

Inequality in Chile before the first globalization: an approach derived from agricultural market income, 1830s-1850s

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This article assesses agricultural market income inequality by examining three untapped comprehensive agricultural censuses of all of Chile, undertaken in 1834, 1838 and 1852. Since there had been no Chilean income inequality measurements prior to 1860, this is a novel contribution. Given Chile's great dependence on the agricultural sector during the pre-industrial period of the 1830s to 1850s, measures of agricultural market income inequality can safely be taken as a proxy for total income inequality. This study found that agricultural market income inequality was extremely high during the first decades after Chilean independence. Gini coefficients for agricultural market income among landowners were 0.75, 0.75 and 0.79 for 1834, 1838 and 1852 respectively, while the figures for the entire rural Chilean population, including the landless, were 0.79, 0.87, and 0.89. Around 85% of the population did not own any land and for an unskilled labourer to rent a plot of 1,500 hectares in 1834 cost 3.3 years of wages, and annual wages of 11.3 in 1838. In a conclusion that is at odds with previous historiographical findings, our data suggest that inequality in Chile was very high and had begun to increase decades before the first globalization.

Desigualdad en Chile antes de la primera globalización: un acercamiento a través del ingreso agrícola de mercado, 1830-1850

PALABRAS CLAVE: desigualdad, propiedad de la tierra, ingreso agrícola, Chile.

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*H*aciendo uso de tres censos agrícolas para la totalidad de Chile que hasta ahora habían permanecido poco explotados, y que fueron realizados en 1834, 1838 y 1852, este artículo examina la desigualdad del ingreso agrícola de mercado. Ésta es una contribución importante toda vez que, para el periodo anterior a 1860, no disponíamos de ninguna medida de desigualdad del ingreso para Chile. Dada la alta dependencia de Chile del sector agrícola durante las décadas de 1830 y 1850 (un periodo preindustrial), nuestras medidas de desigualdad en el ingreso de mercado agrícola pueden ser tomadas como una buena aproximación a la desigualdad del ingreso total. Encontramos que la desigualdad en la distribución del ingreso agrícola de mercado era extremadamente alta en las primeras décadas que siguieron a la independencia. El coeficiente Gini del ingreso agrícola de mercado entre los propietarios de tierra fue de 0,75, 0,75 y 0,79, y de 0,79, 0,87, y 0,89, para el total de Chile (incluyendo a los sin tierra). También encontramos que aproximadamente un 85% de la población no poseía tierra alguna, y que en 1834 y 1838 tomaba 3,3 años y 11,3 años de salarios totales anuales de un trabajador no calificado para poder arrendar una hacienda de 1.500 hectáreas. La desigualdad en Chile era tremendamente alta antes de la primera globalización, una conclusión que se contradice con lo dicho anteriormente por varios colegas, y nuestros datos sugieren que comenzó a aumentar décadas antes de la primera globalización.

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1. INTRODUCTION

Latin America has been one of the most unequal regions of the planet since the colonial period, although little is known about its historical evolution (Arroyo, 2013; Prados de la Escosura, 2007; Gelman, 2011). Even worse, nowadays the continent has the unenviable record of having the highest within-country inequality (Bértola, Prados de la Escosura & Williamson, 2010; Prados de la Escosura, 2007). If we agree that Latin America's slow progress has to do with the concentration of wealth and political power in elite groups (Bértola & Ocampo, 2012; Bértola, Gelman & Santilli, 2015), then this lack of knowledge about its historical evolution ought to be remedied. It is crucial to gain a better understanding of the origins of inequality in our region, in particular for the countries currently showing the poorest record (Gelman & Santilli, 2011).

Within Latin America, Chile has not escaped this historiographical neglect, although thanks to the recent works of Rodríguez Weber (2014, 2015) we now have a good understanding of income inequality in Chile from the 1860s to the present. Notwithstanding, we are still in the dark about what happened to income inequality in Chile before the period covered by Rodríguez Weber. This is not surprising given that 1810-1860 is the period when the least is known about the new Latin American republics (Bértola & Ocampo, 2012; Gelman, 2011), which is particularly true regarding any measure of inequality (Prados de la Escosura, 2007).

By providing new evidence for the 1830s-1850s, this paper will therefore contribute to a better understanding of the historical evolution of inequality of a currently very unequal Latin American economy (*i.e.* Chile) during this neglected period, a crucial period in Chilean history since it was the bridge between the colonial regimen and the period of the first globalization (Gelman, 2011).

Unfortunately, there is no data on Chile's personal income before the 1850s, and this explains why Rodríguez Weber could not cover this period, but we do have sound information on agricultural taxable income and land ownership for this period thanks to the introduction in Chile of a new tax in 1831 (*i.e. catastro*), which taxed the land's annual market income above a certain threshold¹. By market income we mean the agricultural produce that was actually sold in the market, excluding production for self-consumption and wages². After independence, as in most other new Latin American republics, the

1. It was paid by the landowner or, if the land was rented –far less common–, by the tenant.

2. In this article, the terms *agricultural market income*, *taxable agricultural income* and *taxable income* are used interchangeably.

Chilean state depended largely on trade duties (mainly import duties) to fund government expenditure (Llorca-Jaña & Navarrete-Montalvo, 2016; López Taverne, 2014). Although the *catastro* was not important for the state as an income source, it is relevant to our study.

Indeed, when data on total personal income or total wealth is not available, researchers have increasingly explored inequality proxies such as agricultural income, land ownership and other land related indicators (Willebald, 2015; Bértola, Prados de la Escosura & Williamson, 2010; Gelman & Santilli, 2010), in particular to measure income or wealth inequality before industrialisation (Coatsworth, 1998; Bértola & Ocampo, 2012). This being the case, we are using in this paper measures of agricultural market income (Gini coefficients in particular) per landowner but also estimations for the whole of the rural sector (including the landless), as proxies of income inequality for Chile during the first decades that followed independence. Again, regarding income, we are dealing with agricultural market income rather than with total agricultural income, since we do not consider income coming from wages.

We recognize that we should not equate access to agricultural market income (and its distribution) with access to total wealth (and its distribution), but Chile was a pre-industrial society during the period covered by this paper, highly reliant on agriculture, when land and labour were the key factors of production (Bértola, Prados de la Escosura & Williamson, 2010)³. In the words of Vicuña Mackenna, writing in the mid-1850s: *Chile is above all an agricultural country, all the rest is secondary*⁴. Additionally, Chile's mining sector was not yet fully developed (copper production increased in particular after the 1840s, and nitrate later on), since exports were still constrained by high import duties operating in Britain and high overseas freight rates. Furthermore, it is well known that agricultural income (including agricultural market income) and land inequality are crucial underpinnings of long-term wealth and asset inequality (Frankema, 2010), so it is worth concentrating on such indicators.

Finally, given that some authors have suggested that inequality in Latin America increased during the first globalization of 1870-1913 (O'Rourke & Williamson, 1999; Bér-

3. Apart from land, other forms of wealth, like financial assets and education, were not that important during this period in Chile. In this vein, WILLIAMSON (2002: 67) has recommended the use of land ownership or agricultural income as proxies of income inequalities in those economies where the agricultural sector was big (see also COATSWORTH, 1998; GELMAN & SANTILLI, 2010). The agricultural sector in Chile was the most important employer c.1780-1850 (ORTEGA, 2005). It is also believed that by 1820 90% of the population was rural (ORTEGA, 2005) and that in 1862, this share accounted for 78% (CORREA, 2013).

4. *Mensajero de la Agricultura*, January 1857.

tola *et al.*, 2010), this article provides evidence to inform this debate, since we will be able to compare income inequality in Chile during *c.* 1860-1914 (using Rodríguez Weber's data) with agricultural market income inequality during the 1830s-1850s (our data). Furthermore, Williamson has argued that *most analysts of the modern Latin American economy believe that it has always had very high levels of inequality*, but he believes that *income inequality was not even high in the mid-19th century*, albeit based on little evidence (Williamson, 2010: 227-28). So, comparative evidence is provided here.

