

Stature and Immigration in Southern Brazil (1889-1919)

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for a revised version. Comments are welcome)

This paper assesses the heights of workers residents in the southern state of Rio Grande do Sul (Brazil) between 1889 and 1919 in order to evaluate their biological living conditions. Regression analysis and other analysis instruments were applied to a database of more than thirteen thousand observations of male statures and individual characteristics. The principal conclusions are: a) Population had relatively tall statures for the period (about 166.7 cm); b) European immigrants had heights close to those observed among those born in the states. c) Heights stagnated for those born during the period and even reduced in the last years of the sample. Lastly, three explanatory theories for these height reductions are discussed.

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Introduction

There are currently about 10 million inhabitants in Rio Grande do Sul (RS henceforth) and its social indicators place it as one of the most developed in Brazil. Life expectancy at birth is 75 years and infant mortality is 13 per one thousand live births (almost half the national average). In anthropometric terms, men living in the state in 2003, had a stature of 172 cm, almost 3 centimetres taller than the national average and about 6 centimetres taller than people living in the Northeast region (IBGE, 2005).

These better living condition indicators would be, for many Brazilians, the result of German and Italian subsidised immigration, which occupied part of the state. However, were the Gaucho (people born in Rio Grande do Sul) workers' living conditions different from the immigrants when they arrived? It is moreover interesting to ascertain what the well-being level of the Gaucho population was in this key period of their history. If it is shown that living conditions were relatively good, even before the arrival of the immigrants, then it will be necessary to seek other explanations for the high standards of living in RS.

There is no reliable data about income that covers the period in question. It was therefore necessary to turn to Anthropometric History, to have a general vision of the biological living condition levels, inequality and its variation throughout the period. At least since 1829, when Villermé identified an empirical link between height and social class in Paris dwellers (apud Tanner, 1981, p. 26), one knows that there is a relationship between living conditions and stature. Today, the utilization of anthropometric data as proxy is consolidated and as a new survey version by Steckel showed (2008), there is no longer the need to make a defence about this methodology.

There is a “prehistory” in Brazil of anthropometric studies, which were more concerned with the distinctions between “races” and considered height as an immutable and innate characteristic of ethnic groups (for details see Sá et alii, 2008). It was however the authors linked to the public health and epidemiology area who were the first to approach the question of height in a contemporary manner. Monteiro et al. (1994) fitted into this category. The study by Kac (1999) presents a very complete revision of literature at that moment, with emphasis on studies for Brazil.

More recently, the work by Monasterio, Noguero1 and Shikida (2006) studied statures between 1939-1981, based on data from the Family Budget Research (IBGE, 2005). Finally, data was gathered from free individuals and slaves born between 1821-1860, for the XIX century, thanks to the work by Frank (2006).

The object of this paper is to analyze the evolution of the height of individuals in RS between 1889 and 1919, with special attention to the question of immigrants¹. The period choice is justified by the availability of data and it however also deals with a relevant period in Gaucho history. The data was ceded by the Pelotas Federal University Historic Documentation Centre (*Núcleo de Documentação Histórica-UFPeI*), which holds the historic files from the Regional Labour Department (*Delegacia Regional do Trabalho*) and digitalizes information about the ministry of labour individual employment record books. This source enables the appraisal of heights of cohorts from 1889 and 1919, which is a first step for the examination about their evolution and relationship with other economic variables. As the employment record books have data about the individual's characteristics, apart from the anthropometric information, the study possibility emerges that goes much further than the mere description of the temporal trajectory of the statures of the residents in the state.

1- An overview of the population and economy of Rio Grande do Sul between 1889-1919

The beginning of the republic (in 1889), the consequences of the end of slave labour (1888) and the first industrial boom, took place on a national basis in the period being analyzed. In demographic terms, the population of the state went from about 0.09 million inhabitants to 2.2 million between 1890 and 1920 (Brazilian Institute for Geography and Statistics - IBGE, 2003). This results in a demographic growth of 3% per year (whilst Brazil grew at the rate of 2.56% per year). There was also a period of change in the economic axis of the state at the same time, with the consolidation of

¹Parts of this paper are based on Monasterio and Signorini (2008), but the focus is different and the number of observations in the present paper is much larger.

colonial areas and of the capital (Porto Alegre) in detriment to the extreme southern areas of the state. This region which supplies livestock products (dried meat, lard and leather among others) to the rest of the country lost its dynamism in the republican period. The agricultural activity in the state diversified with the integration of the Mountain Range and Upland regions of the colonial areas, which produced multiply food products for the internal market. Manufacturing and industrial activity occupations increased in the Italian and German colonization areas.

