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Article

The real wages and living conditions of construction workers in Santiago de Chile during the later colonial period, 1788–1808

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ABSTRACT

The main objective of this article is to determine the real salaries and living conditions of construction workers in Santiago de Chile towards the end of the colonial period (*c.* 1788–1808). To achieve this purpose, we have used the methodology proposed by Allen to calculate real salaries in terms of welfare ratios. Our main conclusions are: the real salaries of non-qualified workers remained above the subsistence levels throughout the entire period studied in this work, pointing to a lack of labour force in Santiago for this period (in spite of a population increase during the same period); there was also a significant proportion of qualified workers in the construction sector who earned 2–3 times more than non-qualified workers, giving rise to a notable heterogeneity in the mean income of workers in this sector and a greater difference than in other cities; despite being above the subsistence levels, the real salaries of non-qualified workers in Santiago appear to be among the lowest in the region, in contrast with previous conclusions in this respect.

Salarios reales y condiciones de vida de trabajadores de la construcción en Santiago de Chile al final del período colonial, 1788–1808

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RESUMEN

El principal propósito de este artículo es determinar salarios reales y condiciones de vida de trabajadores de la construcción en Santiago de Chile al final del período colonial (*c.* 1788–1808). Con este objetivo en mente, hemos usado la metodología propuesta por Allen para calcular salarios reales en términos de ratios de bienestar. Nuestras principales conclusiones son: los salarios reales de los trabajadores no calificados de la construcción permanecieron por encima de niveles de subsistencia para la totalidad del periodo cubierto por este artículo, sugiriendo escasez de mano de obra en Santiago para dicho periodo (a pesar de crecimiento de la población en el mismo); hubo además una importante proporción de trabajadores calificados dentro del sector construcción, los que ganaron 2 a 3 veces más que trabajadores no calificados, mostrando así una gran heterogeneidad dentro de los ingresos promedios de trabajadores en este sector, y una diferencia mayor que en otras ciudades; a pesar de estar por encima de niveles de subsistencia, salarios reales de trabajadores no calificados de Santiago parecen ser de los más bajos de la región, desafiando así conclusiones previas al respecto.

1. Introduction

This essay is concerned with construction workers' real wages and living conditions in Santiago de Chile during the later colonial period, *c.* 1788–1808, making use of Allen's well-known

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methodology to deal with real wages.[1] In brief, Allen expressed real wages as 'welfare-ratios', which in turn measure the purchasing power of nominal wages in terms of a standardized basket of goods (i.e. a 'bare-bones basket', hereafter BBB) needed for subsistence, to give a rough indication of a passable standard of living.[2] The principal purpose of this framework is to assess the living standards of the population of a given country and to compare real wages across countries for particular periods.[3] For instance, it allows for studying income gap levels before 1820 when per capita GDP estimates are difficult to construct or unreliable, in particular for developing countries.[4] Real wages thus calculated are expressed as the number of BBBs a family of four could afford with the nominal wages of an unskilled labourer (in this case construction workers). The period under study is particularly interesting because it coincides with the later decades prior to the so-called nineteenth century 'Great Divergence'. It is also a period about which we know very little regarding living conditions in Chile, so that it is difficult to gather evidence with regard to the income gap between Chile and developed countries at this stage. The years selected to delimit the study (i.e. 1788 and 1808) are arbitrary inasmuch as they correspond to the availability of primary data. We were not able to find any primary (or secondary) source of information which would allow us to extend the period of study backwards into the eighteenth century or forwards into the first half of the nineteenth century. In any case, Chilean independence began in 1810, so the period covered by this paper corresponds, roughly speaking, to the last two decades before independence.

Allen's methodology is easily applicable to Santiago de Chile during this period because free labour was the predominant working regimen,[5] so that nominal wages are a good indicator of workers' income; they are easy to interpret, and in turn they are available to researchers. Indeed, the *encomienda* had been abolished long ago in Chile, while slavery was little used during the late eighteenth century and the beginning of the nineteenth century in Santiago (apart from a few thousand slaves used predominantly in domestic service). It is true that debt bondage persisted in rural and mining areas, but it was less common in Santiago de Chile. Therefore, as far as Santiago de Chile is concerned, we can conclude that the construction labour market was dominated by a paid wage labour regime. Indeed, construction works in Santiago during this period were mostly undertaken by free wage workers. A few prisoners were occasionally used on some construction works, but even in these cases they also received wages. Finally, a good series of price levels are also available for Santiago de Chile (most of them from secondary sources), the other indispensable element for the calculation of real wages.

Thus, our article concentrates on Santiago de Chile's construction workers, and uses the many wages' ledgers kept in the Chilean National Archives (hereafter ANCH). They contain high quality data on wages, as good as the best data available for European cities, at least for the period covered by this essay. The existence and survival of these ledgers is best explained in terms of the unprecedented rate construction of public buildings undertaken in Santiago de Chile from the 1760s onwards, but in particular during the tenure of Governor Ambrose O'Higgins (1788–1796) and in the last years before independence. This boom was part of a positive aggregate economic performance of Chile during the eighteenth century, in particular during the last quarter.[6] For example, the regional economies (formerly isolated) were integrated into a 'colonial' market; Chile exported large quantities of wheat and flour to Peru (produced mainly in the south of the country and in the region of Santiago); mining activities prospered in the north due to increasing demand from Peru and Europe; trade restrictions were relaxed after 1778 with the promulgation of *comercio libre*, which brought the consequent extension of 'free' trade to Lima and Chile as part of the Bourbon reforms, adding dynamism to the export economy; there was a general improvement and growth of Valparaiso port facilities.[7] As part of this economic boom, there was an important period of urban renovation, 'never seen before' in Santiago, the main urban and economic centre of Chile at the time.[8] Finally, the fact that we focus on Santiago is particularly convenient for international comparisons because previous studies tended to focus on the real wages of unskilled construction workers for urban areas.[9]

Of all the surviving wages' ledgers of the construction works above mentioned, the only ones used before our research are those of Casa de la Moneda, which had been used by two scholars only,[10] but more importantly by Quiroz, in a path breaking study covering the period 1785–1805.[11] And indeed, to the best of our knowledge, Quiroz is the only scholar who has previously worked with wages for Santiago de Chile during the late colonial period. As we shall see, despite the importance of Quiroz's published essays, there is plenty of room for further valuable contributions using the Casa de la Moneda ledgers. We have also consulted the equally important construction ledgers for Tajamares del Mapocho, Santiago's Cathedral, Real Audiencia, and the Customs House, which have not been used so far by scholars. At this point it is worth mentioning that beyond Santiago, other economic historians have also produced valuable data on workers' wages for other regions. Such is the case of Carmagnani, who produced a seminal work on miners' wages in *Norte Chico* (Chilean 'little north'),[12] still regarded as the best piece of work on nominal wages for the colonial period.

Yet, despite the important contributions made by those scholars who worked before with primary data on construction workers' wages for Santiago de Chile and miners in the Chilean north, they did not adopt Allen's methodology to assess construction workers' living conditions in Santiago or any other Chilean region. For example, Quiroz, who collected cash wages for the construction workers of Casa de la Moneda, as well as some data on the prices of food, preferred to allocate only a few paragraphs to the purchasing power of construction workers in anecdotal terms, in order to conclude that 'evidently, a peon managed to buy very little with his diary payment'.[13] The only exception for the Chilean case, but based on secondary material only, would be the valuable and recent

[1] Allen (2001) and Allen et al. (2011, 2012). Wages and prices are expressed in grams of silver. Previously, Van Zanden (1999) had already expressed wages in terms of silver and of grain. On this methodology, see also Broadberry and Gupta (2006) and Dobado and García (2010).

[2] The basket is based largely around grain, but may also include beans, meat and butter, as well as small quantities of non-food products such as soap, clothing, candles, lamp oil and fuel. More important than its exact composition, the total daily intake of calories is set at around 1940, with grains constituting the staple item of the diet (Allen, 2001; Allen et al., 2011, 2012).

[3] For a recent criticism of this approach, see Humphries (2013) and Malanima (2013).

