

**THE ECONOMIC IMPACT OF THE INDIGENOUS KHOE ON THE NORTH-EASTERN
FRONTIER OF THE CAPE COLONY.**

Calumet Links

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arrived at, are those of the author and are not necessarily to be attributed to the GEMS.*



Supervisor: Prof. Johan FOURIE

Co-supervisor: Prof. Dieter VON FINTEL

Co-supervisor: Prof. Erik GREEN

Stellenbosch University

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Declaration

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

“In many circumstances, when people make a claim to an ethnic identity, or ascribe others to such an identity, this is a political act. The claim is made in order to acquire, or safeguard, some scarce good, or to exclude others from that good.”

Robert Ross

Abstract

The role played by the Khoe in early Cape colonial economy remains largely unaccounted for in Economic History. The two exceptions are Fourie and Green's *The missing people: accounting for the productivity of indigenous populations in Cape Colonial History* (2015) and La Croix's *The Khoikhoi population, 1652-1780: a review of the evidence and two new estimates* (2018). This omission is significant since the Khoe formed the cornerstone of the Cape frontier pastoral economy. This thesis investigates the role Khoe labourers, both coerced and free, played in shaping the north-eastern economy of the Cape Colony in the period 1787-1828. I also illuminate the devastating impact that frontier closure had on Khoe society.

The study starts by investigating the substitutability of slave labour. Chapter One questions the substitutability of slave labour through a longitudinal study of the Graaff-Reinet district, located on the eastern frontier of the colony. I calculate the Hicksian elasticity of complementarity coefficients for each year of a 22-year combination of cross-sectional tax data sets (1805–1828) in order to test whether slave labour was substitutable for other forms of labour. I find that slave labour, indigenous labour, and settler family labour were not substitutable over this period, which lends credence to the finding that slave and family labour were two different inputs in agricultural production. I argue that the non-substitutability of slave labour was largely a result of the settlers' need to obtain labourers with location-specific skills such as the Khoe, and that slaves may have served a purpose other than being a source of unskilled labour - such as providing artisan skills or acting as collateral.

In Chapter Two I investigate the relationship between coercion and productivity in this pastoral setting. I find a positive relationship between loosening coercion and effort, and argue that as legislative protection against the mistreatment of the Khoe was promulgated into law, Khoe labourers decreased their levels of effort. This finding leads me to conclude that even in pastoralism, where effort is hard to

observe and quantify, less coercion leads to decreased levels of effort.

Chapter Three investigates the general theoretical argument that women historically broke free of traditional gender roles as a result of the fact that they held an advantage over men in animal husbandry. Working Khoe women on the north-eastern frontier of the Cape Colony present the perfect subjects to test this claim. Both Graaff-Reinet and Tulbagh districts were major meat and crop producers for the colonial centre at Cape Town, and relied heavily on indentured Khoe female labour. By using a pooled Ordinary Least Squares (OLS) regression I find that the presence of indigenous Khoe women on farms had no significant positive effect on sheep and cattle holdings for either of the two districts above that of Khoe men. As a consequence, I argue that Khoe women's actual competitive advantage lay in home-based production.

In the fourth and last chapter, I argue for the importance of incorporating family structure in inequality estimations. This is particularly important for inequality studies in Africa. When calculating the various inequality metrics, contemporary studies, regardless of the setting or context, assume either a conventional western household, or that resources are simply divided on a per capita basis. This study argues that kinship networks matter for the study of inequality in African societies. Households in economic distress often join those of relatives or other kin in order to mitigate the impact of extreme poverty. When studying the level of wealth inequality among the Khoe of Swellendam district in 1825, it is clear that frontier closure impoverished a significant portion of this community which, in order to reduce the impact of destitution, made use of extended kinship networks.

Opsomming

Die rol van inheemse arbeid in die ekonomie van die voormalige Kaapse kolonie is tot dusvêr meerendeels verontagsaam in die studie van Ekonomiese Geskiedenis – buiten die bydrae van Fourie en Green se *The missing people: accounting for the productivity of indigenous populations in Cape Colonial History* (2015) en La Croix se *The Khoikhoi population, 1652-1780: a review of the evidence and two new estimates* (2018). Hierdie leemte is kommerwekkend gegewe die feit dat die Khoe die hoeksteen van die Kaapse pastorale koloniale ekonomie was. Hierdie verhandeling poog om die bestaande leemte te vul deur ondersoek in te stel na die rol wat beide gedwonge en vrye arbeid gespeel het in die ekonomie van die Kaapse noordoostergrens, gedurende die tydperk 1787-1828. Ek ondersoek ook die verpletterende impak wat grens-sluiting op die Khoe gemeenskap as geheel gehad het.

Hierdie verhandeling begin deur ondersoek in te stel na die beweerde vervangbaarheid van slawearbeid met ander vorme van arbeid. Hoofstuk Een bevraagteken hierdie aanname by wyse van 'n dinamiese paneelstudie met data vanuit die Graaff-Reinet distrik op die oosterse grens van Suid Afrika se Kaapkolonie. Ek bereken Hicksiaanse-elastisiteitskoeffisiente om die vervangbaarheid van verskillende vorme van arbeid met slawearbeid te vergelyk. Ek bevind dat slawearbeid nie vervangbaar was met inheemse arbeid of setlaarfamilie-arbeid nie. Hierdie bevinding versterk dan die veronderstelling dat slawe- en setlaararbeid twee verskillende insette in die landbouproduksieproses was. Ek voer ook aan dat die gebrek aan vervangbaarheid gespruit het uit die behoefte van setlaars om arbeid te verkry met liggings-spesifieke kennis, soos byvoorbeeld die Khoe bevolking. Slawearbeid op plase het waarskynlik nie gedien as ongeskoolde arbeid nie, maar eerder as vakmanne of as kolateraal vir lenings. In hoofstuk Twee ondersoek ek die verhouding tussen dwang en werksywer in 'n pastorale opset. Ek bevind dat daar 'n negatiewe verhouding bestaan tussen die vermindering van dwang en werksywer en voer aan dat die instelling van

wetlike beskerming van die Khoe teen mishandeling hulle werksywer laat afneem het. Na 1809, toe die eerste wetlike beskerming tot stand gebring is, het minder dwang op arbeiders gelei tot laer werksywervlakke. Hierdie gevolgtrekkinge bevestig dat, selfs in pastorale landbou waar ywer moeilik is om te monitor of te kwantifiseer, minder dwang tot laer werksywer lei.

Hoofstuk Drie probeer vasstel of vroue verlos was vanuit tradisionele geslagsrolle as gevolg van die feit dat hulle 'n voordeel bo mans gehad het in veeteelt. Die werkende Khoe vroue van die noordoostersegrens van die Kaapkolonie dien as ideale toetsonderwerpe. Beide Graaff-Reinet en Tulbagh was belangrike vleis en oes produsente vir die koloniale middelpunt in Kaapstad en was baie afhanklik van gedwonge Khoe vrouearbeid. Deur die gebruik van 'n saamgevoegde Gewone Kleinstekwadrate (GK) regressie bevind ek dat die teenwoordigheid van inheemse Khoe vroue op die plase geen wesentliche positiewe uitwerking, bo Khoe mans, gehad het op skaap en bees getalle vir Tulbagh en Graaff-Reinet distrikte nie. Alternatiewelik, stel ook voor dat Khoe vroue 'n belangrike rol gespeel het as tuisprodusente en dat hierdie eintlik die voordeel was wat hulle bo mans gehad het.

In die finale hoofstuk beklemtoon ek dat huishoudingstrukture in ag moet geneem word wanneer ongelykheidsgetalle bereken word. Hierdie kwessie is veral belangrik by ongelykheidstudies van Afrika. Wanneer hedendaagse studies ongelykheidsgetalle bereken, word konvensionele westerse huishoudingstrukture as maatstaf gebruik of bronne word net gelykop gedeel tussen alle lede van die betrokke samelewing. Hierdie studie voer aan dat familialenetwerke belangrik is wanneer Afrikaongelykheid bestudeer word. Huishoudings wat dikwels in ekonomiese verknorsings verkeer het, het soms aangesluit by verlangse familieledes of diegene wat beter af was om verligting te vind. Deur na rykdoms-ongelykheid te kyk binne die Khoe gemeenskap van Swellendam in 1825, is dit duidelik dat grens-sluiting tot geweldige armoede gelei het. Dit is ook duidelik dat die Swellendamse Khoe gebruik gemaak het van verbreedte huishoudings-strukture om die impak van hierdie armoede gedeeltelike te stuit.

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*This thesis is **dedicated** to my 204 year noble Nama lineage as "n dagga Links" and to our ancestral seat at !Xheimies in the Kammiesberg mountains. May this work pay homage to those that perished in the battle of Lilyfountain during the South African war, while defending our heritage...*

Introduction

Opening remarks

The conquered indigenous peoples of the world have often been stripped of their history and their place in history given that it is always the victor who writes history. What has made these peoples so vulnerable to erasure, is the fact that their history was very often not written down (Viljoen, 2001). Beyond archaeological remains and oral histories, our understanding of the colonised, the erased, and forgotten, is fragmentary, especially if little of the society in question remains today. This is particularly the case when we try to evaluate their collective economic impact. Since very few written records exist, it is difficult to assess the impact these peoples had on the economies in which they nonetheless participated. It is impossible to measure that which is not quantifiable. This is true of the indigenous people of the Cape Colony, the Khoes, whose complete impact on the economy of southern Africa remains a matter of debate. This thesis is an attempt to re-insert into history the critical role that the Khoes played in South African economic history. Much of the research conducted here relied on records compiled by the colonial authorities in order to further their own agenda. This is fitting, since that implies that I have effectively used the tools of the silencer to give voice to the silenced. The results of the study clearly indicate that, although the Khoes were the backbone of the frontier colonial economy, their systematic disenfranchisement and persecution left them destitute (Smit, 2016).

Motivation

[T]he neglect of the Khoesan population in earlier accounts of the Cape economy has produced a distorted account of colonial life that tends to be self-reinforcing. Just because they are missing from tax censuses, inventories, and other colonial documentation does not mean

that the Khoesan did not matter for the Cape economy in general and the growth of settler farming in particular. - Fourie Green

In the above quote, Fourie and Green (2015) aptly define an issue that transcends the plight of the Khoe. It echoes a greater sentiment in the Economic History literature, namely that to ignore the contribution of the indigenous population in economic theory, produces a deeply flawed historiography. As in the case of the Khoe, our understanding of the early Native and Latin American populations is also extremely limited. Often the surviving knowledge of the economic and political systems of these peoples, both pre- and post European contact, relies on archaeological evidence, or is clouded by colonial-era constructs born of anecdotes and a fear of the unknown (MacLeitch, 2006; Allard, 2020). As for the Khoe, even the archaeological evidence is scant compared to many other indigenous peoples who suffered a similar fate.

This study of the economic contribution of the nineteenth-century Khoe to the economy of the Cape Colony was made possible by the transcription of colonial records from the Cape Archives – records which span roughly three centuries. Since the Cape was initially established by the Dutch as a refreshment station, the Dutch East India company (VOC) kept meticulous records of many of the operations of the colony, including information about the everyday lives of the indigenous population (Fourie, 2014). These record keeping practices were continued after the British took control of the Cape at the start of the nineteenth century. The transcription of archival documents such as tax records, death notices, probate inventories and more, has also bolstered a whole new body of literature on the economic history of the Cape over the past decade or so (Fourie, 2014). Since the level of detail they contain is often quite remarkable, these new data sets enable us to peer into the very fabric of colonial society.

Despite this revolutionary new era in Cape economic history literature, very few studies have focused primarily on the Khoe. Fourie and Green (2015) and La Croix (2018) are the only works of economic history to have done so, producing in the process more accurate Khoe population figures – and productivity levels – for the Cape Colony during the eighteenth century. Many questions regarding the role of the Khoe in the colonial economy and the impact that contact with colonists had on

their livelihoods, remain unanswered. On a larger scale, economic research on the Khoe may also yield greater insights into questions regarding the impact of the open frontier on labour relations, and the relationship between pastoral agriculture and the formation of gender roles. There is a vast amount of data available to address these very important questions.

One of the significant contributions made by this thesis is that it investigates the impact that labour coercion had on the effort of indigenous people. This is particularly significant since there is generally no consensus on the impact that coercion has on productivity. On the one hand, there is the argument put forward by Fogel and Engerman (1974) and Acemoglu and Wolitzky (2011) according to which, provided certain conditions are met, coercion and greater productivity are complementary. On the other hand, Markevich and Zhuravskaya (2018) have argued that free labour will always be more productive than coerced labour. One of the significant limitations of all these studies is that they focus, either on chattel slavery, or on serf labour in crop-based agriculture. Almost none have focused on pastoral agriculture, in part, because Domar (1970) has argued that labour coercion should not be necessary in a labour-saving agricultural society. An additional challenge to studying effort in the context of pastoral agriculture relates to difficulties in conceptualising and estimating productivity. The difficulty here lies in deciding just what fluctuations in cattle stock means in terms of productivity since a decline in livestock holdings may not necessarily be a sign of loss, but could also be the result of cash sales. This thesis not only proves that labour coercion can, and did, exist in a pastoral frontier zone, but also makes methodological contributions to the literature on labour coercion in addition to which it shows how 'loosening coercion' impacted the effort levels of the Khoe.

On the basis of the transcribed data, this thesis also affords us a glimpse into Khoe society after the colonial frontier had closed. Following their complete incorporation into the economy of the Cape Colony, British colonial authorities kept exclusive Khoe tax records for the district of Swellendam which further enabled me to address questions on Khoe family structures and poverty coping mechanism in a way that has not been possible until now.

Definitions

Throughout this thesis the term *Khoe* will be used as an all-encompassing term for the indigenous Khoesan or Khoisan people of the Cape Colony. In modern Nama, the term *Khoe* or *KhoeKhoe* roughly translates as ‘men of men’ (Newton-King, 1999). My usage is in keeping with the general consensus in historiography which groups the San and Khoe together in one ethnic community. This also remains true to the fact that the VOC (that is, the Dutch) distinguished between the Khoe and San on the basis of economic activity, and not out of racial or cultural considerations. For the Khoe, the term ‘San’ meant ‘other’, and referred to Khoe who were poor (Newton-King, 1999). This does not imply that European settlers in the Cape considered the Khoe their equal (Giliomee, 1963). The Khoe were essentially nomadic pastoralists who wandered the southern tip of Africa in search of grazing and water for their cattle and sheep (Sadr, 1998). The San, on the other hand, were hunter-gatherers who roamed the land in search of game for hunting and foraged for berries and edible plants (Ross, 1999; Fourie and Green, 2015). Yet, despite these differences, the Khoesan shared a common language which unified them. It is therefore historically and methodologically sound to include the San in reference to the Khoe.

Another important concept which must be clarified and defined, is *household labour*. Throughout this thesis, *household labour* will not refer exclusively to labour performed in the household, such as cooking, cleaning, laundry or other activities related to home production. Rather, as used in this study, the term specifically refers to European settler labour employed or labouring on farms/households. Since much of the data used in this study derive from colonial tax data sets which, in turn, drive from observations at the settler farm-level, it is acceptable to refer to European settlers working and living on these farms as *household labour*. After all, they are the household unit of account in these records.

Indigenous people and economic history

As stated earlier, studies in Economic History with a focus on indigenous people and systems have been scarce, in part, because of the limited records available. Scholars who have attempted such analyses have done so by utilising European compiled

archival records in innovative ways, especially once modern technology made the large-scale digitisations of these records possible.

Carlos and Lewis (2012) used Hudson Bay Company records to test whether or not the smallpox epidemic of 1781-82 was as deadly to the Native Americans who traded furs with the Hudson House and Cumberland House trading posts. They found that, instead of having wiped out 50% of the Native American communities as was previously believed, mortality rates were in fact lower than 20%. Although this example may be difficult to extrapolate to North America as a whole, it does shed some light on a hotly debated issue, namely the degree to which contact with European diseases decimated Native American populations. In a similar vein, Carlos and Lewis (2002) were able to use digitised probate records to provide insight into the level of sophistication and quality of the goods the Hudson Bay company traded with Native American fur traders of the Hudson Bay basin. Company diaries also reveal fascinating levels of detail, such as the fact that officials were particularly concerned with the quality of the goods traded with the Native Americans since this often determined the success of the transactions being concluded. This shows that even prior to the incorporation of Native Americans into the North American colonial economy, indigenous people had developed sophisticated tastes and constituted a formidable source of supply for the European fur market. In a similar vein, Twrdek and Manzel (2010) used prison records to analyse the height of native Peruvians between the early republican period and the end of the Guano era (1820-1880). They found that the indigenous population imprisoned in the Lima penitentiary (who to a large extent constituted the lower classes), did not benefit from the substantial profits gained from the Guano trade over this period. The authors could demonstrate that, as a result, these indigenous people were significantly shorter than their settler counterparts.

In Southern African historiography, studies such as those conducted by Ross (1981), Ross (1999), Penn (1986), and Newton-King (1999) also made extensive use of archival records such as personal diaries in order to paint vivid pictures of the involvement of the Khoe in the cultural and economic development of the Cape Colony. Marks and Atmore (1980) were able to roughly calculate the average per annum wage a frontier Khoesan was paid using archival records. Economic historians of Southern Africa have been able to use VOC records to make similar inquiries into

the everyday lives of the Khoe. The 1978 Masters dissertation by historian Vetrees Canby Malherbe was in many important ways ahead of its time because of the way in which she used colonial records to comment on the everyday life of the Khoe. Despite the fact that she did not have the modern computational power we have today, she used a combination of Khoe wage information and tax data to arrive at observations about the activities and livelihoods of the Khoe in the Graaff-Reinet frontier district, specifically what Khoe wages were on settler farms, and whether they got paid in cash or in kind. The dissertation also offers great insight into the degree to which the Khoe held assets in their own right. The most recent major contribution in economic history with respect to the Khoe has come from Fourie and Green (2015) and La Croix (2018). Both these studies employed scattered historical sources and settler farm level colonial data to show how excluding the Khoe from productivity estimates of the Cape during the eighteenth century overestimates slave productivity, inequality levels, and GDP estimates. This innovative way of using historical sources have provided us with the best estimates of Khoe involvement in the eighteenth-century Cape economy to date.

As these studies show, the use of data that had been collected for a completely different purpose is an innovation that has afforded scholars meaningful glimpses into the lives of indigenous populations, even though these sources may not be representative of the population as a whole.

This thesis focuses on the quantitative contribution the Khoe made to the north-eastern frontier economy of the nineteenth century. I also analyse the impact that the closure of the frontier had on the livelihoods of Khoe communities who resided specifically in the Swellendam district in 1825 – the only year for which the requisite transcribed data is as yet available.

Brief history of the interaction between the Khoe people and the Cape settler economy

Geographic proximity aside, I combined data for Swellendam, Graaff-Reinet and Tulbagh districts for two main reasons. Firstly, because I wanted to analyse the impact of the interaction between the colonial economy and the Khoe in the open frontier regions of Tulbagh and Graaff-Reinet districts. The period covered by this study,

1787-1828, is a data rich period in which to test theories regarding the open frontier and labour coercion. During this period, frontier borders were still being established and some of the Khoes still managed to maintain independent livelihoods outside of the colonial order (Penn, 1986; Penn, 2005). Secondly, data for the Graaff-Reinet and Tulbagh districts enabled me to study labour conditions and livelihoods of indentured (unfree) Khoes on the colonial border, while the Swellendam data set offered an opportunity to do the same for free Khoes deep inside the colony. The only major caveat here is that, while the north-eastern frontier regions have a vast repository of settler-linked data which contains details about unfree Khoes labour, Swellendam district only has data for the free Khoes for one year, namely 1825.

The Khoes of Swellendam

The district of Swellendam was established in 1745 – much earlier than the districts of Graaff-Reinet and Tulbagh, and was named after Cape Governor Hendrik Swellengrebel and his wife Wilhelmina van Damme (Viljoen, 2001). When the Cape frontier opened up to Swellendam during the first half of the eighteenth century, many settlers moved east from Cape Town to this district in order to try their hand at stock-farming. These settler frontiersmen, who had endured tremendous hardships in the colonial centre, had moved to what was then the colonial hinterland in order to regain a semblance of independence. The settler exodus was primarily motivated by a mixture of environmental and economic catastrophes. Many of them had tried to establish themselves as crop farmers around Cape Town and Stellenbosch but poor weather conditions, crippling debt, and monopsonistic company policies had left them destitute (Viljoen, 2001).

In essence, the open frontier offered the allure of socio-economic mobility – something which often evaded settlers in the established colonial centre or back in their homeland (Walker, 2000). Establishing themselves in what would become Swellendam district was far from easy though, and many initial settlement attempts failed. As time passed, settler perseverance paid off, and the population of the district increased steadily. As the number of settlers grew, so did the need for labour and just as the settlers of Graaff-Reinet and Tulbagh districts would later do, the settlers of Swellendam district constantly communicated to the colonial authorities

that they were experiencing severe labour shortages. Swellendam district, and later Graaff-Reinet and Tulbagh districts', major agricultural endeavours were livestock and, to a certain extent, vine and wheat farming. Frontiersmen who could afford to buy slaves used them to tend their livestock but, for reasons that will be explained later, the ultimate 'prize' for this kind of labour was Khoe labour (Viljoen, 1997; Viljoen, 2001).

Many South African historians have argued that the economic conditions of settlers and Khoe were roughly equal when the north-eastern frontier of the Cape Colony opened up in the seventeenth century (Marks and Atmore, 1980; Newton-King, 1988). Giliomee (1971, p. 35) has argued that the pioneering African frontier, 'rather than being a place where new social and cultural institutions originated, was one where the disparate groups were often successful in maintaining conditions similar to those existing before contact.' Hence, the initial power balance on the colonial frontier, that is, in Swellendam, Graaff-Reinet and Tulbagh districts, was not as inegalitarian as it later became, and many Khoe still possessed a considerable number of livestock and their way of life was largely still intact (Newton-King, 1988). A variety of historical accounts of Khoe tribes who were relatively rich compared to many of the seventeenth-century settlers also confirm this balance-of-power and equal-economic-conditions theory. Accounts of groups such as the wealthy Inqua who lived beyond the Outeniqua mountains noted that these Khoe were significantly taller than those on the coast and were able to supply the Dutch East India Company (VOC) with up to 500 heads of cattle at a time (Newton-King, 1988).

But this relative egalitarianism turned out to be short-lived. The expansion of the Cape colonial frontier, both north and further east, would amount to a major disruption of the Khoe way of life. Frontier closure was not a singular event but came about as a result of a complex and often violent series of events which over time gradually shifted the power dynamic of frontier society (Saunders, 1981). The Cape colonial frontier experienced a series of frontier closures after the arrival of European settlers, especially in areas closest to the early Cape settlement. As these areas closed, so other areas in the north (Tulbagh district) and east of the colony (first Swellendam, then Graaff-Reinet district) opened up. This study focuses on the settled district of Swellendam and the frontier districts of Graaff-Reinet and Tulbagh throughout the course of the nineteenth century. As the eastern frontier closed at

Swellendam, the dominant settler group established hegemony over the Khoe. The Khoe of Graaff-Reinet district further east would suffer the same fate. In many cases, frontier closure meant the subjugation or genocide of the Khoe population (Penn, 2005).

These Khoe were systematically disenfranchised and dispossessed of their livelihoods in a bid to press them into service in the settler economy. The indenturing of the Khoe was paramount to the success of the settler pastoral farming undertakings which partly explains why the closure of the Swellendam district frontier occurred so swiftly. By 1780, most of the Khoe who resided in that area had been engulfed by the colony. Viljoen (1997) comments that the sense of desperation felt by the Khoe of Swellendam district resulted in the widespread killing of their own cattle in the hope that this offering to the ancestors would free them from the hold the colony was establishing over them. But this was not to be. The colony grew stronger, and its reach was extended both north and east.

The Khoe and the north-eastern frontier

During the later period of 1787-1828, Graaff-Reinet and Tulbagh districts experienced similar rapid shifts in power dynamics as the frontier started to close on the Khoe (Penn, 2005). As an acute sense of panic engulfed the Khoe, violent clashes with settler groups ensued. These revolts came to be known as the Frontier Wars. What also made sustained peace elusive was the fact that the Khoe had a horizontal leadership structure which made negotiations with them very difficult (Giliomee, 1963). At the close of the eighteenth century the eastern frontier was in a state of violent crisis as settler hegemony was being entrenched, no doubt as a result of the economic importance the eastern Cape had acquired in the colony's meat trade.

Similar to Swellendam district, most settlers who had moved to the frontier from the established corners of the colony were poor ex-company employees in search of opportunities for a better future (Penn, 2005). Due to the dry interior conditions of the eastern frontier, stock farming or pastoralism became the largest agriculture practise. Nonetheless, Marks and Atmore (1980) describe the pastoralist eighteenth-century frontier as a place of relative freedom and equality for both settlers and Khoe.

By the time of the first British occupation of the Cape in 1795, the Khoe had become largely impoverished and were facing a rapidly closing frontier at Graaff-Reinet. Penn (2005) argues that by the first decades of the nineteenth century, the Khoe had already been condemned to a perpetual state of servitude – a view that is supported by Marks and Atmore (1980), who observe that during the violent 1780s and 1790s, the colonists had started to gain the upper hand in the struggle for the eastern frontier at Graaff Reinet. The colonists had succeeded in securing vast tracts of land for themselves and a steady supply of ‘indentured Khoe’ labourers for their farms. It is worth noting here that despite the formal slave trade coming to an end in the early nineteenth century, the settler population in Graaff Reinet district had always favoured the use of cheaper indentured Khoe labour over more expensive imported slave labour (Eldredge, 1994). In fact, during the late eighteenth century unfree labour constituted around 40% of the farming labour force of settlers on the eastern frontier (Mason, 1994). This explains why settler opposition to the slave trade on the eastern frontier was always relatively weak and why the growing sense of panic in the Cape regarding a perceived labour shortage crisis on the eve of the abolition of the slave trade played well into the hands of eastern frontier pastoralists (Mason, 1994). Although overtly prohibited by the VOC, frontier farmers (organised in military style commandos) regularly captured inland Khoe and amaXhosa to work as indentured labour on loan-farms leased from the Company (Penn, 2005).

During the eighteenth century the eastern frontier became an important meat supplier for the entire colony. This meant that, for settlers, dominance had become a matter of urgency. As for Tulbagh district to the north, frontier closure was not urgent and did consequently not occur rapidly. Portions of the Tulbagh district were also strategically important to the fertile regions closer to the Cape centre but in the vast expanse beyond the Cape fold mountains, crop-based agriculture was difficult. Some trading of cattle between colonists and the Nama people – another ethnic group which fell under the umbrella of the Khoesan people – took place throughout the eighteenth century, although it never reached the trade levels of Graaff-Reinet district (Legassick, 2010). Penn (2005) argues that many historians of the frontier have neglected the study of the colony’s northern regions because its economic importance was not comparable to those of the eastern and south-western Cape.

