

Wages and heights in eighteenth and early nineteenth centuries Hispanic America¹

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January 2010

¹ An extended version of this paper was presented at the Mini-Conference *A Comparative Approach to Inequality and Development: Latin America and Europe*, Madrid, May 2009, at the Session E5 (*Latin America economic backwardness revisited. New empirical contributions*) of the XVth World Economic History Congress, Utrecht, 2009, and at the panel *Anthropometry & Health (II)* of the Economic History Association 2009 Meetings, Tucson, Arizona, 2009. We thank the participants in these academic events for helpful criticism and advice. Usual disclaimer applies. Dobado acknowledge financial support from the Spanish Ministry of Science and Innovation (ECO2008-01989/ECON).

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Abstract

This basically empirical paper departs from an authoritative neo-institutional scholarship since it merely attempts at exploring and widening the limited available quantitative evidence on wages (nominal and real) and on physical statures in Bourbon Hispanic America. While we take advantage of other authors' works on prices and wages, our significant sample of heights constitutes an original contribution to a field that has not yet received the attention it deserves. In our interpretation, the evidence collected challenges widespread and influential ideas about the standard of living of labourers and about the economic inequality in some of the American territories of the Hispanic Monarchy. From an international comparative perspective, neither real wages, especially in terms of a superior good such as meat, were as low nor heights as short as many scholars assume. Therefore, long run inferences on the economic consequences of the "colonial legacy" that are based on those ill-founded assumptions should be reconsidered.

1. Introduction

It is our contention that the empirical foundations of the popular idea that the extremely high level of contemporary economic inequality in Hispanic America would be rooted in the viceregal period is, to say the least, rather unconvincing. Moreover, we find somewhat surprising the sharp contrast between: 1) the strength of some neo-institutionalist claims about the negative consequences on economic development of the assumed high level of inequality since early Hispanic America [Engerman and Sokoloff (1994, 2002, 2005); Acemoglu et al. (2002); Frankema (2009)]; and 2) the absence of quantitative evidence supporting those assumptions. Williamson (2008) has recognized the need of “*far more evidence*” when assessing historical levels of inequality in Hispanic America³.

Therefore, the main objective of this paper is basically empirical. It shows quantitative evidence on wages (nominal and real) and on physical statures in eighteenth and early nineteenth centuries Hispanic America⁴. Besides, those wages and heights of the Bourbon period are compared with many others from a wide range of countries from different parts of the world (Asia, Europe and North America). Thus, we try to put Hispanic America in the map that is being drawn by Allen and other authors [i. e. Van Zanden (1999), Allen (2001, 2007), Allen et al. (2005, 2007)]. Additionally, following a substantial and growing body of literature [i. e. Steckel (1983, 1995, 2005, 2008, 2009), Williamson (1999, 2002), Prados (2007), Komlos (1998)], wages of unskilled workers and average heights of male populations are considered as suitable indicators of the standard of living of the commoners of a given society and of its economic equality

The results of our research suggest that some (probably) popular ideas about living standards –i. e. that power purchasing of wages in terms of grain or meat were lower in Hispanic America than in other parts of the preindustrial world or that the decrease in the living standards of labourers by late eighteenth and early nineteenth centuries was specific to New Spain- might be in need of reconsideration. They also challenge most of the assumptions about inequality in the early post-Columbian period and its secular persistence on which neo-institutionalist claims are based. Neither are

³ However, economic inequality in nineteenth and twentieth Iberian America has been the object of serious empirical analysis by economic historians for some time already –i. e. Williamson (1999, 2002), Bértola and Williamson (2006), Prados (2007a) and Bértola et al. (2008).

⁴ Many of our data on nominal wages and prices are the result from other authors' work. Leticia Arroyo, Amílcar Challú and Robert Allen deserve a special mention. We also like to recognize that two institutions the Global Price and Income History Group (<http://gpih.ucdavis.edu/>) and the International Institute of Social History (<http://www.iisg.nl/hpw/data.php>) have enormously facilitated our work and permitted to widen the original scope of this research.

they in line with the pioneering work on ancient economic inequality by Milanovic, Lindert and Williamson (2008). These authors show a picture in which late eighteenth century New Spain turns out to be the most unequal society within the sample of twenty seven preindustrial observations (from early first-century Rome to British India in 1947)⁵. On the contrary, our findings are consistent with Coatsworth's (2005, 2008) criticism on the view of colonial Latin America as a particularly unequal society, in especial when compared with the US, as Engerman and Sokoloff (1994, 2002, 2005) do⁶. More recent Williamson's (2009) conclusion on the issue is also compatible with our argument, which states that, according to what wages and heights indicate, Bourbon Hispanic America was not an uneven society by international standards of the period, Europe included⁷. Moreover, from the evidence shown below, the inference that it might probably also be more developed than what estimates of GDP per capita by Coatsworth (2008) and Maddison (2009) suggest. Thus, our picture of Bourbon Hispanic America becomes less pessimistic than the one usually assumed by most economists and economic historians.

Apart from this introduction, this paper contains four sections. In Section 2, evidence on nominal and real wages collected from various sources is presented. Section 3 deals with heights. Some final remarks appear in Section 5. Sources of the many figures included in this working paper are shown in Appendix 1 while data and technical aspects on heights are depicted in Appendix 2.

2. Nominal and real wages

In this section we present evidence on nominal and real wages. As there are not yet baskets of goods properly representing the consumption patterns of Bourbon Hispanic American commoners other than that of Leticia Arroyo for Arequipa⁸, we are unable of using appropriate cost of living indices. Therefore, we deflate nominal wages by prices of grain (corn and wheat) and meat in order to estimate wages in terms of an ordinary

⁵ Based on an arguable interpretation of the few data provided by the bishop Abad y Queipo, New Spain economic inequality would be even beyond the "inequality possibility frontier", an interesting concept introduced by these authors.

⁶ "..., *what little quantitative evidence there is does not suggest that ownership of land, or other assets for that matter, was more concentrated in Latin America than in the United States*" Coatsworth, 2008, p. 553.

⁷ "*income inequality in pre-industrial Latin America is found to have been lower than that of North-western Europe, not higher.*" Williamson, 2009, p. 24.

⁸ See http://gpih.ucdavis.edu/files/Peru_18th_c_basket.xls.

good (grain) and of a superior good (meat). Thus, we obtain two proxies of real wages which in turn may proxy for economic inequality.

In considering wages, especially those of unskilled workers as a proxy for economic inequality, we mainly draw from Williamson (1999, 2002). To some extent, we also try to adapt Prados's (2007a) work to the more limited quantitative information existing for the Bourbon period. Our rationale is as follows: estimates of, or the educated guesses on, GDP per capita in Hispanic America by early nineteenth century are lower than in most Western countries; then, finding real wages of unskilled workers which are similar to those in Europe indicates that, at the very least, economic inequality in New Spain, New Granada and Upper Peru was not especially higher by end of the viceregal period. In fact, what we find is higher real (grain and, especially, meat) wages in Bourbon Hispanic America than the European average and similar trends towards stagnant or decreasing living standards throughout late eighteenth and early nineteenth centuries.

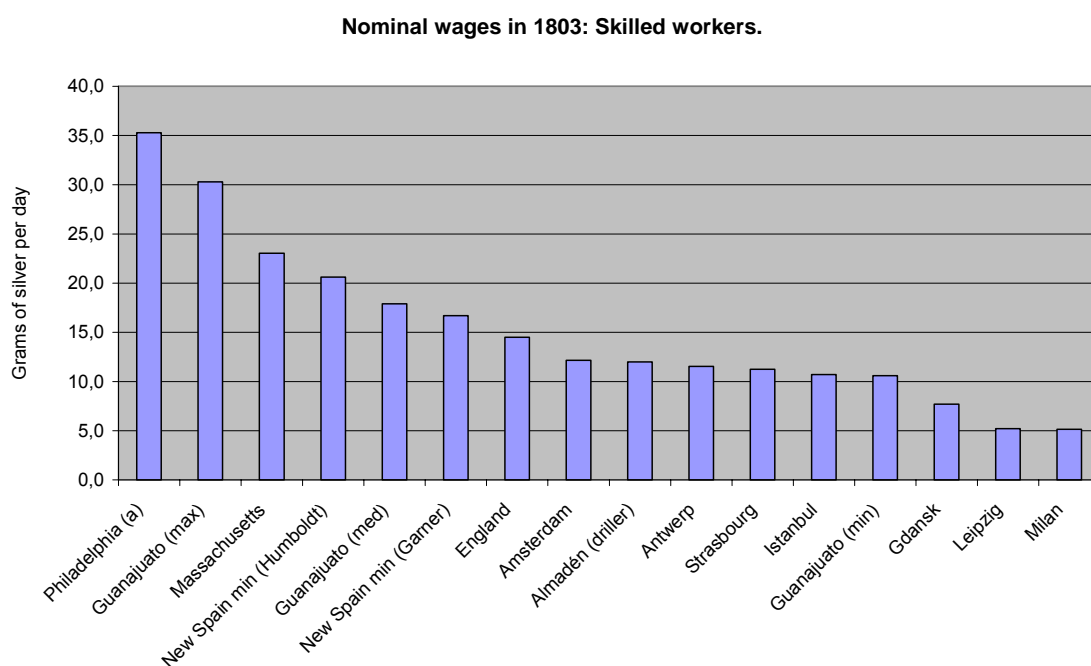
These results might be surprising to many. And not only to those defending the idea that viceregal Hispanic America economies were based on low wages since institutions behind the labour supply for mining and other productive activities were extractive, unequal or bad. That could also be the case of some economic historians of the Bourbon New Spain that: a) have never adopted a comparative approach to determine the size of wages relative to other parts of the world; or b) interpret the perceived downward trend of real wages from the 1780's on as a peculiarity which indicates an irreversible economic crisis. In this regard, probably the main methodological objective of our research consists in emphasising the advantages of the so far rather infrequent comparative approach, other than with the USA, when dealing with the analysis of basic economic features of viceregal Hispanic America. Finding medium to high relative real wages would suggest that labour productivity and living standards were similar to those in most of late pre-industrial Europe. This suggestion might make advisable a careful consideration about the consistency of the comparatively low GDP per capita estimates by Coatsworth (2008) and Maddison (2009) for Latin America 1700 and 1820.

However, more or less far-reaching implications from our empirical findings on wages in terms of living standards and of economic inequality should be appropriately revised if future research demonstrates that some important economic conditions (number of working days per year of miners and unskilled labourers, intensity of the standard work effort, income differences between urban and rural wage-earners and other segments of the commoners –i. e. peasants-, fiscal burden, etc.) were significantly worse in Bourbon Hispanic America than in other parts of the world.

2.1. Wages circa 1803

Our quantitative examination of wages in Hispanic America starts by offering a comparison between nominal and real (grain and meat) wages of skilled workers in Europe and North America and of miners in New Spain circa 1803. Nominal wages are expressed in silver grams per day. In an attempt to capture the level of real wage, we convert nominal wages into grain and meat wages through dividing by the prices of these two goods, which have been previously calculated, when needed, in terms of grams of silver per kilo. Thus we obtain the maximum quantities of grain or meat that could be bought if the whole nominal wage were spent in each of these two goods. This procedure for determining the purchasing power of nominal wages, albeit not fully satisfactory, is justified, as mentioned above, by the lack of consumption baskets for late viceregal Hispanic America. In any case, it offers a proxy of real wages in terms of either a normal good or a superior good within the consumption patterns of the commoners in preindustrial economies. The choice of 1803 simply responds to the fact that it is the year for which good data on wages for La Valenciana, the biggest mine in late Bourbon Mexico, exist. Using only one year, be it 1803 or another one, for comparative purposes is not optimal, but, in spite of it, the static picture that emerges is clear and consistent with the dynamic one presented in the next subsection.

Figure 1 (*)



Source and methods: See Appendix 1.

(*) a, artisan; max, maximum; med, medium; min, minimum.

Figure 1 above depicts nominal wages of urban skilled workers, mostly in the building trades, and of miners in New Spain -three levels of qualification in Guanajuato and two broad estimates by Humboldt (1822:1991) and Garner (1993)- and in Almadén, Central Spain [Dobado (1989)]. It does not seem that nominal wages of New Spain miners by early nineteenth century were low by international standards. On the contrary, they are higher than those of skilled workers in most developed European countries. Most likely they were even higher than what is revealed in Figure 1 as, on top of their nominal wages, some miners were generally paid additional “partidos” – variable quantities of silver mineral- that may be quite significant according to Velasco (1989)⁹ and Ladd (1992)¹⁰.

We are especially interested in showing information on miners’ wages as these workers are very often presented as being the epitome of colonial exploitation [Engerman and Sokoloff (1994, 2002 and 2005); Acemoglu et al. (2002)]. This idea is clearly at odds with the firsthand testimony given by Humboldt after his visit to New Spain in 1803-1804: “*The Mexican miner is the best paid of all miners; he gains at the least from 25 to 30 francs per week of six days*”¹¹. Ward, also a reliable on-the-field observer, claimed shortly after that Mexican independence that “*the ordinary wages of a miner are high.*”¹² Most specialists in New Spain mining history seem to be very close to Humboldt’s view on the issue [i. e. Brading (1983)¹³, Velasco (1989)¹⁴, Swann (1990)¹⁵ and Ladd (1992)¹⁶].

⁹ “... el partido hizo posible que algunos trabajadores firmaran para cumplir con sólo tres o cuatro turnos a la semana y con eso tenían suficiente para vivir.” Ladd, 1992, p. 37.

¹⁰ “Para los barreteros, el partido representaba la parte fundamental de sus ingresos”. Velasco, 1989, p. 585.