All in all, our main findings are that taxable agricultural income inequality Gini coefficients in Chile were extremely high during the first decades after independence, and that inequality was increasing. We also found that a large majority of the rural population did not own land at all. There is little doubt that inequality in Chile's rural sector was very high before the first globalization.

After this introduction, this paper is divided into three more sections. In section two we discuss the nature of our database and the sources used, introducing also the modus operandi of the *catastro* and a sketch of the agricultural sector. In the third section we present our main results, in particular the Gini coefficients of agricultural market income, and other indicators of land concentration. A final section concludes the paper.

2. THE *CATASTRO* AND THE AGRICULTURAL SECTOR IN CHILE

In 1831, under the first presidency of José Joaquín Prieto, a new law was passed in Chile imposing a 4% tax on the market income generated by all land-holdings whose annual market income was equal to or above \$25 (Prado, 1859)⁵ –all figures in this paper are in Chilean pesos. It was a tax on the market income generated by the land itself but also by all property (*i.e.* investment) included on it, mainly cattle and vineyards, as well as improvements made to the land⁶. In other words, it was a tax on total agricultural market income. According to the Minister of Finance, it was an attempt on direct contribution in Chile, a major effort of the State to fully control potential revenues from all agricul-

5. According to BAUER (1972), annual *renta*, the term used in Spanish, should be understood as annual income (rather than profits or wealth). See also MELLAFE (1988), for whom it was a tax on the value of annual production. This makes sense since the agricultural tax replaced by the *catastro* was a 6% tax on sales rather than profits.

6. Certainly other forms of investment mattered too, such as small canals, interior roads, small dams and irrigation facilities. However, these are not explicitly mentioned in the *catastro*, and at this time were in an early stage of development in the Chilean countryside.

tural income, and it was also intended to replace the tithe in the near future⁷. Between 1835 and 1853 both the *catastro* and the tithe were applied⁸. In 1853 the tithe was replaced by a new tax called *contribución territorial*, and in 1861 it was merged with the *catastro* to create a unique agricultural market income tax⁹.

At this point, to give an idea of the purchasing power of \$25 during this period, the annual cash salary of an unskilled construction worker in Santiago c. 1834-52 was \$96, while a rural family of four needed at least \$100 per annum to survive (Gay, 2009). That is, the *catastro* was a regressive tax, taxing not only rich and medium landowners but also the small surpluses of low income farmers. That said, by excluding all plots generating a market income below \$25 per annum (see below our estimates of how many exactly were excluded), we could –wrongly– think that this reform was advantageous to the poorer farmers, who, before the *catastro* was introduced, had to pay a 6% tax on their sales (through the *alcabala de viento*). Nonetheless, for those producing less than \$25 for the market, most of their production was for their own consumption (Bauer, 1970; Ortega, 2005). That being the case, we can conclude that the *catastro* did not benefit the poor.

This new agricultural tax was part of a major tax reform (Eyzaguirre, 1978-79; Gay, 2009; Salazar, 1985; Villalobos, 2010) under the Portalian period (c. 1831-61), characterised by political stability and the introduction of successful economic legislation (Ortega, 2005). Rather than being collected by private officers (as the *alcabala* was), this new tax was collected by government officials of the Factoría General del Estanco (Prado, 1859; Villalobos, 2010). Another reason to introduce the *catastro* was to put an end to the abuses of some private tax collectors¹⁰.

7. The National Archives, UK, Foreign Office, British Consular Reports from Chile (hereafter FO 16). “Memoir of the Minister of Finance, Manuel Rengifo”, 1835.

8. During the 1830s and 1840s, the tithe accounted for about 10% of total fiscal revenues, while the *catastro* accounted for about 2%.

9. This was an initiative proposed by the Sociedad Nacional de Agricultura (SNA) (VICUÑA, 1856). See also EYZAGUIRRE (1978-79). It was highlighted by the *Mensajero de la Agricultura* (February 1857) as one of the great achievements of the SNA.

10. In particular by Factoría General de Especies Estancadas. Government Law of 23 October 1834. All Chilean laws are freely available at <http://www.leychile.cl>. See also EYZAGUIRRE (1978-79: 86).

TABLE 1
Chile's main agricultural and non-agricultural exports, 1844-59
(thousand Chilean pesos of each year)¹¹

Period	Annual Averages (\$000)								
	Agricultural Exports	Copper	Coal	Gold, bullion	Silver, bullion	Silver, minerals	Gold & Silver coins	Sub-Total	Total Exports
1844-49	1,203	2,373	10	236	1,986	9	440	6,257	6,758
1850-54	3,339	3,262	59	69	3,031	738	401	10,899	11,557
1855-59	4,049	8,301	228	9	1,758	1,025	942	16,311	17,707
Shares within total Chilean exports (%)									
1844-49	18	35	0	3	29	0	7	93	100
1850-54	29	28	1	1	26	6	3	94	100
1855-59	23	47	1	0	10	6	5	92	100
Annual Averages (\$000)									
Period	Wheat	Flour	Barley	Beans	Wool	Jerked Beef	Hides (bovine only)	Other agricultural exports	Total agricultural exports
1844-49	239	436	46	50	101	63	128	141	1,203
1850-54	346	1,682	552	161	155	78	95	269	3,339
1855-59	837	1,504	365	59	359	120	423	382	4,049
Shares within total Chilean agricultural exports (%)									
1844-49	20	36	4	4	8	5	11	12	100
1850-54	10	50	17	5	5	2	3	8	100
1855-59	21	37	9	1	9	3	10	9	100

Source: Oficina Central de Estadística (1844-59).

What were the main features of the agricultural sector during this period? There was low agricultural productivity, mainly due to poor techniques¹², poor infrastructure¹³, lack of

14. Latin American export data has some issues, already highlighted by CARRERAS-MARÍN and BADÍA MIRÓ (2008), but nonetheless, to show general trends, the shares here presented can be safely taken as a good proxy of the importance of each product within total exports.

11. The primary agricultural advances introduced in Europe during the agricultural revolution were ignored in Chile for a long time. This was even recognized by the editors of *El Agricultor*, the official publication of the first Chilean Agricultural Society. They highlighted in particular the rudimentary tools used in Chile (*e.g.* low quality plugs); the unawareness of both the importance of crop rotations and the use of clover to feed livestock; the lack of use of fertilizers; the lack of irrigation facilities; poor legislation about water property rights; the fact that livestock was not enclosed; and the unawareness of the positive complementary character of agricultural production and increase in livestock. See in particular *El Agricultor*, volumes 4, 6, 11, 14, 20, 29, 36, 45, 46, 51, 62, 66, and 74.

capital and the absence of financial institutions (Bauer, 2008). The primary and manufactured products of the agricultural sector during this period, and from at least the eighteenth century, were wheat, flour, and the products of cattle-raising such as jerked beef, tallow and hides, followed by barley, beans, legumes, fresh fruits, wine, wool, and timber. Of the most important products, except for the products of cattle-raising, wheat production was confined within small plots, which partly explains the vast number of small rural properties. Most production was consumed internally given the bad state of the internal transport system before the 1860s, which made unprofitable the export of surpluses (Bauer, 1970). This said, many products (flour and wheat in particular, Table 1), were exported (*e.g.* to Peru, later on to California, Australia, Brazil and the River Plate provinces), to the extent that Vicuña went as far as to declare that Chile was at that time the only important agricultural exporter in the whole of South America¹⁴, although this only applies to a few staples.

Nonetheless, despite these exports, there is agreement that the agricultural sector was underdeveloped: it missed the advances introduced in Europe during the first industrial revolution, to the extent that most arable land remained uncultivated for the whole period covered by this paper. The share of the agricultural sector within total exports is small if compared to mining. Only after the introduction of railways did the agricultural export sector become more important (Bauer, 2008; Gay, 2009; Ortega, 2005).