Many eighteenth-century frontiersmen of the northern interior were also of

mixed race descent and operated on the fringes of colonial society. Along with the Khoe, these mixed-race¹ frontiersmen presented considerable opposition to the expansion of the colony. Aided by the natural environment, family bands of Afrikaners and Koks were a thorn in the side of colonial authorities with whom they engaged in regular skirmishes (Legassick, 2010). Yet, a large portion of the Tulbagh district remained only marginally important to the colonial economy, which made the establishment of eventual settler dominance less important (Penn, 1986; Penn, 2005). It was only with the discovery of commercial copper deposits in the Namaqualand region in the 1860s that the far northern reaches of the colony increased in importance. In the areas around Piketberg and the town of Tulbagh where settler plough and pastoral agriculture had taken hold, dominance was established in the early nineteenth century. Since the natural environment in this district ranged from the arid plains of the Karoo to the mild climates around the town of Tulbagh, a mixture of crop-based and pastoral agriculture was established.

Cape colonial frontier labour

It is not possible to understand the role of Khoe labour in the Cape Colony of the eighteenth and nineteenth century without prior knowledge of their interactions with European settlers and imported slaves. Enslaved people were initially brought to the Cape at the behest of the VOC and as labourers for maintenance and construction work around Cape Town. The limited supply of labour in the Cape centre did not present a major issue for Cape farmers since they were initially unable to generate sufficient agricultural surplus (Green, 2014). However, as the settler population grew, so a new class of wealthy farmers (who generated surpluses in wheat and wine farming) emerged who required more slave labour for their farms. Between 1652 and 1808, roughly 63,000 slaves were brought to Cape Town through the Indian Ocean slave trade (Newton-King, 1999; Shell, 1994a).

As settler numbers increased throughout the eighteenth century, discontent with Company policies and the need for independence and upward mobility propelled the ex-company employees to start exploring the colony's hinterland. The open frontier offered an abundance of land and provided a comfortable living, by

¹mixed race refers to descendants of liaisons between the Khoesan and the Europeans that settled close to the Orange River, now the Gariep River (Penn, 1986)

the standards of the time, for a select few. As the population increased, the pastoral frontier regions became challenging places to make a new start, especially since acquiring enough livestock to become self-sufficient was expensive (Newton-King, 1999). The cost of a slave would also have been too great an expense for the newly arrived and relatively impoverished frontiersmen. In order for new arrivals to make a start, arrangements such as 'farming on the half' – according to which new stock farmers would receive either cattle or sheep from an established farmer and then be required to return the initial stock along with half of the increase in numbers – became fairly common. Yet, even this method of farming did not always guarantee success. During the early nineteenth century, life on the frontier was hard and many newly arrived settlers, instead of finding their fortune, ended up poor and destitute (Newton-King, 1999).

Desperation, then, was the catalyst for coercing the Khoe into labour and for the theft of their sheep and cattle. The Khoe's knowledge of the environment – especially the locations of best grazing and drinking water for livestock – as well as the skills they acquired as nomadic pastoralists, made coercing them particularly attractive (Hill, 1966; Boonzaier, 1997). The encroaching colonial frontier had disrupted the Khoe's traditional nomadic existence, often leaving them desolate and scattered following one of the notorious commando raids. Since slave labour was very difficult to obtain and the Khoe possessed the skills necessary for successful stock farming, obtaining their labour was therefore a matter of some urgency (Eldredge, 1994). At the turn of nineteenth century, repeated conflicts had devastated much of Khoe society and although some resistance remained, a significant number of dispossessed and captured Khoe ended up working on settler farms.

Khoe women on early nineteenth-century northeastern frontier farms were typically responsible for the housework. Their duties included cooking, cleaning, and doing the laundry but they would also prepare sheep skin and cattle hides for the purpose of manufacturing clothing for the entire household (Malherbe, 1978). Household items which were produced for own consumption and in some cases for sale to neighbours and passing travellers, included such items as soap, candles, dried fruit and butter (Malherbe, 1978; Ross, 1981). On a smaller scale, Khoe women helped with wheat sowing and vine planting when and where slave labour was unavailable (particular in the Graaff-Reinet district). Khoe men, in turn, assisted with

making clothing and household utensils. What both Khoe women and men were prized for, as William Bird, colonial envoy and former British member of parliament noted in 1807, was their expertise in sheep herding, ox-herding and the driving of wagons. It was ultimately these skills which motivated frontier colonists to constantly complain that labour was in short supply. The irony is that, while the Khoe had over time become critical to the colonial economy, their impoverishment also meant that they had become dependent on the colonial economy for their very survival.

Research Questions

This thesis poses four questions about the involvement of the Khoe in the colonial economy of the nineteenth-century Cape colonial northeastern frontier. I investigate the reasons for the involvement of indigenous Khoe labour in the colonial economy and the impact this had on both the livelihood of the Khoe and the prosperity of the colony. In Chapter One and Two I use two data sets to model pastoral agricultural production functions for the Graaff-Reinet and Tulbagh frontier economies and employ estimates from these models to evaluate the role of Khoe labour and the impact that reduced indenturing had on Khoe effort levels. In Chapter Three, the same data sets are used to consider the role of women in the frontier livestock rearing process. Chapter Four uses a novel Khoe tax data set for Swellendam in 1825 to analyse Khoe asset wealth inequality and how, as a people, the Khoe coped with the severe poverty that was forced upon them.

Chapter One makes use of a 22-year combination of VOC cross-sectional tax datasets (1805-1828) and the Member of the Orphan Chambers eight (MOOC-8) series probate inventories price data for Graaff-Reinet district to assess whether or not different types of labour was substitutable on the frontier. The main objective of this chapter is to ascertain what exactly Khoe, enslaved, and free settler household labour was performing over the period 1805-1822. The second objective is to question whether or not slave labour was in fact a truly flexible form of labour since it is generally assumed that retraining slaves for a different task was easy and that their labour could be substituted for any other form of labour (Engerman, 1992; Anderson and Gallman, 1977). I find that slave labour, indigenous labour, and settler family

labour were not substitutable over the period under consideration which lends credence to the notion that slave and family labour were two different inputs in agricultural production. Indigenous Khoe labour and slave labour remained complements throughout the period of the study even as Khoe labour became scarce following the frontier conflicts. It is therefore clear that the non-substitutability of slave labour was due to the settlers' need to acquire labourers with location-specific skills, such as the indigenous Khoe, and that slaves may have served a purpose other than being a source of unskilled labour, such as providing artisan skills or acting as collateral.

Once the critical role Khoe labour played in the meat economy of the frontier is clarified, it becomes possible to understand the urgency with which the colonists proceeded to indenture the Khoe. Yet, in the first decade of the nineteenth century, colonial authorities placed the need to quell Khoesan resistance above the settlers' desire for (indentured) labour. The main objective of Chapter Two, then, is to understand what impact the reduction of coercive legislative measures such as the 1809 Hottentot Proclamation and the 1812 Cradock laws had on the effort levels of the Khoe. In order to ascertain this, I again used the VOC cross-sectional tax data sets (1805-1828) and the MOOC-8 probate inventory price data. A secondary objective of Chapter Two is to show that coercion can indeed exist in a pastoral setting even though the Nieboer-Domar hypothesis argues the contrary. The closing frontier region of the north-eastern Cape Colony illustrates this fact since coercive labour practices remained widespread. I ultimately find a positive relationship between coercion and effort and argue that as legislative protection against the mistreatment of the indigenous Khoe was promulgated into law, the effort levels of the Khoe workforce decreased. After the first legislation was introduced in 1809, less coercive work on farms yielded smaller returns in livestock. These findings lead me to conclude that even in pastoralism, where effort is hard to observe, less coercion leads to decreased levels of effort.

In Chapter Three, I consider Khoe women's role in the pastoral economy of Graaff-Reinet and Tulbagh districts and I investigate whether it was by coincidence or by design that they made up a significant portion of the frontier labour force. The main objective of this chapter is to understand the role Khoe women played in the frontier's pastoral agricultural process and, at a more theoretical level, whether

women in general have an advantage over men in animal husbandry. Voigtländer and Voth (2013) have argued that the Black Death in fourteenth-century Europe caused women to enter the labour market in order to substitute for the loss of income that resulted from male deaths. The fact that women were then in a position to postpone marriage and limit pregnancies, paved the way for increased female labour force participation. The nineteenth-century northeastern Cape colonial frontier was both a major meat producer, and a crop farming community that supplied the colonial centre at Cape Town. Many of the animal husbandry undertakings relied on indentured female Khoe labour. In fact, around 16 percent of frontier farms had more women working on them than men. This allowed me to test the animal husbandry advantage hypothesis. By utilising a pooled Ordinary Least Squares (OLS) regression, I find that the presence of indigenous Khoe women on farms had no significant positive effect on sheep and cattle holdings for either Tulbagh or Graaff-Reinet district. Furthermore, I conclude that, due to that fact that these women were engaged in alternative activities such as home-based production, they remained critical to the economic viability of settler farms. In the same vein I argue that it was not women's general advantage in animal husbandry which enabled them to enter the labour market after the Black Death as much as it was their role as home producers.

Chapter Four moves the focus away from the open frontier districts of Graaff-Reinet and Tulbagh to the settled district of Swellendam in 1825. There I use recently transcribed British tax census data for the Khoe population and MOOC-8 probate inventory prices to investigate asset wealth inequality. Aside from the fact that micro-level data on the indigenous population are extremely rare, the data set enabled me to achieve two goals. In the first instance, to determine the Khoe's level of poverty and destitution following the closure of the frontier. Secondly, to theorise Khoe coping strategies as a response to their complete destitution. This chapter demonstrates in some detail the extent to which the Khoe society of Swellendam in 1825 was highly unequal and extremely poor and that they tended to make use of extended family structures in their attempt to mitigate the impact of severe poverty on their community.

Contributions

Ultimately, this thesis makes a number of contributions to four major academic areas. The first of these is the economic history of indigenous peoples. Throughout the entire study, colonial tax and probate records are used to shine a spotlight on the role the indigenous population played in the Cape Colony. This continues a line of enquiry represented by the work of Carlos and Lewis (2012), Fourie and Green (2015), and Malherbe (1978), all of whom have employed records compiled for entirely different reasons to illuminate the contribution of indigenous people to colonial society. This study shows that there can be no doubt that these people formed the backbone of the frontier economy.

Secondly, this study provides greater insight into the economics of slavery and labour coercion and illustrates that coercion may occur even in a pastoral environment. Chapter Three in particular demonstrates how 'loosening' the coercion of indentured Khoe not only reduced their effort levels but it also examines ways in which historians could consider calculating productivity in a pastoral setting.

Thirdly, this study contributes to the general literature on the Khoe of Southern Africa – especially the impact that colonial expansion had on their livelihood. Chapters One and Three demonstrate the critical role that Khoe men and women played in the stock farming endeavours of the northeastern frontier while Chapter Four clearly shows how colonisation led to the dispossession and impoverishment of the Khoe. What is particularly new in my analysis, is the way I combine successive cross sections of colonial data in order to investigate the evolution of the Khoe labour force in Tulbagh and Graaff-Reinet districts over time. Their location-specific skills and experience as nomadic pastoralists made their labour incredibly valuable to settler farms.

In the fourth instance, Chapter Three makes a critical contribution to the literature on the rise of female agency in Economic History. The data set used allowed me to test claims by economic historians such as Voigtländer and Voth (2013) why women broke free from the restrictions placed on them by the Neolithic revolution.

In the final instance, Chapter Four contributes to the literature on inequality in Economic History by highlighting how important it is to incorporate household

structures in our calculation of pre-industrial inequality.

The substitutability of slaves: Evidence from the Eastern frontier of the Cape Colony

1.1 Introduction

The enslavement of one man or woman by another is arguably one of the darkest blemishes on humanity's history. Yet, the persistence over millennia of slavery as an economic institution bears testimony to its success in adapting to different settings across time and space (Acemoglu, Johnson, and Robinson, 2002; Acemoglu, Johnson, and Robinson, 2005; Nunn, 2008; Engerman, 1992). Coerced labour formed the basis of the eighteenth and nineteenth century economies of the Caribbean, Latin America, southern USA, and precolonial as well as colonial Africa (Worden, 1985; Klein and Vinson III, 2007; Rönnbäck, 2016; Lovejoy, 2011). One reason for this is that coercion increases effort. Fogel and Engerman (1974) were the first to note the complementary relationship between coercion and effort, complicating the assumed superior productivity of free labour. More recently, Acemoglu and Wolitzky (2011) and Naidu and Yuchtman (2013) have formalised when and how labour scarcity encourages coercion. Another reason for the use of slave labour has been its relative flexibility compared to other forms of free and unfree labour (Engerman, 1992; Anderson and Gallman, 1977). In the past it was relatively inexpensive to retrain or 'repurpose' slaves since the slave owner could extract earnings from a slave over their entire lifetime and sometimes even that of their offspring. Slave labour could also be mobilised quickly for a wide range of tasks, making it particularly suitable for agriculture where time is often of the essence (Berry, 1993). Slave labour offered

production economies not only of scale, but also of scope (Fourie and Von Fintel, 2011b).

In the literature, this relative flexibility of slave labour as an economic institution is often assumed as a given. It is true that, with the necessary capital investment slaves could be retrained when they were required for a different job and that their labour could essentially be substituted for any other form of labour once their training had been completed. Nevertheless, the generality of the substitutability assumption has recently been challenged (to some extent) by a number of cross-sectional studies, mostly in the USA, which have found that slave labour and free labour are essentially two very different production inputs and that they cannot simply be assumed to be substitutes. However, the fact that these cross-sectional studies largely ignore temporality, that is, the evolution of labour characteristics over time, precludes any certainty regarding the degree of complementarity or substitutability of slave labour (Field, 1988; Schmitz and Schaefer, 1978). What is required, then, is a longitudinal study of one slave-owning society. The present chapter addresses this need.

The district of Graaff-Reinet in the nineteenth-century British Cape Colony provides us with an opportunity to test the substitutability of slave labour in a data-rich context. If Domar (1970) was correct, since the settler economy was pastoral, slavery as a source of labour should not have existed. But this district is located on what was at the time the open eastern frontier - a region which, by the end of the eighteenth century, still had a fluid social organisation because of the recurring frontier wars between white settlers and indigenous people. For settler farmers who were mainly engaged in pastoral farming and who relied heavily on the Khoe population for labour, the wars meant increasing difficulties in obtaining sufficient labour. The small but wealthy group of slave-owning farmers in Graaff-Reinet district could respond to this exogenous shock by substituting slave labour for the loss of indigenous labour. In this chapter I analyse the extent to which indigenous labour was actually substituted for by slave labour, i.e. the extent to which slave labour constituted a substitutable form of labour that could be used to make up for the shortage of indigenous labour.

The availability of transcribed Cape colonial records such as the tax censuses

(“*opgaafrolle*”) of the Dutch East India Company and the MOOC8-series probate inventories enabled me to empirically assess the relationship between different types of labour in what was essentially an open frontier society. Since slave, Khoer, and family labour are included in these *opgaafrollen*, I could account for all forms of agricultural labour (Fourie and Green, 2018) (see also Appendix: A). I calculated the Hicksian elasticity of complementarity coefficients for each year in a 22-year combination of cross-sectional tax data sets (1805–1828) in order to assess the relationship between slave, Khoer and family labour over time. I then calculated the elasticities of complementarity by estimating transcendental logarithmic (translog) production functions for each year of the study (Berndt and Christensen, 1973). I found that slave and family labour remained strong complements over the period under study. The results confirm that a master-servant relationship was in place which, in turn, confirmed my research hypothesis that slave and family labour were two different inputs in the agricultural production process. With regard to the relationship between slave and Khoer labour, I also found a strong complementary relationship. I conclude this chapter by positing three reasons for this unexpected finding.

1.2 The resilience of slavery as an economic institution

The Nieboer-Domar hypothesis states that slavery as an economic institution is likely to arise in an open frontier environment where there is abundant land but a scarcity of labour (Domar, 1970; Engerman, 1992; Nieboer, 1900). In such a setting coercion is required in order to force otherwise free labour into production. Formulated differently, the absence of willing and able labourers where vast tracts of agricultural land are available creates the necessity to enslave. Despite some reservations, Green (2014) concludes that the Nieboer-Domar hypothesis helps to explain the choice for slave labour in the Dutch Cape Colony during the seventeenth and eighteenth centuries when a shortage of labour on farms compelled the VOC to find an alternative source of labour in the East Indies. The shortage of labour also meant that, despite it being illegal to enslave the native Khoer, more coercive measures would be used against them by those settlers who lived far away from colonial oversight at the edge of the colony’s expanding frontier. Thus, both slaves and indigenous labourers were coerced into labour on the colony’s settler farms (Feinstein et al., 2005).

The Nieboer-Domar hypothesis also states that in a closed frontier setting where land is scarce and labour abundant, unfree labour arrangements will dissipate because a landless wage-earning labour class will be readily available to perform the work formerly performed by slaves. This would imply that the American Civil War, or movements against coerced labour in Africa, were unnecessary since slavery would have disappeared naturally as land became scarcer (Fenske, 2013). But this may be an oversimplification. Engerman (1992) notes that the Nieboer-Domar hypothesis is silent on the timing of the transition from coerced to free labour, and adds that very seldom, if ever, has any system of enslavement spontaneously disintegrated. Unfree labour arrangements persist and yield significantly more economic benefits to their benefactors than they would if they were merely a temporary placeholder for supposedly more efficient free labour (Engerman, 1992; Russel, 1941; Stone, 1997).

The reason for this is because coercive labour is profitable. Eltis, Lewis, and Richardson (2005) found that in the eighteenth century, before the abolition of slavery, agrarian slave-owning regions of Cuba and the Caribbean far outperformed the non-slave-owning northern states of the USA and that their economies expanded at rates comparable to those of industrialising Britain and the USA. The income of the slave-owning eighteenth-century Cape Colony also rivalled that of the Netherlands and Europe (Fourie and Van Zanden, 2013; Fourie, 2013b). Barzel (1977) has argued that coerced labourers were more productive than free men and women because they had to maintain a more intense work pace than was expected from free men and women. Slaves in the antebellum South were often fed and treated better than many free men precisely because they had to maintain such a higher level of productivity. Foust and Swan (1970) have demonstrated that cotton-producing slaves in the southern USA were extremely productive during the 1850s and 1860s, and that the South was still witnessing productivity growth shortly before the American Civil War. This was not only true in the heavily coerced southern USA but also in the Caribbean. Rönnbäck (2016) found that slave labour at the Cape Coast Castle on Ghana's Gold Coast was productive, and compensation above subsistence level more frequent than originally thought. In fact, slaves were paid wages similar to those earned by free labourers in southern Europe and East Asia. Gray (1930) found that this depended on the type of economic activity: slaves were particularly

profitable for the production of staple crops such as sugar, cotton and tobacco but not for general farming. This was largely due to the economies of scale which can be gained from large-scale staple crop cultivation by a large labour force.

The advantage of coerced labour is not only that it can be more productive but also that the enforcement costs are often much lower than those associated with other forms of unfree or even free labour (Gray, 1930; Klein, 1998). The immense distance between the slaves' place of origin and their eventual destination made large-scale desertion improbable. In a foreign land slaves had few alternatives other than to stay with their masters (Klein, 1998) and, since there was no expectation that they would be compensated above subsistence level, slaves were less prone than free labourers to organise strikes or lockouts as a result of pay disputes.

Slavery was often the most popular form of coerced labour mainly because, in many historical settings, slaves were relatively inexpensive to acquire. Austin (2005) found that the price of a slave in nineteenth-century Ashanti Africa was so low that oxen, guns or even salt were often more expensive. Because slave prices reflected, among other things, the lifetime labour benefit of the slave and his or her offspring, uncoerced labour purchased for a similar amount would in effect be more costly since it would generally be contracted only for a specified time (Nash and Flesher, 2005; Gray, 1930). Investing in training slaves would make more economic sense because their services would be available for most of their lifetime and the lifetime of their offspring (in cases where the skills could be, and were, transferred to them). Slavery therefore offered farmers a more flexible system of labour which could potentially be more economical and adaptable to different tasks and production needs.

The relative flexibility of slave labour in open frontier communities implies that, with some investment in training, slave labour could effectively perform any type of work to great benefit of the slave-owner. Engerman (1992) notes that it was precisely because of the economic success and great flexibility of slavery in the USA antebellum South that there were no signs of its decline despite heavy political opposition during the 1830s. Similarly, in the slave trade that existed in West Africa for centuries prior to the arrival of Europeans, slaves were used in many different ways such as in agriculture, small-scale manufacturing, military conquests or as concubines (Klein, 1998). Slave labour was apparently substitutable for any other type of labour when the slave owner needed it to be.

Many scholars assume this near perfect substitutability of slave labour for many forms of free labour (Klein, 1998; North and Thomas, 1971; Domar, 1970; Fenoaltea, 1984; Engerman, 1992). But not everyone agrees. In a number of studies conducted in the USA, Field (1988) for instance, found that slave and free labour in the antebellum South were complements and considered them to be entirely different inputs in the agricultural production process: slaves did the hard gang-labour on cotton plantations while free labour played a managerial role. On the larger plantations, slaves worked under the supervision of overseers and on smaller farms under the supervision of the slave master himself (Zeichner, 1939). Schmitz and Schaefer (1978), using a CES (constant elasticity of substitution) production function, concluded that free and slave labour were quantitatively different inputs in agricultural production. These conclusions suggest that slave labour may not be substitutable to quite the extent it has generally been assumed to be. However, it must be noted that the empirical methods used in these studies suffer from serious shortcomings. They use cross-sectional data sets from one specific year—which, at best, offers a static picture of the substitutability between various types of labour. They also rely on estimation methods which are now outdated. The jury is still out on the extent of substitutability of slave labour for other forms of free labour.

The transcription of a rich archival source – the tax censuses or *opgaafrollen* from the eighteenth and nineteenth century Cape Colony – offered me an opportunity to use more recent econometric techniques and repeated cross-sections to investigate the substitutability or complementarity of slave labour for other forms of labour.

1.3 The *opgaafrollen*

The frontier district of Graaff-Reinet provides an opportunity to investigate slave substitutability or non-substitutability in a temperate rather than tropical region outside the Americas. The district of Graaff-Reinet, in particular, allows us to test the slave labour substitutability assumption in a pastoral setting – a setting which, according to the Nieboer-Domar hypothesis, would unlikely witness the emergence of slave labour.

In order to investigate the extent of slave substitutability in the period 1805-1828¹ I used the newly transcribed Graaff-Reinet opgaafrolle for that period. These annual tax censuses include every settler household in the colony and record their household size, number of labourers on the farm, assets, and agricultural inputs and outputs, the numbers of various kinds of livestock, the number of wagons, the number of vines, the amount of wine produced, and the crops sown and reaped. They are particularly useful because of their focus on household-level characteristics. This level of detail – which is extremely rare for pre-industrial societies, much less frontier communities – effectively offers one an in-depth look at the economic activities that took place on each frontier settler farm. An additional benefit of the *opgaafrolle* is that they allow one to observe farming activities over a long period which, in turn, allows one to analyse the evolving dynamics of this primarily pastoral frontier society.

Equally important for the purposes of this study is that the opgaafrollen also record the number of male and female Khoe employed on settler farms. This information is not often recorded in the eighteenth century colonial archives. While settlers and slaves are meticulously recorded, far less information is available about the economic contribution of the Khoe (Fourie and Green, 2015; La Croix, 2018) in general, much less a gendered differentiation of that contribution. The richness of the newly transcribed Graaff-Reinet opgaafrolle, then, resides in the fact that they enable the researcher to include in their analysis the Khoe contribution to frontier life – an absence or lack which is a weakness of earlier work. We know little about the manner in which this data were collected. It would seem that a government official, perhaps the veldkornet (field-cornet), travelled through each sub-district and collected data from each farm before sending the completed forms to Cape Town in order to be copied and stored (Fourie and Green, 2018).

These tax censuses, which, under VOC rule were originally referred to as '*opneemrolle*', were collected at different times of the year by officials who were appointed by the field-cornet. The records only became known as '*opgaafrolle*' under English rule, that is, after 1795. Officials had to travel vast distances and often had to rely on farmers to show up at a central point in order to submit their information – a factor which also influences the frequency with which farmers appear in the data

¹The transcription of these records is part of the ongoing *Cape of Good Hope Panel project* (Fourie and Green, 2018). Visit <http://www.capepanel.org> for more information.

set. Appointed officials furthermore had to work under time pressure or had limited literacy levels – something which is particularly true for Graaff-Reinet district which was both a frontier region and far removed from the colonial centre. The limited literacy level is evident from the fact that many names and surnames in the records are often spelled phonetically. Haste and poor literacy levels may therefore have had a bearing on the quality of the data contained in the tax censuses. Column information also sometimes differed across various districts. For instance, while during the early nineteenth century some districts had a column for a head tax for settlers or Khoe who resided on farms, this column later fell away (Fourie and Green, 2018; Potgieter and Visagie, 1974).

This cumbersome process was understandably prone to errors, both at the recording stage and in the process of copying and preservation. We know, for example, that settlers underreported those variables that were taxed – such as livestock and harvested crops (Fourie, 2013b) – in addition to which it is likely that data from not all settler households were recorded every year. The annual series of *opgaafrollen*, for instance, show that some families would be recorded in year t , disappear in year $t + 1$, only to reappear again in year $t + 2$. It is highly likely that they were simply missed by the enumerator in year $t + 1$. We also know that some folios were damaged over the centuries of storage in Cape Town and that the data for some years may have been destroyed entirely. We do not, for example, have any of the relevant information for the years 1808 and 1827 – hence the gaps in my sample.

The *opgaafrollen* have other limitations too. They make no distinction between indentured and free Khoe labour. Elphick and Giliomee (1979) found that the percentage of indentured Khoe increased steadily over the first half of the nineteenth century as settler influence over the frontier grew. Moreover, the records only pertain to settler households and not all Khoe were either enslaved or employed as labourers. Many lived in self-sufficient households of their own, either on unclaimed land or on mission stations. This study is therefore limited to what Fourie and Von Fintel (2011a) have termed ‘the population under European influence.’

These shortcomings could affect the results of this study. Missing individuals could bias the results towards larger, more permanent and affluent households while the underreporting of assets or agricultural output could further distort the analysis. Other idiosyncratic problems, such as damaged pages, could also affect the

analysis in a particular year. While I acknowledge these possible drawbacks I would argue that none of them seem to be systematically related to my central hypothesis, namely that slave and Khoer labour are substitutes. Even if wealthier households are oversampled, the claim that slave labour is not substitutable for Khoer labour will remain valid. In short, I believe the data limitations are orthogonal to the testable hypothesis.

There is some evidence to back up this claim. Firstly, underreporting seems to be limited to those categories of agricultural output that were taxed. Fourie (2013b) notes that while cattle and sheep are underreported in the *opgaafrolle* when compared to probate inventories, slave labour is not. One is therefore on relatively firm ground when comparing Khoer and slave numbers to each other. Additionally, I can show that my aggregate numbers fit the historical narrative. It is generally accepted that the Khoer were the primary source of labour on the frontier. Figure 1.3 confirms this, with Khoer labourers outnumbering slaves by four to one in the Graaff-Reinet district. More importantly, the time trend in my aggregated numbers also coincide with historical events. Since sheep and cattle rearing formed the backbone of the frontier economy, one would expect that the size of sheep and cattle holdings would vary with settler migration patterns.

Figure 1.1 plots the log value of livestock numbers during the period 1805-1828² and shows the extreme volatility of frontier livestock holdings in the Graaff-Reinet district over this period. The devastating effect of frontier conflicts such as the Fourth (1811-1813) and Fifth Frontier Wars (1818-1819) is apparent. It also appears that the livestock holdings did not recover completely after the Fourth Frontier War, partly because many settlers left Graaff-Reinet and Uitenhage to migrate deeper into the interior of the continent.

