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Stellenbosch Economic Working Papers: 23/10
11 OCTOBER 2010

KEYWORDS: SOUTH AFRICA, VOC, GINI, WEALTH, COMPARATIVE, KUZNETS, WILLIAMSON
JEL: N37, D31, D63

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A WORKING PAPER OF THE DEPARTMENT OF ECONOMICS AND THE
BUREAU FOR ECONOMIC RESEARCH AT THE UNIVERSITY OF STELLENBOSCH

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Income inequality in the Dutch Cape Colony[1]

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ABSTRACT

The arrival of European settlers at the Cape in 1652 marked the beginning of what would seemingly become an extremely unequal society, with ramifications into modern-day South Africa. In this paper, we measure the income inequality at three different points over the first century of Dutch rule at the Cape. What emerges from the study is a society characterised by severe inequality, with a relatively (and increasingly) poor farming population combined with pockets of wealth. The inequality is driven largely by wheat and, especially, wine production, which gave rise to an elite. Historical evidence supports our findings: Amongst others, the imposition of sumptuary laws in 1755 is closely correlated with a more segmented elite which includes both alcohol merchants and (wine) farmers. We compare these measures to those of other regions and time-periods in history. Although the exact level of inequality is determined to a large extent by our assumptions, the Cape Colony registers one of the highest Gini-coefficients in pre-industrial societies. This provides some support to verify the Engerman-Sokoloff hypothesis that initial levels of high inequality would give rise to growth-debilitating institutions, resulting in higher inequality and underdevelopment.

Keywords: South Africa, VOC, Gini, wealth, comparative, Kuznets, Williamson
JEL codes: N37, D31, D63

[1] Prepared for the Special Edition: A history of poverty and inequality in South Africa, *Economic History of Developing Regions*. The authors would like to thank Jan Luiten van Zanden, Servaas van der Berg, Francis Wilson and an anonymous referee for their valuable comments.

1 Introduction

While the impact of income inequality on growth remains unclear, severe inequality may hamper a country's growth *potential* (Sokoloff and Engerman 2000). According to the Engerman-Sokoloff hypothesis, initial high inequality may give rise to political institutions that favour the economic elite. Because of the balance of power associated with high inequality, the elite would be able to maintain the institutions that favour them. This would allow the continuation of rent extraction and consequently inhibit long-run economic growth in extreme situations.

Engerman and Sokoloff (2002) put forward two preconditions for the rise of inequality in a newly settled society: favourable climate and soil conditions that are conducive to the growing of (cash) crops, and an extensive native population[1]. Colonies located in the tropics were endowed with fertile conditions that encouraged the production of sugar, coffee, cocoa, bananas, tobacco and rubber – in other words, cash crops that are subject to large economies of scale. The realisation of these economies of scale required labour, sourced from native populations or through slave imports. Where tropical crops were not readily cultivated, but a large native population was available, labour-intensive production (mining, for example) may have arisen. This also would have given rise to the same economies of scale. In both settings, as these labour-intensive industries developed, an elite secured economic power which it maintained through institutions that promoted the status quo, namely an unequal distribution of resources. The two institutions often used for this purpose are the monopolisation of property rights (land or other), and limiting access to education. Engerman and Sokoloff posit that most Latin American and Caribbean countries model this type of development. In contrast, in temperate zones and in the absence of large native populations (such as in British America), a relatively free market developed, promoting institutions (property rights, education and free trade) that resulted in lower inequality and faster economic growth.

A growing literature has emerged to test this hypothesis. Apart from Engerman and Sokoloff's own productive contribution (Engerman, Haber and Sokoloff 2000; Sokoloff and Engerman 2000; Engerman and Sokoloff 2002; 2003; 2005), Easterly (2007) finds that inequality results in lower per capita economic welfare, including worse institutions and schooling outcomes. He shows this using a new instrument indicating the abundance of land suitable for growing wheat relative to sugarcane, which is closely related to the Engermann and Sokoloff hypothesis. In contrast, Nunn (2007), while finding a negative relationship between slave use and subsequent economic development, finds no evidence that the relationship is driven by *plantation* slavery, which is the channel postulated in the initial endowments-inequality-growth hypothesis. Even more critically, Williamson (2009a; 2009b) has argued that there is little evidence to suggest that Latin American countries were uniquely unequal for most of the last five centuries. In fact, when adopting a new measure of income inequality – the inequality extraction ratio – Milanovic, Lindert and Williamson (2008) show that Latin American inequality was on par with most other societies of the time (for which data are available), despite high levels of inequality in that region in modern times. These results are, however, based on few and unreliable sources, which Williamson acknowledges in an earlier version of his paper entitled "History without evidence" (Williamson 2009b).

[1] These two preconditions present one channel through which inequality could affect economic growth. This paper does not investigate other potential paths which could posit potentially different ultimate growth outcomes in the face of initial inequality.

In order to understand the impact of inequality on later development outcomes, the severity of early inequality must be measured accurately for countries across the modern development spectrum. While the preservation of early records enables such measures to be calculated for most of today's developed nations, the dearth of detailed early records for the currently developing world limits the extent to which the hypothesis can be generalised. African regions, especially, are underrepresented in many of these studies, as the set of countries in Milanovic, Lindert and Williamson (2008) confirm. This paper fills this gap, by calculating income inequality of a currently developing region that is also highly unequal today. In contrast to Willamson's (2008) findings for Latin America, the Cape Colony was unequal at the time of its settlement, and this has persisted into modern day South Africa, possibly affecting its potential to grow into a developed economy. Indeed, in this case, although the casual hypothesis that high levels of initial inequality influence the economic status quo appears to be valid, we realise that much further analysis is required to identify the mechanisms by which early inequality may have determined later inequality

The purpose of this paper is to measure income inequality in the Dutch Cape Colony over three points of its 143 years of existence. Using micro-level tax return records and wage data, we infer income inequality for the entire population of the Cape economy, including slaves. In contrast to many other influential studies (such as Milanovic *et al.*, 2008), the data allow the measurement of within-group inequality in a pre-industrial society[2], which appears to be a more important component of inequality than previously assumed. The results suggest that the Cape was a relatively unequal society compared to most other countries. Inequality between slaves and Europeans played a large role in the large disparities in income. However, inequality within the European population contributed more substantially to the overall skewness of the distribution. Given that wages of Dutch East India Company (VOC) employees were fairly equally spread (by any standard), much of the inequality has its roots in the unequal distribution of agricultural income. After the arrival of the French Huguenots and the shift to viticulture, Cape society became more polarised into a (wine) farming elite and stagnant groups, including increasingly impoverished farmers and slaves. This evidence is in line with anecdotal reconstructions and recent wealth inequality measures (Fourie and von Fintel 2010a).

This paper continues as follows. Section 2 motivates why a study of the Cape Colony fills the gaps in the comparative literature. Section 3 considers wealth inequality (which was previously measured at the Cape) and proposes a strategy to measure income inequality in the same society to make results internationally comparable. Section 4 outlines the data sources and assumptions used to construct the income distribution of the various population groups at the Cape. Section 5 highlights other important methodological considerations. Section 6 discusses the results, while section 7 places these in the context of other recent evidence. Section 8 concludes.

2 The Cape Colony as a case study

Given the sparse evidence on inequality in pre-industrial Africa, we turn to one of its well-known colonies as a starting point. While the measures of income inequality constructed by Milanovic *et al.* (2008) cover a wide range of regions and time periods, the currently developing world is under-represented in their analysis. The broader validity of historical income inequality as a precursor to poor modern economic growth potential, crucially depends on a better understanding of the income distributions of these regions in early times. A case study of the Cape Colony (a part of modern South Africa) enriches this view and adds to the small cross section of pre-industrial

[2] At least within the European population. The data still do not allow the measurement of differences within groups of slave and wage labourers.

inequality measures for developing regions. Today South Africa is a highly unequal society; although it is currently Africa's most developed economy, it remains a developing region in the international context and has a long history of inequality.

The Cape, at the southern point of the African continent, was settled in 1652 by the Dutch East India Company (VOC – *Verenigde Oostindische Compagnie*) as a refreshment station for passing ships. The settlement soon expanded into the interior and a small but widely dispersed free settler society was established, supplying the fort with fresh produce, notably wheat, wine and cattle. By 1795, 143 years after the arrival of the Dutch, the Cape Colony covered roughly 110 000 square miles (Giliomee 2003) and was home to 7,129 Europeans and 16,839 slaves (van Duin and Ross 1987).

The Cape Colony presents itself as an ideal case study of the rise of inequality (within the European society but also between Europeans and slaves) in a newly settled, pre-industrial society. The Cape was unique in its geography, demographic composition and its market and political institutions. The original intention of the VOC was not to colonise the Cape with a view to extract resources, as was its strategy in the East Indies and slave settlements in West Africa (which were run under the auspices of the Dutch West India Company). With few additional benefits (apart from providing fresh produce), the VOC ensured that – above all – the costs of the new settlement had to be kept to a minimum. The policies put into practice at the Cape therefore reflect this sentiment.

Furthermore, the area close to Cape Town does not share the same tropical climate with other former VOC settlements, and indeed that of many currently developing regions. The Cape has a Mediterranean climate and is suitable for growing European crops. Yet, the first settlers found the soil and climate harsh; the strong South-easterly winds, for example, rendered agricultural production close to the fort and harbour difficult, and settlers had to move inland (either to the more fertile areas below Table Mountain or to the area west of the first mountain ranges) to ensure a steady supply of wheat, in particular. The rough shrubs (*fynbos*) of the Western Cape also made tilling and cultivation of the land difficult. There is some indication of experimentation with various other forms of agriculture. However, for a variety reasons, the yields from these attempts were modest.

Slave labour played a prominent role in the Cape economy and heavily defined the composition of the population. Slaves were imported from early on and increased rapidly in number after the movement of free settlers into the fertile area west of the first mountain ranges (where they became wine and wheat farmers). A unique characteristic of the Cape was that almost all free farmers owned at least a few slaves as production inputs, so that one might expect differences between the entire European population and other groups to be widespread. While some of these slaves lived on the estates of wealthy wine and wheat farmers, even the poorer farmers of the interior owned slaves, often to help settlers in their homes. The widespread ownership of slaves, even in poorer households, is different to the large slave plantations of the U.S. South and the Caribbean slave societies often studied to analyse inequality. In those regions slave ownership was concentrated in the hands of few very wealthy individuals. Nevertheless, most slaves were owned by the very rich at the Cape, indicating that inequality within the European settler sub-population is also an important research question.