[4] Özmucur and Pamuk (2002, p. 294).

[5] Quiroz (2009, 2012) and Araya (1997). For the whole of Latin America, see also Arroyo-Abad et al. (2012, pp. 3–4).

[6] We have no estimates of per capita income during this boom period, so cannot determine whether the aggregate economic rise we are describing was faster than that of the population. This distinction is important because more often than not, in pre-industrial societies aggregate growth meant decline in per capita terms. Nonetheless, the evidence presented in this paper (e.g. Fig. 4) suggests that there was aggregate growth, but not per capita growth.

[7] Carmagnani (2001); De Ramón (1992); Collier and Sater (2004) and Pinto (2010).

[8] De Ramón (1992, pp. 118–119, 137). See also Guarda (1978, pp. 152–154) and Quiroz (2009, pp. 218–219).

[9] Van Zanden (1999); Allen (2001); Allen et al. (2011) and Arroyo-Abad et al. (2012).

[10] Quiroz (2009) and Guarda (1997, p. 225).

[11] Quiroz (2009) and Quiroz (2012).

[12] Carmagnani (1963).

[13] Quiroz (2012, p. 118).

work of Arroyo-Abad et al., a general study of real wages in Spanish America for the period between 1530 and 1820, and which contains estimates for Chile for part of this period.[14] Unfortunately, Arroyo-Abad et al.'s estimates contain some important flaws for Chile, which call for important corrections.

First, when estimating living standards for Chile as a whole Arroyo-Abad et al. combined wages in the main Chilean mining centres (north of the country) with prices in Santiago. This is equivalent to taking the wages and prices of two different countries, thus miscalculating real wages for Chile. Indeed, it is well-known that wages and prices in the Chilean mining districts were higher than elsewhere in Chile,[15] so that deflating nominal wages in the mining centres with the prices of Santiago would inflate the real wages of the population being analyzed, ceteris paribus. Indeed, Arroyo-Abad et al. recognize this fact by acknowledging that mine workers' wages 'may overstate "normal" wages' of the whole country.[16] Although not explicitly mentioned in their work, Arroyo-Abad et al.'s decision could be explained by the lack of alternative wages data for Santiago for most of the period covered by their study.

Another issue with Arroyo-Abad et al.'s estimates for Chile is that the nominal wages data they used for 1750–1799 is for *skilled* miners (*barreteros*), rather than for unskilled miners (*apires*), even though unskilled miners data was also available from Carmagnani from 1750 onwards. This is surprising given that the authors themselves stated in their article that 'we only consider payments to workers in low-skill occupations'.[17] This is also of consequence because skilled miners during the 1780s and 1790s earned, on average, 40% more than unskilled miners. This issue has other important implications because the cash proportion (monetized) of monthly wages for skilled miners in the Norte Chico was $12[18] during the late 1780s and nearly $10 during the 1790s.[19] In contrast, according to our data, for a comparable period (1788–1808), the most common cashed wage of a construction worker in Santiago de Chile was between $5 and $7 per month.

Finally, when calculating total nominal wages Arroyo-Abad et al. considered the cash wages component only, ignoring the non-cash component of workers' income, which consisted mainly of food, thus diminishing the actual total income of miners. This, we assume, is explained by the fact that the original data they used did not contain the non-cash component of workers' income for 1690–1749, so that for reasons of uniformity the non-cash component was ignored altogether, even after 1750. This, again, has important implications, because as we shall discuss below, the non-cash component of workers' wages was mainly food, essential for the estimation of the living conditions of labourers. In brief, on the one hand Arroyo-Abad et al. underestimated real wages for Chile by not including the non-cash income, but on the other hand they overestimated Chilean real wages by taking the wages of skilled workers in the north and combining these wages with the prices of Santiago. Thus, they were lucky in the sense that correcting these two issues may have little impact on corrected real wages as a whole because they counterbalance each other. We will return to this point later on.

Equally important, the historiography for this period (Chilean in particular) usually portrays the working class as a uniform group, living in extreme poverty, therefore without notable real wages differences. This is more evident in the works of authors such as Villalobos, León, Salazar and De Ramón.[20] As a consequence, there is a distinction between the living standards of the Chilean elites (often referred to as the '300 families') and the rest of the population, but not between the different groups which made up the rest of the population. Or in the words of Collier and Sater, Chilean colonial society was divided in two: the elites and 'everybody else'.[21] Therefore, by exploring real wages differences among labourers, we can gain a better understanding of all the disparities in real income within this 'everybody else' category, which as we shall see were substantial for Santiago.

All in all, this essay sheds new light on workers' living conditions in Santiago at the end of the colonial period by calculating for the first time real wages for this city in particular, not only for unskilled workers, but also for skilled ones, a neglected area not only in Chile but in general for most of Latin America.[22] This is important because real wages are virtually the only solid information we have on standards of living in developing countries before 1820.[23] We also correct the only previous estimates available of welfare ratios for workers in Chile (i.e. those of Arroyo-Abad et al.), thus improving our understanding of the labour market during this crucial period before independence. In particular, we conclude that, if compared to other locations of Spanish America, real wages were not as high as Arroyo-Abed et al. found for Chile for the 1780s–1800s in particular.

This paper consists of 4 other sections. In the next section we deal with unskilled construction workers' nominal wages. We then turn our attention to prices in Santiago in order to calculate the cost of a 'bare-bone basket' for these unskilled workers. In the following section we estimate real wages based on the data produced in the preceding two sections, not only for unskilled, but also for skilled workers. Finally, we compare these real wages for Santiago with those of unskilled workers in other cities.

Table 1
primary source of information for all cash wages used in this essay.

Year	Construction work	Year	Construction work
1788	Catedral de Santiago	1798	Casa de Moneda
1789	Catedral de Santiago	1799	Casa de Moneda
1790	Catedral de Santiago	1800	Casa de Moneda
1791	Catedral de Santiago	1801	Casa de Moneda
1792	Casa de Moneda	1802	Casa de Moneda
1793	Casa de Moneda	1803	Casa de Moneda
1794	Casa de Moneda	1804	Casa de Moneda
1795	Casa de Moneda	1805	Casa de Moneda
1796	Casa de Moneda	1806	Real Audiencia
1797	Casa de Moneda	1807	Casa de Aduana
		1808	Casa de Aduana

Source: ANCH, Fondo Contaduría Mayor, First series, volumes 1054, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1068, 1069, 1072, 1089, 1238; Second series, volumes 1229, 1340, 1349, 1362, 1365, 1386, 1393, 1413, 1416, 1471, 1514 and 1517.

2. Unskilled construction workers' nominal wages in Santiago, 1788–1808

This section deals with unskilled construction workers' nominal wages in Santiago between 1788 and 1808. Table 1 provides the name of Santiago's public works for which each year's information was extracted to build the series shown in this paper.[24] For

[14] Arroyo-Abad et al. (2012).
[15] Carmagnani (1963, p. 80); Pinto (2010, pp. 373–374) and Quiroz (2012, p. 106).
[16] Arroyo-Abad et al. (2012, p. 7).
[17] Arroyo-Abad et al. (2012, p. 14).
[18] We have used $ to refer to pesos of 8 *reales*, the monetary unit used in this paper.
[19] Carmagnani (1963).
[20] León (2002a, pp. 67–69); León (2002b, pp. 254–255); De Ramón (1992, pp. 106–111); Villalobos (1961, pp. 51–53) and Pinto and Salazar (1999, pp. 9 and 98).
[21] Collier and Sater (2004, pp. 18–20).
[22] Arroyo-Abad (2013, p. 116).
[23] Özmucur and Pamuk (2002, p. 294).
[24] In all, we collected data for around 1000 weeks during 21 years, which gives a total of about 18,000–20,000 records entered into our database.

each of these works, the wages ledgers were categorized by their relevance to unskilled workers and skilled workers respectively. Here we are mainly dealing with the first group. Workers received part of their payments in cash (i.e. in specie), weekly,[25] but it is also important to note, they were given food while at work. This non-cash part of the wages is known as 'natural' salary in the literature, as opposed to the monetized or cash salary.[26] That is, total nominal wages would be the sum of the value of the food provided at work, plus the cash remuneration, as previously considered by Carmagnani for the Chilean north,[27] Johnson for Buenos Aires,[28] and other world leading scholars on this subject such as Broadberry and Gupta for Asia.[29] Yet, Quiroz has claimed that it is inaccurate to adopt this methodology because this is 'more a historiographic interpretation than a wages reality', adding that even though there was indeed provision of food for workers, the food provided was independent of the cash payment; it was accounted for in different ledgers from the cash payment; and there was no explicit amount of food to be given per day.[30] In a radical decision, Quiroz decided to ignore the payments in food altogether,[31] even though Quiroz herself is aware of the fact that during the late colonial period workers could spend as much as 80% of their total income on food.[32] In all, we are in strong disagreement with Quiroz on this point.