The steep decline in livestock holdings in 1828 and the missing 1827 values are a result of poor record-keeping by British colonial authorities. By the mid-1820s the British colonial government had started replacing the older VOC administrative processes with its own, in part because it wanted to discourage the old loan-farm system in favour of free-hold farming. As a result, the incentive to maintain accurate *opgaafrolle* declined sharply. For that reason I excluded these years from my analysis.

²The price data obtained to calculate the values for cattle and sheep are taken from the MOOC8-series probate inventories as indicated later in this chapter. This approach is taken from Fourie and Von Fintel (2010) which made use of MOOC-10 auction price information.

FIGURE 1.1: Log output Graaff-Reinet



Source: VOC Opgaafrollen MOOC 8 Series

1.4 The Cape Colony's Eastern frontier

The Cape Colony was governed by the VOC from 1652 to 1795 after which it came under British control. The VOC's strategic interest in the Cape primarily centred on providing a refreshment station for passing ships en route to the east. As the allure of the Cape outpost grew over time and settler family fertility increased, the European population expanded so that by the early eighteenth century the Cape had established itself as a settler colony (Fourie and Von Fintel, 2010; Shell, 2005). Most European farmers settled in the southwestern part of the Cape where they engaged in wine and wheat farming. However, due to steady fertility rates the children and grandchildren of the first settlers moved further into the northern and eastern frontier regions. The Graaff-Reinet district, which is located on the easternmost frontier of the Cape Colony, was established in 1786 in order to accommodate the settlers' growing need for land (Newton-King, 1988)³. Figure 1.2 shows its various sub-districts or 'field-cornetcies'⁴. Frontiersmen had moved into the area some two

³The Graaff-Reinet district itself consist of various sub-districts including Graaff-Reinet town, Agter-op-Sneeuwberg (behind Snowy mountain), the Agter-op-Rhinocterberg (behind Rhinoceros mountain), the Zuurberg, Buffelshoek, the Camdeboo, Zwartruggens, Ghoup, Nieuweveldt, the Lower and Upper Zeekoei rivier, the Hantam, Zwartberg, the Winterveldt, Uitvlug and Swaggershoek.

⁴A field-cornetcy was a district under the jurisdiction of a field-cornet (*veldkornet*), who was a local government official or military officer.

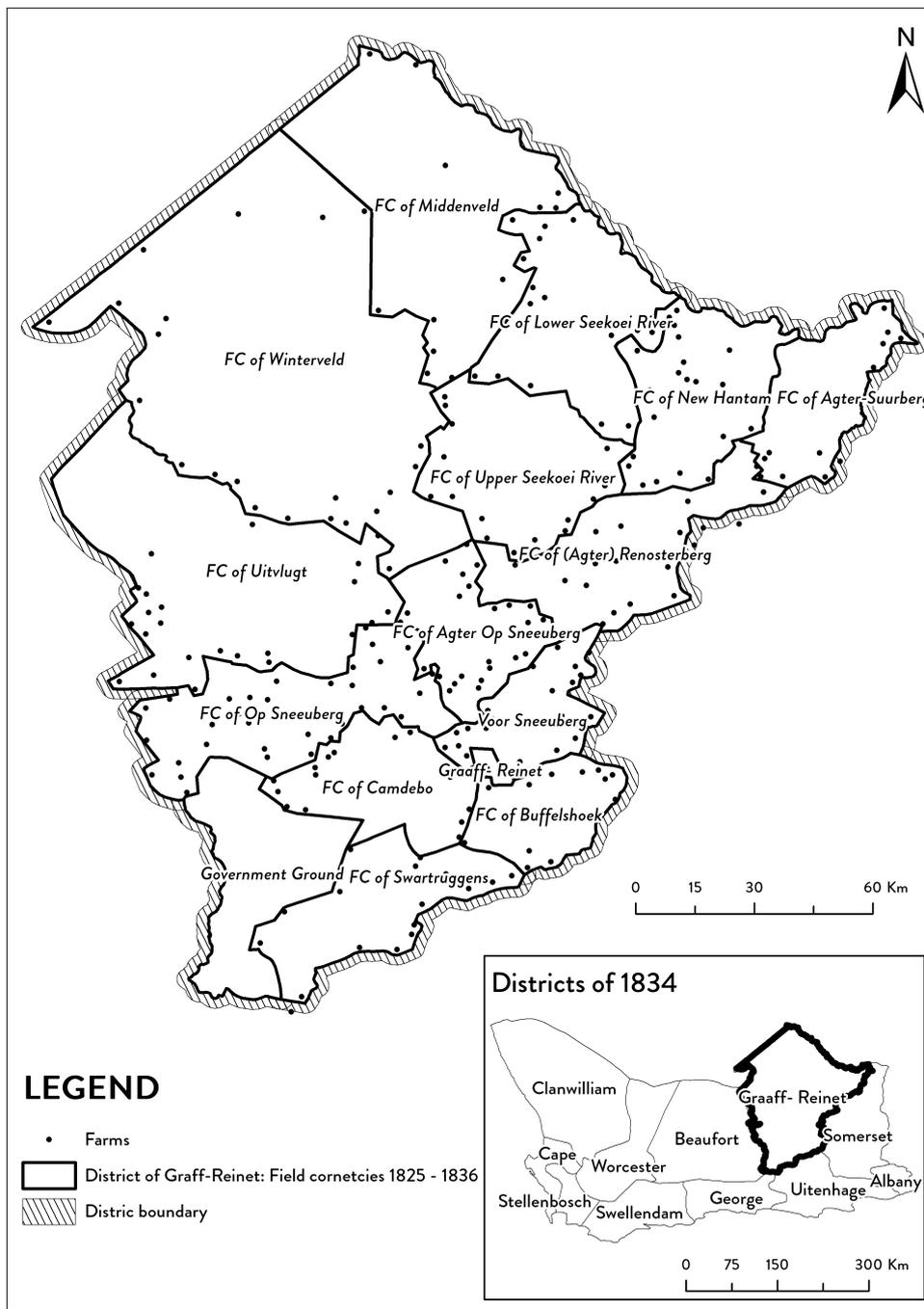
decades earlier but the formal incorporation of the territory into the colony brought about more permanent settlement. Since many of these newly arrived frontiersmen were living just above subsistence level, the frontier also exposed the large inequalities between affluent farmers—those with significant stock and land-holdings—and the poorest of the farmers who had little more than a horse to their name. By the beginning of the nineteenth century the levels of wealth inequality in this district were strikingly high—even by Cape Colony standards (Fourie and Von Fintel, 2011a).

In contrast to the southwestern Cape with its wheat and wine farms, pastoral farming was by far the most common economic activity in the Graaff-Reinet district⁵. Although not completely isolated from the rest of the Cape economy, trade with the commercial southwestern Cape was limited primarily to the livestock trade because of long-distances, poor infrastructure and rough weather conditions (Beinart, 2008). Although we lack precise estimates, evidence suggests that by the early nineteenth century there was an abundance of land available for farming while labour was relatively scarce. If we accept the Nieboer-Domar hypothesis, it seems plausible to assume that settlers had to use various forms of coercion in order to obtain an adequate supply of labour. That said, the extreme form of coerced labour, slavery, was less commonly used than in the southwestern Cape. This may be because the average farmer in the eastern districts was poorer, or because most farms were pastoral, or it could have been an implication of the prevalence of the loan-farm system (Swanepoel and Fourie, 2018; Dye and La Croix, 2018). According to the Nieboer-Domar hypothesis slavery or serfdom will not take root in a pastoral agricultural society since pastoralism is a labour-saving agrarian practice (Nieboer, 1900; Domar, 1970). A stock-farming frontier setting will therefore not lead to coerced labour arrangements (Conning, 2004). This is contradicted, however, by the fact that most farmers in the Graaff-Reinet district depended on a combination of free and unfree labour. Wealthier farmers used slaves side by side with ‘free’ wage or indentured Khoe labourers while poorer farmers combined family labour with Khoe labour.

Figure 1.3 shows how settler, slave, and Khoe numbers contracted and recovered in the Graaff-Reinet district throughout the period. One explanation for this fluctuation could be the result of administrative changes related to shifts in district boundaries. For instance, Figure 1.3 shows that one of the first significant declines

⁵Stock-farming was not new to the area, however. On the contrary, the area had been utilised for stock farming for more than 2,000 years (Keay-Bright and Boardman, 2006) by indigenous Khoe.

FIGURE 1.2: Map of Graaff-Reinet



Source: Visagie (1996)

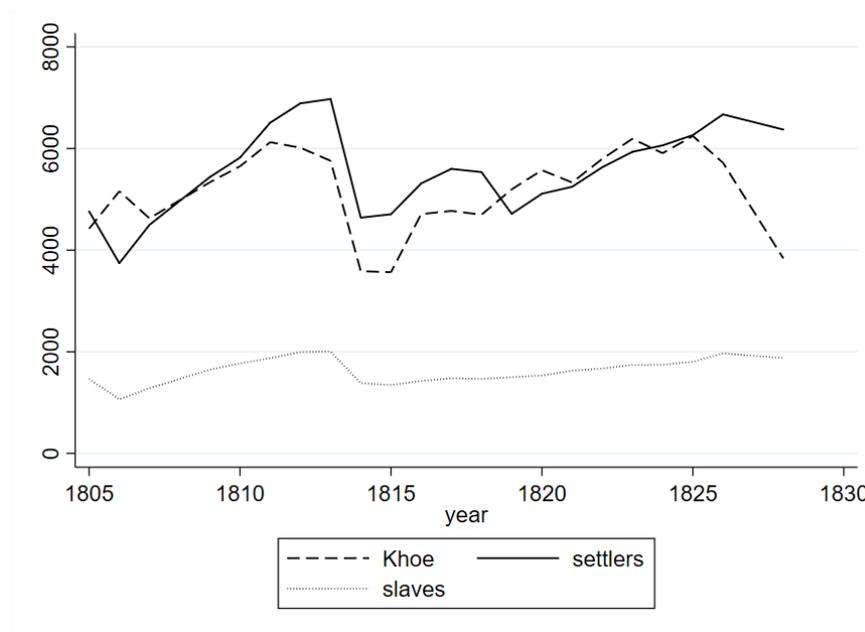
in settler population occurred around 1806. That was the first year of the second British occupation of the Cape and also the year following the formation of the Tulbagh district on the north-western border of the colony. The Tulbagh district initially formed part of the Graaff-Reinet district but as settler numbers on the eastern frontier increased, the necessity for a greater degree of governance also increased. These two significant changes meant that colonial boundaries were altered considerably with some settlers who were previously categorised as living in the greater Graaff-Reinet *landdrost* suddenly finding themselves living in the newly established Tulbagh sub-district (Legassick, 1972; Freund, 1972). An additional reason for the apparent decline in population is that the political uncertainty that accompanied the handover from Dutch to British rule reduced the incentive for accurate, or at least credible, record keeping.

The major declines in settler and Khoe population shown in Figure 1.3 are not, however, simply an illusion produced by border changes or bad record-keeping. They are also indicative of social and political conflicts. During what is now known as the Third Frontier War of 1799-1803, amaXhosa chiefs and heavily armed Khoe virtually destroyed the eastern frontier settler economy, forcing many settler families to flee their loan farms (Freund, 1972). This was clearly a tumultuous time, not only for the Graaff-Reinet region, but for the colony as a whole since control of the colony briefly shifted to the British during the Napoleonic Wars (prior to the conclusion of the Treaty of Amiens in 1802), after which control of the Cape reverted again to the Dutch. The British returned in 1806 and retained the Cape as a British possession until unification in 1910. The weakness of colonial authority during the first decade of the century was effectively capitalised on by the amaXhosa and Khoe clans—as is evident from the fact that the Dutch were forced not only to allow the amaXhosa to remain in the Zuurveld but also to leave the eastern colonial border unchanged (Legassick, 1972).

War continued to ravage the eastern frontier throughout the second decade. The sharp decline in settler numbers in 1814 occurred immediately after the conclusion of the Fourth Frontier War. Apart from the lives lost in the conflict, the colonial authorities actively campaigned for settlers who were living in Graaff-Reinet and Uitenhage districts to relocate to the Zuurveld after the amaXhosa had been expelled in order to reduce the likelihood of the amaXhosa returning to the Zuurveld

area. The Fifth Frontier War also led to a decline in settler numbers, although to a lesser extent since the then governor of the Cape, Lord Charles Somerset, encouraged resettlement in the area between the Fish and Keiskamma rivers (Legassick, 1972).

FIGURE 1.3: Population numbers at Graaff-Reinet



Source: VOC Opgaafrollen

Despite the decrease in the settler population as a result of migration and wars, labour remained in short supply in the Graaff-Reinet district throughout the period. But formal coercion required legislation. The *Inboekstelsel* of 1775 – a pass system which severely inhibited the movement of Khoes as long as they were not in possession of the right papers – was one of the first official measures utilised to regulate labour supply (Penn, 2005). In 1809 the British implemented the Hottentot Proclamation which reduced coercion but formalised subjugation of the Khoes by allowing almost all of the Khoes population of the colony to be indentured to European settler farmers. The traditionally nomadic Khoes now had to produce evidence of having a fixed place of abode, which had to be approved by a local colonial government official. By deliberately omitting explicit recognition of Khoes property rights this piece of legislation instantly reduced the indigenous population to a landless labour class (Eldredge, 1994; Legassick, 1972).

Yet, despite this subjugation settler farmers still had difficulty maintaining a

stable indigenous labour force, largely because of the open border of the eastern frontier. It was for this reason that slaves, brought to the Cape from the VOC's Indian Ocean territories, were acquired to work on settler farms in the Graaff-Reinet district.

1.5 Unfree labour on the Eastern frontier

Slavery in the Cape originated as an urban phenomenon, driven by the VOC's labour needs (Shell, 2005; Fourie and Von Fintel, 2011b; Green, 2014). As wheat and wine production expanded over the course of the eighteenth century—largely due to the arrival of the French Huguenots in 1689 (Fourie and von Fintel, 2014) – demand for slave labour on settler farms increased. This demand was initially limited to the fertile areas west of the first mountain ranges. Beyond the mountains, pastoral farming dominated and an expansive, loan-farm system was adopted which had a high land-to-labour ratio. Although, as noted above, theoretically slavery should not have arisen in the pastoral economy that subsequently developed, records show that slave labour nonetheless became an integral part of Cape society, even on the borders of the colony. Wealthier frontier farmers in the Graaff-Reinet district made extensive use of slaves both on their pastoral farms and in their homesteads, though to a noticeably lesser degree than the wheat and wine farmers in the southwestern Cape (Fourie and Von Fintel, 2011a). This much is evident from Figure 1.4 which shows that the wealthiest 20% of households owned the highest number of slaves.

The main sources of labour available to the Graaff-Reinet pastoral economy during the period 1805-1828 were slaves, Khoe, and family⁶ Table 1.1 shows that a settler household in Graaff-Reinet district had, on average, 496 sheep and 44 heads of cattle. These numbers suggest degrees of wealth well above what has been claimed in earlier histories. Relying on traveller accounts, Dooling (2008, p. 26) for instance, may comment that the “frontier *trekboers* had failed to reap substantial profits from livestock farming: the overwhelming majority in fact lived in extreme poverty” but my tax census numbers suggest otherwise. The tax censuses report that on average Graaff-Reinet frontier households had 3 family labourers, 4 Khoe, and 1 slave per

⁶The services of *knechts* (i.e. European wage workers) were also utilised on farms; however, their contribution to the pastoral eastern colonial economy remained negligible.

household. These numbers are not indicative of a society in which the majority of people live in “extreme poverty.” At the same time, it is also true that these averages may obscure large inequalities and that they may not reflect the true distribution of labour over the period under consideration here.

Table A shows significant variation in the distribution of stock and labour. For example, in 1820 one farmer, Andries van der Walt, employed 63 Khoer labourers while in 1826, another, Carel van Heerden, owned 61 slaves. Additional evidence to suggest that the Graaff-Reinet district was not as destitute as some would believe can be found in the continuous arrival of new migrants despite the obvious dangers of conflict and war (Mitchell, 2009). More than half a century ago, Neumark (1957) had already noted that farmers moved to the interior because stock farming was more profitable than arable land farming.

In order to turn a profit they needed a ready supply of labour and although many poor frontiersmen depended mostly on family labour, this was not all they had—as Table A demonstrates. But labour outside the household could be hard to come by (Penn, 1986; Penn, 2005; Marks and Atmore, 1980; Mason, 1994). Indigenous labour was in short supply and very unreliable. Figure 1.4 above shows the volatility of Khoer numbers, especially during and after the Fourth Frontier War (1811-1814). To compensate for this scarcity and volatility, farmers turned to the slave market in Cape Town. Although Khoer labourers outnumbered slaves throughout the period under consideration, the importance of slave labour to the frontier economy should not be dismissed, as it often is in the literature (Mason, 1994). There were, of course, advantages to both forms of labour. Imported slave labour might have seemed a cost-effective solution to the risk posed by Khoer labourers deserting the farm or stealing cattle but the journey of more than 600km from Cape Town to the Graaff-Reinet border could take months. The cost of purchasing even one slave in Cape Town and transporting that slave to the interior could not only have been unaffordable to a poor frontiersman but would also have made of it a less cost-effective solution. It is therefore safe to assume that it would generally have been cheaper to use Khoer indentured labour than to purchase slaves.

Figure 1.4 shows that slave labour was strongly concentrated in wealthier households. Over the entire period of 1805-1828 the poorest 20% of households in the Graaff-Reinet district measured in terms of livestock wealth, had an average of

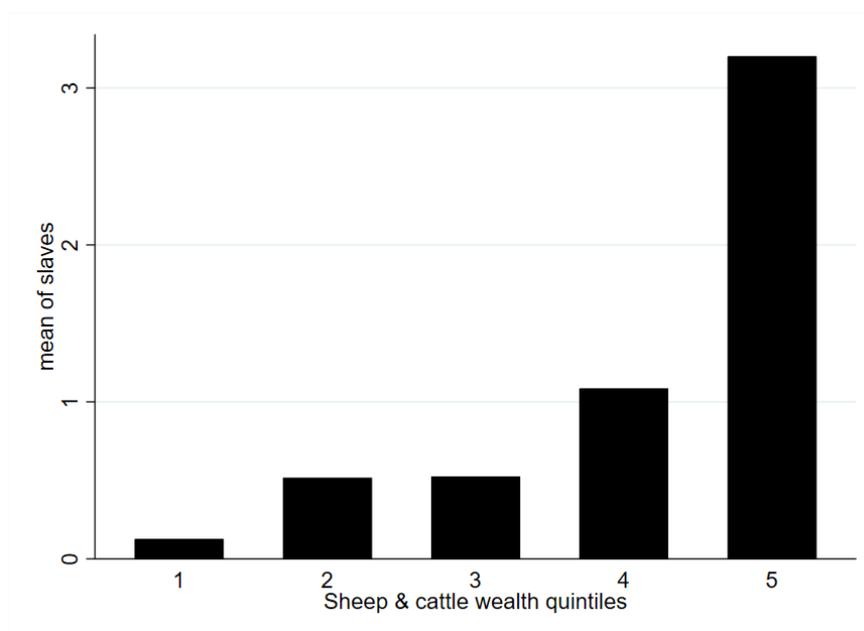
	Mean	Std.Dev	Min	Max
Sheep	496.82	759.92	0.00	14,121.00
Cattle	44.73	72.84	0.00	2,831.00
Family Labour	3.93	2.84	0.00	16.00
Khoe	4.10	6.78	0.00	78.00
Slaves	1.15	2.95	0.00	61.00

TABLE 1.1: Frontier Pastoralist Farms

Source: VOC Opgaafrollen

0.2 slaves while the wealthiest 20% had an average of 3.2. But if it was, in fact, cheaper for poorer farmers to use Khoe rather than slave labour, one would expect to see larger numbers of Khoe labourers than slaves in their employ compared to wealthier farmers. This is not what the data suggest. The disparity between wealthy and poor households is even greater for Khoe labour. Figure 1.5 shows that the poorest 20% of households in the Graaff-Reinet district had an average of 0.4 Khoe labourers while the top 20% had an average of 10.2. Poorer households could of course rely on family labour, but the number of Khoe they employed was twice that of the number of slaves – which complicates the simple cost-benefit analysis above. In the next section I attempt to explain this anomaly.

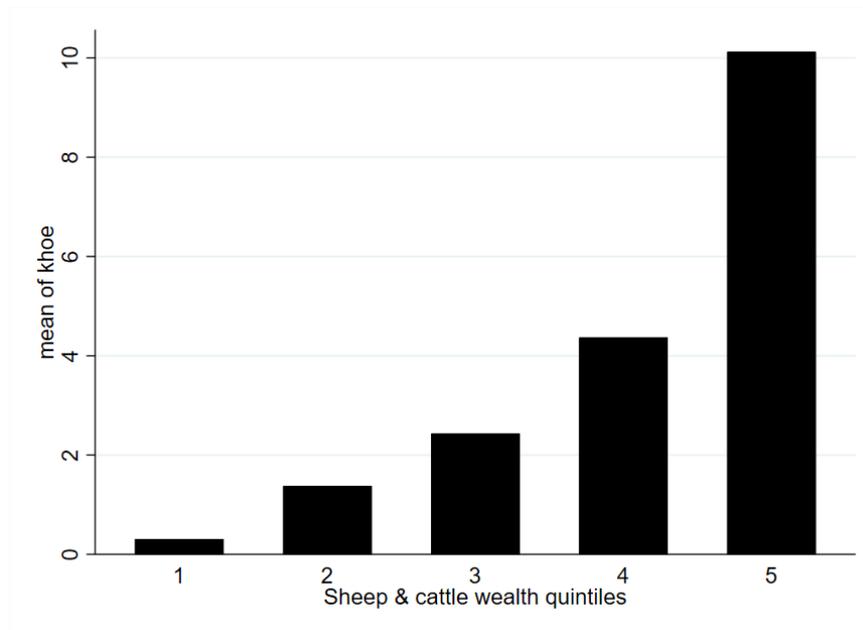
FIGURE 1.4: Average number of slaves per household



Source: VOC Opgaafrollen and MOOC-8 series

Poorer households could rely on family labour, of course, but the number of

FIGURE 1.5: Average number of Khoes per household



Source: VOC Opgaaffrollen and MOOC-8 series

khoe they employed was twice the number of slaves, complicating the simple cost-benefit analysis above. In the next section, we attempt to explain this anomaly.

1.6 Measuring substitutability

The aim of this chapter is to determine whether or not slave labour in the Graaff-Reinet district could be easily substituted for by other forms of labour. To find the answer I used translog production functions in order to calculate elasticity coefficients for every year for which *opgaaffrollen* are available. The translog production function is a standard tool in economics research (Field, 1988; Behar, 2010). I estimated the price elasticity of complementarity between the three types of labour available on farms, i.e. slave, Khoes, and family labour. The elasticities derived for each year (and the production factor) of the study will show whether these types of labour were substitutes during the period analysed.

Production function methods like CES and Cobb-Douglas assume strong separability between production inputs. This problem is largely solved by using more flexible functional forms, such as the generalised Leontief production function or the

translog production function (Berndt and Christensen, 1973) used here. This method relaxes the assumption of separability that could otherwise lead to incorrect inferences in cases where the degree of elasticity between the factor inputs is different for different settler households. (Berndt and Christensen, 1973).

I specify the following translog production function:

$$\ln(Q_{it}) = \ln A_{\alpha_{it}, \beta_{jt}} + \sum_{i=1}^n \ln X_{it} + \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n \beta_{ijt} \ln X_{it} \ln X_{jt} \quad (1.1)$$

In equation (1.1), $\ln(Q_{it})$ represents the log of output for each settler household i at time t . X_{it} and X_{jt} are the utilisation of different labour inputs (Khoe = K, slave = S and household labour = F) in the Graaff-Reinet agricultural production process at time t . I assumed that the major industry for the Graaff-Reinet district was livestock rearing (Penn, 2005). Given that this was a pastoral society I specified the output variable in the production function, Q_{it} , as a combined sheep and cattle indicator. I note that this assumption ignores output in the form of crops, other livestock, and non-agricultural products, and that this omission could distort the elasticity of the substitution coefficients calculated. The exclusion of other outputs may underestimate the productivity of labour inputs that were critical to a specific industry not included in the analysis. This is especially likely since the *opgaafrollen* entirely fail to mention manufactured goods such as soap, candles, and hides, which appear to have generated large profits for frontier households (Mason, 1994) Since households that did not make use of slave or Khoe labour would primarily use household labour, all labour inputs on farms are accounted for.

The final output variable could be obtained by multiplying settler household cattle and sheep holdings per year by price data obtained from the Eastern Cape colonial probate inventories recorded in the MOOC8-series since production function outputs are traditionally measured in terms of their monetary value over a specified period of time. The entire probate inventories span 162 years and infrequently record the value of assets accumulated in an individual's estate at death (Fourie,

2013b). I only utilised prices which appeared in the records during the 20-year period of the study. The values of total cattle and sheep production were then combined to form a global output variable for the Graaff-Reinet district.

Since the output variable in the translog production function has to be transformed from a stock concept to a flow, each year's stock output was multiplied by a rate of return on capital of 6%. This rate of return corresponds to the general average rate of return on assets or loans for the Cape Colony at the time (Worden, 1985; Fourie and Swanepoel, 2018). An alternative would have been to take the change in stock from year-to-year, but this would create serious difficulties because the decline in cattle stock from one year to the next might be due either to a farmer's sale of the livestock or to losses as a result of disease, theft or consumption. Using a rate of return of 6% also avoids using negative numbers.

The production process was estimated by means of Ordinary Least Squares (OLS). It was assumed that all inputs are exogenous; that factor prices are endogenous, and that input and output value selection does not occur simultaneously. Further, that all estimated marginal productivity estimates or coefficients are positive thereby satisfying the condition of monotonicity of the production functions. The estimated parameters were then used to calculate the cross-price Hicksian Elasticity of Complementarity (HEC) for the different labour inputs. The HEC coefficient for each year was estimated using the following equation:

$$HEC_{ijt} = \frac{(\hat{\beta}_{ijt} + M_{it}M_{jt})}{M_{it}M_{jt}} \quad (1.2)$$

In equation(1.2), HEC_{ijt} is the calculated elasticity of complementarity between factor i and j at time t . $(\hat{\beta}_{ijt})$ represents the estimated parameter for the interaction term between $\ln X_i$ and $\ln X_j$ at time t . M is the logarithmic marginal product $\frac{(d\ln Q_t)}{(d\ln X_t)}$ at time t . M_{it} and HEC_{ijt} are functions of the inputs K , S and F . This analysis will derive elasticity of complementarity values for each settler household during each year of the study. Since the M , and the HECs are functions of input values, individual input values for each farm in each year were used to calculate the values of M .