The European immigrants were mostly poor, single ex-Company employees with little expertise in agriculture. Often the tough conditions – including the frequent conflicts with the native Khoikhoi – forced these settlers to return to Company service or escape to Europe. One group of immigrants – the French Huguenots who arrived in 1688 – arrived with families and skills that would dramatically boost output and productivity at the Cape (Fourie and Von Fintel 2010c). Yet, after

1717, immigration was mostly limited and population growth relied mostly on high fertility rates amongst European settlers. This development prompted the formation of a small elite on the back of the newly introduced wine industry, which, according to Fourie and Von Fintel (2010c), later became a driver of inequality at the Cape.

The unique market institutions created by the VOC shaped production decisions at the Cape. Free trade was prohibited by the Company; all production had to be sold at a fixed price to the monopsonist Company. These prices declined as production increased (Du Plessis and Du Plessis 2009). While wheat and wine outputs were market driven, there is little indication that cattle farmers on the frontier were influenced by the demand from the ships at the coast (Boshoff and Fourie 2010). Farmers were only allowed to sell their goods to the ships once the Company's own inventories had been exhausted. Manufacturing was prohibited, especially for the export market, except in the case of wine and brandy, which had to compete in the East Indies with French exports. Heavy duties were levied on imported goods. Free settlers had no political rights and although free (in other words not employed by the Company), were under Company jurisdiction (Schoeman 2007). As a result, many farmers became impoverished and either abandoned their operations, or became nomadic farmers on the frontier. By implication, inequality increased, as this large group became further divorced from the rising elite in the income distribution.

This newly settled, pre-industrial society evolved into modern-day South Africa, a society characterised as one of the most unequal in the modern world. Accurate measures of Cape Colony inequality could establish whether the Engerman and Sokoloff conjecture holds in more societies than the examples they quote to support their hypothesis, or whether the evidence that refutes their ideas (most notably Williamson, 2009a and 2009b and Milanovic *et al*, 2008) is based on a limited sample of the currently developing world. To do this, reliable measures of inequality in the Cape society are developed in the sections that follow.

3 From wealth inequality to income inequality

Economists are not the first to be concerned by the inequality in the Cape society; historians have long noted the high inequality in Cape society and its possible detrimental impact on development (Guelke and Shell 1983). Even Company officials during the period noted the severe inequality between the rich *pachters* (monopoly merchants) residing in Cape Town or on lavish (wine) estates, and the poor *bywoners* (who farmed on richer farmers' lands) and *trekboere* (nomadic farmers) of the interior. Travel writers, especially, note the social divisions between the various groups, often referring only to the European part of the population, with slaves and the Khoikhoi excluded (Thunberg 1986).

Apart from Guelke and Shell's (1983) descriptive analysis of wealth inequality in the Cape Colony, the only quantitative measurement of inequality for this period is by Fourie and Von Fintel (2010a). Using tax return records they measure the dynamics of wealth inequality of *burghers* at the Cape for the period 1663 to 1757. They find that the Cape *burgher* population was a highly unequal sub-section of society and identify possible causes of such high inequality. The arrival of French Huguenots had two impacts on the wealth distribution; firstly, the new immigrants arrived with no assets, adding to the bottom of the distribution. Secondly, their arrival marked the uptake of viticulture, which was adopted by a new elite (from both French and other population groups). Both impacts gave rise to severe wealth inequality. However, this inequality slowly declined as poor French farmers' wealth increased and immigration of assetless Europeans was discouraged. Towards the middle of the eighteenth century, wealth inequality stabilised at a high level within the

farming population. An indicator of the high inequality during the eighteenth century is the imposition of sumptuary laws in 1755, aimed at prohibiting the show of luxury in public (for example, the number of horses and carriages that were allowed to be decorated).

While Fourie and Von Fintel's (2010a) results provide an important first estimate of inequality at the Cape, the limitations in their study blurs the larger inequality picture. Firstly, their focus is only on the farmer population, excluding Company officials and non-farmers. (They do account for slaves and European *knechts*, but each with zero asset values in the data). Secondly and more importantly, they calculate *wealth* inequality based on the first principal component of a basket of core assets. This approach is not comparable to the *income* inequality measures calculated by Milanovic *et al.* (2008) to trace differences in pre-industrial inequality across various regions of the world. The differences between assets as a stock concept and income as a flow concept entail that these results are not the same. The object of this study is to offer a more representative measure to complement their work and obtain a fuller picture of pre-industrial inequality. The discussion of the results below reconciles differences in inequality between both measures. Thirdly, their work also assumes that the relative weights of assets remained the same across the entire period, while it is clear from Table 1 that values of agricultural commodities changed over time (though here agricultural *flows* rather than stocks are measured).

4 Data sources and their limitations

A serious limitation of this and earlier studies is the total neglect of the native Khoikhoi and San[3] population in estimates of inequality. This is mainly as a result of the limited documented evidence which may provide estimates of per capita income or wealth for the two groups,. When Van Riebeeck settled in Table Bay, the first contact he established was with the Khoikhoi, a nomadic, pastoral people consisting of many different clans and widely distributed over what is the Western Cape and parts of the Northern Cape today. Elphick and Malherbe (1989) note that roughly 50 000 Khoikhoi inhabited the southwestern Cape, although there is little evidence to support these claims. Greater consensus exists over the disastrous impact of a smallpox epidemic in 1713 which reduced the Khoikhoi population considerably, with estimates that only one in ten survived the epidemic (De Kock 1924). Together with slow European expansion into the interior, the epidemic resulted in the "fairly easy" cointegration of the Khoikhoi society into the colonial economy as a "subordinate labouring class" (Elphick and Malherbe 1989:3).

Relatively few estimates are available about population size and living standards of those outside of European influence. Anecdotal and archaeological evidence do point to some distribution of wealth, although given different ownership systems (communal land, for example) even comparisons where information is available are fraught with difficulties. The Cochoqua, for example, who arrived in Table Bay a few months after Van Riebeeck in 1652, were rich in cattle and gave the initial impression that all Khoikhoi were well-endowed with livestock and, therefore, relatively well-off (Elphick 1977). And even though they were a semi-nomadic people, some of their villages were fairly large; a traveller into the interior during the seventeenth century estimated a Hessequa village to include more than "85 kraals, one beside the other" (Mossop 1931:69). In contrast to the hunter-gatherer lifestyle of the San, this points to some within-group inequality (where the Khoisan are defined as one group, however inappropriate). Moreover, given that each clan was usually ruled

[3] "Khoisan" being the compound term when referring to both.

by a chieftan, an additional layer of inequality should be noted (again, a sign of potential within-group inequality, but where the Khoi and the San are defined as a single group).

We can but speculate about *intertemporal* shifts in overall inequality (when also taking the Khoikhoi into account). The impact of the 1713 epidemic likely reduced inequality (as the most affected group was the Khoikhoi, which presumably lived in greater poverty than other populations). We cannot measure this impact in any way. The gradual absorption of the Khoikhoi into European society means that their welfare may have increased somewhat, even though it would have remained below that of other working class individuals (Elphick and Malherbe 1989:3). As a result, inequality within the Khoikhoi population would have increased, though between group inequality would have declined. It is not clear which effect would have dominated, so that the impact on overall inequality remains ambiguous at most. What we do, however, implicitly measure in our data is the growth in the working classes as the Khoikhoi integrated into the European economy. Consequently estimates of income inequality would rise over time (*ceteris paribus*), even though this shift actually indicates a narrowing of the between group gap. Nevertheless, it is not clear how much of an effect these transitions had on inequality, as the data does not indicate which individuals in the working classes were Khoikhoi in any time period.

Even less is known about the size and dispersion of the San population, a hunter-gatherer people that made up the original inhabitants of the region. Without reliable estimates of population size, it is simply impossible to infer even crude estimates of between-group inequality (i.e. between the Khoisan and the Europeans). Yet, we speculate that regardless of the size of the Khoisan population, their wealth levels would not have been much above subsistence, probably more so for the San than the Khoikhoi, who did at least produce enough surplus to initially trade with the Europeans. Given this, our estimates of inequality below can only be *lower bound* estimates of total inequality in the Cape Colony.

Our inability to reconcile Dutch records with guesstimates of Khoisan population size and especially the lack of any reliable micro-level information on Khoi and San lifestyles provide us with little alternative but to focus on the *population under European influence* at the Cape. Where Khoisan were indeed recorded as slaves or *knechts* in our sample, we include them as part of Cape society; where they are not, we have no information to judge their relative income level vis-à-vis other members of society. We hope that future research will be able to tackle this important limitation.

Even so, to construct the representative income distribution of the Cape population under European influence is a complex undertaking, especially since wage data are lacking for the majority of the population: many households worked for their own consumption or slave labour was paid in kind. Various sources of data are therefore synthesised in this study to provide an overall picture of inequality.

The period of analysis is determined primarily by the ability to match the various sources of data concurrently. However, the resulting series of inequality estimates corresponds with demographic shifts that directly affected the distribution of well-being at the Cape. Cross sections of households are constructed for 1700, 1723 and 1757. The first two decades of the eighteenth century coincide with a peak in wealth inequality as per Fourie and Von Fintel (2010a); during this time (in 1717) European immigration to the Cape was discouraged in favour of slave importation, thereby changing the composition of the lower tail of the wealth distribution substantially. On the other hand, 1757 represents a time when policies were designed to limit the extravagance of a new Cape elite.

4.1 Incomes of Free Citizens and their Servants

Micro data collected by the VOC are rich in their coverage of the European population at the Cape. Given that the colony was managed by a company, detailed records for the purposes of taxation were maintained on an annual basis. The bulk of the European population was not directly employed by the VOC, but was commissioned to bolster agricultural production as free *burghers* (citizens) in the interior. However, this privilege required the annual payment of taxes on land outputs and stocks. Hans Heese (1979) has transcribed a selection of the so-called annual *opgaafrollen*, the official *burgher* tax returns required by the VOC, which contain detailed micro-level information on assets and yields of the free population. Each of these cross sections comprises a census of European households that were not in the company's employment[4] and provides details on quantities of all the products that formed part of the income basket of this group. Fourie and Von Fintel (2010a) use the number of slaves, the possession of stock and some short-term assets recorded in these data to produce estimates of asset inequality in roughly 5-year intervals over an extensive period from 1663 to 1757. However, the attention of this paper turns away from stock concepts to income flows in specific years.

