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A Large-Scale Mapping of Territorial Development Dynamics in Latin America

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Summary. — This paper summarizes a study of changes in per-capita income, monetary poverty, and income distribution in 9,045 subnational administrative units of nine Latin American countries between the mid-1990s and mid-2000s. The results largely support spatial convergence of mean household incomes, although the estimates indicate it has been slow. Territorial inequality is found to be persistent and reduces the pro-poor effect of local income growth. Although national-context specific, the estimates also indicate that territorial development dynamics are influenced by the structural features of the territories. In view of the evidence, territorial development policies in Latin America seem well warranted.

Key words — territorial development, poverty mapping, Latin America

1. INTRODUCTION

Inequality in Latin America takes multiple forms that reinforce one another. Following Stewart (2001), these include *vertical inequalities* among individuals, in various dimensions of welfare and in assets and capacities that are critical for human development, such as access to health (De Ferranti, Perry, Ferreira, & Walton, 2004), land (Deininger & Squire, 1998), or political participation (Hoffman & Centeno, 2003). The region is also characterized by very large *horizontal inequalities* between culturally constructed groups, such as ethnic groups (Ferreira & Gignoux, 2008), gender groups (Deere & León, 2001), or, as is argued in this special issue of World Development, territories.[1] Both occur because of institutional mechanisms that create segregation from birth and continue to operate throughout the individual's lifetime, perpetuating differences between those who have power and those who lack it or cannot exercise it (de Ferranti *et al.*, 2004).

This paper refers to a particular manifestation of inequality: that which exists between different territories within each country in Latin America. We can easily distinguish the differences between Northern and Southern Mexico (Aroca, Bosch, & Maloney, 2005; González Rivas, 2007), Colombia's Pacific Region and Central Region (Galvis & Meisel Roca, 2010; Galvis & Meisel Roca, 2012), or the Coast and Highlands of Peru (Escobal & Ponce, 2011a, 2011b). Even in countries with rapid growth and/or a sharp reduction in poverty, we still find localized pockets of economic and social stagnation, as in Chile's Araucanía region (Agostini, Brown, & Góngora, 2008) or Northeastern Brazil (Ferreira-Filho & Horridge, 2005).

Over the past 30 years, these territorial inequalities, their causes, and consequences have tended to disappear from the public agenda. Since the 1980s, economic policy has concentrated on large macroeconomic relationships and, consequently, on criteria related to aggregate economic efficiency. To improve a country's development, it was argued, it was enough to create conditions in which the comparative advantages of countries and their regions could be freely expressed. Based on new theories of location, the World Development Report 2009 argued that spatially inequitable growth will eventually lead to socially inclusive development (World Bank, 2009). Those who hold this view trust two main drivers: the first one is the mobility of labor and capital between regions with productivity and return differentials, which will gradually lead the economy to a situation of spatial equilibrium. And second, the direct effects and the externalities of economic agglomeration. Both forces, when fully operational, should lead to territorial convergence in welfare levels.

Others, however, propose that those forces operate in a world with multiple frictions (economic and \non-economic),\ some of them of a structural nature and deeply rooted in history (Berdegué, Bebbington & Escobal, 2015); because of these frictions, results differ from those predicted by the theory (Puga, 2002). Much empirical evidence challenges the idea of regional convergence in Latin American countries (Aroca *et al.*, 2005; Bosch, Aroca, Fernández, & Azzoni, 2003). Even those studies that support it show that the time frame associated with economic convergence processes is extremely long (Serra, Pazmino, Lindow, Sutton, & Ramirez, 2006; Soto & Torche, 2004)[2] and therefore incompatible with the expectations, tensions, and needs of developing societies. Moreover, at excessive levels of spatial concentration of the population

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and of the economic activity such as those seen in many Latin American countries, diseconomies of agglomeration should begin to operate, undermining the overall efficiency of the economy (Brülhart & Sbergami, 2009; Williamson, 1965).

There are good reasons to pay more attention to territorial inequality. First, evidence indicates that inequality between sub-national units is an important component of overall inequality in these countries, possibly accounting for as much as 40% of total inequality (Elbers, Lanjouw, Mistiaen, Özler, & Simler, 2004), and rapidly growing in some cases (Escobal & Ponce, 2012). Second, place matters for the development of persons, households, and communities,[3] and territorial inequality is related to factors that go beyond differences between individuals or social groups (De Ferranti, Perry, Lederman, Foster, & Valdes, 2005; Kanbur & Venables, 2005).[4] Third, territorial inequalities may be related to social and political conflict, particularly in developing countries with relatively weak institutions (Lessmann, 2011; Tadjoeddin, Suharyo, & Mishra, 2001; Østby, Nordås, & Rød, 2009).

This paper summarizes work done as part of the Rural Territorial Dynamics Program (RTD; http://www.rimisp.org/dtr). The first part of this program had the objective of documenting the extent of territorial inequality and building a typology of territories according to the outcomes of their development dynamics. RTD partners throughout the region documented the *changes* in per-capita income or consumption, monetary poverty, and distribution of per-capita income or consumption in 9,045 subnational administrative units[5] in nine countries: Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, and Peru.[6] Overall, in 2010 these nine countries represented 78% of the total population, 81% of the people living in poverty, and 73% of the GDP of Latin American countries.[7] The characterization of local development dynamics, with such a degree of disaggregation and spatial coverage, is a first step toward understanding the territorial dimension of recent development in the region's countries.

The period we looked at was from the mid-1990s and the mid-2000s, with variations depending on the data available in each country (see Table 7). During those years, Latin America emerged from the morass of the "lost decade," consolidated its democratic processes and began to regain a certain economic and social dynamism. Except for Ecuador, the countries analyzed here registered annual average growth rates during the 1990s ranging from a modest 1.9% yearly for Brazil to 4.6% for El Salvador, and 6.2% for Chile (World Bank, 2013). According to ECLAC (2010), in almost all of them significant progress was also made in reducing extreme monetary poverty, in some cases notably, as in Brazil or Chile, which cut poverty to half or less than half the level of the 1990s. In short, in many ways, compared with the 1980s, this period was positive for nearly all the countries considered. Nevertheless, few countries in the region showed improvements in their high income inequality, and there was even backsliding in countries such as Bolivia, Colombia, Ecuador, and Peru (World Bank, 2013).

In this paper, we examine how these relative advances were distributed among municipalities and other subnational territories. For example, Chile and Brazil showed strong decreases in poverty, but did all of Chile and all of Brazil experience that improvement? Was relative progress concentrated in large regions with comparative advantages, such as northwestern Mexico or the coast of Peru? Were gaps exacerbated between these regions and those that already lagged?

The paper is divided into five sections. After this introduction, Section 2 presents the questions addressed in this paper, and the conceptual framework followed to answer them. Section 3 presents the methods and the data. Section 4 summarizes the key results, and we conclude in Section 5 by presenting some areas for future research and recommendations for public policy.

2. CONCEPTUAL FRAMEWORK

Territorial development is a complex and multidimensional phenomenon, involving the interplay of geographic, institutional, and economic factors, and mechanisms. In the absence of a unified theory that can explain territorial development outcomes, we follow an \open-ended\ approach to gain an understanding of the spatially detailed patterns of income, poverty, and inequality changes in Latin America. Consistently with the conceptual framework of the RTD program (Berdegué *et al.*, 2015), the proposed analytical framework emphasizes three aspects of the dynamics of territorial development:

1. It is a path-dependent process (Boschma & Frenken, 2006; Martin & Sunley, 2006) (Proposition 1).
2. With interrelated outcomes (Bourguignon, 2003; Datt & Ravallion, 1992; Dollar & Kraay, 2002) (Proposition 2), and
3. Conditioned by the structural features of territorial economies and societies (Barro, Sala-I-Martin, Blanchard, & Hall, 1991; Capello, 2007), here referred to as the *local framework conditions* (Proposition 3).

A simple way of summarizing a framework consistent with Propositions 1–3 is as follows. First, there are three outcomes of territorial dynamics that we seek to understand: *changes* in mean household income or consumption, in headcount monetary poverty, and in income or consumption inequality. Those outcomes are influenced by two sets of elements.

The first set of elements captures the *initial conditions* of mean income, headcount poverty, and income inequality. Such initial conditions are aimed at testing for path dependence (Proposition 1), meaning that the evolution of development outcomes is conditioned by the history of the territory (Martin & Sunley, 2006; Ospina & Hollenstein, 2015). There are many conceptual grounds for a \path-dependent\ territorial development process. In the case of regional growth, path dependency may be the result of series of mechanisms creating positive feedbacks of past to current development outcomes, such as technological \lock-in\ effects (David, 1985), dynamic increasing returns (e.g., learning effects, economies arising from agent coordination; Arthur, 1989) and/or institutional reproduction (hysteresis) (North, 1990). Under strong path dependence, divergent income growth trajectories should arise. The alternative hypothesis is that of spatial convergence. It stems from the (neoclassical) assumption of decreasing returns and free mobility of production factors. In such conditions, factors should reallocate from areas of higher stocks and low marginal productivity toward emerging regions where input increases have a higher marginal productivity. The implication is that areas with lower initial levels of development should *ceteris paribus* grow faster (Barro *et al.*, 1991).

In the case of inequality, it is currently widely accepted that inequity is to a large extent the result of institutional mechanisms that affect the relative mobility of social groups (Rao, 2006). But such institutional arrangements (particularly economic institutions) are the result of slowly changing,

self-reinforcing political economy processes (e.g., Acemoglu & Robinson, 2008, 2012). As economic and social institutions preserving the *status quo* tend to be themselves persistent, inequality should also persist. This leads to what has been conceptualized as "inequality traps" (Bourguignon, Ferreira, & Walton, 2007; Rao, 2006). To the extent that these institutional mechanisms have consequences over the spatial distribution of public and private investments, as is the case of urban-biases in public decision-making (Bezemer & Headey, 2008) or elite-capture in capital cities and other dominant urban agglomerations (Galiani & Kim, 2011), one can also expect "*spatial inequality traps*" in the form of localized spots of high and persistent income inequality. A similar trap-based rationale could be applied to the case of poverty (e.g., Azariadis & Stachurski, 2005) to explain the existence of "*spatial poverty traps*" (Galvis & Meisel Roca, 2012).

The initial conditions also reflect the interdependencies of development outcomes, as claimed in Proposition 2. Reduction of monetary poverty, for instance, is the result of a rise in the income of poor households, which is driven by the overall growth of the (territorial) economy (Bourguignon, 2003; Dollar & Kraay, 2002), but also by the distribution of such growth (Datt & Ravallion, 1992). This means that a high and stable inequality undermines the pro-poor potential of economic growth (Bourguignon, 2003). At the same time, poverty and inequality undercut territorial growth capacity (Perry, Arias, Lopez, Maloney, & Serven, 2006), due to, for instance, increased social fragmentation, sociopolitical instability, and underinvestment (Alesina & Perotti, 1996).