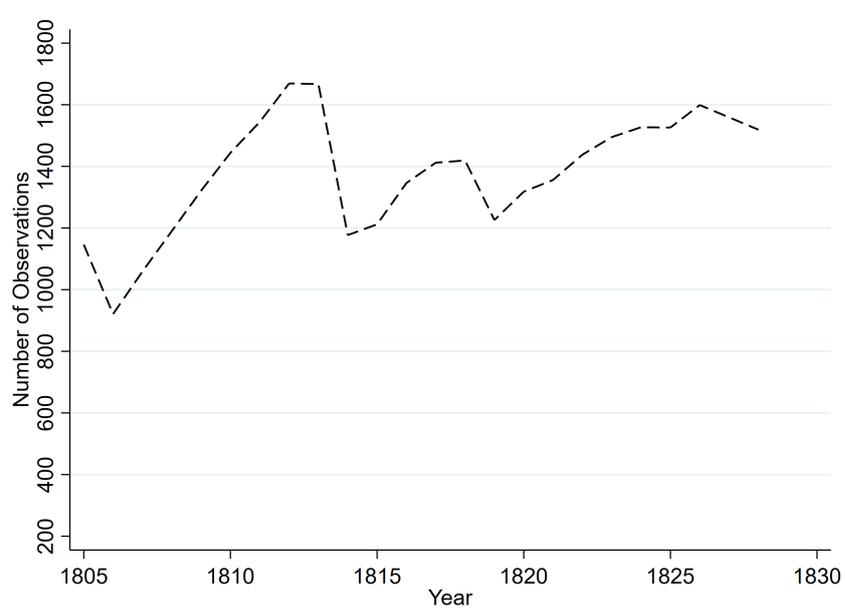
In estimating the translog production function for each year of the *opgaafrol-len*, a five-year moving average per year is calculated. This smoothing approach increases the observations utilised in each regression adding to the robustness of the eventual results. This technique is also utilised to smooth the long term trend and to create interpretable graphs. If the elasticity of complementarity coefficient is calculated to be strongly positive ($HEC_{ij} > 0$) the inputs in the production process are complements (different inputs all together); however, if the elasticity of complementarity coefficient is calculated to be negative ($HEC_{ij} < 0$) the inputs are considered substitutes.

1.7 Evidence of substitutability or complementarity

I began by calculating the elasticities between settler family labour and slave labour. Figure 1.6 demonstrates that the average number of observations in each regression performed for every year of the data set averages around 1,379. The year with the greatest number of observations is 1812 (with 1,669), and the year with the least observations is 1806 (with 921). In Figure 1.7 the mean calculated elasticity of complementarity coefficient from 1805 – 28 suggests that slave and settler family labour were complements throughout the period of analysis, since the Hicksian mean elasticities of complementarity are all positive. Complementarity implies that the two labour inputs are distinctly different. This result is to be expected since the master-servant relationship already existed between slave and settler household labour at the Cape Colony (Field, 1988). The analysis suggests that slave and settler family labour remained distinctly different types of labour throughout the period under consideration. Eastern frontier settlers remained the supervisory masters and slaves performed domestic labour in and around the homestead and on the farm.

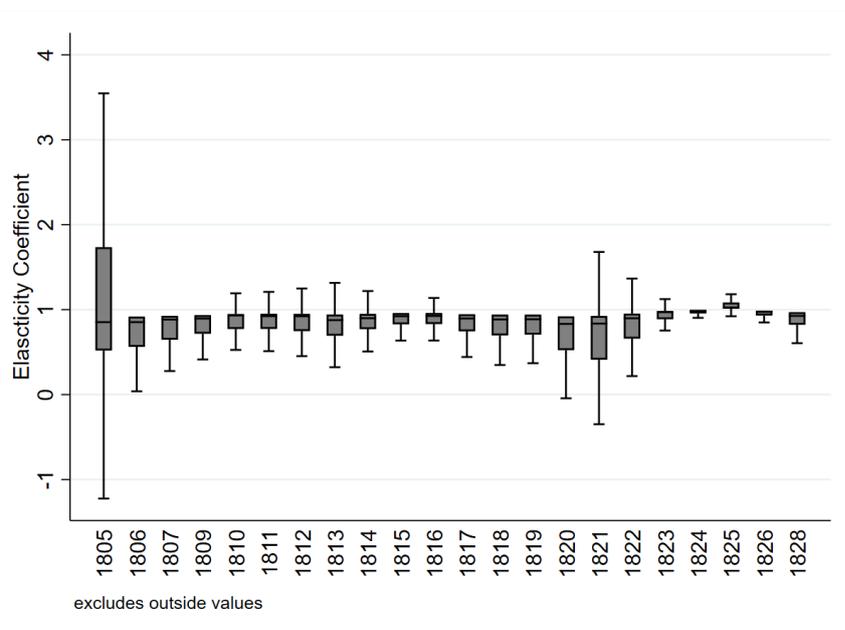
For the period in question the mean elasticity of complementarity estimates for household and Khoe labour (shown in Figure 1.8) also remains positive throughout. Khoe and family labour are also distinctly different labour inputs into the production process in the Graaff-Reinet district. In addition, the elasticity estimates from 1814 to around 1818 show a widening trend in its spread across frontier farms with a number of farms reporting negative elasticities of complementarity (substitutes).

FIGURE 1.6: Number of observations per regression per year



Source: VOC Opgaafrollen and MOOC-8 series

FIGURE 1.7: Elasticity of Complementarity Household Labour and Slaves

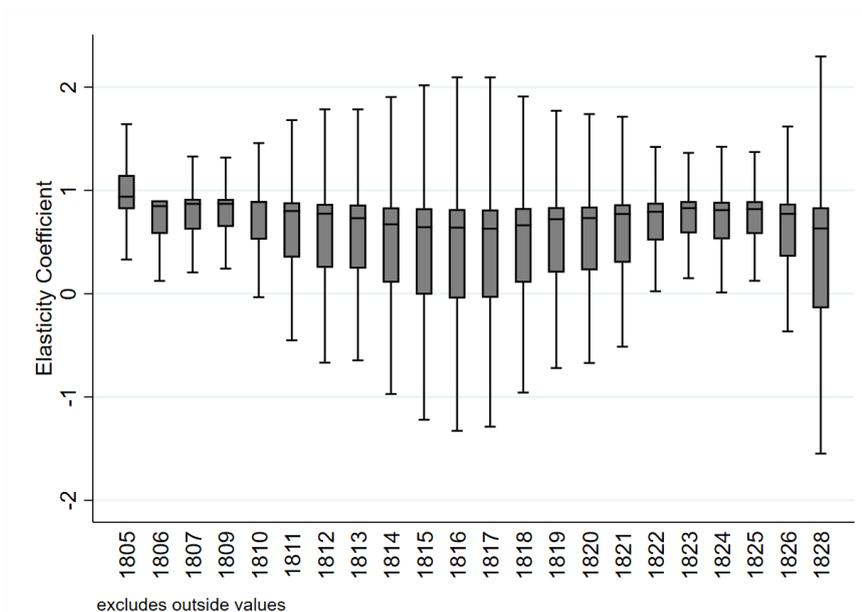


excludes outside values

Source: VOC Opgaafrollen and MOOC-8 series

This phenomenon can probably be explained by the recovering population numbers after the Fourth Frontier War. As a coping mechanism to labour losses after the Frontier War some farms had to substitute Khoe labour with family labour. This may suggest that household and Khoe labour were somewhat fluid and could, to some degree, be substituted. It may also indicate that the Khoe still enjoyed a reasonable degree of freedom.

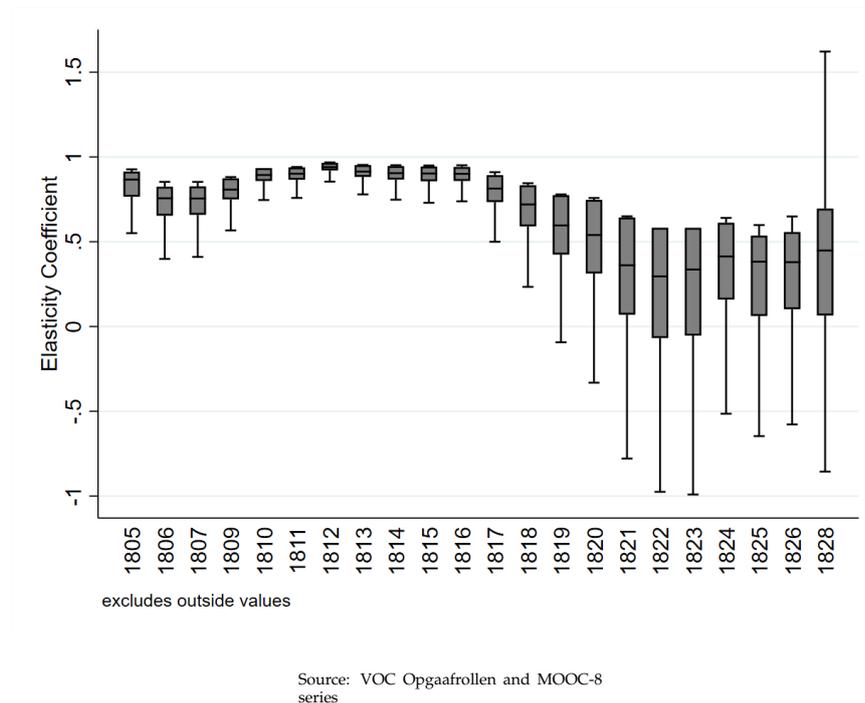
FIGURE 1.8: Elasticity of Complementarity Household Labour and Khoe



Source: VOC Opgaafrollen and MOOC-8 series

My major hypothesis, though, is that slave and Khoe labour were substitutes. As a coping mechanism in times of scarce Khoe labour the most logical response would have been to replace Khoe with slave labour. Yet, as Figure 1.9 shows, the mean elasticity of complementarity figures calculated for slaves and Khoe over the period 1805-1828 indicates that these two types of labour inputs remained complements throughout. This result indicates that slaves and Khoe on the frontier were performing different tasks in the production process. This is an especially important conclusion since it refutes the idea that Khoe labour could be easily replaced with slave labour, and vice versa.

FIGURE 1.9: Elasticity of Complementarity Slaves and Khoe



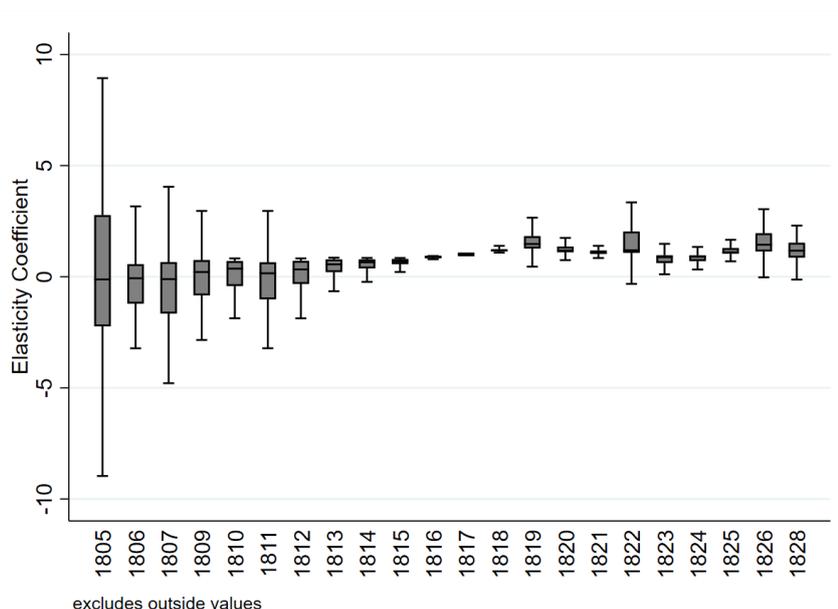
1.8 Assessing the robustness of the results

1.8.1 Restricting analysis to settlers present before and after population shock of 1814

So far my estimates have not taken into account changes to the settler labour force that came about as a result of conflict and war. The largest simultaneous decline in the combined Graaff Reinet settler, slave, and Khoe numbers over the period delimited for this study occurred in 1814, after the Fourth Frontier War. The total population of settlers, Khoe, and slaves recorded in the *opgaafrollen* decline by 33.5%, 37.7% and 31.1%, respectively. This structural break in the data may bias the results obtained in favour of the complementary labour relationship in the aforementioned analysis. To control for this, I restricted the sample utilised in the calculation of elasticities of complementarity to settler households that were present before and after the population shock of 1814. When this restriction is applied, the total observations across all the years falls substantially from roughly 42,180 to around 8,639.

Figure 1.10 shows the recalculated elasticity of complementarity estimates for settler household labour and slaves after this restriction is implemented. In the case

FIGURE 1.10: Elasticity of Complementarity Household Labour and Slaves with 1815 restriction

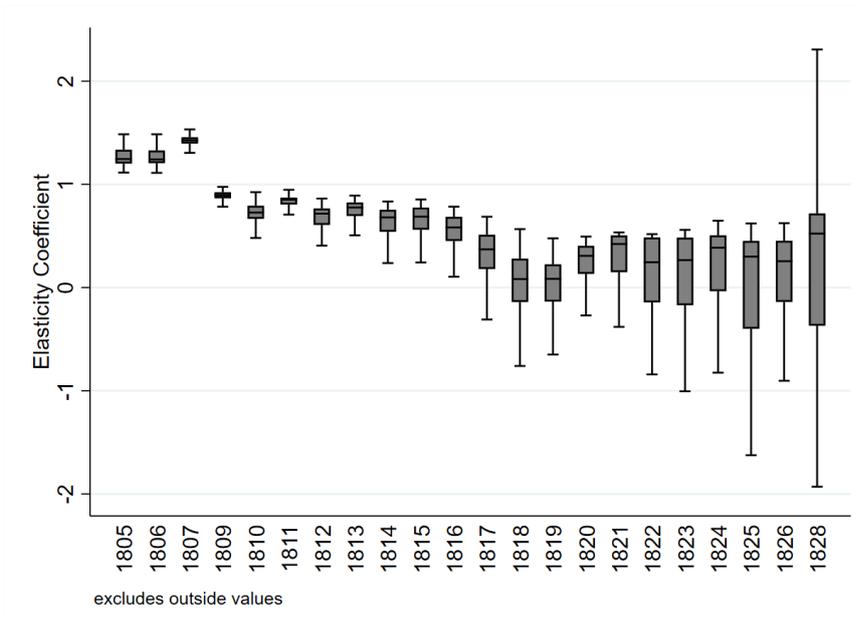


Source: VOC Opgaafrollen and MOOC-8 series

of household and slave labour the complementary relationship persists. With the exception of 1805 and 1806 (where substitutability is present, but with few observations), all the other years show reasonably strong complementarity (positive mean elasticities of complementarity). For Khoe and slaves it is also clear that these two types of labour inputs remain complements throughout the period of analysis even after the restriction is implemented—as is shown in Figure 1.11. What does appear to happen from 1822 onwards, is that Khoe and slave labour become substitutes on a small number of farms (possibly wealthier farms). This phenomenon can be explained by the fact that Khoe numbers started declining rapidly in the 1820s, effectively forcing more settlers, who could afford to acquire slaves, to substitute away from Khoe labour. Since this was not possible for all farms, Khoe and slave labour remained complements on most farms.

Figure 1.12 confirms that the mean elasticity of complementarity estimates between Khoe and household labour remains positive in this restricted sample. However, from 1816 to 1828 it appears as if the complementary relationship between household and Khoe labour becomes significantly weaker. This conclusion seems to support the notion that Khoe labour supplies were declining over time and that frontier settlers had to become less reliant on Khoe labour for rearing their cattle and

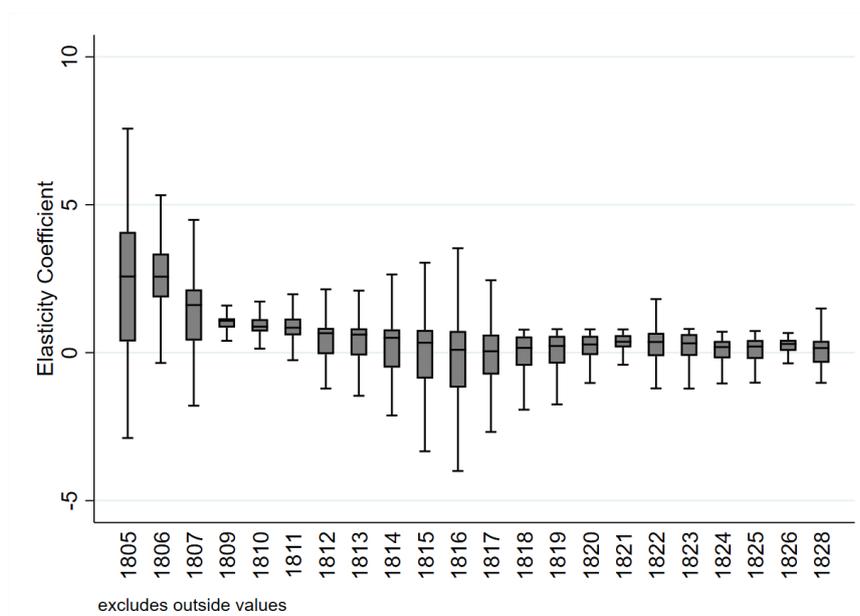
FIGURE 1.11: Elasticity of Complementarity Slaves and Khoes with 1815 restriction



Source: VOC Opgaafrollen and MOOC-8 series

sheep.

FIGURE 1.12: Elasticity of Complementarity Household Labour and Khoes with 1815 restriction



Source: VOC Opgaafrollen and MOOC-8 series

1.8.2 Restricting analysis to slave-owners only from 1805 to 1828

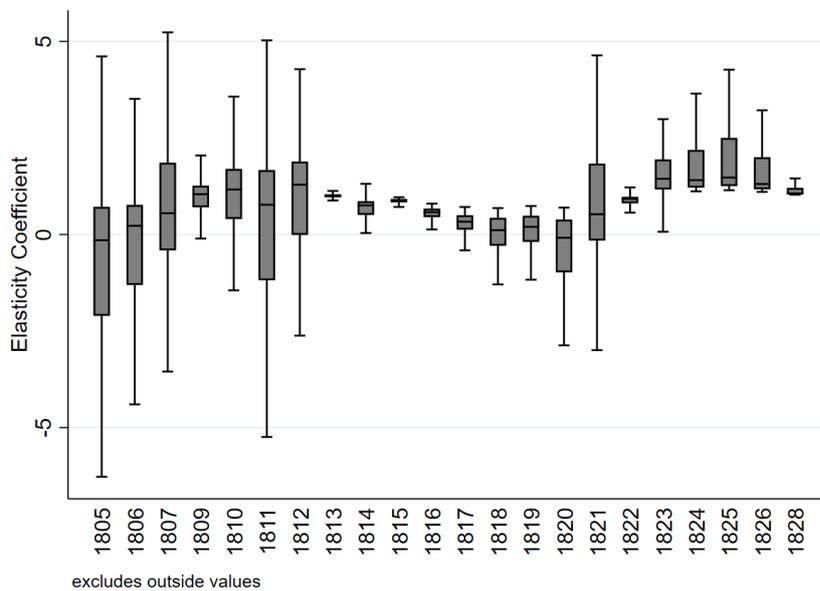
As shown in the descriptive statistics, slave ownership was primarily limited to a smaller group of wealthier households. That we find slaves to be complements rather than substitutes in the production process may simply be a result of the fact that for the vast majority of settlers it was not an option to use slaves as a coping strategy. I therefore focused solely on the minority group of slave owners to test the robustness of the complementarity result for slave, Khoe, and settler family labour over the period delimited for this study. After implementing this restriction (retaining only households with one or more slaves in the sample), the number of observations in the data set is reduced from 42,180 to 11,456. Figure 1.13 shows that, once the above mentioned restriction is applied to the period 1805- 1828, the mean elasticity of complementarity estimates for slaves and household labour remains positive. This finding supports my earlier conclusion that slave labour was not easily substitutable with family labour. The same holds true for the relationship between Khoe and slaves. Figure 1.14 suggests that slaves and Khoe performed distinctly different labour roles in the livestock rearing production process from 1805 to 1822. Again, the results change for the last few years. As Khoe numbers decline, the wealthier slave owning frontiersmen were able to substitute away from Khoe labour in order to procure slaves as a coping mechanism.

The next section will discuss the possible reasons for the complementary nature of the labour types as well as the reasons for its apparent change over time.

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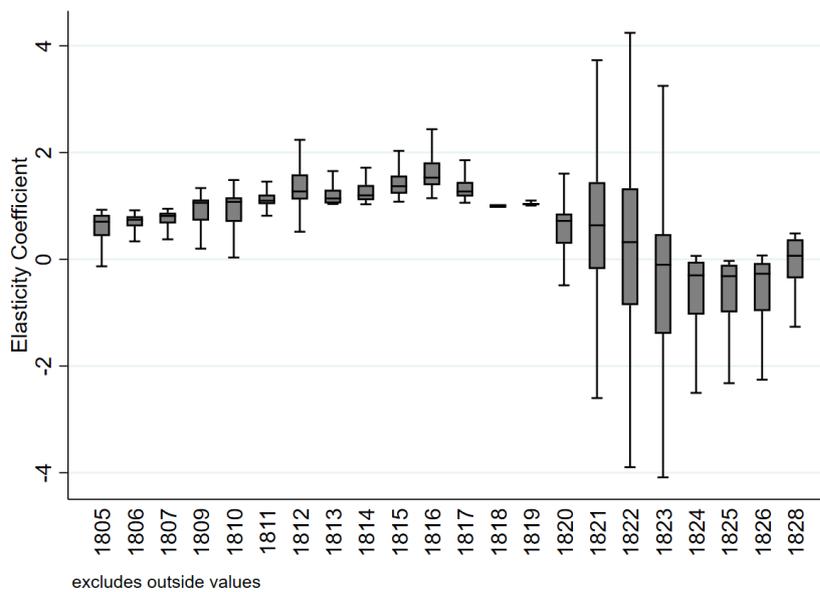
The next section will discuss the possible reasons for the complementary nature of the labour types, and the reasons for its apparent change over time.

FIGURE 1.13: Elasticity of Complementarity Household Labour and Slaves with only slave-owners



Source: VOC Opgaafrollen and MOOC-8 series

FIGURE 1.14: Elasticity of Complementarity Slaves and Khoes with only slave-owners



Source: VOC Opgaafrollen and MOOC-8 series

1.9 Reasons for complementarity of slaves

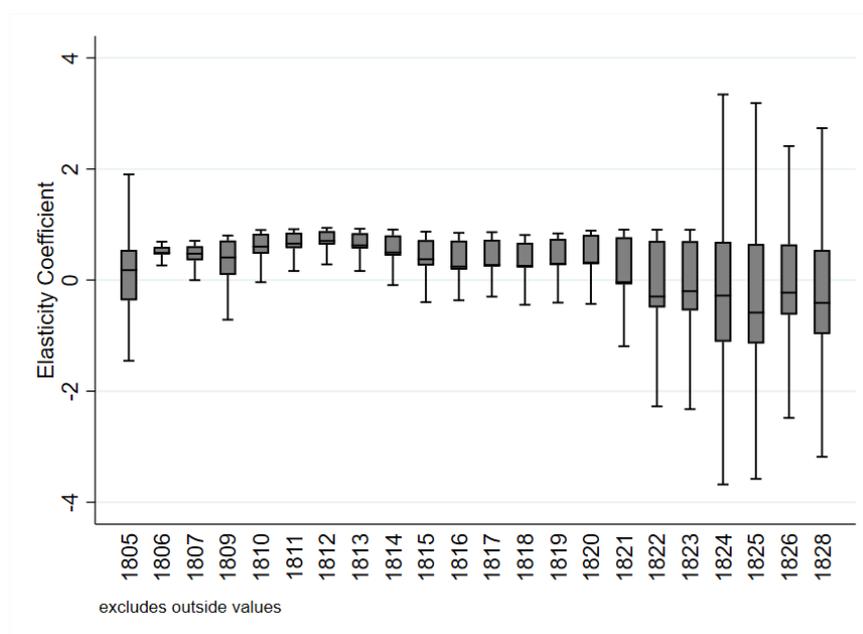
The results pertaining to the relationship between slave and Khoe labour are somewhat surprising since it would make sense to assume that at least these two forms of labour would be easily substitutable. Yet, Khoe and slave labour remained complements throughout the frontier period. It is my contention that the lack of substitutability can be ascribed to at least two important factors. First, the settlers' need to acquire labour with location-specific skills. Herding in Graaff-Reinet district required knowledge about the environment and climate. These were skills that Khoe labourers already possessed due to their long tradition of engaging in pastoral farming practices. They knew the geography very well; how herds, for example, needed to be moved throughout the season in order to access high quality grazing. In addition, the fact that colonial legislation forbade slave owners from arming their slaves also played an important role. Because they were considered free men and women, Khoe herdsman could bear arms and protect livestock against attacks from predators and other indigenous people.

By contrast, slaves brought skills such as carpentry and masonry from their regions of origin; skills which, although valuable in the colonial economy, were not necessarily useful in the veld. In addition, slaves also spoke the language of the slave owners, which gave them a significant advantage in production closer to, or within, the home (Worden, 1985; Dooling, 1992). Fourie (2013a) also argues that slaves were primarily used as workers in the 'proto-factories' which farmers introduced in order to manufacture articles such as soap, candles, and hides for local markets. In addition, the presence of wheat, vines, barley, and rye for a rather small number of Eastern frontier farmers confirms that at least a small amount of crop cultivation took place in the Graaff-Reinet district. Since many slaves were acquired from the wine and wheat producing regions close to Cape Town, some slaves were more suitably trained for such crop cultivation.

It can therefore be argued that the location-specific context made slave labour less likely to be easily substituted with Khoe labour. Whereas the Khoe had an absolute advantage in pastoral farming, slaves had an absolute advantage in non-agricultural production. Another way to test the different roles of labour on the frontier is to split livestock into its two components, cattle and sheep. When this

is done – as is shown in Figures 1.15 and 1.16 – an interesting trend becomes visible towards the end of the period: slaves and Khoes become more substitutable in sheep farming and less so in cattle farming. This suggests that, over time and when they were available, slaves were adapting more easily to sheep-rearing in the Graaff-Reinet district.