¹¹ Humboldt, 1822, p. 248. The conversion from francs into silver at the early nineteenth century rate (<http://www.iisg.nl/hpw/data.php>) yields 112,5 to 135 grams.

¹² Ward, 1828, vol. II, p. 146.

¹³ “Los trabajadores mineros de México, lejos de haber sido los peones oprimidos que la leyenda nos presenta, constituían una fuerza laboral libre, bien pagada y geográficamente móvil que en muchos casos era prácticamente socia de los patronos.” Brading, 1983, p. 201.

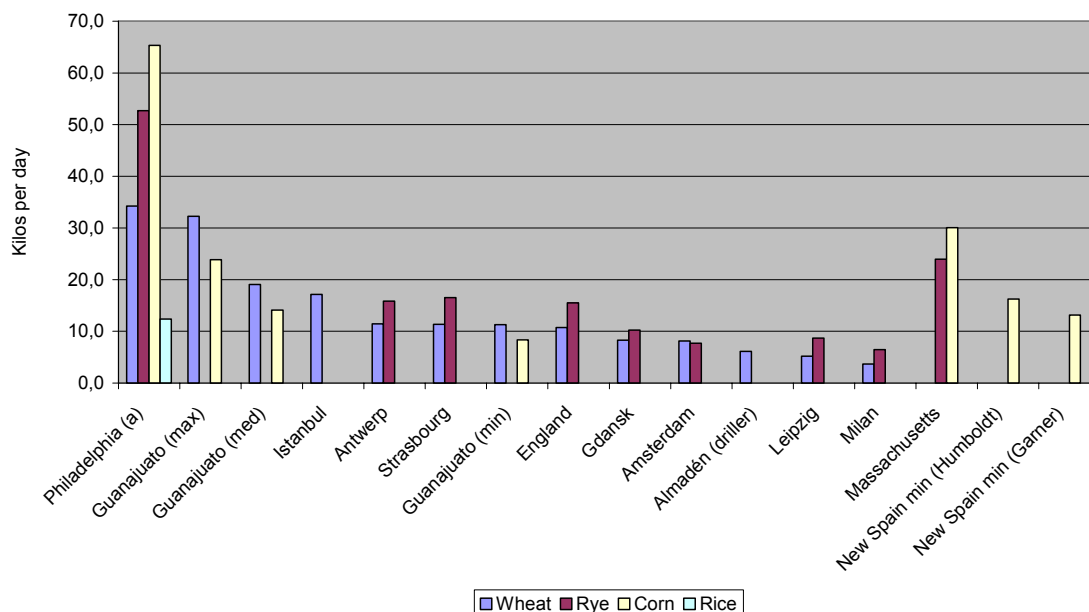
¹⁴ “... la mayoría de los trabajadores eran libres, en el sentido de que no eran obligados a trabajar en explotaciones mineras o en plantas de refinación; iban a éstas atraídos, en general, por percepciones económicas considerablemente más altas que las usuales en las labores agrícolas.” Velasco, 1989, p. 582.

¹⁵ “... these labourers were comparatively well paid”. Swann, 1990, p. 145.

¹⁶ According to this author, the amount of goods that a miner could buy in Central Mexico by the 1760’s with a fraction of his wage was enormous in comparison with Europe and Asia: “Cada trabajador que bajaba recibía el mismo salario: cuatro reales (cincuenta centavos) [12.4 grams of silver] por turno de 12 horas. Con un real se podía comprar una lengua de res, medio kilogramo de lana, 800 gramos de cordero, o dos y medio kilogramos de res o ternera. Con tres reales podía comprar 12 kilogramos de velas, sebo o carbón.” Ladd, 1992, p. 34. For the sake of comparison, in the basket of goods suggested by Allen (2001) for eighteenth century Europe, candles and meat are valued at 4.98 and 2.21 grams of silver per kilo, respectively.

Figure 2 (*)

Grain wages in 1803: Skilled workers.



Source: See Appendix 1.

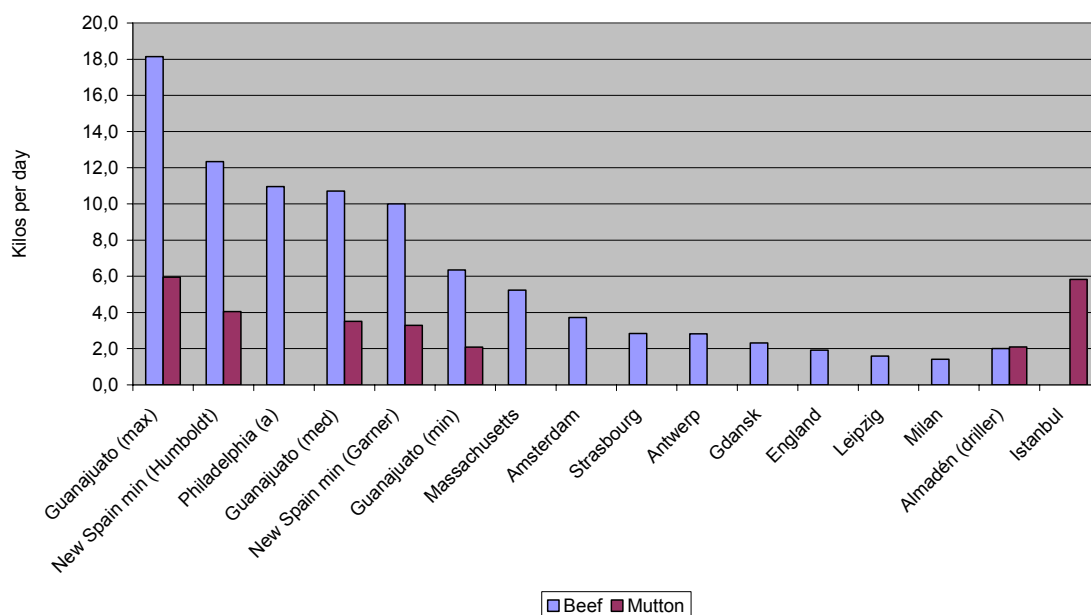
(*) a, artisan; max, maximum; med, medium; min, minimum.

However, it might be objected that the finding of high nominal wages in late Bourbon Mexico was expectable as it was by far the main world producer of silver. Were they also high in terms of grain? Yes, they were too –see Figure 2 above, which depicts the power purchasing power of daily wages in terms of grain. As it may be seen, grain wages of New Spain miners are lower only than those of skilled workers in the USA. Grain-purchasing power of miners’ nominal wages does not seem to be negatively affected by an especially high level of grain prices.

When we calculate wages in terms of a superior good, differences in favour of Bourbon Mexico become enormous. Differences in meat wages are quite substantial. Access to animal proteins was much easier for New Spain miners than for skilled workers in more economically developed Europe. The high purchasing capacity of miners’ wages in terms of meat in Bourbon Mexico was partially due to the comparatively low prices of beef, which in turn responds to the favourable factor endowments for extensive cattle raising in Northern regions –see Figure 3 in which the power purchasing power of daily wages in terms of meat.

Figure 3 (*)

Meat wages in 1803: Skilled workers.



Source: See Appendix 1.

(*) a, artisan; max, maximum; med, medium; min, minimum.

Prices of other superior goods might also be comparatively cheap for New Spain's consumers. At least that is the case of sugar. This good, which is not included by Allen (2001) in the European basket of goods, generally cost in eighteenth century New Spain less than 5,4 grams of silver per kilo –Figure 1 in Crespo (1995)- while the secular average price is 8,2 grams of silver per kilo in London and Southern England¹⁷.

More research needs to be done in order to put the Bourbon Mexico miners living standards in the international map that is being drawn by recent scholarship –i. e. Van Zanden (1999), Allen (2001, 2007), Özmucur and Pamuk (2002), Allen et al. (2007). However, what seems clear after this examination of nominal and real (grain and meat) wages is that miners in late Bourbon Mexico were far from being the coerced, immobile and poorly paid labour force created by those supposedly extractive, unequal or bad colonial institutions that are so often assumed in the literature. But it is not only the Mexican case which is in need of being reconsidered in the light of historical evidence such as the one offered by Bakewell (2004) regarding Andean mining labour relations in viceregal times.¹⁸ They seem to have been less coercive and

¹⁷ <http://www.nuff.ox.ac.uk/users/allen/studer/london.xls>. The average of discontinuous data on sugar prices in Massachusetts for 1753-1799 is 6.1 grams of silver per kilo. (http://gpih.ucdavis.edu/files/Massachusetts_1630-1883.xls).

¹⁸ "After their year in the in the town [Potosi], many men, ..., apparently preferred to stay on as worker in mining, refining, or something else, ... Others moved out to of the town to nearby

much more complex than what the *World Development Report 2006*, following the mainstream assumptions, claims.¹⁹ In eighteenth century Potosi, most mining labour force consisted of free workers while in Lower Peru (nowadays Bolivia) *mita* never existed at all [Garavaglia and Marchena (2005)]. Therefore, it would not be surprising to find higher than expected wages in the Andes too. The legal daily wage established by the authorities of the Viceroyalty for the *mitayos* (aboriginals compelled to serve the *mita*) in Potosi by early nineteenth century was 4 reales (12,12 grams of silver)²⁰. As we will soon see, this nominal wage, higher than those of most skilled workers in Europe, has also a very high purchasing power at least in terms of grain.

Based on the evidence shown above, it seems, then, reasonable to question the validity of the notion of colonial mining not only as an “extractive” [Acemoglu et al. (2002)] or “unequal” [Engerman and Sokoloff (1994, 2002 and 2005)] activity but also as a “bad” one [Bruhn and Gallego (2008)]²¹.

Following in accordance with the rationale underlying this empirical research on economic inequality –see Introduction- we now focus our attention on unskilled workers. Therefore this subsection continues with the examination of nominal and real (grain and meat) wages of unskilled workers, mostly urban building labourers, except otherwise mentioned (i. e. Massachusetts, New Spain “hot regions”, etc.), circa 1803. Figure 4 shows nominal wages of unskilled workers in a wide sample of countries, including nowadays Bolivia and Colombia.

alleys, apparently as subsistence farmers or workers on chacras. The boom at Oruro after 1600 was another lure to Indians who had learned mining and refining in Potosi after being taken there by the mita. In fact, Oruro drew off mita men on their way to Potosi. They worked there as contracted wage laborers, since the authorities made hardly any mita allocation to Oruro. The other lesser mining centers that rose and fell in the Potosi district after 1600 were similarly mita-less, and had only the attraction of wages to secure workers –some from Potosi, some from native towns.” Bakewell, 2004, p. 240.

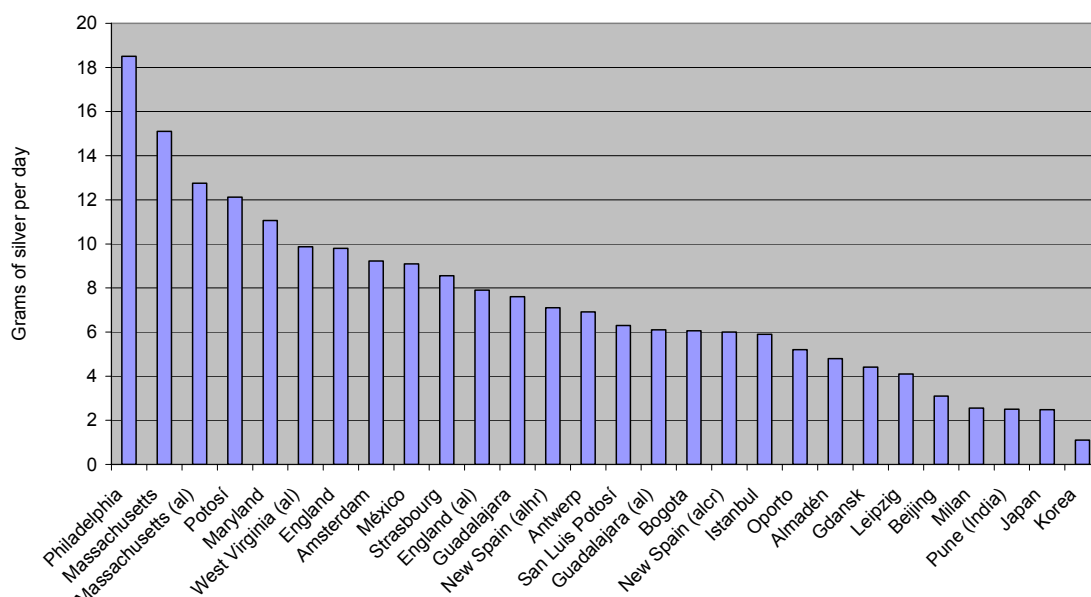
¹⁹ “the mita (from the quechua world *mit’a*, meaning “turn”) became a central institution until independence, ...” . World Bank, 2006, p. 111.

²⁰ Tandeter, 1999, p. 369. This author shares the revisionist view on Andean mining institutions by Bakewell: “*El conjunto de fuentes del siglo XVIII permite confirmar la validez de esa aproximación al problema.*” Tandeter, 1999, p. 369.

²¹ More arguments in favour of a positive consideration of the effects of mining on economic development during the Bourbon period in Mexico may be found in Dobado and Marrero (2001, 2005).

Figure 4 (*)

Nominal wages circa 1803: Unskilled workers.