Yields (rather than short-term assets) are multiplied by prices from archival sources to calculate household income from farming activities. Prices were obtained mostly from auction rolls, and the most consistent figures in each year were chosen to represent the market value of each commodity in the respective years.[5] Though some variation did exist, the prices in 1757 are the most stable. In the robustness checks discussed below this observation is taken into account to ensure that incomes estimated in this way were consistent across time. Table 1 summarises units of production available in farmers' tax returns, as well as the archival sources of prices that were used in the relevant years. It is assumed that 15% of animals were sold to generate income in any given year (van Duin and Ross 1987). However, horses not being a strictly consumption item, are assumed to be kept in greater numbers by farmers, with only 5% sold in any period. Furthermore, horse rearing was an arduous task at the Cape due to horse sickness and other diseases (Swart 2003), so that it was not a promising income source.[6] Hence, the ratio applied here is indeed an upper bound.

The tax returns reveal that a substantial proportion of the population was not engaged in any agricultural activity whatsoever. Particularly in urban Cape Town, many *burgher* households only recorded the ownership of slaves, horses and weapons, with no evidence of any seeds sown, vines planted, stock possession or agricultural yields. Owing to the nature of the data, however, no other income was recorded, nor is there any indication regarding the mode of economic activity of these households. A simple imputation approach is adopted here to generate the income distribution of this section of the population. The log of total household incomes of farmers[7] is regressed on variables indicating the gender and adult-child split of slaves owned and household members, the number of horses, and the number of weapons in each period. Parameters from these models are used to construct incomes for the non-farming *burgher* population.[8] Slavery is the most important

[4] A comparison with alternative official records (Van Duin and Ross, 1987: 112-127) suggests that the version of the *opgaafrollen* used here captures very close to all households in the colony, including total slave and European servant numbers in non-VOC employ. Slight discrepancies are accounted for by adjusting the weights applied to each household, as discussed below.

[5] The source of the price data are the probate inventories available in MOOC8 and the auction rolls available in MOOC10.

[6] Our thanks go to Sandra Swart for pointing this out.

[7] Defined here as any household that at the minimum sows seed, has vines or has animals.

[8] In converting the predicted *log(Household Income)* back to the linear form, we adjust estimates for prediction errors, as per the smearing estimate suggested by Wooldridge (2009: 210-212).

predictor in this context. Slave ownership is strongly positively correlated with wine and wheat yields, suggesting that this is a good indicator of the capability to generate income (Armstrong and Worden 1988). Other authors have also used slave ownership as an indicator of elitism in Cape society (Giliomee 2003; Fourie and Von Fintel 2010b). Indeed, the fit of the regression is satisfactory, with R-squareds in excess of 0.5. However, this approach assumes that the monetary returns (in terms of income from outputs) on slave labour are the same for both farmers and non-farmers, while for the latter group it is not certain in which activity workers were employed, and whether these were indeed slave-intensive sectors that would have yielded the same returns as in agriculture.[9] Further, the distribution of this predicted income is narrower than that for farmers *a priori*, as the regression line moderates much of the dispersion in the data.

Up to this point, non-agricultural activity among free citizens has been largely uncaptured. However, the Cape Colony was not only well-known as a refreshment station for ships to replenish food supplies, but also as a stop-over where sailors sought entertainment along the sea route. Alcohol monopolists (*pachters*) played an important role in this social context. These individuals bought exclusive rights from the VOC to sell alcohol to the public. Groenewald (2007; 2009) provides a vital exploration of their role in Cape society. It is evident that the high prices that they paid for these selling rights were rewarded by much higher returns. We identify the alcohol *pachters* in the *opgaafrolle* and record the amount that each monopolist paid for these rights in the respective years. Krause (1955) cites two separate examples, one in 1684 and another in 1685, from which it is possible to calculate the ratio of gross profits to initial monopolist fees. Both indicate that the gross profits were 247% of the monopolist fee paid. We apply this figure to each of the alcohol sellers (who were incidentally also very successful wine farmers) that were recorded in the tax records.[10] However, this estimate of income from monopoly contracts appears excessive, and is not necessarily representative of the entire period of analysis. The result is that only a few households skewed the upper tail of the income distribution to very high levels. Given that this income type was atypical of the entire population, and that more reliable estimates of returns on monopoly contracts are not forthcoming, analyses include and exclude this source of income to test the robustness thereof. We note that monopolies also existed in other markets, but, to the authors' knowledge, detailed information is not available.

While slaves and European servants did not submit tax returns of their own, information on their numbers is included in the entries of their supervisors or owners. This information is exploited to flesh out the income distribution beyond the free European population. However, we rely on averages for each type of labour to impute incomes to these individuals, as detailed micro-level information was not recorded for these population segments.

The main source of income data for these individuals is the transcript of a Policy Council meeting held in the Cape of Good Hope. A discussion document sent by the Lords XVII in Amsterdam to the Cape on the 24th of June 1716 requested feedback on a number of policy related issues, of which a few relevant ones are listed here: firstly, they wanted to establish whether more immigrants could find a means of subsistence in the colony without becoming a burden to the Company; secondly, they discussed whether European farm hands and agriculturalists would be less expensive than slaves, and thirdly whether the colonial economy required more artisans. Seven Company officials,

[9] Yet, while the assumption of equality of returns between agricultural production and non-agricultural production is strong, the fact that free burghers could move freely between the town and the rural areas and that the prices of slaves were determined in a "free" market, one would expect that slaves would have been purchased by those that would have been able to extract the highest return, eventually equalising the marginal returns per worker.

[10] Only isolated cases were not found in the *opgaafrollen*.

in 1717, responded to the discussion document, arguing in favour of or against the Amsterdam proposals, and often provided quantitative proof for their arguments. The letters were later translated by John X. Merriman and published in 1918 by the Van Riebeeck Society (De Chavonnes 1918).

In terms of European servants, the following discourse followed. Jan de la Fontaine, later to be governor of the Cape Colony, wrote in a letter to the Council of Policy in the Cape of Good Hope that "the wages paid to a [European] farm labourer for a year and half would often pay for a slave, as the usual wage of such a labourer is 15-20 guldens a month, exclusive of food, which would be considerably more for a European than for a slave". D.M. Pasques de Chavonnes calculated the cost of a "pioneer" to be 9 gulden per month, and that of a youth in training, 6 gulden per month, plus approximately 2 gulden per head per month for bread and another 2 gulden for lodging (De Chavonnes 1918:106). Van Beaumont also calculated the wage costs at 9 gulden per month, "the rate of a soldier's pay" (De Chavonnes 1918:100), while Cranendonk noted that a farm labourer would "cost the Company 14 gulden odd per month" (De Chavonnes 1918:98). Van der Meer Pietersoon estimated that "farm-servants here usually earn from 10 to 16 and even 18 guldens and more, in addition to good food and drink, besides 1 to 2 lbs. of tobacco per month." (De Chavonnes 1918:126). The wage and "in kind" cost of farm labourers was therefore estimated to be between 13 and 18 guldens per month, or between 156 and 216 guldens per annum. In this study, European servants (*knechts*) are all assumed to be paid 13 guilders per month in 1700, based on the soldier's salary and an allowance for food. A separate household is created for each servant employed by the free citizens – a lack of additional information means that no wives or children are added to these households. Given that the servants were often unmarried Company employees stationed at the Cape (Romero 2003), these servants likely had few dependants and therefore the full income carries a weight of 1 person in per capita conversions. The impact of this assumption becomes clearer below.

Similarly, the policy documents were used to establish credible income imputations for slaves. Given that slaves did not strictly earn an income, we impute a basic cost of living value to each slave recorded in the data. Cranendonk, in his letter to the Council of Policy in 1717 examining the expenses on slaves for the last five years, calculates that "every slave – adults, boys and girls – costs the Company about 40 gulden a year, including expense of clothing" (De Chavonnes 1918:96). Van Beaumont also concludes that "a slave costs annually (everything included) about f40". According to Van der Meer Pietersoon, "each slave …costs the Company only 40 guldens per year, but as there are many children among them, the slave of a private person is usually estimated at f60, reckoning 1 rixdollar per month for food, a length of tobacco per week, 2 pairs of trousers and one coat per year" (De Chavonnes 1918:126). It seems that the cost per slave was between 40 and 60 guilders per annum or between 3.5 and 5 guilders per month in 1717, depending on whether they had dependants or not. Each adult slave is imputed with a value of 40 guilders, while the premium of 20 guilders is assigned to child slaves in the data. Again, a new household was created for each slave owned by a free citizen, which carries a weight of one in a per capita index. However, in contrast to the European servants we know how many female and child slaves were owned by each free citizen, so that a certain element of household composition is known. Nevertheless, it is not clear which of the slaves were directly related, so that we create artificial households for each male, female and child slave separately. These separate households also contribute a weight of 1 person for a per capita variable. Household weights are adjusted to account for under or over representation, as well as to inflate slave numbers to reflect slave numbers of those in VOC possession. The latter's numbers are not linked to owners in the micro data, but aggregate figures of VOC slave ownership allow us to inflate the weights so that the number of privately owned slaves also represent those owned by the company. This is discussed in more detail below.

4.2 Income of VOC Employees and Company Officials

Apart from the rural population, the Company employed a few hundred soldiers and officials in and around the fort. Other artisans, officials, teachers, medical staff and administrators were also employed by the company. Data for these are sourced from the *monsterrollen* (records of VOC officials, their occupations and wages), as transcribed by the TEPC (2008) and recently compiled into a wage index by Du Plessis and Du Plessis (2009). By comparing the total number of wage earners in these data with the number of company employees in van Duin & Ross (1987), it is evident that records were more complete in some years than others. Only those years with sufficient representation are kept in the analysis. We link the 1699 wage cross section with the *opgaafrol* of 1700 to sketch a complete picture of the population at the Cape. Similarly, wage data for 1724 are merged with the 1723 free citizen tax data, as are the wage data from 1756 and the tax data from 1757. This allows us to study almost complete population censuses in these three periods. Wage-earning households are also assumed to be of size 1, as indicated in the TEPC (2008) transcriptions, though it is possible that company employees did settle for longer periods with families. This has more severe implications for per capita income estimates than is the case for *knechts*; the assumption that these households did not grow (which is not true for other European households) means that per capita income could be overestimated for this group in later years. As a result, between-group inequality estimates are adversely affected.

