

**Neither so low nor so short!  
Wages and heights in eighteenth and  
early nineteenth centuries colonial  
Hispanic America**

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## Resumen

Basado en abundante trabajo empírico, nuestro papel contribuye al debate actual sobre las causas históricas de los problemas contemporáneos de desarrollo en Hispanoamérica (lento crecimiento y gran desigualdad). En él se muestran datos sobre salarios y estaturas en la Hispanoamérica borbónica que, en nuestra opinión, ponen en cuestión algunos supuestos mayoritarios sobre los supuestamente negativos efectos del colonialismo español sobre el bienestar de los grupos no privilegiados. La capacidad de compra de mineros y jornaleros en términos de grano y, especialmente, de carne era generalmente igual o mayor que en Europa y Asia. Las estaturas de unos 5.000 reclutas del ejército colonial y las milicias muestran diferencias interregionales significativas. En la Nueva España suroriental la estatura era algo menor que las media europea mientras que en el Norte novohispano y en Maracaibo son comparables a los de Europa central, oriental y mediterránea. Así, los salarios de los hispanoamericanos del común en el período borbónico no eran bajos. Tampoco sus estaturas estaban eran menores que la norma europea a mediados del siglo XVIII.

Nuestros resultados podrían tener implicaciones de cierto alcance. Por un lado, una creciente e influyente corriente de pensamiento caracteriza a la Hispanoamérica virreinal como un caso extremo de economía basada en instituciones extractivas y de desigualdad [Engerman and Sokoloff (1994, 2002, 2005); Acemoglu, Johnson and Robinson (2002)]. ¿Era realmente así? Nuestra respuesta es un tanto escéptica. Por otra parte, los ratios de estaturas y salarios reales respecto al PIB per capita estimado por Maddison (2009) para 1820 hace de Hispanoamérica un claro outlier dentro de una amplia muestra de países. Este resultado sugiere que las estimaciones disponibles del PIB per capita de la Hispanoamérica borbónica deberían ser revisadas al alza.

**Palabras clave:** Estaturas, Bienestar, Colonialismo, Desarrollo, América Latina.

## Abstract

Based on substantial empirical work, our paper contributes to the ongoing debate on the historical causes of contemporary Latin America problems of development (slow growth and high inequality). It shows solid quantitative evidence on wages and heights for Bourbon Hispanic America that, in our opinion, challenges mainstream assumptions about the –allegedly negative– effects of Spanish colonialism on the welfare of common people. Purchasing capacity of miners and labourers in terms of grain and, especially, of meat was generally equal to -or higher than- that in most parts of Europe and Asia. Heights of some 5000 recruits in the colonial army and militias show a significant inter-regional variance. In South-eastern New Spain they turn out to be slightly below Western standards whereas in Northern Mexico and Venezuela (Maracaibo) they are comparable to those of Central, Eastern and Southern Europe. Thus, wages of ordinary Hispanic Americans in eighteenth and early nineteenth centuries were not low by international standards. Neither were their physical statures always shorter than the European norm in the middle of the eighteenth century.

Our results might carry other far-reaching implications. On the one hand, an increasing and influent scholarship characterizes colonial Hispanic America as an extreme case of economy based on extractive institutions and inequality [Engerman and Sokoloff (1994, 2002, 2005); Acemoglu, Johnson and Robinson (2002)]. Was it really the case? Our response is somewhat sceptical. On the other hand, calculating ratios of heights and real wages to GDP per capita estimates [Maddison (2009)] for 1820 converts Hispanic America into a clear outlier within a wide sample of countries. This finding suggests that available estimations on Bourbon Hispanic America GDP per capita should be revised upwards.

**Key words:** Heights, Welfare, Colonialism, Development, Latin America.

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# 1. Introduction

Economic inequality in Hispanic America has become a fashionable topic. And not without good reason, since Hispanic America, along with Sub-Saharan Africa, is the most unequal region of the world [López and Perry (2008)].

The search for “*inequality in Latin America*” in Google yields approximately 1,330,000 results as for mid October this year. One of them is particularly telling about contemporary perceptions on the issue: “*Inequality is as Latin American as good dance music and magical-realist fiction.*”<sup>1</sup> As the *danzón*, which was danced at least since late eighteenth century in the Caribbean, has economic inequality been conspicuously Hispanic American from colonial times? Or did it appear, as the literary magical-realism, much more recently? Very likely, most economist and economic historians would nowadays answer affirmatively to the first question. This was clearly also the case of the *dependencia* school that flourished some decades ago [Stein and Stein (1970), Coatsworth (2005), Love (2005)].

However, the empirical foundations, in particular those of quantitative character, of the popular idea that Hispanic American economic inequality has colonial origins are rather unconvincing, to say the less. In this respect, we agree with Grier (1999) in that “*much of the work on colonialism has been theoretical or anecdotal*”<sup>2</sup>. The contrast between the strength of some propositions regarding the particular case of colonialism in Hispanic America and the evidence supporting them is very often striking. The need for “*far more evidence*” on Hispanic American economic inequality has also been pointed out by Williamson (2008).<sup>3</sup>

Therefore, the main objective of this work in progress is basically empirical. We attempt at contributing to the reduction of the gap between: a) very general assumptions on colonialism in Hispanic America and its long-term economic consequences; and b) the availability of reliable quantitative information upon which research on colonial economic history

should be based. We limit our attempt to the significant case of wages and heights in Bourbon Hispanic America and to the inferences that they suggest in terms of approaching economic inequality in eighteenth and early nineteenth centuries from an international comparative perspective.

On the contrary, economic inequality in post-colonial Hispanic 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).

Lately, the interest of empirically studying economic inequality in colonial Hispanic America has been reinforced. A growing and increasingly influential body of literature posits that the main contemporary Hispanic American economic problems (low growth and extreme economic inequality) are deeply rooted in colonial times. On the basis of the alleged existence of either “extractive” institutions [Acemoglu, Johnson and Robinson (2002)] or institutions producing extreme economic inequality [Engerman and Sokoloff (1994, 2002 and 2005)], the Spanish colonial legacy is blamed for the creation of a “*reversal of fortune*” among European colonies in the Americas –the poorest one circa 1500 (i. e. the USA) became richer while the initially richest ones (i.e. Mexica and Inca empires) got poorer- or of an adverse development path that differs sharply from the one followed by the United States.<sup>4</sup> Many authors have been more or less influenced by this neo-institutional interpretation of economic development in Hispanic America and other parts of the world since 1500 –i. e. Cogneau (2003), Frankema (2006), Angeles (2006), Baker et al. (2008), Bruhn and Gallego (2008). All these interesting ideas, albeit lacking, in our opinion, of solid empirical support, deserve to be examined in the light of the available evidence.

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<sup>1</sup>[http://www.economist.com/world/americas/displayStory.cfm?story\\_id=2193852](http://www.economist.com/world/americas/displayStory.cfm?story_id=2193852).

<sup>2</sup> Grier, 1999, p. 317.

<sup>3</sup> The title of Williamson’s work, “History without Evidence: Latin American Inequality since 1491”, may be seen as an honest recognition by the author of the weak empirical evidence on which most statements on early modern inequality in Latin America are based.

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<sup>4</sup> This set of propositions, termed as “new orthodoxy” by Dobbado (2009) is exerting an increasing intellectual influence as can be seen, for example, in Helpman (2004) or in Easterly (2006), among many others. Of greater practical importance is, perhaps, the fact that the World Bank has adhered to this “new orthodoxy” in several of its latest publications: De Ferranti et al. (2004), the *Report on World Development* 2006 and Perry et al. (2006), López and Perry (2008).

It is also worth checking some results from the pioneering work on ancient economic inequality by Milanovic, Lindert and Williamson (2008) in which late colonial New Spain is shown as the most unequal society in the sample. New Spain turns out to be so unequal that its estimated economic inequality is significantly greater than the maximum implied by the “inequality possibility frontier”, an illuminating concept that those authors introduce.

In this work in progress we do not present any ambitious interpretation of the causes and consequences of economic inequality in colonial Hispanic America. Our attempt is much more limited and empirical. Using, *faute de mieux*, real wages and heights as proxies for economic inequality, we offer substantial evidence supporting the notion that late colonial Hispanic America was not an especially uneven society when compared with other parts of the world. If real wages and heights may also be considered acceptable indicators of living standards and economic development, the picture of Bourbon Hispanic America becomes less pessimistic than the one usually assumed by most economists and economic historians.

In doing so we follow Coatsworth’s (2008) empirically based revisionism on comparative colonial Hispanic America’s economic inequality:

*“... , 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”.*<sup>5</sup>

The additional empirical evidence shown here by us reinforces Coatsworth’s (2008) revisionist claim. It is also in line with Williamson’s (2008) contention that, from a wide international comparative perspective on economic inequality, “*there is little that is unusual in pre-industrial Latin America*”.<sup>6</sup>

Thus, it seems that an approach to the empirical study of colonial Hispanic America’s economic inequality based upon the hypothesis of normality [Dobado (forthcoming)] deserves to be explored further. Underlying our research, this hypothesis responds to the Occam’s razor philosophical principle of exploring first the simplest hypothesis: Why should colonial His-

panic America be very different to most of other pre-industrial economies?

Apart from this introduction, this working paper contains four sections. In Section 2, evidence on nominal and real wages collected from various sources is presented. Section 3 deals with heights. Indexes of economic inequality built on ratios relating GDP per capita to real (grain) wages and heights are shown in Section 4. Some final remarks appear in Section 5. Sources of the many figures included in this working paper should be mentioned in detail in Appendix 1. We are sorry to say that we have failed in fulfilling the deadline. Naturally, however, sources are available under request to the authors. Sources of 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 colonial Hispanic American workers other than that of Leticia Arroyo for Arequipa<sup>7</sup>, 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 good (grain) and of a superior good (meat). Thus, we obtain two proxies of real wages which in turn may proxy for economic inequality.<sup>8</sup>

In considering wages, especially those of unskilled workers as a proxy for economic inequality, we mainly draw from Williamson (2002). To some extent, we also try to adapt Prados’s (2007a) work to the more limited quantitative information existing for the colonial period. Our rationale is as follows: estimates of, or the educated guesses on, GDP per

<sup>7</sup> See [http://gpih.ucdavis.edu/files/Peru\\_18th\\_c\\_basket.xls](http://gpih.ucdavis.edu/files/Peru_18th_c_basket.xls).

<sup>8</sup> Many of our data on nominal and real wages are the result of other authors’ impressive work to whom we are grateful. 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. In particular, Leticia Arroyo and Amílcar Challú have made possible that our sample of colonial Latin American nominal and real wages include data for Bogotá (capital town of the Viceroyalty of New Granada), for Potosí (famous mining town in Upper Peru) and for several cities in the Viceroyalty of New Spain, such as its capital town (Mexico), Guadaluajara, Puebla and San Luis Potosí.

<sup>5</sup> Coatsworth, 2008, p. 553.

<sup>6</sup> Williamson, 2008, p. 2.



capita in the Spanish colonies in America by early nineteenth century are lower than in most Western countries; then, finding real wages of unskilled workers in colonial Hispanic America which 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 colonial 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 colonial 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 colonial period in Mexico 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 in late Bourbon Hispanic America as a peculiarity which indicates the crisis of the colonial system. In this regard, probably the main methodological objective of this 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 colonial Hispanic America.

Medium to high relative real wages suggest that labour productivity and living standards could be neither too low nor too different to those in most of late pre-industrial Europe. This inference does not appear implausible under reasonable economic assumptions and neither is contradictory with our hypothesis of normality regarding colonial Hispanic America in general and New Spain in particular.