Politically it is a hegemony period of the Rio-Grandense Republican Party (*Partido Republicano Riograndense*), which is seen by contemporary literature as modernizing and directed to the well being of Gauchos, through investments in education and health²(Targa, 1998; Herrlein, 2002). Other authors (Fonseca, 1983) highlight the modernizing character (authoritarian of course) of the Rio-Grandense Republican Party political project. The Party moved away from the positivist ideology that supposedly would orientate their policies by widening the sphere of actuation of the State and defend the diversification of the state's economy.

Despite the regional differences, the population of Rio Grande do Sul has a population with the most diverse origins. Apart from the Amerindian populations and of internal migrations, the state received families from the Azores as from 1752 and the first experiences with German and Italian immigration already began in the XIX century, in 1824 and 1875, respectively. Celso Furtado affirms in his influential "The Economic Formation of Brazil" (1959, p. 237) that slavery – this institution that is so present in Brazilian history – was almost unknown in Rio Grande do Sul. This view is incorrect: negro slave labour just like in the rest of Brazil was utilized in all sectors of the Gaucho economy, with special highlighting for the production of dried meat. In 1872, 15 % of the Gaucho population were slaves, which was a figure virtually

²Herrlein (1982, p.14-15): "The State directed the society modernization process, promoting public education and access to health through the unrestrained practice of medicine. Public education headed the expense list (except in time of war) and the State Government destined a larger proportion of income to education than in São Paulo and Minas Gerais. This emphasis lent to public education, combined with the capacity of the government to expressively tax land ownership, conferred a clearly progressive stamp to state fiscal policies compared to other states."

identical to that observed in Brazil as a whole (DGE, 1876).³ It is to be expected that the legacy of slavery impacted on the living conditions of Afro-descendants living there in the observed period.

As such, the Gaucho population is as a whole heterogeneous and was formed by the same groups that are present in the Brazilian population: Amerindian, Europeans, and Africans. The non-Iberian Europeans in fact had a larger relative participation in the state, however this is a question of degree and not substantial. The state stands out as it received an enormous contingent of subsidized Europeans vis-à-vis the resident population. More than 2.7 million immigrants entered Brazil in the period 1889-1919, (Levy, 1974). Notwithstanding that the major part of immigration had been destined to the state of São Paulo, as a substitute for slave labour in coffee plantations, a considerable share went to Rio Grande do Sul. The below data shows the Gaucho population profile per nationality. The major change sub-period of this aspect was in the decade between 1890 and 1900: whilst the Brazilian population in RS grew 18%, the population of foreigners grew 289%. Although the Rio-Grandense Republican Party discourse did not support the federal subsidy policy for immigrants, in practice, the state government provided transport from the arrival point in Brazil to the colonies and actively provided land and infrastructure (Roche, 1969) .

Table 1- Population of Rio Grande do Sul per nationality in selected years.

| Year | Brazilians | Foreigners | % Foreigners |
|------|------------|------------|--------------|
| 1872 | 405237 | 41725 | 9.3% |
| 1890 | 862690 | 34765 | 3.9% |
| 1900 | 1013971 | 135099 | 11.8% |
| 1920 | 1981688 | 151025 | 7.1% |

Source: Levy (1974)

It should be noted that there was not a large difference between the illiteracy levels between Rio Grande do Sul and the rest of Brazil. In 1890, 51.2% of the state's residents knew how to read compared with 50.5% of Brazilians. In 1920, the illiteracy rate in the population was 50 percent. These results put in doubt the views that

³Fernando Henrique Cardoso (1977) demonstrated the importance of the slave labour of the Africans and their descendants in the state, especially in its most meridional part. He also collaborated to combat the myth that slavery in Rio Grande do Sul was of a benign nature. In addition, there were slavery in all municipalities in the state. 23% of the population in the capital Porto Alegre were slaves in 1872 and even in that municipality with the smallest slave participation, the Germanic Colony of São Leopoldo, the percentage was 5% (DGE, 1876).

considered the Rio-Grandense Republican Party (Partido Republicano Riograndese – PRR) would have given more priority to public education than the other Brazilian states. As to the distinctions between Brazilians and Foreigners, one notes a small difference with regard to the literacy of people over the age of 15 in 1920: 55% of Brazilians knew how to read against 62% of the foreigners (DGE, 1876 and MAIC, 1927).