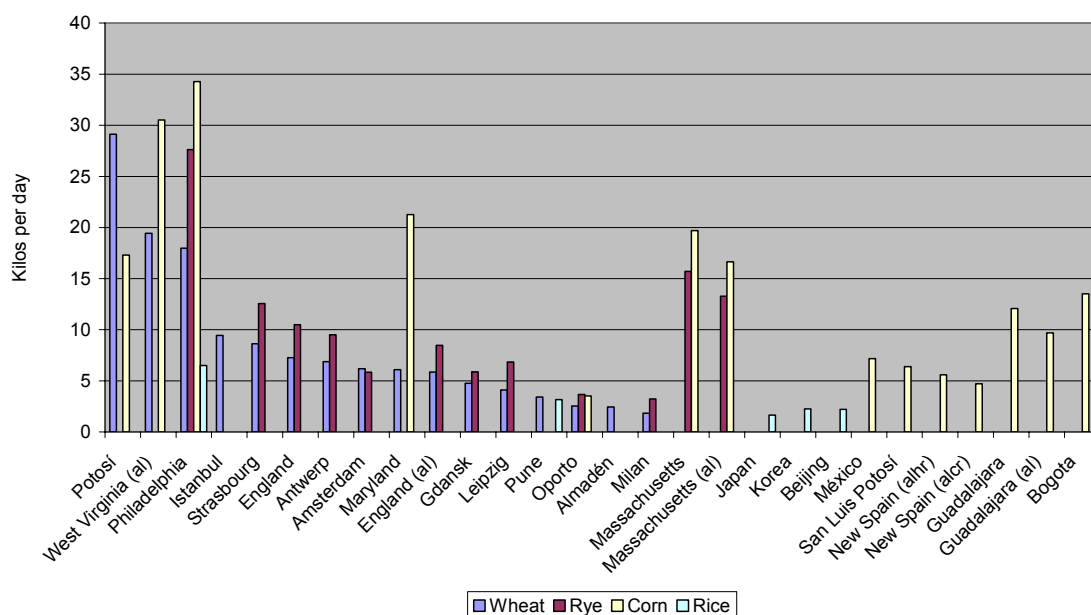
Source: See Appendix 1.

(*) al: agricultural laborer; alhr: agricultural laborer “hot regions”; alcr: agricultural laborer “cold regions”.

Neither of the Spanish colonies in America is among the parts of the world with the lowest nominal wages. Most of the observations belonging to the Hispanic America subsample are among the central third of the range of values. In some cases, those of unskilled workers in Potosí and of construction workers in Mexico are very close or similar to the highest ones. Again, in order to check whether this relatively medium or high level of nominal wages is due to the supposed abundance of silver in colonies such as New Spain or Upper Peru, we calculate real wages in terms of ordinary (grains) and superior (meat) goods –see Figure 5 and Figure 6.

Figure 5 (*)

Grain wages circa 1803: Unskilled workers.



Source: See Appendix 1.

(*) al: agricultural laborer; alhr: agricultural laborer “hot regions”; alcr: agricultural laborer “cold regions”.

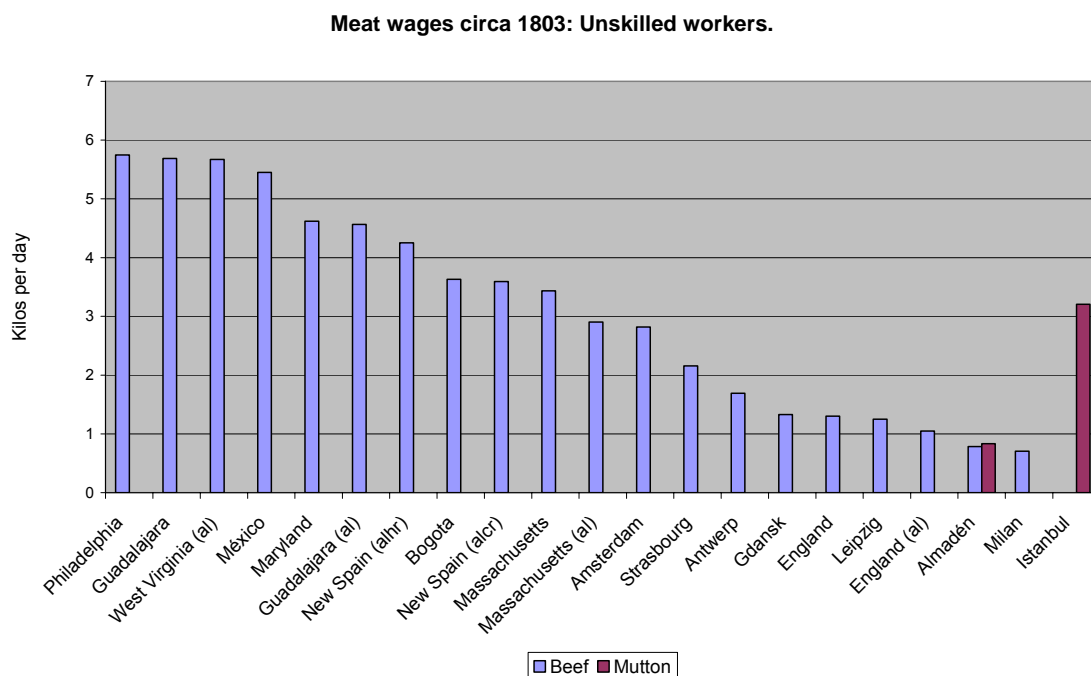
Either in terms of grain or, especially, of meat, the level of wages in New Spain and Bogota are much higher than in Europe and Asia. In fact, in some cases, they are even higher than in the USA. The comparatively big purchasing power of Hispanic America nominal wages in terms of meat is a somewhat surprising finding. However, at least for the case of Mexico, it is indisputable after the research on meat consumption in the capital city of New Spain conducted by Quiroz (2005).²² While in Europe, eating meat by late eighteenth and early nineteenth centuries was not frequent among the commoners, this was far from being the case in Mexico: “*se ha comprobado el arraigo entre los habitantes de la capital de comer carne en forma bastante más abundante de lo que se acostumbraba en ese siglo en Europa. Incluso al grado de romper preceptos religiosos*”²³. This seems to have been also the case in Guadalajara and the rest of the colony, especially in the Northern regions. The possibility of consuming meat for

²² “En 1791 Humboldt estimó el consumo global de carne de la ciudad (...) en 26 000 000 de lb y un consumo per cápita de 189 lb anuales, es decir 255 gr diarios por habitante. En la época, este autor se sorprende de sus propios cálculos y señala que en México se consumía más carne que en París, donde sólo se alcanzaban las 163 lb anuales (79 kg) por habitante. Este cálculo no deja de llamar la atención si se considera que París era la ciudad privilegiada de Francia aun antes de la Revolución, cuando el consumo medio en toda la nación sólo era de 48.5 lb, es decir 23.5 kg, cantidad que para muchos comentaristas era aun generosa.” Quiroz, 2005, p. 44.

²³ Ibidem, p. 335.

ordinary wage earners in Bogotá was also well above that in most developed European countries.²⁴

Figure 6 (*)



Source: See Appendix 1.

(*) al: agricultural laborer; alhr: agricultural laborer “hot regions”; alcr: agricultural laborer “cold regions”.

Summarising the results presented so far, the conventional, pessimistic, assumptions on wages and living standards of miners and unskilled workers in late Bourbon Hispanic America do not seem to receive full empirical support. It is rather the optimistic alternative on the issue the one which is based on the available evidence.

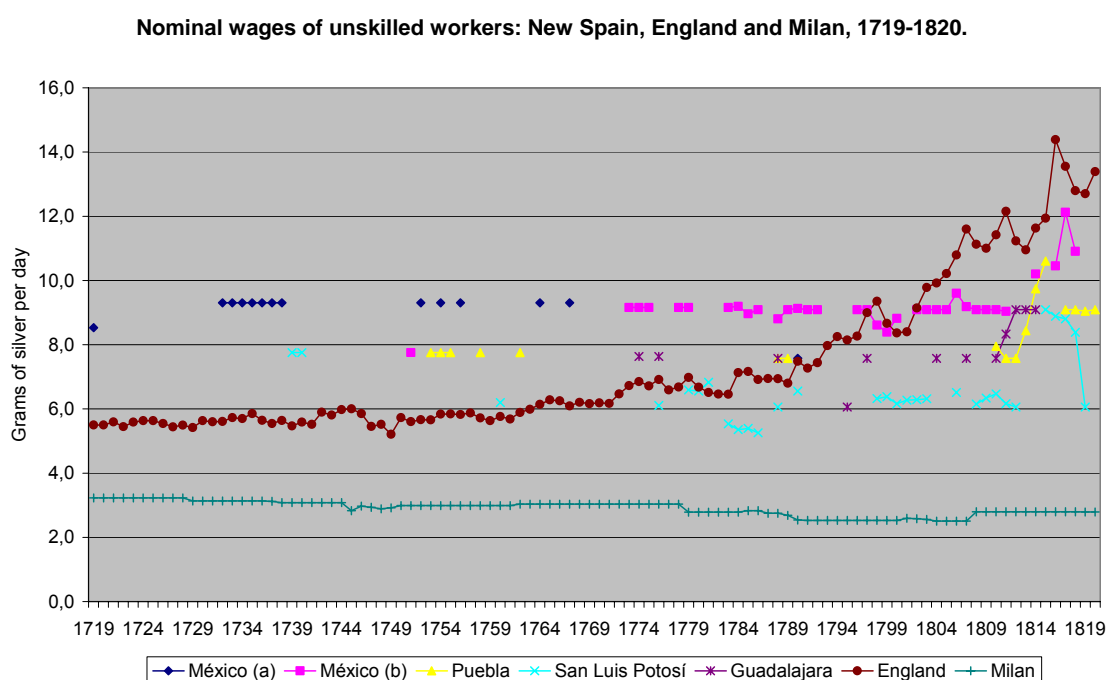
2.2. Wages throughout the eighteenth and early nineteenth centuries in Hispanic America

Our empirical research proceeds by offering a dynamic, comparative, perspective on nominal and real (grain and meat) wages of unskilled workers which are those

²⁴ In Allen et al. (2007), the European “barebone basket” around 1750 includes 5 kilos of meat and/or fish per person/year whereas the subsistence level is estimated in 3 kilos in China. In a “respectable basket” meat and/or fish would reach 25 kilos per person/year –accompanied by other sources of proteins- in Europe and 31 kilos in China. By mid eighteenth century a laborer’s daily wage could buy more, and even much more, than six kilos of meat in Mexico and around five in Bogota.

especially relevant regarding the rationale underlying our ad hoc version of the Williamson's economic inequality. We use wages in England and Milan, which may be considered, respectively, the upper and lower bounds of the range of variation in Western Europe, as terms of comparison. We assume, following Allen et al. (2007) that real wages in England were not only higher than in the rest of Europe but also than in the rest of the world (North America excluded). Figure 7 shows a long-term picture of unskilled building workers nominal wages in several towns of New Spain (Guadalajara, Mexico, Puebla and San Luis Potosí), England and Milan.

Figure 7 (*)



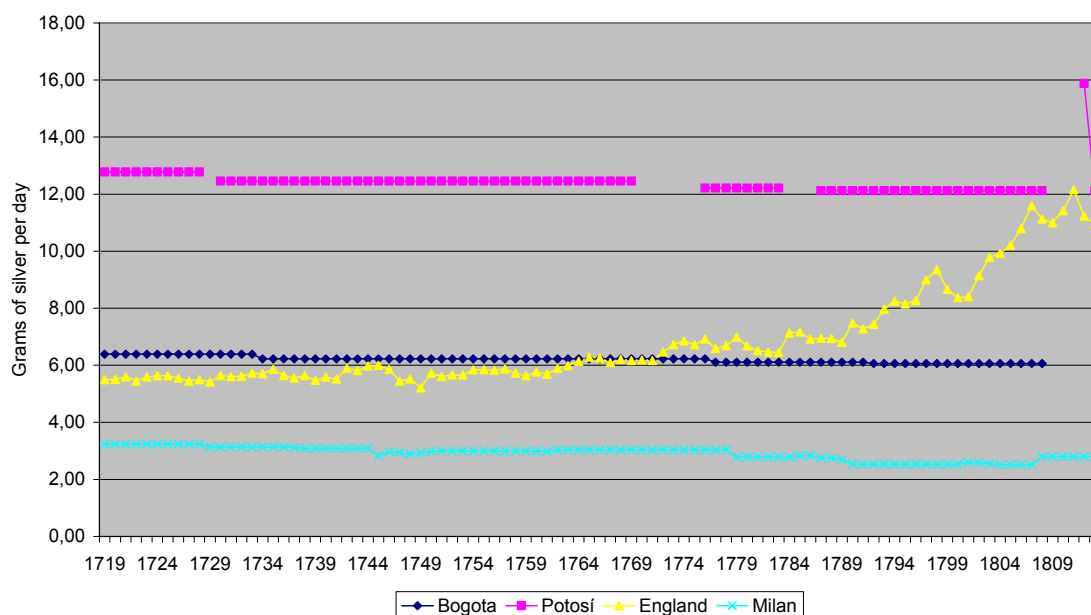
Source: See Appendix 1.

In all available cases, nominal wages in Bourbon Mexico are clearly higher than in Milan. Until the 1760's they are also higher than in England. Afterwards, as a result of the strong growing trend that starts in the 1770's, nominal wages in England finally run ahead those in New Spain. As in Milan, nominal wages in Bourbon Mexico exhibit a basically long-term stagnant evolution. Only at the very end of the period under consideration they show some dynamics, which might probably be related to the abnormal circumstances surrounding the turmoil caused by the upheaval (*Insurgencia*) that began in 1810.

Nominal wages in Bogota and Potosi in eighteenth and early nineteenth centuries were not lower than in Europe –see Figure 8.

Figure 8

Nominal wages of unskilled workers: Botoga, Potosi, England and Milan, 1719-1813.

