785	0.863	0.695	0.559	0.755
ΔTRADE	0.635	0.701	0.693	0.826	0.472	0.561
~ΔTRADE	0.521	0.853	0.910	0.477	0.403	0.713
~ΔDISPLACE	0.802	0.764	0.653	0.809	0.399	0.425
ΔDISPLACE	0.368	0.788	0.914	0.521	0.577	0.841
ΔTRANS	0.840	0.855	0.790	0.624	0.329	0.449
~ΔTRANS	0.341	0.636	0.834	0.726	0.701	0.860

Source: Authors' elaboration through R Package 'Set Methods'. Medzihorsky, et al (2017)

When the outcome is absence of significant poverty reduction (ΔPOVERTY) the increase in electoral turnout in the polls shows a consistency above 0.84, but still below the consistency threshold so it does not turn out to be a necessary condition to produce the outcome, that is a low reduction of poverty.

Analysis of sufficiency

We will identify firstly, the pathways or recipes of conditions that guarantee the "presence" of poverty reduction (~ΔPOVERTY). Subsequently, we will identify the pathways or recipes of conditions that guarantee the "absence" of poverty reduction (ΔPOVERTY).

The model for ~ΔPOVERTY has a consistency of 0.84. Although it is below the threshold it can still be considered valid as a whole. Specifically, the model suggests that the institutional and the economic conditions have had a decisive weight in the reduction of poverty in the Colombian regions.

These results support the argument that the control of corruption coupled with a stable political system and effective government are fundamental ingredients of the pathways to the reduction of poverty (Tebaldi and Mohan, 2010).

Pathway 1 includes improvement in institutional transparency and income increase. Pathway 2 includes enhanced institutional transparency, reduced forced displacement and higher trade openness. Pathway 3 consists of displacement reduction, improvement in

institutional transparency and higher electoral turnout. Finally, pathway 4 combines decrease in displacement, higher electoral turnouts and income increase.

In summary, all identified pathways include improvements in the quality of institutional variables. Economic variables also appear in several configurations, including improvement in income (2 recipes) and trade openness (1 recipe). However, they have always to be combined with improvements in institutional factors. In fact, the Colombian armed conflict had detrimental effects on the reduction of poverty over time.

For the same token, this situation has been reversed in recent years, thanks to the policies implemented to achieve peace. In particular, forced displacement has decreased in the last 5 years, from 480 thousand people in 2003 to 230 thousand people in 2014, according to the Unified Victim Registry (RUV). Therefore, it can be said that the institutional dimension plays an important role in the reduction of poverty in the Colombian regions.

Table 5. Analysis of sufficiency. Outcome: poverty reduction

Pathway	Δ TURNOUT	Δ INCOME	Δ TRADE	Δ DISPLACE	Δ TRANS	Coverage		Consistency
						Raw	Unique	
1		■			■	0.630770	0.144682	0.940328
2			■	O	■	0.458075	0.009043	0.925751
3	■			O	■	0.561022	0.038573	0.979033
4	■	■		O		0.521310	0.071203	0.855364

solution coverage: 0.821930

solution consistency: 0.840370

Pathway 1. Meta, Santander, Antioquia, Cesar, Boyacá, Risaralda, Tolima, Cauca, Nariño, Bolívar, Valle del Cauca.

Pathway 2. Meta, Tolima, Norte de Santander, Quindío, Boyacá, Córdoba, Huila.

Pathway 3. Meta, Tolima, Cesar, Risaralda, Cundinamarca, Bolívar, Antioquia, Caldas, Córdoba, Norte de Santander, Huila, Boyacá.

Pathway 4. Meta, Cesar, Sucre, Atlántico, Magdalena, Risaralda, Tolima, Antioquia, Bolívar, Boyacá.

O   Absence

■   Presence

Source: Authors' calculation throuhg fsQCA 2.5 (Ragin y Davey, 2014)

Maps 2a, 2b and 2c show the regional clusters fulfilling pathways 1, 3 and 4 (pathway 2 is discarded because it shows an unique coverage close to zero). Pathway 3, with the highest consistency, is fulfilled by 12 Departments, only includes institutional conditions. Pathways 1 and 4 are fulfilled respectively by 11 and 10 Departments, and combine economic conditions with institutional improvements. It worth noting that 5 Departments following pathway 3 are

not present in the pathways 1 and 4 (Cundinamarca, Caldas, Córdoba, Norte de Santander, Huila), which represent a cluster of regions where institutional conditions shows to be more determining.

In the rest of regions, the improvement of economic conditions has been more relevant in explaining poverty reduction, although always combined with institutional improvements. Pathway 1 focuses more in the enhanced institutional transparency, in particular in regions only present in this cluster (Santander, Cauca, Nariño and Valle del Cauca). Pathway 4 indicates the contribution of increased electoral participation and lower displacement, in particular in Sucre, Atlántico, Magdalena, which are exclusive of Pathway 4. However, Pathway 4 shows lower consistency and it failed to really explain the poverty change in Sucre (24.57%) and Magdalena (19.16%), where poverty rates did not reduced above the average (34.43%) between 2003 and 2014. It seems that a more profound analysis is needed to explain the failure of these regions in reducing poverty above the Colombian average.