2 – Evolution of Statures in Rio Grande do Sul

Data source

This study is based on data taken from the individual employment record books of residents in Rio Grande do Sul issued between 1933 and 1940. There were initially 26,677 observations. After having cleaned the database, the following restrictions were made: a) the study was limited to those born between 1889-1919 b) restriction of research was made of those who were over 21 years old and those who were under 55;⁴ c) only men were considered in order to preserve the comparability with other international studies. This resulted in a sample of 13,463 observations.

A problem that may have contaminated the sample is some selection bias, since the workers with a valid signed employment book perhaps were not a representative sample of Gauchos from the period. In fact, the two extremes of income distribution are probably excluded: the informal workers and the superior layers of society. With these two groups sub-represented, it is hoped that one bias tends to cancel out the other with regard to the assessment of the average statures of the population. Furthermore, since one has other individual data like colour and schooling, one part of this bias can be filtered in the econometric analysis that follows.

The fact that part of the data utilized was obtained during the Second War period, could bring about doubts as to the exactness of the information about nationality. It is however hardly probable that Italians and Germans would have identified themselves as Brazilians to avoid possible hostilities. The most recent employment record book

⁴In the previous paper (Monasterio and Signorini, 2008), individuals over 18 years old were included in the sample.

was issued at the end of 1940 and Brazil only declared war against the Axis in the middle of 1942. Until then the Vargas Government remained neutral. It is worthwhile also noting that the data refers to the place of birth of the individuals and not their nationality. Therefore the distinction between foreigners and Brazilians in the database must be reasonably accurate.

It is appropriate to mention that the method utilized in the measurement of heights is not known and there are signs – as customarily happens with height data – that there was rounding up. The Whipple's index for the measurement of the rounding up of heights is 138.8. If there was no heaping for digits ending in 0 and 5, the index would be equal to 100 and if there were statures ending in such digits, then the value would be equal to 500.⁵ This means that there is a preference for heights ending in 0 and 5. Nevertheless, stresses Komlos (2003), symmetric rounding up is not a grave problem, as it only marginally alters the results and as a rule can be ignored.

The evolution of statures (1889-1919)

The height measurements of residents born in RS were 167.6 cm (in the decade of 1890-1899), 167.9 cm (1909-1900) and 166.7 cm (1910-1919). According to data from Steckel (1995, p. 1919), they were taller than the French (165 cm) and close to the English (167 cm) at the beginning of the XX century. They however were behind the North Americans and Norwegians who were 171 cm and 169 cm.

The stature data up to 1910 that places them close to those of Salvatore (2004, p 240), does not surpass the mark of 168 cm, when compared with other countries in Latin America. The Rio Grande do Sul residents almost reached the height of passport bearers (168.2 cm) in Colombia, who were about 5 cm taller than the population in general (Roca and Vega 2007). Compared to Mexican military personnel in the same period, the Gauchos were about 3 cm taller (López-Alonzo, 2007). The Brazilian male population itself only reached 168 cm in the cohorts in the decade of 1940 (Nogueról, Shikida and Monasterio, 2005, p. 7).

These results corroborate other biological well-being indicators and abundance of natural resources. The state always had a trade-balance surplus with the rest of the world (including Brazil) in the period and this was achieved with livestock products.

⁵Baten, A; Hearn, Crayen (2006) used the Whipple's index as a proxy for numeracy and human capital.

Dried meat, leather and beans, in a decreasing order, were the principal export products in the first decade of the XX century and together were responsible for more than half of exports (Dalmazo, 2004)⁶. So this makes it clear that the state had a comparative advantage deriving from the relative abundance of natural resources.

The evolution of the average heights of Brazilians and European immigrants is shown in Graph 1. As one can see, there is not much difference between the two curves. Actually the average height of Brazilians was 167.0 cm whilst the height of the foreigners was 167.7, for the total sample without any control. The most notable fact was the reduction in heights of both groups from 1914. The average height of the born in 1919 was 165.8 cm..

GRAPH 1 HERE.

What is the explanation for this reduction? Before seeking the most deeply rooted causes possible, it is necessary to ascertain if this reduction is the result of the changes in the composition of the sample. With this in mind, econometric analysis was carried out on individual data.

3 – ECONOMETRIC ANALYSIS OF THE INDIVIDUAL HEIGHT DETERMINANTS

The strategy was to assess the individual heights through ordinary least squares and utilize all the available information in the employment record book registers, as well as variables which would endeavour to capture the effects of the cohorts and age of the individual. Dummies were created for colour, place of birth and level of education. The reference individual was the one born in Brazil, illiterate and white. Instead of imposing a functional form for the assessment of changes over time, one opted to include a dummy for each cohort (the 1889 one is the reference).