Quiroz may have a point to make, but it is difficult to maintain that the food provided was independent of the cash payment: if the worker did not turn up, no food was given (nor cash). Furthermore, whether the food provided was accounted for in a different ledger or not seems to have been more of an accountancy issue than an income-related one. Indeed, considering labourers worked, or could work, 12 h per day for 6 days per week, then the food provided while at work could represent an important part of their total income. Peons cared very little about whether the food they received was, or was not, accounted for together with the cash payments they also obtained. What they really cared about was whether this food was, or was not, important for their total income. In the same vein, although for different reasons, Allen et al. (2012) also ignored non-cash payments in their total nominal wages' calculations: 'sometimes wages were paid exclusively in cash, and sometimes they included food, drink, or accommodation. We have focused primarily on cash wages because estimating the value of in-kind payments is difficult'.[33] The said difficulty has been overcome here.

Before going any further, it is worth noting that authors such as Romano told us before that wages, in general, remained stagnant in Chile during the period we are dealing with in this paper, although Romano's evidence is patchy and does not relate to unskilled labourers in particular.[34] Of more interest to us here, for the particular case of Santiago, Quiroz previously found that for construction workers in Casa de la Moneda, between 1792 and 1805, the 'cash' wages of unskilled workers remained without any change whatsoever (at $6 per month).[35] We wanted to verify and expand Quiroz's results and collected comparable data for the same period for Casa de la Moneda, but we have also collected data from other construction works for four and three years before and after, respectively, the period covered by Quiroz. Our results can be seen in Fig. 1.

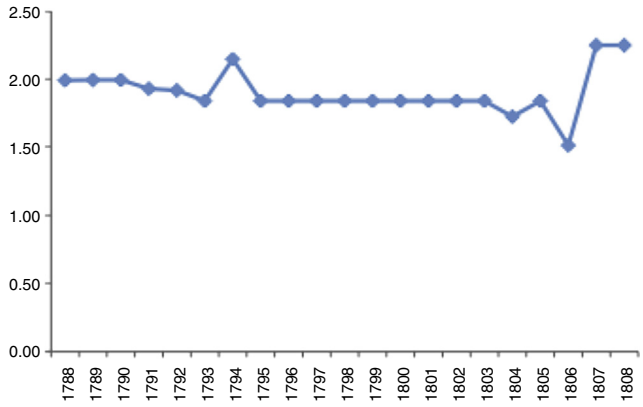

Fig. 1. Cash wages of unskilled workers, reales per day, 1788–1808. (Most unskilled workers were paid the same rate, although there were some variations in the rates paid to them within the same week. We have used the mode, rather than averages, to calculate annual wages because an overwhelmingly majority of workers falls within the modal rate.)
Source: See Table 1.

Our findings are in line with those of Romano and Quiroz, but rather than complete stagnation we found some annual variations for the cash component of nominal wages. It is true that between 1788 and 1805 daily payments were on average 1.8 reales per day in 11 out of 18 years, but it is also true that within this period the series oscillated between a maximum of 2.1 and a minimum of 1.7 reales per day. Even for Casa de la Moneda, 'cash' wages of unskilled workers departed from the fixed rate reported by Quiroz in 1792, 1794 and 1804. For these three years, the temporary increase in 1794, which is coincident with an important increase in the prices of jerked beef (the main staple food for labourers) for that year also, is particularly significant. Finally, the values for 1806–1808 depart from the general trend observed in the previous years, but this may be because these wages relate to different construction works of the previous 18 years.

Having collected data on cash wages, we now need to add natural wages (non-cash) in order to obtain total nominal wages. Workers typically worked 12 h a day, so that they received breakfast and lunch during their workday.[36] This routine is similar to that of workers in Buenos Aires, where the working time per day was 11–12 h.[37] The food given in Santiago consisted mainly of *charqui* (jerked beef, and only occasionally fresh meat),[38] bread, *frangollo* (boiled wheat), fat, beans, chilli, onion, salt and water. To convert the value of the food provided into cash salary, we have estimated the actual value of the food provided to workers per day worked. We examined in particular the ledgers of Tajamares del Mapocho for the period 1794–1805, which provide unmatched evidence, and found that jerked beef and bread accounted for 40% and 38% (respectively) of the money spent on feeding the workers, followed distantly by *frangollo* (5%), while fat, beans and chilli

[25] As shown recently by Quiroz, cash payments (in specie) were very common in Chile during the late eighteenth century (Quiroz, 2012, p. 99). This is in line with Johnson's work for Buenos Aires (1990) but contradicts Romano (1963, pp. 38–40) and Romano (1965, pp. 34–35).
[26] Carmagnani (1963).
[27] Carmagnani (1963).
[28] Johnson (1990, pp. 140 and 143).
[29] Broadberry and Gupta (2006, p. 13).
[30] Quiroz (2009, pp. 214–215).
[31] Quiroz (2009, p. 222).
[32] Quiroz (2009, p. 253).
[33] Allen et al. (2012, p. 869).
[34] Romano (1965, pp. 44–45).
[35] Quiroz (2009, p. 229).
[36] Carmagnani (1963, p. 69) and Salazar (1985, p. 236).
[37] Johnson (1990, pp. 137 and 140).
[38] This means that Chilean construction workers consumed more meat than elsewhere (but mainly dried). According to Allen, for poor labourers around the world, 'meat was rare and consumed mainly on ceremonial occasions'. Allen et al. (2012, p. 872). In contrast, in Santiago, jerked beef was consumed in a regular fashion. It is worth noting that elsewhere, jerked beef was mainly regarded as slaves' food, being unpopular among free workers. That is, the high consumption of jerked beef in Chile would be exceptional among the free population of the Americas.

Table 2
Annual total wages of unskilled construction workers in Santiago de Chile, 1788–1808 (pesos per year).

Year	Nominal wages, $ per annum		
	Cash wage	Value of food given at work[a]	Total wage
1788	70	56	126
1789	70	57	126
1790	70	57	126
1791	68	55	122
1792	67	54	121
1793	64	52	117
1794	75	61	136
1795	64	52	117
1796	64	52	117
1797	64	52	117
1798	64	52	117
1799	64	52	117
1800	64	52	117
1801	64	52	117
1802	64	52	117
1803	64	52	117
1804	60	49	109
1805	64	52	117
1806	53	43	96
1807	79	64	143
1808	79	64	143

Source: For cash wages, same as in Table 1, and for the value of food given at work, same as footnote 39.

[a] Estimated as 81% of cash wages (or 45% of total wages).

accounted for about 3% each.[39] These findings tally with evidence found by Carmagnani for the north,[40] and by Quiroz for Casa de la Moneda,[41] and the road between Santiago and Valparaiso.[42] In all, our own calculations estimate the value of daily food rations at about $4–6 per worker per month, depending on the year.