The second set of elements is what we call here *local framework conditions* (e.g., Groth, 2000). [8] Contextual factors condition the way in which development trajectories and \outcome-interactions\ unfold, as stated in Proposition 3. To illustrate this idea, think of the notion of "*conditional convergence*" in which economies may converge to specific equilibrium growth rates, conditioned by a range of idiosyncratic growth determinants (Barro *et al.*, 1991). Furthermore, the inclusion of regional features is also supported by spatial–temporal persistent economic processes (e.g., Andersson & Koster, 2010), where slowly changing regional features may reinforce \feed-back\ mechanisms of the territorial development process. Examples of a "sticky" economic geography are the inertia of regional industrial structures, localized technological \lock-in,\ or as already mentioned, the hysteresis of local institutional frameworks (Berdegué *et al.*, 2015; Martin & Sunley, 2006).

Following the tradition of the regional economics literature, local framework conditions include a broad range of conditions and resources shaping territorial dynamics (e.g., Capello, 2007). A first element is physical geography. The resource endowment has been proposed as an important factor defining comparative advantages and thus the regional productive orientation, so that local economies with abundance of easily accessible natural resources would be in a better position to develop (Watkins, 1963). Alternative theories posit that resource abundance may lead to a negative dependency on natural resources limiting the necessary productive restructuring (see Gunton, 2003). In any case, resource endowment is likely to be an important factor in Latin American, given the reliance of many regional economies (particularly the vast majority of largely *rural* territories) on primary economic activities (Olfert *et al.*, 2014).

A second element of local framework conditions is human capital, as proposed by the theories of endogenous growth (Lucas, 1988; Romer, 1986). A rich empirical literature tends to confirm that a skilled and creative local workforce is a prime factor behind regional productivity (Ciccone & Hall, 1996), entrepreneurship (Audretsch, Dohse, & Niebuhr, 2010; Jacobs, 1969), and innovation (Fritsch and Slavtchev, 2007). A related element is the demographic composition of human capital. In presence of strong horizontal inequalities (Stewart, 2001) demographic considerations may be of particular importance in explaining local outcomes, since certain ethnic, gender, age, or other disadvantaged groups tend to sort spatially in response to quality of life, labor markets, or cultural considerations. [9]

A third type of local framework condition is a broad range of services we generically call "place-based investments." In order to realize comparative advantages and the potential of the regional human capital, a critical level of general support services must be in place. Some examples are physical and technological infrastructure, financial services, effective local governments, social organizations, and, in general a broad range of "hard" and "soft" conditions supporting social life, including but not limited to economic activity (Fan, Hazell, & Thorat, 2000; Feldman & Florida, 1994; Gao, 2004; Naudé *et al.*, 2008). Also important is the provision of services that enable human capabilities (Sen, 1999), such as those that are required to enforce the rights of social groups and individuals, or universal public health and education. Despite their importance, such place-based investments are still largely under-provisioned in numerous Latin American territories, particularly in the rural ones (Rimisp-Latin American Center for Rural Development, 2013).

Another important element of local framework conditions is the spatial structure of the economic activity (or "second nature geography"). In first place, the spatial economics literature points to a range of productivity-increasing agglomeration externalities, such as spatially bounded knowledge spillovers (Glaeser, Kallal, Scheinkman, & Shleifer, 1992), pooling of specialized labor (Combes, Duranton, & Gobillon, 2008), or productivity linkages due to a broader supplier base (Rivera-Batiz, 1988). Second, the New Economic Geography has stressed the importance of access to markets for local wages and incomes, as distant producing regions face the burden of higher transaction costs (Hanson, 2005; Redding & Venables, 2004). The main implication of the new theories of location is that remoteness is a cause of regional economic disadvantage (Redding & Sturm, 2008; Wu & Gopinath, 2008). The World Development Report 2009 (World Bank, 2009) has synthesized the role of the economic geography for development in the triad "density-distance-integration".

Related although distinctive compared to economic geography factors, is the local productive structure. It is characterized by elements such as sectorial specialization or diversification, industrial organization, and competition in local markets. Since Marshall (1890), sectorial specialization has been regarded as a main driver of productivity increases and innovation, due to availability of specialized suppliers and workers and relevant-knowledge transfers between related firms (van der Panne, 2004). Others (Glaeser *et al.* 1992; Jacobs, 1969) have pointed at social and economic diversity as the most conducive environment for knowledge spillovers, entrepreneurship, and growth, as knowledge flows would be mostly the result of interactions between firms and workers with different backgrounds. Finally, competition in local products and labor markets has also been identified as a factor stimulating local productivity (Jacobs, 1969; Porter, 1990) and innovation (Feldman & Audretsch, 1999). The local industrial organization, characterized by aspects such as the number and size distribution of firms is also an important element for conditioning economic activity, with structures

Table 1. *Summary of national studies*

Country	Period	Level of analysis	Aggregate trends	Major findings	References
Brazil	1991–2000	4267 Minimum Comparable Areas (essentially corresponding to municipalities, adjusted for changes in borders in 2000 compared to 1991, for example due to subdivisions of municipalities)	Income concentration increased slightly, making Brazil the most unequal country in Latin America. Poverty fell substantially, however, more as a result of social policies than per-capita GDP growth, which averaged less than 1% annually during the period, which was marked by a political crisis at the beginning of the decade and by the Asian crisis as of 1997	One of the results highlighted by the authors is the performance of rural territories, which, in relative terms, was better than that of urban territories. Overall, Brazil's performance is good, as in 892 MCAs with 11% of the population, there were significant improvements in the three indicators of welfare (income, poverty, and inequality), while "only" 693 MCAs that are home to slightly more than one-third of the population showed no significant progress in those indicators	Favareto and Abramovay (in press)
Chile	1992–2002	342 Municipalities ("*comunas*")	The study covers the "golden decade" of the Chilean economy. During this period, GDP grew by about 7% annually and poverty was cut nearly in half. Nevertheless, Chile maintained a very high and steady concentration of income	Economic growth was concentrated geographically in about 39% of the municipalities. In half the country's municipalities there was no significant decrease in poverty, and income distribution improved in only 17%. Only eight municipalities, home to 1% of the population, registered positive changes in all three indicators, contrasting with the situation in 34% of the municipalities, where 25% of the population lives, and where none of those dimensions improved significantly	Modrego et al. (in press)
Colombia	1993–2005	131 Provinces	The economy went through three stages during the study period: growth until 1997, strong contraction until 2000, and then growth again, at rates higher than those of the first stage. The armed conflict, which worsened until 2003, led to the forced displacement of as many as three million Colombians. Poverty at the end of the period was the same as at the beginning, the result of a strong increase until 1999, followed by a drop in that indicator, as well as in inequality, during the 2000s	Only 1% of the population lives in provinces that experienced growth with significant reduction in poverty and inequality during this period. Another 27% of the population lives in provinces that did not have an increase in income distribution, although growth increased and poverty decreased. At the other extreme, one-fourth of the provinces, where 15% of the population lives, experienced no significant improvement in any of the three indicators. One important finding is that nearly three-quarters of Colombians live in provinces in which poverty did not decrease. Unlike other countries, in Colombia there is no marked concentration of the different types of dynamics in a particular macro-region	Fernández et al. (in press)
Ecuador	1995–2006	978 Parishes (a sub-division of a municipality)	During this period, Ecuador showed practically no growth, and it underwent a serious crisis in 1998, which ended with the dollarization of the economy in 2000. The combination of very low growth and increasing inequality translated into an increase in poverty between 1995 and 1999, which decreased in the last years of the study period because of remittances from migrants, higher oil prices and targeted social policies	Only eight parishes, home to slightly less than 2% of the population, registered positive changes in the three indicators. In contrast, 39% of the population lives in 677 parishes (69% of the total) where no improvement in growth, poverty, or inequality was found	Larrea et al. (in press)

El Salvador	1992–2007	265 Municipalities	The period begins with the end of the civil war in 1992. During this time, territorial dynamics were also affected by high rates of emigration and the flow of remittances, the huge destructive impact of Hurricane Mitch, the dollarization decreed in the early 2000s, and the eroding importance of agriculture and the economy's shift toward services and product assembly (*maquila*). Per-capita GDP grew with some vigor during the 1990s and again as of 2005 and 2006. Poverty decreased, although more slowly than in most of the other countries discussed here. The Gini index began dropping slightly as of 2000	Only 7% of the population lives in the 28 municipalities that experienced significant positive changes in income, poverty, and distribution during the study period. Nevertheless, another 45% of Salvadorans live in 169 other municipalities where, although inequality did not improve, per-capita income rose and poverty decreased. El Salvador stands out because of the low proportion of population in municipalities that showed no significant improvement in any of the indicators: less than 1%; remittances and emigration from this type of municipality apparently are largely responsible for that result	Damianović et al. (in press)
Guatemala	1998–2006	330 Municipalities	Guatemala experienced a significant reduction in poverty, although at the end of this period the rate remained extremely high, especially in rural areas. In contrast, inequality increased significantly, even though it had shown improvement in the early 2000s. GDP growth was mediocre until 2003, when it began to accelerate	Nearly one-fifth of the Guatemalan population lives in these 86 municipalities where the three indicators improved, compared to the national averages, and another group lives in 59 municipalities that, although they did not notably reduce their inequality, did grow and reduce their poverty. Slightly less than one-fourth of the population lives in 87 municipalities with results below the national average in the three dimensions analyzed. More than 60% of indigenous Guatemalans live in municipalities where there was little or no relative progress. The greatest differences are between the Northwest and North, which did not advance, and the Southwest and Southeast, which have the largest number of municipalities with positive dynamics of change	Romero and Zapil Ajxup (in press)
Mexico	1990–2005	2045 Municipalities	The Mexican economy showed mediocre performance because of the impact of the crises of 1994 and 1995 and the beginning of the 2000s. Poverty and distribution of consumption also showed a zigzagging trend, resulting in deterioration in social conditions beginning in the mid-1990s, with some recovery by 2001 or 2002	Slightly less than 3% of Mexicans live in just 89 municipalities where there was a significant joint improvement in consumption, poverty rates and distribution of consumption. Another 15% live in 751 municipalities where growth measured by increased consumption was accompanied by a significant reduction in poverty rates, but not in inequality. At the other end of the spectrum, nearly half the population lives in 911 municipalities where there was no significant improvement in any of the indicators; another one-fifth lives in 259 municipalities where consumption did not increase significantly and poverty was not reduced, but inequality did decrease (probably because of the loss of wealth more than a reduction in poverty). Unlike other countries, such as Peru or Nicaragua, whose dynamics of change reflect major macro-regional differences, in Mexico the municipalities that improved tend to be concentrated on a North–South axis in the center of the country. For example, in much of the wealthy Northwest during this period, the poverty rate increased and income become even more concentrated	Yúnez Naude et al. (in press)