To collect this agricultural tax, the Chilean government had to estimate first the market income produced by all plots. To accomplish this task, the government created a Junta Central del Catastro (Central Board, integrated by five members), which in turn appointed provincial boards (*junta departamental*, of five members each). The provincial board constituted the Governor, the *estanco* administrator, and three of the richest neighbours. This board, in turn, appointed parish boards (*juntas parroquiales*, of five members each, including the local priest, a governor's delegate and three neighbours appointed by the governor himself). Parish boards were responsible for collecting the primary data, which was then revised by the provincial boards, and subsequently validated by the Central Board (Prado, 1859; Eyzaguirre, 1978-79). With this aim in mind, the government undertook a herculean task; a comprehensive agricultural census for the whole of Chile, started in 1832 and finished in 1834 (hereafter 1834 census), which was followed by sim-

12. Stephen Sullivan, the British consul general in Chile, highlighted the fact that *the bad State of the roads throughout the Republic is a great drawback to the agricultural interests of the country*. The National Archives, UK, FO 16/79, "Observations respecting the Agricultural Interests of the Republic of Chile as connected with the present state of Commerce", 29 November 1852.

13. *Mensajero de la Agricultura*, October 1856.

ilar censuses in 1837-38 (hereafter 1838 census), 1852 and a final one in 1861 (Mellafe, 1988). To give an idea of the significance of undertaking these censuses, this was the first complete land survey ever undertaken in Chile (Bauer, 1970), and its full coverage was unique for the region, which is particularly striking in a country where land without an owner was a rarity (Bauer, 2008; Correa, 2013)¹⁵. Furthermore, it was more than a land census since it also included, apart from the extension of the plots, other variables such as cattle and vineyards. Furthermore, we are not aware of comparable data for any other Latin American country during this period¹⁶.

Thus, during 1834 and 1838, for each plot of land generating a market income of \$25 or more per annum, the following variables were registered: province, department, parish, name of property, name of the owners, and annual market income. Whenever applicable, additional information such as the extension of the property (in *cuadras*), vineyards, plants and cattle was also entered. For the 1852 *catastro*, unfortunately, the information is restricted to province, department, property name, name of owners and annual income, thus missing useful information if compared to the previous two *catastros*.

The information entered by government officials in charge of these censuses was naturally not perfect, but nonetheless we believe it is good enough to get a strong measure of agricultural market income inequality¹⁷. After all, and as stated by one of the experts on the subject, when studying inequality in pre-industrial societies, *we must start somewhere* (Milanovic, Lindert & Williamson, 2007: 6), with the best data we have at hand, and ours is not particularly bad. That said, Villalobos (2010) and Bauer (1970) believed that some land owners colluded with members of the *catastro*'s boards to underestimate the annual market income of their properties (in particular the richest landowners)¹⁸, and

15. The church's rural properties were scant, as well as common lands and indigenous land north of the Bío Bío river.

16. For instance, for Buenos Aires, GELMAN and SANTILLI (2010) obtained data on rural wealth rather than agricultural market income, and for Buenos Aires only, rather than for the totality of the provinces. Córdoba was included later on by GELMAN and SANTILLI (2011), with data from 1838 on rural wealth, but for the rest of the River Plate provinces nothing else has been produced on agricultural market inequality before 1858.

17. We cannot take at face value the opinion of government officials in charge of collecting this tax, but it is still worth noting the words of a Treasury Minister: *we have made them [the catastros] with the most possible accuracy, and they have given us a statistical data which is really beautiful* (MINISTERIO DE HACIENDA DE CHILE, 1834-42).

18. This situation reminds us of ENGERMAN and SOKOLOV's (1997) theory that colonial and post-colonial institutions mainly protected the rights of ruling elites rather than the majority of the population. Yet, even if the undervaluation affected mainly the richest landowners, it would not be a major problem for us. Our primary conclusion is that agricultural market income inequality was extremely high. It would only be higher if rich landowners' property was actually undervalued in our sample.

that probably some properties were reported as generating less market income than \$25 per annum to avoid taxation altogether (although this is less probable since the poor had no influence upon government officials). We mentioned above that the estimated market income of the plots was established by local council committees, which were in turn made up of the local priest, a governor's delegate and three "respectable" neighbours (*i.e.* a sample of the richest neighbours), who surely looked out for their own class' interests. This was probably the case, but the information reported in the *catastro* was public, and the 1852 *catastro* was printed, which presumably precluded government officials from making any gross or unfair undervaluation since this information was under public scrutiny. That is, undervaluation probably occurred, but within "tolerable" margins¹⁹. Furthermore, the owners of taxed plots had 25 days to appeal against the value of the market income allocated to their plots (Prado, 1859), which surely also precluded reporting unfair taxes.

And indeed, we have gathered information about successful appeals, for both individual plots and complaints from provinces. For instance, in 1834, Ramón Formas (from Colchagua) presented a formal complaint against the valuation of his plot's income, which was sent by the Minister of the Treasury to the *Catastro*'s Central Board, where it was given a positive reception²⁰. Likewise, by the end of the 1830s, Patricio Vera also filed a complaint for a high valuation of his plot in Santa Cruz, which was also rectified²¹. At a higher scale, in 1841, the Treasury Minister Joaquín Tocornal signed two important decrees ordering the *Catastro*'s Central Board to review and reduce the valuation assigned to most plots in Concepción and Combarbalá²², and something similar took place in 1842 for many plots in Concepción, Maule and Coquimbo²³. This is fragmentary, but there is strong evidence that there was in place an important institutional setting facilitating a fair process for the market income valuation of a plot.

19. In 1856, VICUÑA (1856), speaking to members of the National Agricultural Society, recognized that there was some moderation in the estimation of the value of the annual income of the plots, but he did not mention that it affected any particular group.

20. Archivo Nacional de Chile (ANCh), fondo Documentos del Ministerio de Hacienda, vol. 28.

21. ANCh, fondo Documentos del Ministerio de Hacienda, vol. 27.

22. *Sesiones de los Cuerpos Legislativos de la República de Chile*, 17 June 1841.

23. *Sesiones de los Cuerpos Legislativos de la República de Chile*, 17 October 1842.

TABLE 2
Descriptive statistics of the plots paying the *catastro*, 1834, 1838 and 1852
(plots with a market income of \$25 per annum, or more)

Variable	1832-34	1837-38	1852	Growth 1832-34 to 1837-38 (%)	Growth 1837-38 to 1852 (%)
Number of plots	5,408	9,977	33,040	84	231
Market Income (\$)					
Total market income	1,518,230	2,760,630	7,400,322	82	168
Average plots' income	284	277	224	-3	-19
Min plots' income	25	25	25	0	0
Max plots' income	14,000	16,000	89,000	14	456
Median plots' income	70	75	50	7	-33
Mode plots' income	25	25	25	0	0
Extension (hectares)					
Min	0,4	0,4	N-A	0	N-A
Max	56,520	64,370	N-A	14	N-A
Average	153	341	N-A	123	N-A
Total (millions)	2,55	3,23	N-A	27	N-A
Vine plants (number)					
Min	1	2	N-A	100	N-A
Max	150,000	170,000	N-A	13	N-A
Average	2,083	4,943	N-A	137	N-A
Bovine cattle (heads)					
Min	1	1	N-A	100	N-A
Max	12,000	20,000	N-A	13	N-A
Average	12	132	N-A	137	N-A
Ovine cattle (heads)					
Min	1	2	N-A	100	N-A
Max	8,000	12,000	N-A	50	N-A
Average	12	205	N-A	1,686	N-A

Source: ANCh, fondo Documentos de la Contaduría Mayor de Cuentas, for 1834 and 1838; *Estado que manifiesta...* (1855), for 1852.