More importantly, based on Tajamares' ledgers, we estimate that for 1794–1805, the value of the food given at work was, on average, 81% of the cash salary (45% of total workers' income), not a negligible amount. Thus, we have used this rate (i.e. 45%) to calculate the total nominal salary for 1788–1808 for unskilled workers.[43] The results are shown in Table 2. Indeed, our findings are in line with the work of Salazar, who estimated that for Serena food accounted for 37.5% of the total salary in 1792 ($5 in cash, and $3 in food).[44] Likewise, Carmagnani also found that for skilled miners, the 'natural' salary accounted for 32% and 29% of the total salary for 1780–1789 and 1790–1799, respectively, while for unskilled miners food accounted for a higher rate of total income: 45% and 41%, respectively for the same periods.[45]

At this point, it is worth mentioning that in order to calculate annual cash wages, we endeavoured to collect average daily payments on a weekly basis. Incidentally, (when available) we found that there was no variation in the daily payment within each week. Unfortunately, for most construction works the daily (or weekly) rate payment was not available, and instead a referential monthly rate was reported within the ledgers for each week. Such was the case for Santiago's Cathedral and Casa de Moneda for 1788–1805. Thus, when only this monthly rate was available every week, we obtained the daily cash wages assuming that the working week consisted of 6 days per week, and that on average a month has 4.345 weeks (i.e. 26.07 working days per month, excluding religious holidays). This is not to say that all peons worked the equivalent of 26.07 days per month, but this monthly payment accounts for the maximum monthly salary they could have obtained had they worked all working days within a month. Fortunately, in the ledgers of Real Audiencia and Real Casa de Aduana, daily rates were reported every week (i.e. for 1806–1808).

With the average daily payment we obtained for each year, we multiplied it by 280 days. Why 280? Of the 365 days of each year, 52 were Sundays, which leaves a maximum of 313 workable days only. But, following Allen's recommendations,[46] we need to deduct religious holidays and also those days when because of bad weather workers could not work. Fortunately for us, the accountant of Tajamares was assiduous in recording all non-worked days for a wide range of years, information we have not seen elsewhere. Thus, according to the ledgers of Tajamares, for the years 1793 and 1798–1803, there were on annual average 25 religious holidays, and because of bad weather conditions and other non-specified reasons, construction works stopped for another 9 days per annum, which would take the actual workable days to around 280 per year.[47] Thus, we have extrapolated these results to the whole period covered by this paper. In the same vein, but with regard to Spain, during the late eighteenth century and early nineteenth century, Campomanes estimated that peons worked 270–280 days per annum, which is confirmed by recent research on this topic.[48] For Buenos Aires, 290 working days were previously estimated by Urquijo for the same period.[49] Beyond the Americas, in 1771 in England, 280 days were also estimated as days of work per year.[50]

Yet, we are aware that this may be a liberal assumption.[51] While skilled construction workers tended to work continuously all year round (or for whatever time they were hired for) on the same construction work, unskilled construction workers had a less regular pattern of work, as was previously found for Santiago de Chile by Quiroz and for Buenos Aires by Johnson.[52] It is assumed that unskilled workers did not work continuously on the same construction work (although we do not know if they worked elsewhere the days they did not turn up to the construction work they usually undertook). Thus, Johnson believes that 245 days per annum is a better estimate for unskilled workers in Buenos Aires, while Allen et al. and Arroyo-Abad et al. took 250 days for the countries they analyzed in Latin America, although no clear explanation is given about how exactly these lower estimates were obtained. Indeed, Allen et al. (2012, p. 869) recognize that 250–275 is a fair estimate, but they used 250 days for reasons of 'uniformity' only. Moreover for the particular case of Chile, Arroyo-Abad et al., despite declaring that they assumed 250 workable days per annum, in practical terms the annual wages they calculated come from the monthly wages reported by Carmagnani, which are referential wages only, assuming miners worked the whole month. Thus, Arroyo-Abad et al. did

[39] ANCH, Contaduría Mayor, First Series, Volumes 1068 (1793), 1069 (1795), 1071 (1797), 1072 (1798), 1073 (1799), 1074 (1800), 1076 (1801), 1077 (1803), 1054 (1804–1805).

[40] Carmagnani (1963, p. 69).

[41] Data collected by Quiroz for 1792, 1794 and 1796–1802 shows that in the construction of Casa de la Moneda, of the total spent on food, 41% and 34% was spent in jerked beef and bread, respectively. Quiroz (2009, pp. 245–246, 256). Both are very similar to the rates we found for Tajamares.

[42] Quiroz (2012, p. 108).

[43] We could not find similar information for other construction works, and certainly not for the construction works listed in Table 1. Nonetheless, we believe that the situation in Tajamares del Mapocho was representative of the industry as a whole.

[44] Salazar (1985, p. 235). See also Quiroz (2012, p. 106).

[45] Carmagnani (1963, pp. 82–83).

[46] Allen et al. (2012, p. 869).

[47] ANCH, Contaduría Mayor, Serie I, 1793 (1068), 1798 (1072), 1799 (1073), 1800 (1074), 1801 (1076), 1802 (1078), 1803 (1077).

[48] García-Zúñiga (2011) estimated that between 1750 and 1850 there were approximately 282 workable days in Spain, which is in line with our own data.

[49] Information reported in Johnson (1990, p. 145).

[50] Allen and Weisdorf (2013, p. 721).

[51] And as already highlighted by Allen and Weisdorf (2011, p. 716), it is also reasonable to assume that the working number of days per year was constant. See also Voth (2001) on this topic.

[52] Quiroz (2009, pp. 227–228) and Johnson (1990, pp. 143–144).

not multiply daily wages by 250, instead they multiple monthly wages by 12, and therefore whether they believe labourers worked 250 or 275 days per annum is of little consequence, if of any at all. Indeed, by taking Carmagnani's monthly wages, they have implicitly assumed that labourers worked 280–290 days or even over 300 days per annum.

Overall, the fact that unskilled workers did not generally work the whole month on a particular construction work poses an important challenge when calculating actual annual income for unskilled workers. Johnson, for example, thinks that in Buenos Aires it is hard to imagine that unskilled peons worked 6 days per week during 52 weeks per annum in the same workplace.[53] This is reasonable to assume, given the evidence available to us, in particular considering that real wages in Buenos Aires were the highest in the region (i.e. peons could afford not to work the whole week given their high wages). But what is puzzling for Santiago is that, if (as we have been told before) peons received daily wages which were barely enough to guarantee subsistence, how did they survive if they did not work as regularly as skilled workers did? We can speculate that they got involved in other paid activities besides the construction work they usually undertook. That is, in aggregate they did work continuously, albeit in different workplaces.[54] In any case, we have assumed that 280 days is a better estimate than 250 days because in practice it was possible for unskilled construction workers to work continuously had they wanted, and indeed many of them did so regularly. That is, we are interested in the potential annual income of this group.

3. Prices in Santiago and the cost of a 'bare-bone basket', 1788–1808

In general terms, we were under the impression from previous works that during the period this article is concerned with, prices in Santiago remained stagnant. That is, at least, the conclusion provided by Romano in his renowned work on eighteenth century Chile, although he does not provide any data to support his results.[55] Better information is available from Larraín and Carmagnani,[56] who show that for basic products the picture is mixed, as can be seen in Fig. 2, which is quite different to the impression given by Romano's work. Indeed, rather than stagnation, important fluctuations are observed even in the short run, which seems to have been fairly common during the colonial period in Spanish America.[57]

To start with, the price of wheat flour increased dramatically between 1789 and 1800, but remained stagnant later on. Prices of jerked beef oscillated frequently, but they show a clear increasing trend towards the end of our period. This is important because, as we established above, jerked beef and bread were the main staples of construction workers' diet, with the two together constituting over three quarters of the expenditure on food for the construction works for which we have data available. As for other products included in the BBB, the price of clothing was also higher during the late 1790s than elsewhere, while we could say that only the price of beans and firewood remained stagnant during the whole period, but of course with some annual variations to note. The implications of these price movements for our study are important, as we shall see later on.