Nicaragua	1998–2005	153 Municipalities	During the study period of 1998 to 2005, the country was severely affected by Hurricane Mitch, benefited from a very favorable renegotiation of its foreign debt and registered high economic growth, especially in the agricultural sector	Just two out of every 100 Nicaraguans live in municipalities that experienced growth with significant poverty reduction and improved distribution of per-capita consumption. Another 18% of the population lives in municipalities where there was growth with poverty reduction or reduction of inequality (but not in both social indicators). In contrast, slightly more than two-thirds of the population live in municipalities where there was no significant growth in consumption or decrease in poverty. Moreover, 72% of the Nicaraguan poor live in these municipalities, where no noticeable economic or social progress is seen. The Central, Managua, and Atlantic regions, which constitute most of the territory, contain the municipalities with poor performance, while the extreme north and south of the Pacific Region show more positive dynamics	Rodríguez et al. (in press)
Peru	1993–2007	195 Provinces	During this period, the Peruvian economy showed vigorous growth, and poverty rates in the country began to fall sharply, especially during the later years. Inequality did not change significantly in the aggregate in this period	About half the Peruvian population lives in 29 provinces that experienced growth, poverty reduction and a decrease in per-capita spending inequality during the study period. At the other extreme, one out of every four Peruvians lives in the 141 provinces where there was no growth and poverty did not decrease. Escobal and Ponce note that 83% of the provinces where all indicators moved in the desired direction are urban. In contrast, 80% of the provinces without growth or poverty reduction are rural. Another important finding of Escobal and Ponce is that although intra-provincial inequality showed no significant changes during the study period, there was a considerable increase in indices of spatial polarization, or inter-provincial inequalities. This polarization is seen between the coast, which shows advances in economic growth and social welfare, and the highlands and most of the Amazon region, which are stagnant or backsliding. It is not difficult to associate this spatial polarization with the political dynamics seen during the last presidential election	Escobal and Ponce (in press)

characterized by a larger share of small, independent suppliers favoring business entry (and thus presumably competition and innovation) (Chinitz, 1961; Glaeser & Kerr, 2009).

Along the rest of the article, this simple conceptual framework is articulated around three stylized trends that the statistical analysis explores with the aid of the data generated in the Rural Territorial Dynamics Program:

1. Is there spatial convergence or divergence of mean household income in the different Latin American countries?
2. Is small-scale spatial inequality persistent in Latin American territories?
3. Is there a pro-poor growth effect of inequality reduction in Latin American local economies?

3. METHOD AND DATA

This paper, and the national studies on which it is based, start from estimating changes in mean income or consumption, headcount poverty, and income or consumption inequality. Except for the study of Brazil, [10] which provides direct calculations from census data, our work is based on the Small Area Estimates (SAE) method (Elbers, Lanjouw, & Lanjouw, 2003). In simple terms, the SAE method combines censuses and national household surveys to estimate monetary indicators of welfare at disaggregated spatial scales. Censuses cover (nearly) all the population of a country, but usually lack information about monetary variables. On the other hand, national surveys that are used to measure standards of living include that information, but their representativeness and statistical

precision are usually limited to large regions or groups of regions.

Adjusting income (or consumption) models with survey data at a level of aggregation in which the latter is reliable yields parameters that are applied to the households in the census to predict household incomes (consumption). Evidence from various countries shows that this method yields indicators with reasonable precision for levels of aggregation where the survey is not representative or lacks coverage, or where it is representative but does not allow sufficiently precise estimations (Elbers *et al.*, 2004; Hentschel *et al.*, 1998; Demombynes *et al.*, 2008).

The data used in each country are taken from the last two population censuses that were available when the study was undertaken. These were combined with data from the national standard of living survey for the date closest to each census. In each country, therefore, microdata from two censuses and two household surveys were used. These data were supplemented by other sources of information, such as agricultural censuses, municipal databases, or administrative records of public agencies. The estimation process was carried out with the software PovMap 2.0, a freeware package developed by the World Bank. The first versions of these studies were peer review (Lanjouw & Rascon, 2009) and the revised results are the ones used for this article. [11]

With these data we do two types of analyses. First, we developed a simple typology of territorial dynamics, to get a general and purely descriptive sense of broad patterns of territorial inequality. [12] For each indicator (income and consumption, poverty rate, income/consumption inequality), a statistical comparison was made between two points in time for each territory, to determine whether there was a statistically significant improvement during the period analyzed. By "improvement," we mean an increase in per-capita income or consumption in the territory, a decrease in the poverty rate or a reduction in the Gini index, which measures the concentration of per-capita income or consumption. For each indicator there are two possible results: there was a significant improvement ("win") or there was not ("lose"); the latter could imply the absence of significant changes or a significant worsening of the indicator. By combining the three indicators with their two results, we arrive at a typology of eight possible types of development dynamics.

Secondly, we use the small area estimates of income/consumption, poverty and inequality, to answer the three questions at the end of the previous section of this paper, on mean household income convergence/divergence, persistence of income inequality, and the relationship between mean income growth, poverty, and income inequality. Such analysis was based on fitting regression models relating changes or final levels of the outcome variables with initial levels, also controlling for local contextual conditions captured by territorial-level variables from other data sources in the different countries. We call the reader's attention that this regression should be taken as spatial profiles of the dynamics of welfare outcomes and not at as a models intended at testing for causal mechanisms.

4. RESULTS

Table 1 summarizes the key findings of each of the nine national studies on which the present article is based. The results of the nine studies do not allow for a strict direct comparison between subnational units in different countries, because of the differences in the level of aggregation of territorial units and in the definitions used in each country for aspects such as poverty lines, or in the variables on which the income, poverty, and inequality indicators are based. Nevertheless, the common methodology for both periods within countries allows an overall reading and a comparison of results in terms of general trends. These are stylized trends, of course, but they still help us interpret the territorial heterogeneity of development in Latin America.

(a) *Typology of territorial dynamics*

Aggregate results by type of development dynamics in the nine countries are summarized in Table 2. The first observation, and perhaps the most important, is that in all of the countries, including the poorest and those that had little growth during the period analyzed, it is possible to find territories that were able to grow while also reducing poverty and improving income distribution in statistically significant terms. The study period was not one of a particular social and economic bonanza (except perhaps in Chile), but even so, 12.5% of the territories studied, where about 37 million Latin Americans live, improved their average welfare simultaneously in the three dimensions here considered. Focusing only in the Type 1 dynamics (simultaneous improvements in income/consumption, poverty, and inequality), all of the countries except Peru and Guatemala show very low percentages of the population in that situation (less than 10%). If we add Type

Table 2. *Territorial development dynamics in nine Latin American countries*

Type of territorial dynamic/1	Number of subnational units/2	Total population	Average annual population growth (%)/3
1 WWW	1,133	37,658,746	1.8
2 WWL	2,139	61,151,863	2.0
3 WLW	30	2,623,373	2.0
4 WLL	503	31,676,805	1.8
5 LWW	1,025	31,507,943	1.5
6 LWL	517	11,288,103	1.2
7 LLW	1,098	73,962,371	1.4
8 LLL	2,600	139,505,356	1.8
Total	9,045	389,374,560	1.8

Notes: /1: WWW = significant favorable change in the three dimensions; WWL = significant favorable change only in average household income and poverty rate; WLW = significant favorable change only in income and income distribution; WLL = significant favorable change only in income; LWW = significant favorable change only in poverty rate and income distribution; LWL = significant favorable change only in poverty rate; LLW = significant favorable change only in income distribution; LLL = no significant change in any of the three variables. /2 In Mexico, El Salvador, Guatemala, Nicaragua, and Chile: municipalities; in Colombia and Peru: provinces; in Ecuador: parishes; and in Brazil: minimum comparable areas. /3: calculated as a simple average of average annual rates of each unit in each type of dynamic. *Source:* compiled by authors based on national studies.

2 and 3 territories, however, growth with an improvement either in poverty *or* in income distribution is seen in about one third of the 9,000 units analyzed, accounting for more than one fourth of the population. There are enough of these cases that we can conclude that they are not exceptional anomalies. In other words, growth with relevant degrees of social inclusion has been possible at the territorial scale in Latin America. At the same time, however, the *status quo* is the norm and not the exception: two thirds of the territories have not experienced that type of development.

The rest of the section is aimed at teasing out some general patterns in the different countries, based on the three questions at the end of Section 2.

(b) *Spatial mean household income convergence*

Following the proposed conceptual framework, we first ask whether there is spatial divergence or convergence of mean household incomes across subnational units in Latin American countries. It is important to recall that the convergence hypothesis was elaborated as an explanation to the problem of economic growth (Barro *et al.*, 1991). In this regard, we acknowledge that our proxy variables generated by means of the SAE method (changes in mean household income/consumption) are imperfect indicators of the growth of local economies. The average total per capita household income, for instance, includes public cash transfers (of greater importance in countries with large safety nets such as Brazil or Chile) and also private transfers such as remittances (of a major importance in countries with large international migration, such as El Salvador or Ecuador).[13] The changes in average household consumption, on the other hand, arguably can be considered a measure of monetary wellbeing (Meyer & Sullivan, 2003) rather than of economic growth.[14]

In order to analyze the patterns of absolute mean household income convergence, Figure 1 illustrates the relationship between initial levels and the changes in mean household income/consumption for the group of Latin American countries considered in this study. It includes two fast-growing economies in the period under study, Chile and Peru, and also countries with a more modest performance in those years, Colombia and Mexico. The vertical and horizontal lines in each chart represents the size-weighted average initial level and change in income/consumption; thus it is a simple matter to see the contrast in both dimensions between territories and the national average performance. The size of the markers is proportional to the population size of the administrative unit, in order to take a first look at the importance of agglomeration for income dynamics. Some notable results are as follows:

(1) Large urban centers tend to have larger initial average household income/consumption levels. This result is clear in all countries except perhaps for Peru (leaving Lima aside) where many medium to large provinces are below the initial national level of household income/consumption. Overall, this evidence is broadly consistent with predictions of spatial economic theories pointing at productivity-increasing externalities of