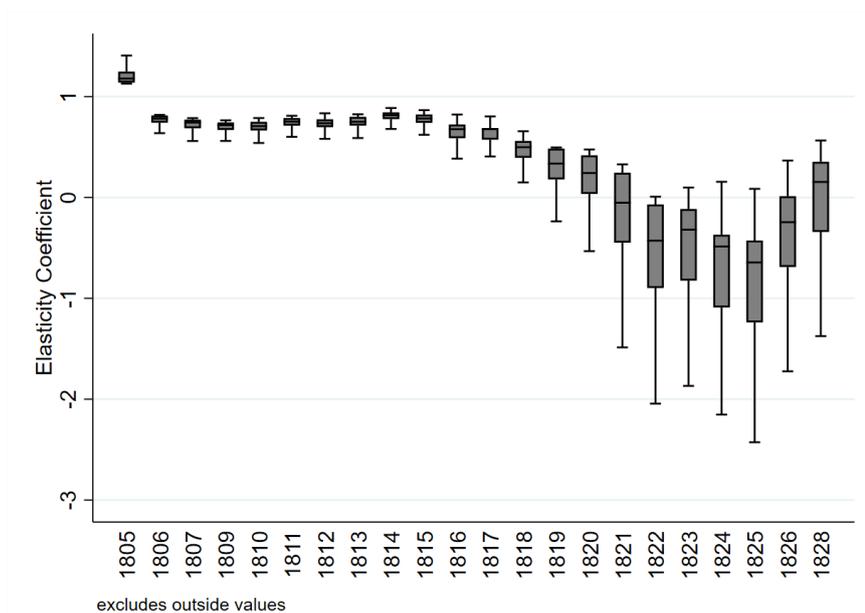
FIGURE 1.15: Elasticity of Complementarity Slaves and Khoes (Cattle)



Source: VOC Opgaafrollen and MOOC-8 series

Despite these changes on sheep farms toward the end of the period under analysis, the weak substitutability of slave and Khoes labour on most farms remain surprising. Perhaps it is worth looking beyond labour as an explanation. Just as in USA studies (for example (González, Marshall, and Naidu, 2017)), slaves were widely used as collateral in the Cape Colony (Fourie and Swanepoel, 2018), and may therefore have been acquired as financial instruments as well as labour sources. Martins (2019) uses the exogenous shock of the 1807 ban on slave imports to show that livestock farmers were less likely than crop farmers to switch to different labour types after the ban. This was because slaveholders, as, Martins (2019, p. 1) suggests, ‘could extract rents from the enslaved in a multitude of ways beyond agriculture production’. In a separate study, Martins et al. (2019) have demonstrated that, in the long-term, the emancipation of slaves had negative outcomes for former slaveholders. They speculate that one mechanism that could account for this long-term impact was the loss of a vital form of collateral. This confirms the conclusions of

FIGURE 1.16: Elasticity of Complementarity Slaves and Khoe (Sheep)



Source: VOC Opgaafrollen and MOOC-8 series

earlier work by Fourie (Fourie, 2013a) that examined 'slaves as capital'.

It is my contention that in the absence of secure land property rights, notably on the Cape frontier (Swanepoel and Fourie, 2018; Dye and La Croix, 2018), slaves were a rational choice as store of value. Using slaves primarily as collateral would also have had consequences for the type of labour they performed: to reduce the risk of escape (and thus capital loss), slaves would have been forced to work closer to, or within, the home. In an environment in which slaves with specialised skills could be rented out, it is evident that slave and Khoe labour were unlikely to be perfect substitutes.

1.10 Conclusion

In general, slave labour should be considered to have been the most flexible type of labour when compared to free and indentured labour. In fact, economic theories on the origins of slavery, such as the Nieboer-Domar hypothesis, rely heavily on the assumption that, with some retraining, slave labour in an open frontier setting could effectively be substituted with any form of labour. This assumption has not

gone uncontested. Many cross-sectional studies have shown that at least slave and free labour could be considered to have been completely different inputs in the agricultural production process. In addition, apart from focusing almost completely on slavery in the Americas, these static cross-sectional studies do not account for the fact that labour characteristics may evolve over time.

The Eastern frontier district of the Cape Colony over the period 1805- 1828 period presents a fertile testing ground for investigating the degree of substitutability of slave labour in an open frontier setting. Despite the fact that economic theories on the origins of slavery posit that unfree labour arrangements would not arise in labour-saving pastoral societies, slave and indentured indigenous labour were present in the primarily sheep and cattle rearing Graaff-Reinet district. Settler households in this open frontier district made extensive use of family as well as (free and indentured) Khoe and slave labour in the livestock production process.

The results obtained from the elasticity of complementarity estimates between settler family and Khoe labour show that the master-servant relationship between these two groups had already been established by the advent of the nineteenth century. Khoe were tending to livestock, largely due to their in-depth knowledge of the environment as well as their extensive experience with pastoralism over millennia. In addition, I argue that settler family members were most likely performing more supervisory roles.

The surprising finding is that slaves and Khoe were also not substitutes. As a natural coping mechanism one would assume that frontier farmers would automatically have relied more on slave labour. However, as the elasticity of complementarity results show, context-specific factors impact significantly on the degree to which slaves could be substituted for other forms of labour. I identified three possible reasons for this: the location-specific knowledge of the indigenous labourers; the artisan skills of the slaves, and the non-labour benefits of slaves, notably as collateral. The different skills and uses of slaves made them less substitutable for most of the period under analysis. Towards the end of the period, when the skills gap between slaves and Khoe had narrowed over time, the two forms of labour became more similar. However, for most of the period under consideration and even in the context of a frontier, pastoral society, slaves were not substitutes, which questions the assumptions of earlier literature on the topic.

Coerced indigenous labour and effort in pastoral agriculture: Lessons from the nineteenth-century Cape frontier

2.1 Introduction

Coerced labour practices have been widespread throughout most of human history (Rostovtzeff, 1926; Galenson, 1984; Eltis, 1993; Hoeffte, 1998; Ogilvie, 2007; Lovejoy, 2011). Although it is now generally accepted that these practices emerged in settings with a high land-labour ratio (Domar, 1970; Nieboer, 1900), the debate about the impact of coercion on effort and, as a consequence, productivity, continues. Some argue that greater coercion induces greater effort in bonded labourers. Therefore, labour coercion and effort can be, and are assumed to be, complementary (Acemoglu and Wolitzky, 2011). This argument is premised on a 'master' being able to easily observe effort and, on the basis of that observation, to exert more or less coercion on the labourer. An opposing argument states that, since coerced labourers do not share in the fruits of their labour, they will almost always exert less effort than free wage labourers.

A large body of literature supports the opposite notion, that is, that coercion induces low levels of labour effort (Markevich and Zhuravskaya, 2018; Klein and Ogilvie, 2017; Stone, 1997; Naidu and Yuchtman, 2013; Wright, 2006) and continues the kind of reasoning that often underpinned arguments advanced by the

anti-abolitionist movement of the eighteenth century (Barzel, 1977). Proponents of this movement argued that, since slavery yielded inferior returns compared to free labour, coercion would eventually disappear of its own accord. According to this argument, no intervention in the slave trade would be the 'least destructive' remedy for both slaveholder and slave; coercion, it was argued, was merely a temporary measure deployed to forcefully attain labour in settings where land was abundant. Nieboer (1900) and Domar (1970) have argued that as long as a frontier remains open, the presence of large tracts of land and labour scarcity combined with elite pressure, will lead to the rise of coercion; consequently, as the frontier closes and land becomes more scarce, labour will become more abundant with the result that coercion will no longer be needed. In contrast, many other studies have argued that, subject to certain conditions, the more labourers are coerced, the more effort they will exert—which will ultimately trump the productivity of free labour and justify the inhumane practise of slavery (Fogel and Engerman, 1974; Acemoglu and Wolitzky, 2011).

This chapter aims to make three significant contributions to the literature on coercion and effort. Firstly, most studies focus primarily on coercive regimes in crop-based agriculture. For instance, Fogel and Engerman (1974), compare black slave labour in the antebellum South of the USA with free Caucasian labourers in the North (crop-based agriculture was the primary source of income in both settings). The theoretical literature suggests that slavery should not exist in pastoral societies. By way of example, Domar (1970) argues that, since pastoralism is a labour saving form of agriculture, pastoral agriculture would be free from coercion. The first contribution this study makes, then, is to focus on a pastoral setting and, in so doing, to clearly illustrate that coercion can indeed exist in such a setting. Investigating the Cape Colony's rural frontier, this contribution will expand on the existing Nieboer-Domar hypothesis.

Secondly, with a few exceptions, most studies on labour coercion focus on chattel slavery. One such exception is Markevich and Zhuravskaya (2018) which investigates the relationship between the abolition of serfdom and productivity in imperial Russia, while the study by Naidu and Yuchtman (2013) analyses the impact that the repeal of the 1875 'masters and servants laws' had on industrial production. This study will similarly investigate labour coercion outside the domain of chattel

slavery. Instead, I focus on the indentured labourers drawn from the Khoe of the Cape colonial frontier at the advent of the nineteenth century.

Thirdly, this chapter makes a methodological contribution to studies on labour coercion by suggesting a new way of defining *effort* or productivity in pastoral settings. The difficulty here is how to assess the extent of care invested in flocks or herds since a decline in numbers may not necessarily be indicative or a direct result of negligence; fewer livestock may simply be due to a sale of cattle or sheep. In this chapter I theorise that flocks of which the numbers remain reasonably stable exhibit greater effort or care than those of which the numbers are quite volatile.

The open eastern and northern Cape frontier districts of Graaff-Reinet and Tulbagh at the advent of the nineteenth century present a unique opportunity to study cases in which the Khoe, although initially an indentured class of labourers, were granted greater liberties through a series of legislative enactments after the British took control of the Cape Colony in 1806. Settler farmers in these frontier regions needed well-adapted indigenous labourers to tend their large livestock holdings. In a setting in which institutional oversight was weak, farmers opted for severe coercive tactics in order to force Khoe men and women into servitude. The frontier conflicts of the early nineteenth century were outright revolts against the coercive practices imposed on the indigenous population by settler farmers.

Various pieces of legislation were introduced in an attempt to regulate this coercion. The Hottentot Proclamation of 1809 and the labour laws enacted by the administration of governor John Cradock in 1812 were intended to reduce both the extent and brutality of labour coercion. The introduction of these legislations coincided with the closing of the frontier as a result of more settlers arriving in the sparsely populated and dry interior (Newton-King, 1999; Penn, 2005). This provides the researcher with an ideal setting to test whether or not the Nieboer-Domar hypothesis also holds true for a pastoral setting. In this study it allowed me to compare the effort of the indigenous labour force before and after the enactment of these legislative shocks in order to determine whether the legislation increased or decreased effort (Acemoglu and Wolitzky, 2011). Because of the rich data at the researcher's disposal it is also possible to compare the effort level of the indigenous Khoe with the effort level of the settlers and the slaves before and after the labour legislation. The free settler reference group in particular, provides a well-identified post-legislation

comparison.

In this study, that was achieved by transcribing detailed agricultural census-like information for the two frontier districts of Graaff-Reinet and Tulbagh. The transcribed Dutch East India Company tax census or (*Opgaaffrollen*) – an agricultural census that was continued under British rule – constituted my primary source material. Since this data set contains micro-level information at farm level, I first estimated Cobb-Douglas production functions for each settler farm in the two districts. These production function estimates were then employed to calculate the Value of Marginal Product (VMP) for indigenous labour for each year between 1805 and 1822. The evolution of these VMP estimates were then analysed in order to determine the impact that legislative coercion had on indigenous effort.

I found that Khoe agricultural effort declined during the period 1809-1818, following the first of the legislative changes. After 1818, Khoe effort recovered somewhat. However, one cannot simply ascribe this post-1809 decline in effort solely to a reduction in coercion because frontier conflicts between settlers, Khoe, and the amaXhosa would also have had a significant impact on output levels. I utilised a difference-in-differences (DID) approach in order to ascertain the more direct impact that legislation had on Khoe effort. My results show that Khoe effort *decreased* relative to free household effort after the implementation of the 1812 Cradock legislation.

The Khoe decreased their effort levels as legislative acts aimed at protecting them from mistreatment were promulgated into law. Labour laws and the possibility of prosecution reduced the frequency of settler brutality inflicted on indentured labourers. As a consequence, the Khoe could reduce effort—not only because severe punishment became less likely, but also because they received very little of the fruits of their labour. Additionally, since much of the Khoe way of life had already been destroyed, escape beyond the Cape fold mountains was near impossible. On the basis of my research I conclude that in pastoralism, where effort is hard to observe, less coercion leads to lower levels of effort.

2.2 Economic theory on coercion

Historically, two theoretical arguments have underpinned the debate about the relationship between effort (or productivity), and labour coercion. The first argument is premised on the notion that bonded labourers will always be less productive or exert less effort than free labourers. This assumption, in turn, is based on a number of generalisations: that coercion exists only in agricultural economies where an abundance of land and a scarcity of labour exist, and where there is adequate buy-in from elites (Nieboer, 1900; Domar, 1970); that, should land become scarce and labour abundant, the need for coercion will dissipate and superior free labour will triumph; lastly, that since above a certain subsistence level none of the returns generated by coercive labour accrue to the labourers themselves, there is no incentive to work harder¹. Formulated differently, this argument is premised on the twin assumptions that 1) labourers who do not work for their own well-being will shirk on their responsibilities, and 2) coercive labour practices only exist because labour is scarce and land abundant, and not because they are superior in terms of productivity.

A number of studies have come out in support of this thesis. Stone (1997) argues that customary labourers in fourteenth-century Wisbeach Barton, England, were less productive in hay harvesting than their free, hired counterparts; Klein and Ogilvie (2017) consider the rapid decline in labour productivity under Bohemian serfdom as the major cause of divergent economic outcomes in Eastern and Western Europe during the period 1350-1861; Baten and Szoltysek (2012) argue that the rise of the 'Second Serfdom' or resurgence of coerced labour contracts was the primary reason for the slower economic expansion (and economic growth) in Eastern Europe; Markevich and Zhuravskaya (2018) note that both agricultural productivity and living standards in imperial Russia underwent significant improvements after the abolition of serfdom in 1861, and Rönnbäck (2016) finds that slave labour at the Cape Coast castle in Ghana was compensated above subsistence levels—in fact, that slaves were paid wages similar to those of free labourers in southern Europe and east Asia. Because slaves in Ghana were paid for their effort, and those wages reflected free labour market wages, it seems to suggest that bonded, unpaid labour was not

¹I acknowledge that there are other indirect productivity advantages to free labour, like innovation, which Adam Smith noted in his *Wealth of Nations*. While these may be quite substantial, my focus is exclusively on the direct relationship between effort and coercion.

more productive than free labour.

Studies which have argued for the superior productivity of free labour have largely omitted production processes outside of crop-based agriculture. The only study which has investigated a setting outside of agriculture was conducted by Naidu and Yuchtman (2013). Their study focused on Britain mid-industrial revolution and they found that, after the 1875 repeal of criminal penalties for breach of the Master and Servant legislation, labour productivity increased substantially. This outcome again reiterates the superior productivity of free labour, even outside the traditional agricultural setting. That said, very little, if any, work exists on productivity in the context of pastoral agriculture. This is unsurprising given that (Domar, 1970) has argued that, since pastoral agriculture is labour-saving, coercion would not be necessary.

The second and opposing argument in the debate about the relationship between effort (or productivity), and labour coercion states that increased coercion ultimately leads to greater productivity in coerced labourers even though, measured in terms of both long-term economic growth and human life, this may come at a great cost to slave-based economies. The seminal work by Fogel and Engerman (1974) shows that slaves in the antebellum USA were equally productive than family labourers on smaller-scale, northern-territory farms. Yet, these findings have not gone uncontested. Barzel (1977) argued that the superiority of slave productivity alluded to by Fogel and Engerman was a myth, and that the rational response for Southern slaves would have been to shirk their responsibilities. Barzel (1977) however, does concede that there may be circumstances under which slave labour could be more productive than free labour. In support of fogel1974, a study conducted by Acemoglu and Wolitzky (2011) also supports the notion that the greater the level of coercion, the more intense the effort will be, although this conclusion only holds true in the absence of alternative (“outside”) options for bonded labourers. The only study on the Cape Colony, by Du Plessis, Jansen, and Fintel (2015), similarly notes that, although early eighteenth-century slavery was profitable for elites who owned large farms, small-scale farmers were unable to recoup the capital costs associated with slave ownership.

A critical feature of all studies that have argued for a positive relationship between coercion and productivity is the fact that, in order for coercion to increase

effort, there needs to be an absence of alternative, outside options for the coerced (Acemoglu and Wolitzky, 2011). Outside options, such as the opportunity to escape, which reduce the effectiveness of coercive mechanisms, tend to be limited in those settings where there are no alternative forms of employment or opportunities for self-employment – such as a dry, uninhabited interior. In the case of the Khoe, such opportunities decreased as the frontier closed. The succession of frontier wars had wiped out a large portion of the Khoe communities which had existed outside the borders of the colony, and the harsh conditions beyond the Cape fold mountains made survival difficult. In the end, this meant that less coercive measures resulted in lower levels of effort from the Khoe.

The Cape colonial frontier regions present a unique opportunity to overcome some of the major shortcomings of earlier studies. The use of the Dutch East India Company tax census data, or *opgaafrollen*, allows for the measurement of household-level productivity estimates in the two frontier regions which are the focus of this study, namely the Graaff-Reinet and Tulbagh districts. Additionally, these records contain information about the size of the Khoe population before and after the impact of legislative enactments. This enables one to ascertain whether or not effort from the indentured Khoe decreased as coercion was reduced. Should one be able to demonstrate that effort decreased as coercion was reduced, it will be a clear indication that free labour yields lower levels of effort in a labour-saving form of agriculture such as stock farming, as has been argued by (Acemoglu and Wolitzky, 2011).

2.3 Historical background on coercion of Khoe and slaves

Slavery in the Cape Colony, which was different in nature to the indenturing of the indigenous population that followed, has historically received considerable academic attention because of its importance for the early colonial agrarian economy (Schoeman, 2007; Worden, 1996; Ross, 1979). The VOC's decision in 1657 to release nine company officials in order to expand the Cape's agricultural production led to an increase in the demand for labour and the arrival of the first two shiploads of slaves in 1658 (Groenewald, 2010). Over the period 1705 – 1731 slave numbers in the Southwestern Cape region increased by 307% – from 1,057 slaves in 1705, to

4,030 slaves in 1731 (Guelke and Shell, 1983). According to Shell (1994b) an estimated 63,000 slaves were brought to the Cape Colony from 1652 to 1808. At the same time and as a greater number of farms were apportioned to ex-VOC officials or to the children of these settlers, an increasing number of Khoe labourers were employed. The intensity of Khoe coercion during the period prior to the Hottentot Proclamation varied; because of the availability of outside options, it is generally believed that during this period the Khoe were incentivised with attractive (in-kind) payments to work on settler farms. Since Khoe labourers were cheaper than European wage labourers or *knechts*, indigenous labour became a critical component of the Cape Colony's labour force (Fourie and Green, 2015).

Khoe labour remained an important part of the labour force in Cape Town and surrounding areas. This, despite the outbreak of a smallpox epidemic in 1713 which radically impacted indigenous population numbers (Fourie and Green, 2015; Guelke and Shell, 1983). Notwithstanding the relatively large number of slaves that were being used on the Cape wine and wheat farms, Fourie and Green (2015) have noted that settler farmers continuously expressed their discontent with the VOC's policy of employing large bands of Khoe labourers for public work projects because it depleted their own labour supply during harvest times. There can therefore be little doubt that labour was in short supply, notably during the summer months.

As the settler population grew – largely as a result of very high fertility rates (Cilliers and Mariotti, 2019) – the need for more land drove settlers towards the frontier regions. Additionally, these newly arrived settlers had usually been unable to amass the capital or credit necessary to establish farms in the already settled regions of the colony with the result that they had to push towards the northern and eastern boundaries of the colony in order to make a living. Many of these *trekboere*, as they had become known, survived as pastoralists, traders, and hunters (Delius and Trapido, 1982) and their lifestyle was in stark contrast to that of Cape Town, where a small colonial elite had successfully managed to establish their position of privilege through a combination of slavery and the cultivation of crops such as wheat, rye, and grapes. In contrast, it is generally accepted that the frontiersmen of the eighteenth century were considerably poorer. The harsh interior and Karoo climate made pastoral activities the only viable means of subsistence (Merwe, 2006). The eastern

regions, although dry, could sustain such a pastoral lifestyle while the first frontiersmen who pushed north found that a combination of wheat and stock farming was a viable form of agriculture in areas surrounding Tulbagh and Piketberg. But the Cape fold mountains beyond Piketberg presented a significant barrier for settlers, and the perilous *Knersvlakte* beyond the mountains could not sustain any form of human cultivation. For much of the eighteenth century and well into the nineteenth century very few settlers or Khoe travelled beyond this barrier. The Cape northern frontier was open and land was abundant.

Since the majority of the *trekboere* were unable to purchase slaves given the high cost and the vast distance from the Cape slave markets, they had to rely on a mixture of family and Khoe labour in order to maintain their livelihood. As the Cape frontier opened up, these frontiersmen were not completely isolated, however. On the one hand, they had to buy goods such as tobacco and gunpowder from Company stores in Cape Town, and on the other hand, the Company also operated local administrative offices in the various frontier districts in order to ensure the maintenance of peace and the rule of law. Despite these measures, the power of colonial authorities under the Company decreased as colonial borders expanded (Malherbe, 1978). The greater the distance from Cape Town, the less Company oversight existed, and the more *trekboere* were given to coercing the Khoe. Historiography has shown that they brutalised or killed indentured Khoe without fear of consequence, and that they coerced the Khoe into submission with very little remuneration (Delius and Trapido, 1982).

The Khoe, however, were not just passive participants in this process of subjugation. Violent clashes between settlers and Khoe became more frequent over time as the Khoe attempted to defend their way of life against the increasing influence of both colonial and *trekboer* authorities. On the north-eastern frontier, the bloody *trekboek* commando raids would become the primary method of obtaining Khoe labour and included the abduction of Khoe women and children as spoils of war. Between 1784 and 1825 a total number of forty-five raids took place on the eastern border alone (Graaff-Reinet), according to (Dooling, 2005). In the early-1780s, the Khoe initially had some success in rolling back the north-eastern frontier – so much so that at one point colonial authorities considered abandoning the border altogether. Instead, settling the dispute between the settlers and the Khoe became a matter of urgency

because the north-eastern frontier district had developed into a major meat producer for the Cape economy (Penn, 2005).

The Khoes were understandably hostile to the idea of being indentured to settler farmers. In 1775, Governor van Plettenberg introduced the first 'apprenticeships' for children who were born to Khoes mothers and slave fathers. This was in response to concerns raised by the settler population about the colony losing the services of these children since they were born to *free* mothers² (Malherbe, 1978). Because of persistent labour shortages, legislative measures such as the *inboekenstelsel* of 1787 were introduced. As explained in the previous chapter, this was a pass system which required the Khoes to be registered with the local magistrate/veld-cornet and to carry a pass. In effect, the law restricted the physical mobility of the Khoes in order to augment the frontier labour force. Even the establishment of the town of Graaff-Reinet in 1785 was a display of authority by the colonial government in its quest to exert greater influence over Khoes in the region. Newton-King (1999) also notes that during the violent 1780s and 90s, settlers campaigned vehemently for dominance at the colonial border as a result of which they secured vast tracts of land and a steady supply of 'indentured Khoes' for their farms (Ross, 1993). By 1798 and despite resistance from the Khoes, the *inboekenstelsel* had become common practice in the Graaff-Reinet district, tightening the colonial authorities' grip on the Khoes. These practices of indentured servitude had also taken hold in Tulbagh (a district in the north-west of the colony), which had become a district separate from Stellenbosch in 1805. By the turn of the nineteenth century, frontiers on both the northern and eastern borders of the colony were rapidly closing.

The conflict that would become known as the Third Frontier War (1799-1803) was a watershed moment for colonial authorities. Settlers fought both the Khoes and the amaXhosa who inhabited the fertile land on the eastern borders of the colony. The conflict ended at a high cost for both sides, and decimated the north-eastern frontier colonial economy (Penn, 2005; Malherbe, 1978). The first occupation of the Cape by the British during the Napoleonic Wars occurred concurrently with this domestic conflict and meant that the colonial state was weakened – which gave frontier settler 'rebels' the upper hand for a short while. The hostile nature of this internal or domestic conflict is vividly illustrated by the journal entries of Cape Governor W.S.

²The Khoes as indigenous inhabitants of the Cape were considered to be free by Dutch law, but in reality, especially on the unpoliced frontier, this was rarely the case

van Ryneveld (Dooling, 2005):

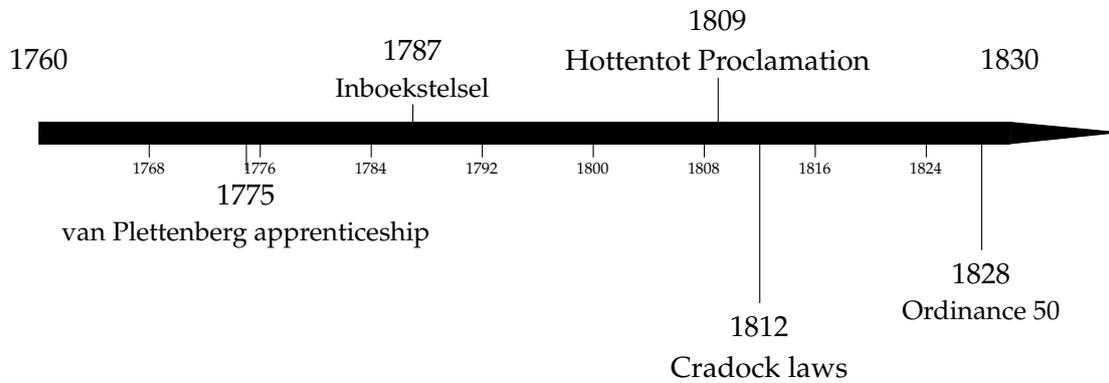
The Hottentots [Khoes] already reduced ... to slavery ... have often times shewed, and recently given convincing proofs, that they are by no means indifferent as to their situation, that they aim at revenge, whenever opportunity may favour their design. The farmer on the other side perceives very well that the Hottentot is only restrained by awe and a superior power ... in short both parties, especially in the remote Districts, consider one another in the light of enemies...

Something had to be done to stabilise labour relations on the frontier in order to ensure the survival of the colony. When the British took control of the Cape for the second time in 1806, the first civilian governor of the Cape Colony, the Earl of Caledon, hoped to settle the frontier disputes once and for all. Upon his appointment, he wrote:

Whereas it appears that provisions made from time to time for securing the fulfilling of contracts of hire between the inhabitants of this colony and Hottentots are not sufficient for the intended [peaceful] purpose; and whereas for the benefit of this colony at large, it is necessary, that not only the individuals of the Hottentot nation, in the same manner as the other inhabitants, should be subject to proper regularity in regard to their places of abode and occupations, but also that they should find an encouragement for preferring entering the service of the inhabitants...(Malherbe, 1978)

The British believed that legislatively defining the relationship between master (settler) and servant (Khoes) in this way would be the best way of protecting the interests of both parties. On the one hand, the settler population would obtain a ready supply of labour for their farms and, on the other hand, the Khoes would be protected under law from corporal punishment and other severe forms of maltreatment. Under the Hottentot Proclamation, masters were now contractually compelled to provide Khoes servants with the necessities for survival, and the Khoes could no longer be arbitrarily imprisoned or punished for unpaid debts. On the downside (for the Khoes), Caledon's passing of the Hottentot Proclamation in 1809 tied every Khoes to a specific settler and compelled them to present, on request from any government official, the requisite documentation to prove this fact (Dooling, 2005). Not

FIGURE 2.1: Summary timeline of Khoe indenturing legislation



Source: Malherbe (1978)

only was this a revival of the old pass regulation, but it also required of every Khoe to be attached to a settler household. Another law that affected settler-Khoe labour relations was passed by Cape Governor Sir John Francis Cradock in 1812. The law extended the reach of the Hottentot Proclamation and made provision for the offspring of Khoe who had received food and shelter from settlers for the first eight years of their lives to be ‘apprenticed’ to these settlers for an additional ten years. The colonial authorities hoped that both these legislative measures, although legally indenturing the Khoe, would reduce the need for violence between the two groups (Eldredge, 1994). Yet, the question remains as to whether or not these laws had any impact on the productivity of Khoe labourers. That is the question I intend to answer in this chapter.

