

No reversal of fortune in the long run:
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prosperity in Colombia, 1500-2005

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NO REVERSAL OF FORTUNE IN THE LONG RUN:
GEOGRAPHY AND SPATIAL PERSISTENCE OF
PROSPERITY IN COLOMBIA, 1500-2005*

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ABSTRACT

This paper examines the non-reversal of fortune thesis proposed by Acemoglu, Johnson, and Robinson (2002) in the light of the Colombian experience over the last 500 years. Using a total of 14 national population censuses and the record of tributary Indians in 1559, it is found that the population density of Colombian regions presented a high degree of persistence through time. Thus, the evidence indicates that those places that were prosperous circa 1500 remain so today, and viceversa. These results indicate that the long run influences of geography on regional economic disparities within a country are not negligible.

Keywords: Comparative Economic History, Demographic Economics, Latin America.

Jel Code: N16, J10, N36.

RESUMEN

Este trabajo examina la tesis de la no reversión de la fortuna propuesta por Acemoglu, Johnson y Robinson en el contexto de la experiencia de Colombia durante los últimos 500 años. Utilizando un total de 14 censos nacionales y un recuento de los indígenas que pagaban impuestos en 1559, se demuestra que la densidad de población de las regiones colombianas ha sido muy persistente a través del tiempo. Por lo tanto, los sitios que eran prósperos en 1500 tienden a ser los mismos en la actualidad y viceversa. Estos resultados sugieren que el papel de la geografía en las disparidades regionales al interior de un país no es despreciable.

Palabras Clave: Historia Económica Comparada, Demografía Económica, Latino América.

I. INTRODUCTION

Over the last two decades the work of Daron Acemoglu, Simon Johnson, and James A. Robinson and their associates has enriched the debate regarding the long run determinants of economic prosperity. Their contributions in this field have been both theoretical and empirical.

Their main message on the matter is quite clear: in the long run institutions are the predominant reason why some places grow rich, while others stagnate. One of the empirical arguments developed by Acemoglu, Johnson, and Robinson to demonstrate the primacy of institutions, over other possible determinants of long run prosperity, such as geography, is what they have called the “reversal of fortune thesis”. In their view, the European colonization of the world which began since the early XVI century, dramatically changed the spatial distribution of wealth: those places that circa 1500 were the most prosperous became poor and remain so today and viceversa.

The reason for this reversal of fortunes is that in those places where there were large groups of indigenous inhabitants the colonizers set up very extractive and excluding institutions. Where the population density was low, the relative size of the colonizing group tended to be large and thus interested in establishing institutions favoring equality.

In this paper I will show that for the case of the Colombian regions there was no reversal of fortune. Rather, what is observed is the continuity of relative prosperity. With few

exceptions, those places which in 1500 were relatively rich remained prosperous throughout the centuries. This conclusion does not deny the enormous importance of institutions for long run economic growth. However, it indicates that the role of geography cannot be discarded completely. Furthermore, from the persistence of relative prosperity through time at the subnational level it cannot be inferred that reversal of fortune does not hold between countries. For example, if colonizers established a larger infrastructure and more complete state institutions in the regions of a country where more extractive institutions were set up, persistence could be observed over time as a result of path dependence. That this would occur, however, depended among other things on the type of productive activity involved. Alternatively, it could be that there were some institutions which were similar throughout the territory of an administrative unit that later became a country and thus, the degree to which a reversal of fortune may occur could be much more limited at the subnational level.

Colombia is an interesting case to study in relation to the long-run role of geography because it has one of the most rugged terrains in the tropics. The territory is divided south to north by three mountain ranges, and as a result there are clearly differentiated geographic regions with very uneven levels of population densities and relative prosperity across the country.

For the estimates of the population densities through time we have used the demographic data of Colombia available in 13 of the 17 national censuses that have been conducted since independence from Spain, as well as the most complete record for the indigenous population made in the early sixteenth century.

II. THE REVERSAL OF FORTUNE THESIS AND SOME OF ITS CRITICS

The world economy has changed enormously since 1500. Many of those changes were produced by the European expansion overseas and the colonization of vast territories in the Americas, Africa, and Asia. According to Acemoglu, Johnson, and Robinson (AJR, 2002), this expansion led to a reversal in the relative prosperity of the new territories¹. “Among countries colonized by European powers during the past 500 years, those that were relatively rich in 1500 are now relatively poor.”

The explanation for the reversal of fortune that AJR (2002) offer is what they call the “institutions hypothesis”. According to this hypothesis, those societies that offer better opportunities for investment and protect property rights will prosper more than those which do not. The reason why institutions explain the reversal of fortune is that the impact of European expansion varied according to how densely populated were the territories which were colonized after 1500. Those places with high concentrations of population at the time of colonization, witnessed the introduction of highly extractive institutions, such as the *encomienda* in Spanish America. Thus the long run growth prospects of those places were low. In contrast, the areas which were sparsely populated attracted large numbers of European settlers. These immigrants set up institutions that permitted equality of opportunity, secure property rights, and broadly based political power structures. Over the long run these territories became very prosperous.

AJR (2002) illustrate their reversal of fortune thesis with the examples of Mexico and Peru, compared to the US. While at the time of the Spanish conquest the Incas and the Aztecs had very rich civilizations, what is now the US was sparsely populated by indigenous people

¹ Acemoglu, Johnson, and Robinson (2002: 1231).

who did not have a level of prosperity comparable to the former. Today the situation is the opposite of what it had been circa 1500.