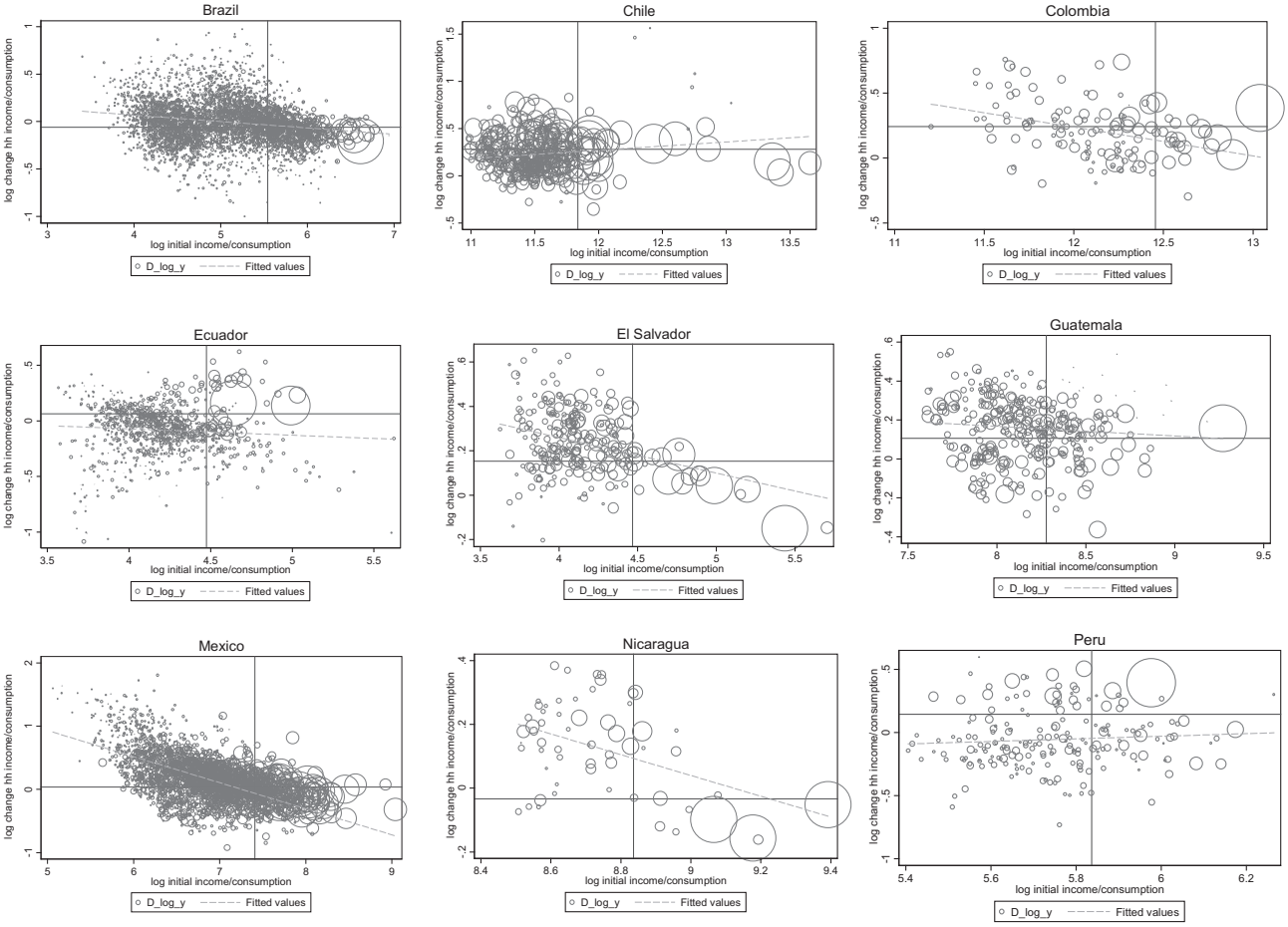

Figure 1. *Absolute spatial convergence of local household income/consumption in Latin American countries.*

urbanization (Ciccone and Hall, 1996), sorting of skilled workers in agglomerated areas (Combes *et al.*, 2008) and/or higher worker compensation in areas facing larger demand (Hanson, 2005).

(2) However, large urban centers are not necessarily the fastest growing places. In the majority of the nine countries here considered, in a large number of small- to medium-sized communities mean household incomes grew relatively fast during the period of analysis. In contrast, large agglomerations do not show a particularly remarkable performance, except in the case of Peru and, to a lesser extent, Ecuador, where the relationship between initial size and household income growth is stronger.

(3) Furthermore, the general trend points toward spatial convergence of mean household incomes. The remarkable exceptions are actually the fastest growing economies of the group: Chile and Peru. These two countries do not show any indication of absolute spatial convergence, but on the contrary, a moderate tendency toward absolute divergence in the case of Peru. In this regard, some studies have discussed the spatially polarizing nature of the market mechanisms in Chile, which would have been reinforced by ineffective regional development policies that have been unable to reverse this trend (Aroca, 2009). In the rest of the countries, while we cannot fully dismiss the possibility of spatial income transfers (mainly in the form of cash transfers from the central government or interregional or international remittances) as an explanation for the observed convergence, we believe it has more to do with local processes of economic restructuring, as cash transfers generally account for a relatively small fraction of total households income. [15]

To shed lights on the role of local framework conditions in conditioning mean household income growth dynamics, in each country we estimate a simple conditional convergence specification (e.g., Mankiw, Romer, & Weil, 1992). The model states that the changes in average per capita income or consumption in the territory between the two years studied in each country are a function of initial income/consumption levels and a set of regional controls. The formal representation of the model is:

$$y_{it} - y_{it-1} = \beta y_{it-1} + \gamma' x_{it} + \mu_{it} \quad (1)$$

In Eqn. (1), y_{it} represents the (log) average household income/consumption in unit i in time t, x is the vector of regional features, which (consistent with Propositions 2 and 3 above) includes proxies for local framework conditions, but also the initial levels of inequality, both hypothetically influencing regional growth dynamics. Vector γ is made up of estimation coefficients. The main estimation parameter is β, being negative pointing at conditional convergence dynamics. [16]

Table 3 shows the results of the conditional convergence regressions in a selection of countries in this study. To fit these regressions, we added to the small area estimations a set of sub-national variables taken from different sources. These additional variables were, to the extent possible, introduced as lagged values (before the second SAE year) to avoid direct endogeneity in the regressions. The time spans and levels of aggregation in these and the following regressions in each country are indicated in Table 7 and the variables and data sources are indicated in Table 8. Again, we note that these estimates should not be taken as having a structural or a causal interpretation, as they are not free of several potential sources of bias, such as omitted variables, measurement errors, and so on (see, for example, the discussion in Bond, Hoeffler, & Temple, 2001).

The odd columns in Table 3 report the results for the basic (absolute) convergence regressions, and the even columns the results of the conditional convergence specifications (including regional controls). [17] As previously suggested by Figure 1, the absolute convergence relationship is statistically significant in El Salvador, Nicaragua, and Mexico, and is particularly strong in this latter country. The estimated annual rates of (absolute) convergence are close to the "legendary 2%" (Abreu, de Groot, & Florax, 2005), ranging from 3.5% in México to 1.2% in El Salvador, meaning a half-life (the time the convergence process takes to reduce half of the mean income difference) of 20–60 years. On the contrary, even after removing some outlying municipalities from the estimation sample, the absolute convergence relationship is still virtually inexistent in Chile.

When the relationship between initial household income levels and its change is controlled for local variables, *conditional* convergence is verified in the four countries. Notably, in the case of Nicaragua, the convergence parameter now becomes only marginally significant. Moreover, in this country the (admittedly few) variables in the augmented model make a poor job of accounting for the spatial variation of changes in consumption, leaving most of the explanatory power in the hands of macro-regional dummy variables. Estimated annual rates of conditional convergence are larger than absolute convergence rates (except for El Salvador where are roughly the same), ranging from 10% in México to 1.2% in El Salvador, meaning a half-life ranging from 7 to 60 years. [18]

In terms of the regional controls and in line with the propositions of endogenous growth theories (Lucas, 1988; Romer, 1986), the results confirm the positive and statistically significant coefficient for the local stock of human capital in three of four countries (in Nicaragua also being positive but not significant). At the same time, consistent with the hypothesis of a detrimental role of inequality for growth, the parameter for the initial Gini coefficient has the expected negative sign in all countries, but is significant only in Mexico. The results in Mexico also confirm that distance to urban centers is *ceteris paribus* associated to slower territorial household income growth (Hanson, 2005; Wu & Gopinath, 2008). This is not the case in Chile, although in this latter country we are only able to account for the distance to the national capital, which is likely of less relevance for many territorial economies that are more reliant on closer small and medium urban centers. As expected, in Chile the results also indicate a positive association between household income growth and access to ICT's and initial economic dynamism (proxied by occupation rates). Also, we found positive and significant partial correlation between growth rates and economic diversity in Chile and in El Salvador, consistent with findings in developed countries (Glaeser *et al.*, 1992). In Mexico there is a positive and significant parameter for the proportion of immigrants in the population, perhaps indicating a positive effect of social diversity for local economic dynamism (Audretsch *et al.*, 2010).

Summarizing, the results are fairly supportive of conditional convergence of average household income/consumption across territories in Latin American countries, which means that small, initially poorer territories tended to exhibit a faster household income growth rate in average. However, estimated speeds of convergence are too low to be significant from a territorial cohesion point of view. In terms of conditioning factors, human capital turned to be the most \cross-cutting\ factor correlated with mean income or consumption changes, while the relevance of other explanatory factors is highly

Table 3. *Absolute and conditional convergence of territorial income/consumption in selected countries (dependent variable: Log change in mean income/consumption)*

Country	Chile		El Salvador		Mexico		Nicaragua	
Parameter	1	2	3	4	5	6	7	8
Log initial income	−0.003	−0.415***	−0.161***	−0.160***	−0.411***	−0.781***	−0.142***	−0.243*
	(0.248)	(0.051)	(0.030)	(0.043)	(0.013)	(0.021)	(0.045)	(0.137)
Log initial population		−0.036***		0.002		−0.030***		0.016
		(0.010)		(0.009)		(0.007)		(0.012)
Log initial Gini		−0.037		−0.184		−0.209***		−0.011
		(0.132)		(0.151)		(0.040)		(0.206)
Log Human Capital		0.526***		0.002***		0.889***		0.020
		(0.117)		(0.001)		(0.040)		(0.028)
Log distance to urban center		0.002**				−0.002***		
		(0.001)				(0.000)		
Log banks per Km^2		−0.000						
		(0.001)						
Log computer access		0.138***						
		(0.025)						
Log % internet access				0.001				
				(0.001)				
Log % mobile phone access						−0.000		
						(0.001)		
Log labor participation								−0.110
								(0.186)
Log occupation rate		0.805***						
		(0.167)						
Log in-migration						0.003***		0.012
						(0.001)		(0.022)
Log agriculture land		−0.000		−0.025		0.000		−0.016*
		(0.001)		(0.016)		(0.000)		(0.008)
Log Herfindahl (economic diversity)		0.042**		0.002**		0.000		
		(0.019)		(0.001)		(0.000)		
Regional dummies	N	Y	N	Y	N	Y	N	Y
Constant	0.248	0.666	0.902***	0.649**	2.986***	4.098***	1.343***	2.494*
	(0.411)	(0.853)	(0.125)	(0.299)	(0.088)	(0.135)	(0.381)	(1.450)
λ (rate of convergence)	0.000**	0.054**	0.012***	0.012***	0.035***	0.101***	0.022***	0.040***
	(0.000)	(0.000)	(0.000)	(0.000)	(6.39e–06)	(6.15e–06)	(0.000)	(0.002)
N	337	335	250	250	2401	2401	147	147
r^2	0.000	0.666	0.101	0.387	0.338	0.643	0.085	0.333
r^2_a	−0.003	0.643	0.098	0.359	0.337	0.637	0.079	0.208
F	0.006	35.659	29.417	38.741	1039.11	102.807	9.999	4.880

* significant at 10%-level.
** significant at 5%-level.
*** significant at 1%-level.