Another potentially more serious issue, though, is that by taking only those plots paying the *catastro* we are missing the smallest landowners (those whose plot's market income was less than \$25 annually) and the landless. The potential effects of including those owners whose land market income was below \$25 per annum on any measure of agricultural market income inequality is unclear, in theory. However, we are very lucky that the first *catastro* included the total market income of all the plots in Chile, including those whose annual market revenue was below \$25. That is, we are able to calculate, say, agricultural

income Gini coefficients for all paying the *catastro* but also for all landowners in Chile in 1834. And, as we shall see below, by incorporating all landowners the agricultural income Gini coefficient increased massively in 1834. Nonetheless, we are missing the people without rural land, those working for the big *hacendados*, which is a higher proportion of the population (see below our estimates for this), but we can work out this problem too by making some assumptions, as we shall see below.

Table 2 summarises the primary contents of our databases. Thus, in the *catastros* of 1834, 1838 and 1852 we have 5,408 (plus 15,000, see footnote 24); 9,977; and 33,040 plots entered (with taxable income). That is, over 63,400 rows in total. For each of these land plots we entered at least six variables, so that our database contains around 380,000 records. Should we add the additional records entered for the 1834²⁴ and 1838 censuses then we reach about half a million records. Our primary source of information was Archivo Nacional de Chile (Contaduría Mayor's collection) for the 1834 and 1838 *catastros*²⁵; while the 1852 *catastro* was published as a book (*Estado que manifiesta*, 1855)²⁶.

As can be seen from Table 2, the total number of *fundos* being taxed increased by 84% between the first two censuses and then by a staggering 231% between the second and the third²⁷, reaching over 33,000 plots, a process explained in the next section. Yet, in 1908 it is estimated that the number of agricultural properties in Chile was 37,410 (Mellafe, 1988), not far from the 33,040 recorded more than 50 years earlier, when Chile had already incorporated the northern provinces won by Peru and Bolivia, as well as the southern provinces taken from the Mapuche. That is, the increase in the number of rural properties between the 1830s and early 1850s is truly remarkable. Likewise, the total market income of the *fundos* being taxed reached \$7.4M in 1852²⁸, 168% above the value in 1838, which in turn had been 82% higher than in 1834 (in a period without inflation), although the average annual market income of the *fundos* decreased from \$284 to \$277, and then to \$224 in these periods.

24. For this census we also entered, separately, over 15,000 plots whose market income was below \$25.

25. ANCh, fondo Documentos de la Contaduría Mayor de Cuentas, Dirección General de Estadísticas, Registro de Predios Rústicos.

26. This was part of a law passed in Chile, making this information public, and which had to be published on paper.

27. Between 1837 and 1852, it is estimated that the Chilean population increased from 1,172,914 to 1,487,451 people (BRAUN *et al.*, 2000). That is, a 27% increase, well below that of the plots' total income included in our database.

28. To give an idea of the value of \$7.4 million, in that year (1852), the total value of Chilean exports to the world reached \$12.2 million, while the total value of agricultural exports that year was \$3.9 million.

Having reached this point, we should mention that there is agreement that the 1830s-1850s were characterised by price stability in Chile (López Taverne, 2014), although we have no sound data to hand. Yet, we do know that the exchange rate between the Chilean peso and the sterling pound was remarkably stable during this period, and at the same time inflation in Britain was low, so that we can conclude that, despite the lack of sound data for Chile, given that there was almost a fixed exchange rate between Chile and Britain during this period, there was no inflation in Chile.

TABLE 3
Frequency of plots according to their estimated annual market income

Plot's annual income (\$)	1832-34		1837-38		1852	
	Number of plots	Share (%)	Number of plots	Share (%)	Number of plots	Share (%)
25	654	12	2,054	21	4,739	14
26-49	1,224	23	1,028	10	10,485	32
50-99	1,229	23	2,425	24	8,286	25
100-199	935	17	1,794	18	4,503	14
200-299	340	6	721	7	1,531	5
300-399	239	4	474	5	775	2
400-499	149	3	263	3	457	1
500-599	109	2	212	2	334	1
600-999	177	3	368	4	652	2
1,000-1,999	159	3	324	3	551	2
2,000-3,999	132	2	206	2	400	1
4,000-9,999	53	1	99	1	273	1
10,000 or more	8	0	9	0	58	0
Total	5,408	100	9,977	100	33,044	100

Source: same as in Table 2.

Likewise, it is worth noting that the wealthiest *fundo* increased its annual market income from \$14,000 to \$16,000, and then to \$89,000 during this period. That is, the very rich got richer. And indeed, in 1834 and 1838 there were 352 and 638 plots whose estimated annual market income was above \$999, but in 1852 this increased to 1,282, nearly twice as much as in 1837-38 (Table 3). Furthermore, in 1834 and 1838, the ratio between the richest plot and the poorest of those taxed (\$25) was 560 and 640, but in 1852 it was the even more staggering 3,560. That is, the wealthiest taxed plot in 1852 produced the same market income as the equivalent of over 3,500 small taxed plots (Table 3).

TABLE 4

Market income by provinces of all taxed plots, a thousand Chilean pesos of each year

Provincia	1832-34		1837-38		1852	
	Income	Share	Income	Share	Income	Share
North	159	10	288	10	799	11
Coquimbo	130	9	288	10	419	6
Serena	29					
Atacama					380	5
Central Valley	1,284	85	2,117	77	5,806	78
Aconcagua	276	18	374	14	654	9
Santiago	704	46	1,000	36	2,165	29
Valparaíso					549	7
Colchagua	180	12	417	15	1,107	15
Maule	124	8	197	7	684	9
Talca			129	5	278	4
Ñuble					368	5
South	75	5	356	13	795	11
Concepción	71	5	328	12	354	5
Arauco					108	1.5
Chiloé	0.1	0.01	5	0.2	276	4
Valdivia	4	0.3	23	0.8	57	0.8
TOTAL	1,518	100	2,761	100	7,400	100

Source: same as in Table 2.

Regarding extension, the biggest *fundo* in 1834 and 1838 consisted of 56,520 and 64,370 hectares²⁹, but on average only 153 and 341 hectares. We have no comparable information for 1852. Finally, for the *fundos* we have information on other variables (beside annual market income and extension) for 1834 and 1838; those with the highest number of vineyard plants had 150,000 and 170,000 plants, but on average (of those that reported having vineyard plants) only around 2,000 and 5,000 plants³⁰. As for cattle, on average, those *fundos* with bovine cattle had 12 and 132, while the maximum was 12,000 and 20,000 heads. In the case of ovine cattle, there were 12 and 205 animals, while the maximum was 8,000 and 12,000 heads.

29. Original information was given in *cuadras*. One *cuadra* was equal to 1.57 hectares (TORNERO, 1872).

30. The figures in Table 2 for minimum vine plants and cattle are for those plots that reported having vine plants or cattle. Obviously, many plots did not have either.

As far as the market income of the plots by geographical distribution is concerned, Table 4 contains information on income per region and province (using the contemporary political classification for each period)³¹. Unsurprisingly, since it was the most populated of all regions³², the Central Valley gathered 85%, 77% and 78% of the total market income produced by all taxed Chilean plots in 1834, 1838 and in 1852 respectively, Santiago and Colchagua being the richest provinces. In turn, the Little North gathered 10%-11%, a stable share during the whole period under study. As for the southern provinces, they gathered variable shares of 5%, 13% and 11% in these periods, including the poorest provinces.

Before proceeding to our results, we are aware that during our period of study land prices increased in Chile (Gay, 2009; Rodríguez Weber, 2014), but this would not change our conclusions in this paper since we are particularly concerned about agricultural market income distribution at a given time, rather than market price tendencies. And indeed, a similar caveat has already been made by Gelman and Santilli (2010) when analysing their data for Buenos Aires for a comparable period, in a study concerned with agricultural wealth³³—rather than agricultural market income, as ours is. Nonetheless, it is worth mentioning that land prices increased in particular from 1830³⁴. For example, according to Gay (2009), in 1824 the average price of a hectare in Concepción was \$2, but in 1830 this had increased to \$15-\$20 (*i.e.* an increase of between 650% and 900%). Land prices further increased from the 1840s, after the temporary boom of Chilean exports to Cali-

31. Chile was politically divided into provinces, and provinces in turn into departments (URÍZAR, 1835). During our period of study there were many changes in this political division: some provinces were created (*e.g.* Valparaíso, Atacama, Arauco), others merged with previous ones, and were therefore eliminated (*e.g.* Serena). Arauco was created in 1852, being formerly part of Concepción.