One of the main empirical difficulties in this debate is how to measure the level of prosperity in 1500. The two measures used by AJR (2002) are the level of urbanization and the degree of population density with respect to the amount of available arable land. Both measures have problems of a conceptual nature as well as with the quality of the information available. The authors present graphs on the negative correlation of the per capita GDP for 1995 with urbanization and population densities circa 1500 for a wide sample of countries. In both cases the correlation coefficient is negative and significant.²

The main conclusion that AJR (2002) derive from the reversal of fortune result is that what they define as the simple version “geographic hypothesis” is invalidated, since they argue that it predicts persistence of fortune. These authors define the geographic hypothesis as one that: “explains most of the differences in economic prosperity by geographic, climatic, or ecological differences across countries”.³

AJR (2002) also discuss what they call the sophisticated “geographic hypothesis”, with which they agree, and according to which the effect of geography will vary throughout time.⁴ An example of this is the drift of economic activity that has been observed through time from the equator to the north and south. Many years ago the tropics prospered because the technology of early civilizations was well adapted to that climate. A second consideration, in the same direction, is that certain geographic conditions became more important in the process of industrialization.

² Acemoglu, Johnson, and Robinson (2002: 1233-1234).

³ Acemoglu, Johnson, and Robinson (2002: 1232).

⁴ Acemoglu, Johnson, and Robinson (2002: 1257).

Several authors have been critical of the reversal of fortune thesis presented by AJR (2002). The basis for most of these negative evaluations is the weak empirical basis of their analysis. One of the first authors to question the general validity of the results of AJR (2002) was Adam Przeworski (2004). This author argued, using the data on income published by Angus Maddison in 2003, that the only major reversal of fortunes that continued to hold was that of the four British offshoots: Australia, Canada, New Zealand, and the United States. Also, Przeworski questions the validity of the statistical methods used by AJR and makes a call: “Instead of taking shortcuts, we need to study the variations among countries along their entire modern history. This means we need better data on the history of institutions”.⁵

According to Gareth Austin (2008), the first problem with the thesis of the reversal of fortune as presented by AJR (2002) is the poor quality of the evidence they present. For example, the quantitative data for Africa circa 1500 is quite deficient, and this region comprises a large part of the sample used by the authors (23 out of 64 cases).⁶ For instance, most of the populations’ densities for around 1500 were obtained from backward projections starting with already deficient estimates for 1900. Finally, Austin (2008) questions the validity of the compressing of history by comparing two moments in history 500 years apart, when in between there were so many changes in the actors and conditions. Sanghamitra Bandyopadhyay and Elliot Green (2012) question the results of AJR (2002) regarding the proxies they used for pre-modern income. For example, they argue that the measure of urbanization used by AJR (2002) contains no data for Africa. When Bandyopadhyay and Green (2012) use an alternative measure of urbanization that increases

⁵ Przeworski (2004: 20).

⁶ Austin (2008: 998).

the sample from 41 to 71 observations the reversal of fortune disappears and even changes in sign. Bandyopadhyay and Green (2012) also question the handling of the information about arable land by AJR (2002). According to these authors, AJR (2002) did not have information on that variable for 86 of the 91 observations they used, so they assumed that all the land was arable. When new estimations are made with better data, the results change. Finally, these authors argue that the results of AJR (2002) do not hold for Africa and that they are largely influenced by the neo-Europes. When the latter are excluded the relationship becomes weakly significant or not significant.

All of the above authors discuss the reversal of fortune hypothesis between countries. In contrast, the paper by William F. Maloney and Felipe Valencia Caicedo (2012) uses subnational historical data to show the within country persistence of prosperity in the Americas since 1500. Contrary to the reversal of fortune thesis defended by AJR (2002), Maloney and Valencia (2012): "...show that high pre-colonial density areas tend to be dense today; population agglomerations persists."⁷

In their analysis Maloney and Valencia (2012) used data for 18 countries in the Americas. The variable they use to measure prosperity in 1500 is population density. For prosperity in 2005 they used both per capita income and population density. For example, using population density both for 1500 and 2005 they find a positive and significant relationship for 15 out of 18 countries. In the case of Panama and Uruguay the relationship was not significant and only for Canada it was negative and significant. Thus, for the Americas, at the subnational level they observe no reversal of fortune.

The current paper also studies the reversal of fortune hypothesis at the subnational level for the case of Colombia. However, in this case the evolution of relative prosperity through

⁷ Maloney and Caicedo (2012: 1).

time is observed using population data at various points in the nineteenth and twentieth century and not just at the initial and endpoint.

III. THE DATA

The information for the population of the Colombian departments and municipalities, the main territorial units in which the country is currently divided, comes from the national population censuses. At present, Colombia has 32 departments and 1.123 municipalities plus the capital city. In Map 1 the present political division of the country into departments and municipalities is shown.

Throughout the republican history of Colombia there have been a total of 17 national population censuses. The 1928 census is not considered in this paper because it was never approved by Congress due to a significant level of over reporting.⁸ Additionally, for the censuses corresponding to 1825 and 1864 the data is not sufficiently disaggregated so that it cannot be rearranged and consolidated according to the current limits of the departments. Thus we are left with four censuses covering the 19th century, nine for the 20th century, and one for the present century.

⁸ Flórez (2000: 141).

Map 1. Current limits of Colombian departments and municipalities.



Source: Instituto Geográfico Agustín Codazzi (IGAC).

The only population information used in this paper that did not come from the national censuses, corresponds to an extensive record of the number Indians which had to pay tributes to the Spaniards which existed in 1559 in the territory of what is now

Colombia. Immediately after obtaining control of a territory, the Spaniards would assign specific groups of Indians among the different conquerors so they would pay a tribute in work, money or in kind. The men in working age, generally 16-60 years old, were responsible for that tribute. This institution was known as the *encomienda*.