GRAPH 2 HERE

⁶ The “exports” in this paper, refer to all the sales for out of the state delivery.

The results for all the variables, except the dummies per cohort, which will be discussed later, are in Graph 2. The non-white dummy showed that these individuals were about 0.9 cm shorter than the reference individuals. As the literature indicates that there is no relevant genetic difference in terms of potential stature, it is probable that this variable captures the effect of worst social-economic condition of the non-white residents in the state. Even in the post-Abolition, food, the physical intensity of work and the limited access to public health, had perverse effects on the non-white individuals.

The dummy result for the immigrants reinforces what the graphic analysis in the previous session suggested: there is no statistic effect of birth abroad in the determination of heights. That is to say, that the small difference in the average heights between those born in Europe and those born in Brazil, commented upon previously, does not prevail when other control variables are inserted.

The dummies for the schooling levels captured the effects of the social status of their members. In relation to the illiterate individuals, those at primary level are 1.9 cm taller and those at secondary level, 4.7 cm. Of the university level – only 55 individuals in the sample – are 5.1 cm taller. An unquestionable sign that the social-economic differences had an impact on the biological conditions of life.

Lastly one can see the dummies created per year of birth. In order to see the effects better, Graph 3 shows their values, remembering that the reference value is the one for those born in 1889. The only years which had significant variables of 5% were for those born in 1915, 1917 and 1919. The t-value for the dummy for those born in 1918 is equal to 0.058. This reinforces what Graph 2 suggested: there was a considerable reduction in statures for those born in the last years of the series.

GRAPH 3 – HERE

4 – Hypotheses for the reduction in height

There are three hypotheses – not mutually excluding – that explain the reduction in heights at the end of the 1st War. Unfortunately, at this very moment of the research, it

is not possible to give a clear reply about which mechanisms would be involved in this reduction.

The impact of the First Great War

Would this reduction in height have been the result of the contraction of economic activity? There are no GDP per capita annual records for the period in Rio Grande do Sul, however export data can serve as a reasonable proxy. The real value of RS exports between 1901 and 1913, increased by 6.9% per year. There was a reduction in exports between 1914 and 1920 of 6.6% per year (Herrlein, 2002). In terms of quantity exported, data shows that 380 thousand tonnes of goods were exported in 1913, whilst the following year this quantity dropped to 198 thousand tonnes. The tonnage exported by the state surpassed the 1913 quantities only in 1923 (Dalmazo, 2004, p. 103). It is worthwhile noting that the quantity exported dropped, for both international markets and for the rest of Brazil. This is in part explained by the world crisis deriving from the 1st War, which resulted in the fact that only in the middle of the twenties did the GDP per capita in western Europe surpass 1913. In Brazil, this same value dropped 3.8% between 1913 and 1914 and only returned to the pre-War level in 1919 (Maddison, 2007). Moreover, the inflation in Brazil during the War years would have reduced real salaries and therefore the living conditions in the period. In short, it appears that the 1st War led to economic consequences that generated a weighting down on the biological standard of living of the populations.

The Spanish flu

One of the possible explanations of the reduction in heights around 1918 is the arrival of the Spanish flu in the southern lands. The disease struck in Rio Grande do Sul, in the last months of 1918. Due to the official censorship and the society's efforts to minimize the situation, it is difficult to obtain accurate statistics. However if it followed the world pattern, the flu contaminated more than 50% of the population and killed 5% of them. What is known is that the cities effectively shut down, the prices of food went up and the hospitals were stretched well beyond their capacity. The epidemic had already been quelled in the principal cities in the state at the beginning of 1919.

Although the majority of the death rates from the Spanish flu were noted among young adults, it is possible that the phenomena associated with the pandemic had reduced the statures of individuals born in the period. High food prices, overburdening of the medical infrastructure and the abnormality of social-economic life may have impacted on the health of the younger individuals (Brauner, 2001). This would explain that even those born before the flu would have had their height affected by the disease. The simultaneous reduction in the height of European immigrants would furthermore be explained by the lightening speed that the flu struck the globe.

The problem with this explanation is that the Spanish flu, notwithstanding its high death rate and speed of contamination, only lasted a few months in the affected places. It seems improbable that such a brief occurrence of this nature would have had such an important impact on statures.