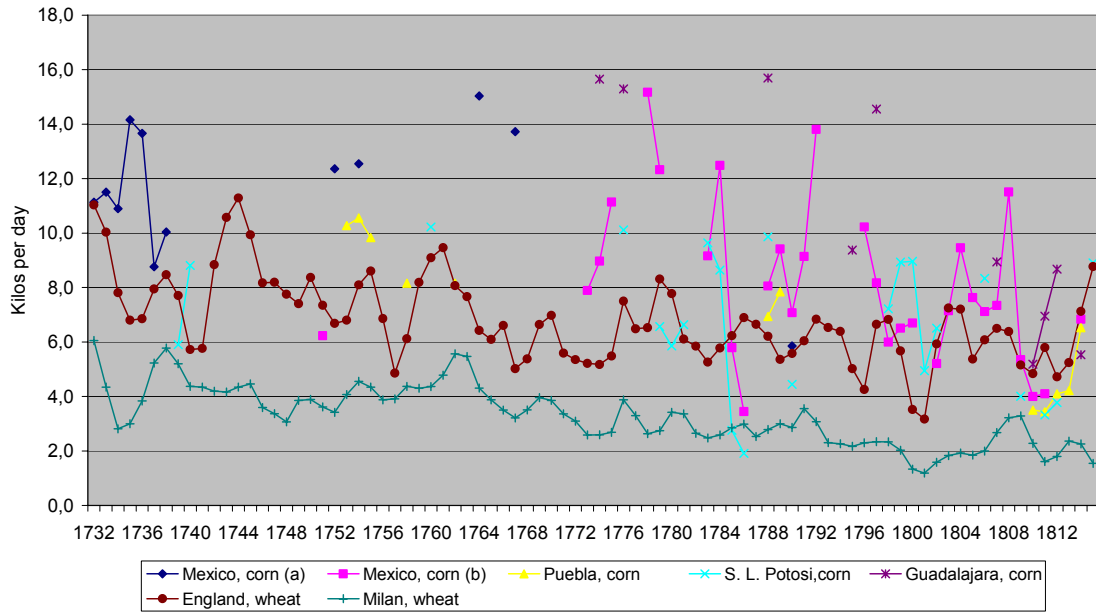


Source: See Appendix 1.

In fact, nominal wages in Potosí, albeit showing a slight downwards secular trend, probably interrupted only circa the pre-independence years, were consistently higher than in England and, especially, in Milan. Our sample of late Hispanic America nominal wages in eighteenth and early nineteenth centuries is also well above those of India, China and Japan –see Allen (2007) and Allen et al. (2007). Given that differences between England and the rest of Europe were not minor, it can be properly said that only nominal wages of unskilled workers in the USA were clearly higher than in Hispanic America during the last decades of the Bourbon period. Being Potosí and New Spain important producers of silver, it might be argued that their comparative high level of nominal wages was expectable. However, this circumstance does not apply to Bogotá, or at least not to the same extent. In any case, again, as in our static analysis of the previous subsection, we try to control for any possible monetary effects on prices that might decrease the purchasing power of nominal wages in Hispanic America through deflating them with grain and meat prices. Grain wages in New Spain were substantially higher than in Milan during the whole period considered –see Figure 9.

Figure 9

Grain wages of unskilled workers: New Spain, England and Milan, 1732-1815.

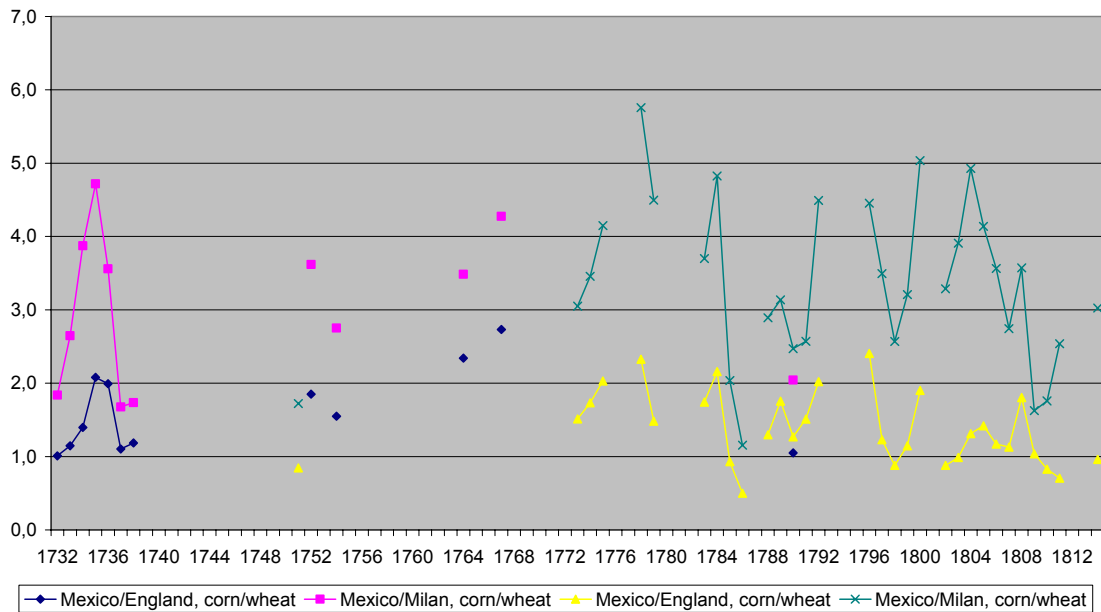


Source: Appendix 1.

Generally, except during some especially intense agricultural crisis -í. e. 1785-1786 and after 1810-, they also exceeded to those in England.

Figure 10

Relative grain wages of unskilled workers, 1732-1814.

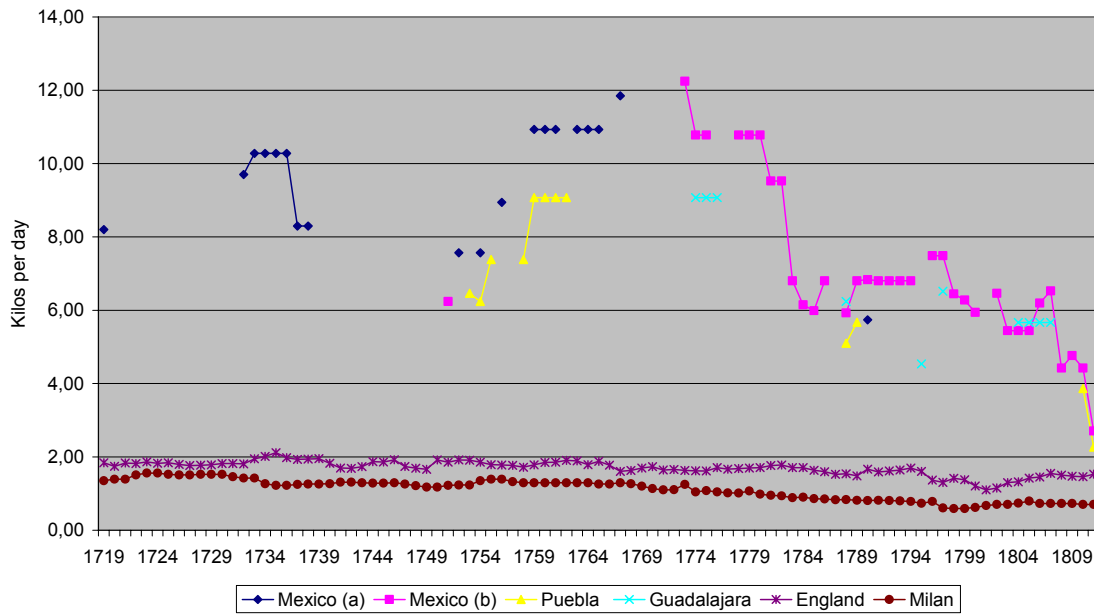


Source: See Appendix 1.

Bourbon Mexico grain wages relative to England grew during the second third of the eighteenth century and fell afterwards. In the early 1810's they were close to their historical minimum level of the 1730's. The evolution of New Spain's grain wages relative to Milan is not very different and was also influenced at the beginning of the nineteenth century by the circumstances surrounding 1810.

Figure 11

Meat wages of unskilled workers: New Spain, England and Milan, 1719-1811.

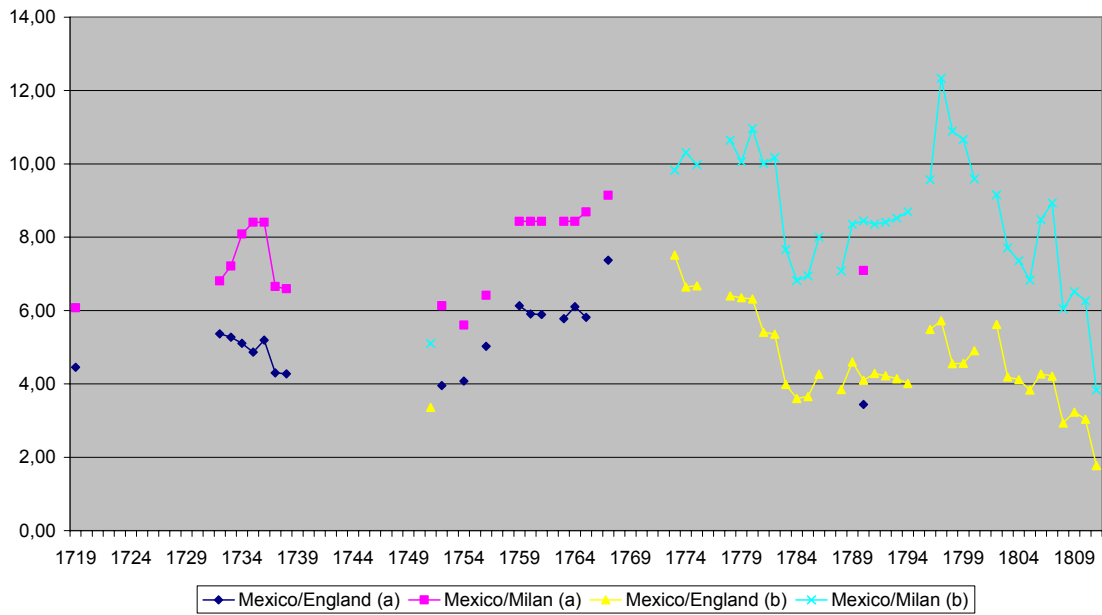


Source: See Appendix 1.

Meat wages reached a peak in New Spain in the 1760's and 1770's –see Figure 11 above. By then, the difference with England or Milan was simply amazing. It was substantially reduced afterwards, particularly from 1808 on. In any case, in spite of the reduction associated with the agrarian crisis in immediate pre and post 1810 years, relative meat wages were at its worst in New Spain almost twice and four times higher than in England and Milan, respectively –see Figure 12.

Figure 12

Relative meat wages of unskilled workers, 1719-1811.

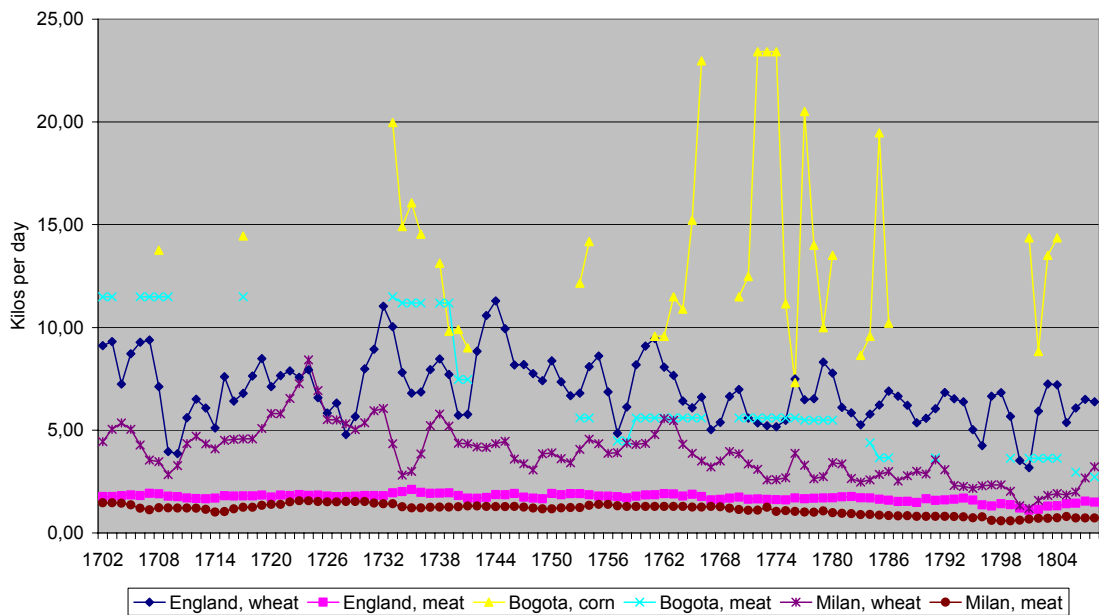


Source: See Appendix 1.

Bourbon Mexico was not the only challenging case for those who assume low wages as a result of extractive, unequal or bad colonial institutions. Grain and meat wages in Bogota were also much higher than in England and Milan –see Figure 13.

Figure 13

Grain and meat wages of unskilled workers: Bogota, England and Milan, 1702-1808.