For the first part of the sixteenth century historians calculate a ratio of 1 to 3 between the number of tributaries and the total population.⁹ In 1559 there were a total of 1,119 *encomiendas* and 65,113 tributary Indians in what is now Colombia.¹⁰ Thus, the total population that can be inferred from that record, around 200,000 persons, is below even the relatively conservative estimates for total population at the beginning of the conquest. For example, the historian German Colmenares calculated that circa 1537 the indigenous population was around 3.000.000.¹¹ Several things might serve to explain why the total population subject to *encomienda* in 1559 was much less than the probable population in 1500.¹² One reason is the large mortality that occurred when the indigenous population was exposed to the epidemics that the Spaniards brought to America, and which caused what has been labeled as a demographic catastrophe.¹³ A second reason is that not all of the population was under the control of the Spaniards in 1559, thus they were not subject to the *encomienda*. However, we believe that the 1559 record of the tributaries provides a good picture of the regional population distribution in 1500, because it is highly unlikely that the

⁹ Meisel (1980: 236).

¹⁰ Tovar (1988).

¹¹ Melo (1977: 110).

¹² The conquest of the territory of what is now Colombia began in 1525. However, several years passed before the Spaniards had control of most of the territory.

¹³ Livi-Bacci (2006). It has been argued that the indigenous population that was most decimated by the conquest, in relative terms, was the one that had lower levels of socioeconomic development. This were precisely the natives living in the less densely populated areas. Thus the effect of differential mortality would have been to increase differences in relative densities, not to reverse the pre 1500 levels.

mortality observed in the years since the conquest started could have changed significantly the relative regional population densities (see footnote 13).

IV. THE SPATIAL PERSISTENCE OF PROSPERITY IN THE COLOMBIAN REGIONS, 1500-2005

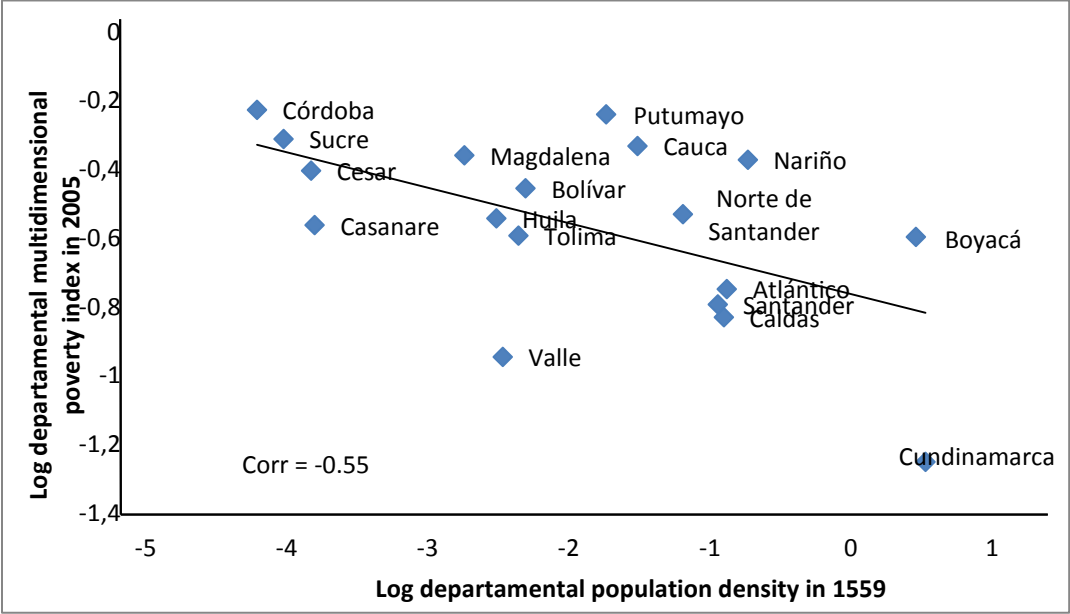
The territory of continental Colombia has an extension of 1.141.748 square kilometers. It is characterized by very distinct climatic, economic, and cultural regions. To a great extent, this has been the result of the very rugged topography that covers much of its territory. When the Andes mountains enter into Colombia they split into three ranges that divide the country from south to north. Although all of the country is located in the tropics, the different elevations produce large variations in temperature. These variations, plus a wide variety of rainfall regimes and soils, lead to very distinct ecological conditions across the country.

The first systematic records of the location of population in what is now Colombia come from the records of the indigenous population assembled by the Spanish officials during the years of conquest. What these records reveal is that most of the population was concentrated in the mountains, at elevations between 1000 and 3000 meters above sea level, where soil productivity and health conditions were better than in the tropical lowlands, which were sparsely inhabited.

Perhaps the most accurate measure of the standard of living in the Colombian regions is the recently estimated Multidimensional Poverty Index (MPI) which was constructed by the

National Department of Planning using information from the 2005 population census.¹⁴ The correlation coefficient between the MPI and the population density of 1559, using the geographical limits of the current departments, is -0.55 . That is, the regions that were prosperous in 1559 tend to be the same ones in 2005: thus, there is no reversal of fortune (see Graph 1). This correlation persists if we use, for both 1559 and 2005, the population density of the departments (see Graph 2).¹⁵ In that case the correlation coefficient is 0.45

Graph 1. Correlation between the population density of Colombian departments in 1559 and the multidimensional poverty index in 2005.