The hidden cost of development

Cuff (2005) called the hidden cost of development, the worsening of biological living conditions, which are associated with the processes of economic⁷ modernization. Accelerated urbanization overburdens the infrastructure and can impose a worsening of basic sanitation conditions. The higher demographic density that defines the urban zones also makes them more susceptible to the spreading of diseases. Other perverse economic growth impacts on stature are more subtle. The integration of markets, with all their known benefits, put populations formerly isolated within commercial networks. By doing this, the possibilities of contact with new diseases widen, which imposes a new demand upon organisms and reduces the height of individuals when they are adults. This phenomenon was identified by Cuff for Pennsylvania in the first half of the XIX century. With the due controls, there are shorter individuals in the more integrated and closer areas to navigable canals. Furthermore consumption choice by individuals can result in a reduction of stature. As one knows, the substitution effect, deriving from a relative drop in prices of manufactured goods, can lead to the

⁷The inverse relationship between monetary salaries and stature was observed in the USA during the XIX century and in the English cities during the industrial Revolution in the middle of the XIX century (Fogel, 2004, p. 17; Komlos, 1998).

choice of a hamper with less nourishment (Komlos, 1998). In this case the reduction of the nutritional situation would be “voluntary”.

The two most well studied cases in South America are of Colombia and Argentina and show disparate results. Roca e Acevedo (2007) identified a secular trend to the increase in heights in Colombia that accompanied the development of the country, while Salvatore (2004) found an inverse relationship between income and height of the Argentinians. Salvatore shows that despite the economic development boom in the country between (1900 – 1914) nutritional conditions and health deteriorated leading to a stagnation and even reduction in heights. After identifying that the statures were shorter in 1906-1910 than in 1901-1905, he concluded: “Paradoxically, a food-rich economy during an export bonanza generated a situation of health and nutritional stress” (Salvatore, 2004, p. 239). The Argentine case is of special interest because, like Rio Grande do Sul, they are economies with an abundance of natural resources which also went through large population growth in the period.

As to the Argentine Belle Époque issue, it makes sense to imagine that the relative price of the animal proteins had increased, reducing the consumption of meat and restricting heights. However in Colombia, where coffee does not have the same nutritional relevance, heights would not have been directly impacted by their price and consumption variations. Along these lines, the experience of Rio Grande do Sul during First War is singular, as the reduction of the relative price of meat was expected but statures decreased.

The RS economy continued its modernization process in the second half of 1910, despite the problems in its export sector and with the inflation. Even in the extreme south of the state, it was during this period that the first modern slaughterhouses and processing plants were deployed (Pesavento, 1980). Simultaneously, the integration of the markets in the Mountain Range and Uplands region with the extension of the railroads and urbanization would have induced a situation whereupon the Gaucho society would have had to bear the same hidden costs that Cuff identified in Rio Grande do Sul.

FINAL REMARKS

There are many ways to achieve a high biological living conditions. This can be obtained thanks to a low labour/land ratio, which guarantees the abundance of natural resources, low demographic density and healthier environments. This would be the case of the referred to North Americans at the beginning of the XIX century. On the other hand, the developed societies, like contemporary Holland, the high income provides for nutritional abundance and health services that reduce nutritional stress and produce the tallest individuals in the world. The data herewith contained suggests that individuals from RS in the period focused were placed in the first category. They had heights comparable to industrialized countries at the time, despite being a basically rural society.

A trend in the reduction of heights was identified of those individuals born nearer the end of the decade of 1910. There are three non-excluding possibilities: 1) It was a short term occurrence, an impact from the economic crisis that followed the outbreak of the 1st World War, or the result of the Spanish flue; 2) It is a structural phenomenon, which repeats the trajectory of other countries: there is a reduction in statures in the initial phases of modern economic growth, which will only be recuperated on later occasions; 3) The Spanish Flu. The role played by each one of these forces, will be much better understood when the height data of the cohorts of Gauchos after 1919 are examined.

The econometric results show that the Gauchos were as tall as the immigrants who lived there, indicating a similarity between the biological living conditions between the origin and destination regions. As such the necessity of subsidies for the immigrants is clear, since the differential between these conditions would not have been sufficiently attractive for mass immigration to Rio Grande do Sul. The econometric analysis also emphasized the inequality in heights: in statistical terms a non-white and illiterate individual was almost 6.0 cm shorter than a white graduated individual.

There are still many answers to be given about the living conditions in Rio Grande do Sul in the XX century. The most immediate step of the research involves the

codifying of registers per place of birth in order to identify possible regional differences within the state. The increase in the number of observations will help in the search for answers. The Regional Labour Department files that are available in the Pelotas Federal University Historic Documentation Centre hold more than 600 thousand record cards with height data. The record cards that were issued during the decade of 1940 will be processed over the next years, resulting in height data of those born in the decade of 1920. The concatenation of this data source with other anthropometric research of national scope, like the National Study of Family Expenses 1974-1975 (IBGE, 1975) will provide a clearer picture of the biological living conditions over time.