5 Method of Analysis

5.1 Weighting

Van Duin and Ross (1987) provide population totals from a reliable set of *opgaafrollen* and other VOC records. Discrepancies between the version of the data used here and their totals are small (for free citizens and servants), so that adjusting household weights for sample differences does not alter the picture substantially. However, their totals differ more substantially from the TEPC (2008) data for VOC employees, so that weighting is non-negligible here. Further, as mentioned above, slave numbers are weighted not just to reflect Van Duin and Ross's (1987) population totals, but also to account for the lack of micro records of slaves in VOC possession. Each of the slaves in the possession of free citizens is weighted up, to also represent company slaves. Tables 2 and 3 summarise the population totals in the relevant years, as well as the weighting factors that were applied to the data. It is evident that in most cases the reweighting should be inconsequential for the results. Exceptions exist in 1700[11] for slaves (when a relatively large proportion of them were held by the VOC, and would therefore not be reflected in the *opgaafrollen*), and in 1724, when VOC employees tend to be under-captured by the TEPC data.

Total household incomes are converted to per capita household income levels throughout. In calculating inequality indices and plotting distributions, these are weighted by household size, adjusted for the sampling differences referred to above.

5.2 Price fluctuations

Du Plessis and Du Plessis (2009) illustrate that real wages increased over time as a result of a declining overall price level, coupled with stable nominal wages over the entire century. This gradual deflation is also reflected in Table 1, where the prices obtained by farmers for their output are generally lower later in the sample. By implication, farmers' nominal incomes decline when

[11] Figures for 1700 are not available from Van Duin & Ross (1987), hence numbers for 1702 are used as a proxy.

multiplying the falling prices with the respective quantities; this stands in contrast with the experience of VOC employees, whose nominal wages were stable across time (Du Plessis and Du Plessis 2009). As a result, estimates of between-group inequality are affected if this discrepancy between the sub-distributions is not remedied.

Three approaches are implemented to account for price fluctuations. Firstly, farming and wage income in all years are converted to 1700 prices with the most favoured price index computed by Du Plessis and Du Plessis (2009). The same price index converts slaves' incomes (as outlined in the policy discussions) from 1717 to 1700 prices, and it is assumed that real incomes remain constant for this group, despite increases for other sections of society. However, this assumption is not necessarily true for European servants: While nominal wages in 1717 may have been similar in all the other periods, real wages would have been higher (in 1700 prices) in later periods. Hence the price adjustment is also done for this group. Secondly, 1700 prices are applied to each of the farming commodities in *all* years, so that farming-income changes are only driven by fluctuations in quantity. In this scenario, the resulting farm incomes are not scaled by the price index, while those of the other groups are (as before). Thirdly, the same strategy is followed with 1757 commodity prices to derive real farm incomes, as these are considered most stable both within and across product groups. All other incomes are converted to 1757 prices.

6 Results

6.1 Changes in mean per capita income

Table 4 provides an overview of the major shifts in average real per capita incomes of various groups from 1700 to 1757. As confirmed by Du Plessis and Du Plessis' (2009) overall indices, VOC employees' real incomes rose in light of price deflation. For similar reasons, farming *burghers'* real incomes decline, as the prices that they obtain for individual products decline; adjusting for the overall price level does not alter this picture. It is possible that income sources diversified for farmers later in the period, so that this decline was not as stark in reality as it appears in the data. Evidence provided by Van Duin and Ross (1987) on Cape Colony exports provide further proof of more diversified activities by the farmers; the mid-eighteenth century saw an increase in the exports of ivory, skins and hides, butter, wax, aloes, oil, to name a few. None of these activities are recorded in the available data. What is clear from these records, however, is that *traditional* agriculture became less profitable on a per capita level, or that its share in total income of farmers diminished relative to new income sources.

Agricultural income initially compared favourably with VOC wages, while later it is evident that even *knechts* earned more (on a household per capita level) than farmers. However, the farming population almost doubled, while this increase is not so rapid for VOC employees and *knechts*. The analysis assumes that the latter groups had no children or wives, and that these particular households did not grow. For farmers, however, household composition changed over time, with households generally becoming larger (and total yields not necessarily showing the same increase; see Figure 1). Combining these features, per capita incomes of VOC employees and *knechts* are likely to be biased upwards, though the extent of this cannot be measured. Therefore two sources of possible mismeasurement arise: First, diverse incomes of *burghers* are not captured by the available records, and second, the lack of household structures for some of the non-farming sectors in the micro data do not reflect the real demographic shifts at the Cape.

A similar pattern emerges for non-farming burghers. However, the figures are substantially lower compared to those of their farming counterparts, and are driven largely by the imputation strategy implemented. Again, a lack of information on diverse income sources limits the analysis. *Pachters*' returns decline over time, the implications of which are discussed below. Real incomes of *knechts* increase marginally in line with the price index applied, while slaves' real incomes remain constant by assumption. They evidently constitute the poorest groups in this society.

6.2 Robustness checks of inequality measures

6.2.1 Prices

First we consider the influence that different assumptions regarding agricultural output prices have on estimates of overall and between-group inequality. Making no adjustment for these output prices in income estimates (not shown) – in other words assuming that their buying power was eroded by lower market prices for their products – does not appear to yield very different results from the other approaches. This indicates that the influence of output prices does not bias inequality estimates in favour of other groups.

Further minor differences arise for Gini coefficients using different adjustments for prices (see Table 6). Notably, when excluding income from *pacht* monopolies and the living cost of slaves, estimates of inequality increase marginally over the century (when adjusting income for an overall price index), while fixing specific output prices to specific years causes a slight reversal in this trend in 1757. Overall, however, estimates of between-group inequality appear to yield robust results over time.

6.2.2 The role of extreme tails

Including all income types and population groups captured in the sample, suggests that Gini inequality declined from estimates of 0.792-0.837 in 1700 to 0.713-0.744 in 1757 (see Table 6). However, given that *pachter* income declined over the period (see Table 4), and that the returns on monopoly contracts are not reliably estimated, the decline in inequality is driven by a shrinking upper tail of the income distribution (which is driven by a small group of non-representative elites). Table 5 illustrates that the greatest relative changes in income occurred at the very top of the distribution if *pachter* income is taken into consideration, while the percentiles changed in similar magnitudes across the distribution if it is excluded. Hence, large (perhaps artificial) falls in monopoly rents drive inequality trends downwards over time.

Income from *pachts* is disregarded in the next set of Gini estimates (Table 6), resulting in a slight increase in inequality from 1700 to 1757. Gini coefficients drop from their high levels to estimates of between 0.543-0.569 in 1700 and 0.555-0.590 in 1757, with slightly higher estimates in 1723. While this study acknowledges the potentially large role that *pachter* income played in fuelling inequality, the inadequate measurement thereof precludes any reliable level or trend analysis on this basis. Nevertheless, whether monopolist income is included or excluded, it is apparent that between-group inequality (based on the Theil decomposition in Table 7) declined by between 5-13 percentage points (depending on the strategy followed to account for changing output prices) from 1700 to 1757. The decline is more rapid when *pacht* income is included, underlining that *pachters*' returns dampened over time according to the calculations made here: however, it is not certain whether this is a real phenomenon (in light of the sumptuary laws) or purely a measurement issue (given limited data on their real returns across time).

The decline in between-group inequality that remains despite excluding the income from *pachts* can be explained by movements at the bottom of the income distribution. Because we do not measure income differences among slaves, much of the inequality is by default driven by differences *between* slaves and Europeans. However, this is not such a heroic assumption, given what we know about the well-being of this group. If we further exclude slaves from the population (in addition to *pacht* income), inequality estimates fall even further in level terms, now with a Gini lower-bound of 0.475-0.479 in 1700 and a climax of between 0.539-0.587 in 1757. The change from a decreasing to an increasing inequality trajectory is driven completely by changes in *between-group* inequality. Once slaves are excluded from the sample, most estimates show that about 90% of European inequality occurred within groups rather than between groups, compared to only about 60% if slaves are also accounted for (Table 7)[12]. This suggests that slaves' low mean income relative to Europeans constituted a large component of inequality at the Cape, which is consistent with intuition. Nevertheless, these results do emphasise that between-group inequality dominated the picture; this contrasts with the assumptions of Milanovic *et al.* (2008) who assume (based on the available data in the social tables) that within-group inequality was zero.

Given that we assume that slaves' real incomes remain constant (a reasonable assumption given that slaves' remuneration was often in kind) and that many Europeans' real incomes increased over time, the decline in inequality in the broader population requires further explanation. Figure 2 shows that slaves' share of income increased over time; part of this is driven by faster population growth compared to Europeans. However, the gap between slaves' share of income and their population share narrowed over time, so that population growth does not explain the entire picture. The progressive relative impoverishment of farmers over the period completes the picture; while other groups' income shares remained stable, it is apparent that the lower prices obtained for produce could not sustain agricultural incomes as in time past. It is not necessarily true that farmers did become as poor as depicted here, but it is possible that their income sources became more diversified as the economy matured and alternative industry became more established. Nevertheless, qualitative evidence suggests that many farmers struggled to survive, either abandoning their farms altogether or moving into the interior to become pastoral farmers (Guelke 1980). In fact, these results provide further evidence to fuel the debate about the reasons why farmers moved to the frontier, supporting the notion that "push" factors (in the form of declining incomes) played an important role (van der Merwe 1938; Neumark 1956; Guelke 1976).

6.3 Income inequality within groups

Because inequality is predominantly found within groups, we analyse each subpopulation separately. Among VOC employees, inequality is particularly low in levels and remained stable in the region of 0.30, as measured by the Gini coefficient. Figure 4 reveals that the distribution of employee wage income remained fairly consistent over time, except for minor improvements in the position of the 6th to 9th deciles in 1757.

In contrast, income Ginis of farming *burghers* started at relatively high levels of 0.55-0.57 (depending on how output prices are accounted for) in 1700, and rose steadily thereafter to 0.65-0.69 in 1757. Table 5 reveals that while incomes captured in this data dropped for most of the farmer distribution, they did so faster for the lower quantiles. Figure 3 reveals that non-trivial weight fell at the extreme top of the distribution, which grew to much higher levels by 1757, indicating that an elite had indeed formed by this point.[13] While the same caveats mentioned above

[12] Note, however, that the lack of variation in imputed slave incomes artificially drives this figure down.