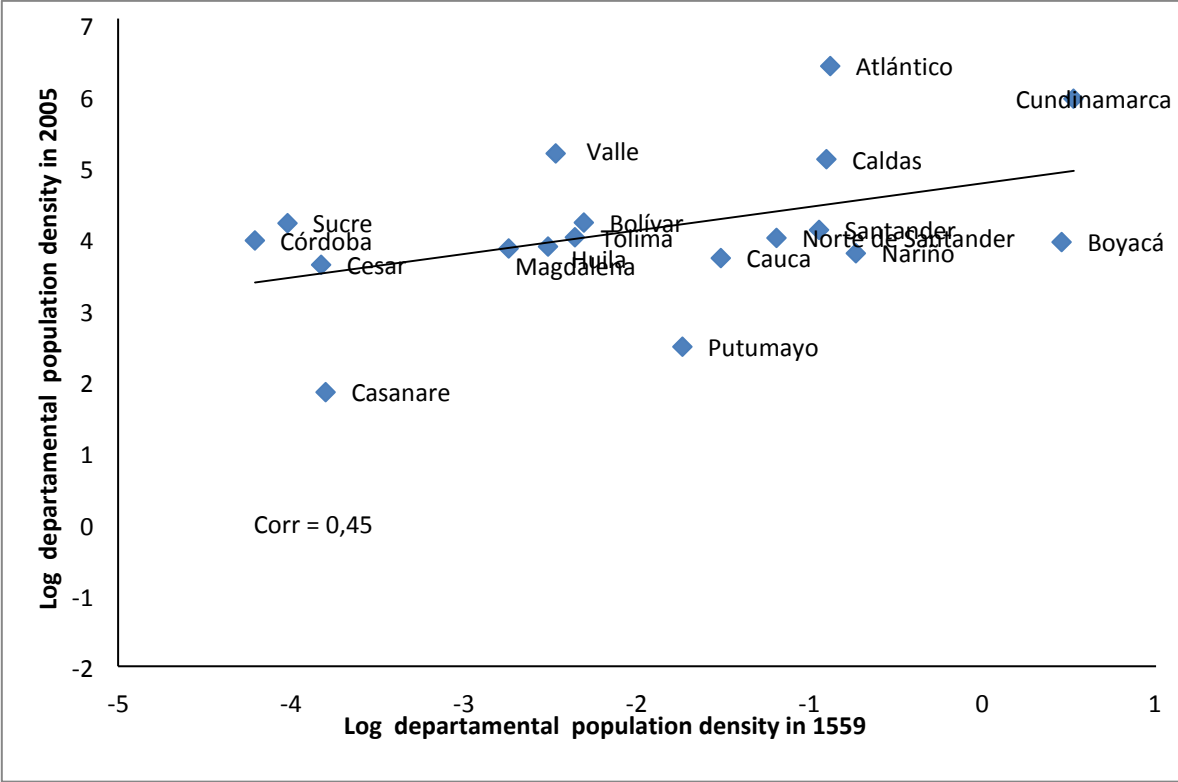


¹⁴ The GDP per capita of the departments is not used as a measure of regional prosperity because in many cases it is distorted by the presence of mining and oil production in some departments, which leads to very high levels of GDP which have almost no relation with local incomes.

¹⁵ The department of Antioquia, one of the most populated at present, was excluded from the estimation for 1559 (but not for the later dates) because the number of tributary Indians reported for its territory in that year was of only 298, a clear under-reporting, according to the evidence provided by the historical records. According to the historian Jorge Orlando Melo, throughout 1557-1560 there was a generalized rebellion of the indigenous population of what is now Antioquia. That could have been the reason for the clear underestimation of the tributary Indians in that region, Jorge Orlando Melo, “La conquista de Antioquia, 1500-1580”, at <http://jorgeorlandomelo.com>

Source: Calculations based on Tovar (1988) and Departamento Administrativo Nacional de Estadística (DANE); **Note:** The department of Antioquia was removed from the sample, since its population in 1559 was underestimated (see footnote 15).

Graph 2. Correlation between the population density of Colombian departments in 1559 and the population density of Colombian departments in 2005.



Note: The department of Antioquia was removed from the sample, since its population in 1559 was underestimated (see text).

Source: Calculations based on Tovar (1988) and DANE.

In Table 1 we present the correlation coefficient between the density of the territories that correspond to the current limits of Colombian departments and the MPI for 2005, starting in 1559. It can be observed through time that the coefficient increases as the time lag falls

to zero. What is important about these is that the results of persistence are rather robust and do not depend on two single observations.

Table 1. Correlation coefficients of the log departmental population density in different years with the multidimensional poverty index in 2005.

Year	Correlation coefficient		Number of observations
1560	-0,5553	** ¹	18
1835	-0,5694	*** ²	22
1843	-0,5796	***	22
1851	-0,5126	**	23
1870	-0,5796	***	23
1905 ³	-0.3930	* ³	22
1912	-0,5159	***	25
1918	-0,5838	***	27
1938	-0,6163	***	28
1951	-0,6264	***	28
1964	-0,6435	***	28
1973	-0,6544	***	29
1985	-0,6711	***	29
1993	-0,6714	***	29
2005	-0,6791	***	29

Note: *Significant at 10%, **significant at 5%, ***significant at 1%.

¹The department of Antioquia was removed from the sample, since its population in 1559 was underestimated (see text).

²The department of Meta was removed for the years 1835, 1843, 1851, and 1870, because it behaves differently to the rest of the sample (outlier).

³For the departments of Atlántico, Bolívar, Cesar, Córdoba, Sucre and Magdalena, its population and density were calculated as proportion to the share of each department in the 1912 census.

Source: Calculations based on Tovar (1988) and DANE.

In Table 2 we can observe the complete set of pairwise correlations for all the population censuses that we have used and for the 1559 enumeration of indigenous males of working age subject to the *encomienda* regime. All of the coefficients are significant at the 1% level, except for those corresponding to 1559 with the different censuses, which are significant at the 5 and 10% level. Beginning in 1835 all the correlation coefficients are above 0.73, showing the strength of the persistence of relative prosperity in the same locations. But even for 1559 the correlation coefficients are quite high, always above 0.45.