2.4 Data and summary statistics

2.4.1 Data

To measure labour productivity on the frontier, I used the transcribed Graaff-Reinet and Tulbagh district tax censuses or *opgaafrollen* for the period 1805-1822. This means that the number of farms that are included for Graaff-Reinet district is 22,705 and for Tulbagh, 16,158. The data set as a whole combines a series of linked cross-sectional

information sets for settler farming household across different sub-districts³ into an unbalanced panel. What makes this data set unique is the fact that it reflects farm-level characteristics. This level of detail for agricultural, pre-industrial societies, much less frontier communities, is rare and offers us an in-depth look at the economic activities which took place on each settler farm of the Cape Colony's north-eastern frontier. An additional benefit of the *opgaafrollen* consists in the fact that the characteristics of farming units can be observed over an extended period of time, which allows for a detailed analysis of the dynamics of this pastoral frontier society. Despite the fact that the frontier zone was primarily pastoral, some wheat, vines, and barley were also cultivated – albeit on a much smaller scale and, given the distance to Cape Town, largely for the purpose of home consumption. A final, substantial advantage of this data set consists in the details it recorded of the Khoe who were employed on settler farms. It is this information that proved to be vital for my analysis.

The information recorded in the data set included, amongst other things, the number of Khoe and slave labourers, the number of livestock kept, the number of wagons, the number of vines, the amount of wine produced, as well as the amount of crops sown and reaped. The data set has two main shortcomings: firstly, it does not include information for the years 1808 and 1827 and secondly, it limits the scope of this study to the north and north-eastern frontier populations. This essentially means that my analysis is limited to those Khoe who were recorded by colonial officials on settler farms *on the day of successive censuses only* (Fourie and Von Fintel, 2011a). As stated in Chapter 1, this problem is not unique since most colonial data collection institutions focused primarily on the settler population and not on indigenous inhabitants of the colonised territories. In the case of the Graaff-Reinet and Tulbagh districts, the Khoe were only included if they were in the service of settler households. Unfortunately, this means that I was only able to analyse the productivity of those Khoe who worked on settler farms.

As I noted in Chapter 1, the data set also makes no distinction between indentured and free Khoe labour. Here it is important to mention that, for the purpose of simplification, I assumed that all Khoe remained indentured labourers but that the

³These areas included Graaff-Reinet town, Agter op Sneeuwberg, the Agter op Rhinocerberg, the Zuurberg, Buffelshoek, the Camdeboo, Zwarttruggens, Ghoup, Nieuweveldt, the Lower and Upper Zeekoei rivier, the Hantam, Zwartberg, the Winterveldt, Uitvlug and Swaggershoek.

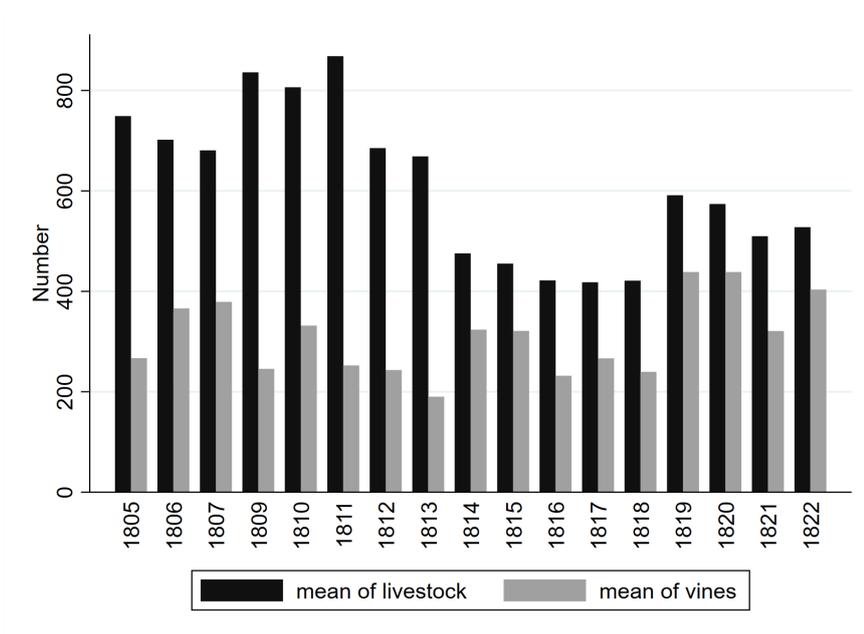
levels of coercion decreased after the implementation of the Hottentot Proclamation of 1809. This is not an unreasonable assumption to make since the proclamation applied to all Khoes who were in the service of settler farmers at the time and served to provide the Khoes with legal protection against the abuse of their masters (Elphick and Giliomee, 1979). This made it possible for the Khoes to report abuse suffered at the hands of their colonial masters to the colonial courts.

2.4.2 The Khoes labour force in Graaff-Reinet and Tulbagh districts

By the beginning of the nineteenth century, the local economy of Graaff-Reinet district was heavily reliant on stock farming (see Figure 2.2). In Tulbagh district, mixed agriculture was practised: while the main focus was on vine cultivation, a sizeable amount of stock farming was also practised. Figure 2.3 shows that the average farm in the Tulbagh district had four times as many vines as livestock. Sheep farming formed the basis of the eastern frontier's pastoral economy and Figure 2.4 shows that flock sizes in the Graaff-Reinet district averaged about 568.3 sheep per settler household over the period of study. Flock sizes for Tulbagh district, while sizeable, were smaller than those in Graaff-Reinet district and averaged about 262.5 sheep per settler household. Figure 2.4 and Figure 2.5 show that sheep holdings of settler farmers in both Graaff-Reinet and Tulbagh districts were much larger compared to cattle holdings. On average, settler households owned far smaller herds of cattle—around 43.5 heads of cattle per household in Graaff-Reinet district and an average of 29.2 heads of cattle for households in the Tulbagh district. Figure 2.2 illustrates another important component of the economy of the Graaff-Reinet frontier district that would rise to prominence in the early nineteenth century, namely vine cultivation, although it never became nearly as significant as livestock rearing.

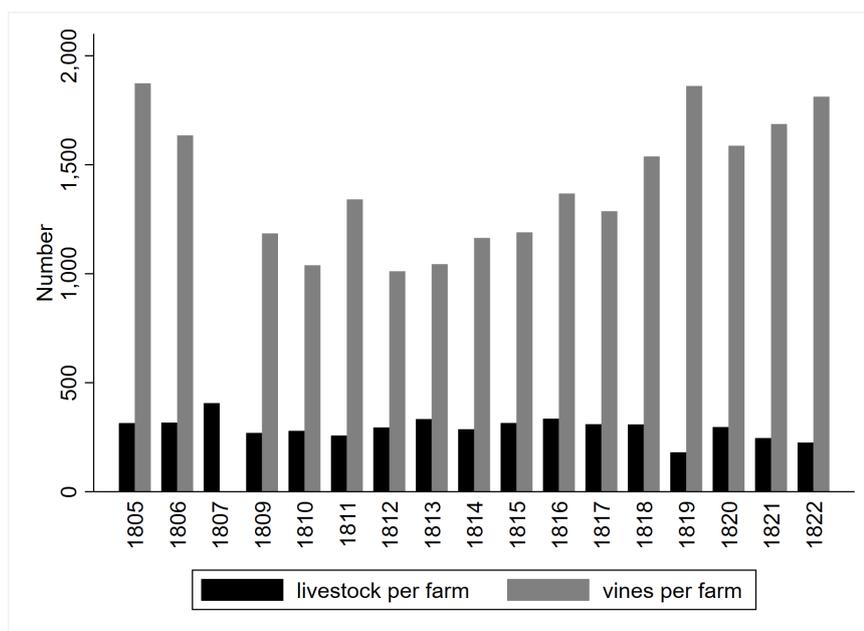
There was a critical difference in geography between the Tulbagh and Graaff-Reinet districts. Northern migration into the Tulbagh district beyond the Cape fold mountains encountered formidable resistance in the vast expanses of arid and desert-like regions such as the Knersvlakte and Koue Bokkeveld which made survival very difficult. Additionally, the challenging conditions beyond the Cape fold mountains would have made escape from settler servitude in the colony nearly impossible. By

FIGURE 2.2: Average livestock and vine holdings Graaff-Reinet



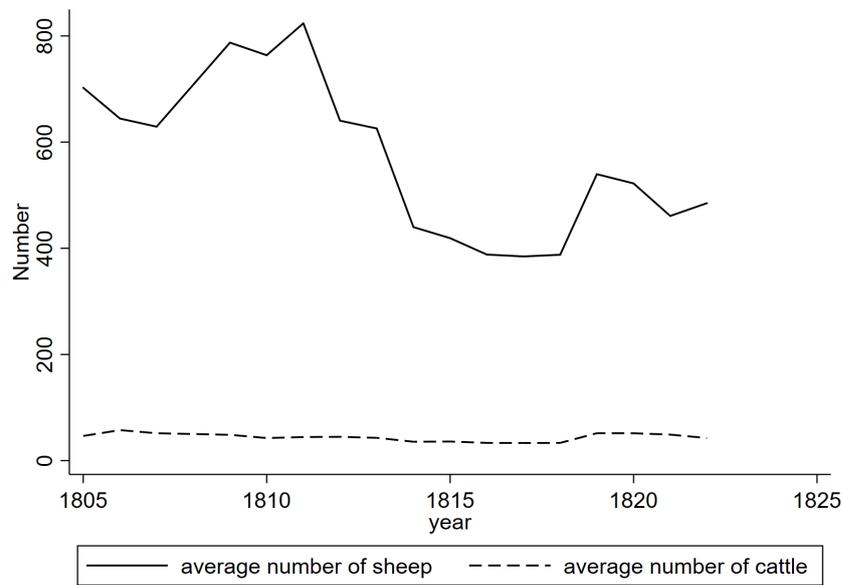
Source: VOC Opgaafrollen

FIGURE 2.3: Average livestock and vine holdings Tulbagh



Source: VOC Opgaafrollen

FIGURE 2.4: Average sheep and cattle holdings Graaff-Reinet



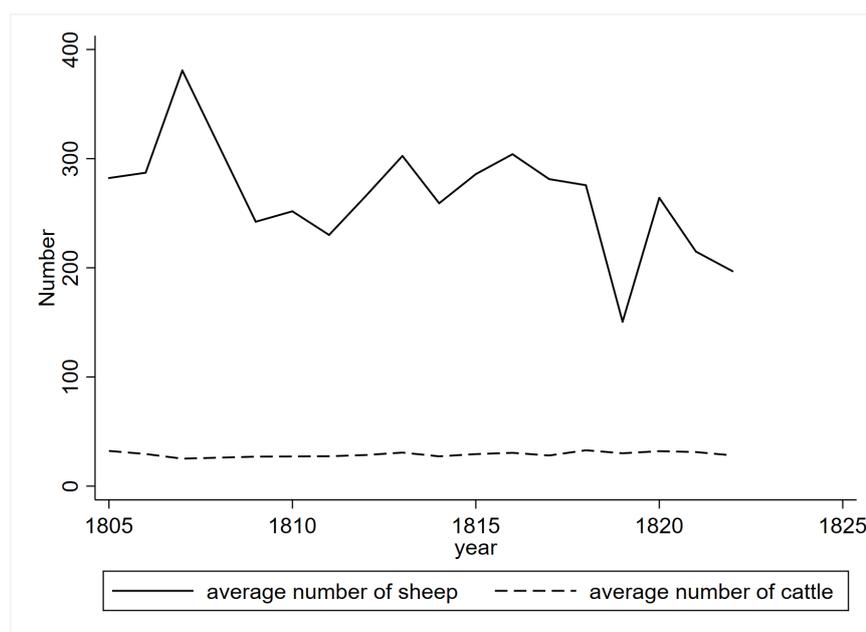
Source: VOC Opgaafrollen

contrast with these regions, Graaff-Reinet, the environment of the Zuurveld, and beyond, could support life and were originally inhabited by the Khoe, and further to the east, the amaXhosa (Penn, 2005). The successive conflicts on the eastern border destroyed Khoe society and made survival difficult, even though a handful were assimilated into amaXhosa tribes once they managed to cross the border.

The predominantly pastoral nature of these frontier economies would result in a heavy reliance on Khoe herding skills. In theory, there were at least two reasons why the Khoe were ideally suited for stock-farming. Firstly, since they had been nomadic pastoralists for centuries, their in-depth knowledge of the landscape and of cattle rearing in general made them highly desirable labourers (Dooling, 1992). Secondly, while slaves were prohibited from carrying guns (except in the presence of their masters), the Khoe were not. As early as 1688, the VOC had declared it unlawful for any slave to bear arms, and reaffirmed this prohibition in 1794 for fear of a large-scale slave mutiny (Delius and Trapido, 1982). The right to bear arms was particularly important since herders needed to be able to defend their flocks against thieves (such as the amaXhosa), and predators. In practice, slaves were also used as herders and were often allowed to carry guns. That said, the enormous expense involved in acquiring slaves was often a significant challenge for poor frontiersmen.

Figure 2.6 shows that, over the period of this study, the number of Khoe labourers on farms in the Graaff-Reinet district always by far exceeded the number of slaves. The Khoe were gradually compelled to enter the service of *trekboere*, since most of their *kraals* had been occupied by the settlers (Malherbe, 1978) and they no longer had sufficient grazing space for their herds.

FIGURE 2.5: Sheep and cattle holdings Tulbagh

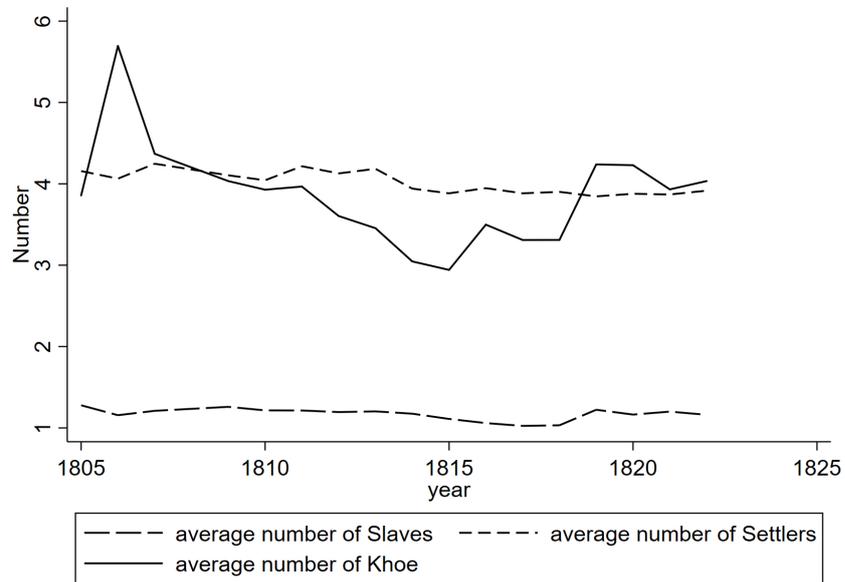


Source: VOC Opgaafrollen

Figure 2.6 shows that the average number of Khoe per farm was always higher than that of slaves. On average, there were 4.1 Khoe and the same number of settlers recorded on farms in the Graaff-Reinet district over the period 1805-1822. However, between 1809 and 1818, the average number of European settlers per farm (4) was higher than that of the Khoe (3.5). Figure 2.6 also shows that the numbers of Khoe and settlers varied considerably between 1805 and 1822. At the start of this period, the Khoe appear to have outnumbered settlers by far. But this imbalance would be reversed over time with the most significant drop in Khoe numbers occurring during, and immediately after, major frontier conflicts.

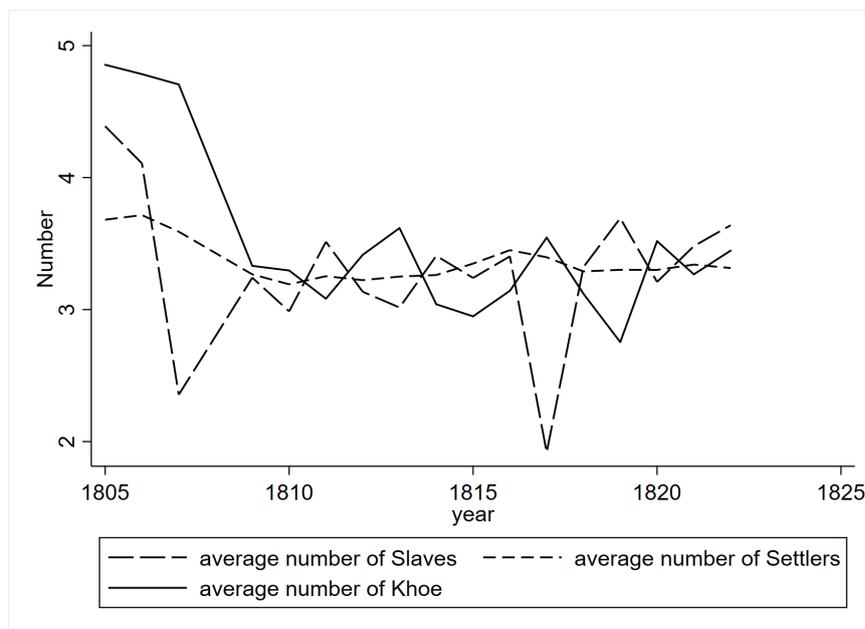
As for the Tulbagh district, Khoe and settler labour per farm remained roughly similar in number over the period 1805 to 1822 — as is illustrated by Figure 2.7. While the Khoe initially outnumbered settlers (until 1814), settlers would become the dominant population group over most of the period delimited for this study.

FIGURE 2.6: Labour force at Graaff-Reinet



Source: VOC Opgaafrollen

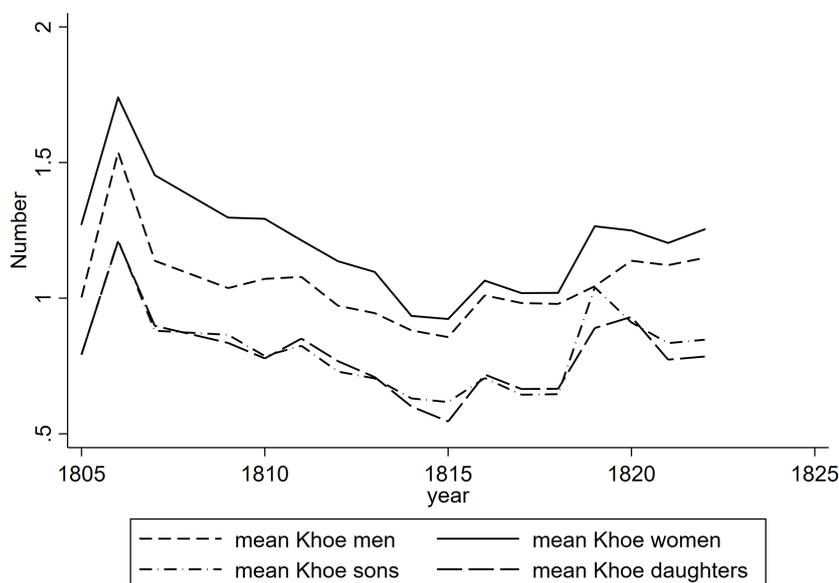
FIGURE 2.7: Labour force at Tulbagh



Source: VOC Opgaafrollen

Slaves also made up a substantial part of the labour force in the Tulbagh district. Vine cultivation in particular favoured slave labour, as it did in Cape Town, and so, because of the relatively greater prominence of vine cultivation in the Tulbagh district, slaves were used for both pastoral and crop-based agriculture there. Since the economy of the Tulbagh district also had a sizeable stock farming community, it is useful to compare the impact of reduced coercion on the effort levels of Khoer labourers in both Graaff-Reinet and Tulbagh districts. The Hottentot Proclamation of 1809 and the 1812 Cradock laws would have been enacted across the entire Cape Colony. Since Graaff-Reinet and Tulbagh districts had somewhat similar agricultural and demographic features at the time, it would lend more credibility to my earlier findings on Khoer effort levels if Tulbagh district can be shown to have exhibited similar trends in productivity or effort levels. In the case of Tulbagh district where general population numbers were lower, settler and Khoer numbers were also roughly similar. Some years, the Khoer outnumbered settler and vice versa—as is shown in 2.6. On average, Tulbagh settler farms housed around 3.6 Khoer, 3.5 settlers and around 3 slaves.

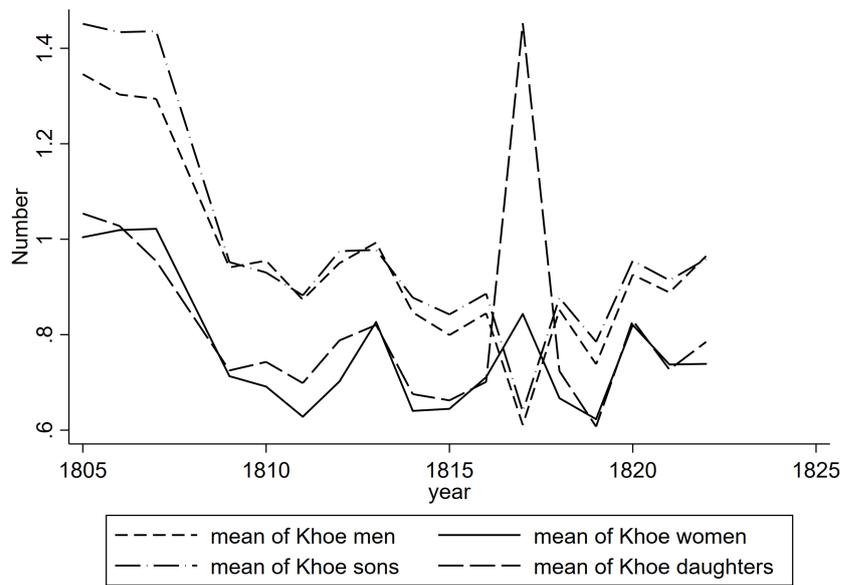
FIGURE 2.8: Average number of Khoer per farm: Graaff-Reinet



Source: VOC Opgaafrollen

As figure: 2.8 shows, settler farms in Graaff-Reinet district had on average more female than male Khoer labourers. These Khoer women and men were equally likely to work as cattle or sheep herders. Malherbe (1978) also found that both Khoer

FIGURE 2.9: Average number of Khoes per farm: Tulbagh



Source: VOC Opgaafrollen

men and women were leaders of wagons and oxen. In his writings, the colonial official Robert Barrow consistently remarks that the Khoes were best suited for more tiring jobs such as herding, but that they were too slight of built for heavy, crop labour. Both male and female Khoes also served as game hunters for *trekboer* families. Figure: 2.9 shows that men, especially boys, made up the majority of the Khoes labour force in Tulbagh district. This does not come as a surprise since settler farmers who could not gain access to slave labour would instead opt for cheaper, Khoes labour; and since vine planting required tremendous physical strength, men, and especially boys, would be the optimal choice of labour (Alesina, Giuliano, and Nunn, 2013). In addition to herding, Khoes men also performed such work as milking, butter churning, soap boiling, cattle kraal construction, slaughtering, the preparation of skins, and candle making, while women were tasked with doing the laundry, kitchen work, performing the end-of-day foot washing ritual, plucking poultry, and the manufacture of soap and candles (Malherbe, 1978). In performing such a wide range of critical tasks, Khoes men and women formed an integral part of everyday life on the northern frontier.

During this period, the Khoes labour force primarily consisted of adult women. Khoes men were a much less reliable source of labour since they were more prone to

join rebel amaXhosa or San groups. Consequently, it is Khoe women who therefore would have been most affected by the legislative “softening” of indenturing which occurred during the first decade of the nineteenth century. Ultimately, coercion was gradually reduced through a combination of legislative softening, the general destitution of the Khoe, and the capacity of colonial authorities to assert their dominance over the north-eastern frontier. The colonists had succeeded in securing vast tracts of land, and a cheap, steady source of labour.

2.4.3 How to measure effort in a pastoral setting

In contrast to crop-based agriculture, measuring productivity or effort in a pastoral setting is difficult since merely taking stock levels from one year to the next will be methodologically problematic for production function estimates. When measuring productivity in crop farming, yields can be determined and annual sales, tracked; with stock farming, animal stock can be sold, consumed, or retained so that they can reproduce. Consequently, when it comes to pastoral farming, it is difficult to differentiate between inputs, sales, and outputs. In a first attempt at measuring effort with the data set available to me, I used the value of the difference in cattle and sheep stocks for farm i between year t and year $t + 1$, based on the assumption that, if greater effort is exerted by the production inputs, then livestock numbers on the respective farm would increase. When using tax census data, there are two major caveats to applying such an approach. Firstly, a drop in the market value of sheep and cattle stocks from one year to the next may not necessarily represent a decline in effort or some negative shock on livestock holdings. It could merely mean that a settler farmer may have had more cash in hand due to a sale of sheep and cattle. Since information about the reason for the reduction in sheep and cattle stocks for each farm is not available, the validity and reliability of utilising this output measure is difficult to interpret. Secondly, the levels of sporadic entry, exit, and re-entry present in the data make it very difficult to use the first difference of sheep and cattle stock values – a problem which is amplified by the fact that a large number of farms must be excluded from the analysis because they do not stay in the panel for longer than two periods. This approach therefore does not fully utilise the richness of the available data.

Another approach which I considered consisted in de-trending sheep and cattle stocks data. The rationale for such an approach would be that farms on which cattle and sheep stocks remained relatively stable were more successful because they exercised a greater level of care than farms where stock numbers were more erratic. A greater degree of care or effort is therefore assumed to have been exercised on farms where cattle and sheep stocks remained relatively stable. In order to implement this estimation I used an approach suggested by Hamilton (2018), which entails regressing three or more lags of the sheep and cattle wealth variable on itself. I then used the size of the residual from this regression as the departure from steady state stock; in other words, where the estimated residual is smaller, productivity (effort) can be concluded to have been higher. This approach can be depicted as follows:

$$\delta Y_{it} = Y_{i,t} - Y_{i,t-1} \quad (2.1)$$

$$Y_{i,t} = \beta_0 + \beta_1 Y_{i,t-1} - \epsilon_{i,t} \quad (2.2)$$

$$\epsilon_{i,t} = Y_{i,t} - \beta_0 - \beta_1 Y_{i,t-1} \quad (2.3)$$

In equation 2.1 the change in wealth stocks is substituted into equation 2.2 which represents the estimated regression equation with one lag. The end result is the suggested measure of effort in equation 2.3. This may appear plausible but what makes the measure untenable is the high level of attrition in the data. One can use at most one lag.

Consequently, I decided to follow the approach put forward by Upton (1993) which at least partially incorporates Hamilton (2018)'s empirical strategy. Taking into consideration the data limitations I faced, my selected empirical strategy made use of one lag of the dependent variable (the value of sheep and cattle stocks) as one of the inputs into the production process. This dynamic approach assumes that

sheep and cattle stocks in year $t - 1$ have an impact on stocks in year t . This is a reasonable assumption because the current cattle and sheep stocks will always have an impact on future stocks. This method of productivity estimation represents the best compromise between what the data allows for, and what is methodologically optimal.