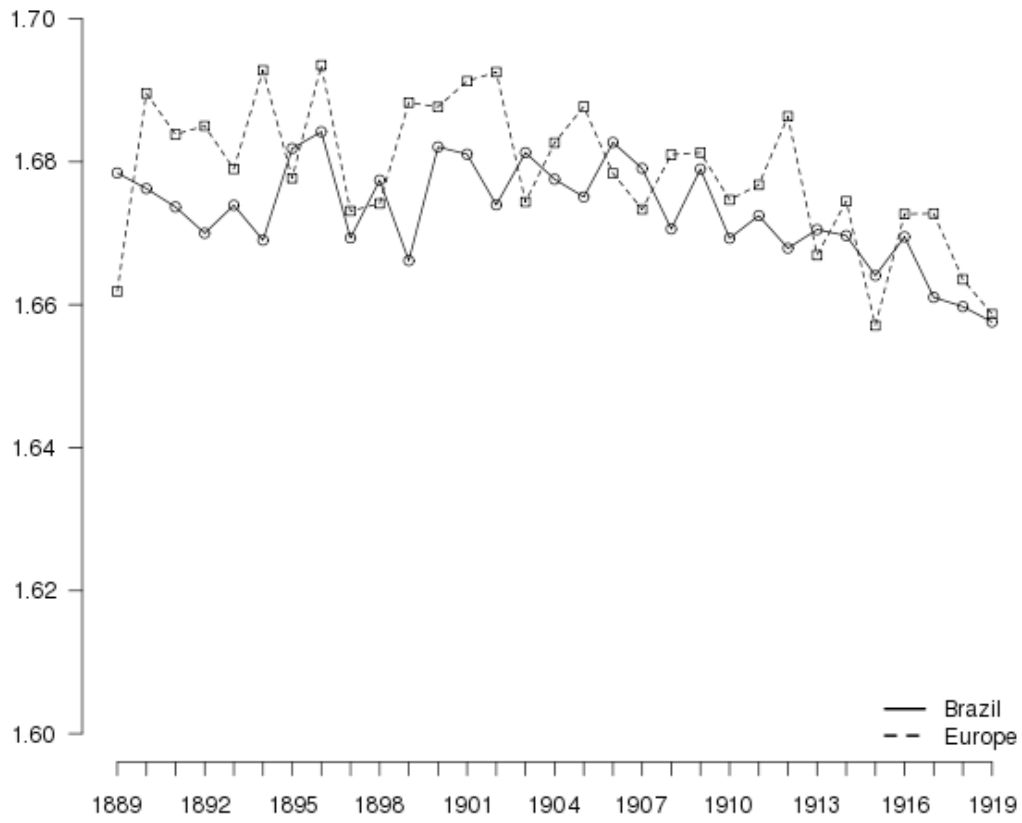
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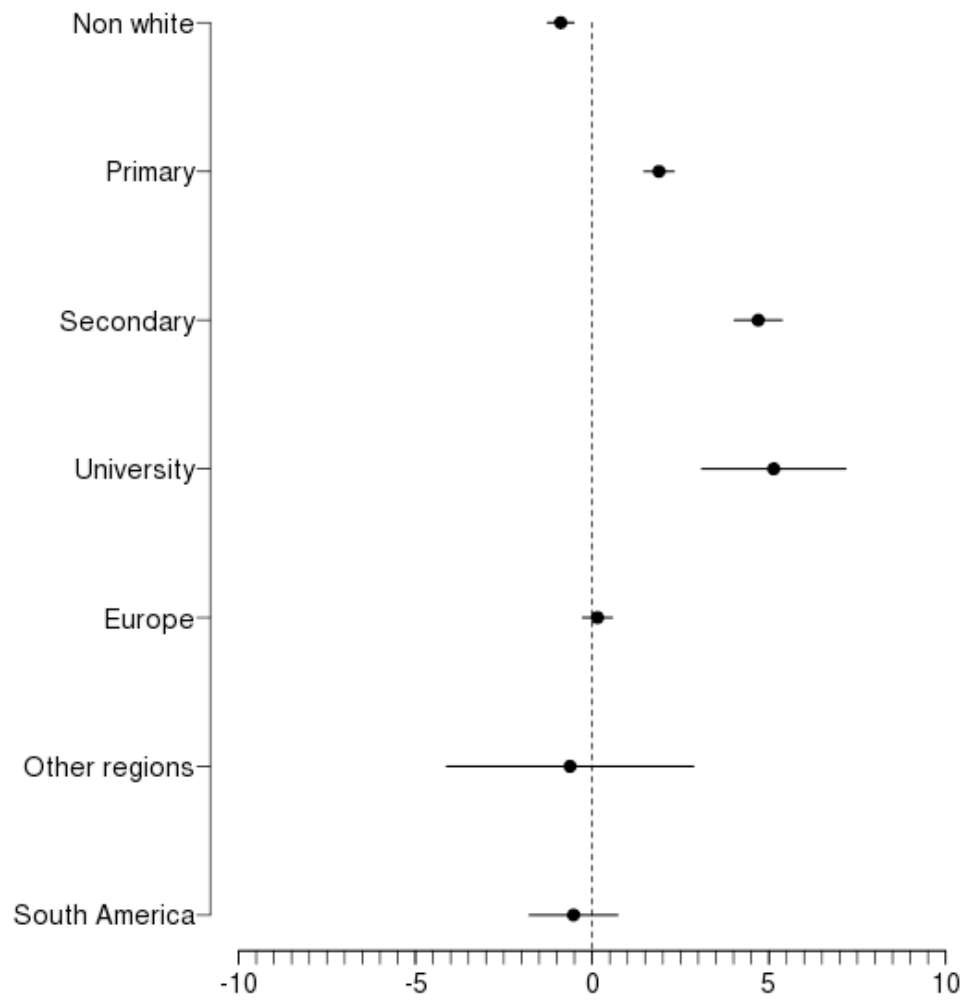
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Graph 1 - Average heights by cohort and place of birth in meters
(Rio Grande do Sul - 1889-1919)