Only if future research demonstrates that the number of working days per year of miners and unskilled labourers in colonial Hispanic America were significantly lower or the difference between wage-earners and other segments of the commoners –i.e. peasants- higher than in other parts of the world, inferences from our findings on wages in terms of economic inequality should be appropriately re-

vised. In any case, as for now, we believe that they hold true.

## 2.1. WAGES CIRCA 1803

Our quantitative examination of wages in colonial 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 in 1803 or in the surrounding years. 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 colonial 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 quantitative data on wages paid in La Valencia, the biggest mine in late colonial 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.

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*"<sup>9</sup>. Ward, also a reliable on-the-field observer, claimed shortly after that Mexican independence that "*the ordinary wages of a miner are high.*"<sup>10</sup> Most specialists

<sup>9</sup> 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.

<sup>10</sup> Ward, 1828, vol. II, p. 146.

in Mexican colonial mining history seem to be very close to Humboldt's view on the issue [i. e. Brading (1983)<sup>11</sup>, Velasco (1989)<sup>12</sup>, Swann (1990)<sup>13</sup> and Ladd (1992)<sup>14</sup>].

Figure 1 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 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)<sup>15</sup> and Ladd (1992)<sup>16</sup>. 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 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 – see Figure 3 in which the power purchasing power of daily wages in terms of meat.

Thus, 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 favorable factor endowments for extensive cattle raising in Northern regions of the colony. Prices of other superior goods might also be comparatively cheap for late colonial Mexico 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 England<sup>17</sup>.

More research needs to be done in order to put the colonial 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 colonial times.<sup>18</sup> They seem to have

<sup>11</sup> "*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.

<sup>12</sup> "... *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.

<sup>13</sup> "..., *these labourers were comparatively well paid*". Swann, 1990, p. 145.

<sup>14</sup> 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.

<sup>15</sup> "..., *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.

<sup>16</sup> "*Para los barreteros, el partido representaba la parte fundamental de sus ingresos.*" Velasco, 1989, p. 585.

<sup>17</sup> <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](http://gpih.ucdavis.edu/files/Massachusetts_1630-1883.xls)).

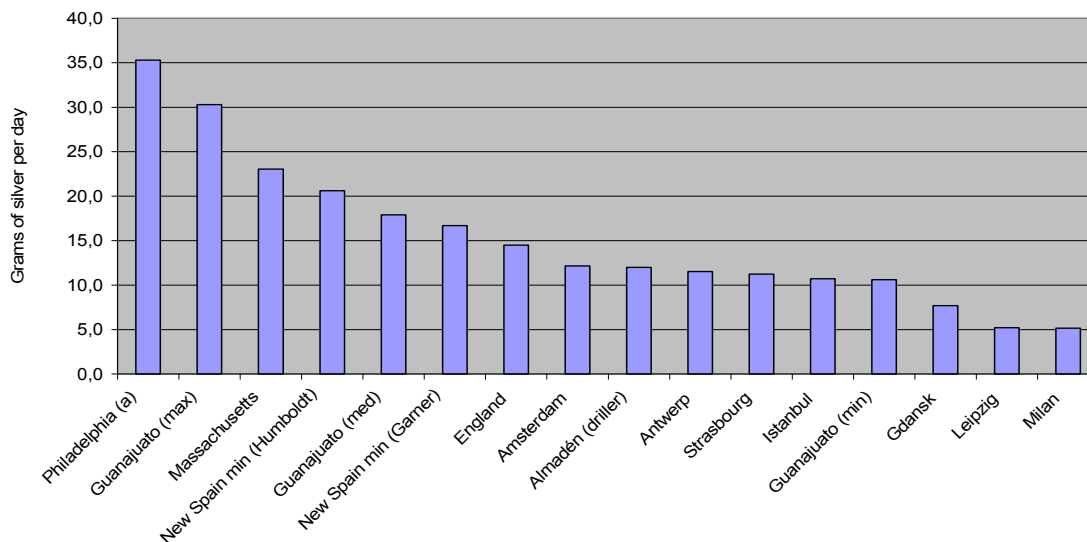
<sup>18</sup> "*After their year in the in the town [Potosi], many men, ..., apparently preferred to stay on as worker in mining, refining, or something else,.... Others moved out to of the town to nearby alleys, apparently as subsistence farmers or workers on chacras. The boom at Oruro after 1600 was 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.

been less coercive and much more complex than what the *World Development Report 2006*, following the mainstream assumptions, claims.<sup>19</sup> 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 colonial authorities for the *mitayos* (aboriginals compelled to serve the *mita*) in Potosi by early nineteenth century was 4 reales (12,12 grams of silver)<sup>20</sup>. 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.

**Figure 1 (\*)**

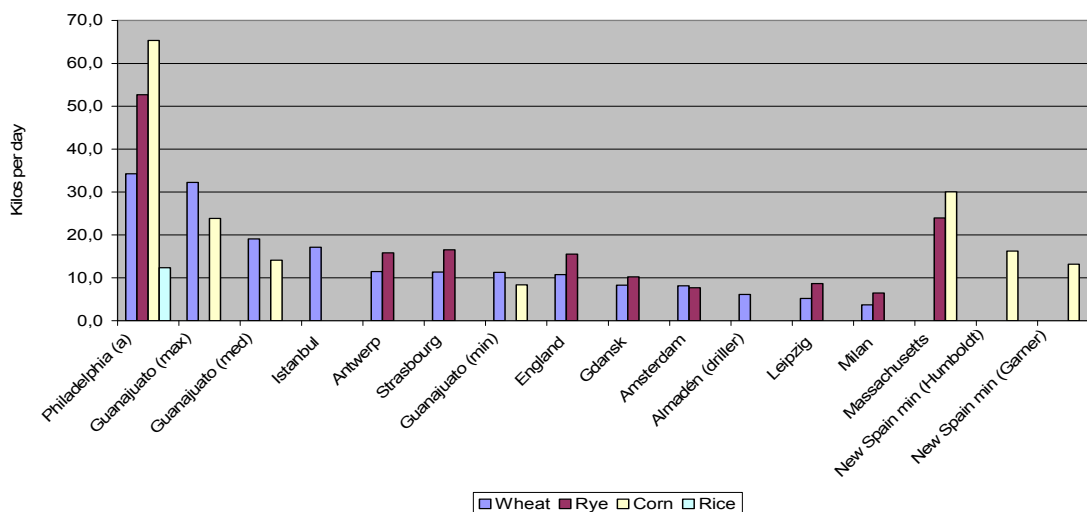
**Nominal wages in 1803: Skilled workers.**



Source and methods: See Appendix 1.  
 (\*) a, artisan; max, maximum; med, medium; min, minimum.

**Figure 2 (\*)**

**Grain wages in 1803: Skilled workers.**



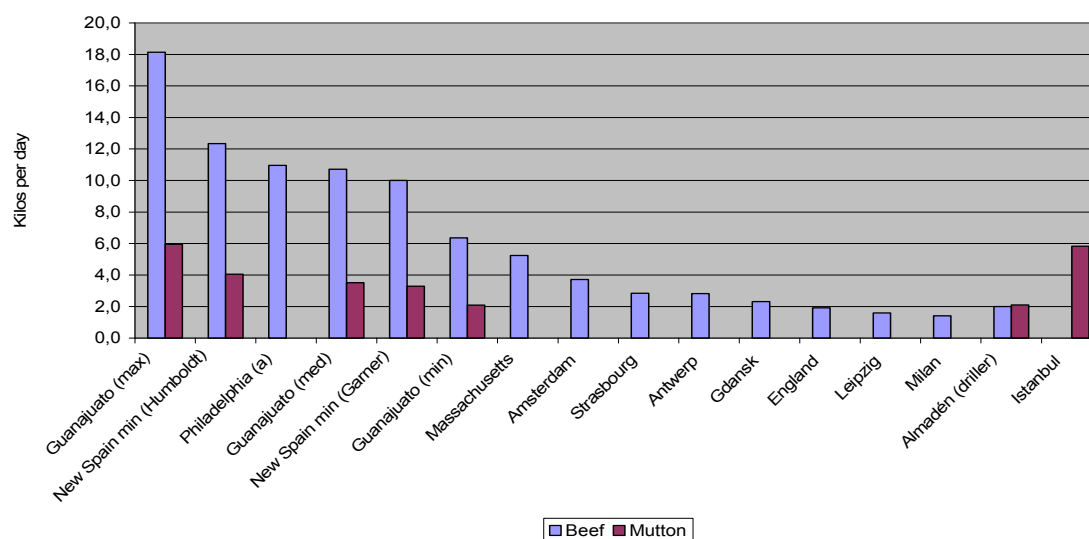
Source and methods: See Appendix 1.  
 (\*) a, artisan; max, maximum; med, medium; min, minimum.

<sup>19</sup> "the mita (from the quechua world mit'a, meaning "turn") became a central institution until independence,..." World Bank, 2006, p. 111.

<sup>20</sup> 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.

Figure 3 (\*)

Meat wages in 1803: Skilled workers.



Source: See Appendix 1.

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

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)]<sup>21</sup>.

Following in accordance with the rationale underlying this empirical research on colonial 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.

Neither of the Spanish colonies in America is among the parts of the world with the lowest nominal wages. Most of cases in the colonial 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.

Either in terms of grain or, especially, of meat, the level of wages in colonial Mexico and Colombia 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 late colonial Hispanic America nominal wages in terms of meat is a somewhat surprising finding. However, at least for the Mexican case, it is indisputable after the research on meat consumption in the capital city of New Spain conducted by Quiroz (2005).<sup>22</sup> 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*”<sup>23</sup>. This seems to have been also the case in Guadalajara and the rest

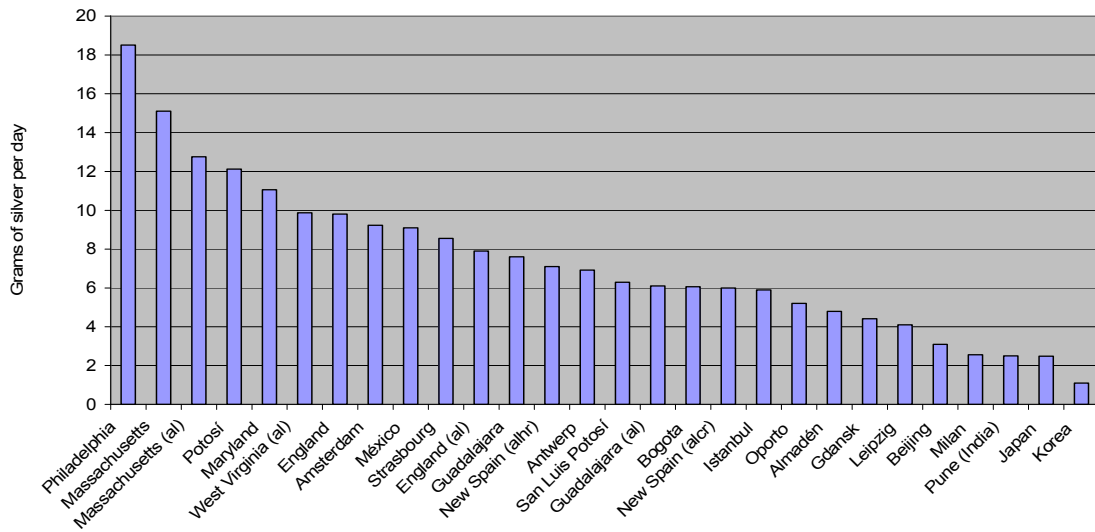
<sup>21</sup> More arguments in favour of a positive consideration of the effects of mining on economic development during the Bourbon period in Mexico may be found in Dobado and Marrero (2001, 2005).

<sup>22</sup> “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.

<sup>23</sup> Ibidem, p. 335.