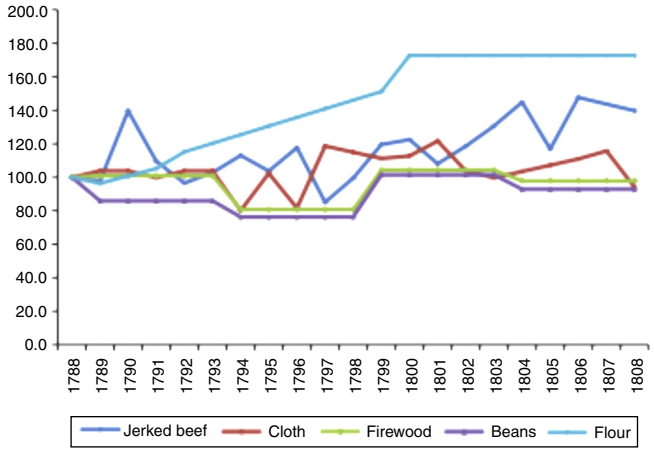

Fig. 2. Prices of essential products in Santiago, 1788–1808 (index, where 1788 = 100).
Source: Own elaboration from prices found in Carmagnani (2001) for jerked beef and Larraín (1992) for all others.

The core of the 'bare-bone basket' (BBB) used to calculate Allen's real wages consists of the cheapest available food in one locale that provides most of the calories needed for survival to such an extent that the total basket must supply about 1.940 calories and 60–90 g of protein per day for an adult male.[58] For the Chilean case, Arroyo-Abad et al. (2012) were able to include in their BBB the following three products: wheat (albeit indirectly),[59] jerked beef and cloth (given the prices available to them), but they were not able to include soap, firewood, candles and lamp oil, as originally intended. Instead, they adjusted the cost of the BBB obtained using three products only, assuming that wheat, jerked beef and cloth accounted for 81% of the basket (thus adjusting by the missing 19%).[60]

Given the data we have seen on the actual food consumed by construction workers in the case of Santiago, we have slightly modified this basket by including beans, which were popular among the working class. Accordingly, we have reduced the amount of wheat included in the BBB suggested by Allen in order to keep the intake of daily calories constant (Table 3). We have also included the prices of firewood,[61] but we were unable to get prices for soap, candles and lamp oil, and were also forced (as were Arroyo-Abad et al.) to adjust the value of our BBB, but by 12% only (rather than by 19%). Thus, our new BBB accounts for 1938 calories per day (the same as Arroyo-Abad et al.) and 93 g of protein per day (slightly more than Arroyo-Abad's estimate of 89 g).

As can be seen in Fig. 3, the cost of the BBB increased importantly from the late 1790s, mainly due to the significant rise in the prices

[53] Johnson (1990, p. 144).
[54] Our interpretation at this point is, therefore, at odds with those scholars who portray Santiago's peons as lazy people. See, for example, Villalobos (1961); León (2002a,b) and De Ramón (1992).
[55] Romano (1965, pp. 39–42).
[56] Carmagnani (2001) and Larraín (1992).
[57] Arroyo-Abad et al. (2012, p. 6).
[58] At this stage, it is worth mentioning that this level of calories has been regarded recently as too low by Humphries (2013).
[59] Arroyo-Abad et al. did not have prices of wheat at their disposal and instead used prices of flour. The problem is that they equated the price of wheat to the price of flour. Instead, we have assumed that the price of flour (per kilogram) was 20% higher than that of wheat. We could not find prices for both wheat and flour for Chile (or for other Spanish American cities for our period of study), so we used instead prices for these two commodities for New York, where for 1788–1808, the average annual difference was 20% in favour of flour. Data available from Centres for International Price Research: http://www.vanderbilt.edu/econ/cipr/cole-historical-data.html. We assume this 20% mark up was similar in Chile.
[60] The annual consumption of each product within the basket used by Arroyo-Abad et al. come from Allen (2001) and Allen et al. (2011).
[61] The most common firewood used in Santiago de Chile was *espino* (acacia caven). Based on information provided by the Californian Consumer Energy Center (www.consumerenergycenter.org/home/heating_cooling/firewood.html), we have assumed that *espino* gave 22 MBTU per cord, and that each cord contained 2500 pounds of dry firewood.

Table 3
Bare-bone basket (BBB) in Chile for an adult male.

Category	Good	Unit	Calories per unit	Grams of protein	Annual consumption (units)
Food	Wheat	kg	3370	88	114
	Beans	kg	1455	71	42
	Jerked beef	kg	2500	200	105
Total (daily)			1938	93	
Other	Firewood	MBTU			3
	Soap	kg			1.3
	Candies	kg			1.3
	Lamp oil	kg			1.3
	Cloth, linen or cotton	m			3

Source: For jerked beef, firewood, candles and cloth (Allen, 2001; Allen et al., 2011; Arroyo-Abad et al., 2012). For wheat and beans, we modified the quantities suggested by Allen et al. based on our own evidence as in footnote 39.

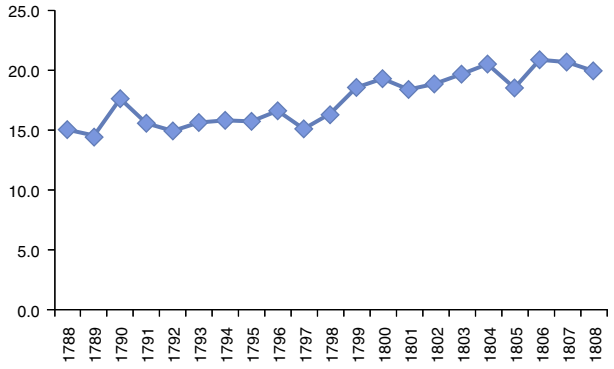

Fig. 3. Cost of a BBB for an adult male in Santiago, 1788–1808 ($ per annum).
Source: Fig. 2 for prices and Table 3 for the products' weights within the BBB.

of wheat and jerked beef as noted above, which, ceteris paribus, would decrease real wages. But we return to this point in the following section. At this stage, it is important to mention that Allen et al. and Arroyo-Abad et al. multiplied the cost of their BBB by a factor of 3.15. These works have assumed that a family of 4 people (two adults and two children) consumed the equivalent of three male adults' BBB, arguing that 'the recommended calorie intake of one man, one woman, and two children is approximately equal to that of three men'.[62] We have agreed with this assumption. This entails multiplying the individual cost of a BBB by 3.

The other 0.15 comes from the fact that the cost of each BBB was increased by 5% ($0.15 = 0.05 \times 3$), on account of the hypothetical cost of housing. Yet, no explanation is given about how exactly this rate was reached. And indeed, it is difficult to estimate the cost of housing for unskilled construction workers in Santiago given the informality of the housing market and the patchy evidence available to us. As an example of this complexity, given the lack of sound data on housing rent, Larraín was forced to estimate the cost of housing based on the cost of construction materials, thus estimating that for eighteenth-century Santiago the cost of housing was 16% of total consumption expenditure.[63] For the same period that this paper is concerned with, Johnson found that the cost of renting a room in the centre of Buenos Aires between 1790 and 1810 was well beyond the purchasing power of unskilled workers in that city. In any case, Johnson assumed that the cost of housing was 20% of the consumption basket of all workers in Buenos Aires between 1776 and 1811.[64] Thus, on account of these higher estimates for Santiago and Buenos Aires, we have increased the cost of housing to 10% of the BBB of unskilled workers, rather than 5% (30% in total for the whole family). Yet, we recognize that further work is needed in this area.[65] But what is clear is that unskilled constructions workers slept somewhere and paid for it, directly or indirectly. Indeed, according to De Ramón (1992, pp. 93–95) during our period of study, together with an increase in Santiago's population, there was also an expansion of the city's suburbs in order to house the population.

4. Real wages of construction workers in Santiago de Chile, 1788–1808

Allen's proposed framework used to calculate real wages consists of three basic steps. First, we need to measure the annual wage income of an unskilled labourer (preferably in the building industry). We have done this already, but we have also calculated the non-wage income of construction workers in order to obtain a total nominal income for unskilled construction workers in Santiago. This is an important contribution by itself, which previous scholars were not able (or willing) to produce.