2.4.4 Estimating effort levels for Tulbagh and Graaff-Reinet

The period of analysis for this chapter is 1805 to 1822 for both Tulbagh and Graaff-Reinet. Over this period the data set contains information for 16,158 farms for Tulbagh and 22,638. In order to assess the effort of the Khoe labour force in Graaff-Reinet and Tulbagh districts prior to, and after, legislative indenturing, this study compared the change in Value of Marginal Product (VMP) from 1805 to 1822. Firstly, asset data from the *opgaafrollen* and price data from the MOOC-8 records⁴ were employed to estimate Cobb-Douglas production functions for each year of the respective data sets. Secondly, the output obtained from the production function estimates was utilised to calculate the value of the marginal product for each production input (VMP) for each farm in the respective datasets. The VMP calculated served as the effort intensity estimate for each input in the agricultural production process. In order to perform this calculation, the coefficients on $\log(I)$, $\log(S)$ and $\log(HH)$ obtained were multiplied by the average cattle and sheep output per worker to obtain the VMP measure of effort (Du Plessis, Jansen, and Fintel, 2015). The following functional form was used:

$$TP_{it} = \beta_0 TP_{i,t-1}^{\beta_1} S_{it}^{\beta_2} I_{it}^{\beta_3} HH_{it}^{\beta_4} \prod_{m=1}^M K_{m;it}^{\beta_5+m} \quad (2.4)$$

$$\log(TP_{it}) = \beta_0 + \beta_1 \log TP_{i,t-1} + \beta_2 \log S_{it} + \beta_3 \log I_{it} + \beta_4 \log HH_{it} + \sum_{m=1}^M \beta_{5+m} \log K_{mit} \dots \quad (2.5)$$

⁴Member of Orphan Chambers 8-series

$$VMP^I_{it} = \frac{\partial TP_{it}}{\partial I_{it}} = \beta_3 \frac{TP_{it}}{I_{it}} \quad (2.6)$$

TP refers to total farm production; S to the total number of slaves employed per settler farm; I refers to the total number of Indigenous labour (Khoe and HH refer to the total number of settler family labour available for production); K refers to all capital related factors such as wagons and horses which are employed in the cattle and sheep rearing production process, while TP_{t-1} represents the total value of cattle and sheep for period $t - 1$. A critical production factor that this data set provides no information about is weaponry since guns formed an integral part of the pastoral production process in both Graaff-Reinet and Tulbagh districts. The i notation represents the individual household, and t refers to the time component or the specific year in the data set. The VMP is calculated by multiplying the coefficient estimates from each year of the repeated cross-sectional data set with each farm's production per input for each year.

The total production per farm was obtained by multiplying quantities in the *opgaafrollen* with price data obtained from the MOOC-8 probate inventory series. The entire series of probate inventories span 162 years and record the value of assets accumulated in an individual's estate at death. Ultimately, the value of total cattle production and sheep production were then added together to form a livestock output variable. For the purposes of this study it was assumed that the price level remained constant throughout the period of analysis. This is not an unrealistic assumption to make since the general price level for the district remained relatively stable throughout this period (Du Plessis and Du Plessis, 2012; Fourie, 2013b).

The coefficient estimates needed to calculate the VMP were obtained by estimating ordinary least squares (OLS) regression equations using the log-linearised version of the production function in equation 2.5. This analysis omits settler households that owned zero cattle or sheep. The production functions were also estimated with household fixed effects. Frontier households that had zero or no livestock were typically either engaged in other agricultural activities or non-agricultural activities altogether, or they were extremely poor. Newton-King (1988) and Penn (2005) both confirm that the major agricultural industry in Graaff-Reinet district (and, to a lesser extent, Tulbagh district) was cattle and sheep rearing; however, other crops such as

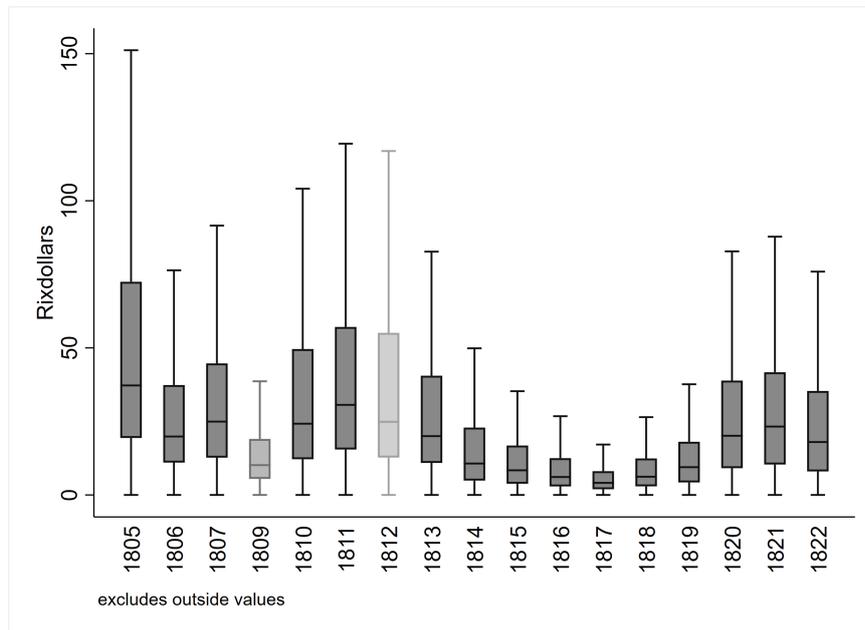
wheat, barley or grapes were also grown.

2.4.5 Final Value of Marginal Product estimation

If the calculated Khoe effort level with livestock for Graaff-Reinet district is plotted for the period 1805-1822, it becomes evident that 1812 can serve as pivotal point for Khoe livestock effort levels in the district. Figure 2.10 shows boxplots of farm-level VMP_I in rixdollars. VMP estimates at all percentiles increased for all farms between 1809 and 1812. However, effort level declined continuously after 1812 and does so until 1818. The decline was steepest for farms where productivity was highest. Effort levels seem to have recovered after 1818, though the highest percentiles did not reach the same levels of productivity they had before 1812. In Tulbagh, livestock productivity also increased after 1809 but only declined on a sustained basis after 1813 – as is depicted in Figure 2.11. At first glance it appears as if the combined effects of the Hottentot Proclamation of 1809 and the Cradock laws of 1812 had a substantial impact on the absolute effort levels of the Khoe even though the effect appears to have been transitory in the Graaff-Reinet district. These observed trends may also be due to the fact that the frontier conflicts, although far less severe than those that had taken place in the eighteenth century, negatively affected general effort levels at the time (Dooling, 2005). Figure 2.12 shows that, although slave labour in Graaff-Reinet district initially appeared to exhibit a higher effort level in terms of VMP than Khoe labour (slave VMP peaked at an average of c. Rd100 in 1809 – a level never attained by the Khoe), effort levels fell continuously after 1809. In the case of Tulbagh district, the sustained decline in slave effort levels in livestock rearing appears to be absent. Apart from the fact that effort levels of Tulbagh district slaves were much lower compared to those of Graaff-Reinet district, no long-term trend can be discerned in Figure: 2.13

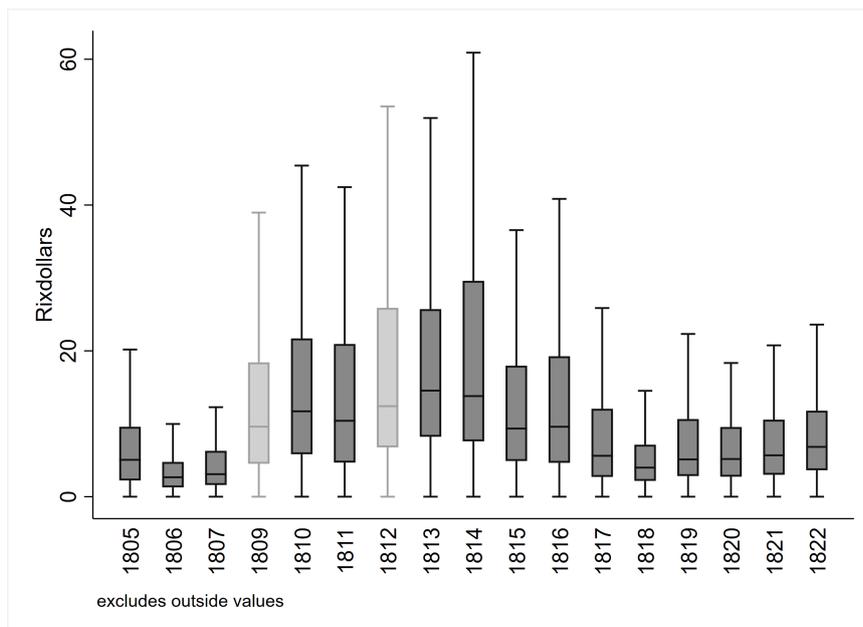
Figure: 2.10 plots the VMP in rixdollars of Khoe labour for each year in the respective data sets for Tulbagh and Graaff-Reinet districts. It is evident that there was a decline in Khoe productivity (if measured in terms of (VMP) directly after 1809. For Graaff-Reinet district, the mean VMP_I declines from around Rd200 in 1809 to Rd150 in 1818. The VMP_I estimates also show an increase in Khoe effort after 1818, similar to the general productivity trend. It would be very convenient

FIGURE 2.10: Graaff-Reinet Khoer effort levels



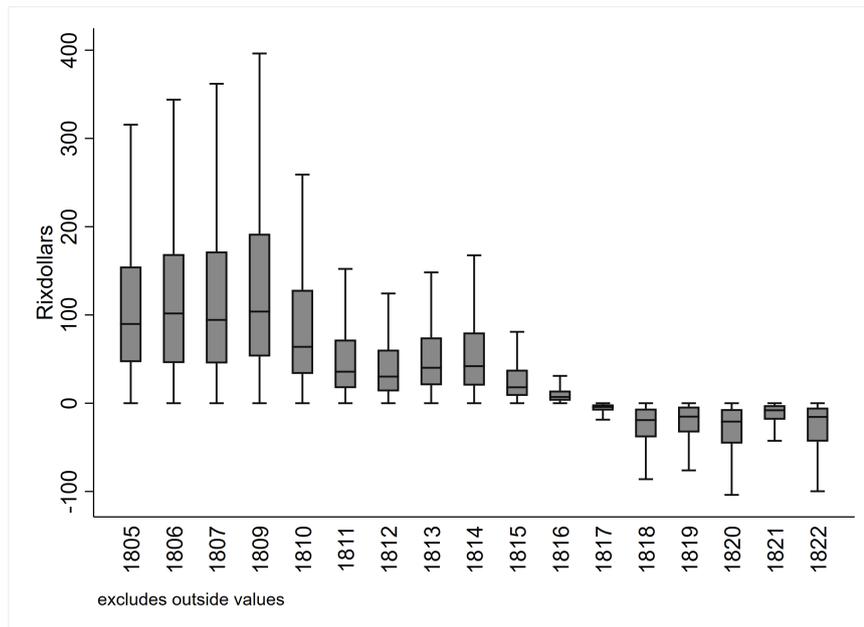
Source: VOC Opgaafrollen and MOOC-8 series

FIGURE 2.11: Tulbagh Khoer effort levels



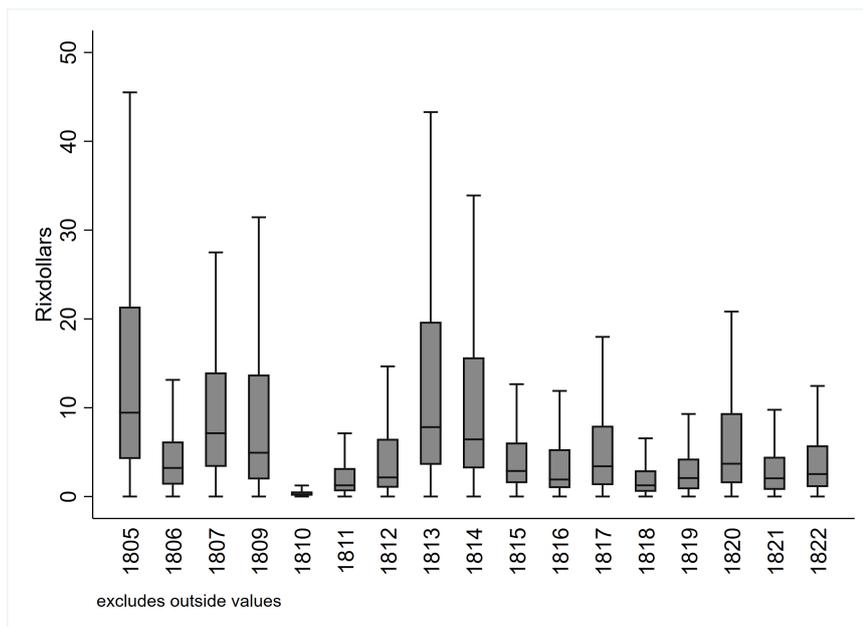
Source: VOC Opgaafrollen and MOOC-8 series

FIGURE 2.12: Graaff-Reinet slave effort levels



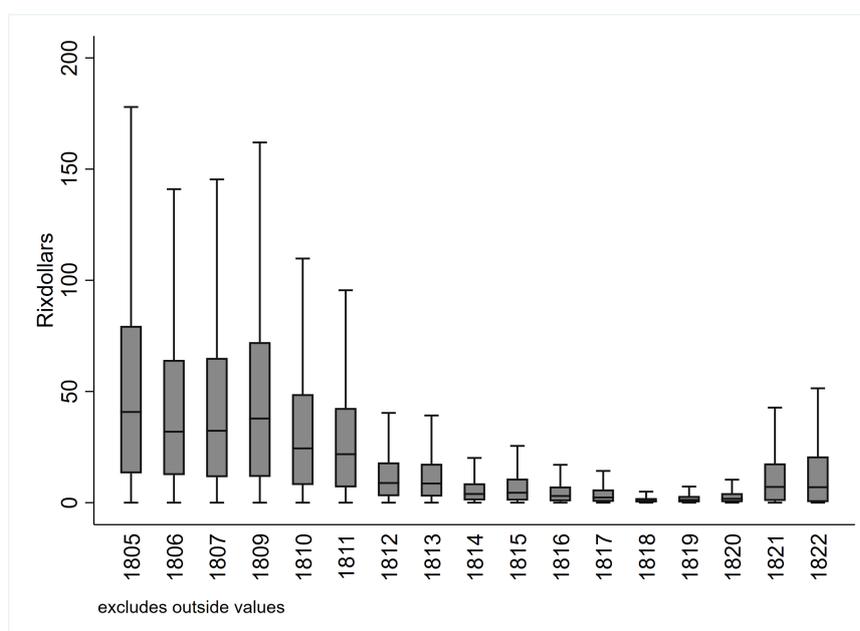
Source: VOC Opgaafrollen and MOOC-8 series

FIGURE 2.13: Tulbagh slave effort levels



to ascribe the decline in productivity for indigenous labour to the promulgation of the 1809 Hottentot Proclamation. Yet, this decline in productivity after 1809 may also be indicative of a general decline in productivity in Graaff-Reinet district as a result of the frontier conflicts. When viewing the data for Tulbagh district, the *VMP* estimated for the Khoes initially increases but also shows a declining trend after 1809 and this trend seems to persist until 1822. Since Tulbagh district was not affected by the frontier wars, the results present in both districts indicate that Khoes productivity generally declined after the promulgation of the Hottentot Proclamation in 1809. Another persistent result is that the 1812 Cradock laws seemed to have had no real impact on Khoes productivity.

FIGURE 2.14: Graaff-Reinet European settler effort levels

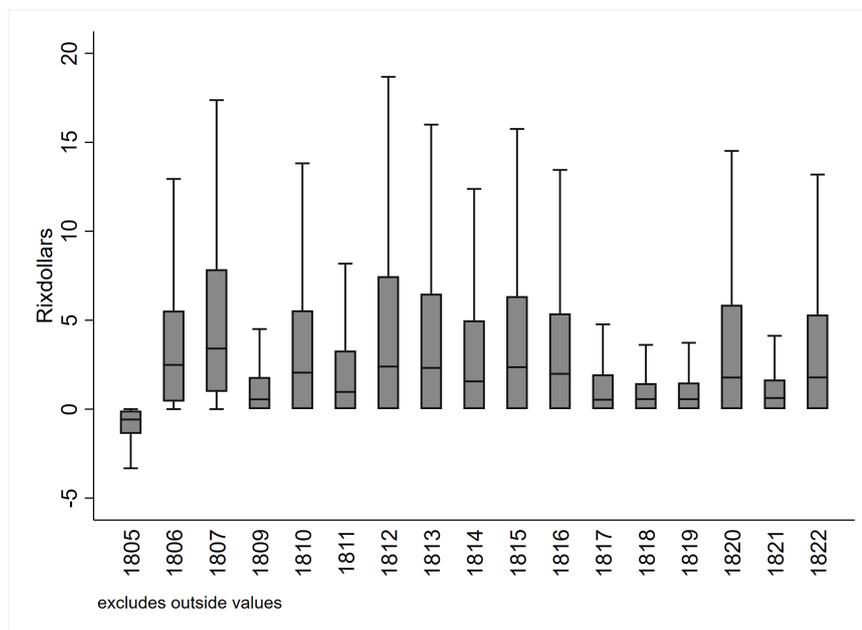


Source: VOC Opgaafrollen and MOOC-8 series

In the case of European settler labour force in Graaff-Reinet district it appears from figure: 2.14 that effort levels continuously declined over the period of this study. Figure: 2.15 also shows that, as in the case of Tulbagh district, the various *VMP* estimates displayed no clear, long-term trend over the period of this study. *VMP* estimates for slave and Khoes labour employed for livestock rearing in the two frontier regions show a sustained decline in effort levels after 1812, which may have been brought about, either by continued skirmishes between settlers and free Khoes beyond the colonial border, or by the impact of reduced coercion. The reduction in coercion may also have had a spill-over effect on slaves, especially since

the slave trade was abolished in 1807. Figure: 2.16 and figure: 2.17 show that both Graaff-Reinet and Tulbagh districts experienced sustained declines in average livestock values for a significant portion of the period under study here. As the conflicts declined over the first two decades of the nineteenth century and the frontier finally closed, Graaff-Reinet livestock levels appear to have recovered after 1818. The next critical step consists in disentangling the effects of reduced coercion and the impact of the raging, if subsiding, frontier wars on Khoe effort levels.

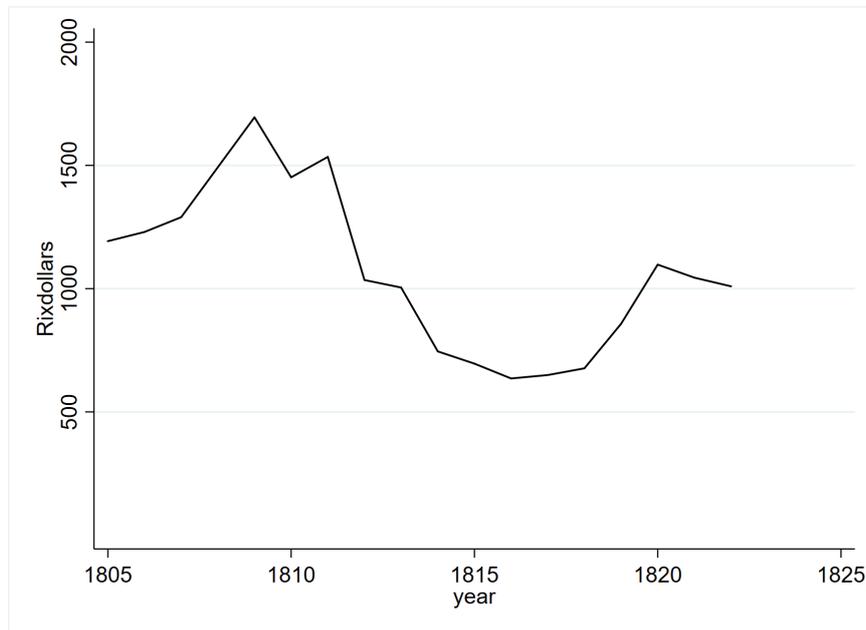
FIGURE 2.15: Tulbagh European settler effort levels



Source: VOC Opgaafrollen and MOOC-8 series

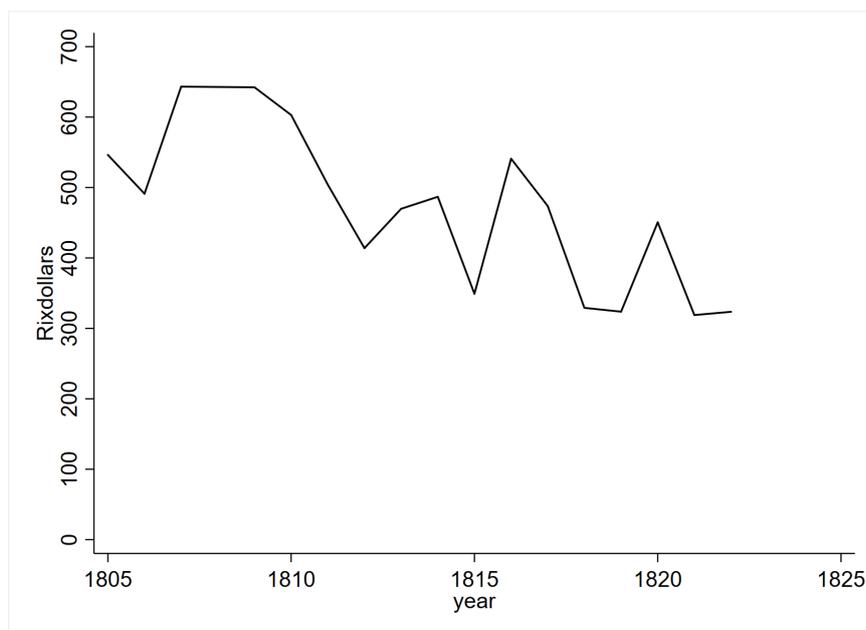
I acknowledge that ultimately these findings may just be the result of a general decline in effort levels on the frontier and consequence of conflicts continuing well into the nineteenth century. In order to separate out from each other the impact of the promulgation of the Hottentot Proclamation in 1809 and that of the 1812 Cradock laws, I employed a different empirical strategy which allowed for a more direct assessment of the impact that various legislative enactments had on Khoe effort levels.

FIGURE 2.16: Graaff-Reinet average livestock value in rixdollars



Source: VOC Opgaafrollen and MOOC-8 series

FIGURE 2.17: Tulbagh average livestock value in rixdollars



Source: VOC Opgaafrollen and MOOC-8 series

2.5 Empirical analysis

2.5.1 Difference-in-differences estimation

The general motivation for using a difference-in-differences (DID) approach is that it allows the researcher to evaluate the impact of a particular ‘treatment’ or policy by comparing the performance of the ‘treatment’ group before and after the ‘treatment’ relative to the performance of a control group, also measured before and after the same ‘treatment’ (Slaughter, 2001; Branas et al., 2011; Miyawaki, Noguchi, and Kobayashi, 2017). A DID approach provides a more direct way of testing the impact of the reduction in coercion on indigenous labour effort after the fact. For this study, I assessed the effort levels of Khoe labourers in the service of settler households *before* the Hottentot Proclamation of 1809, in the period *between* the Hottentot Proclamation and John Cradock’s Khoe apprenticeship legislation of 1812, and finally in the *post*-Cradock period. This method was selected in order to isolate the impact that the reduction in coercion of the Khoe had on their effort levels, from consequences that could have been a function of the general shock of the series of frontier conflicts. The DID model estimated is as follows:

$$VMP_{it} = \beta_1 I_i + \beta_2 BT_t + \beta_3 JC_t + \beta_4 (I_i * BT_t) + \beta_5 (I_i * JC_t) + \lambda_t + \epsilon_t \quad (2.7)$$

In equation 2.7, VMP_{it} refers to the value of marginal product of the i^{th} household at time t , and I_i refers to the treatment—in this case, a dummy variable which states whether a labourer is Khoe or not. In this analysis, the treatment, or policy shock, is denoted by a dummy variable for the implementation year of the legislative reduction in indenturing. Because the Hottentot Proclamation was instituted in 1809, the period between 1809 and 1812 is denoted by ‘between 1809 and 1812’, and the period *after* the implementation of the Cradock regulations in 1812 is denoted by ‘after 1812’. The interaction effects denotes the impact on VMP of the Khoe with the implementation periods of the various pieces of legislation.

$$VMP_{it} = \beta_1 S_i + \beta_2 BEman_t + \beta_4 (I_i * BEman_t) + \lambda_t + \epsilon_t \quad (2.8)$$

As a robustness check for the mechanism through which coercion works, I include a difference-in-differences specification for enslaved people on Graaff-Reinet and Tulbagh farms to see what impact the slave import ban by the British in 1807 has on slave effort. The assumption is that as the enslaved become aware that no new slaves could be bought or sold their incentive to work harder dissipates, basically dealing an adverse blow to their potential effort levels. It therefore is relatively easy to see whether or not a reduction in coercion leads to lower levels of effort for slaves as well. In equation 2.8, VMP_{it} also refers to the value of marginal product of the i^{th} household at time t , and S_i refers to the treatment—in this case, a dummy variable which states whether a labourer is enslaved or not. In this analysis, the treatment, or policy shock, is denoted by a dummy variable for the year the British placed an import ban on slaves. The interaction effects, as before, denotes the impact on VMP of the enslaved with the implementation of the 1807 import ban.

2.5.2 Threats to D-I-D specification

One of the main threats to the DID specification is the fact that a large number of farms move in and out of the data set. This makes the true impact that legislation had on livestock wealth difficult to determine since the farmers who appear in the data set *after* the legislative enactments may not have been affected. Similarly, farmers who appear in the data set *prior* to the legislative enactments, may have fallen out afterwards. In order to control for this, I restricted the sample to farms that are present both before and after the relevant laws were promulgated. This naturally led to a large loss in observations and meant that I was only able to chart developments on c. 414 farms in the Graaff-Reinet district (down from c. 10,660 farms per year), and 468 farms in the Tulbagh district (down from c. 11,897 farms per year). A further caveat that should be added to this approach is that not all farms are present in the analysis for the entire period. As a stricter measure of control for this caveat, I also performed an additional analysis that restricted the sample of farms to only those who appear in the panel for the entire period. This led to a further loss in the number

of farms that can be observed. The number of farms I was able to follow dropped to 119 for Graaff-Reinet district, and 158 for Tulbagh district.

Another issue which may be of concern for a DID analysis is that the legislative promulgation may not have been experienced as a true shock. It stands to reason that the impact of the legislation may not have been exogenous if its effects were anticipated by settlers. I argue that, despite the fact that the legislation was enacted by colonial authorities, the peripheral nature of frontier districts meant that if these laws had not been enforced, they would effectively have remained irrelevant. It was only with the unexpected formation of the 'black circuit' – which presented Khoe complaints to colonial authorities – that the impact of the legislation was truly felt. I also acknowledge the fact that the frontier wars may have had a significant distorting impact on the results observed in DID regression results. In order to control for this threat, I included time fixed effects in my panel regression results. (Ross, 1979)

2.5.3 Results

The regressions performed in Table 2.1 restrict the sample of farms to those that are present in the data set for at least one year before the first legislative enactment and at least one year after enactment of the second legislation. The fact that I am working with an unbalanced panel means that, after applying the above mentioned restriction, the number of observations incorporated fall to 8,846 for Graaff-Reinet district and to 8,181 for Tulbagh district. The results for regressions with farmers present *before* and *after* presented in Table 2.1 show that the effort level measured in VMP for Khoe labour was, on average, higher than that of free settler labour over the period of study (1805-1822) with a positive and significant coefficient for the *Khoe labour* variable. This finding confirms the fact that, on the eastern Cape colonial frontier of Graaff-Reinet district, Khoe labour was significantly more beneficial to livestock rearing than free settler labour. When looking at the impact of the legislative enactments it is clear that legislative loosening had a significant impact on Khoe effort in the period 1809-1812 – that is, *after* the Hottentot Proclamation and *before* the Cradock laws, with respect to free settlers. According to the results, Khoe effort levels declined after both legislative enactments. The reduction of coercion in this pastoral setting had a negative and significant impact on Khoe labour relative to free

labour after both 1809, and 1812. The livestock output per Khoe worker declined after 1812, relative to that of free labour. As for Tulbagh district, the results reveal a similar outcome despite the fact that livestock output per labourer was higher *after* the legislative enactments. Here, too, the interaction variables in Table: 2.1 indicate that Khoe effort levels declined after coercion was loosened.