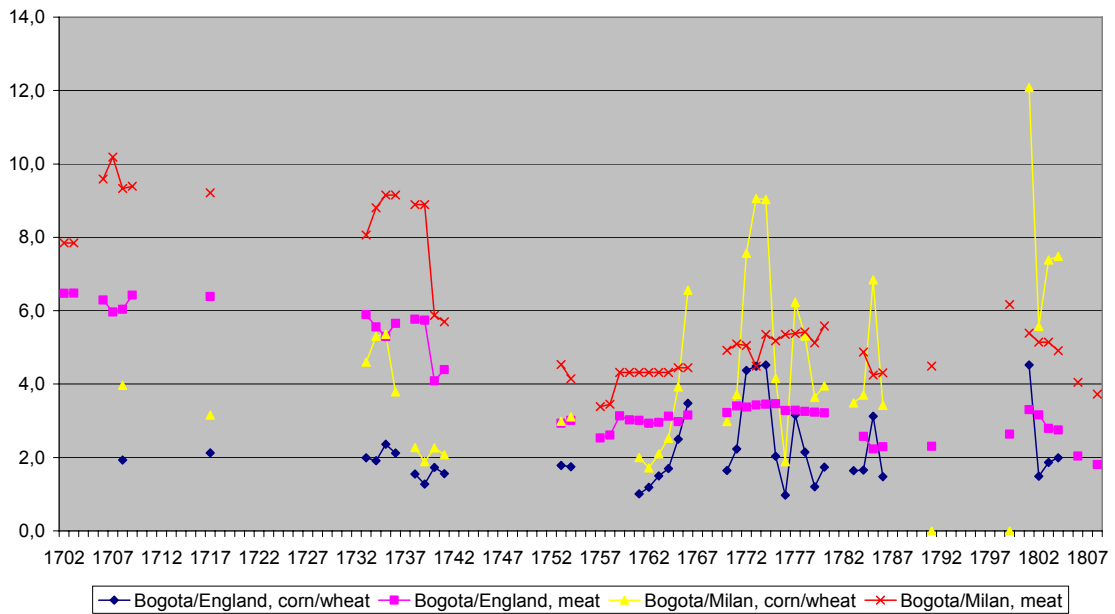


Source: See Appendix 1.

However, meat wages relative to England and Milan were significantly lower in the second half of the period under consideration. Grain wages relative to England basically fluctuate around the very long-term average with no signs of deterioration while grain wages relative to Milan show a clear growing trend since the 1760's on – see Figure 14.

Figure 14

Relative grain and meat wages of unskilled workers, 1702-1808.

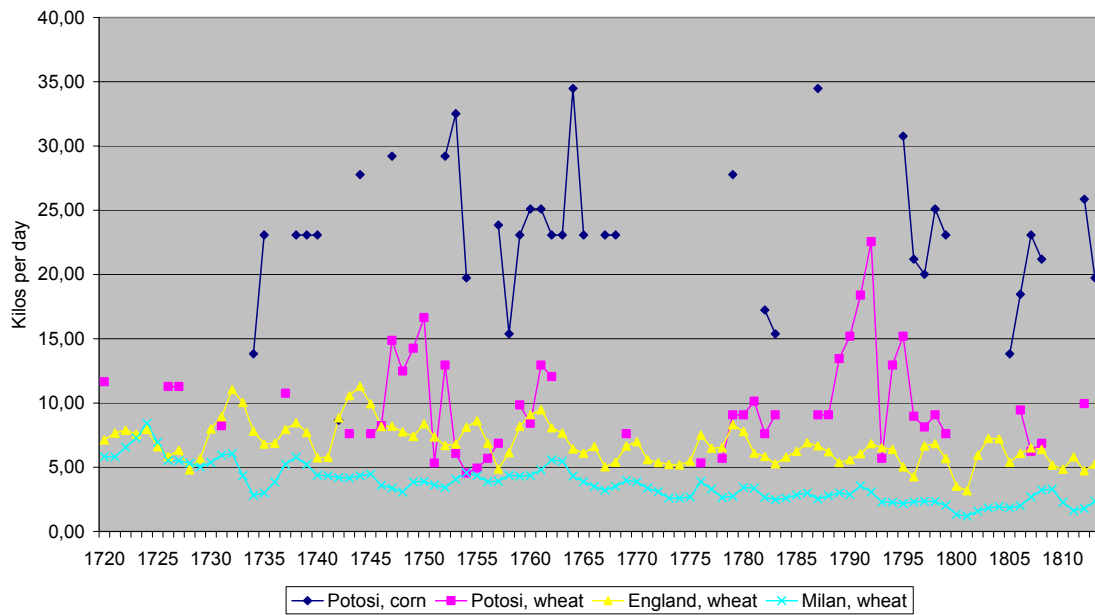


Source: See Appendix 1.

In Potosí, to many the epitome of colonial exploitation in America, grain wages, were not generally lower than in England and Milan either –see Figure 15.

Figure 15

Grain wages of unskilled workers: Potosi, England and Milan, 1720-1813.

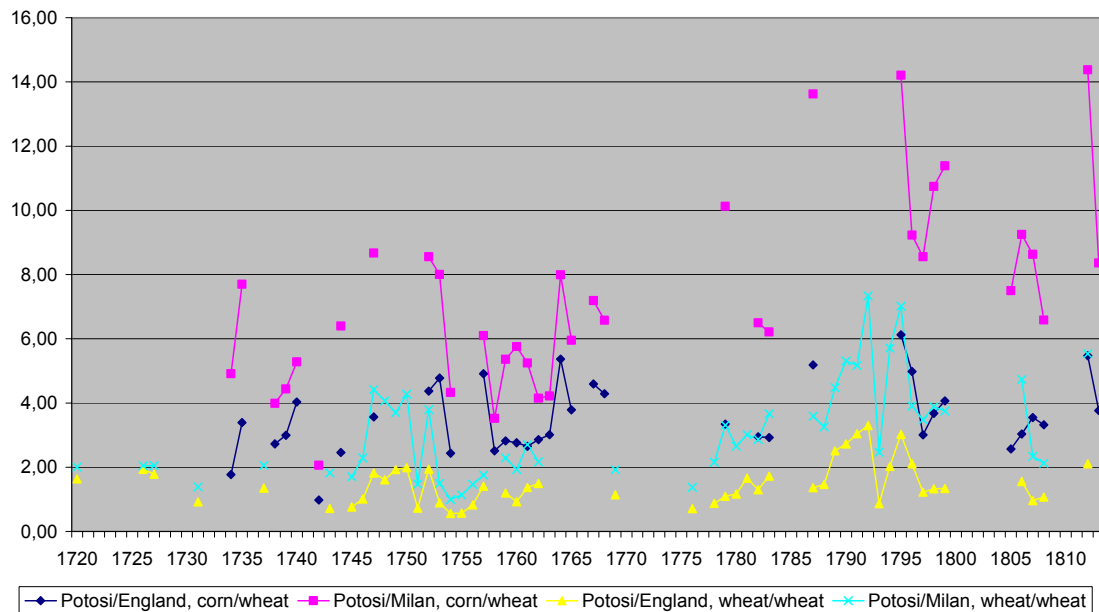


Source: See Appendix 1.

Grain wages relative to England and Milan show a rather growing trend during the second half of the eighteenth century –see Figure 16 in next page.

Figure 16

Relative grain wages of unskilled workers, 1720-1813.



Source: See Appendix 1.

It is our contention that the dynamic comparison of wages presented in this subsection also gives room for optimism rather than pessimism regarding the level and

the evolution of nominal and real (grain and meat) wages in late colonial Hispanic America when compared the rest of the world (North America excepted). Certainly, real wages in Bourbon Mexico and Colombia share the same falling trend that is observed –albeit with variable intensity- practically all known cases within the Northern Hemisphere (North America included –i. e. Adams (1986) for Maryland) during late eighteenth and early nineteenth century. However, this fact reinforces the “hypothesis of normality” that we defend in our approach to the study of colonial Hispanic America economic conditions. Since these conditions were powerfully influenced by the relative abundance of land and other natural resources and the relative scarcity of labour, it should not come as a surprise to find that viceregal Hispanic America’s economy –or at least significant parts of it- does not seem to have been based on low wages. By implication, if wages were not so low, it is very likely that institutions behind the labour market were not as extractive, unequal or bad as usually claimed either.

3. Heights in Bourbon Mexico and Venezuela

In this section we present information on heights in Bourbon Mexico and Venezuela. This information is totally new since it comes from a source that had not been exploited yet. We use it as an additional approach to the study of economic inequality in late viceregal Hispanic America. In the scheme of this research, the comparative study of statures plays a double role: it is interesting in itself and serves as a relevant check of our findings on wages.

The rationale behind using heights in our empirically-driven analysis is that they are very sensitive to economic inequality. This sensitivity has often been claimed by an abundant anthropometric literature [i. e. Steckel (1995, 2005) and Komlos y Baten (2004)]. An inverse relationship between economic inequality and average height has been pointed out by Steckel (1983). Besides, heights complement the information on welfare and living standard offered by more conventional economic indicators, such as GDP per capita –particularly in the pre-statistical era-, real wages, etc. [Baten (2000) and Steckel (2008a)].

Based on the findings of the above-mentioned literature that links equality and height, our reasoning here is similar to the one previously presented with respect to the relationship between real wages of unskilled workers and GDP per capita. Thus, it is our assumption that, *ceteris paribus*, for a certain level of GDP per capita, the higher the average height in a given country, the less economic inequality might be expected.

In other words, finding comparable heights in Bourbon Hispanic America to those in allegedly more developed countries would cast serious doubt on the plausibility of mainstream assumptions on early modern economic inequality in the region. And, if our sample is representative –nothing suggests the opposite–, what we have found is that heights in late Bourbon Hispanic America are comparable to those in Europe in spite of its lower GDP per capita. These results are consistent with those obtained through the examination of wages in which they do not confirm the widespread idea of an especially unequal society in Bourbon Hispanic America.

As a result of the growing popularity of Anthropometrics after some decades of existence, Hispanic America started to appear in a picture in which numerous social groups, countries and periods were already present [Komlos and Baten (2004), Steckel (2009)]. Studies on heights in Argentina, Colombia, Mexico and Puerto Rico during the nineteenth and twentieth centuries are available²⁵. However, anthropometric research on viceregal Hispanic America is scarce: to the best of our knowledge, Challú (2009), for Central Bourbon Mexico, and Salvatore (1998) and Salvatore and Baten (1998), for the late Viceroyalty of the Rio de la Plata and early independent Argentina. Thus, it is necessary to widen the time and space dimensions of the viceregal Hispanic American sample of heights in order to fill the gap in information with other parts of the world. We try to contribute to that goal by offering new data on Bourbon Mexico and Venezuela. Working with Spanish military sources –*filiaciones* and other documents of the conscripts to the militias- we have been able to build a data base of almost 6000 observations -see Appendix 2²⁶. Data include generations born from the 1730's to the 1780's in Northern and Southern regions of the Viceroyalty of New Spain (modern day Mexico and the South-western USA) and in Maracaibo (nowadays Venezuela) –see Table 1.

²⁵ See Martínez Carrión (2009) for a recent review of the literature on historical Anthropometrics in Spain, Portugal and Latin America.

²⁶ Representativeness of the data base is greater than in the case of a professional army since militias were formed through universal adult male conscription of which only those suffering from serious physical handicaps or below the minimum height requirement, public servants and high skilled professionals were excepted. See Marchena (1992, a and b) for a study on the origins, evolution and composition of these militias.

Table 1

Main characteristics of the heights sample				
		N	N (50 ≥ age ≥ 23)	N (after truncation)
Northern México (1)		1559	848	845
Central México (2)		119	35	35
Southern México (3)	"Blancos"	1981	1502	1106
	"Pardos"	1327	961	311
Maracaibo (Venezuela)	"Blancos"	396	298	207
	"Pardos"	400	222	169
Total		5782	3866	2673

Source: See Appendix 2.

(1) Current states of Sonora, Sinaloa, California, Coahuila, Durango, Chihuahua, Nuevo León, Tamaulipas, California, Arizona, Nuevo México and Texas.

(2) Current states of Jalisco, Aguascalientes, Puebla, San Luis de Potosí, Querétaro and México DF. Because of the small size of this subsample, it has been excluded from the analysis.

(3) Current states of Yucatán and Campeche.

Our estimation of the average heights of the militiamen in our sample that were born in every decade from 1730 to 1780 has followed the methodology suggested by Komlos (2004). Thus, we firstly exclude all individuals whose age lies outside the range 23-50,²⁷ since they might either still grow –those under 23- or have started to decrease in height because of aging –those over 50. Secondly, we have drawn the histograms using the original measures –see Appendix 2- in order to check whether the heights distributions of the military units approach a normal distribution, which it is needed for a proper selection of the truncation points. In the third place, we have applied the method proposed by Komlos and Kim (1990) to estimate the average height of the whole distribution²⁸.

Results in Table 2 for Northern Mexico whites –the category white is probably more socio-economic and cultural than racial- do not show a decrease in average heights over the period under consideration.

²⁷ Doing this substantially reduces the number of observations as many militiamen were enlisted when they were eighteen to twenty-three years old.

²⁸ Although Komlos and Kim's method is intended to obtain the trend of series, it may also be used to estimate the average height of a population by assuming a constant standard deviation of 6.86 centimetres [(Komlos and Kim (1990: 120)]. This method yields results similar to those of the RTML (Restricted Truncated Maximum Likelihood) by A'Hearn and Komlos (2003).

Table 2

Average heights, cohorts born from 1730's to 1780's.						
	Northern México		Southern México, "blancos"		Maracaibo (Venezuela), "blancos"	
Decade of birth	N	Average height	N	Average height	N	Average height
1730	47	1645			8	1690
1740	201	1653	143	1614	56	1690
1750	364	1656	307	1608	94	1675
1760	143	1647	409	1593	49	1680
1770	46	1662				

Source: See Appendix 2.