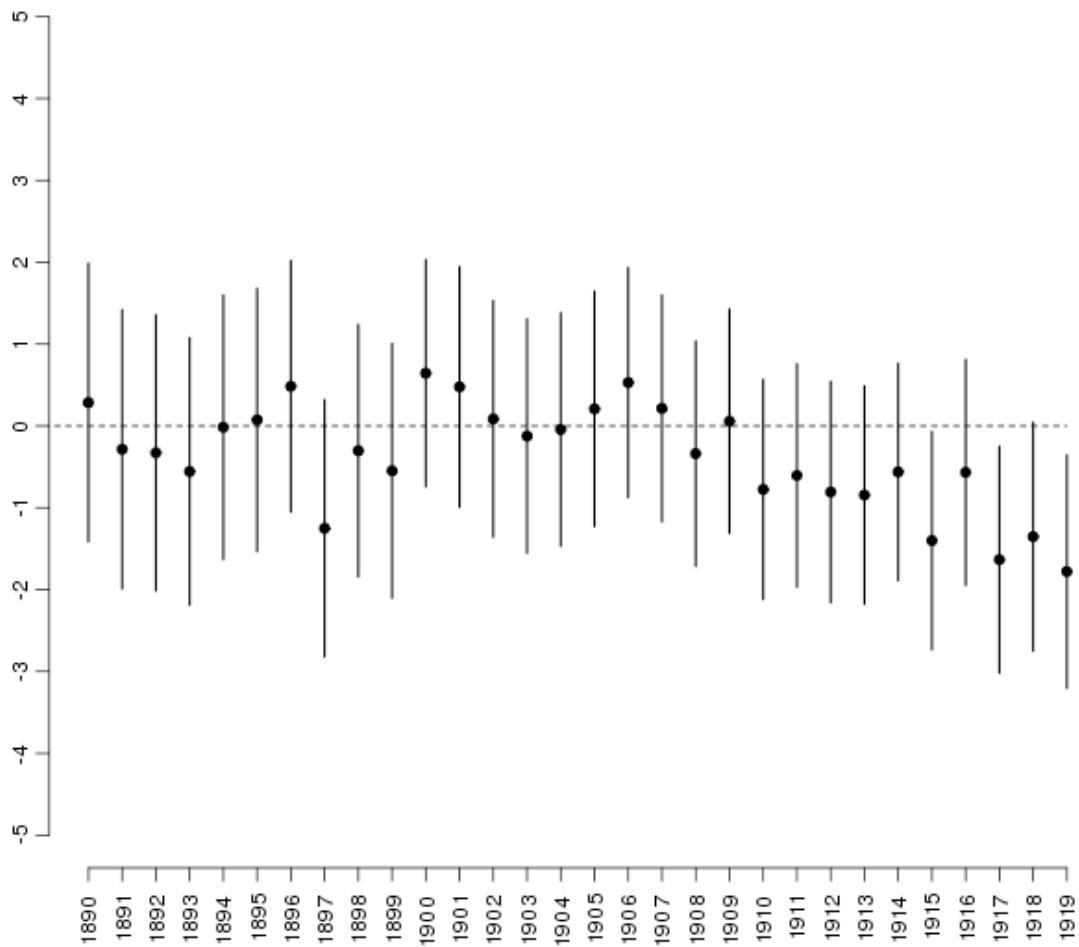


Graph 2 – Econometric Results- Dependent variable: height (in cm).