[13] This group is not reflected in Table 5, as this really is above the 99th percentile, and hence constitutes a very small group.

apply here, it is nevertheless true that *traditional agricultural* income became more unequal over the period.[14] Limiting the sample to only VOC wage earners and farming *burghers*, it is evident that in excess of 90% of inequality is found within groups, and that this figure possibly increases over time (only under the assumption of fixing agricultural prices at 1700 levels). This suggests that the initial differences (and subsequent divergence) in mean incomes between these groups do not dominate inequality measures, but that the rise in European income inequality is driven largely by a skewer distribution of agricultural income. This has important implications for alternative estimates of income inequality in the literature, which assumes that inequality is found predominantly between groups (Milanovic *et al.,* 2008).

6.3.1 Decomposition of Agricultural Income Inequality by Source

Given that agricultural income represents the thrust of reliably measured changes in within-group income inequality, this particular sector is decomposed by income source to understand which types of production drove the inequality. Earlier descriptive work suggests that a strong correlation exists between large-scale viticulture and a large slave labour force, causing the rise of an elite, particularly towards the latter part of the period under study (Fourie and Von Fintel 2010b)

Shorrocks (1982) and Lerman and Yitzhaki (1985) propose decomposing the Gini coefficient into its sources as follows:

$$G = \sum_{k=1}^{K} G_k S_k R_k$$

where G_k represents the Gini coefficient of the k^{th} income source, S_k is the source's share in total income and R_k is the source's correlation with the overall income distribution. If one income source is unequally distributed relatively to others, it should contribute more to overall inequality. However, if that income source only has a small share in total income, then its impact on the overall Gini may be dampened. Similarly, if the distribution of an income source does not correspond strongly to the overall distribution of income, then it is not driving the general inequality observed in the overall Gini. This paper implements López-Feldman's (2006) module, which also estimates marginal effects. Elasticities denoting the percentage change in the overall Gini coefficient should each income source increase by 1 percent, are calculated here. Results are presented in Table 8.

Across all years it is evident that the distributions of wine, grains and cattle are consistently and highly correlated with the overall agricultural income distribution, suggesting that these income sources reflect the overall distribution best.[15] Further, these sources together represent more than 70% of traditional agricultural income. Wine clearly was the most dominant income source of farmers across time, constituting in excess of 40 per cent of agricultural income.[16] While this income source is never the most unequally distributed among products, its Gini coefficients are consistently high. In all years except 1723, it contributes more to the overall Gini coefficient than its share in income. The marginal effects reveal that most often an increase in income from animals marginally decreases the Gini coefficient. Grains and wine consistently drive inequality upwards if

[14] The analysis of non-farming *burgher* income inequality is inconclusive, but is dependent on the imputation strategy that was followed. Again, unrecorded incomes limit the full picture of this section of the population.
[15] Cumulative densities (not shown) confirm that this is true. In particular, the long upper tails that emerge in agricultural income by 1757 are discernable in each of these categories.
[16] 1723 is a notable exception. This is driven partially by the price decline between 1700 and 1723. However, this price does not recover in 1757, suggesting that quantities declined dramatically in 1723, but turned around by 1757.

income from these sources increases. However, these income sources do not have high Gini elasticities (with all figures below 1). Nevertheless, by 1757 it is evident that wine is the dominant contributor to inequality, and a 1 per cent increase in this income type leads to a 0.08% increase in Gini inequality. These findings corroborate those of Fourie and Von Fintel (2010b), which suggest that the rise of the wine industry formed an elitist class among farmers at the Cape. This was true, despite the general levels of poverty otherwise registered among this population. Overall, however, some farming households were able to capitalise on the use of slaves to increase wine yields and become wealthy relative to most other farmers.

6.4 Reconciling Wealth and Income Inequality Estimates

How do these results compare with those of wealth inequality, notably those of Guelke and Shell (1983) and Fourie and Von Fintel (2010a)? The latter paper shows that the assets of farmers increased over the period, with poor immigrants converging on more established settlers. At the same time, some farmers were able to accumulate substantial amounts of assets to form an elite. This contrasts slightly with the income evidence of farmers presented here. As is evident in Tables 4, average real incomes of farmers declined substantially over the period, and the distribution of the entire population shifted leftward (Table 5), except at extremely high percentiles (Figure 3). The latter underscores the growth of an elite among *burghers* at the Cape, or at least that its position remained stable relative to the eroding incomes of poorer deciles. The evidence of an income elite is not as clear as for the asset elite, and the accumulation of assets is not reflected in higher incomes over time at the lower part of the distribution.

Furthermore, differences between *burghers'* income and wealth are a function of how slaves are treated in the separate studies. When measuring wealth inequality, the increasing numbers of slaves are considered to be assets in the hands of Europeans. Removing this asset from (in many cases elitist) settlers, and creating (poor) households of these slaves in the current context, causes a substantial change in the income distribution relative to the wealth distribution.

Understanding the differences between income as a flow concept and assets as a stock concept is also necessary to interpret the results. The accumulation of slaves by households over the period suggests that substantial wealth had been gathered by settlers during the 18th century. This explains the period of partial "convergence" in the assets of new immigrants to the levels of more established households. The narrowing of the bottom tail of the distribution persisted as older generations transferred established farming operations to their descendants. However, whether the *profitability* of these assets in farming activity continued over time, or whether assets were employed to branch into alternative economic activity, is not clear from the data available. What is certain, however, is that traditional farming activity in itself became more unequally profitable (despite declines in the average levels in favour of alternative economic activity). Figure 3 reveals that between 1700 and 1723 that this shift almost exclusively occurred for the first 9 farming deciles, while the elite maintained its profitability. Together, this fuelled inequality. The cumulative density for 1757 exhibits poverty dominance, so that the whole *agricultural* distribution deteriorated by this point in time. However, it is evident that a long upper tail emerges by 1757, which corroborates all other evidence of a small farming elite that became rich from mainly viticulture.

7 Comparative performance

The main purpose of measuring inequality in the Cape Colony is to add to estimates that test the relevance or validity of theories postulating that high initial inequality may explain later inequality

and underdevelopment, amongst others by Engerman and Sokoloff (2000; 2002). The claims made by these authors have been widely disputed, both on theoretical grounds but also because of empirical realities. Williamson (2009a; 2009b), in particular, has argued that while modern-day Latin America may be highly unequal, this is not as a result of inequality immediately after colonisation. In fact, he argues that Latin American exhibited average levels of inequality immediately after colonisation, with rising inequality during the 17th and 18th centuries. Following independence, inequality seemed to be no higher in Latin America than in other pre-industrial societies or even the industrialised North. Only during the *belle époque* of the nineteenth century did Latin American inequality increase significantly above inequality levels of comparator countries. While Williamson (2009a) points out that these findings are inconsistent with the Engerman-Sokoloff hypothesis, he calculates an extraction ratio for each of these countries, which does support the hypothesis.

Table 9 provides a comparison of Gini coefficients for different regions across time, as measured by Milanovic *et al*. (2008), and the Ginis calculated here for the Cape Colony in the eighteenth century. The results show that the conservative estimates of inequality at the Cape (where the *pachters* are excluded) rank as some of the highest inequality measures documented before the twentieth century. The Cape Colony consistently performs worse than the European countries in the sample (except Holland in 1732) and share similar high levels of inequality to those of New Spain and Chile in the eighteenth and nineteenth centuries. It is especially these regions that Engerman-Sokoloff refer to when postulating their endowments-inequality hypothesis. Based on this evidence, one might conclude that high initial inequality at the Cape persisted to modern day South Africa.

However, the Cape's comparative record is subject to a number of caveats. Firstly, these estimates may be higher than the comparable figures of Milanovic *et al.* (2008) because they use social tables, where within-group inequality is assumed to be zero. This study reveals that (particularly within the farming population) within-group inequality was high relative to between-group inequality, though some subpopulations (for instance the VOC wage earners) displayed more moderate levels of inequality. Hence, using the social tables likely underestimates inequality, while the use of micro data here offers a more realistic view of the income distribution. Thus, either pre-industrial inequality has been grossly underestimated for all regions using the social tables (and all societies more closely approximated the Cape Colony) or the Cape was indeed an exceptionally unequal society. The first case would counter any Kuznets-type argument that initial inequality was low in pre-industrial societies, and would also not concur with the Engerman and Sokoloff notion that currently developed nations would have been relatively equal in the pre-industrial era. The second scenario suggests that the Cape was indeed a highly unequal region in the 17th century and remained part of the developing world into the 21st century with persistent inequality. This fits the Engerman and Sokoloff narrative well.

8 Conclusions

Using detailed records collected by the Dutch East India Company, we calculate new income inequality measures for the Cape Colony during the eighteenth century. We find that income inequality was severe and persistent throughout the period. Depending on various assumptions, the Cape Colony Gini ranged between 0.543 and 0.837, which is high relative to other countries, for which measurements exist, during the pre-industrial period. The differences in mean incomes between slaves and Europeans only partially explain high levels of inequality. Notably, within-group inequality (particularly among farmers) plays an important role that cannot be accounted for in social tables often used in such studies. Our results support earlier qualitative and quantitative

evidence of a rising farming elite in the Cape Colony relative to the progressive impoverishment of others. While (recorded) farming income declined in real terms across most of the distribution (except at the extreme top, where the elite either maintained or extended their positions), this decline was faster for the bottom tail. Poorer farmers' positions quite possibly deteriorated because of the distorted market incentives created by a mercantilist system. Because their produce was not guaranteed to be profitably sold (in contrast to the elites), they diverted their production to subsistence living, often by moving closer to the frontier if their farming operations failed. However, this system favoured the elite, who could continue selling their large wine and wheat yields to the VOC and, through the *pacht* system, earn monopoly profits.

Disaggregating the sources of inequality provides a more comprehensive analysis of agricultural income trends in the Cape. We find that wheat and especially wine production drive income inequality upwards. This is consistent with the literature: The arrival of French Huguenots at the Cape in the late seventeenth century led to a shift towards viticulture. As viticulture was a labour-intensive industry, wine production resulted in a greater demand for slave labour. Slave imports increased after 1700, and especially after 1717 when the Council of Policy at the Cape restricted European immigration in favour of slave labour. These changes gave rise to a small elite at the Cape consisting mostly of alcohol *pachters* and wine farmers; proof of this is provided by the rising inequality within the farmer population in our results. By 1757, while the majority of farmers had gained little in terms of welfare, sumptuary laws were introduced to curb the luxurious lifestyles of the farming elite.