That is not case for Southern Mexico "*blancos*" ("whites"), whose average heights experience some fall, as it happens with those of Central Mexico that Challú (2009) observes, in particular from the 1790's to the 1830's.

Table 3

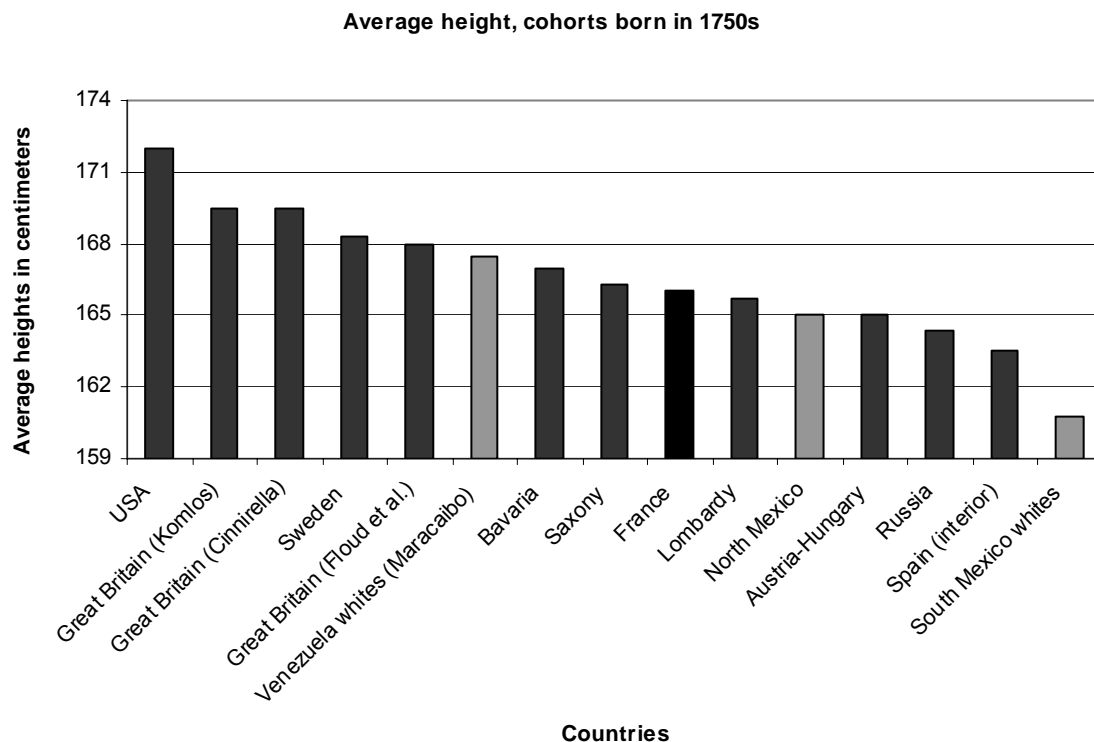
Heights of " <i>blancos</i> " and " <i>pardos</i> " in Southern Mexico and Maracaibo								
	Southern México				Maracaibo (Venezuela)			
	"Pardos"		"Blancos"		"Pardos"		"Blancos"	
Birth decade	Average height	N	Average height	N	Average height	N	Average height	N
1730		4			1627	8	1690	8
1740	1570	103	1614	143	1647	45	1690	56
1750	1580	132	1608	307	1660	76	1675	94
1760	1590	73	1593	409	1665	40	1680	49

Source: See Appendix 2.

However, the trend of those of Southern "*pardos*" (mulattos and mestizos) is somewhat upwards –see Table 3 above. Neither decreases the average height of

“*blancos*” and “*pardos*” from Maracaibo. In Figure 17 an international comparison of heights is shown.²⁹

Figure 17



Source: See Appendix 1.

Heights of militiamen, most of them working in mining and cattle raising, from the scarcely populated Northern New Spain regions were similar to those of contemporary Europeans. It implies that they probably were taller than many Eastern Asians. “*Blancos*” from Maracaibo are even rather tall by Western standards of the period. In Central Mexico, according either to Challú (2009) or to our less significant results, heights would be in the lower range of the available international sample. On the contrary, “*blancos*” from Southern New Spain were clearly the shortest in Figure 17. However, their average height is not unknown in some European regions and during certain periods of the eighteenth and nineteenth centuries³⁰. Besides, it is doubtful that the sample of “*blancos*” and “*pardos*” is genetically homogeneous to that of Northern New Spain. An additional reason why results for Southern New Spain might be

²⁹ *Pardos* have not been included in order to make a comparison as homogeneous as possible that avoids possible bias due to genetic differences.

³⁰ As to the cases of France, Austria-Hungary, Italy, Portugal, Russia and Spain see, respectively, Heyberger (2005), Komlos (1989), Italy Breschi and Pozzi (eds.) (2007), Baten *et al.* (2009), Mironov (2005) and García Montero (2009).

downward biased is that heights of the militiamen are closer to the European standards in the only case in which original data do not present a serious problem of heaping on the minimum height requirement (the *Batallón de Infantería de Castilla*, formed by “*blancos*” from Yucatán). This possible bias is reinforced by the fact that officers’ heights were never recorded while only seldom those of the sub-officers. Finally, most skilled workers were excluded from conscription. Thus, our estimate might rather be considered the lower bound of Southern New Spain heights. One more reason to believe so is the fact that the modal value of the heights distribution, if heaping is omitted, is roughly 61 French inches (approximately 165 centimetres). In any case, our findings are not surprising as they are consistent with those from Challú (2009) for eighteenth century Central New Spain and from López-Alonso (2007) and Carson (2005 and 2007) for México and Southwestern United States in the nineteenth century. On the other hand, differences in height across regions seem to have been very persistent since a North-East stature gradient has also been found in Pre-Hispanic Mesoamerica [Márquez et al. (2005)] and in México during the nineteenth and twentieth centuries [López-Alonso and Porras (2007)] and Velez-Grajales (2009)].

An additional measure of economic inequality is the racial gap: the difference in heights between “*blancos*” and “*pardos*” –see Table 3 above. As it may be seen, some racial gap existed, albeit it tended to decrease in either Southern Mexico or Maracaibo for the cohorts born from the 1730’s to the 1780’s. Moreover, the gap we find is significantly smaller than the one observed between different social classes in some European countries [Komlos (2007)]. The racial gap between “*blancos*” and “*pardos*” in Maracaibo is similar to the existing between black slaves and free whites in the US of the period [Steckel and Margo (1983) and Steckel (1986)] and higher than that estimated for Brazil and Lima in the nineteenth century by Baten, Pelger and Twrdek (2009). However, in Southern Mexico, although the term *pardo* may be somewhat misleading, the gap decreases from about four centimetres to practically null.

To summarize, improvable as they are, our data show that average heights of Mexicans and Venezuelans from the Bourbon period are basically similar to those of the contemporary Europeans, while the racial gap is comparatively small and decreasing, which may be interpreted as evidence against the idea of an especially unequal Hispanic America. On the contrary, our results support the hypothesis of normality.

If average heights are a good proxy for welfare and equality, a speculative inference drawn from the limited evidence available on pre-Columbian Mesoamerica bio-archaeological indicators [Márquez et al. (2005)] might likely make sense. According to Marquez et al. (2005), two generalizations have been produced by

previous research on statures in Pre-Hispanic Mesoamerica: *“first, the existence of a northeast to southwest gradient in average stature, ...; and second a trend toward diminishing height over time.”*³¹ Leaving aside the Mayan Area, whose geography in Márquez et al. (2005) is much wider than in our Southern New Spain sample (modern day states of Campeche and Yucatán), the centuries-long trend toward diminishing heights seem to have been interrupted sometime during the viceregal period: eighteenth century inhabitants of Central Mexico were taller than in most of the Pre-Hispanic history of Mesoamerica. Whether this hypothesis will prove correct is to be seen. If it were confirmed, explanations will need to be found. Neither a higher productivity nor a lesser economic inequality in the post-1521 society should be overlooked as plausible hypothesis. As to the first point, we agree with Coatsworth (2008) in that the introduction of new crops and, especially, new animals, facilitated by the demographic catastrophe of aboriginal population, brought about substantial gains in the productivity of the domestic-use agricultural sector in Mesoamerica during the first century of the Spanish rule. Those gains might well have been more long-lasting than claimed by Coatsworth (2008), especially in Northern Mexico. And they probably were even bigger than assumed if the symptoms of crisis in the economy of the late Mexica Empire (overpopulation, famines, extra-mortality, etc.) which are mentioned by Knight (2002) and Semo (2006) are taken into account. On the one hand, living conditions in Post-classic Central Mesoamerica were harsh even if only *“because the Basin of Mexico is not an easy environment to live in with the pre-Hispanic technology.”*³² Additionally, income distribution patterns within the Mexica Empire do not seem to justify Williamson’s (2008) assertion that the *“less rapacious indigenous elite”* was replaced with a *“more rapacious European elite”*³³. Some qualitative evidence suggests that this was not necessarily the case. According to Knight (2002), by early sixteenth century:

*“population growth, stimulated by ‘explosive’ immigration created severe pressures and sporadic famines, during which ‘members of the lower classes suffered horribly and died in great numbers’, most recently in 1504-6. (...) These pressures were aggravated, not alleviated, by the skewed distribution of goods which underlie the imperial political economy. Anáhuac fed off resentful provinces; the elite of Anáhuac were gorged on tribute; the poor periodically starved.”*³⁴

³¹ Márquez et al., 2005, p. 320.

³² Ibidem, p. 336.

³³ Williamson, 2008, p. 20.

³⁴ Knight, 2002, p. 189.

Steckel's (2005) view on health and nutrition in pre-Columbian America is rather pessimistic and may help to see the viceregal period under a new, more evidence-based, light³⁵. Of particular relevance for our speculative argument here is that:

*"... high rates of degenerative joint disease in the cities points to work effort, which drains net nutrition, as a significant culprit. The monumental architecture and the rituals associated with it in pre-Columbian cities of Mexico and the Yucatan region were emblems of a highly stratified society. Monuments were built by masses of labourers with simple tools, without the help of draft animals. Inequality in access to food and housing likely compounded the biological stress created by hard work."*³⁶

In our interpretation, data, scarce as they are, and inferences from the anthropometric approach to human material wellbeing in Hispanic America from a very long-term perspective do not seem to support either most of the usual perceptions on the effects of colonialism. In particular, the notions of a "reversal of fortune" after 1500 and of an increase in the concentration of assets and income that made of viceregal Hispanic America a unique case from which nowadays extreme economic inequality in the region directly derives are in need of reconsideration. On the contrary, our results seem to be in line with others that, according to Steckel (2009), show that in some cases colonialism had positive effects on welfare.

4. Final remarks

1) More empirical research is needed to expand the –so far too small- quantitative information on which most claims on viceregal Hispanic America economic conditions are commonly based. The gap between strong claims and weak –or inexistent at all- empirical evidence should urgently be closed when the economy of pre-independent Hispanic America and its long term consequences on contemporary economic development are assessed. The importance of the issue goes beyond academic debates.

2) From an international comparative perspective, neither real wages (especially if measured in terms of meat) nor heights in our Bourbon Hispanic America sample should be considered low. Rather the opposite seems to be true.

3) The inference that living standards of wage-earners in some of the territories of the Hispanic Monarchy in America during the Bourbon period were relatively

³⁵ "This article and other work in anthropometric history suggest that the poor nutrition of many native populations, including those rapidly conquered, has been overlooked." Steckel, 2005, p. 29.

³⁶ Ibidem, p. 28.

satisfactory, even if compared with some European countries -let alone Asia-, does not appear unjustified.

4) Under certain reasonable assumptions, basically those -accept by us until the opposite is proved- derived from the hypothesis of normality about Bourbon Hispanic America's economy, its relatively medium to high level of real wages suggest that GDP per capita estimates by Coatsworth (2008) and Maddison (2009) for Latin America in 1700 and 1820 should probably be revised upwards.

5) If our interpretation is correct and wages and heights may be considered as acceptable indicators of economic inequality, the limited available evidence does not support the idea that Bourbon Hispanic America was an especially unequal society.

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Appendix 1: Sources and methods of figures.

Figure 1

Sources: Brading (1983), Dobado (1989), Garner (1993), Global Price and Income History Group, Hamilton (1988), Humboldt (1822:1991) and International Institute of Social History.

Methods: Daily wages of urban skilled labourers and miners in grams of silver. Guanajuato (New Spain), *La Valenciana* Mine, (Max: Drillers, Med: Weighted average of all male workers, Min: Labourers), weekly wages in *pesos* divided by 6 and converted into grams of silver at the rate of 24.245 grams per peso [Burzio (1956-1958)]. Almadén (Spain), Mines of Almadén (drillers), *reales de vellón* per day converted into grams of silver at the rate of 1,21 grams of silver per *real de vellón* [Hamilton (1988)]. New Spain miner, weekly wage of 27,5 francs divided by six days converted into grams of silver at the rate of 4,5 grams of silver per franc [Humboldt (1822:1991)]. New Spain miner, daily wage of 5,5 *reales de plata* [Garner (1993)] converted into grams of silver at the rate of 3.03 grams of silver per *real* [Burzio (1956-1958)]. The rest of daily wages in grams of silver have been taken directly from the Global Price and Income History Group and the International Institute of Social History web pages. All data correspond to 1803 except those for Istanbul (mean of 1802 and 1805) and for New Spain miners from Humboldt (1822:1991) and Garner (1993) that may be assumed to belong to early nineteenth century and to the second half of the eighteenth century, respectively .