Second, we need to estimate the value of a BBB required for the survival of a family of four, implicitly making use of a Laspeyres price index, since quantities are fixed. We have also done this in the previous section. At this point, it is worth clarifying that we are not necessarily assuming that an average working class family in Santiago was composed of two adults and two children. The rationale behind this assumption is to have an indicator of the actual income a male would need to generate in order to support such a family, That is, the hypothetical cost of maintaining a whole family at subsistence level. As has been argued already by Allen, this is an arbitrary assumption about the size of the family, but anyone who objects to this assumption[66] can ignore it: 'in that case, the welfare ratio is just a peculiarly scaled real wage index'.[67] In any case, according to Goicovic, in urban centres like Santiago, most houses contained one family only, and, more important for us here, these urban families, in general, comprised no more than five people.[68] In the same vein, according to Carmagnani, in a parish of Curicó in 1777, there were 1.6 children per home, while in the Mincha parish, there were 2 children per home.[69] That is, in any case, a family of four for Santiago during the period covered by this paper seems to be a reasonable assumption.

Third, we need to calculate real wages, which in this case is the ratio between the total income of the construction workers and the value of the BBB. That is, we need to estimate the 'welfare ratio', which is the number of BBBs that can be obtained with the income of the unskilled labourer. For those unfamiliar with this methodology, a welfare ratio of one implies that the total wage of the unskilled construction worker is just enough to afford the most basic consumption of a four-person family, or that an unskilled labourer working full time could earn just enough to support such a family at subsistence level. If the welfare ratio is below one, the nominal wage is insufficient for feeding, clothing, and housing his family.

[62] Allen et al. (2012, p. 875). Nonetheless, later on, in a paper published with Weisdorf, Allen acknowledged that, at least for agricultural workers a family poverty line computed from tripling the costs of a man's BBB was probably insufficient (Allen and Weisdorf, 2011).
[63] Larraín (1992, p. 122) and De Ramón and Larraín (1982, p. 345).
[64] Johnson (1990, p. 152).
[65] For example, in Allen et al. (2012, p. 875), they believed that 5% was a minimum rate, recognizing that it could be as high as 10%.
[66] See for example Humphries (2013, pp. 697 and 705), for objections to this point.
[67] Allen (2001, p. 427).
[68] Goicovic (2006, pp. 33–34).
[69] Carmagnani (1967, p. 190). Likewise, Pinto has also provided referential data on the cost of feeding a family of four in the North, thus assuming that such size was also a reasonable assumption (Pinto, 2010, p. 374).

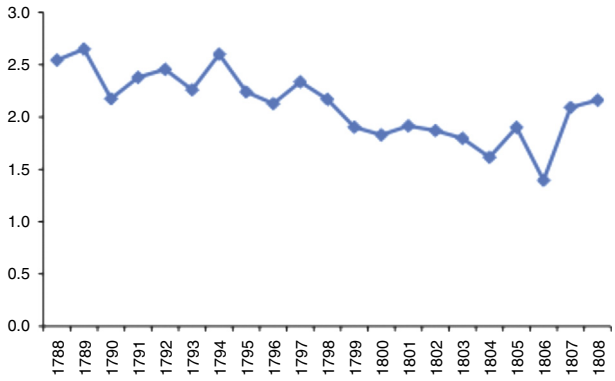

Fig. 4. Real wages (i.e. welfare ratios) of unskilled construction workers in Santiago de Chile, expressed as welfare ratios, 1788–1808.
Source: As in Table 2 and Fig 3.

Our own calculations show that the average welfare ratio of unskilled construction workers in Santiago for 1788–1808 was 2.1,[70] with a maximum of 2.7 (in 1789) and a minimum of 1.4 (in 1806), as seen in Fig. 4. That is, the real wages of unskilled construction workers were high enough to support a family of four at subsistence level, and there was still some income available to be spent on other necessities (e.g. tobacco, alcohol and sexual services). This is at odds with Quiroz' judgement that unskilled construction workers in Santiago during this period earned barely enough to live on,[71] or with Pinto's similar conclusions for the whole of Chile.[72] Indeed real wages in Santiago were above subsistence levels during the whole period covered by this essay, suggesting labour scarcity in the city, which seems to have been a general problem in Hispanic America during this period.[73] For other Chilean regions, we know that nominal wages were higher in the mining districts, and this probably made the north even more attractive than Santiago for free workers.

It is also interesting to note that between 1795 and 1804 the welfare ratio of Santiago's unskilled construction workers declined from 2.7 to 1.6, in part due to the increase in the prices of wheat and jerked beef, while nominal wages remained stagnant. Thus, in the short term the most important determinant of real wages seems to have been changes in price since nominal wages did not adjust to price shocks. But this fall in real wages could also be seen as a result of an increasing supply of labour in the city. These results force us to analyze what happened to Santiago's population during our period of study. After all, real wages must respond to market conditions.

According to Carmagnani, the population of the Bishopric of Santiago (to which Santiago belongs, but which encompasses a wider area, from the Atacama desert to the Maule river) increased importantly during the last decades of the eighteenth century, in particular after the 1760s–1770s, a phenomenon which also applies to the whole of Chile. For example, in 1777–1778, the population of the Bishopric of Santiago was 183 thousand people, and it increased quickly to 383 thousand by 1813.[74] This suggests an important increase in the supply of labour in Chile, including Santiago, which surely pushed down real wages in this city, as was suggested more generally by Carmagnani for the whole of Chile.[75] Unfortunately we do not have precise numbers for Santiago in isolation to the rest of the country, but qualitative evidence suggests that Santiago's population was increasing rapidly during this period. Indeed, according to De Ramón (1992, pp. 89–90, 106–107), in his famous history of the city, during the 1780s and 1790s it is clear that Santiago's population was on the increase (in particular the lower classes). De Ramón believed that it doubled between 1779 and the late 1810s. This being the case, we are in the presence of a remarkable increase in unskilled labour supply in the short run, which must have pushed down real wages in all sectors of the economy, including construction.

So far we have concentrated on unskilled construction workers' wages and living conditions. Yet there were an equally important number of skilled workers working alongside unskilled labourers on the construction works undertaken in Santiago during our period of study, and their earnings were quite different. Therefore, it is worth analysing these differences. After all, 'relative prices and wages are crucial sources of information about the structure of the economy and its level of development'.[76] Indeed, for all the construction works we have collected data on the number of workers employed during 1788–1808, 13% of them were skilled, by no means a negligible amount.[77] Furthermore, for some particular construction works this rate could be as high as 40–45% during long periods of time, as in the construction of Santiago's Cathedral between 1788 and 1791. In turn, within the skilled group, it is worth mentioning that 38% were bricklayers and 41% carpenters, these being the two most important skilled professions for the whole period covered by this paper.

But the crucial point to make here is that these skilled workers earned far more than unskilled workers (i.e. there was a substantial skill premium). Fig. 5 portrays the most common wage received by bricklayers and carpenters. Carpenters, for instance, obtained about 4 reales per day, that is, twice as much as most unskilled construction workers (shown in Fig. 1). Bricklayers, in turn, were a step above carpenters, being paid 3 or 4 times more than unskilled workers. This significant cash wage difference between unskilled and skilled construction workers is at odds with the idea portrayed in the Chilean historiography about a uniform working class. Villalobos, for example, has said that all members of the working class 'were born poor, lived and died poor, leaving no other mark than their children, who suffered the same fate'.[78]

More importantly, the difference between unskilled and skilled wages in Santiago seems to have been higher than elsewhere,[79] which is not surprising given the apparent negative links between

[70] If compared to the data of Arroyo-Abad et al. for Chile, the common period between theirs and ours is 1788–1799. For this period, our average welfare ratio is 2.3 and theirs is 2.1. Yet we assumed a higher cost of housing. Assuming the same cost of housing (to make both welfare ratios fully comparable), our average welfare ratio for this period would be 2.5 (19% higher than Arroyo-Abad et al.). Our higher welfare ratio is mainly explained by the fact that we considered non-cash income within total nominal wages, and this more than counterbalanced the fact that Arroyo-Abad et al. took cash wages of the north (higher than those of Santiago). Finally, it is worth mentioning that the 'average' data reported for Chile by Arroyo-Abad et al. for the period 1775–1820 is 2.4, which according to their own online appendix, is not the average but the maximum rate (Arroyo-Abad et al., 2012, pp. 2).