The divergence between the poor (but majority) farmers and the rising elite gave rise to severe inequality at the Cape. Although the purpose of the current paper is not to verify or refute the Engerman-Sokoloff hypothesis in a larger context, it is tempting to suggest that the persistent high levels of inequality in the Cape Colony of the eighteenth century measured here may, to a certain extent, be a root cause of South Africa's high income inequality, and consequent underdevelopment today. Gini coefficients measured here are remarkably similar to those found in modern-day South Africa. Nevertheless, these estimates add to the evidence that their narrative can hold, even in a very specific context. This, to some extent, stands in contrast with other work that does not consider a full set of modern developing regions, and prompts a re-investigation of these matters.

However, this first set of inequality estimates for a modern developing African economy may not be entirely comparable with other estimates for the rest of the world. The estimates presented here are severe, either because the Cape really was one of the most unequal pre-industrial societies (among those for which measurements are currently available), or because the contribution of within-group inequality is ignored for lack of micro data in other regions. Should the former be true, it adds to the body of evidence that developing countries across the world (not just in samples for which estimates have been constructed up to now) potentially match the Engerman and Sokoloff hypothesis. While this contrasts with some evidence from Latin America (Williamson, 2009a), it begs the question of whether all measurement issues are satisfactorily addressed using social tables. However, should the latter be a prominent issue, it is evident that some theoretical links between pre-industrial inequality and growth require renewed thought. More such histories with evidence, including calculations of within- and between-group inequality across different regions, will enable scholars to identify more accurately the mechanisms by which early inequality influences later development and underdevelopment. Furthermore, this research prompts the inclusion of a wider spectrum of cross-country pre-Industrial inequality estimates to understand more fully the links with consequent development. In particular, excluded regions from the currently developing world would add significantly to the picture. While the Cape appears to have

had among the highest levels of inequality in the pre-Industrial era, it is quite likely that other colonies exhibited a similarly severe degree of inequality.

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10 Appendix

Table 1 Sources of prices of agricultural products to calculate farming income

Period	Unit of record in *Opfaarollen*	Price per unit	Source
1700	Grain (muid)	8.1	MOOC8/165
1724	Grain (muid)	6	MOOC10/3.42*
1757	Grain (muid)	6	MOOC8/9.29*, MOOC8/10.15*
1700	Wine (leaguer)	75	MOOC8/8.150
1724	Wine (leaguer)	51	MOOC10/3.53*
1757	Wine (leaguer)	48	MOOC8/8.23*
1700	Cattle (head)	30	MOOC8.150
1724	Cattle (head)	24	MOOC10/3.48*
1757	Cattle (head)	9.36	MOOC8/8.42*
1700	Horses (head)	50	MOOC8.150
1724	Horses (head)	90	MOOC10/3.42
1757	Horses (head)	10	MOOC8/8.42*
1700	Pig (head)	3.42	MOOC8/2.12*, MOOC 10/1.21*
1724	Pig (head)	5.25	MOOC10/3.58*
1757	Pig (head)	4.2	MOOC10/5.22*
1700	Sheep (head)	2	MOOC8.150
1724	Sheep (head)	6	MOOC10/3.48*
1757	Sheep (head)	1.5	MOOC8/8.42*

NOTES: (*) indicates that prices were converted from *rijksdaalders* to *guilders* in the ratio of 3:1 as per van Duin & Ross (1987). Given that cattle, pigs and sheep each represent stocks and not flows, it is assumed that 15% of current stock is sold in each year at the given price, which generates the farming income used in this study. The conversion is suggested by van Duin & Ross (1987). Horses, while also not representative of income flows, are not sold for food or other consumption purposes, and are therefore not assumed to generate as much income as other stocks. We assume that 5% of the stock of horses is sold to generate income. Many thanks to Sandra Swart for suggesting this figure.

Table 2 Free Citizens and their servants: Population Totals and Reweighting

	Year	Adult Males	Adult Females	Boys	Girls	Burgher Total	Knecht	Male Slave	Female Slave	Boy Slave	Girl Slave	Slave Total (Burgher)	VOC Slaves	VOC:Burgher
Van Duin & Ross	1700													
	1702	502	270	337	333	1442	90	653	120	41	36	850	358	0.421
	1723	679	433	544	589	2245	119	2224	408	139	151	2922	553	0.189
	1757	1509	1019	1412	1392	5332	105	4135	1042	433	350	5960	615	0.103
Current Sample	1700					1255	71	668	113	40	39	860	0	0.000
	1702					1554	91	649	124	52	41	866	0	0.000
	1723					2395	116	2293	422	155	141	3011	0	0.000
	1757					5367	102	4008	1035	428	354	5825	0	0.000
Proportion Captured	1700													
	1702					1.078	1.011	0.994	1.033	1.268	1.139			
	1723					1.067	0.975	1.031	1.034	1.115	0.934			
	1757					1.007	0.971	0.969	0.993	0.988	1.011			
Weighting factor	1700													
	1702					0.928	0.989	1.430	1.375	1.121	1.248			
	1723					0.937	1.026	1.153	1.150	1.066	1.274			
	1757					0.993	1.029	1.138	1.111	1.116	1.091			

NOTES: Figures in the *opgaafrollen* sample used in this study are compared with those of Van Duin & Ross (1987). Weighting factors are calculated as the inverse of the proportion of individuals in each category captured, except for slaves, where each category is also inflated to reflect the number of slaves in VOC ownership, and that are not captured in the micro data. Figures for 1700 are not available, and where applicable 1702 weights are applied. The latter is relevant for slaves due to the relatively high ratio of slaves in VOC ownership in the earlier section of the sample.

Table 3 VOC Employees - Population Totals and Reweighting Factors

Year	Van Duin & Ross	TEPC (current sample)	% captured by TEPC	Weighting factor
1699		502		0

1724	829	661	0.7973462	1.254160363
1756	1255	1,118	0.890836653	1.12254025

NOTE: Figures in the TEPC sample used in this study are compared with those of Van Duin & Ross (1987). Weighting factors are calculated as the inverse of the proportion of individuals in each year captured.

Table 4 Real Per Capita Income of Various Groups

Year	VOC Employee	Farming Burgher	Non-farming Burgher	Farming Pachter	Non-farming Pachter	Knechts	Male Slaves	Female Slaves	Boy Slaves	Girl Slaves
1700	169	244	121	4473	15914	204	52	52	26	26
	(172)	(382)	(96)	(3221)	(9882)					
	531	845	401	37	6	70	955	155	45	49
1723	149	192	87	2412	5150	140	52	52	26	26
	(176)	(334)	(113)	(2004)	(5431)					
	821	1496	926	41	7	119	2645	485	165	180
1757	187	107	67	9794	1758	218	52	52	26	26
	(184)	(243)	(63)	(3884)	(1971)					
	1249	3303	2029	5	29	105	4562	1150	478	386

NOTE: Figures are weighted by household size and sampling adjustments. Standard errors are in parentheses and the total population represented by the group (the sum of the weights) is given below that. Nominal incomes are converted to 1700 prices by the price index of Du Plessis & Du Plessis (2009).

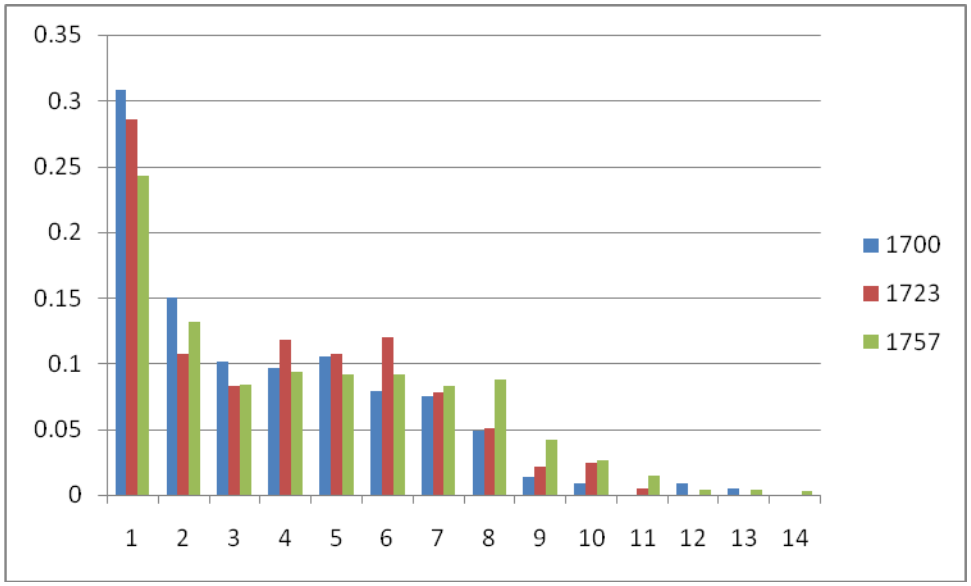


Figure 1 Distribution of household size of farming burghers over time

Table 5 Percentage change in real income at various percentiles

	With Pacht Income		Without Pacht Income		Farming Burgher Income Only	
Percentile	1700-1723	1723-1757	1700-1723	1723-1757	1700-1723	1723-1757
1	-57.998%	31.045%	-62.198%	45.606%	-95.233%	1488.589%
5	-40.227%	-18.904%	-43.601%	-14.053%	-73.332%	19.485%
10	-45.805%	-26.178%	-45.805%	-26.595%	-46.029%	-39.014%
25	0.000%	-33.596%	0.000%	-34.230%	-37.850%	-57.202%
50	-17.855%	0.000%	-17.855%	0.000%	-30.314%	-59.240%
75	-37.623%	-32.497%	-37.497%	-33.841%	-30.991%	-40.885%
90	-31.806%	-20.588%	-28.952%	-16.023%	-14.442%	-30.216%
95	-36.851%	-31.199%	-23.043%	-30.055%	14.123%	-35.800%
99	-68.454%	-45.423%	-16.121%	-33.824%	-23.906%	-12.776%

NOTE: The distributions that are used to derive changes are calculated from weighted data. To allow intertemporal comparisons, each year's distribution is converted to 1700 prices by Du Plessis and Du Plessis' (2009) price index.