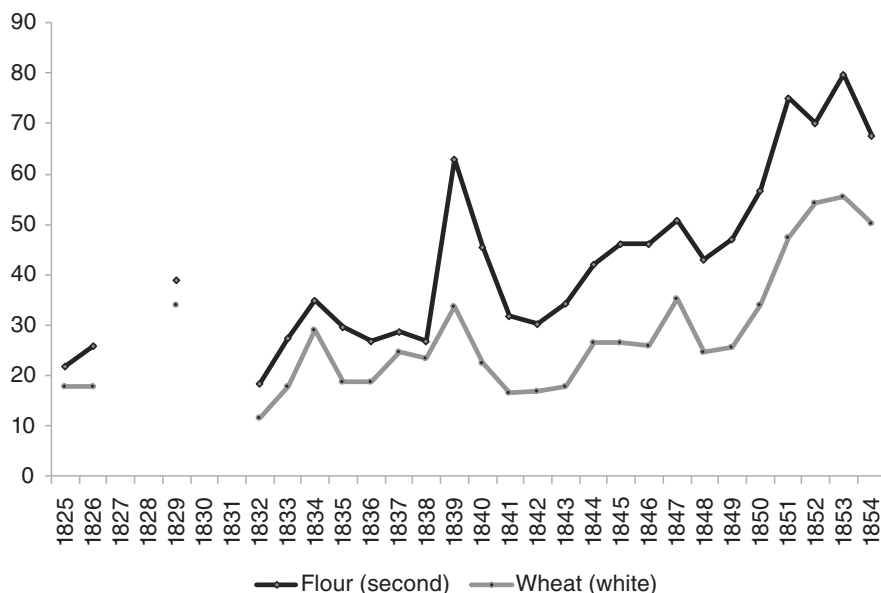
32. In 1835, the Central Valley accounted for 63% of the total Chilean population, while the North had 15% and the South 23% (PINTO, 2010). By 1854 the share of the Central Valley had increased to 72% (LÓPEZ TAVERNE, 2014).

33. Gelman and Santilly gathered data on *contribución directa*, a tax on total wealth, including land, improvements to the land, and cattle for 1839 Buenos Aires. They also gathered data for 1855 for Buenos Aires, but from the fall of Rosas (1852) *contribución directa* was applied to real estates only (that is to land and its improvements, excluding other forms of rural wealth such as cattle). To be consistent, for 1839 they considered wealth linked to real estate only.

34. There are no series available of land prices for Chile. According to AMUNÁTEGUI (1940), before 1650 there were just a handful of land sale operations. Only from the second half of the seventeenth century did land plots start—gradually—to be sold on the market, but prices did not increase. During the eighteenth century land prices started to increase (thanks to increasing exports to Peru), but gradually and slowly, mainly owing to the bad state of roads, lack of bridges, the war against the Mapuche, lack of currency, poor technology, political instability, and lack of canals. It was mainly from the late eighteenth century, after the expulsion of the Jesuits from Chile, and the consequent land expropriation of this religious order—holders of the most productive agricultural land at that time, which was put on the market, and during the nineteenth century, that land prices increased.

ifornia and Australia. For instance, it is estimated that in Ñuble province, land prices increased 200% between *c.* 1840 and *c.* 1860 (Gay, 2009)³⁵.

FIGURE 1
Valparaiso's FOB prices of wheat (\$ per fanega) and flour (\$ per quintal), 1825-54



Source: own elaboration from FO 16 (several volumes).

This increase in land prices is closely linked to the evolution of the price of the main agricultural export staples during this period: wheat and flour. As can be seen from Figure 1, up to 1843 (except for 1839, when there was a war between Chile and the Peru-Bolivia Confederation, and prices rocketed), export prices of wheat and flour remained low. Yet, from the second half of the 1840s there was a sharp increase in export prices, in particular during the early 1850s.

3. FINDINGS ON INEQUALITY

Given that an owner could possess more than one plot, which was fairly common (Bauer, 2008), and that we are interested in particular in analysing agricultural market income

35. Finally, patchy data shows that in La Ligua, the price of a *cuadra* in 1790 was \$70, increasing to \$100 in 1825 (MELLAFE & SALINAS, 1988).

inequality per landowner rather than per plot, we have grouped the data per owner³⁶, with 4,980, 9,229 and 27,860 taxed owners for 1834, 1838 and 1852. Since we do not have a unique ID number per person for this period, as we do today, in gathering plots per owner we faced a similar problem to that encountered by Gelman and Santilli in their works (on agricultural wealth) for Buenos Aires in a comparable period: homonymy. That is, we have many plots that had the same owner's name but perhaps belonged to different people. To ensure that we were grouping plots belonging to the same person only, we followed the same criteria used by Gelman and Santilli (2006, 2013)³⁷. In any case, this caveat aside, our data shows that there was a substantial increase in the number of taxed landowners: 85% between 1834 and 1838, then 202% between 1838 and 1852 (and in turn this increase was higher than the population increase during this later period, *i.e.* 27%), although the average annual market income per owner fell by 2% and 11% during these periods (Table 5).

TABLE 5
Plots' market income per landowners paying the *catastro*

Variable	1832-34	1837-38	1852	Growth 1832-34 to 1837-38 (%)	Growth 1837-38 to 1852 (%)
Number of owners	4,980	9,229	27,860	85	202
Average owners' income (\$)	305	299	266	-2	-11
Gini among landowners	0.75	0.75	0.79	-1	5
Share Richest 20% (%)	81	80	82	-1	3
Share Richest 5% (%)	54	53	65	-1	23
Share Richest 1% (%)	23	23	37	340	62
Share Poorest 20% (%)	2.3	1.6	2.1	-30	31

Source: same as in Table 2.

36. In so doing we excluded from this new database state-owned and church plots. For the 1852 *catastro*, we excluded 102 plots, whose combined income was \$102,456 (or 1.4% of total income). For the 1837-38 *catastro*, the plots excluded were 47 (worth \$60,629, equivalent to 2.2% of total income), and for the 1832-34 census 60 plots (worth \$38,485 equivalent to 2.4%).

37. That is, we used our general knowledge of aristocrats of this period (*e.g.* the owners of big *haciendas* near Santiago usually lived in Santiago, where they also had properties), we also consulted biographical dictionaries of the period, we took into account the commonality or rarity of the surnames, while we also considered the location of the plot (*e.g.* plots with the same owner's name within a province most probably belonged to the same person, especially if these were large plots; but if the plots were located in different provinces, those plots which generated a low income probably belonged to different people). Apart from Gelman and Santilli's criteria, we also considered the size of the plot (or its annual market income), and gender.