In Map 2 we can observe the population density in 1559. The density is presented in relation to the limits of the current departments. The highest density corresponds to the departments of Boyacá and Cundinamarca, which in 1500 were the areas where the Chibcha chiefdoms were located. Overall, most of the population was located in mountainous center of the country. The rest of the country had a lower population density. A somewhat similar pattern is observed nowadays (see Map 3). In Map 3, we can observe that in 2005 Cundinamarca still has the highest population density, and that most of the population is located in the mountainous center of the country, with the Amazonian and Orinoquian regions, in the southeast, having the lowest density and very low altitude.

Table 2. Correlation Matrix of population density in different years (1559-2005)

1559 ¹	1835	1843	1851	1870	19052	1912	1918	1938	1951	1964	1973	1985	1993	2005	
1															
18															
0,5776	**	1													
18		23													
0,5651	**	0,996	1												
18		23	23												
0,5816	**	0,99	0,993	1											
18		23	23	24											
0,5904	***	0,969	0,965	0,987	1										
18		22	22	23	23										
0,5470	**	0,914	0,903	0,933	0,969	1									
18		22	22	22	21	22									
0,6677	***	0,878	0,869	0,913	0,962	0,982	1								
18		23	23	24	23	22	25								
0,679	***	0,882	0,873	0,883	0,942	0,977	0,989	1							
18		23	23	24	23	22	25	27							
0,5403	**	0,853	0,845	0,904	0,951	0,97	0,979	0,956	1						
18		23	23	24	23	22	24	26	28						
0,5222	**	0,842	0,831	0,882	0,936	0,961	0,976	0,963	0,998	1					
18		23	23	24	23	22	24	26	28	28					
0,4952	**	0,814	0,801	0,851	0,91	0,935	0,959	0,96	0,99	0,995	1				
18		23	23	24	23	22	24	26	28	28	28				
0,4631	*	0,804	0,787	0,834	0,89	0,92	0,953	0,964	0,976	0,982	0,994	1			
18		23	23	24	23	22	25	27	28	28	28	29			
0,4634	*	0,777	0,756	0,813	0,864	0,895	0,942	0,952	0,971	0,978	0,993	0,997	1		
18		23	23	24	23	22	25	27	28	28	28	29	29		
0,4695	**	0,767	0,745	0,803	0,853	0,887	0,936	0,961	0,971	0,98	0,99	0,993	0,995	1	
18		23	23	24	23	22	25	27	28	28	28	29	29	29	
0,4522	*	0,758	0,738	0,798	0,841	0,867	0,924	0,951	0,965	0,973	0,985	0,991	0,994	0,999	1
18		23	23	24	23	22	25	27	28	28	28	29	29	29	29

Note: For 1559 the coefficients are: *Significant at 10%, **significant at 5%, ***significant at 1%. For the rest of the years the coefficients are significant at 1%.

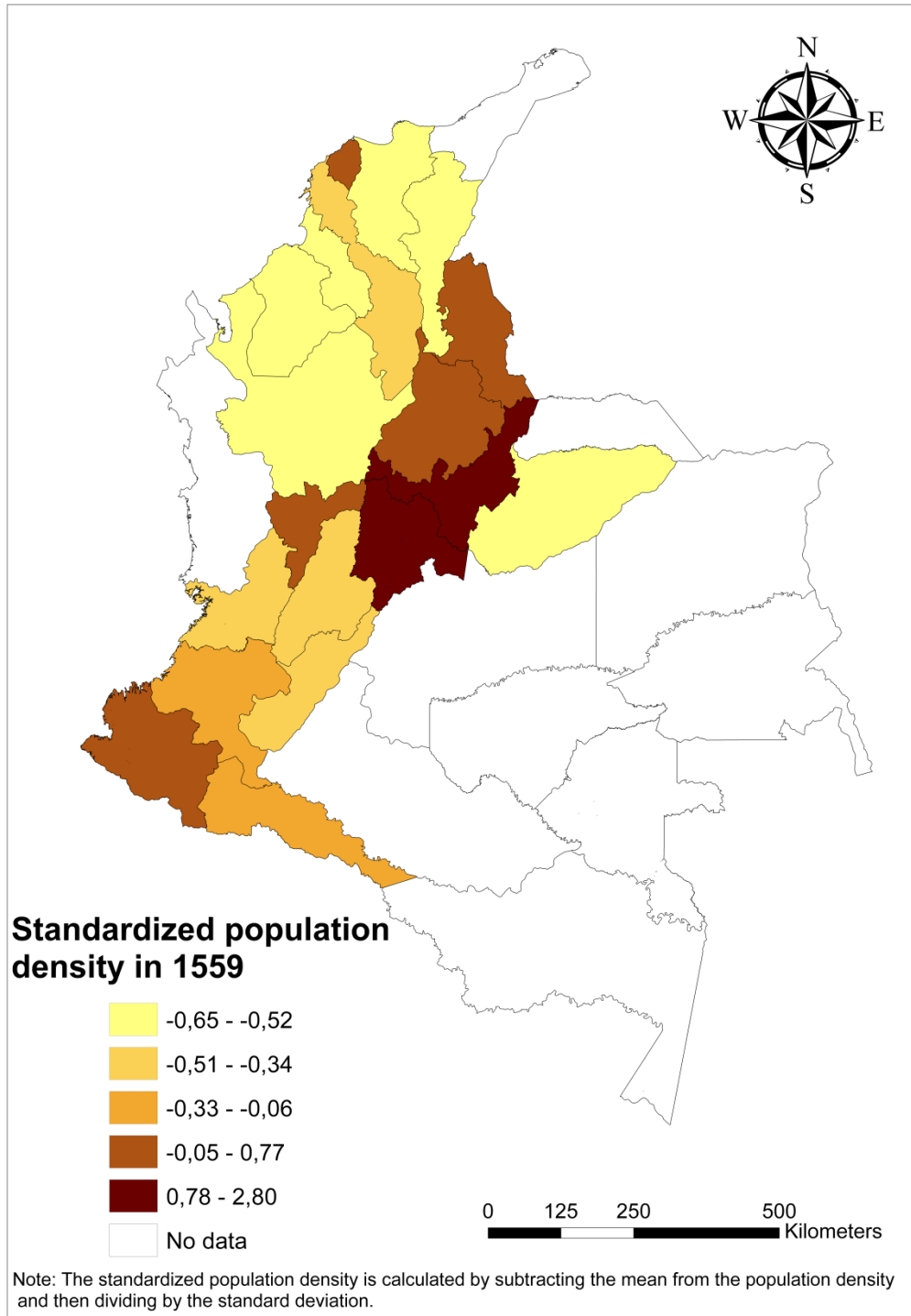
The number of observations is below each coefficient.