**Figure 4 (\*)**

**Nominal wages circa 1803: Unskilled workers.**

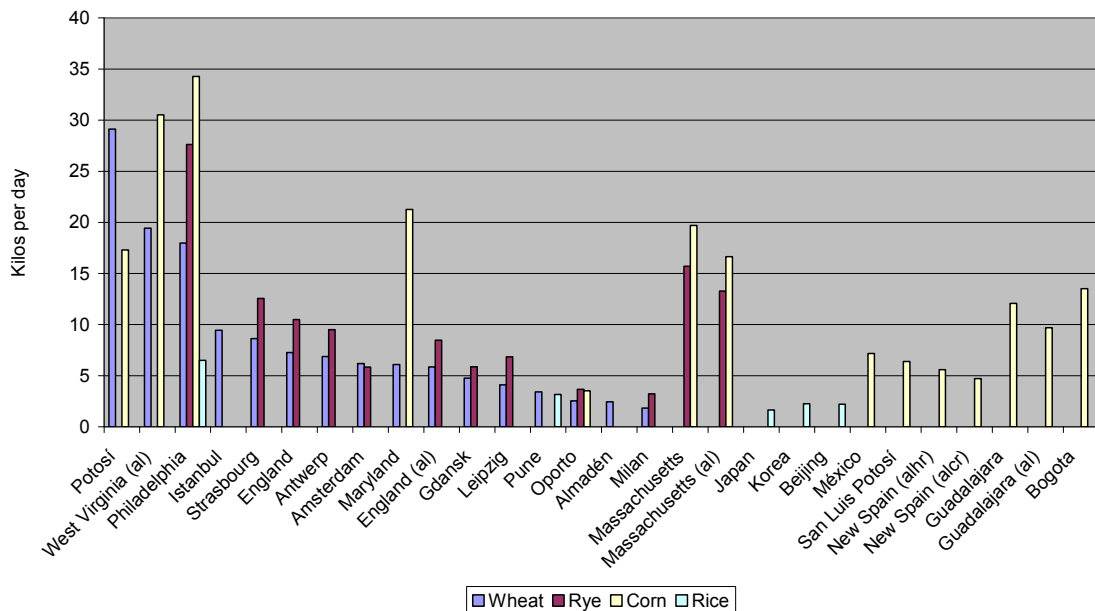


Source: See Appendix 1.

(\*) al: agricultural laborer; alhr: agricultural laborer "hot regions"; alcr: agricultural laborer "cold regions".

**Figure 5 (\*)**

**Grain wages circa 1803: Unskilled workers.**

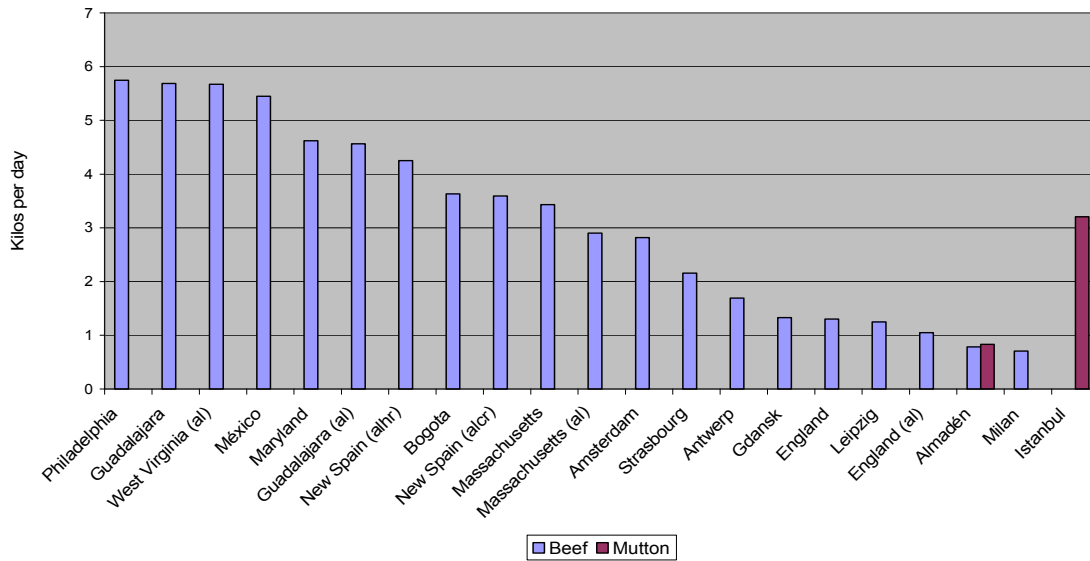


Source: See Appendix 1.

(\*) al: agricultural laborer; alhr: agricultural laborer "hot regions"; alcr: agricultural laborer "cold regions".

**Figure 6 (\*)**

**Meat wages circa 1803: Unskilled workers.**



Source: See Appendix 1.

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

of the colony, especially in the Northern regions. The possibility of consuming meat for ordinary wage earners in Bogotá was also well above that in most developed European countries.<sup>24</sup>

Summarising the results presented so far, the conventional, pessimistic, assumptions on wages and living standards of miners and unskilled workers in late colonial 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

Our empirical research proceeds by offering a dynamic, comparative, perspective on nominal and real (grain and meat) wages of unskilled workers which are those especially relevant regarding the rationale underlying our ad hoc version of the Williamson’s economic inequal

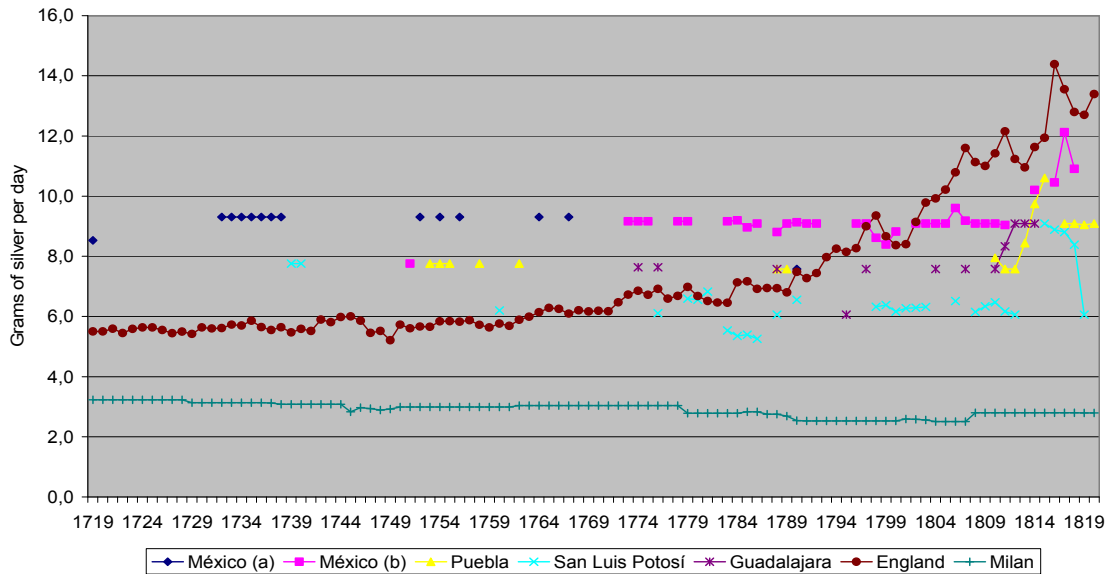
ity. We use wages in England and Milan, which may be considered, respectively, the upper and lower bounds of the range of variation in Western Europe, as terms of comparison. We assume, following Allen et al. (2007) that real wages in England were not only higher than in the rest of Europe but also than 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. 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 late colonial Mexico. As in Milan, nominal wages in Bourbon Mexico exhibit a basically long-term stagnant evolution. Only at the very end of the colonial period 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.

<sup>24</sup> 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.

**Figure 7**

**Nominal wages of unskilled workers: New Spain, England and Milan, 1719-1820.**



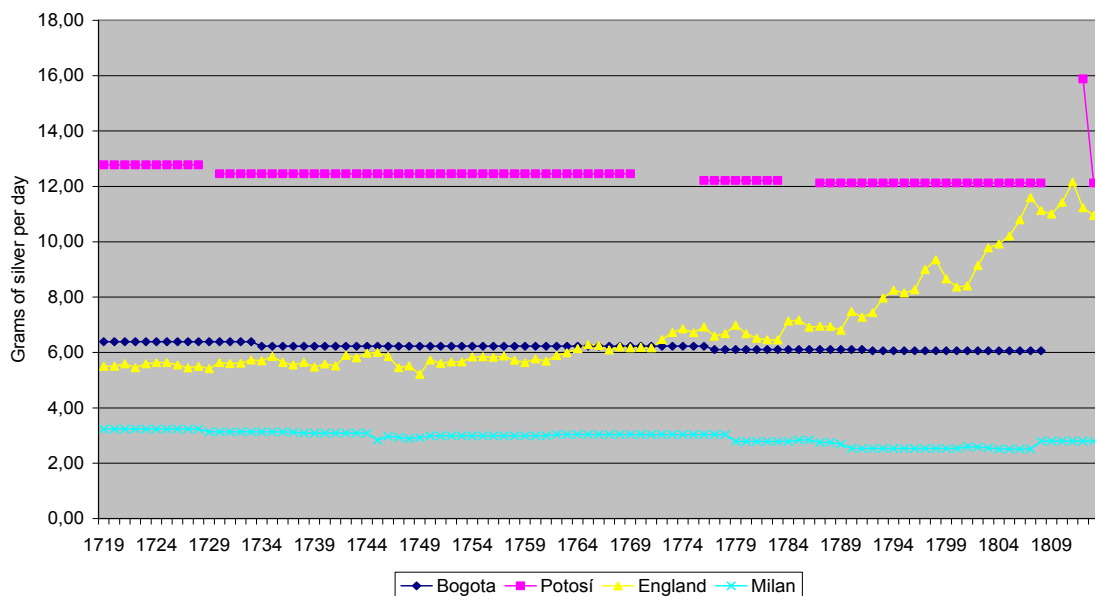
Source: See Appendix 1.

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

**Figure 8**

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



Source: See Appendix 1.

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.