The remarkable increase in the number of landowners whose plots generated a market income of \$25 or over per annum needs explanation. We believe that, given that the agricultural sector was mostly damaged by the wars of independence (c. 1810-17), it took time for the sector to recover (Correa, 1938). In the words of Vicuña (1856: 42), this *war was death for agriculture*. It was only from the early 1830s that the sector started to regain some degree of importance (Bernedo & Couyoumdjian, 2010), in part due to the dynamism shown by the mining sector, at a time when mining activities had close ties with agricultural property (Vicuña, 1856; Ortega, 2005). Another factor explaining the recovery of agriculture was the end of the construction of San Carlos Canal in the late 1820s (to connect Maipo and Mapocho rivers), which according to Claudio Gay (2009) was, together with the creation of Almacenes Francos (the Customs Stores system created in the 1820s, in part to promote agricultural exports), one of *the two greatest agricultural creations of the ancient regime*. Other important canals followed: Canal de Pirque³⁸, Canals San Francisco, San Joaquín, San Miguel, Perdices, Nuevo de Maipo, Colina, La Punta and La Pólvora (all in Santiago), Canal de Waddington (Aconcagua), Canals Bellavista and Romero (Serena). This network of canals gave Chilean agriculture a new character; it was now available for entrepreneurs looking to exploit the land and agriculture became the economic and political basis of society and the state (Vicuña, 1856). After this, more land was gradually and profitably incorporated to produce for both the internal and external markets, rather than for self-consumption, in particular by small and medium plots, formerly excluded from commercial circuits. The growing number of landowners was further increased thanks to booming wheat and flour exports from 1840 (when export duties on these products were abolished by the Chilean government; Ortega, 2005). This trend was further accelerated after the gold discoveries in California (1848) and Australia (1852), although exports to Australia were already important by the 1840s. Although the boom was short-lived, it meant increasing exports to these destinations (Bauer, 1970). Likewise, from the mid-1830s Chilean wool (of low quality) started to be exported to the USA³⁹. Furthermore, 1838 saw the creation of the first National Agricultural Society (SNA) of Chile⁴⁰, to promote improvements in the sector through better and updated

38. According to VICUÑA (1856: 44), this was *the most colossal construction work ever undertaken by the private sector in the agricultural sector in Chile*. Before the construction of this canal, over 5,000 hectares of land were not cultivated in Hacienda Pirque due to the lack of water. After the canal (*the best irrigation work of the entire republic*) this land was intensively cultivated and became very profitable. See “El Canal de Pirque”. *Mensajero de la Agricultura*, October 1856.

39. In 1840, consul Rouse reported that *the export of wool to the United States commenced about 1834 and has since continued*. In 1839, 4,000-5,000 quintals were exported, but in the first quarter (alone) of 1840, 7,000 quintals were sent to the USA. The National Archives, UK, FO 16/42, Prices return, 31 March 1840.

40. Its full name was Sociedad de Agricultura y Colonización (CORREA, 1938). This first SNA started to publish a bimonthly journal called *El Agricultor*, published from 1838 to 1848. The “second”

agricultural education and dissemination of good practice (Gay, 2009; Vicuña, 1856). According to a British consul:

*Agriculture has received an impulse from the formation of an Agricultural Society composed of the principal landowners & men of science, who by occasional meetings and the publication of a journal, diffuse information and stimulate a spirit of competition. Many young Chileans of good family are now travelling and studying in Europe, acquiring information upon agriculture and transmitting it to their country, together with tools and instruments adapted to the cultivation of land here*⁴¹.

As part of the SNA's activities, in 1843 it created the Escuela de Artes y Oficios⁴² and in 1842 the Quinta Normal, formally inaugurated in 1852 (Vicuña, 1856).

The early 1850s was a particularly dynamic period for Chilean agriculture, well summarised by a consul in Santiago:

*the high price of grain during the three past years [Figure 1], consequent upon the demand from California, has given a great stimulus to agriculture, and the erection of mills. It is estimated that for three years past, there has been sown each succeeding year, one third more grain than on the year previous*⁴³.

Machinery also started to be introduced in the fields, as was highlighted by the *Mensajero de la Agricultura* in Hacienda de Tango⁴⁴. Thus, *large tracts of land [were] brought into cultivation*⁴⁵ in the country, a process described above. In all, because the price of grains increased (Figure 1), the price of the grain's producing plots –many of which were small– also increased. So, a logical consequence of this was that many plots, formerly producing below the \$25 threshold, started to pay taxes.

SNA started to publish another journal, monthly, called *Mensajero de la Agricultura*, from 1856.

41. The National Archives, UK, FO 16/100, E. A. J. Harris to Earl of Clarendon (London), Santiago, 10 January 1857.

42. This school was, according to its first director, able to produce any agricultural machine requested by local landlords. *Mensajero de la Agricultura*, January 1857.

43. The National Archives, UK, FO 16/84. Vice Consul Cunningham, "Commercial Report for 1852", Talcahuano, 1 May 1853.

44. José A. Eyzaguirre was proud of his machinery to thresh wheat (up to 60 *fanegas* per day). It was mentioned as one of the greatest agricultural advances ever introduced in the country. (*Mensajero de la Agricultura*, October 1856). For more details see also "La Cosecha y la Maquinaria Agrícola", *Mensajero de la Agricultura*, November 1856.

45. The National Archives, UK, FO 16/94. E. A. Y. Harris to Earl of Clarendon (London), Santiago, 12 March 1855.

But this agricultural boom also came hand-in-hand with an intense process of land partition in Chile (Ortega, 2005; Correa, 2013), well explained by Claudio Gay. According to Gay (2009), from the early 1830s the Chilean government was particularly interested in subdividing large land plots into smaller plots. Thus, the government abolished all taxes on sale operations involving small pieces of land; most *mayorazgos* (a colonial institution, which favoured a high concentration of wealth in a few hands)⁴⁶ were also abolished⁴⁷; and finally, as we know, thanks to the new *catastro*, those plots producing less than \$25 per annum for the market did not pay any tax on their annual production. Furthermore, two laws of 1821 and 1823 further promoted land partition (Amunátegui, 1940), and the 1833 constitution ensured a better distribution of land from father to all sons, not only to the eldest⁴⁸. All these changes, concludes Gay, meant that formerly vast and unused pieces of land were “democratised” and made land ownership a more fluid system. Plots were sold and bought more freely than before (in particular small properties), a phenomenon labelled by Gay himself as the *dismemberment* of land, while Mellafe preferred to call it *land atomization*⁴⁹. Vicuña also endorsed these views. Writing in the mid-1850s he noted that a powerful change was taking place in the agricultural sector thanks to land partition (due to population growth and a new inheritance system) and also due to the popularisation of land renting⁵⁰. Besides, road construction increased during this period, before the railways, a process also associated with the emergence of small plots along the new roads (Bauer, 2008)⁵¹.

To reinforce this point, Table 6 shows a clear increase in the volume of the principal agricultural exports during the 1850s, at least if compared to the second part of the 1840s, which is the earliest period for which we have official data on exports per product. In the

46. The first *mayorazgo* was authorised in 1684 (AMUNÁTEGUI, 1940). *Mayorazgos* gave the right to the firstborn son to inherit most of his parent’s estate, in preference to daughters or younger sons, to avoid the risk of sub-dividing a family’s wealth.

47. A new law was introduced to allow the subdivision of *mayorazgos*’ land (VICUÑA, 1856: 77), which was further supported by new legislation in 1855 and 1857, to the extent that these legal changes are said to be *comparable to the end of encomiendas en Chile* (AMUNÁTEGUI, 1940). See also *Mensajero Agrícola*, January 1857.

48. For example, TORNERO (1872) mentions the case of the Hacienda Catemu, property of Vicente García Huidobro. After his death in 1835, the hacienda was sub-divided into four plots, one each for his four sons.

49. Taking into account a longer period of time, from roughly speaking 1600 to 1852, it is estimated that *circa* 1600 Chile was divided into 360 *predios* (plots) only (CORREA, 1938). By 1852 there were over 33,000 plots, so that a plot of 1600 was “dismembered” into over 90 plots by the 1850s.

50. *Mensajero de la Agricultura*, January 1857.

51. This process was not unique to Chile; land fragmentation occurred in many Latin American countries during the first decades after independence (COATSWORTH, 2008).

first half of the 1850s, the combined volume of the two main agricultural exports (wheat and flour) was 118% higher than in 1844-49. Barley exports also increased dramatically: in volume, average annual exports in 1850-54 were over 400% higher than in 1844-49⁵².

TABLE 6
Chilean exports of wheat and flour (annual averages), 1844-64

Year	Wheat (metric quintals)	Flour (metric quintals)	Total (flour converted to wheat)
1844-49	76,999	70,164	165,195
1850-54	88,647	217,818	360,919
1855-59	139,961	147,189	323,947
1860-64	300,915	154,950	494,573

Source: own elaboration from Sepúlveda (1959), who converted flour into wheat by a factor of 1.25.