\country-specific.\ Quite notably, and against predictions of mainstream economic theories of agglomeration, the results are not indicative of a significant positive relationship between initial size of the local economy and subsequent household income growth, and, in fact, we observe a significant negative effect in Chile and Mexico. Finally, it is worth noting that the models leave a substantial share of unexplained variation of territorial income/consumption growth; the most likely suspect behind such residual variation are differences in local institutions (Acemoglu & Dell, 2010; Acemoglu & Robinson, 2012; Berdegué *et al.*, 2015), the only major hypothetical driver we were unable to control for.

(c) *Inequality persistence*

In accordance with the inequality traps and institutional path dependence arguments put forth in section 2 and in the RTD program's conceptual framework (Berdegué *et al.*, 2015), we now focus on inequality persistence in Latin American territories. Figure 2 depicts the relationship between initial and final Gini coefficients of income/consumption. The dash line is the regression of final on initial income inequality and the solid line represents a situation of perfect persistence of initial inequality levels (i.e. a 45° line). Again, the size of the markers is proportional to the population in the administrative unit.

Some notable patterns are:

(1) Large agglomerated areas are not necessarily the places where income inequality grew most rapidly. Even in countries where large cities had relatively high levels of initial inequality (like Brazil or Nicaragua), the Gini coefficients didn't grow much (or even declined) in those areas.

(2) In all countries the vast majority of territories are below the national levels of income inequality. In Chile, for instance, the SAE national estimate is of around 0.54 for both years (Modrego, Ramírez, Tartakowsky, & Jara, in press), which is above the percentile 90 of the municipal distribution of Gini coefficients.[19] As the national Gini coefficient is a (non-linear) combination

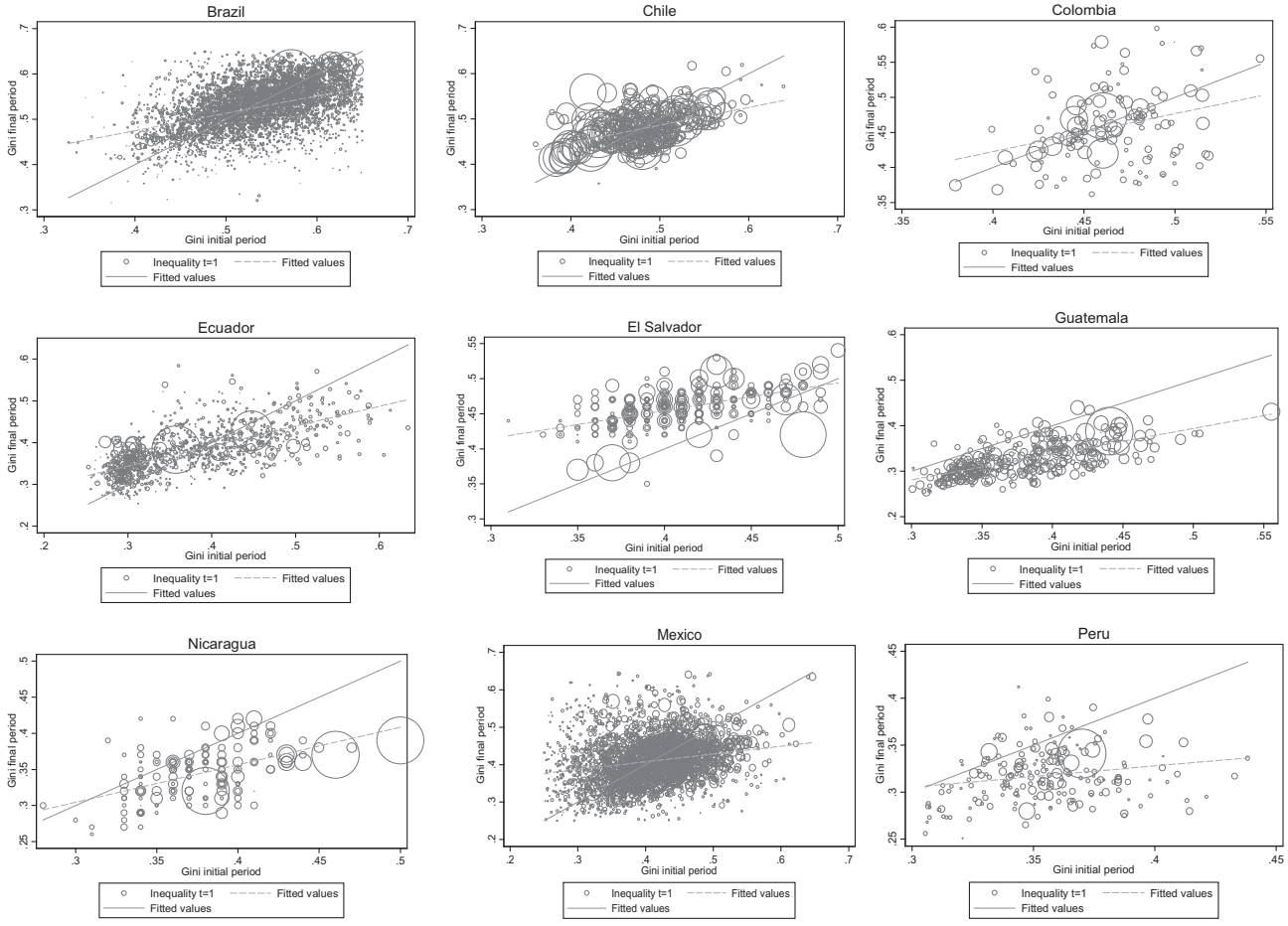

Figure 2. *Absolute territorial inequality persistence in Latin American countries.*

of intra- and inter-territorial income inequality, this result is indicative of the non-negligible component of spatial income inequity in Latin America. Table 4, summarizes the results for a selection of countries in the sample of the decomposition procedure by Araar (2006).[20] The territorial component of inequality, usually accounts for more than 11% of aggregate national income inequality and reaches almost 25% in the case of Peru in 2007.

(3) In most countries there is a similar share of territories with increasing (above the 45° lines) and decreasing (below the 45° line) income inequality. The exceptions are Peru, Guatemala, and Nicaragua, where the majority of provinces or municipalities reduced their internal inequality. In El Salvador (another over-performing country in the sample with respect to economic growth), the opposite took place. In the case of Peru, the decreasing intra-territory inequality is in a context of stable national inequality and the results for the country in Table 4, confirm a large increase in the share of the spatial component of consumption inequality (which to a lesser extent also happened in Nicaragua).

(4) In all countries and consistently with the hypothesis of inequality persistence, there is a significant and positive correlation between initial and final income inequality levels. The simple correlation between initial and final inequality is stronger in Ecuador, Guatemala, Nicaragua (all above 0.5), and weaker in Colombia, México, and Peru (around 0.2–0.3). Given the relatively long time spans for which the two estimates are available (between seven and fifteen years depending on the country), Figure 2 confirms inequality as a persistent phenomenon (Acemoglu, Bautista, Querubín, & Robinson, 2007). Nevertheless, as the national inequality levels remained fairly constant in most countries during the same periods (ECLAC, 2011), the far-from-perfect association indicates a non-negligible redistribution of income or consumption within the sub-national units. Given the slowly changing nature of institutional mechanism conditioning distributional outcomes (Setterfield, 1993), equalizing endogenous processes within the territories is an unlikely explanation for this result. More probably, with a different

Table 4. *Inequality decomposition in a selection of Latin American countries*

Country	Inter-territorial component as proportion of total inequality in initial period (%)	Inter-territorial component as proportion of total inequality in final period (%)	Change in inter-territorial component's share (percentage points)
Brazil	11.2	11.8	0.6
Chile	11.9	11.1	−0.8
Mexico	16.3	13.3	−3.0
Nicaragua	8.4	11.2	2.8
Peru	11.8	23.5	11.7

importance in each country, there should have been a redistributive effect stemming from public transfers targeted to the most vulnerable population (see Agostini & Brown, 2010 for the case of Chile) or from remittances, along with some spatial reallocation of (richer and/or poorer) households during the period.

To understand better the role of territorial heterogeneity in the dynamics of local income inequality, we now allow contextual factors to condition the basic relationship. We estimate a simple dynamic model that states that the measure of inequality (in our case, the Gini coefficient of income/consumption in a given territory) is a function of a number of characteristics of the territory and of the level of initial inequality. The proposed specification takes the form (e.g., Andersson & Koster, 2010):

$$g_{it} = \alpha + \beta g_{it-1} + \gamma' z_{it} + \mu_{it} \quad (2)$$

In Eqn. (2), g_{it} represents the (log) Gini coefficient of income/consumption in unit i in time t and z a vector of regional controls (again, to the extent possible, as initial conditions). Following the discussion in Section 2, we pay particular attention to variables representing inequalities between social groups (Stewart, 2001), such as ethnic, gender, and age structure indicators. But, consistently with the third proposition in Section 2, we also include the initial levels of income and its quadratic form, following the predictions of an inverted-U shaped relationship between the level of development and inequality: the well-known Kuznets curve, that is, the proposition than inequality grows at early stages of economic development, but decreases after a certain point, so that the relationship between inequality and growth takes the form of an inverted U (Jha, 1996; Kuznets, 1995). Parameter β reflects the degree of inequality persistence (the closer to one indicating higher persistence), controlling for observable factors related to local inequalities.