¹The department of Antioquia was removed from the sample in the correlations for 1559, since its population in that year was underestimated (see text).

²For the departments of Atlántico, Bolívar, Cesar, Córdoba, Sucre and Magdalena, its population and density were calculated as proportion to the share of each department in the 1912 census.

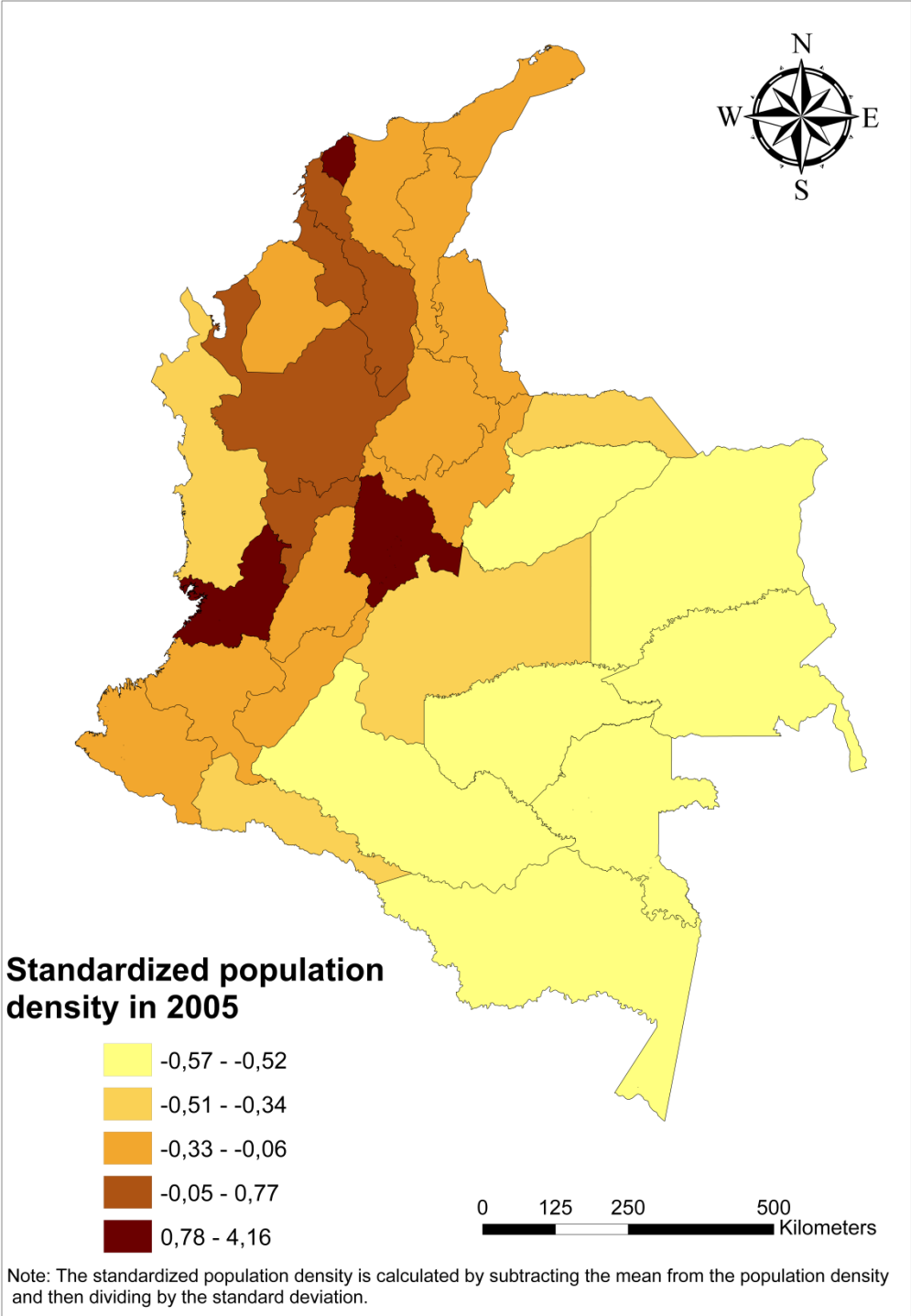
Source: Calculations based on Tovar (1988) and DANE.

Map 2. Standardized population density in 1559 using current departmental limits.



Source: Calculations based on Tovar (1988).

Map 3. Standardized population density in 2005.



Source: Calculations based on DANE.