Figure 2

Sources: See Figure 1 for nominal wages of skilled workers and miners; for grain prices, Challú (2007), Dobado (1989), Florescano (1986), Garner (1993), Global Price and Income History Group, Hamilton (1988), Humboldt (1822:1991), International Institute of Social History and Van Young (1981).

Methods: Daily wage (grams of silver) divided by the price of one kilo of grain (grams of silver). For Guanajuato, prices of wheat are those of Upper Bajío [Garner (1993)] and those of Mexico [Florescano (1986)] for corn. For New Spain, prices of corn are those of Florescano (1986) for Mexico. In the rest of cases the prices have been taken directly from the same sources as for nominal wages in Figure 1 (IISH and GPIH web pages). For New Spain, a *fanega* of corn equals 46.024 kilograms [Florescano (1986)] while a *carga* of wheat makes 149.578 kilos [Florescano (1986), Hocquet (1995)]. In all other cases, the ratios used in the conversion of litres into kilos have been 0.772 for wheat, 0.721 for corn and 0.579 for rice [Weight vs. volume, <http://gpih.ucdavis.edu/Converting.htm>]. Grain prices correspond to 1803 except Amsterdam (1804) and Istanbul (mean of 1802 and 1805).

Figure 3

Sources: See Figure 1 for nominal wages of skilled workers and miners; for meat prices, Challú (2007), Dobado (1989), Florescano (1986), Garner (1993), Global Price and Income History Group, Hamilton (1988), Humboldt (1822:1991), International Institute of Social History, Quiroz (2005) and Van Young (1981).

Methods: Daily wage (grams of silver) divided by the price of one kilo of meat (grams of silver). For New Spain, Guanajuato included, prices of meat are of those of Mexico [Quiroz (2005)]. The rest of prices come directly from the web pages of the IISH and the GPIH. Meat prices correspond to 1803 except for Almadén (1798 for beef and 1800 for mutton) Amsterdam (mean of 1800 and 1811), Antwerp (mean of 1791, 1792, 1793 and 1796) and Istanbul (mean of 1798 and 1814).

Figure 4

Sources: Bassino and Ma (2005), Challú (2007), Dobado (1989), Global Price and Income History Group, Humboldt (1822:1991), International Institute of Social History and Van Young (1981).

Methods: Daily wages of urban and rural unskilled labourers in grams of silver. For New Spain, daily wages of building and agricultural labourers in *reales de plata* converted into grams of silver at the rate of 3.03 grams of silver per *real de plata* [Burzio (1956-1958)]. The rest of daily wages in grams of silver have been taken directly from the sources. All data correspond to 1803 except those for Amsterdam (1804), Beijing (1807), Guadalajara (1804), Istanbul (mean of 1802 and 1805), Maryland (1801-1810), New Spain alhr -agricultural labourers in "hot regions"- and alcr -agricultural labourers in cold regions- (early nineteenth century), Potosí (mean of 1799 and 1806) and Pune (1805-1830).

Figure 5

Sources: See figure 4 for nominal wages of unskilled workers; for grain prices, Bassino and Ma (2005), Challú (2007), Dobado (1989), Florescano (1986), Garner (1993), Global Price and Income History Group, Humboldt (1822:1991), International Institute of Social History and Van Young (1981).

Methods: Daily wage (grams of silver) divided by the price of one kilo of grain (grams of silver). For Guanajuato, prices of wheat are those of Upper Bajío [Garner (1993)] and those of Mexico [Florescano (1986)] for corn. For New Spain, prices of corn are those of Florescano (1986) for Mexico. In the rest of cases the prices have been taken directly from the same sources as nominal wages in Figure 1 (Global Price and Income History Group and International Institute of Social History web pages). For New Spain, a *fanega* of corn equals 46.024 kilograms [Florescano (1986)] while a *carga* of wheat makes 149.578 kilos [Florescano (1986), Hocquet (1995)]. In all other cases, the ratios used in the conversion of litres into kilos have been 0.772 for wheat, 0.721 for corn and 0.579 for rice [Weight vs. volume, <http://gpih.ucdavis.edu/Converting.htm>]. Grain prices correspond 1803 except Beijing (1801-1810), Potosi (mean of 1799-1805 for corn and of 1800 and 1806 for wheat) and Pune (1805-6/1830-1). Potosi original prices of corn and wheat in *reales de plata* per *carga* have been converted into grams of silver per kilo at a ratio of 138.072 and of 149.518 kilos per *carga* of corn and wheat, respectively.

Figure 6

Sources: See figure 4 for nominal wages of unskilled workers; for meat prices, Challú (2007), Dobado (1989), Florescano (1986), Garner (1993), Global Price and Income History Group, Hamilton (1988), Humboldt (1822:1991), International Institute of Social History, Quiroz (2005) and Van Young (1981).

Methods: Daily wage (grams of silver) divided by the price of one kilo of meat (grams of silver). For New Spain, Guanajuato included, prices of meat are of those of Mexico [Quiroz (2005)]. The rest of prices come directly from the web pages of the Global Price and Income History Group and the International Institute of Social History. Meat prices correspond to 1803 except for Almadén (1798 for beef and 1800 for mutton) Amsterdam (mean of 1800 and 1811), Antwerp (mean of 1791, 1792, 1793 and 1796) and Istanbul (mean of 1798 and 1814). All prices correspond to 1803 except for Almadén (1798 for beef and 1800 for mutton), Amsterdam (mean of 1800 and 1811), Antwerp (mean of 1791, 1792, 1793 and 1796) and Istanbul (mean of 1798 and 1814).

Figure 7

Sources: Challú (2007), Global Price and Income History Group, International Institute of Social History and Van Young (1981).

Methods: Daily wage of urban unskilled labourers in grams of silver. Mexico (a) and Mexico (b) taken, respectively, from Global Price and Income History Group and Challú (2007). Nominal wages of Guadalajara, Mexico (b), Puebla and San Luis Potosí in *reales de plata* per day converted into grams of silver at rates of exchange taken from Burzio (1956-1958). The rest of nominal wages in grams of silver per day (England, Mexico and Milan) come directly from the sources.

Figure 8

Sources: Global Price and Income History Group and International Institute of Social History

Methods: Daily wage of unskilled urban labourers in grams of silver. Existing data blanks between two years or groups of years in which the nominal wage is known and constant in the original Potosi series are filled with the figure corresponding to those years or groups of years – i. e. if a blank exists between 1778 and 1780 and in those two years the nominal wage is 12.22 grams of silver per day, we assume that the figure is 12.22 for 1779 as well; on the contrary, if there is a blank between 1769 (12.45 grams of silver per day) and 1776 (12.22 grams), we keep the original blank in 1770-1775.

Figure 9

Sources: See Figure 7 for nominal wages; grain prices come from Challú (2007), Florescano (1986), Global Price and Income History Group and International Institute of Social History.

Mexico (a) wages and prices of corn series have been taken directly from Global Price and Income History Group; Mexico (b) idem from Challú (2007).

Methods: Daily wage (grams of silver) divided by the price of one kilo of grain (grams of silver). Grain is corn for New Spain and wheat for London and Milan. Prices of Mexico from Florescano (1986) are used for Puebla. Conversion from *reales de plata* into grams of silver according follows Burzio's (1956-1958) equivalences. See Figure 2 for rates of conversion of litres of corn and wheat into kilos.

Figure 10

Sources: See Figure 9.

Methods: Grain (corn) wages of Mexico (a) and Mexico (b) are divided by those of London and Milan (wheat).

Figure 11

Sources: See Figure 7 for nominal wages; meat prices from Global Price and Income History Group, International Institute of Social History, Quiroz (2005) and Van Young (1981).

Methods: Daily wages (grams of silver) divided by the price of one kilo of meat (grams of silver). Prices of Mexico from Quiroz (2005) are used for Puebla.

Figure 12

Sources: See Figure 11.

Methods: Meat wages of Mexico (a) and Mexico (b) divided by those of London and Milan.

Figure 13

Sources: See Figure 8 for nominal wages of unskilled urban labourers; grain and meat prices from the Global Price and Income History Group and the International Institute of Social History.

Methods: Daily nominal wages (grams of silver) divided by the price of one kilo of corn (Bogota) or wheat (England and Milan) and of meat (grams of silver). See Figure 2 for rates of conversion of litres of corn and wheat into kilos.

Figure 14

Sources: See figure 13.

Methods: Grain and meat wages in Bogota divided by those in England and Milan.

Figure 15

Sources: See Figure 8 for nominal wages; grain and meat prices from the Global Price and Income History Group and the International Institute of Social History.

Methods: Daily nominal wages divided by the price of one kilo of corn (Potosi) or wheat (Potosi, England and Milan) and of meat. See Figure 2 for rates of conversion of litres of corn and wheat into kilos. Potosi original prices of corn and wheat in *reales de plata per carga* have been converted into grams of silver per kilo at a ratio of 138.072 and of 149.518 kilos per *carga* of corn and wheat, respectively.

Figure 16

Sources: See figure 15.

Methods: Grain wages in Potosí divided by those in England and Milan.

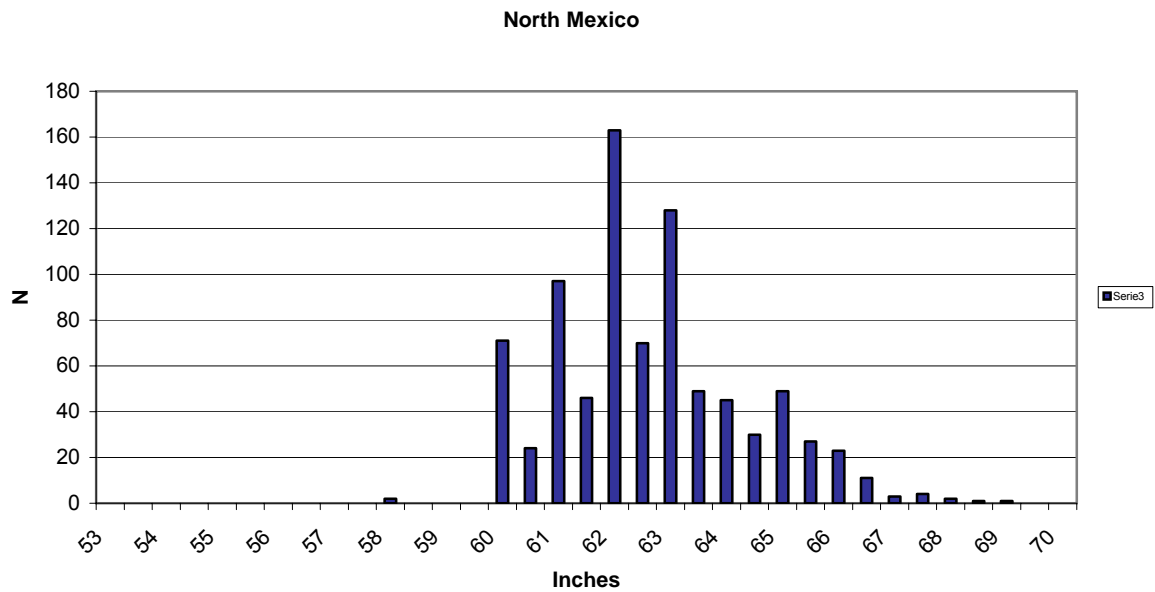
Figure 17

Sources: USA [Sokoloff and Villaflor (1982)], Great Britain [Floud et al. (1990), Komlos (1993) and Cinnirella (2008)], Sweden [Heintel *et al.* (1998)], Bavaria [Baten (2001)], Saxony [Cinnirella (2008)], France [Komlos *et al.* (2003)], Lombardy [A'Hearn (2003)], Austria-Hungary [Komlos (1989)], Russia [Mironov (2005)] and Interior Spain [García Montero (2009)]; see Appendix 2 for heights in colonial Latin America.

Appendix 2.