Note: 95% confidence intervals. The graph was generated using R (R Development Core Team, 2008) and code based on Kasstellec and Leoni (2007). See Appendix for full econometric results.

Graph 3: Estimated Value for Cohort Dummies (1890-1919).



Note: 95% confidence intervals. The graph was generated using R (R Development Core Team, 2008) and code based on Kashtellec and Leoni (2007). See Appendix for full econometric results.

APPENDIX:

Dependent Variable:stature in cm.

| | Estimate | Std. Error | t value | Pr(> t) |
|---------------|----------|------------|---------|-------------|
| (Intercept) | 166.3847 | 0.6260 | 265.78 | < 2e-16 *** |
| 1890 | 0.2865 | 0.8691 | 0.33 | 0.742 |
| 1891 | -0.2854 | 0.8706 | -0.33 | 0.743 |
| 1892 | -0.3289 | 0.8606 | -0.38 | 0.702 |
| 1893 | -0.5568 | 0.8340 | -0.67 | 0.504 |
| 1894 | -0.0168 | 0.8242 | -0.02 | 0.984 |
| 1895 | 0.0725 | 0.8208 | 0.09 | 0.930 |
| 1896 | 0.4841 | 0.7838 | 0.62 | 0.537 |
| 1897 | -1.2512 | 0.8015 | -1.56 | 0.119 |
| 1898 | -0.3022 | 0.7869 | -0.38 | 0.701 |
| 1899 | -0.5486 | 0.7943 | -0.69 | 0.490 |
| 1900 | 0.6438 | 0.7087 | 0.91 | 0.364 |
| 1901 | 0.4767 | 0.7499 | 0.64 | 0.525 |
| 1902 | 0.0860 | 0.7378 | 0.12 | 0.907 |
| 1903 | -0.1241 | 0.7310 | -0.17 | 0.865 |
| 1904 | -0.0441 | 0.7282 | -0.06 | 0.952 |
| 1905 | 0.2084 | 0.7331 | 0.28 | 0.776 |
| 1906 | 0.5292 | 0.7170 | 0.74 | 0.461 |
| 1907 | 0.2141 | 0.7073 | 0.30 | 0.762 |
| 1908 | -0.3386 | 0.7023 | -0.48 | 0.630 |
| 1909 | 0.0576 | 0.6994 | 0.08 | 0.934 |
| 1910 | -0.7760 | 0.6863 | -1.13 | 0.258 |
| 1911 | -0.6050 | 0.6961 | -0.87 | 0.385 |
| 1912 | -0.8083 | 0.6903 | -1.17 | 0.242 |
| 1913 | -0.8447 | 0.6798 | -1.24 | 0.214 |
| 1914 | -0.5627 | 0.6775 | -0.83 | 0.406 |
| 1915 | -1.4014 | 0.6810 | -2.06 | 0.040 * |
| 1916 | -0.5680 | 0.7048 | -0.81 | 0.420 |
| 1917 | -1.6341 | 0.7076 | -2.31 | 0.021 * |
| 1918 | -1.3531 | 0.7142 | -1.89 | 0.058 . |
| 1919 | -1.7801 | 0.7277 | -2.45 | 0.014 * |
| non.white | -0.8876 | 0.1888 | -4.70 | 2.6e-06 *** |
| primary | 1.8921 | 0.2157 | 8.77 | < 2e-16 *** |
| secondary | 4.6980 | 0.3431 | 13.69 | < 2e-16 *** |
| university | 5.1375 | 1.0397 | 4.94 | 7.9e-07 *** |
| Europe | 0.1509 | 0.2135 | 0.71 | 0.480 |
| Other | -0.6247 | 1.7817 | -0.35 | 0.726 |
| South America | -0.5267 | 0.6377 | -0.83 | 0.409 |

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7.53 on 9595 degrees of freedom
(3830 observations deleted due to missingness)

Multiple R-squared: 0.037, Adjusted R-squared: 0.0333

F-statistic: 9.96 on 37 and 9595 DF, p-value: <2e-16