The importance of the geographic factor for the location of the Colombian population persists until present. In Table 3 we show the results for an ordinary least squares regression in which the level of poverty of the Colombian municipalities, measured by the MPI in 2005, is determined by altitude, altitude squared, percent of ethnic population (indigenous plus Afrocolombians), and the population. Thus we include geographical variables (altitude), institutions (percent ethnic), and economies of scale and agglomeration (population size).¹⁶

Table 3. Determinants of the municipal poverty index in Colombia in 2005.

	Coefficients	Standard error	robust P-value
Altitude	-0,00010	0,000	0,000
Altitude ²	2,72E-08	0,000	0,000
%Ethnic population	0,0015206	0,000	0,000
Quartile population 2	-0,02305	0,009	0,011
Quartile population 3	-0,0504599	0,010	0,000
Quartile population 4	-0,1828065	0,012	0,000
Constant	0,7919448	0,010	0,000
		P-value	(Test
No. observations	1047	$R^2 = 0.37$	F)0,000

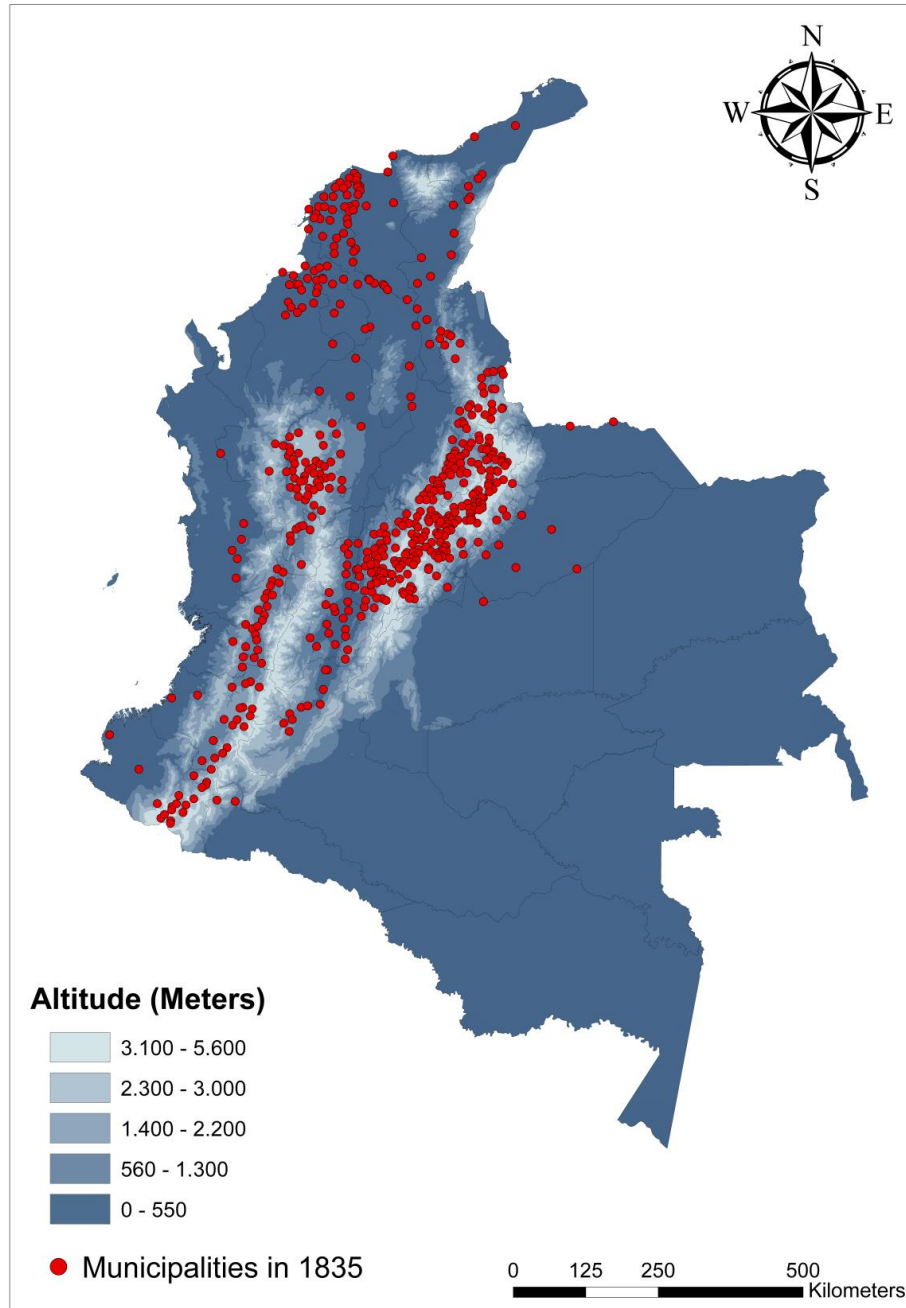
¹⁶ In a paper with Laura Cepeda we show that in Colombia the current percent of ethnic population in the departments is a good proxy for institutions of colonial origin, see Cepeda and Meisel (2013). The geographic variable is measured altitude because altitude has a direct relation with temperature, and thus with soil moisture and productivity. Since departments are heterogenous in quality of soil, rain, ruggedness, and other geographic variables, it is not easy to include them in one single measure.

Note: The quartiles of population are binary variables, taking the value of one if the municipality belongs to a given quartile. The comparison group is the municipalities of the first quartile, that is the least populated of them.

Source: DANE and estimations by the author.