[71] Quiroz (2012, p. 118) and Quiroz (2009, pp. 255–258). In the same vein, De Ramón (1992, p. 112) portrays the lower classes of Santiago de Chile as a homogenous lot, living in miserable conditions, 'which could not be more asphyxiating'.

[72] Quiroz (2009, pp. 255–258) and Pinto (2010, pp. 374–375).

[73] Dobado and García (2010, pp. 262–263).

[74] Carmagnani (1967, pp. 183–185) and Carmagnani (2001, p. 308). For the Central Valley, which would be equivalent to the Bishopric of Santiago excluding Norte Chico, Pinto shows a similar increase between 1778 and 1813 (Pinto, 2010, p. 372).

[75] Carmagnani (1967, p. 191).

[76] Van Zanden (2009, p. 121).

[77] These are the works listed in Table 1, plus Tajamares for 1793, 1795–1803 and 1805; Real Audiencia for 1804. For these other works, we consulted these volumes: ANCH, Fondo Contaduria Mayor. Volumes 1068, 1070, 1072, 1073, 1074, 1075, 1076, 1077 and 1078.

[78] Villalobos (1961, p. 52).

[79] Indeed, in an analysis of 20 different European cities, for the period 1750–1799, only in Warsaw was the skill premium of construction workers above 100 (116 in fact). Only outside Western Europe were there skill premiums similar to those of Santiago (Van Zanden, 2009, pp. 127, 131–132).

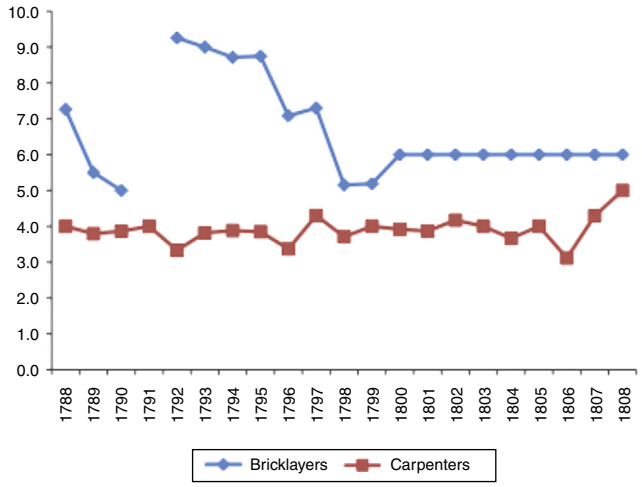

Fig. 5. cash wages of skilled workers, reales per day, 1788–1808. (As in Fig. 1, we have used the mode since most skilled workers were paid the modal rate).
Source: See Table 1 and Fig 1.

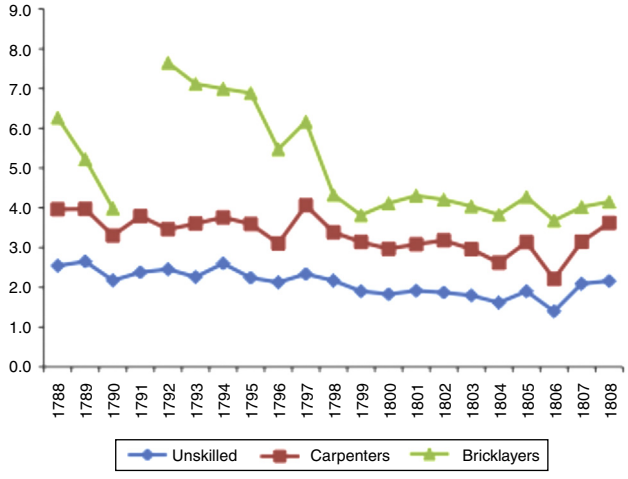

Fig. 6. Real wages of skilled and unskilled construction workers in Santiago de Chile, expressed as welfare ratios, 1788–1808.
Source: As in Table 2 and Fig. 3.

income per capita and skill premiums.[80] For instance Özmucur and Pamuk found that for 1790–1809 the wages of skilled workers in Istanbul were 'just' 88% above those of unskilled,[81] and not the 100–300% gap of Santiago. In the same vein, Allen et al. found that in China, skilled construction workers during 1769–1795 earned wages just 23% higher than unskilled workers did,[82] again suggesting less inequality than in Santiago. Similar results are found for London, where skilled construction workers got 55% and 63% more wages than unskilled workers for 1750–1799 and 1800–1849, respectively.[83] In Madrid, the capital of the Spanish empire (to which Chile belonged), in 1750–1799 and 1800–1849, skilled construction workers obtained 102% and 106% more than unskilled,[84] a substantial difference[85] but lower than in Santiago (at least if

[80] Van Zanden (2009, p. 125).
[81] Özmucur and Pamuk (2002, p. 301, Table 1).
[82] Allen et al. (2011, p. 12, Table 1).
[83] Allen (2001, p. 416, Table 1).
[84] Allen (2001, p. 416, Table 1).
[85] Indeed, according to data provided by Llopis and García-Montero (2011, p. 307), during 1750–1799, Madrid's skill premium in the construction sector was the highest in Europe, at least for the 14 European cities with available data.

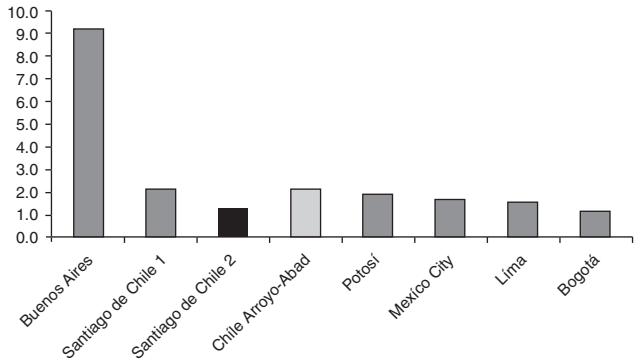

Fig. 7. Real wages (i.e. welfare ratios) of unskilled workers in Spanish America, average for 1788–1808.
Source: Fig. 4 for Santiago de Chile 1 and 2; Arroyo-Abad et al. (2012) for all others.

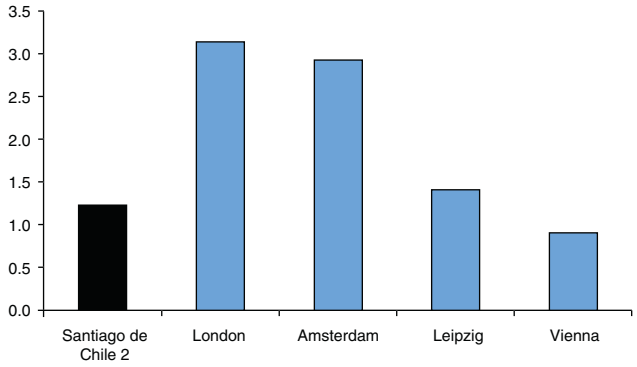

Fig. 8. Real wages (i.e. welfare ratios) of unskilled workers in Santiago de Chile and several European cities, average for 1788–1808.
Source: Fig. 7 for 'Santiago de Chile 2'; Allen et al. (2011) for the rest. The annual data was kindly provided by Prof. Robert Allen.

compared to the wages of bricklayers), while in Barcelona the skill premium for construction workers during 1750–1799 was just 68%.[86]

Indeed, at these cash wages, we estimate that the average real wages (i.e. welfare ratios) of bricklayers and carpenters for 1788–1808, was 5.0 and 3.3, respectively (Fig. 6), well above the 2.1 we found for unskilled workers for the same period. Therefore, these real wages could afford a more than decent living for skilled construction workers in Santiago at the end of the colonial era. They were, for example, higher than the real wages of unskilled construction workers in London during this period (Fig. 8). That is, Santiago's carpenters and bricklayers in particular enjoyed better standards of living than unskilled construction workers in London, where real wages were among the highest in Europe, and indeed London was perhaps the fastest growing city at the end of the eighteenth century.