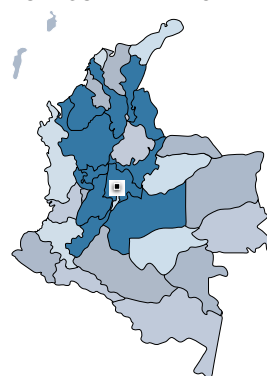**Map 2. Analysis of sufficiency. Outcome: poverty reduction**

Map (2a). Pathway 1
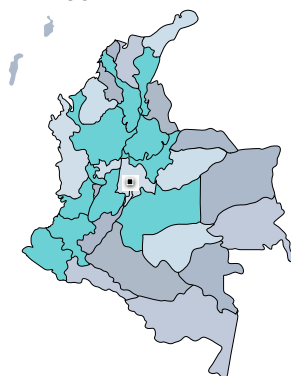
ΔINCOME*ΔTRANS

Meta, Santander, Antioquia, Cesar, Boyacá, Risaralda, Tolima, Cauca, Nariño, Bolívar, Valle del Cauca.
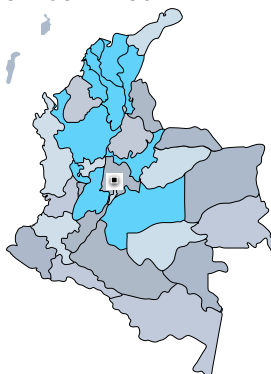
Map (2b). Pathway 3

ΔTURNOUT~ΔDISPLACE*ΔTRANS

Meta, Tolima, Cesar, Risaralda, Cundinamarca, Bolívar, Antioquia, Caldas, Córdoba, Norte de Santander, Huila, Boyacá.

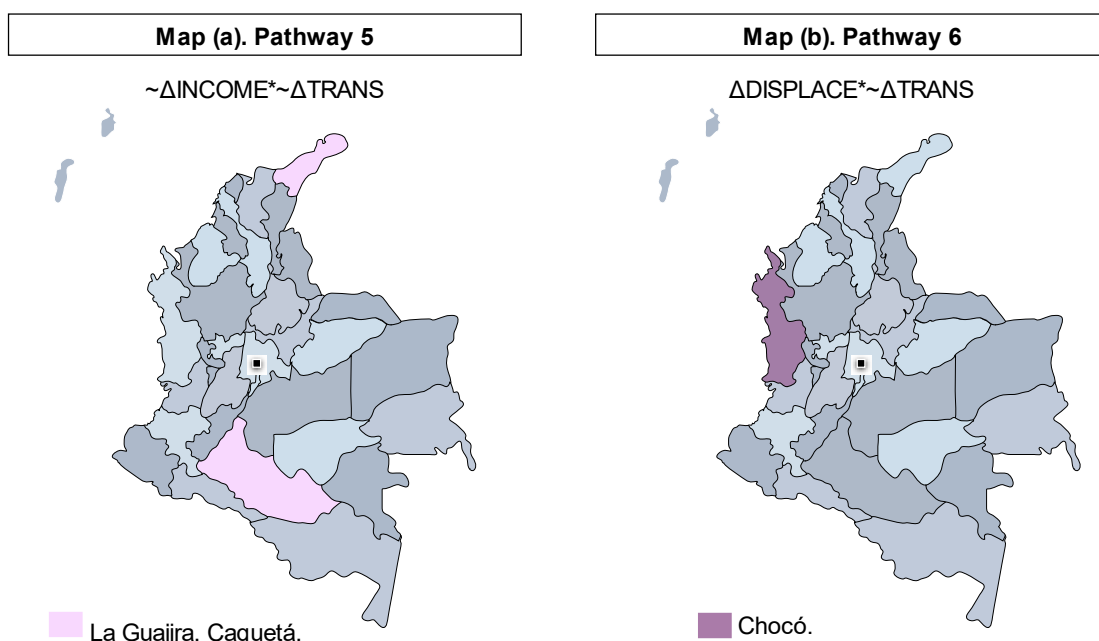**Map (2c). Pathway 4**

ΔTURNOUT*ΔINCOME~ΔDISPLACE

Meta, Cesar, Sucre, Atlántico, Magdalena, Risaralda, Tolima, Antioquia, Bolívar, Boyacá.

Source: Authors' elaboration.
Note: (~) means absence of the condition. (*) is the logical operator AND (+) is the logical operator AND.
fsQCA 2.5 (Ragin & Davey, 2014).

The analysis of sufficiency can be also applied to explain the conditions for failure in poverty reduction (Table 6), with a model consistency of 0.79. It is noteworthy that the institutional conditions also appear in the two identified sufficient pathways for failure, in terms of absence or worsening of institutional transparency (pathways 5 and 6) and of lower political participation (pathway 6).