So, all in all, the numbers of landowners increased importantly, but what about agricultural market income inequality? Our first, and most important, indicator of inequality is the agricultural market income Gini among landowners generating an income of \$25, or more, per annum. For 1834, 1838 and 1852 we obtained Gini coefficients of 0.75, 0.75 and 0.79, respectively, showing significant agricultural market income inequality among landowners, which was on the increase in the later period. In addition, in 1834, 1838 and 1852 the 20% who comprised the richest landowners took 81%, 80% and 82% of all agricultural taxed plots' market rents, while the poorest 20% only took 2% of the agricultural market income of all taxed plots in these three periods (Table 5). This confirms that local elites controlled a vast amount of all national productive land producing for the market.

Moving ahead, and following recent trends in income inequality studies (on this topic, see Bértola, Gelman & Santilli, 2015), it is worth paying even closer attention to what happened to the very rich, or top incomes. That is, not only the richest 20% above reported, but also the richest 5% or 1%. Thus, in 1834 and 1838, the top 5% and 1% richest landowners took 54% and 23%, 53% and 23% of all agricultural market income (of the taxed plots), even increasing these shares to 65% and 37% in 1852. These ratios confirm a massive and increasing inequality in agricultural market income, although the extent of it is striking. It also reflects a quick process of powerful land elite conformation in the early Chilean republican period.

The increasing agricultural market income inequality within taxed plots between 1837 and 1852 may come as a surprise given that we also documented an increase in the num-

52. *Mensajero de la Agricultura*, December 1856.

ber of landowners paying the *catastro*, which is a paradox. But, as we also found in the previous section, as long as the number of taxed landowners increased, so did the share of total market income of those on the top of the pyramid. Nonetheless, we must admit that there is an issue with Table 5: as long as wheat and flour prices increased, together with land prices and plots' income, more plots started to pay the *catastro*, after generating more than \$25 per annum for the market. This means that the population upon which we calculated agricultural income Gini was on the increase (*i.e.* the sample was widening). Indeed, the number of taxed plots increased nearly six fold in twenty years, while the tax collected with the *catastro* increased from \$41 thousand to \$100 thousand between 1835 and 1852.

To avoid the effects of any potential bias in our samples, we would need to calculate new Gini coefficients for all landowners' market income, including those that did not pay the *catastro*. Luckily, for 1834 the data reported by the local *catastro*'s councils included all plots in Chile (21,915)⁵³, even those whose annual market income was below \$25 (16,451 plots). The new Gini coefficient for all landowners is a staggering 0.897 (*i.e.* it increased by widening the sample). However, we have no data for the two other *catastros*, so we are unable to estimate agricultural market income Gini coefficients for all plots in Chile in 1837-38 and 1852.

Furthermore, and perhaps more important, these Gini coefficients exclude the households that did not pay *catastro*. It would be ideal to have Gini coefficients for the whole population, and although we have insufficient data, by making some reasonable assumptions we can estimate Gini coefficients for total agricultural market income including all rural households, even the landless. In order to do this, let's assume that 80% of the Chilean population was rural⁵⁴; that on average a household during this period had six members (two parents and four children)⁵⁵; that there were two groups of landless house-

53. The 1813 census estimated that, excluding parts of the province of Santiago and the whole of Concepción, there were nearly 11,000 plots in Chile. Rough estimations of what is missing in this census would take this number to 15,000-16,000 for the whole of Chile. That is, between 1813 and 1832 the number of plots increased by some 27%-32%.

54. This ratio was previously noted. By 1820, 90% of Chile's population was rural and as late as 1862 this share accounted for 78%, so 80% seems a fair assumption.

55. Rural Chilean families by 1850 had, on average, 5-7 children (SALINAS, 2004), but infant mortality was high and could be over 35% for infants (URIZAR, 1845). For La Ligua alone, couples had five children (MELLAFE & SALINAS, 1988). In the entire province of Maule, on average there were seven people per house (URIZAR, 1845), so, in all, an average family of six people makes sense. For Buenos Aires, the average number of people per house in 1838 was 6.3 (*i.e.* 4.3 children) (GELMAN & SANTILLI, 2011).

holds, those led by *peones-gañanes*, and those led by *labradores*⁵⁶ (following Rodríguez Weber, 2014); that the taxable income of a landless household led by *peones-gañanes* was \$0, which means that they did not sell any surpluses on the market; that landless households led by *labradores* had an agricultural market income of \$24.5 (*i.e.* just below the smallest farmer paying *catastro*); that all households that did not pay the *catastro* but were landowners had an annual market income equal to those of *labradores*⁵⁷; that all landowners that paid the *catastro* were heads of households, and that the head of the household was the only landowner within the family; that *peones-gañanes* and *labradores* were also heads of households.

Having assumed all this, we can now proceed to estimate Gini coefficients for total agricultural market income for the entire rural population. For 1834 it was 0.792; 0.865 for 1838 and 0.889 for 1852⁵⁸. That is, the effect of including all the rural population is that taxable agricultural income inequality increases for each period. Likewise, inequality also increases through time, reaching a high number by the end of our period. In other words, our conclusions regarding agricultural market income would not change much by adding the whole rural population, including the landless. This is at odds with Williamson's (2010) idea that inequality was not high in Latin America by the mid-nineteenth century; at least that does not seem to be the case for Chile's rural sector, as Rodríguez Weber has convincingly shown for a later period for the entirety of Chile.

All this said, *inequality is a complex concept [...] it is always necessary to combine different inequality measures* (Bértola, Gelman & Santilli, 2015: 21), with the aim of getting a better picture of overall inequality for the population under examination. Therefore, apart from the agricultural market income Gini above presented, it is worth analysing other inequality measures if possible. Luckily we can get Gini coefficients for land owned distribution for the first two *catastros*. For 1834, the land Gini coefficient of land owned is a staggering 0.92, if all landowners are considered, and 0.87 if only those that paid the *catastro* are included. For 1838 we have no data for all landowners, but for those that paid the *catastro*, the land Gini is equally high: 0.86. These ratios suggest again

56. Following SALAZAR (1985) and RODRÍGUEZ WEBER (2014), *labradores* refers to *inquilinos* and *minifundistas*. That is, owners of very small plots, or big *haciendas*' tenants that received as part of their payment the right to cultivate some land.

57. This makes sense since RODRÍGUEZ WEBER'S (2014) category for this group was *labradores* and *minifundistas*, grouped together.

58. For a benchmark of total income inequality (not only agricultural market income inequality), Rodríguez Weber estimated a Gini coefficient for total income, including all sectors, for the whole of Chile of 0.515 for 1850. This is not comparable to our findings, but we wanted to give the readers an idea of this author's work for Chile.

a severe inequality amongst landowners in the agricultural sector of nineteenth century Chile.

Another indicator of inequality widely used for pre-industrial societies is land ownership concentration, which is defined as the *share of households owning no land* (Arroyo, 2013). This indicator complements the first agricultural market income Gini above presented, because that Gini coefficient includes only landowners whose annual agricultural market income was equal or superior to \$25. That is, the poorest landowners and the landless are excluded. In part we corrected this issue with the Gini coefficient we estimated for 1834, and with the second pair of Gini coefficients including the whole rural population. To calculate this new indicator we need to make similar assumptions regarding: the proportion of people living in the rural sector; the average size of rural families; landowners' family profile; as well as how land was distributed within households. As we did above to calculate Gini coefficient for total agricultural income, let's assume again that 80% of the population was rural; that on average a household during this period had six members; that all landowners were heads of households; and that the head of the household was the only landowner within the family.

This being the case, for 1834, 1838 and 1852 we estimate that 97%, 94% and 86% of all Chilean households in the rural sector either did not own land at all, or the land they owned generated a market income of less than \$25 per annum. That is, a huge proportion of the population was excluded from owning profitable land. Yet, it is worth noting the decline from 97% to 86% in about twenty years, which is partly explained by the land "dismemberment" process described above. Even if we relax some of our assumptions to calculate this alternative indicator of land inequality (*e.g.* assuming that the number of people per household was higher or that the share of rural population was lower), we would still find that a large number of rural households possessed no land, or land associated with extremely small annual market incomes. Finally, if we calculate this same ratio for all landowners, lifting the \$25 cap (*i.e.* including those owners whose annual market income was below \$25), then in 1834, the only period for which we have sound data to hand, 86% of households did not own any land at all, which is still a large share of the population.