5. Comparing the real wages of unskilled workers in Santiago with other cities

At this point, an obvious question arises: how did the real wages of unskilled construction workers in Santiago compare with those of other cities for the period covered by this paper? One of the main purposes of using Allen's methodology was to compare our results with those of other Latin American cities and other regions elsewhere. Arroyo-Abad et al. (2012) have already considered part

[86] Llopis and García-Montero (2011, p. 307).

of this comparison for Spanish America[87] but, as we have shown, their data for Chile had several problems, which have already been addressed. But we have also introduced further modifications that make our welfare ratios non-comparable to those of Arroyo-Abad et al. For example, we included non-cash income within nominal wages, and increased the cost of housing from 5% to 10% of the cost of the BBB and increased the workable days from 250 to 280.

Thus, in Fig. 7 we plotted three welfare ratios for Chile. First, the average of the one shown in Fig. 4 (our own welfare ratio for Santiago), labelled as 'Santiago de Chile 1', but which is not, alas, comparable to that of Arroyo-Abad et al. for other Spanish American cities for the reasons mentioned above. Second, trying to produce a ratio more comparable to that of Arroyo-Abad et al., we excluded non-cash income, assumed there were 250 working days, and kept the cost of housing at 5%, thus calculating another ratio (labelled as 'Santiago de Chile 2'), keeping our new BBB (including beans and a new series of jerked beef prices, which are two less relevant differences if compared to those of Arroyo Abad et al.). Yet, still both welfare ratios, ceteris paribus, would not be identical because they took the wages of the north and we took wages for Santiago, but our series is better. Finally, we have included Arroyo-Abad et al.'s welfare ratio ('Chile Arroyo-Abad') as well, to give an indication of the implications of taking wages and prices for the same city and for unskilled workers (ours), rather than taking the wages of skilled miners and combining them with the prices of Santiago.

We should, therefore, mainly concentrate on 'Santiago de Chile 2', but also keep a close eye on 'Chile Arroyo-Abad'. Based on Arroyo-Abad et al., 2012 ('Chile Arroyo-Abad'), we were under the wrong impression that, for the period covered by this essay, apart from Buenos Aires (where real wages were higher than anywhere else in the region and also higher than in Europe, Asia and probably anywhere),[88] unskilled construction workers of Santiago enjoyed the highest real wages in the region. We now know that Arroyo-Abad et al.'s estimates for Chile were inflated, and that our average welfare ratio labelled as 'Santiago de Chile 2' is a better benchmark. In all, Chile's real wages in 'Chile Arroyo-Abad' were 71% higher than our own calculations. And indeed, 'Santiago de Chile 2' is now the lowest of all locations in the sample shown in Fig. 7. That is, if compared to other Spanish American cities, the real wages of unskilled workers in Santiago were slightly above subsistence level but lower than in most Spanish American cities for which evidence is available to us. All in all, we have provided a different picture from that available in Arroyo-Abad et al. (2012).

If compared to Europe, it is true that real wages in Santiago de Chile (without taking into account food remuneration in either case, and assuming 250 working days) were less than half the rates paid in London and Amsterdam (Fig. 8), but it is also the case that these are the capital cities of the most advanced European countries of the time. A different picture emerges if Santiago's real wages are compared to those of other European cities.[89] Indeed, real wages in Santiago during 1788–1808 were just 16% below those of Leipzig but 36% above those of Vienna. These two later comparisons suggest a different picture regarding income differences between Chile, Germany and Austria to that based on Maddison's per capita GDP estimates for 1820, the earliest period for which data is available for Chile, and are in line with the previous work of Dobado and García (2010) for Bogotá, Potosí and Mexico. Indeed, according to Maddison, in 1820 Austria's per capita GDP was 75% higher than that of Chile. Fig. 8, although for an earlier period, suggests rather the opposite. Likewise, the gap between Santiago and London or Amsterdam is lower if real wages are considered in place of Maddison's per capita GDP.

6. Conclusions

We have shown in this paper that unskilled construction workers' real wages in Santiago were above subsistence level for the whole period covered by this essay, in particular before 1800. This is perhaps the most important piece of evidence regarding standards of living for this crucial period in Chilean history, in particular considering the absence of reliable information on production and income for Chile during the decades prior to independence. Additionally, we have also provided sound evidence to support the view that among construction workers, there were substantial differences in real wages. These results suggest that the working class was not a homogenous group, at least as far as earnings are concerned. They also suggest labour scarcity in Santiago during this period, which is in line with Dobado and García (2010) results for other Hispanic American cities.

Both the higher than expected living standards we found, as well as the real wages differences between skilled and unskilled workers are at odds with the usual picture painted by the classic Chilean historiography. We also found a downward trend in real wages for unskilled and skilled construction workers, which was mainly due to shock prices and a relative increase in local population. In any case, this fall was not enough to undermine significantly the standard of living of construction workers in Santiago, who continued enjoying welfare ratios above subsistence levels.

Usually economic historians use per capita GDP as an indicator of living standards or of growth in the long run. The same indicator is also used to analyze trends in the real income gap between rich and poor countries. However, for Chile, given the extant quantitative evidence available to us, it is very difficult to get any estimate of per capita GDP before the mid-nineteenth century, and certainly before 1810, for which we have no series available. This is not the case for Chile only, but was a general problem before 1820 for developing countries.[90] Thus, the data on real wages here provided sheds valuable light on the development of living conditions as an alternative indication of per capita GDP. After all, in pre-industrial societies the material living standard for the bulk of the population will be determined by the purchasing power of the wages of the unskilled workers.[91] Furthermore, thanks to our data, we can also compare living conditions in Santiago with those of several Spanish American and European cities. Thus, we can conclude that real wages in Santiago were among the lowest in Spanish America, slightly less than half of those of London and Amsterdam, but very close to the rates of Leipzig and twice as much as those of Milan. This means that Santiago's labour productivity was not too distant to those of pre-industrial European countries, which is in line with Dobado and García (2010) findings for Mexico and Bogota for 1800–1820. Thus, even though the period we are

[87] In turn, Dobado and García (2010) calculated grain wages and meat wages for Bogotá, Potosí and Mexico.

[88] Arroyo-Abad et al. (2012, pp. 8–9). Buenos Aires' high real wages were due to a combination of very low prices and very high nominal wages in part due to a relative labour scarcity and land abundance. Indeed, there was a very high land/labour ratio if compared to the rest of the region. This situation, according to Johnson (1995, p. 412), started with the creation of the Viceroyalty of the River Plate in 1776, which 'initiated a long period of chronic labour shortage that persisted until the era of large-scale immigration in the 1880s.

[89] We have not included northern Italy because Malanima (2013) convincingly shows that Allen underestimated real wages in Italy. Regarding Spain, we could not find 'welfare ratios' based on Allen's BBB, but we know that nominal wages in Madrid were high within Europe, some 51% and 66% higher than those paid in London and Amsterdam respectively, for the period 1780–1799 (Llopis and García-Montero, 2011, p. 306), even though there was a fall in Spanish real wages as a whole during the second half of the eighteenth century (Alvarez Nogal and Prados de la Escosura, 2013, p. 6).

[90] Özmucur and Pamuk (2002, p. 293).

[91] Clark (2007, pp. 21–22).

dealing with is a relatively short one, our findings shed new light on the origins of a gap in real wages between developed and developing countries.

Finally, we are aware that it is difficult to extrapolate construction workers' real wages in Santiago to the whole of the Chilean labour market.[92] In order to obtain more conclusive results, we would need to provide evidence that building tradesmen were representative of workers in general. Ideally, we would need to compare construction workers' wages to the earnings of other workers in other sectors and regions. Unfortunately, alternative data on wages and prices is not readily available to us. Yet, based on Carmagnani's study, we know that there was an important migration of workers lured by higher wages to the north of Chile. That is, the living conditions of construction workers in Santiago do not appear exceptionally high if compared to other sectors and regions. Last but not least, further research is needed on the rural sector, in order to gain a better understanding of all workers' living conditions during the decades immediately prior to Chilean independence.

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[92] Nonetheless, it is well known that the use of a series of wages in the building industry is a standard procedure by economic historians (Malanima, 2013, p. 46).