Table 6 Gini Coefficients

	GINI	Deflation of Burgher Income by price index[a]			Use 1700 prices[b]			Use 1757 prices[c]		
		1700	1723	1757	1700	1723	1757	1700	1723	1757
	Whole Population[d]	0.792	0.761	0.742	0.792	0.757	0.713	0.837	0.816	0.744
	Whole Population (excluding income from pachts)[e]	0.569	0.592	0.559	0.569	0.626	0.590	0.543	0.582	0.555
	Whole Population (excluding income from pachts and slave population)[f]	0.475	0.563	0.578	0.477	0.586	0.539	0.479	0.587	0.575
Within Group Inequality	VOC Employees	0.284	0.310	0.297	0.284	0.310	0.297	0.284	0.310	0.297
	Farming Burghers	0.554	0.625	0.689	0.554	0.636	0.652	0.565	0.659	0.689
	Other Burghers (Imputed Figures)	0.402	0.576	0.433	0.402	0.568	0.426	0.417	0.546	0.433

NOTES: All estimates are constructed using per capita levels of household income, weighting by household size and other sampling adjustments.
[a]Farming income adjusted by the overall price index of Du Plessis & Du Plessis (2009) to 1700 levels.
[b]Prices of farming output fixed at 1700 levels, while only allowing quantity to vary. All other groups' incomes are adjusted to 1700 prices by the overall index.
[c]Prices of farming output fixed at 1757 levels, while only allowing quantity to vary. All other groups' incomes are adjusted to 1757 prices by the overall index.
[d]Includes the entire population and all income sources available.
[e]Includes the entire population, income from pachts is excluded (though pachters' other income sources are used in constructing the income estimates).
[f]Includes the entire population except for slaves, income from pachts is excluded (though pachters' other income sources are used in constructing the income estimates).

Table 7 Theil Indices

	Deflation by price index[a]			1700 prices[b]			1757 prices[c]		
	1700	**1723**	**1757**	**1700**	**1723**	**1757**	**1700**	**1723**	**1757**
Whole Population[d]	1.422	1.161	1.240	1.423	1.127	1.057	1.763	1.484	1.273
Whole Population (excluding income from pachts)[e]	0.672	0.791	0.728	0.674	0.911	0.784	0.609	0.793	0.715
Whole Population (excluding income from pachts and slave population)[f]	0.478	0.641	0.679	0.481	0.720	0.602	0.472	0.712	0.669
VOC Employees	0.238	0.266	0.235	0.238	0.266	0.235	0.238	0.266	0.235
Farming Burghers	0.607	0.765	1.003	0.607	0.805	0.895	0.629	0.867	1.003
Other Burghers (Imputed Figures)	0.267	0.594	0.320	0.267	0.577	0.302	0.290	0.528	0.320
Between[d]	0.445	0.375	0.338	0.445	0.391	0.382	0.380	0.324	0.331
Within[d]	0.555	0.625	0.662	0.555	0.609	0.618	0.620	0.676	0.669
Between (excluding income from pachts)[e]	0.403	0.374	0.331	0.403	0.397	0.357	0.387	0.364	0.326
Within (excluding income from pachts)[e]	0.597	0.626	0.669	0.597	0.603	0.643	0.613	0.636	0.674
Between (excluding income from pachts and slave population)[f]	0.077	0.074	0.099	0.081	0.109	0.017	0.105	0.123	0.092
Within (excluding income from pachts and slave population)[f]	0.923	0.926	0.901	0.919	0.891	0.983	0.895	0.877	0.908
Between (Wage & Agriculture)[g]	0.031	0.012	0.050	0.031	0.042	0.001	0.004	0.002	0.050
Within (Wage & Agriculture)[g]	0.969	0.988	0.950	0.969	0.958	0.999	0.996	0.998	0.950
Between (Slaves and rest)[h]	0.351	0.321	0.252	0.350	0.321	0.342	0.314	0.271	0.252
Within (Slaves and rest)[h]	0.649	0.679	0.748	0.650	0.679	0.658	0.686	0.729	0.748

NOTES: All estimates are constructed using per capita levels of household income, weighting by household size and other sampling adjustments .

[a]Farming income adjusted by the overall price index of Du Plessis & Du Plessis (2009) to 1700 levels.

[b]Prices of farming output fixed at 1700 levels, while only allowing quantity to vary. All other groups' incomes are adjusted to 1700 prices by the overall index.

[c]Prices of farming output fixed at 1757 levels, while only allowing quantity to vary. All other groups' incomes are adjusted to 1757 prices by the overall index.

[d]Includes the entire population and all income sources available.

[e]Includes the entire population, income from pachts is excluded (though pachters' other income sources are used in constructing the income estimates).

[f]Includes the entire population except for slaves, income from pachts is excluded (though pachters' other income sources are used in constructing the income estimates).

[g]Includes only the farming burghers and the VOC employees.

[h]Measures inequality between slaves and the rest of the population. Income from pachts is excluded (though pachters' other income sources are used in constructing the income estimates).

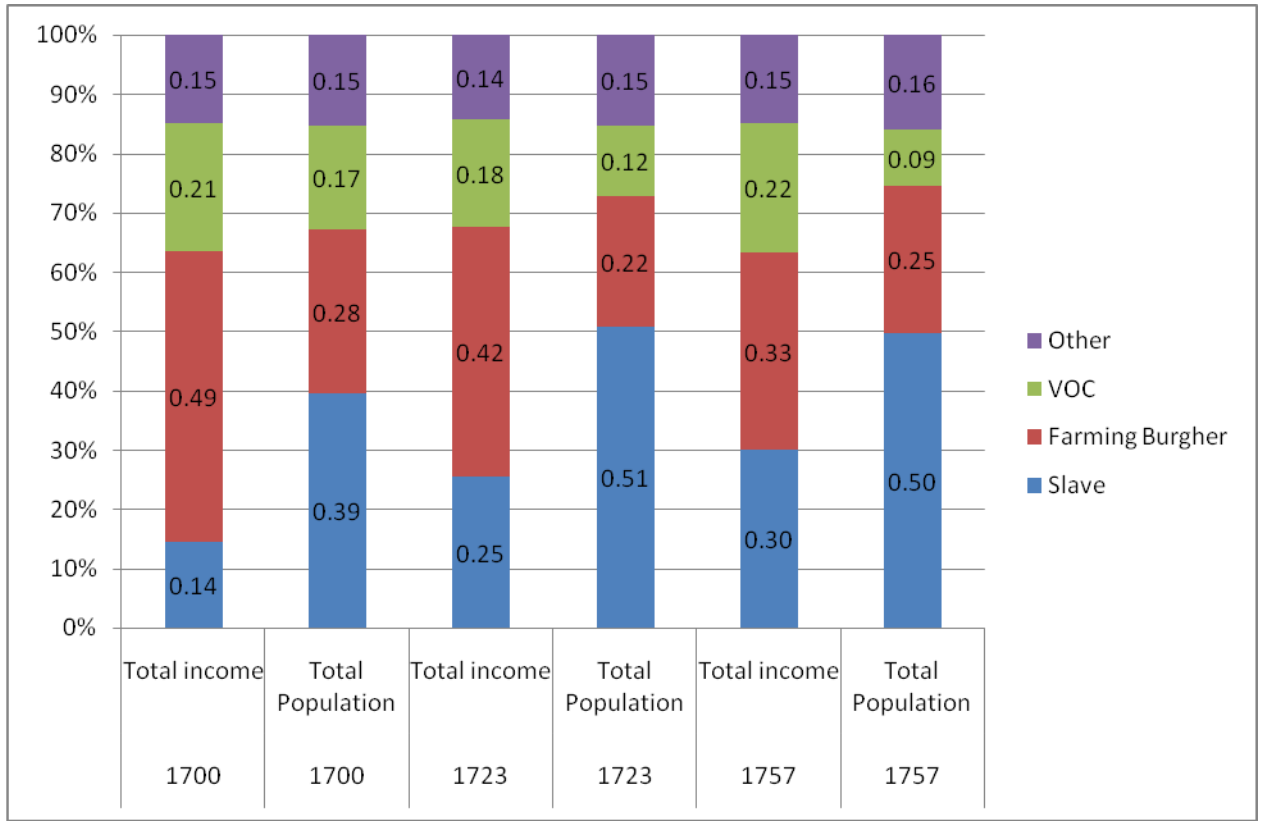
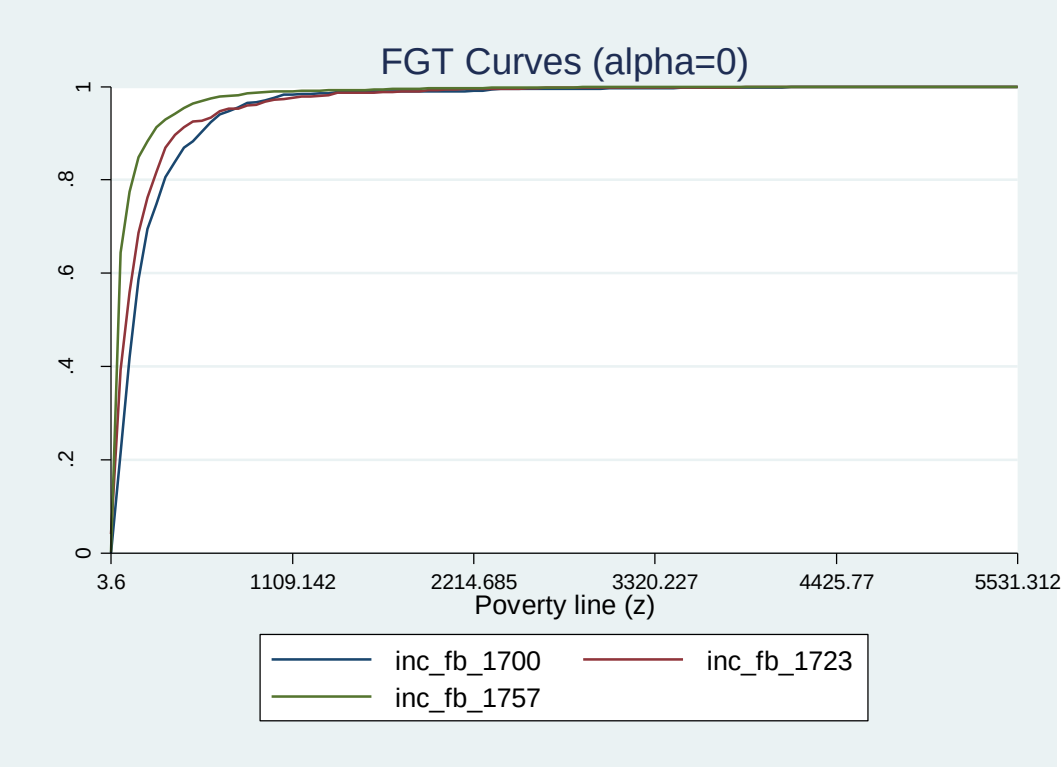