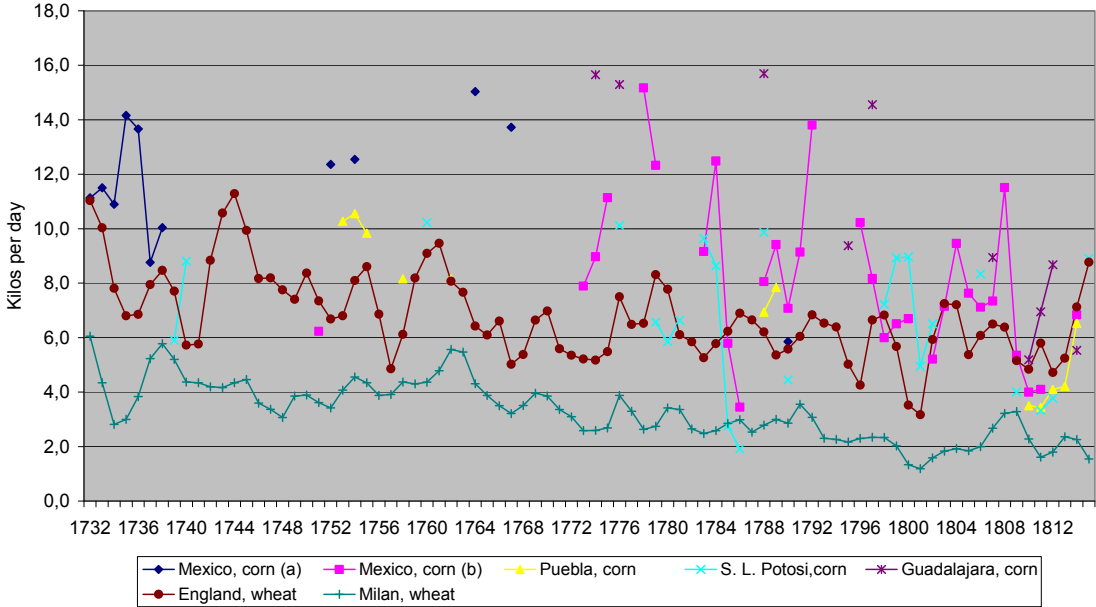
Being Potosí and New Spain important producers of silver, it might be argued that their comparative high level of nominal wages was expectable. However, this circumstance does not apply to Bogotá, or at least not to the same extent. In any case, again, as in our static analysis of the previous subsection, we try to control for any possible monetary effects on prices that might decrease the purchasing po-

wer of nominal wages in colonial 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. Generally, except during some especially intense agricultural crisis -i. e. 1785-1786 and after 1810-, they also exceeded to those in England –see Figure 9. Relative grain wages are shown in Figure 10. 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 9**

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

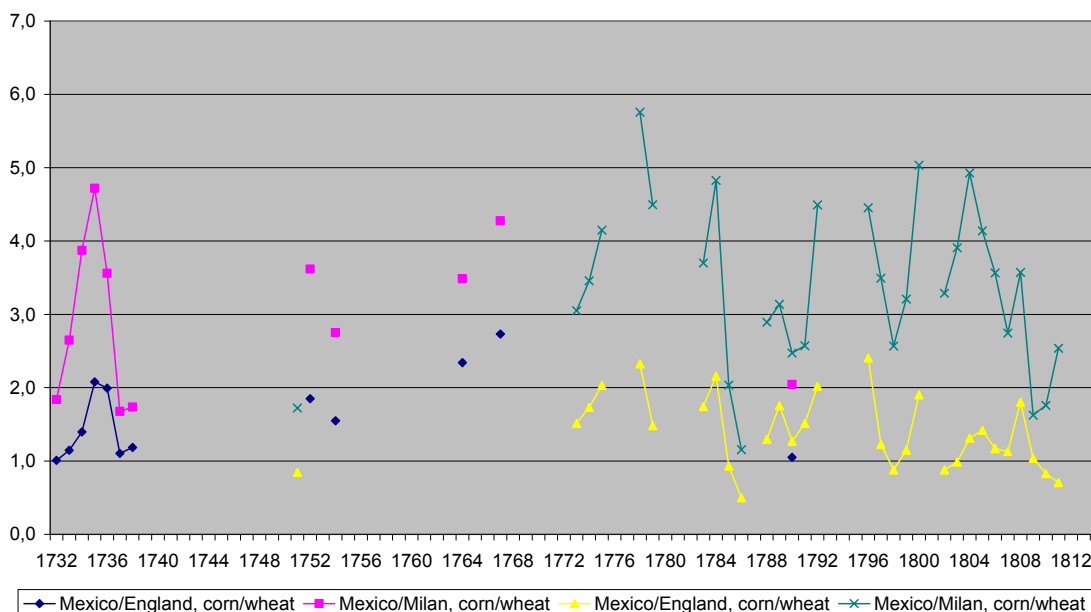


Source: See Appendix 1.



**Figure 10**

**Relative grain wages of unskilled workers, 1732-1814.**



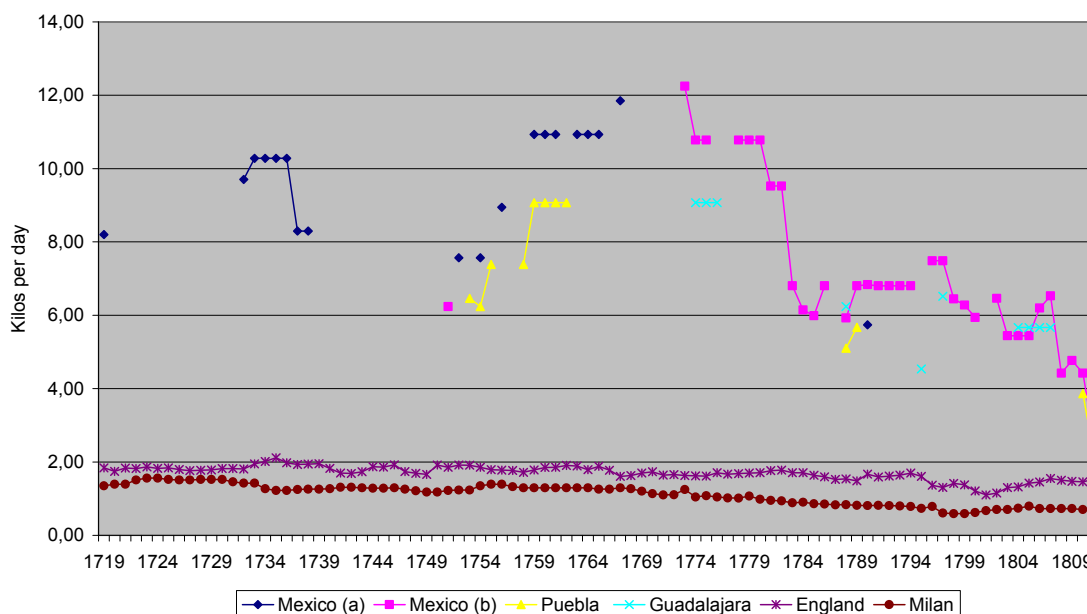
Source: See Appendix 1.

Meat wages reached a peak in New Spain in the 1760's and 1770's –see Figure 11. 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 11**

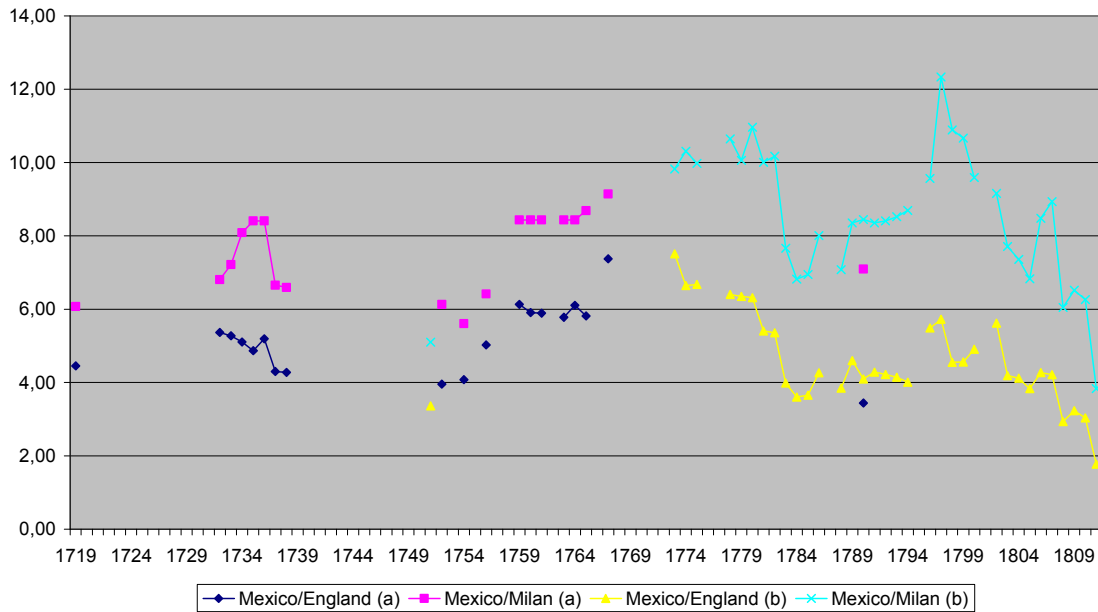
**Meat wages of unskilled workers: New Spain, England and Milan, 1719-1811.**



Source: See Appendix 1.

**Figure 12**

**Relative meat wages of unskilled workers, 1719-1811.**



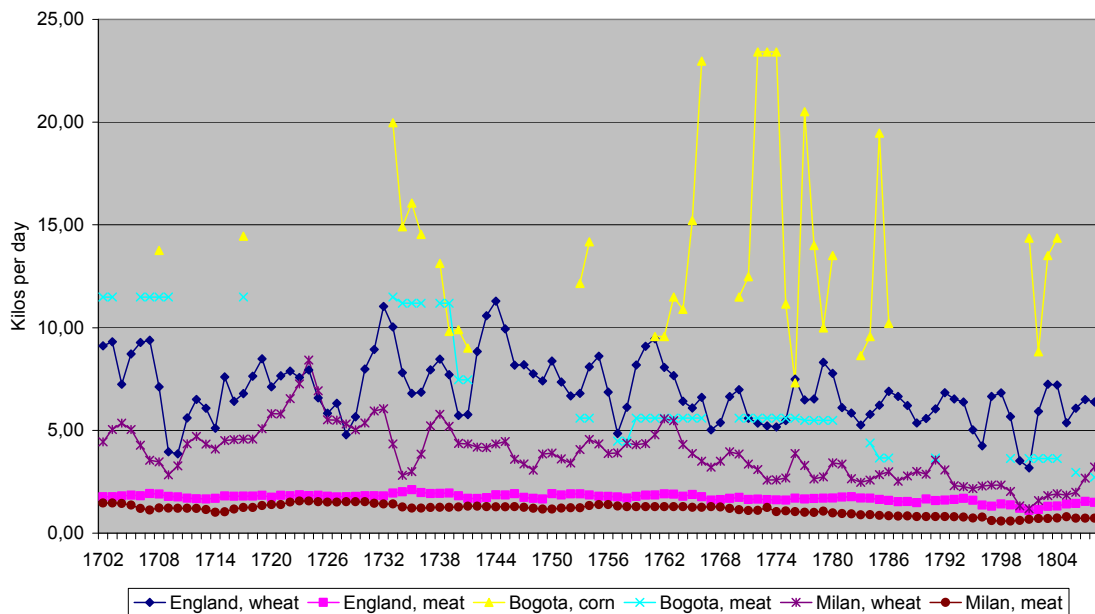
Source: See Appendix 1.

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. However, meat wages relative to England and Milan were significant-

ly 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 13**

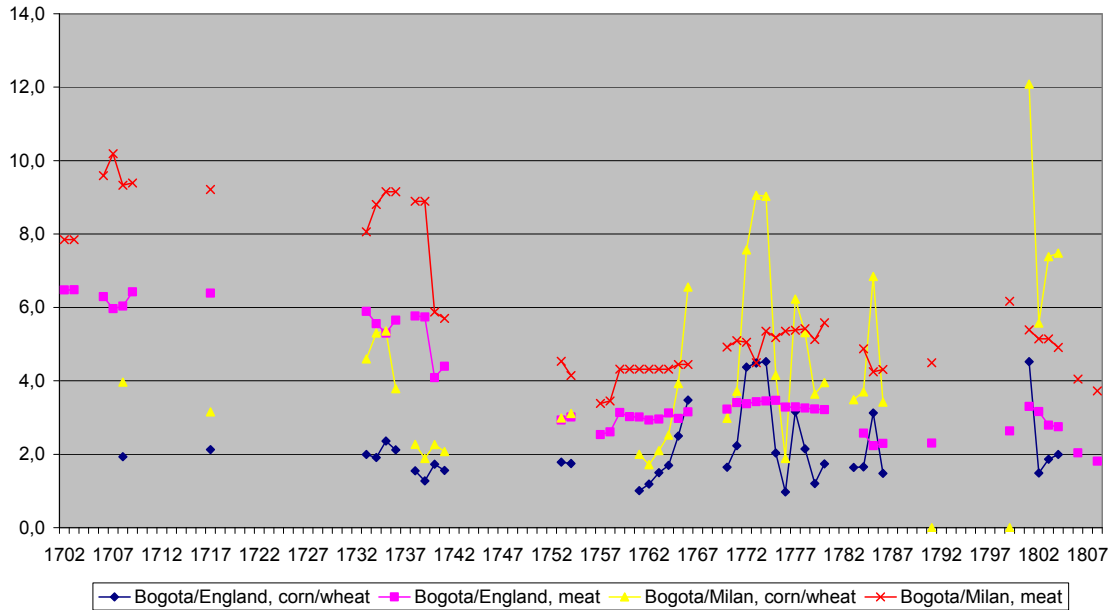
**Grain and meat wages of unskilled workers: Bogota, England and Milan, 1702-1808.**



Source: See Appendix 1.