This takes us to another inequality measure used by colleagues studying pre-industrial societies, which is the ratio between land rent and the unskilled workers wage. We have already mentioned that, for pre-industrial societies, the factor prices that mattered most to income distribution were unskilled wages and agricultural land rents (Williamson, 2002). Indeed, the ratio between land rent and the unskilled workers wage conveys the earning power of the wealthy relative to earnings of a large share of the working popula-

tion (Arroyo, 2013). It is a useful index for economies with a big agricultural sector and where big landowners are a minority (Willebald, 2015), as in our case. It can be calculated as the number of full-year salaries an unskilled worker had to accumulate in order to rent a 1,500 hectares plot of land for a year (Arroyo 2013: 44)⁵⁹, although this precise land extension is arbitrary⁶⁰ (and it does not tell us anything about land quality or the capital invested on it). In any case, for 1834 and 1838 we estimated that it took 3.3 years and 11.3 years of his annual wages for an unskilled worker to rent a 1,500 hectares plot of land⁶¹. If compared to other countries of the region, Chile looks similar to Argentina and Venezuela. For instance, it is estimated that in Argentina this same ratio was 4 in 1830 and 12 in 1860, while in Venezuela it was around 4 in 1830 and 11 in 1860. Within the region, Uruguay stands out, with just 1 in 1850 and 5.5 in 1870, but Mexico yielded around 12 in 1830 (Arroyo, 2013), the only country which was clearly worse than Chile *circa* 1832.

4. CONCLUSIONS

Before this article we had little information about wealth or income distribution in Chile before 1860. This is important because Chile's lagging economic growth may be partly

59. To calculate these ratios Arroyo used urban workers' wages –as we do here too. Land rental values were obtained by ARROYO (2013) from land prices using the D. Jorgenson derivation: *in a nutshell, the land rental value is the product of value and the combination of the prevailing interest rate and the depreciation rate for land*. That is: $\text{land rent} = \text{land value} * (\text{interest rate} + \text{depreciation})$, where depreciation was fixed at 2% and interest rate was taken as the interest rate of the country's international bonds. Since we do not have the land value for most plots, just the annual income of the plots (but income coming from both the land and the capital on it), to estimate land value (on its own) we selected plots of 1,500 hectares that did not have either cattle, or vineyards, that is, they were just land. We then assumed that the annual income of the plots was 5% of the land value and its investments (based on several properties for which we had both land value and annual income, from other sources besides the *catastro*). This 5% is also proposed by VICUÑA (1856) as a fair rate or return for land in Chile. We then kept 2% as depreciation (as Arroyo, but also as suggested by the *Mensajero de la Agricultura*, October 1856), and as interest rate we took 12%, which was the interest charged by British merchants (the main providers of capital in Chile at that time) to local businessmen. According to VICUÑA (1856), Chilean agriculturalists borrowed at a minimum interest rate of 10% before the late 1850s (when the Caja de Crédito Hipotecario was created, to lend to farmers at 8% per annum), but higher rates were more common, so our 12% makes sense.

60. Arroyo justifies this precise land extension in terms of a *historical lower-end estimate*, but then the average size of the plots of the economies she analyzed are either higher or lower than 1,500 hectares.

61. Following ARROYO (2013), for 1834 and 1838 we calculated the average rent of all plots included in our sample (with no investments on them) with an extension close to 1,500 hectares (*i.e.* between 1,450 and 1,550 hectares, to widen the sample). The values were \$316 and \$1,088, respectively. We then divided it by the annual salary of an unskilled construction worker (\$96), which remained fairly constant. Unfortunately, we cannot make these calculations for 1852 because data on land extension is not given.

explained by a colonial and early post-colonial inequality. It is, therefore, crucial to know more about the origins and development of the massive inequality that has characterised this country. Unfortunately, we have no data available on total income inequality for Chile before 1860 (the period after that is well covered by Rodríguez Weber). However, thanks to a new tax applied in Chile, we do have good data on taxable agricultural income distribution amongst landowners for the 1830s-1850s, as well as for land distribution for the 1830s, which can be used as a reasonable proxy for both total agricultural income inequality and total income inequality, given Chile's high dependence on the agricultural sector during this period, and given the general correlation between agricultural income inequality and persistent wealth and asset inequality suggested by Frankema.

Thus, we have found in this paper that agricultural market income inequality in Chile in the first decades after independence was extremely high, regardless of the inequality measure used. In modern parlance, and as far as agricultural income distribution is concerned, after independence there was a persistence of *extractive institutions*, to the benefit of a minority or elite group (Acemoglu, Johnson & Robinson, 2001). Providing new and strong data our findings are in line with previous assertions that Chile was a case of *severe structural inequality*, where small-scale producers (farmers) could not challenge large *hacienda* owners (Bértola & Ocampo, 2012; Correa, 2013; Mellafe, 1988), and that most of the population (rural) lived under harsh conditions (Ortega, 2005). A few at the top of the landed elite took most of Chile's agricultural income, and we are now able to quantify the extent of this phenomenon for the first time. The high concentration of land and agricultural income of the colonial regime persisted after independence. Our findings are also in line with Milanovic, Lindert and Williamson's (2007) general assertion that in pre-industrial societies *inequality was driven largely by the gap between the rural poor at the bottom and the landed elite at the top*.

All in all, we found a very high taxable agricultural market income Gini coefficient among landowners. If we include the landless and smaller landowners (*i.e.* those that did not pay the *catastro*) in our calculations, we get even higher Gini coefficients for taxable income, this time for the whole of rural Chile. Likewise, the richest 5% of the landed elite took between 54% and 65% of all agricultural market income during the 1830s-1850s. We also estimated that the share of rural households owning no land or land generating a taxable agricultural income was extremely high. Finally, we estimated that if an unskilled worker wanted to rent a plot of 1,500 hectares, he had to save the totality of his wages during 3.3 and 11.3 years in 1834 and 1838, a similar rate compared to other countries of the region for which we have comparable data. This severe agricultural income inequality was the norm from the beginning of Chile's foundation as a republic, and surely

also from the colonial period, although we do not have quantitative data to enable us to be more precise about the colonial roots of agricultural income inequality⁶².

Likewise, our new quantitative evidence (on agricultural market income inequality), combined with that of Rodríguez Weber on total income inequality (and which covers a much longer period), is at odds with Williamson's assertion that *historical persistence in Latin American inequality is a myth* and that total income inequality decreased between c. 1790 and 1870 (Williamson, 2010). At least Williamson's idea is not applicable to the agricultural market income inequality of Chile. Chile has been an unequal country since its early foundation until the present day. Furthermore, our data can be set alongside that of Rodríguez Weber, although they are not comparable since our Gini include only the market income of the agricultural sector while Rodríguez Weber's data is for total income. The two sets of data would suggest that during the 1830s-1870s inequality was increasing in Chile, which, again, does not match Williamson's idea that Latin American inequality increased mainly during the first globalization. This, of course, is only a tentative conclusion, but our data does suggest that agricultural market income inequality started to increase several decades before the first globalization (c. 1870-1913). The increase we show in agricultural market income inequality is consistent with the Stolper-Samuelson's model (Prados de la Escosura, 2007). As soon as Chile deepened its entry into the world economy and expanded its international trade sector, the relative position of land improved (*i.e.* land prices increased), and given the initially high level of agricultural income distribution, agricultural income tended to increase.

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62. That said, there is agreement in the historiography that from the seventeenth century to the first decades of the nineteenth century there was little change in the structure of agricultural property in Chile: it was based on very large landholdings, the property of a reduced elite (BORDE & GÓNGORA, 1956).

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