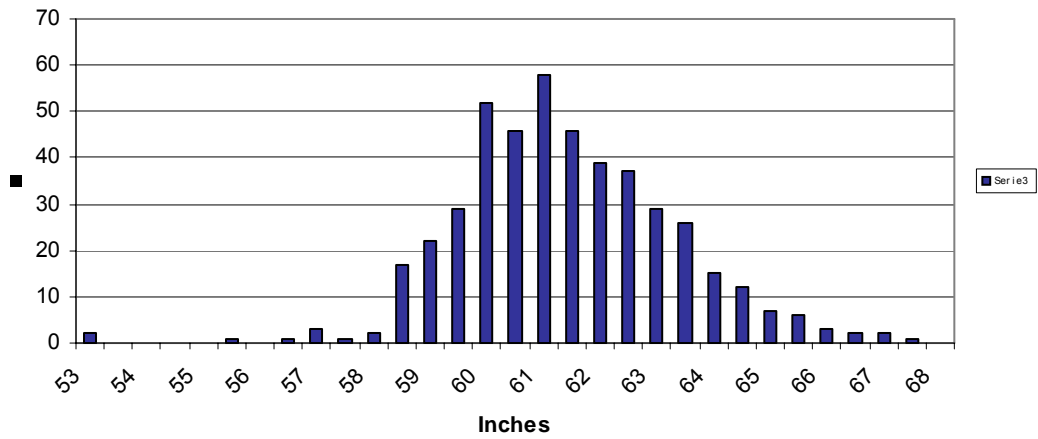
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HISTOGRAMS FOR MILITARY UNITS



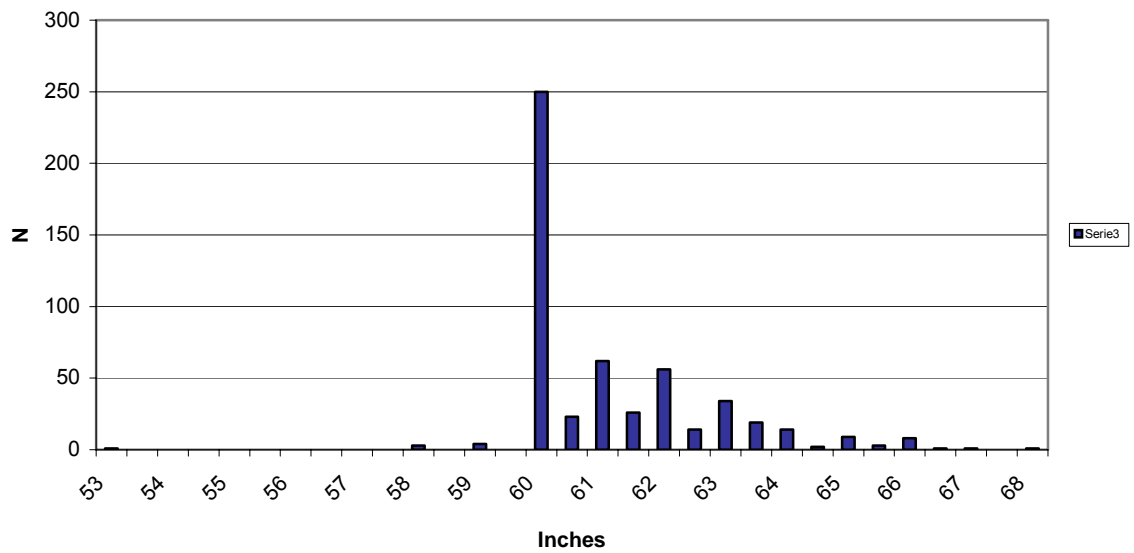
Truncation point used to estimate average height: 60 inches

Battalion Infantry of Castile (South Mexico)



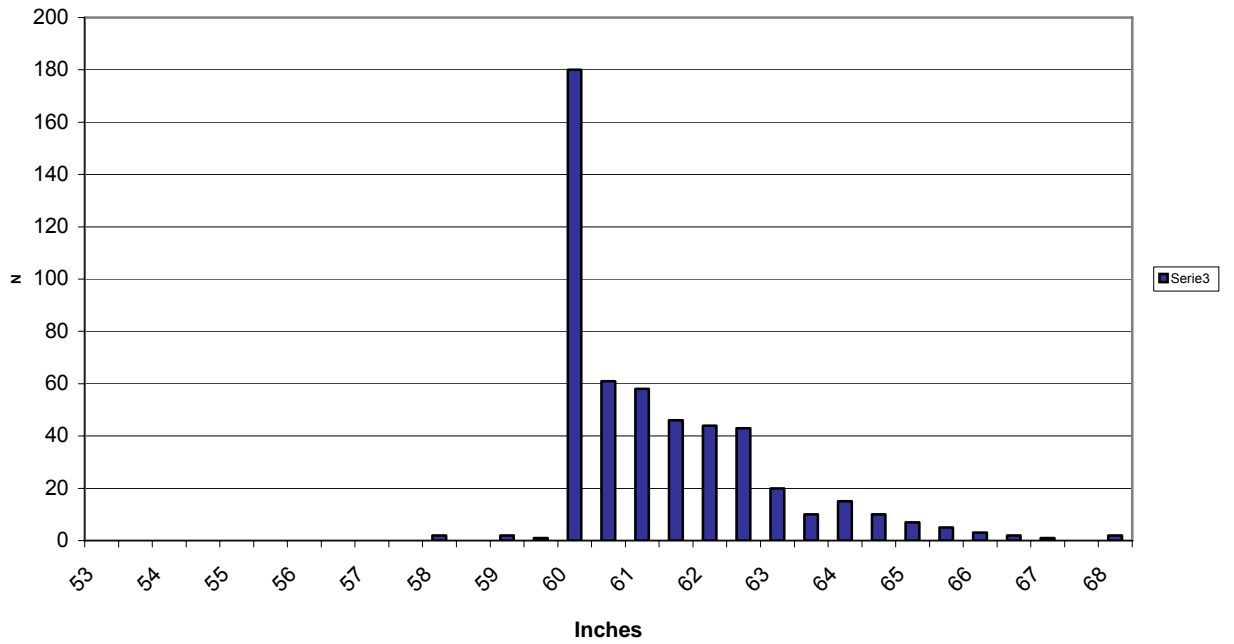
Truncation point used to estimate average height: 60 inches

Infantry Militia of Whites from Campeche (South Mexico)



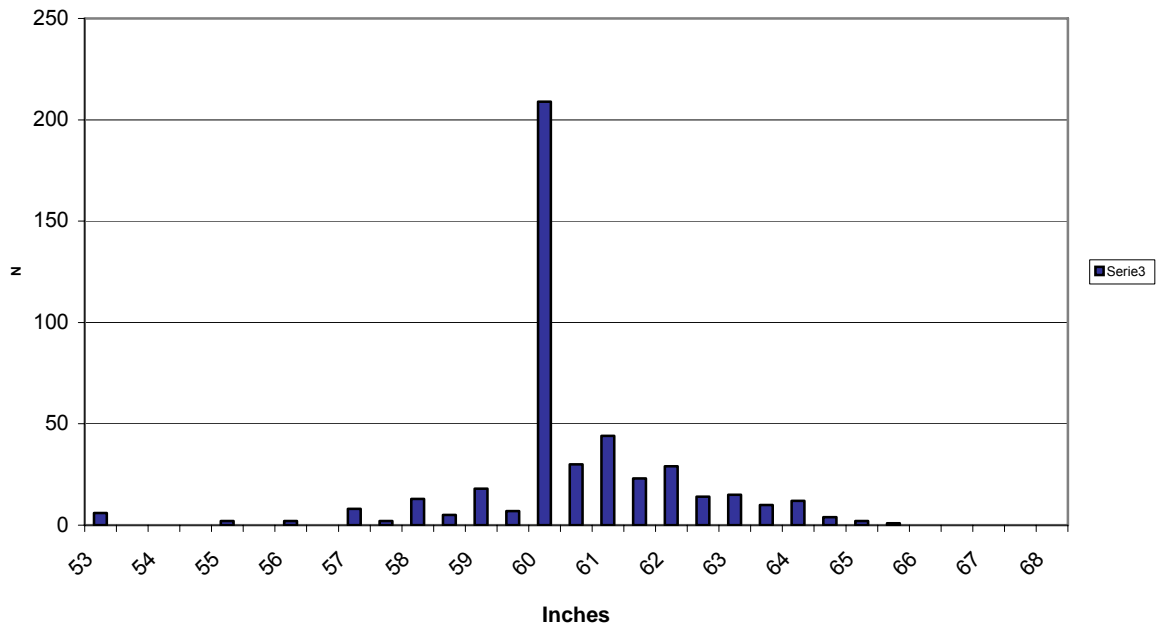
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Battalion of White Infantry from Mérida of Yucatán (South Mexico)



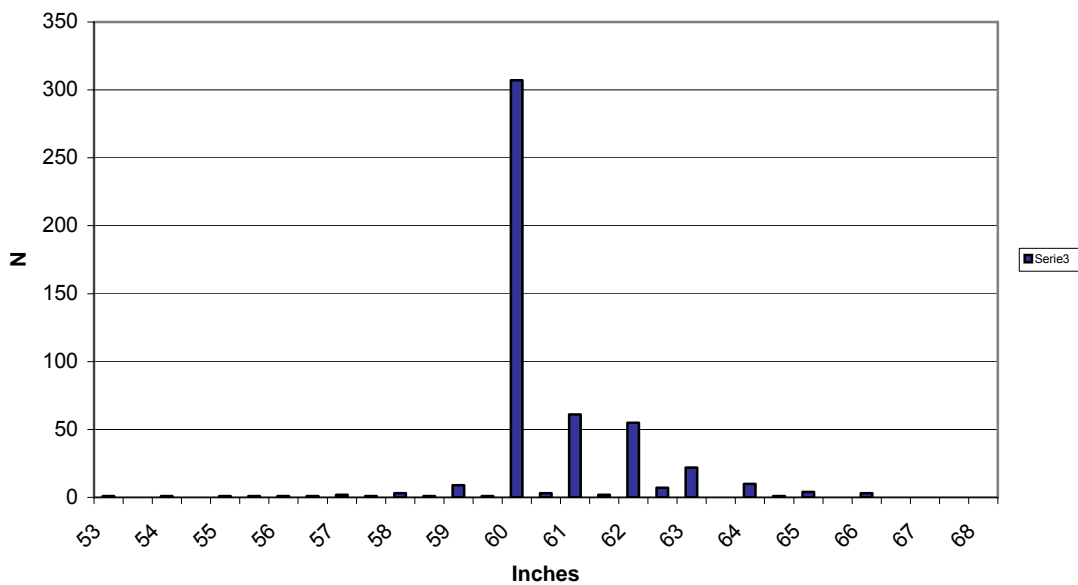
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1st Division Pardos Yucatan (South Mexico)



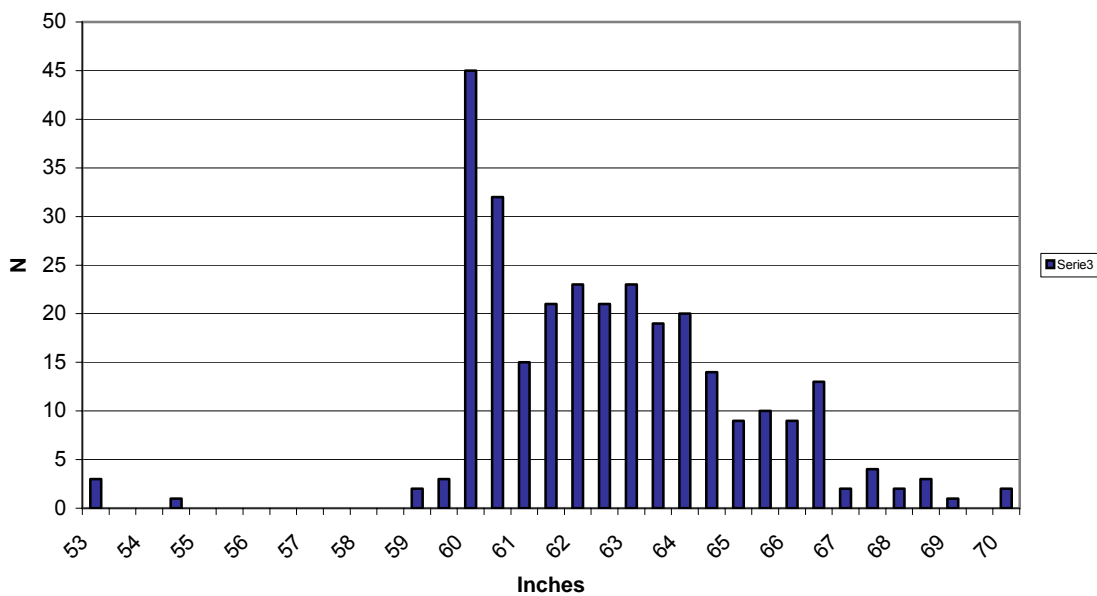
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2nd Division Pardos from Yucatan



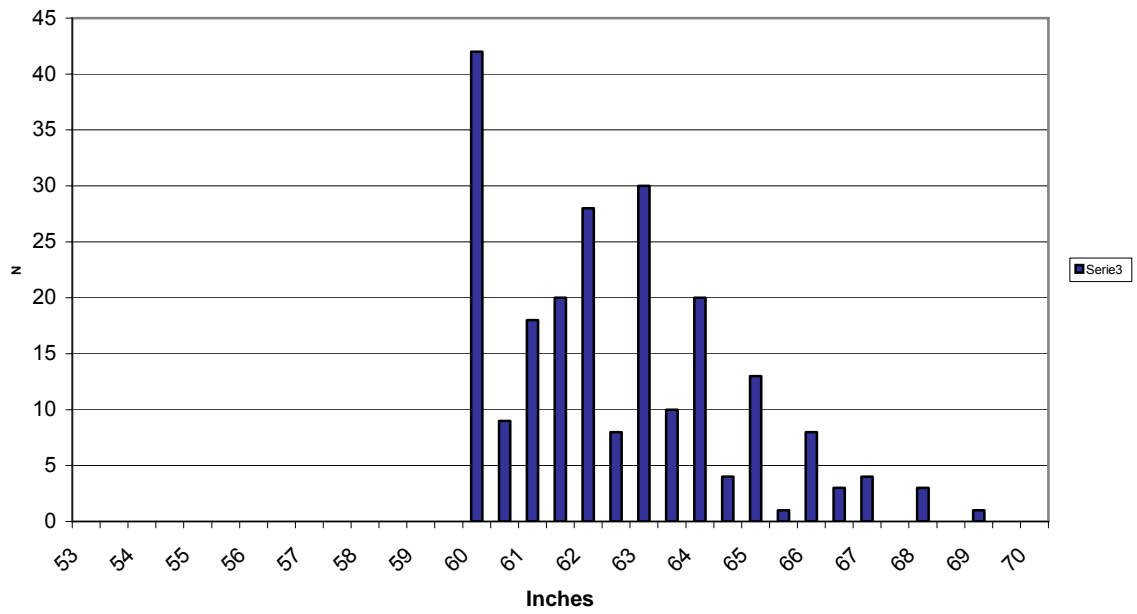
Truncation point used to estimate average height: 61 inches

Militia of Whites from Maracaibo



Truncation point used to estimate average height: 61 inches

Militia of pardos from Maracaibo



Truncation point used to estimate average height: 61 inches