**Figure 14**

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



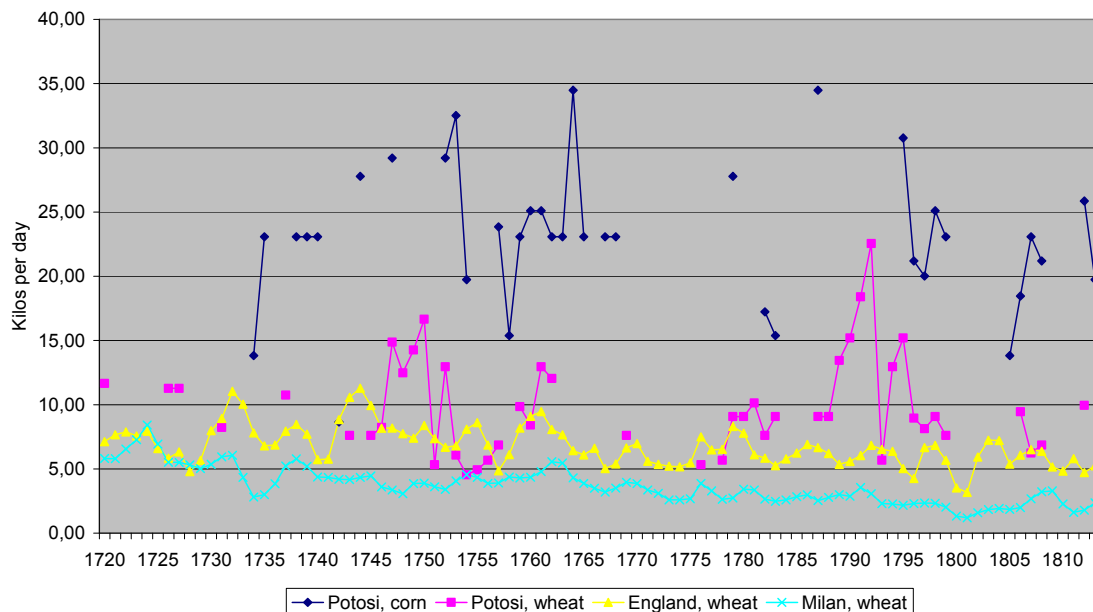
Source: See Appendix 1.

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. Grain wages relative to

England and Milan show a rather growing trend during the second half of the eighteenth century –see Figure 16.

**Figure 15**

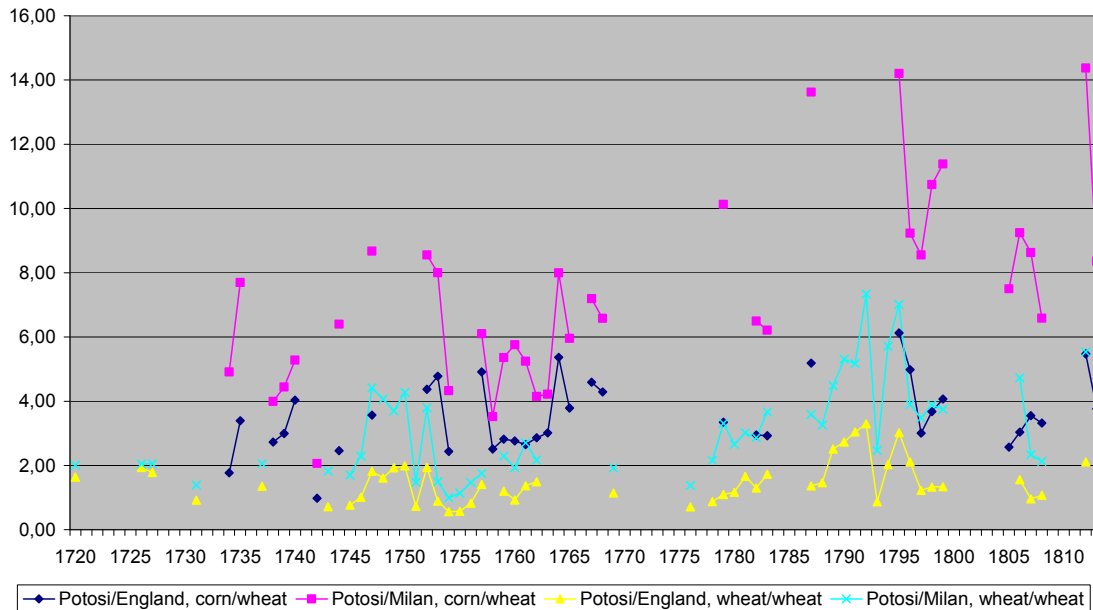
**Grain wages of unskilled workers: Potosi, England and Milan, 1720-1813.**



Source: See Appendix 1.

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 colonial 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 colonial 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 late colonial 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 colonial 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 colonial society in 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 available<sup>25</sup>. However, anthropometric research on colonial Hispanic America is scarce. To the best of our knowledge, only 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, have dealt so far with heights in the colonial period. Thus, it is necessary to widen the time and space dimensions of the colonial Hispanic American sample of heights (is necessary) 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 colonial militias, we have been able to build a data base of almost 6000 observations -see Appendix 2<sup>26</sup>. 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.

**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.

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

<sup>26</sup> 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.

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,<sup>27</sup> 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 distribution<sup>28</sup>.

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. 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. However, the trend of those of Southern “*pardos*” (mulattos and mestizos) is somewhat upwards –see Table 3. Neither decreases the average height of “*blancos*” and “*pardos*” from Maracaibo.

**Table 2**

Average heights, cohorts born from 1730's to 1780's.						
	Northern México		Southern México, “ <i>blancos</i> ”		Maracaibo (Venezuela), “ <i>blancos</i> ”	
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.

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

<sup>28</sup> 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 3**

Heights of “ <i>blancos</i> ” and “ <i>pardos</i> ” in Southern Mexico and Maracaibo								
	Southern México				Maracaibo (Venezuela)			
	“ <i>Pardos</i> ”		“ <i>Blancos</i> ”		“ <i>Pardos</i> ”		“ <i>Blancos</i> ”	
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.

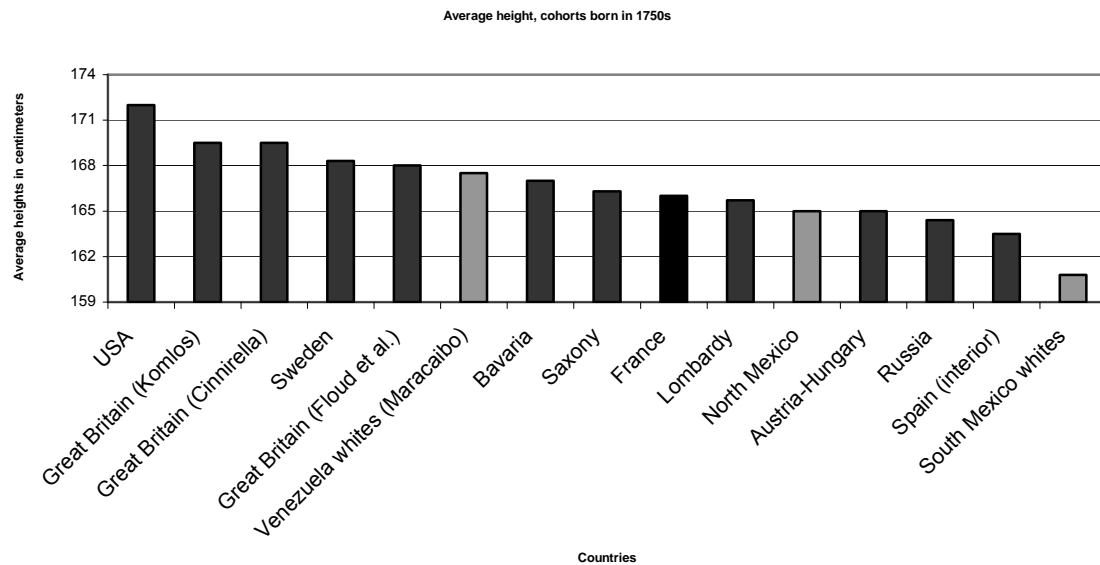
In Figure 17 an international comparison of heights is shown.<sup>29</sup> Heights of militiamen, most of them working in mining and cattle raising, from the scarcely populated Northern New Spain regions were similar to those of contemporary Europeans. It implies that they probably were taller than many 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 centuries<sup>30</sup>. 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 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 leaping 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)].

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

<sup>30</sup> 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).

Figure 17



Source: See Appendix 1

An additional measure of economic inequality is the racial gap: the difference in heights between “*blancos*” and “*pardos*”—see Table 3. 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, data on average heights of colonial Mexicans and Venezuelans are basically similar to those of Europeans, while the racial gap is comparatively small and decreasing, which may be interpreted as evidence against the idea of an especially unequal late colonial 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-colonial Mesoamerica bio-archaeological indi-

cators [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.*”<sup>31</sup> 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 colonial 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 of the colonial economy nor a lesser economic inequality in the post-1521 society should be overlooked. 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

<sup>31</sup> Márquez et al., 2005, p. 320.



crisis in the economy of the late Mexica Empire (overpopulation, famines, extra-mortality, etc.) which are mentioned by Knight (2002) and Semo (2006) are taking 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.”<sup>32</sup> 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”<sup>33</sup>. 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.”*<sup>34</sup>

Steckel’s (2005) view on health and nutrition in Pre-Columbian America is rather pessimistic and may help to see the colonial period under a new, more evidence-based, light<sup>35</sup>. 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 com-*

*pounded the biological stress created by hard work.”*<sup>36</sup>

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 colonial 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. Wages, heights and GDP per capita.

In this section we present indexes of economic inequality using grain wages –an attempt to adapt the Williamson’s index of economic inequality to the available data in this research- and heights. Figure 18 shows the ratio of Maddison’s GDP per capita figures for 1820 to our estimation of grains wages in roughly the period 1800-1820 for several countries in America, Asia and Europe. As it may be, Hispanic American countries at the end of the colonial period are characterized by having very low values of this ad hoc version of the Williamson’s economic inequality index that we built. Certainly, using a less crude way of calculating real wages would offer somewhat different results. Problems with data used may also be altering the ratio corresponding to some countries. However, it is unlikely that the Spanish colonies in America change from low levels of Williamson’s economic inequality to high or very high levels. Besides, if instead of using grain prices as deflator for real wages we use meat prices the ratio of GDP per capita to real wages for Bolivia, Colombia and Mexico would be higher and by construction the Williamson’s economic inequality would decrease. In any case, whatever the change, if reasonable, in the inputs used for calculation of this measure of economic inequality, a very different picture to that shown in Figure 18 seems rather implausible. Therefore, our conclusion that late colonial Hispanic America does not

<sup>32</sup> Ibidem, p. 336.

<sup>33</sup> Williamson, 2008, p. 20.