Table 5 shows the results for the persistence of inequality regressions in a selection of countries in this study. The odd columns show the results of the basic (absolute) inequality persistence regressions (ordinary least squares, OLS). They confirm the highly significant relationship between initial and

Table 5. *Territorial inequality persistence in selected countries (dependent variable: Gini coefficient in the final period)*

Country	Chile		El Salvador		Mexico		Nicaragua	
Parameter	1	2	3	4	5	6	7	8
Initial Gini coefficient	0.371***	0.458***	0.395***	0.295***	0.220***	0.293***	0.574***	0.456***
	(0.044)	(0.063)	(0.041)	(0.062)	(0.021)	(0.026)	(0.072)	(0.107)
Log initial income		0.037		−0.027		−0.312***		0.640**
		(0.134)		(0.074)		(0.053)		(0.315)
sqrt Log initial income		−0.002		0.001		0.021***		−0.039**
		(0.005)		(0.008)		(0.004)		(0.019)
Log initial population		−0.005**		0.003*		0.005***		0.004
		(0.002)		(0.002)		(0.001)		(0.003)
Log Human Capital		0.055**		−0.016*		−0.017*		0.015***
		(0.026)		(0.009)		(0.009)		(0.006)
Log women labor participation				0.013***		−0.007*		
				(0.005)		(0.004)		
Log woman occupation rate		0.028***						
		(0.009)						
Log share of women in population								0.001
								(0.007)
Log indigenous population		0.003		0.001		−0.002**		0.006***
		(0.002)		(0.001)		(0.001)		(0.002)
Log population younger than 15 years old		0.002**						
		(0.001)						
Log population older than 64 years old		0.003**						
		(0.001)						
Log electricity access		0.003						
		(0.011)						
Log infrastructure						0.000**		
						(0.000)		
Log internet access				0.006***				
				(0.002)				
Log agricultural land				0.004				−0.001
				(0.003)				(0.001)
Regional dummies	N	Y	N	Y	N	Y	N	Y
Constant	0.300***	0.300	0.297***	0.327**	0.318***	1.416***	0.128***	−2.560*
	(0.022)	(0.802)	(0.017)	(0.165)	(0.008)	(0.182)	(0.028)	(1.349)
N	337	337	249	202	2385	2365	147	147
r^2	0.183	0.531	0.281	0.659	0.052	0.249	0.306	0.749
r^2_a	0.180	0.498	0.278	0.635	0.051	0.236	0.301	0.699
F	70.332	17.275	91.142	34.404	114.472	19.384	63.314	27.055

* significant at 10%-level.
** significant at 5%-level.
*** significant at 1%-level.

final levels of income inequality in the four countries considered. Moreover, except for Mexico, the results indicate a high explanatory power for the single initial inequality levels, with coefficients of determination ranging from 0.18 in Chile to 0.31 in Nicaragua.

Once additional controls are included (seen in the even columns of Table 5), the results for the persistence coefficient remain qualitatively unchanged, and the point estimate is actually larger in Chile and Mexico. Estimated coefficients are supportive of the Kuznets hypothesis in Chile and Nicaragua and contradict it in Mexico and El Salvador. The coefficients on initial income/consumption are, however, significant only in México and Nicaragua. On the other hand, there is no univocal relationship between agglomeration and inequality, as indicated by the varying signs for the population coefficient across countries. Similarly, the effect of initial levels of human capital is also country-specific, as well as the effects of variables representing horizontal inequalities (the share of indigenous population and the participation of women in the labor force).

Summarizing, the inequality persistence regressions indicate that: (i) territorial income inequality is persistent in time; (ii) the effects of the different local framework conditions are highly idiosyncratic, and (iii) the models leave a large share of unexplained variation. Altogether, this evidence again points at territorial institutional frameworks—the uncontrolled factor—as an influential factor conditioning the inequality dynamics in Latin American territories.

(d) *Poverty responses to changes in income and inequality*

Figure 3 depicts the relationship between mean household income or consumption growth and changes in poverty rates in Latin American territories. Again, the vertical and horizontal lines show the population-weighted average changes.

Significant poverty reduction at the territorial level was the norm in the studied period in Chile, El Salvador, Guatemala, México, and Nicaragua. Chile and Peru are the countries with the largest reduction in poverty at the national or aggregate level; such positive trend is spatially widespread in Chile, but in Peru the national outcome is mostly driven by poverty reduction in the large urban agglomerations. In fact, the majority of (smaller) Peruvian provinces show stable or increased poverty rates during the period.

Countries with a more modest overall performance in the period (Brazil, Colombia, México, and Nicaragua, all with stable poverty or with national reductions below five percentage points) show a variety of territorial patterns. In Brazil and Mexico, for instance, poverty reduction is observed to a large extent in small, rural territories; which suggests a prominent role of large public transfer programs in these two countries which *de facto* if not by design, were largely geographically

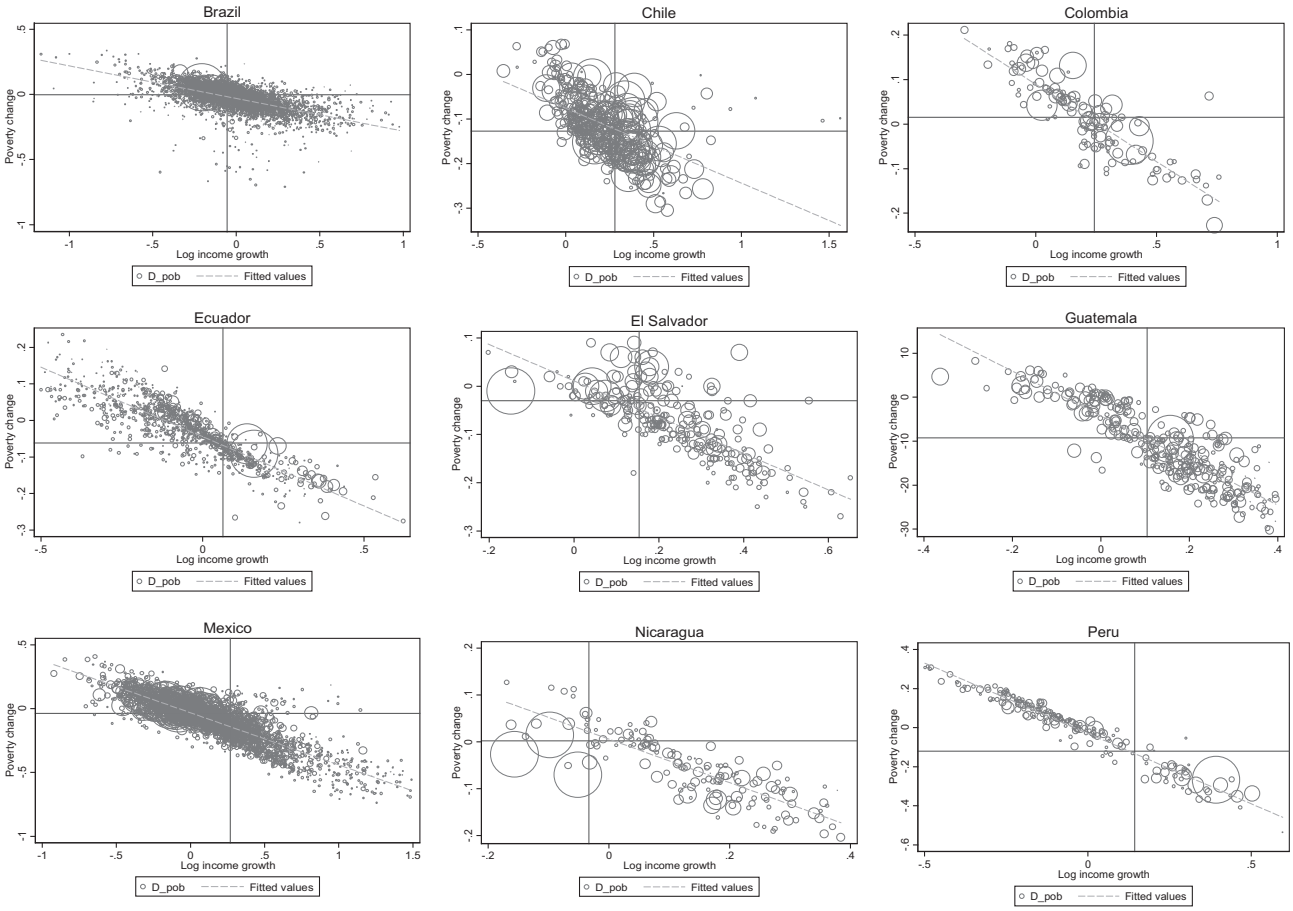

Figure 3. *Territorial growth and poverty reduction in Latin American countries.*

targeted (Helfand & Del Grossi, 2009; Scott, 2010). In Colombia and Nicaragua, there is no apparent relationship between urban agglomeration and poverty reduction. An intermediate situation is Ecuador, with a national reduction of 6% points, and with a spatial pattern of poverty reduction similar to that of Colombia.

The most important result is, however, the strong negative correlation between mean household income and poverty changes, confirming the positive effect of economic growth on poverty (according to Bourguignon, 2003, a tautological relationship). Such relationship is almost one-to-one in Colombia, Ecuador, México, Nicaragua, and Peru. Curiously, in countries with large social transfers like Chile and Brazil, the relationship, while strong, is far from perfect, a fact that might be indicative - again - of a larger dependence on non-autonomous income sources for poverty reduction in localized poverty pockets.

Figure 4 shows the relationship between mean household income growth and changes in inequality. Consistent with the unequalizing nature of economic growth in Latin America (Deininger & Squire, 1998; Fajnzylber, 1990), in most countries the relationship between both variables is moderately to strongly positive. The relationship is particularly strong in Brazil and Chile, two of the most unequal countries in the sample, but also in Nicaragua. In Guatemala and Peru there is virtually no relationship between changes in territorial mean consumption and changes in the Gini coefficient. No country showed a clear average pattern of territorial growth with decreasing inequality.