Map 3. Analysis of sufficiency. Outcome: failure in poverty reduction

Map (a). Pathway 5	Map (b). Pathway 6
~ΔINCOME*~ΔTRANS	ΔDISPLACE*~ΔTRANS

La Guajira, Caquetá.

Chocó.

Pathway 5, represented in Map 3a, is present in La Guajira and Caquetá. Both regions have been hit significantly by violence and their levels of corruption have remained, which has made it difficult to reduce poverty over time. For its part, pathway 6 (Map 3b) combines an increase in forced displacement and non-significant improvement in transparency. The risk of corruption in the department of Chocó remains high and forced displacement has shown no signs of recovery. Specifically, in 2003, forced displacement in Chocó represented 3% of the national total compared to 6.5% in 2014.

Table 6. Analysis of sufficiency. Outcome: failure in poverty reduction

Configuration No.	Δ TURNOUT	Δ INCOME	Δ ITRADE	Δ DISPLACE	Δ ITRANS	Coverage		Consistency
						Raw	Unique	
1		⦿			⦿	0.497923	0.211336	0.774022
2				■	⦿	0.349866	0.063279	0.776783

solution coverage: 0.561202

solution consistency: 0.791659

Pathway 5: La Guajira, Caquetá.	
Pathway 6: Chocó.	
○	Absence
■	Presence

<div align="right">Authors' calculation throuhg fsQCA 2.5 (Ragin y Davey, 2014)</div>

Concluding remarks

The reduction of poverty necessarily requires a change in the existing power structures that improve the opportunities of the most disadvantaged. We believe that a value added of the present research has been to provide a framework to monitor the conditions conform pathways for success and failure in regional poverty reduction. We cannot disregard the role of macroeconomic conditions in those pathways but found further evidences of the relevance of institutional change, as measured by personal safety, people's participation in democratic processes and good governance.

The fsQCA does not allow to identifying a single condition that is necessary for the outcome, either for success or failure in significantly reduce poverty. There are instead several pathways that appear to be sufficient for success. Thus one pathway includes increase in per capita GDP but also requires institutional improvements, as measured by transparency indices. This seems to be the recipe followed by Santander, Cauca, Nariño and Valle del Cauca. But another pathway, with high consistency, only includes institutional conditions, and this is seemingly the pathways followed for Cundinamarca, Caldas, Córdoba, Norte de Santander, Huila. When the outcome of the model is failure in poverty reduction, again the worsening of institutional conditions matter, what could explain the development in La Guajira and Chocó.

Improvements of institutional transparency and personal safety have been determining in some regional clusters to reduce poverty significantly in Colombia. Power relations and the political context have a direct influence on poverty. This differs from one region to another. Hence the territorial approach is relevant to better understand this phenomenon within a country. In this sense, territorial development can directly influence the reduction of poverty, which would imply "[...] an improvement in the well-being of people, over time, a reduction in vulnerability and the eventual gradual elimination of poverty. the causal relationships that keep poor people" (Mwangi and Markelova, 2009).

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Annex 1. Variation outcome and conditions (percentage changes between 2003 and 2014)

Departments	~ΔPOVERTY	ΔTURNOUT	ΔINCOME	ΔTRADE	~ΔDISPLACE	ΔTRANS
Antioquia	47.40	2.31	116.18	-24.35	63.73	26.83
Atlántico	45.42	17.54	115.33	25.51	69.33	-3.67
Bogotá	68.54	-9.39	101.24	51.58	-62.54	0.00
Bolívar	25.97	11.55	103.85	-86.97	79.09	6.27
Boyacá	40.87	0.30	135.81	408.40	73.47	11.72
Caldas	38.27	2.20	88.09	-99.13	91.34	29.80
Caquetá	27.24	67.13	98.92	113661.73	15.74	-30.41
Cauca	12.58	1.81	155.85	177.56	-134.45	6.64
Cesar	31.95	20.04	133.62	-99.42	93.66	15.00
Choco	4.77	6.81	102.63	1163.93	-2.56	-45.20
Córdoba	27.66	12.97	72.84	58.97	8.70	69.21
Cundinamarca	66.67	3.41	97.37	-99.82	94.71	31.70
Huila	34.28	14.89	87.98	7211.70	4.06	43.70
La Guajira	9.09	8.87	61.88	-82.65	72.07	-10.88
Magdalena	19.16	11.95	112.44	12.12	87.44	-4.85
Meta	43.31	18.88	323.34	217.87	71.42	42.34
Nariño	38.71	38.24	104.79	-4.04	-142.16	15.19
Norte de Santander	32.26	1.66	99.70	169.34	62.17	16.96
Quindío	18.30	-3.12	94.30	878.83	29.36	35.96
Risaralda	31.50	5.13	111.44	-93.30	63.34	28.88
Santander	55.86	-7.05	140.55	-65.51	79.61	69.03
Sucre	24.57	22.78	130.61	-16.92	90.27	-8.82
Tolima	37.38	14.76	111.22	1363.89	45.07	45.72
Valle del Cauca	44.63	-1.34	100.75	-98.50	-23.53	29.53

Authors' elaboration from sources indicated in Table 2.