Figure 2 Total Population and Income Shares of Various Groups

NOTES: Own calculations from the *opgaafrollen* and TEPC data, with income imputations for non-farming burghers, knechts and slaves. All data are weighted by household size and take account of sampling discrepancies. Income excludes returns on *pachts* and is normalised across groups to 1700 prices with the price index of Du Plessis & Du Plessis (2009)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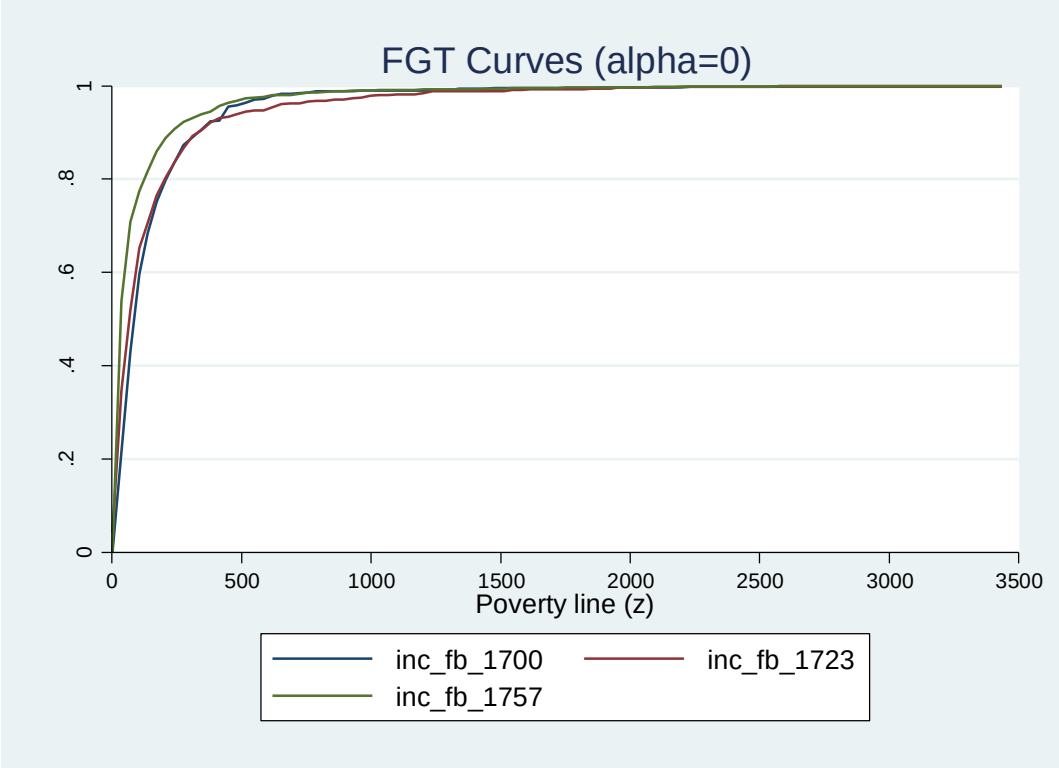

Figure 3 Cumulative Density Functions of Farmers' Income - by year

NOTES: Per capita incomes are converted to 1757 prices and densities are weighted by household size and account for sampling differences.

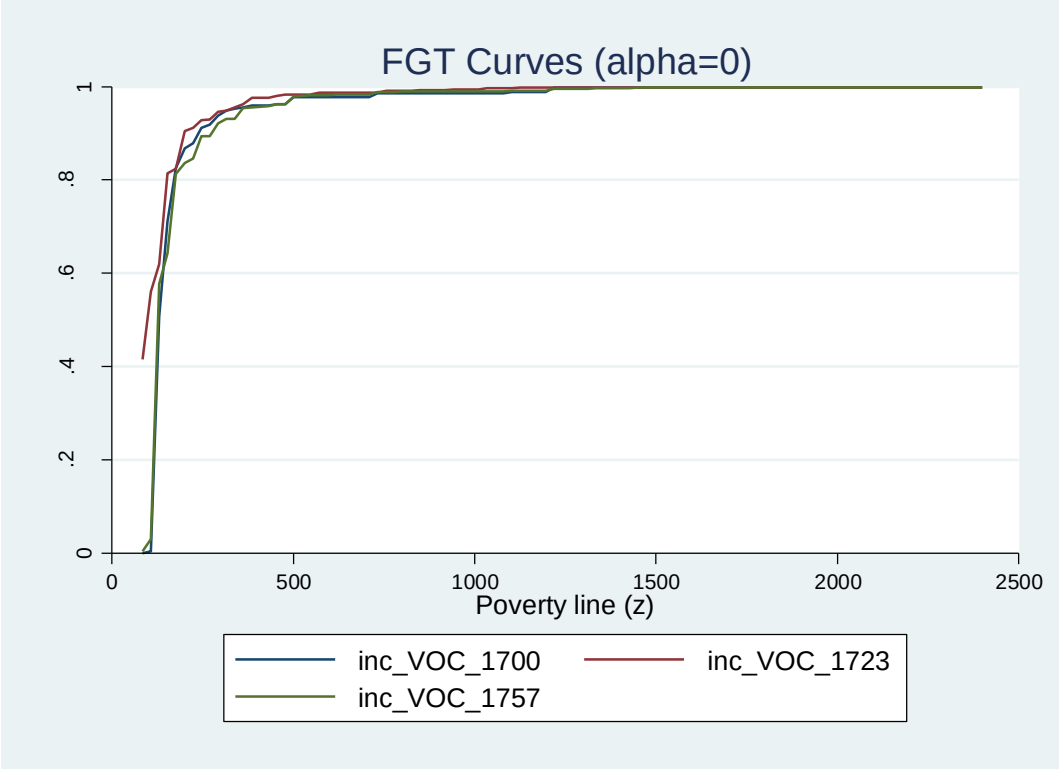

Figure 4 Cumulative Density Functions of VOC Employees - by year

NOTES: Per capita incomes are converted to 1757 prices and densities are weighted by household size and account for sampling differences. Curves are cut off at f3000 per capita per annum to aid presentation.

Table 8 Decomposition of Gini from Agricultural Income by Source

Year	Income Source	Share in Agricultural Income	Gini within Income Source	Rank Correlation with Total Agricultural Income	Contribution to Inequality in Agricultural Income	Gini Elasticity of Income Source
1700	Grain	0.274	0.628	0.898	0.281	0.007
	Cattle	0.206	0.570	0.855	0.183	-0.023
	Wine	0.436	0.621	0.900	0.444	0.008
	Sheep	0.076	0.754	0.822	0.085	0.010
	Pigs	0.001	0.860	0.694	0.001	0.000
	Horses	0.007	0.625	0.677	0.006	-0.002
	Total Agricultural Income	**1.000**	**0.549**		**1.000**	
1723	Grain	0.312	0.765	0.916	0.348	0.036
	Cattle	0.223	0.603	0.897	0.192	-0.031
	Wine	0.203	0.773	0.819	0.205	0.002
	Sheep	0.236	0.685	0.900	0.232	-0.005
	Pigs	0.003	0.812	0.627	0.002	-0.001
	Horses	0.023	0.738	0.798	0.021	-0.001
	Total Agricultural Income	**1.000**	**0.628**		**1.000**	
1757	Grain	0.258	0.905	0.888	0.301	0.043
	Cattle	0.156	0.592	0.711	0.096	-0.061
	Wine	0.441	0.880	0.921	0.519	0.078
	Sheep	0.134	0.604	0.651	0.077	-0.058
	Pigs	0.001	0.990	0.864	0.001	0.000
	Horses	0.010	0.647	0.771	0.007	-0.003
	Total Agricultural Income	**1.000**	**0.689**		**1.000**	

NOTES: Income shares are calculated according to the relevant prices in the respective years, and not by normalising to one year. The "descogini" STATA module (López-Feldman, 2006) used for the decomposition does not accommodate weighting. Here we expand the dataset by the weights, so that frequency weights are implicitly assumed. Hence minor differences in the overall Gini coefficients presented here and in Table 6 exist. The Gini Elasticity of the Income Source estimates the percentage change in the overall Gini coefficient if that income source increases by 1 percent.

Table 9 Comparative Gini-coefficients across region and over time

Country/region	Year	Gini	Source
Tuscany	1427	46.1	Milanovic, Lindert and Williamson (2008)
South Serbia	1455	20.9	Milanovic, Lindert and Williamson (2008)
Holland	1561	56	Milanovic, Lindert and Williamson (2008)
Levant	1596	39.8	Milanovic, Lindert and Williamson (2008)
England & Wales	1688	45	Milanovic, Lindert and Williamson (2008)
Cape Colony	1700	54.3 – 83.7	Own analysis
Cape Colony	1723	58.2 – 81.6	Own analysis
Holland	1732	61.1	Milanovic, Lindert and Williamson (2008)
Moghul India	1750	48.9	Milanovic, Lindert and Williamson (2008)
Old Castille	1752	52.5	Milanovic, Lindert and Williamson (2008)
Cape Colony	1757	55.5 - 74.4	Own analysis
England & Wales	1759	45.9	Milanovic, Lindert and Williamson (2008)
France	1788	55.9	Milanovic, Lindert and Williamson (2008)
Nueva España	1790	63.5	Milanovic, Lindert and Williamson (2008)
England & Wales	1801	51.5	Milanovic, Lindert and Williamson (2008)
Bihar (India)	1807	33.5	Milanovic, Lindert and Williamson (2008)
Netherlands	1808	57	Milanovic, Lindert and Williamson (2008)
Naples	1811	28.4	Milanovic, Lindert and Williamson (2008)
Chile	1861	63.7	Milanovic, Lindert and Williamson (2008)
Brazil	1872	43.3	Milanovic, Lindert and Williamson (2008)
Peru	1876	42.2	Milanovic, Lindert and Williamson (2008)
Java	1880	39.7	Milanovic, Lindert and Williamson (2008)
China	1880	24.5	Milanovic, Lindert and Williamson (2008)
Japan	1886	39.5	Milanovic, Lindert and Williamson (2008)
Kenya	1914	33.2	Milanovic, Lindert and Williamson (2008)
Java	1924	32.1	Milanovic, Lindert and Williamson (2008)

NOTES: The Gini's are split into four groups: below 40, 40-50, 50-60, and above 60. Darker bands indicate higher Gini-coefficients.