We now analyze more formally the poverty responses to growth and income redistribution. Following the framework by Bourguignon (2003) and consistently with Proposition 2, changes in monetary poverty can be expressed as a function of changes in the average income and in the distribution of income, which motivates a regression equation of the form (Bourguignon, 2003; Klassen & Misselhorn, 2006):

$$p_{it} - p_{it-1} = \beta_0 + \beta_1[y_{it} - y_{it-1}] + \beta_2[g_{it} - g_{it-1}] + \gamma' w_{it} + \mu_{it} \tag{3}$$

In Eqn. (3), p_{it} indicates de headcount poverty rate in unit i in time t. Again, we permit this essential relationship to vary according to the local framework conditions (vector w), including initial conditions (as in the "improved standard model" in Bourguignon (2003)), but also on other regional controls. The main test of hypothesis is the negative relationship between mean household income growth and poverty changes (the "growth effect") and between income inequality changes and poverty changes (the "distribution effect").

Table 6 summarizes the results of the poverty equation (S). The odds columns report the basic growth–poverty–inequality relationship (the "standard model" following the nomenclature by Bourguignon (2003)), whereas the even columns report

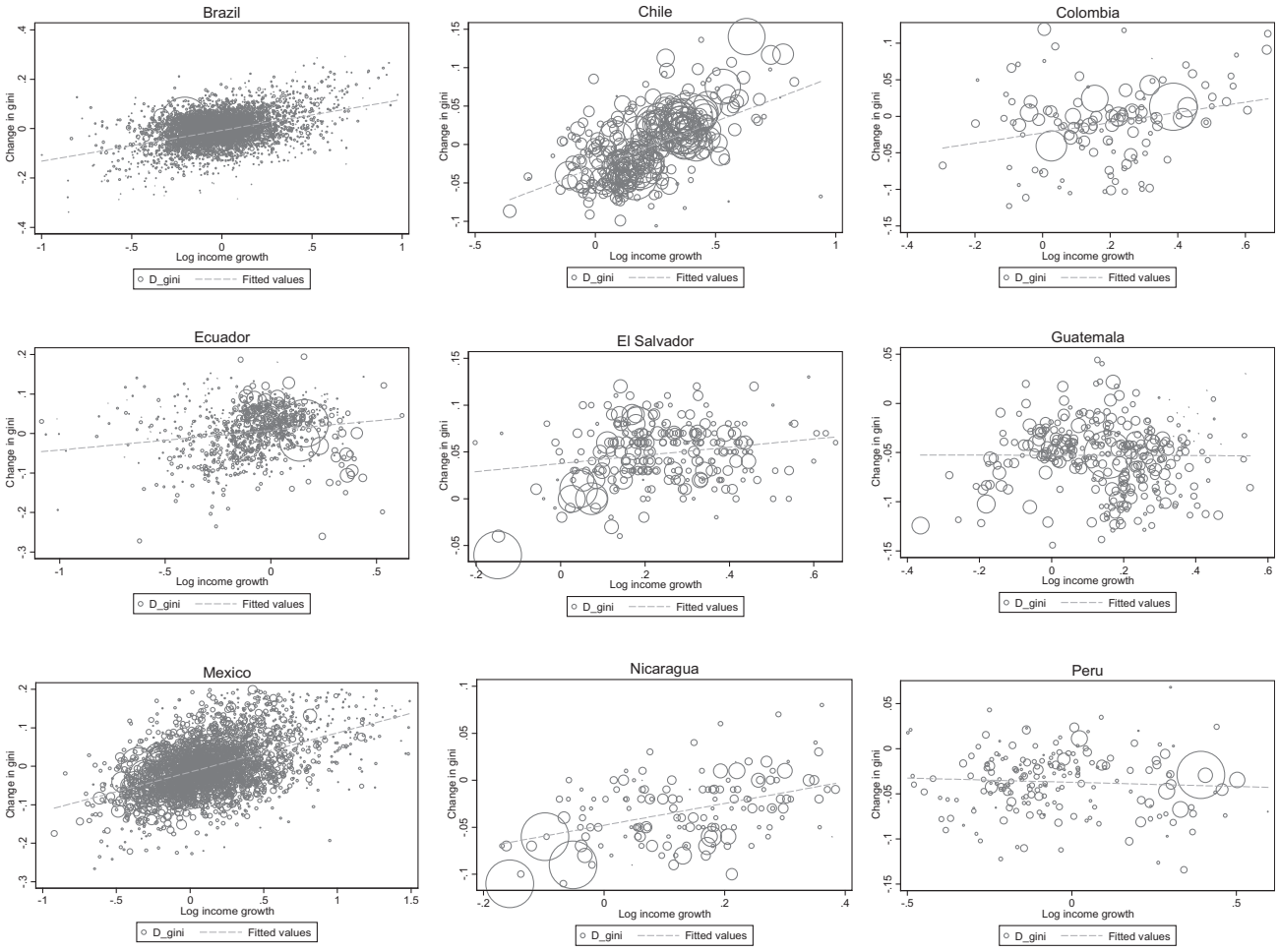

Figure 4. *Territorial growth and inequality changes in Latin American countries.*

Table 6. *Poverty responses to mean income and inequality changes in selected countries (dependent variable: absolute change in poverty rates)*

Country	Chile		El Salvador		Mexico		Nicaragua	
Parameter	1	2	3	4	5	6	7	8
Log change in mean income	−0.384***	−0.342***	−0.426***	−0.382***	−0.526***	−0.516***	−0.552***	−0.560***
	(0.017)	(0.021)	(0.021)	(0.023)	(0.005)	(0.006)	(0.028)	(0.023)
Abs. change in Gini coefficient	0.987***	1.050***	0.524***	0.402***	0.935***	0.990***	0.708***	0.455***
	(0.050)	(0.073)	(0.099)	(0.122)	(0.022)	(0.024)	(0.093)	(0.121)
Log initial income		0.099***		0.077***		−0.010		−0.079***
		(0.016)		(0.020)		(0.007)		(0.021)
Log initial population		−0.006***		0.017***		0.003**		0.001
		(0.002)		(0.003)		(0.001)		(0.002)
Initial Gini coefficient		0.139*		−0.533***		0.190***		−0.140
		(0.076)		(0.160)		(0.029)		(0.116)
Log Human capital		−0.013		0.004		0.032***		0.007*
		(0.025)		(0.015)		(0.009)		(0.004)
Log woman occupation		−0.027***		−0.000***		0.010***		0.004
		(0.009)		(0.000)		(0.003)		(0.007)
Log indigenous population		0.005**		0.001		0.001		−0.001
		(0.002)		(0.001)		(0.001)		(0.002)
Log computer access		−0.004		0.000		0.000		
		(0.006)		(0.000)		(0.000)		
Regional dummies	N	Y	N	Y	N	Y	N	Y
Constant	−0.030***	−1.066***	−0.005	−0.386***	−0.019***	−0.128***	0.039***	0.716***
	(0.003)	(0.156)	(0.006)	(0.062)	(0.001)	(0.033)	(0.005)	(0.164)
N	333	333	247	209	2387	2365	143	143
r^2	0.752	0.900	0.678	0.798	0.901	0.924	0.804	0.941
r^2_a	0.751	0.893	0.675	0.785	0.901	0.922	0.801	0.929
F	273.63	166.128	220.427	63.022	6765.31	521.219	191.273	101.528

*significant at 10%-level.
**significant at 5%-level.
***significant at 1%-level.

the results of a model that allows this basic relationship to be conditioned by contextual conditions.

The estimated coefficient confirms in all countries the negative relationship between changes in mean income/consumption and the absolute change in territorial poverty rates. The "anti-poor" effect of inequality is also established. Point estimates yielded a remarkably large positive and statistically significant coefficient for the parameter capturing the distribution effect in the four cases. Notably, the relationship between poverty and inequality is able to explain a large share of the variation of poverty changes, from 67% in El Salvador to 90% in Mexico, which support the proposition regarding the importance of the interrelations between territorial development outcomes.

The inclusion of additional controls does not add too much explanatory power to our regressions, but the results in columns (2), (4), (6), and (8) do give us some interesting insights regarding the role of local framework conditions in conditioning the growth–poverty–inequality relationship. The most important finding is that the negative relationship between income growth and poverty reduction, and the positive relationship between inequality and poverty change, remain unaltered after controlling for other regional variables.

Only in Nicaragua do we see that poverty was reduced more in areas that were richer in the initial period for a given level of growth and inequality change; this association was not observed in the fastest growing countries (Chile and El Salvador). This result probably has to do with the fact that in those latter two countries, richer areas had already very low poverty rates, where further progress is more difficult to achieve. The coefficients for the initial inequality levels indicate that for a given income and inequality change, reduction of poverty was lower in more unequal areas in Chile and El Salvador, while the opposite is observed in Nicaragua. The participation of women in the labor market is associated with poverty reduction in Chile and El Salvador, but not in Mexico, and indigenous areas are particularly disadvantaged in terms of poverty reduction performance in Chile. In terms of the importance of agglomeration, while in Chile larger municipalities reduced more poverty, *ceteris paribus*, the opposite happened in México and El Salvador.

Summarizing, there are two results in the poverty equations that are of particular interest to the policy discussion addressed in this paper. First, despite the particularities of different national and territorial contexts, there is a robust verification that inequality increases dampen the pro-poor potential of local economic growth, and second, that there is no consistent effect of agglomeration on poverty reduction across countries.

5. CONCLUSIONS

In its early stages, the Rural Territorial Dynamics program was able to establish that the national averages of economic growth or poverty and inequality reduction, masked large differences in development outcomes between local administrative units, in each of the nine countries discussed in this article and that together account for the majority of Latin America's economy, population, and number of people living

in poverty. Territorial inequality is a significant fact, it explains an important share of total inequality in income or consumption, and at least in several countries it is growing in importance even as inter-personal inequality is stable or reduced.

There are two contrasting theoretical and policy approaches to dealing with territorial inequality: one can either trust that market forces will correct these unbalances on their own, or one can propose that market forces alone will not solve the problem or at least not in a politically and socially reasonable period of times, and that territorial inequalities could even be worsened because of the influence of both market and non-market forces.

Taking advantage of highly detailed estimates of changes in average household income/consumption, in headcount poverty, and in the distribution of average income/consumption, we have verified three propositions that describe some fundamental aspects of the dynamics of territorial development: (1) income growth was spatially convergent, which means that at least to a certain degree, small, lagging territorial economies were able to respond to changes in internal and external conditions during the period of analysis; however, convergence was too slow to support a *laissez faire* stance to territorial inequalities; (2) growth, poverty, and inequality outcomes are interrelated, and in particular, income inequality reduces the pro-poor potential of territorial income growth; (3) the statistical significance of many regional controls in our three sets of equations indicate that territorial development dynamics are to a certain extent conditioned by the structural features of territories, but in ways that are highly country-specific. Altogether, and in contrast to policy approaches that advocates for a spatially concentrated growth aided by spatially blind institutions (e.g., World Bank, 2009), we believe that these main three findings build a strong case for place-based development policies in the region.