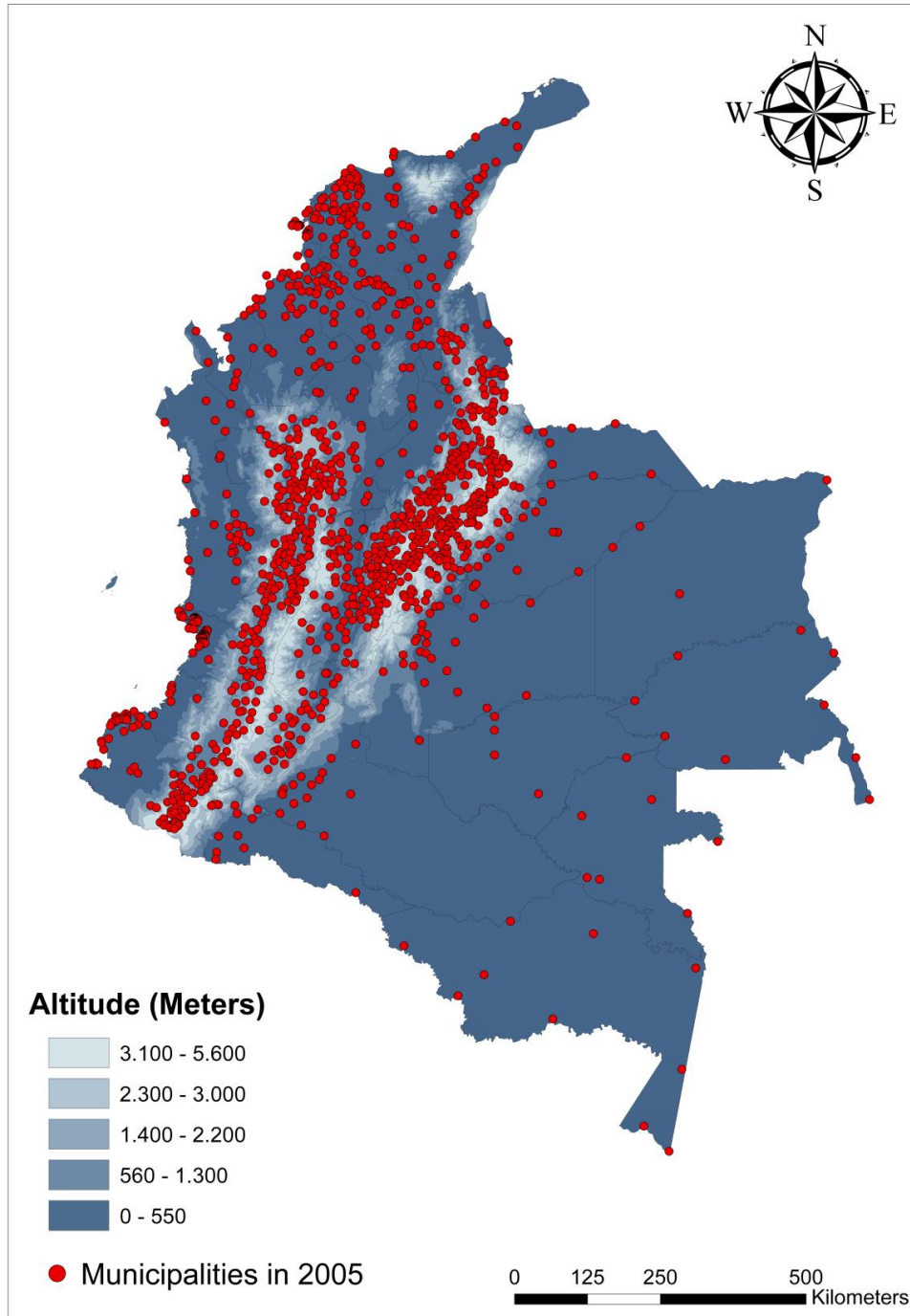
In Map 4 and Map 5, we illustrate more clearly the strong association between the location of the Colombian population and the Andes mountains, and therefore with altitude. For 1835, Map 4 shows that the immense majority of the municipalities were located in the three ranges (Occidental, Central, and Oriental) in which the Andes split in Colombia. In that year there was a second cluster of municipalities, located in the Caribbean Coast, around the seaports of Barranquilla, Cartagena, and the lower Magdalena River. The pattern of location of the municipalities observed for 2005, Map 5, is not very different than what was observed in 1835, with the exception that many more municipalities had been created, by dividing those already existing. Additionally, the southeastern regions became more populated, although the density continues to be relatively low.

Map 4. Colombian physical geography and the localization of the municipalities in 1835.



Source: IGAC.

Map 5. Colombian physical geography and the localization of the municipalities in 2005.



Source: IGAC.

V. CONCLUSIONS

One of the main empirical arguments that AJR present in favor the primacy of institutions over geography in the discussion about the long run determinants of prosperity is the reversal of fortune thesis. There empirical evidence is based on comparisons between countries. This reversal of fortune may not hold for the subnational level as has been shown by Valencia and Maloney (2012) for the Americas. Perhaps the existence of similar “national” institutions within a country makes it more likely that relative prosperity may persist over time in the same locations. This would indicate that geographic differences are more important in explaining economic differences within a country than between them.

In this paper we have shown that for Colombia in the period 1559-2005 there is no evidence of a reversal of fortune. Rather, what is observed is a robust persistence of the pre-hispanic patterns of wealth. We have also shown that location is closely related to altitude, which affected the weather and the humidity of the soil, and therefore positively influenced the productivity of agriculture as well as the prevailing health conditions.

One of the main advantages of empirical evidence we present in this study is that we use a total of 14 censuses, from 1835 to 2005. Thus, what occurred through time is taken into account and not just the end points of the period analyzed. The main message from this result relates to the spatial persistence of relative prosperity in Colombia over the last 500 years and the non- negligible influence of geography in the regional distribution of that prosperity.

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