<sup>34</sup> Knight, 2002, p. 189.

<sup>35</sup> “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.

<sup>36</sup> Ibidem, p. 28.

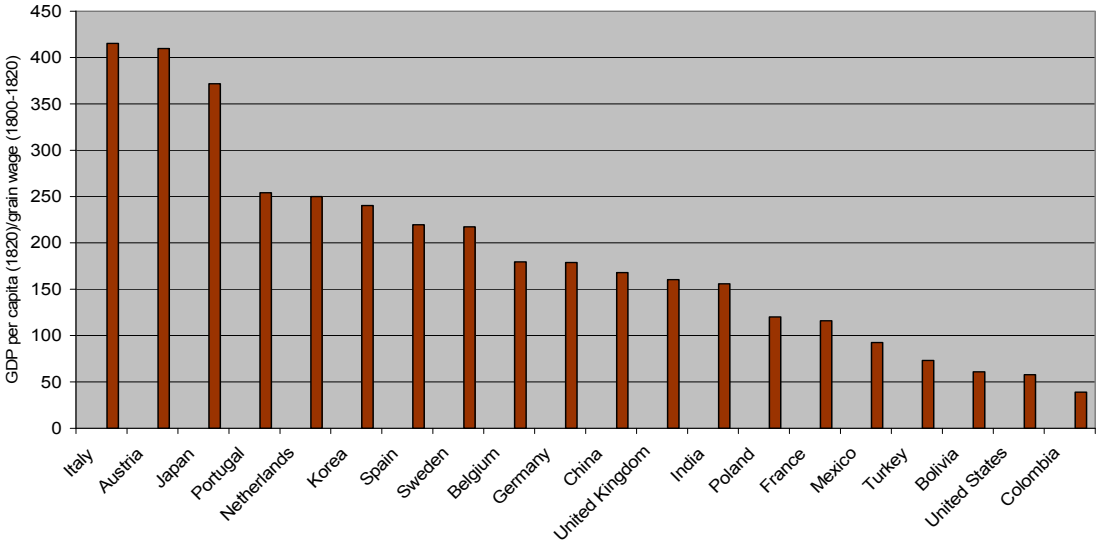
stand at the top of the Williamson's economic inequality ranking holds. If alternative, somewhat lower, estimates of Hispanic American countries GDP per capita in 1820 provided by Coatsworth (2008) and Prados de la Escosura (2007b) are used instead of Maddison's, Williamson's economic inequality indexes for late colonial Colombia and Mexico slightly decreases.

A slightly different approach to the empirical assessment of economic inequality under the serious limitations of reliable data that characterized early modern societies is shown in Fi-

gure 19, where our estimation of grain wages are plotted against GDP per capita of 1820. As it was expectable, Bolivia, Colombia and Mexico appear in the relatively less unequal region of Figure 19, in which, by the way, only two European countries are located. Colombia and the USA turn to be clear outliers within the comparatively more egalitarian region of the scattered graph.

**Figure 18**

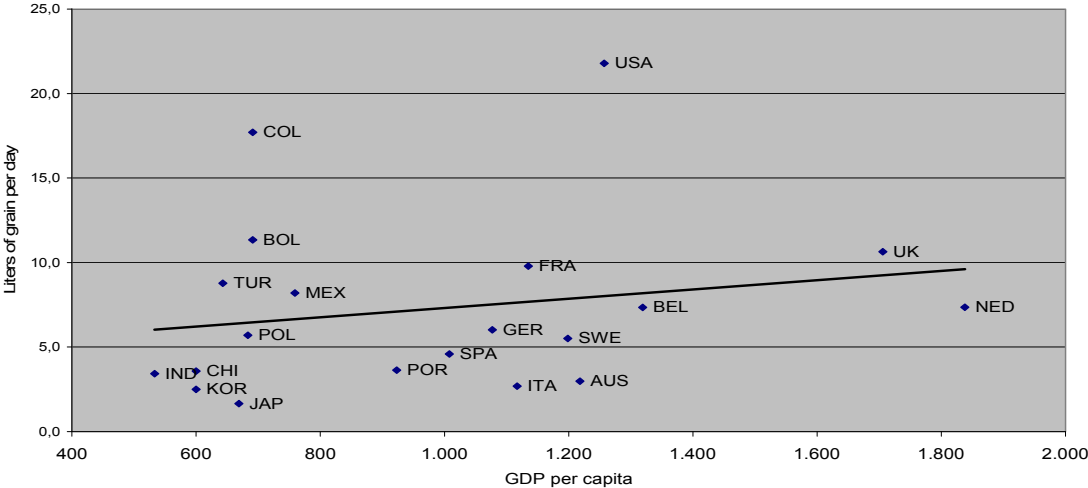
**Williamson's inequality index, early nineteenth century**



Source: See Appendix 1.

**Figure 19**

**Grain wages and GDP per capita circa 1820**



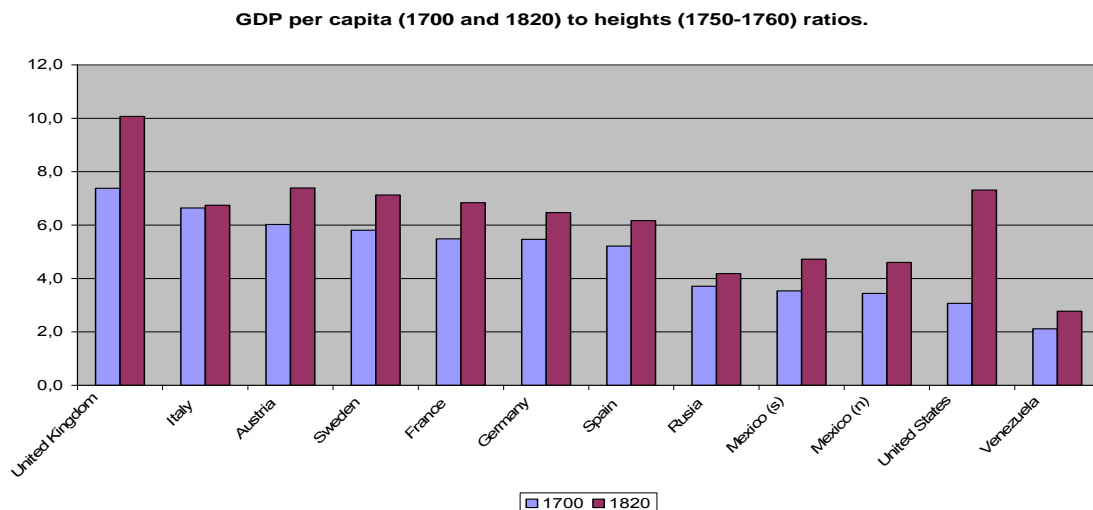
Source: See Appendix 1.

Results shown in Figure 18 and Figure 19 deserve some additional comments. On the one hand, differences between countries in our ad hoc version of Williamson's economic inequality index are enormous –i. e. roughly a factor of eight between Italy, Austria and Japan and Bolivia, the USA and Colombia. Are they due to similar real differences in any meaningful meaning of economic inequality or to other circumstances? The high variability in the GDP per capita to grain wages ratio deserves closer scrutiny that probably would permit to properly answer the above question. On the other hand, it is also striking that small differences in Maddison's GDP per capita estimates coexist with big differences in nominal (grams of silver) and grain wages –i. e. Bolivia versus Japan. Again, this counterintuitive result is worth to be explored as well.

As to the results in terms our ad hoc version of Williamson's economic inequality index regarding colonial Hispanic America, we considerer them valuable evidence in favour of what we term the "hypothesis of normality". However, albeit three Spanish colonies share low relative economic inequality, differences between them are substantial too –i. e. Colombia versus Mexico.

This work in progress also explores the potential of an additional and complementary approach to the study of economic inequality when direct indicators of income distribution are arguably reliable or non-existent at all, as it is more often than not the case in early modern societies. As mentioned before, the anthropometric literature has been producing substantial arguments and evidence supporting the notion that heights are very sensitive to economic inequality. Drawing on a number of contributions, we present a first exploration of a methodology that, to the best of our knowledge, has not been used before empirically. This methodological novelty simply consists in calculating GDP per capita to heights ratios, which may be as an alternative index of economic inequality. The rationale under this tentative suggestion is very intuitive: given a certain level of GDP per capita, higher heights would be associated with less economic inequality. This hypothetical relationship between GDP per capita to heights ratio is consistent with contemporary evidence available for some developed countries [Bilger (2004)]. In Figure 20, the ratio of GDP per capita in 1700 and 1820 to heights of those born in 1750-1760 is shown.

Figure 20 (\*)



Source: See Appendix 1.

(\*) Mexico (s): Southern Mexico; Mexico (n): Northern Mexico.

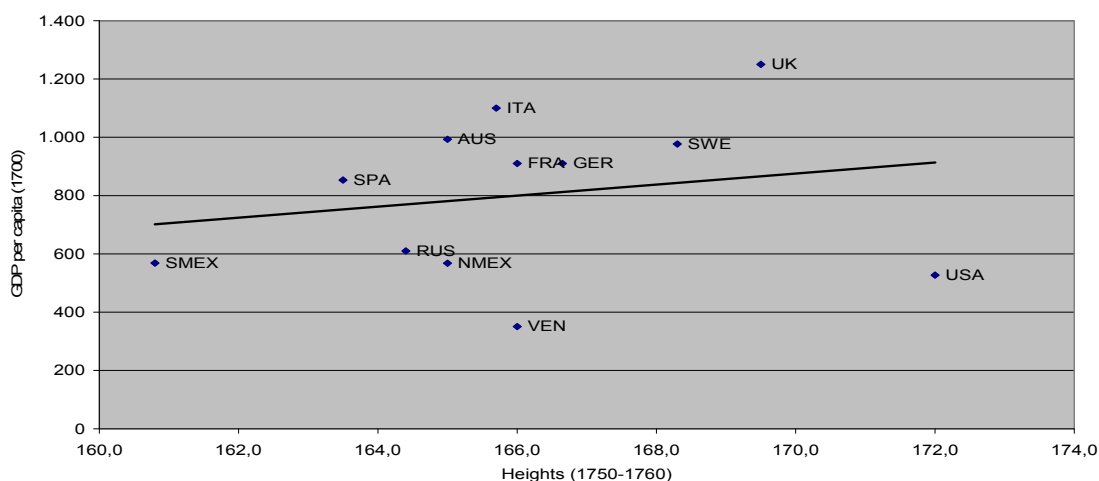
The ratios are, both in 1700 and 1820 for Northern and Southern Mexico and, particularly, for Venezuela, significantly lower than those for Europe. By 1700, the USA are among the “American group”: relatively tall people for their GDP per capita. Not so in 1820, when the USA ratio is one of the highest while the ones for Mexico and, especially, for Venezuela stay at the lower part of the ranking. If this index of economic inequality that we are suggesting makes sense, the conclusion is clear: those Spanish colonies for which we have found original sources for heights are not among the most unequal societies in eighteenth and early nineteenth centuries, rather

the opposite is true.

When our sample of heights for mid eighteenth century is plotted against Maddison’s estimates of GDP per capita for 1700 and 1820, an interesting picture emerges –see figures 21 and 22. In 1700 USA and Venezuela are clear outliers. By 1820 only Venezuela remains as such. Northern and Southern Mexico never appear too far from the regression line. In our interpretation, these results would indicate that neither Bourbon Mexico nor, especially, Bourbon Venezuela were more unequal societies than Europe according to this plausible measure of economic inequality.