Strategies aimed at reducing regional disparities by reshaping local framework conditions, should include investments to improve both "hard" (e.g., physical infrastructure) and "soft" factors (e.g., social institutions) (Barca, 2009). It is important to bear in mind, however, that as human capital is mobile whereas regional economic geography is largely "sticky" (Andersson & Koster, 2010), such policies still face major challenges in their way of becoming effective instruments for achieving territorial welfare convergence in Latin America.

NOTES

1. A territory is defined as a geographical space with a socially constructed identity (Schejtman & Berdegué, 2004).

2. The global Gini index is estimated to have decreased by 2.4% between 1970 and 2000, while the Theil index fell by 6.9% during the same period (\Sala-i-Martin,\ 2006).

3. In a recent article discussing the relationship between crime and poverty, The Economist (2014) offered a neat formulation of this idea: "... you can, to put it crudely, take the kid out of the neighborhood, but not the neighborhood out of the kid."

4. Kanbur and Venables (2005) offer a very good discussion of the issue from different perspectives.

5. In Mexico, El Salvador, Guatemala, Nicaragua, and Chile, municipalities; in Ecuador, parishes, which are sub-municipal administrative units; in Peru and Colombia, provinces, which are units between the district and the region (in Peru) or between the municipality and the department (in Colombia); in Brazil, minimum comparable areas (MCAs).

6. The Territorial Dynamics Program used the definition of territory advanced by Schejtman and Berdegué (2004): a space with a socially constructed identity. However, national statistics are organized by administrative units. Therefore, in this article the smallest possible administrative unit is a proxy for a rural territory.

7. Our calculations, based on CELADE, 2005; ECLAC, 2011 and data available in CEPALSTAT, respectively. For GDP, see total annual gross domestic product at current prices, in dollars at: http://interwp.cepal.org/.

8. Note that a more complete representation of the territorial system should also include \feed-back\ mechanisms running from past outcome variables to current local framework conditions. While important, such interdependencies are beyond the scope of the present analysis.

9. This point about horizontal inequalities and the spatial sorting of social groups as an important aspect of spatial inequalities, was suggested by one of the anonymous reviewers to whom we are grateful.

10. Peter Lanjouw and Ericka Rascon reviewed the original reports of the different country studies. In the case of Brazil, which relies on direct census data and not on small area estimates, these reviewers warned that the information could be underestimating total income and overestimating poverty levels, since the Brazilian census mainly measured labor income. Also, one of the peer reviewers correctly pointed out that since there is no small area estimation procedure for Brazil, there is no prediction error associated with the data for this country used in this article. There are still, however, estimation errors arising from sampling since the Brazilian census only collects income data from a sample of the total population. Therefore, the proposed territorial dynamics typology still applies in this case.

11. The peer review report mainly emphasized in the need to better account for spatial sources of heterogeneity, either by fitting strata-level (e.g., rural/urban) household income models, or by allowing for a lower level cluster component of the regression error. This suggestion was largely incorporated in the revised versions. The second main suggestion was the inclusion of regional price indexes to adjust the incomes and poverty lines. With the exception of Peru, such regional price indexes were unavailable in the different countries.

12. A main objective in developing this typology was to support the purposeful selection of 20 territories whose development dynamics were studied in depth. This was the second phase of the Territorial Dynamics Program, and several of the papers in this volume are the results of those case studies.

13. A preferred measure feasible to obtain through small area estimations would be the average total household *autonomous or labor* income. Unfortunately, it was not generated by the SAE exercise in the countries using income as the monetary welfare measure. We still believe that this is

not a limiting issue, as the share of non-autonomous sources in total incomes would be relatively small (in Chile, one of the countries with greater social transfers in the sample, of around 7% in 2003 according to data of the National Survey of Socioeconomic Characterization-CASEN). Moreover, total and autonomous incomes highly correlate across regions (in Chile, for instance, the correlation at the regional, provincial, or municipal level is higher than 99% in 2003 according to the data from CASEN).

14. In the case of consumption, one may argue that local growth in product should highly correlate with local consumption growth, as has been documented for the case of countries (Boarini, Johansson, & Mira d'Ercole, 2006).

15. See for instance the results for Latin America by the Rural Income Generating Activities (RIGA) project (Davis *et al.*, 2007).

16. From parameter β, the annual speed of convergence (λ) can be retrieved as: $(-1/T)^{*} \ln(1+\beta)$, where T is the length of the time span and the half-life as: $\ln(2)/\lambda$ (see Mankiw *et al.*, 1992).

17. The estimations exclude some small outlying units where SAE estimates become less reliable (see Elbers *et al.*, 2003).

18. Not fully comparable across countries, as the set of covariates greatly differ in each case.

19. Estimated from national household surveys (very similar to SAE estimates at the national level when available), compiled by ECLAC (2011).

20. We are grateful to Javier Escobal for suggesting this decomposition method.

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APPENDIX A.

Table 7. *Countries, time spans, and levels of aggregation*

Time spans/countries	Colombia	Mexico	Chile	Nicaragua	Peru	Ecuador	Guatemala	El Salvador	Brazil
$t = 0$	1993	1990	1992	1998	1993	1990	1998	1992	1991
$t = 1$	2005	2005	2002	2005	2007	2001	2006	2007	2001
T	12	15	10	7	14	11	8	15	10
Levels of aggregation	Provincial	Municipal	Municipal	Municipal	Provincial	Parroquias	Municipal	Municipal	Federative units

Table 8. *Definitions and sources of variables used in the regression analysis*

Variable	Definition	Source
Income/ consumption	Income consumption in initial and final moment	Small Area Estimates (SAE)
Population	Total population in initial and final moment	Small Area Estimates (SAE)
Gini coefficient	Gini coefficient in initial and final moment	Small Area Estimates (SAE)
Human capital	*Chile:* average years of schooling of the population in 1992	*Population Census 1992*
	El Salvador: Sum of the population 15 or more years until ninth grade education completed (up to 9 years of schooling excluding nursery) among the total population of the same age in 2007	*VI population Census* of 2007. http://www.censos.gob.sv/ censos/login.aspx
	Mexico: Average years of schooling of the population above 15 years in 2005	*Population and Housing* Census 2005 (INEGI) and *Population Count Territorial Integration System* (ITER)
	Nicaragua: sum of the population aged 15 years and over with a high school education among the total population of the same age in 1995	*Population and Housings Census.* Available in www.inide.gob.ni
Distance to urban center	*Chile:* Distance in kilometers to the national capital	*Ministry of Public Works* (MOP)
	Mexico: Distance from the municipalities to the nearest town of 50,000 or more inhabitants in 2005	Based on *Territorial Integration System* (ITER) in 2005, using centroids (GIS-ARC-VIEW)
Banks per Km^2	*Chile:* number of banks per square kilometer in the municipality in 2005	Based on the Office of the Superintendent of Banks and Financial Institutions of Chile (SBIF) and SINIM
Computer access (%)	*Chile:* Number of persons with access to computer divided by the total population in 2002	*Population Census 2002*
Internet access (%)	*El Salvador:* Sum of households with access to telephones, computers and the Internet among all households percent as percent	VI *Population Census and V Housings Census* 2007
Mobile phone access (%)	*Mexico:* Number of occupants of private dwellings with service availability between total occupants of private dwellings	*Population and Housings Census* 2000, (INEGI)
Labor participation	*Chile*: Participation rate by comuna in 2002, calculated as sum of Economically Active People between sum of the Population in Working Age (15 and over)	*Population Census 2002*
	Nicaragua: Occupation rate by comuna in 1995, calculate as sum of Economically Active People between sum of the Population in Working Age (14 and over)	*Population and Housings Census* 1995. Available in www.inide.gob.ni
Labor woman participation	*El Salvador:* Sum of economically active people between the sum of the working age population by sex	*V Population Census* and *IV Housings Census* 1992
	Mexico: economically active female population divided by the population of working age (over 12 years) in the municipality	*Population and Housings Census* 2000 and *Territorial Integration System* (ITER)
Labor woman occupation	*Chile:* employed population divided between economically active population by sex in 2002.	*Population Census* 2002
In-migration	*Mexico:* Population 5 years and over born in another federal entity in relation to the total population 5 years and over in 2000	*Population and Housings Census* 2000, (INEGI)
	Nicaragua: Sum of the number of persons residing in another department of the country or in another country by total population in 1995	*Population and Housings Census 2005.* Available in www.inide.gob.ni
Agriculture land	*Chile:* percentage agricultural area in 1997 divided by total area per comuna	*VI National Agricultural Census* 1997
	El Salvador: hectares of agricultural exploitation in 1970-71 divided by the municipal population in 1971	*III Agricultural Census* 1971 and *V Population and Housing Census* 1971
	Mexico: area of agricultural use as a percentage of the total area in 2005	*Municipal Information System* (SIMBAD) 2005
	Nicaragua: Surface soils used exclusively for agricultural use of annual or temporary crops, expressed mzn in 2001, divided by the municipal population at the initial moment	*National Agricultural Census 2001.* Available in www.inide.gob.ni
Herfindahl (economic diversity)	*Chile:* Herfindahl index of sectoral diversity of enterprises in 2005	Based on Internal Revenue Service (SII)

	El Salvador: Herfindahl index of sectoral diversity of enterprises and workers in 2005	Based on *Economic Directory, Economics Census* 2005. Available in www.censos.gob.sv
	*Mexico:*Herfindal index that measures the degree of concentration of employment in the various branches of economic activity taking place at the municipal level	Based on *Population and Housings Census* 2000. Microdata Sample.
Share of woman in population	*Nicaragua:* percentage of female population by municipality	*Population and Housings Census* 1995
Indigenous population	*Chile:* Percentage of population self-defined as indigenous in the total population	*Population Census 2002*
	El Salvador: Percentage of population self-defined as indigenous or African descent, of the total population	*VI Population Census* and *V Housings Census* 2007. Available in www.censos.gob.sv/censos/login.aspx
	Mexico: Population aged five years and over who speak an indigenous language in relation to the population 5 years and over	*Population and Housings Census* 2000
	Nicaragua: Percentage of population self-defined as indigenous or African descent, of the total population	*Population and Housings Census* 2005. Available in www.inide.gob.ni
Population younger than 15 years old	*Chile:* Percentage of population below to 15 years	*Population Census* 1992
Population older than 64 years old	*Chile:* Percentage of population higher to 65 years	*Population Census* 1992
Electricity access	*Chile:* Percentage of housings with electricity	*Population Census* 2002
Infrastructure	*Mexico:* Road length as a proxy variable quality of infrastructure	Based on *Economic Information Bank* (BIE), 2005 and 2009, (INEGI)