**Figure 21(\*)**

**GDP per capita(1700) and heights (1750-1760).**

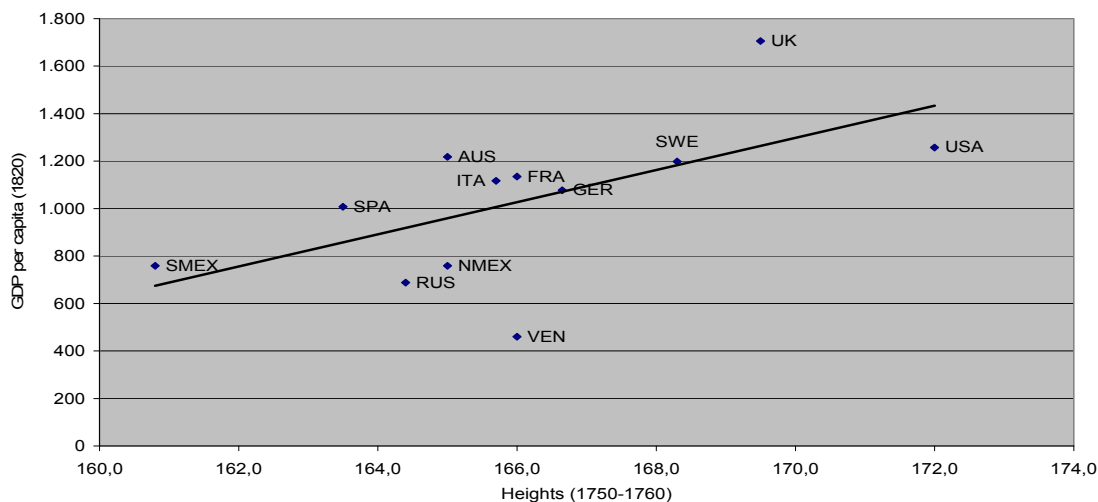


Source: See Appendix 1.

(\*) SMEX: Southern Mexico; NMEX: Northern Mexico.

**Figure 22 (\*)**

**GDP per capita (1820) and heights (1750-1760)**



Source: See Appendix 1.

(\*) SMEX: Southern Mexico; NMEX: Northern Mexico.

## 5. Final remarks

1) More empirical research is needed to widen the –so far too small- quantitative information on which most claims on colonial Hispanic America economic conditions are commonly based. The gap between strong assumptions and weak –or inexistent at all- empirical evidence should urgently be closed if the economics of Spanish colonialism in America and its consequences on post-colonial economic development are to be properly assessed. The importance of the issue goes beyond academic debates.

2) In our interpretation, judging from an international comparative perspective, the limited available evidence does not support the idea that colonial Hispanic America was an especially unequal society.

3) Those views on colonial Hispanic America and its economic long-term legacy based on assumptions about extractive, unequal or bad institutions appeared shortly after 1500 should offer more convincing empirical evidence.

## 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 Potosí 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 (Potosí) or wheat (Potosí, England and Milan) and of meat. See Figure 2 for rates of conversion of litres of corn and wheat into kilos. Potosí 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.

#### **Figure 18**

**Sources:** See Figure 5 for grain wages; Maddison's web page (<http://www.ggdc.net/maddison/>) for GDP per capita in 1820.

**Methods:** GDP per capita in 1990 international dollars for 1820 of the countries considered divided by the average grain wage of 1800-1820 in the towns, provinces, regions or countries for which data exit. Thus, Amsterdam is associated to the Netherlands, Japan to Japan, Pennsylvania to the US, Pune to India and so on. As to grain wages, exceptions are Almadén (mean of 1800-1808, 1810-1814 and 1816-1820), Amsterdam (mean of 1801-1819), Bogota (mean of 1801-1804), Gdansk (mean of 1800-1812), Istanbul (mean of 1805, 1807, 1814 and 1820), Korea (mean of 1800-1801, 1803, 1805, 1809, 1816 and 1819), Leipzig (mean of 1800-1810), Mexico (mean of 1800, 1802-1811 and 1814), Milan (mean of 1800-1804 and 1808-1820), Paris (mean of 1805-1820), Pennsylvania (mean of 1800-1819), Potosí (mean of 1806, 1808 and 1812), Pune (mean of 1805-1830) and Sweden (mean of 1816-1820). GDP of Poland in 1820 is the Eastern European average. GDP of Bolivia and Colombia are the Latina America average.

#### **Figure 19**

**Sources:** See Figure 18.

**Methods:** Idem.

**Figure 20**

**Sources:** Maddison's web page (<http://www.ggd.net/maddison/>) for GDP per capita in 1700 and 1820; see Appendix 2 for sources on heights.

**Methods:** For all countries in the sample, GDP per capita in 1700 and 1820 divided by the average height of cohorts born in 1750-1760, except Interior Spain (1767-1770).

**Figure 21**

**Sources:** See Figure 20.

**Methods:** Idem.

**Figure 22**

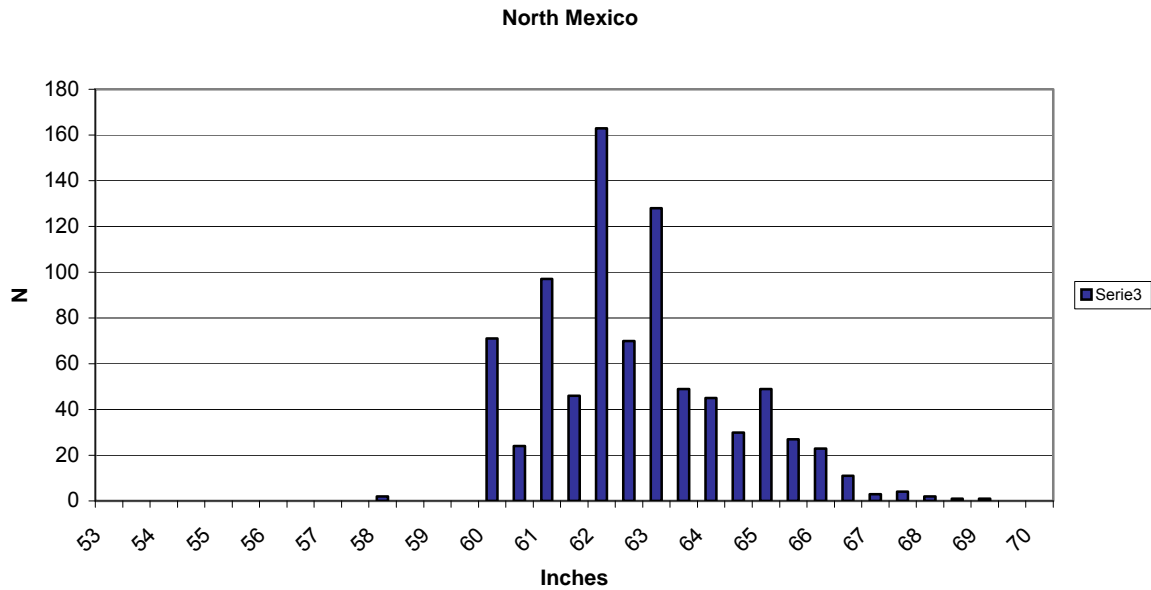
**Sources:** See Figure 20.

**Methods:** Idem.

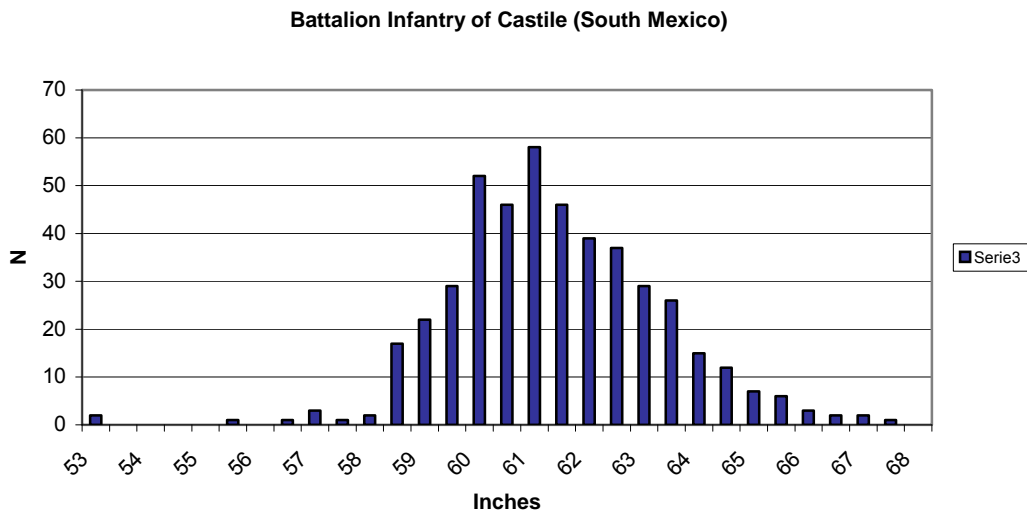
**Appendix 2.**

**Sources:** Archivo General de Simancas, Simancas, Valladolid, Spain, Secretaría del Despacho de la Guerra, files 7299-2, 7299-3, 7299-4, 7299-5, 7299-6, 7198-18, 7198-2, 7028-7, 7029-1, 7034-1, 7027-12, 7026-1, 7048-5, 6991-2, 7025-2, 7047-9, 7047-10, 7047-11, 7047-13, 7047-14, 7047-15, 7047-16, 7047-17, 7047-18, 7047-19, 7047-20, 7047-21, 7047-22, 7047-23, 7047-24, 7047-25, 7047-27, 7047-29, 7048-2, 7048-3, 7048-4, 7048-6, 7048-7.

**HISTOGRAMS FOR MILITARY UNITS**

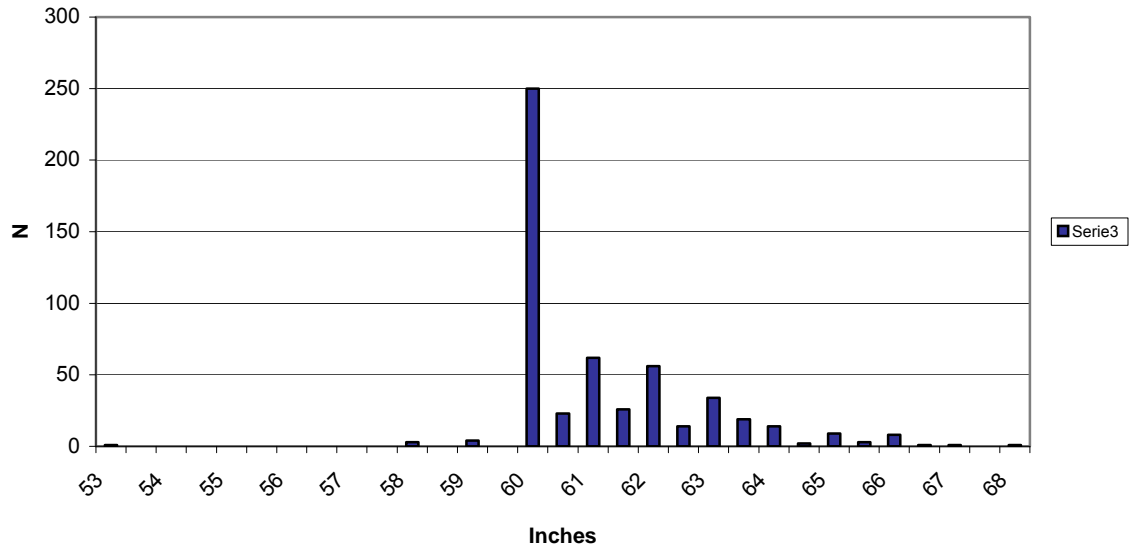


Truncation point used to estimate average height: 60 inches



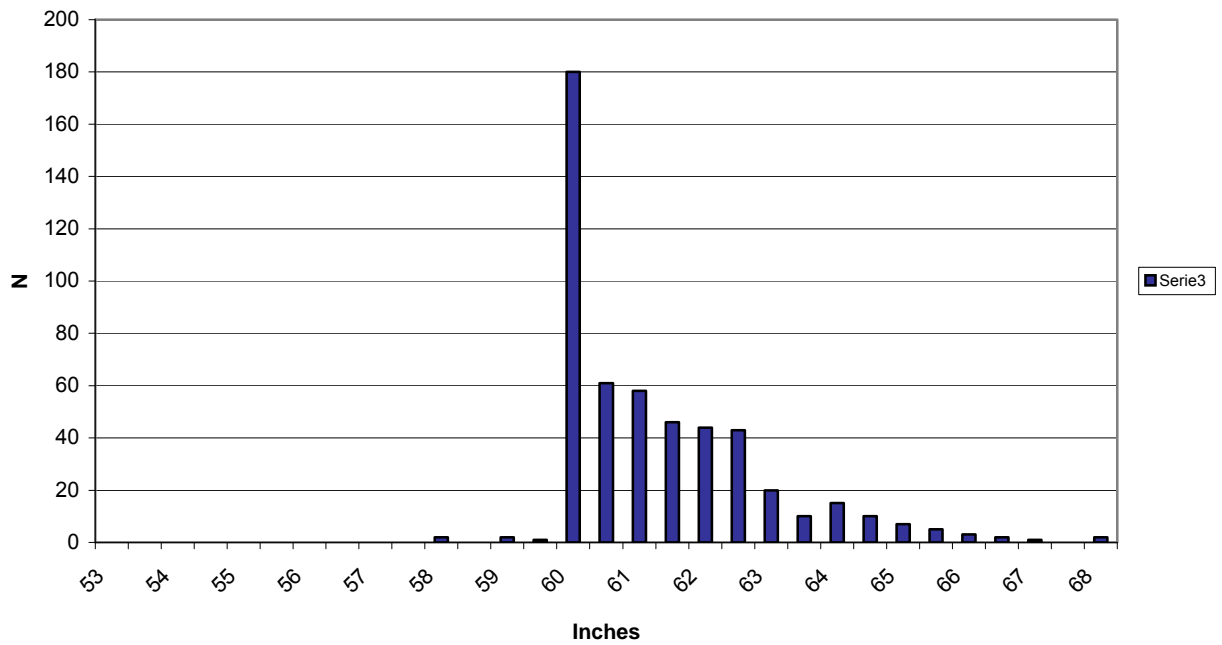
Truncation point used to estimate average height: 60 inches

**Infantry Militia of Whites from Campeche (South Mexico)**



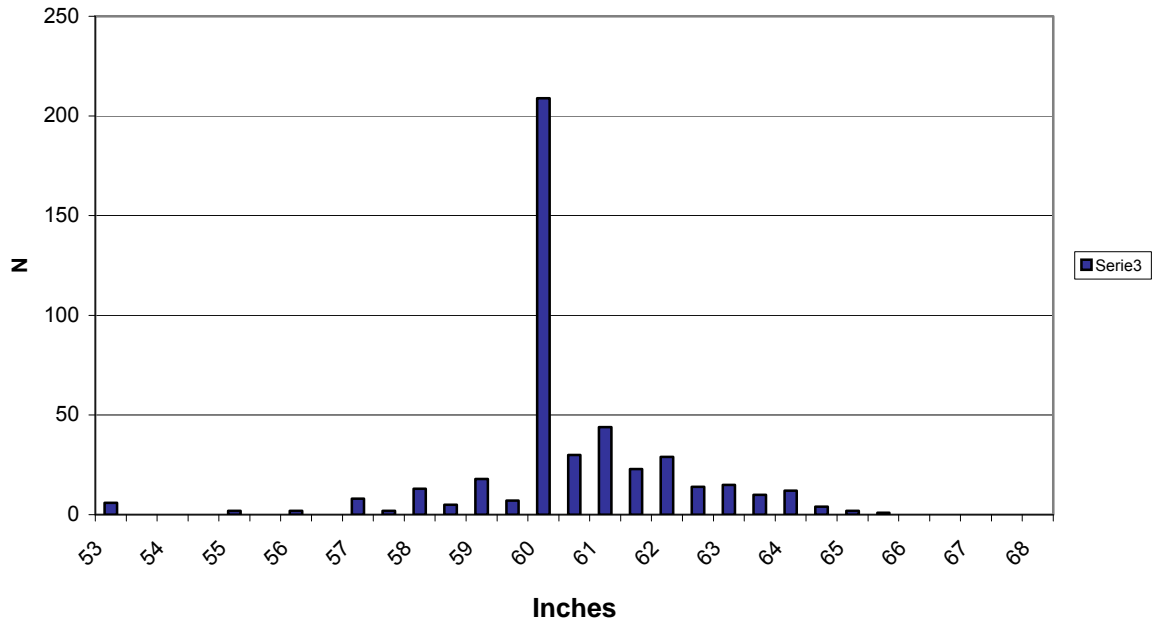
Truncation point used to estimate average height: 61 inches

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



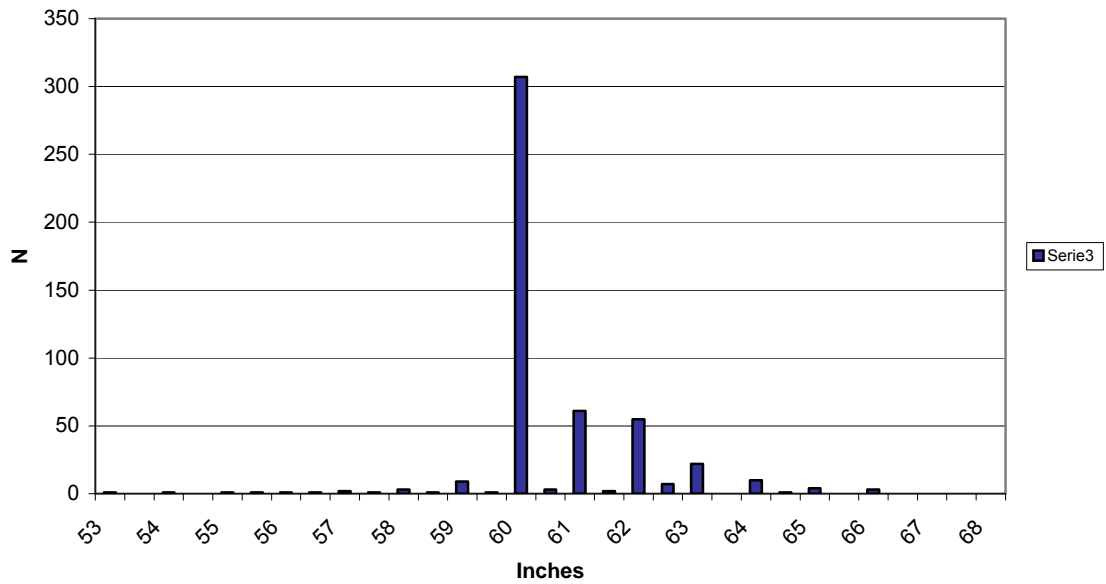
Truncation point used to estimate average height: 61 inches

1st Division Pardos Yucatan (South Mexico)



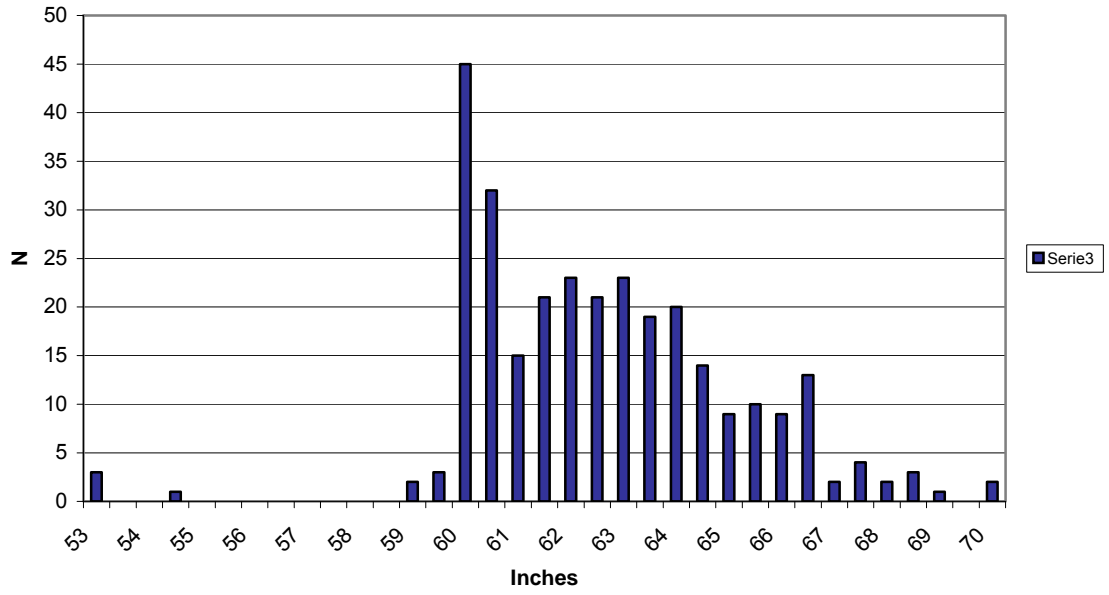
Truncation point used to estimate average height: 61 inches

2nd Division Pardos from Yucatan



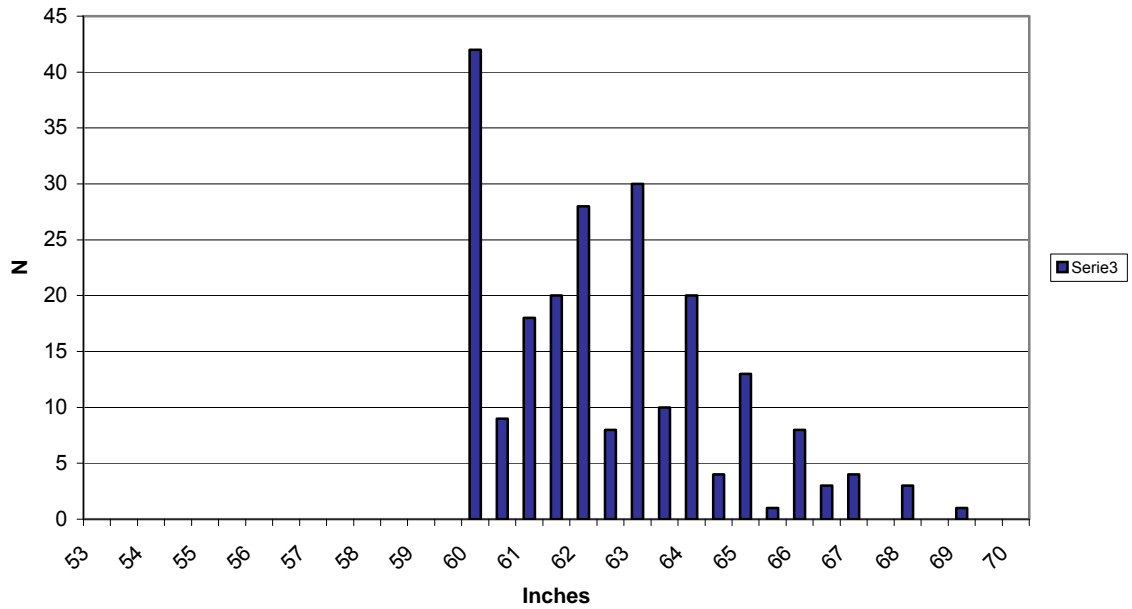
Truncation point used to estimate average height: 61 inches

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

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