VARIABLES	(Graaff-Reinet) free labour	(Tulbagh) free labour
<i>between_1809_and_1812</i>	-1.443*** (0.0450)	2.729*** (0.0958)
<i>after_1812</i>	-0.676*** (0.0678)	3.213*** (0.105)
<i>Khoe_labour</i>	1.013*** (0.111)	3.926*** (0.147)
<i>Khoe_labour*between_1809_and_1812</i>	0.575*** (0.0911)	-2.644*** (0.148)
<i>Khoe_labour*after_1812</i>	-0.324*** (0.113)	-2.451*** (0.159)
Constant	1.521*** (0.139)	-2.405*** (0.0932)
Observations	8,846	8,181
R-squared	0.111	0.219
Number of households	414	464

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

TABLE 2.1: Regressions with individuals present before and after legislation

Source: VOC Opgaafrollen and MOOC-8 series

Table: 2.2 also demonstrates the use of a similar DID specification to compare free settler labour to enslaved labour. In this case the sample of farmers was again restricted to those present before and after the British government's implementation of the slave import ban in 1807. As noted earlier in this thesis, slave ownership was largely restricted to wealthier settlers which means that restricting the samples of the two districts to farms with slaves present before and after 1807, reduces that number of observations incorporated significantly. In fact, for Graaff Reinet and Tulbagh districts the observations fall to 3,968 and 3,105, respectively. I argue that this ban impacted the treatment of slaves - even in the colonies. Since more slaves could no longer be imported, settlers who relied on enslaved labour had to improve

their treatment of slaves in order to prolong the service that could be derived from enslaved individuals. This analysis enables us to check whether or not reduced coercion had a similar impact on another type of bonded labour used in pastoral agriculture. One would expect these results to be similar to the results obtained with regard to the Khoe. Regression table: 2.2 clearly indicates that the reduction in coercion of the enslaved had a similar impact on slave effort. Slave effort declined relative to free labour after the 1807 ban on slave imports.

VARIABLES	(Graaff-Reinet) free labour	(Tulbagh) free labour
<i>after_1807</i>	1.400*** (0.199)	1.010*** (0.0960)
<i>enslaved_labour</i>	1.609***	5.975*** (0.270)
<i>enslaved_labour*between_1807</i>	-0.868*** (0.192)	-3.444*** (0.172)
Constant	-0.596*** (0.193)	-0.501*** (0.176)
Observations	3,968	3,105
R-squared	0.046	0.386
Number of households	158	119
FE	YES	YES

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

TABLE 2.2: DID regression with households that remain 1805 to 1822

Source: VOC Opgaafrollen and MOOC-8 series

Table 2.3 and table 2.4 show the results when the same analysis was performed for both Khoe and enslaved labourers in Tulbagh and Graaff-Reinet districts on the sample of farms present in the panel throughout the entire period. The implication of this restriction on the sample is more severe since the farm has to be present in the sample for the entirety of the panel. The end result here is that the number of farms incorporated in the analysis will decline even further from that presented in Table 2.1 and Table 2.2. The regression results remain robust even against this further reduced sample and indicate that in pastoral agriculture, a reduction in coercion leads to a decline in effort across all forms of bonded labour, both enslaved and indentured.

VARIABLES	(Graaff-Reinet) free labour	(Tulbagh) free labour
<i>between_1809_and_1812</i>	-0.00777 (0.125)	1.485*** (0.185)
<i>after_1812</i>	0.838*** (0.0871)	1.322*** (0.196)
<i>Khoe_labour</i>	2.599*** (0.212)	1.972*** (0.206)
<i>Khoe_labour*between_1809_and_1812</i>	-0.392** (0.161)	-1.138*** (0.202)
<i>Khoe_labour*after_1812</i>	-1.546*** (0.192)	-0.809*** (0.216)
Constant	1.318 (0.105)	-0.501*** (0.176)
Observations	3,442	3,968
R-squared	0.081	0.072
Number of households	158	158
FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 2.3: DID regression with households that remain 1805 to 1822

Source: VOC Opgaafrollen and MOOC-8 series

VARIABLES	(Graaff-Reinet) free labour	(Tulbagh) free labour
<i>after_1807</i>	-0.783*** (0.0636)	2.784*** (0.115)
<i>enslaved_labour</i>	3.936*** (0.145)	4.371*** (0.173)
<i>enslaved_labour*between_1807</i>	-0.571*** (0.190)	-3.090*** (0.168)
Constant	7.049*** (0.104)	-2.393*** (0.114)
Observations	8,434	7,702
R-squared	0.320	0.152
Number of households	414	468
FE	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 2.4: DID regression with households present pre- and post legislation

Source: VOC Opgaafrollen and MOOC-8 series

2.5.4 Discussion

The results obtained show that loosening coercion of an indigenous population in a pastoral setting had a negative impact on effort levels. This largely supports the notion that reducing coercion reduces effort levels even in a labour-saving form of agriculture. Since Khoer labourers in Graaff-Reinet district could no longer be brutalised (even though their movements remained severely restricted), they simply reduced effort levels. Physical escape had a slight likelihood of success as long as they were prepared to be absorbed into amaXhosa and amaZulu societies beyond the colonial border (Malherbe, 1978; Dooling, 2005; Penn, 2005). The complete disintegration of a way of life which existed prior to colonial contact, meant that escape was often worse than remaining where they were. It is my contention that the proximity to the colonial border of the Khoer in Graaff-Reinet district did not present much of an outside option since they were a landless people. Consequently, reduced coercion simply meant that the Khoer could reduce effort levels because of a much lower probability of punishment. After the implementation of the Hottentot Proclamation in 1809 and the Cradock laws of 1812, the Khoer were protected and settlers were required by law to ensure that indigenous workers were being treated better than they were in the past. Although they still lived in servitude and with less fear of being brutalised, there was less cause to increase the intensity of their effort. The effect this had on productivity was profoundly negative. To this should be added that the incentive to escape may have been further reduced by the fact that opposition beyond the border had been quashed, which meant that it would have become very difficult for them to sustain their livelihoods beyond the borders of the colony. The loosening of coercion may have made prospects on farms appear more attractive than destitution in the great unknown. This conclusion seems to broadly support the notion that less coercion means less effort, as has been suggested by (Acemoglu and Wolitzky, 2011) even where some, albeit limited, escape options exist.

Similar to Graaff-Reinet district, the Tulbagh district was a relatively active pastoral border region in the Cape Colony during the early nineteenth century. That said, geographically, Tulbagh district differed significantly from Graaff-Reinet district. Where Graaff-Reinet district offered some possibility of escape, very little opportunities existed beyond the Cape fold mountains. In the case of Tulbagh district it is my contention that, since the colony beyond the Cape fold mountains presented

a considerable geographic barrier, escape into this region was not a viable option. Apart from a handful of scattered Khoe groups, no kinship networks existed in the *Knersolakte* and the *Koue Bokkeveld* precisely because water was scarce and food difficult to obtain (Penn, 2005). The Khoe had an even smaller likelihood of survival beyond the borders of the Tulbagh district, which meant that the loosening of coercive measures would have decreased the motivation levels of Khoe labourers in the Tulbagh district which, in turn, would have negatively influenced effort levels. In light of all this, it is therefore not surprising that Khoe effort levels decreased as a result of legislative enactments.

In both sub-districts the results of regressions that consider enslaved labour used in stock farming seem to yield the same conclusion. In both districts, the slave import ban drastically reduced the effort levels of the Khoe. Once again, it appears that, even in a pastoral setting, less coercion leads to less effort where no outside options exist. In the case of slaves, even less outside options for escape existed. Since they were mostly imported from the West Indies, very little opportunities existed for them outside of the farm environment in which they found themselves.

2.6 Conclusion

There can be no doubt that slavery as an institution is one of the most abhorrent practices mankind has ever conceived. Yet, its persistence as an institution throughout the ages can be explained, in part, by the fact that in many circumstances slave labour may be more productive than free labour. Many economic historians have argued the contrary, namely that, due to coerced labour's inferior productivity, it will inevitably cease to exist and be supplanted by free labour. As the Nieboer-Domar hypothesis states, coercion only exists in an open frontier where there is an abundance of land and labour scarcity. If the labour scarcity dissipates, coercion will no longer be necessary since free labour will always yield higher levels of effort.

Moreover, in the case of labour-saving forms of agriculture, no coercion would be necessary.

The case of the Cape Colony at the turn of the nineteenth century clearly contradicts this line of argument. Because labour coercion did exist in a pastoral setting, it becomes important to ask why that would have been the case? This chapter addressed three major shortcomings in the contemporary academic debate on the effort of coerced labour. Firstly, through the analysis of data offered by *opgaafrollen* I was able to analyse the impact legislative indenturing had on the effort of the Khoes in a pastoral setting. Secondly, and no doubt owing to a shortage of data, quantitative studies have historically focused mainly on chattel slavery. As this chapter demonstrates, we are now in a position to also answer this question in the context of indentured indigenous labour. Thirdly, this chapter has also proposed a way in which 'effort' – which can often be very difficult to define in stock farming – can be measured.

By way of conclusion, this chapter has demonstrated that, compared to free household and enslaved labour and measured in terms of its *VMP*, Khoes' effort declined after legislative indenturing was reduced. The fact that very few outside options remained open to them, combined with the fact that the threat of punishment had been reduced, and that so little of the proceeds of their labour returned to them, meant that they reduced their effort levels. Ultimately, the loosening of coercive measures had a negative impact on Khoes' effort levels as the colonial frontier closed, land abundance declined, and labour shortages were reduced. What the colonists lost in the process was buy-in from the ruling British authorities for whom the reduction of coercion necessary to quell dissent was more important than improvement in effort levels.

On the misconception of gender roles: Khoe women and home production

3.1 Introduction

The main aim of this chapter is to use data collected from the north-eastern frontier of the nineteenth century Cape Colony to test what has generally become known as the 'animal husbandry hypothesis'. Commenting on the world-historical evolution of gender roles, Alesina, Giuliano, and Nunn (2013) and Boserup (2007) have argued that, owing to the physical exertion and strength needed to operate a plow, men naturally became more heavily involved in cultivating fields and providing for the family while women were 'assigned' household related activities and the producing of offspring. The Boserup (2007) argument seems reasonable given that men are generally physically stronger than women, which means that men are better suited to work that requires hard labour. In a sense, one could argue that both Alesina, Giuliano, and Nunn (2013) and Boserup (2007) ascribe the development of the deeply held cultural belief that 'men are from Mars and women from Venus' to the rise of plough agriculture.

In the kind of hunter-gatherer society that preceded the Neolithic transition to crop-based agriculture, a large portion of a family unit's daily sustenance came from the foraging activities of women. This meant that women had a greater influence over household decisions and, with respect to gender roles, enjoyed a more egalitarian position in society (Hansen, Jensen, and Skovsgaard, 2015). This 'original egalitarianism' was lost in the transition to crop-based agricultural society and has given

credence to the idea that the subsequent understanding of gender roles and the cultural beliefs that underpin them have been the result of specialisation in agricultural activities. It has also been empirically proven that societies with a long history of crop cultivation are more likely to have lower female labour force participation rates in the present (Hansen, Jensen, and Skovsgaard, 2015). This conclusion ultimately 'gave rise to the Victorian conceptualisation of gender roles ... that a women should be passive, obedient, pious and pure.' (Garceau-Hagen, 1997)

A large body of literature supports this Boserup (2007) hypothesis on the origin of gender roles (Alesina, Giuliano, and Nunn, 2013; Hansen, Jensen, and Skovsgaard, 2015; Voigtländer and Voth, 2013). Voigtländer and Voth (2013) however, ascribe the rise of the European Marriage Pattern (EMP) after the Black Death of 1350 to increased female labour participation in animal husbandry – a domain in which they possessed an advantage over men; in other words, that women's liberation from the home came on the back of participation in animal husbandry. Voigtländer and Voth (2013) have explained women's advantage in this domain by arguing that they would naturally do well in activities where (pastoral) care matters, and that they would therefore excel in cattle and sheep farming. The implication seems to be that since women specialised in child care, they would be more likely than men to do well in caring for cattle and sheep, which should ultimately lead to an increase in the numbers of livestock. The implications of this 'animal husbandry hypothesis' are far-reaching. For one, it has major implications for explaining why European women started limiting fertility after the outbreak of the plague in the fourteenth century. It therefore becomes quite a vital exercise to delve deeper into the 'animal husbandry hypothesis'.

This chapter will examine and comment on the general validity of the claim that women may be better suited to animal husbandry than men. The north-eastern frontier of the nineteenth-century British Cape Colony presents an ideal opportunity and context for such a study. In the two border districts of Graaff-Reinet and Tulbagh which constituted the open north-eastern frontier of the Cape Colony, settler farming mainly focused on animal husbandry although in the Tulbagh district, wheat and vine cultivation were also quite widespread. Both districts relied heavily on the Khoe population as a source of labour. In the Tulbagh district, slave labour was better suited for plough-based agriculture, and Khoe labour for animal husbandry

(Malherbe, 1997). Khoe female pastoralists were a critical component of the labour force. If Voigtländer and Voth (2013)'s animal husbandry hypothesis is indeed true, it would follow that, since the settler economy was predominantly pastoral and relied heavily on animal husbandry, the presence of female Khoe pastoralists on the respective settler farms should have had a significant positive effect on sheep and cattle holdings. In this chapter, I analyse the extent to which Khoe women were actually more beneficial to animal husbandry than men with specific reference to cattle and sheep rearing in the respective north-eastern frontier districts.

The availability of transcribed *opgaafrolle* and the MOOC8-series probate inventories enabled me to empirically assess the impact Khoe women had on cattle and sheep wealth stock levels. Since all forms of labour which were employed on farms are included in the *opgaafrollen*, I was able to single out the female Khoe workers on settler farms (Fourie and Green, 2018). I made use of an Ordinary Least Squares (OLS) regression on a 16-year combination of cross-sectional tax data sets (1812-1828) to assess the relationship between cattle and sheep wealth stocks, and the proportion of Khoe women on European settler farms.

In the Graaff-Reinet district I found a positive relationship between a greater proportion of Khoe women on settler farms and animal wealth stocks. These results were confirmed through a number of robustness checks. Wherever a greater proportion of the workforce consisted of Khoe women, there was a positive correlation between the number of Khoe women on the farm and livestock holdings as a whole. However, the coefficient on increasing the proportion of men on settler farms in both districts is larger than that of the proportion of women. This result shows that, even though Khoe women have a long history of animal husbandry, the Voigtländer and Voth (2013) animal husbandry hypothesis does not hold. Unsurprisingly, the OLS estimates show that Khoe labourers were not significantly correlated with wheat farming. In both districts, the presence of men mattered more to both animal husbandry and plough based agriculture. Khoe women do not appear to have had any advantage over men in either of the two districts.

I argue that women's competitive advantage lay not in animal husbandry but in other activities. These activities may include taking care of settler children on farms, or due to the fact that they were easier to coerce than men. The most likely

alternative explanation maybe be their role in the manufacturing of household products such as medicine, soap, textiles and candle-making. In the case of the Cape colony, Khoen women were experts at manufacturing soap, medicine, clothing from animal hides and candles from animal fats and plants from the surrounding areas (Malherbe, 1997). This bears a striking resemblance to the status of women across time and space. For instance, peasant women became the backbone of the British Industrial revolution through the production of textiles by means of the spinning jenny (Humphries and Schneider, 2019). Similarly, they were the foundation of weaving and dye industries in south-eastern Nigeria during the early years of colonialism (Austin, Frankema, and Jerven, 2016). As I argue in this chapter, women did not break free from their role in the home due to an advantage in animal husbandry, but for altogether different reasons.

3.2 Economic theory on gender roles and agriculture

The origins of gender inequality remains an important topic in contemporary academic discourse, especially since gender inequality has such important implications for development outcomes (Antman, 2011; Cavalcanti and Tavares, 2016). Boserup (2007) theorises that cultural beliefs concerning gender roles and gender inequality stem primarily from the shift to plough agriculture (rather than what is referred to as shifting agriculture). In the move towards plough agriculture, men's advantage in terms of strength meant that they took up the dominant role in plough work while women were resigned to the home where they produced children and took care of domestic affairs. These notions of gender roles persisted across time and continue to affect cultural norms in the present (Alesina, Giuliano, and Nunn, 2013). This argument is shared by other authors such as Hansen, Jensen, and Skovsgaard (2015) who view the Neolithic revolution as a defining moment in the development of gender roles. Their study finds that, in the case of Europe and the USA, a large and significant correlation exists between female labour force participation and the length of time a particular society has participated in crop-based agriculture. Ultimately, it is argued, the move away from hunter-gatherer societies towards crop cultivation proved detrimental to women's position in society.

Voigtländer and Voth (2013) have theorised explanations for the emergence of

the European Marriage Pattern (EMP) – a phenomenon which provided a significant boon to Europe’s long-term economic trajectory and which marked the beginning of women’s liberation from the home and a re-invention of gender roles (Moor and Zanden, 2010). Voigtländer and Voth (2013) argue that, due to the drop in the male labour supply following the Black Death in fourteenth-century Europe, women entered the labour market to make up for the loss in income. Voigtländer and Voth (2013) accept that men have a comparative advantage in plough agriculture and that women have a comparative advantage in animal husbandry. By taking up animal husbandry, women could enter the labour market and were able to delay the age of marriage and limit fertility, two changes which contributed significantly to the rise of the EMP. It was perhaps too easy to assume that, because women engaged in activities of care and nurturing in relation to their own offspring and because animal husbandry requires a great deal of care and nurturing, women would automatically excel at animal husbandry. This assumption may be misleading.

Lobao and Meyer (1995) argue that during times of economic hardship, when households become vulnerable, opportunities open up for women which enable them to enter the labour market. Such points of economic distress should be seen as critical liberators from traditional conceptions of gender roles. Authors such as Lobao and Meyer (1995) and Draper (1975) have noted that both stock farming and crop-based agriculture were historically tended to by men while women took responsibility for preparing and storing household wares and food and water supplies. Women therefore held no advantage in animal husbandry and by becoming well versed in the home production of articles such as textiles, soap, and candles (Munro et al., 2011) effectively became the earliest proto-industrial manufacturers. This was also true in Africa and elsewhere. In colonial south-eastern Nigeria, women weaved and dyed the cloth needed for sale and export while in Britain the spinning jenny became a symbol of the industrial revolution (Austin, Frankema, and Jerven, 2016; Humphries and Schneider, 2019), and, from the 1880’s up until 1930, women were the silk reelers, weavers and spinners who powered Japan’s rapid industrialisation prior to World War II (Hunter, 2003). Although often marginalised and misrepresented, women’s role in industrialisation has been undeniable.

Greenwood, Seshadri, and Yorukoglu (2005) note that the industrial revolution liberated women from the home. Since women used to spend much time manufacturing goods at home, the introduction of off-the-shelf grocery stores, and the mechanisation of menial tasks meant that they had more time for professional pursuits which, in turn, impacted positively on female labour force participation. Much of the 'watershed thesis' on the impact of World war II on the female labour force participation rate in USA rests on this 'liberation' of women from the home. Since their husbands were drafted into the war and because household activities, including manufacturing, no longer took up large portions of their time (Goldin, 2013), few impediments remained to prevent women's entry into the labour market.

The Voigtländer and Voth (2013) hypothesis may well have picked up women's advantage or specialisation in home manufacturing via animal husbandry. A large amount of housewares were usually produced from animal or plant fats (Konkol and Rasmussen, 2015). After the Black Death, women may have had more time to commercialise these activities in order to compensate for income lost as a result of men perishing from the plague. Women may also have tended livestock in order to generate the inputs they required for their proto-industrial undertakings. Graaff-Reinet district, with its large indigenous female workforce and pastoral economy, offers an ideal context in which to test whether or not this theory stands up to empirical scrutiny.

3.3 Data

To investigate the Voigtländer and Voth (2013) hypothesis, I used the newly transcribed *opgaafrollen* of 1812-1822 for the Graaff-Reinet and Tulbagh districts. Before the regression results are discussed, it should be noted that the samples for both Tulbagh and Graaff-Reinet districts were restricted from 1812 to 1822. This means that the total number of farms considered for analysis in Graaff-Reinet district is 18,246 and for Tulbagh, 12,578. As I mentioned in the previous two chapters, these *opgaafrollen* provide information on the number of settler men, women and children in the household, the number of slaves owned, the number of Khoer labourers employed, and the agricultural assets and output, including the numbers of various kinds of livestock, the number of wagons, the number of vines, the amount of wine

produced, and the crops sown and reaped. It is the statistical break-down of the number of male and female Khoer labourers on each farm that is particularly important and useful for the analysis of this chapter. Such a break-down is rare for nineteenth century colonial archives, because, while the number of settlers and slaves were meticulously recorded, far less information is available on the economic contribution of the Khoer (Fourie and Green, 2015; La Croix, 2018).

This chapter investigates the role played by Khoer adult females in the stock farming process in order to consider whether or not their presence on settler farms was more beneficial to that process than that of their male counterparts. Our knowledge of the methods used to collect all the data this study relies on is scant. As mentioned in Chapter 1, it would appear that a government official, probably the *veldkornet* (or field-cornet, who was a local leader), travelled through each sub-district in order to collect data from each farm which was then sent on to Cape Town for copying and safekeeping. The obvious weaknesses of such a system of data collection and storage were also mentioned in Chapters 1 and 2. Suffice it to add here that, although the *opgaafrollen* distinguished between the number of male and female Khoer labourers, they do not give a clear indication as to the different duties of Khoer men and women on these settler farms. Apart from being able to observe farm output levels, it is very difficult to ascertain which tasks were assigned to whom, and who were directly responsible for which agricultural undertakings. In the previous two chapters I commented on the extent to which the general weakness of the *opgaafrollen qua* data collection process could negatively affect the results of analyses. Yet, I would argue that none of these problems or weaknesses are systematically related to the central hypothesis under investigation in this chapter, namely that Khoer women had an advantage in animal husbandry. I believe the data limitations are random and that they do not materially affect the testable hypothesis under investigation here.

3.4 Historical background

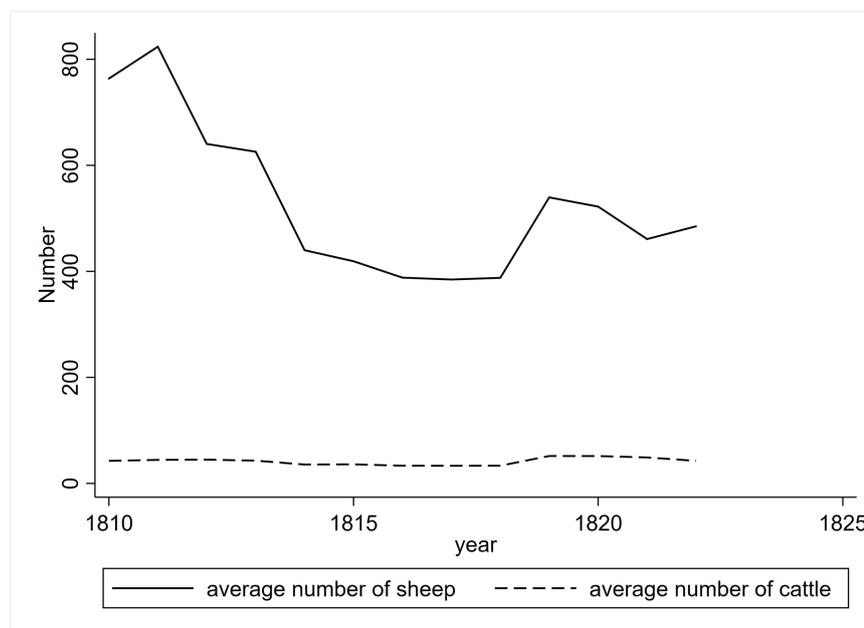
3.4.1 The economy of the north-eastern frontier

As mentioned in Chapter: 1 and 2, the two districts of Graaff-Reinet and Tulbagh varied in climatic conditions and as such specialised, to some extent, in different types of agriculture – Graaff-Reinet predominantly in animal husbandry, and Tulbagh in crop-farming, more specifically wheat and grapes. Despite being frontier districts, neither were completely isolated since new migrants continuously arrived, undeterred by the dangers of conflict and war (Mitchell, 2009; Penn, 2015). In his study, Neumark (1957) notes that farmers initially moved to Graaff-Reinet district because animal husbandry was more lucrative than crop farming. Graaff-Reinet district's natural environment was well-suited for stock farming – which was evident from the fact that the Khoe had for centuries been nomadic pastoralists there (Penn, 1986). This meant that during the period 1812-1822, the district was a major meat producer for the entire Cape Colony (Malherbe, 1997; Penn, 2005; Giliomee, 1963; Arnott, 1937). As such, nineteenth-century Graaff-Reinet district was dominated by the rearing of livestock such as cattle and sheep. The sheer size of livestock kept by eastern frontier farmers significantly outweighed other agricultural endeavours in the region.

In Tulbagh district, on the other hand, and despite a certain degree of animal husbandry being practiced, conditions at the turn of the nineteenth century were ideal for wheat and grape cultivation. Although large swathes of the Tulbagh region, such as the Hantam, Roggeveldt, and Little Namaqualand, were suitable for stock farming, the areas around Piketberg and the town of Tulbagh were particularly well-suited for crop-farming (Penn, 2017). What remains clear is the fact that flock sizes were significantly higher in Graaff-Reinet than in Tulbagh. Graaff-Reinet district was also more densely settled by the colonists and its meat trade was strategically important for the entire colony (Penn, 2017). Flock sizes over the 1812-1822 period were significantly higher in Graaff-Reinet district where they averaged c. 522 sheep per settler household compared to flock sizes for Tulbagh which averaged c. 269 sheep per settler household. Figure: 3.1 and 3.2 also show that sheep holdings for settler farmers in both Graaff-Reinet and Tulbagh districts were much larger than cattle holdings. On average, settler households owned relatively small herds of

cattle – around 47.2 and 29.2 heads of cattle per household in Graaff-Reinet and Tulbagh districts respectively, as is shown in Figure: 3.3 and 3.4. Figure: 3.5,3.6,3.7,3.8 compare the two districts in terms of the most important component of the Tulbagh frontier economy, namely crop farming, more specifically, wheat and vine planting. As is evident from these figures, Tulbagh district far outpaced Graaff-Reinet district when it came to crop farming. On average, farmers in the Tulbagh district sowed around 26.3 *muiden* of wheat compared to farmers in Graaff-Reinet district who only sowed around 0.27 *muiden*. By the same token, farmers in Tulbagh district planted on average 1,334 vines per year over the period of this study compared to an average of only 303 in Graaff-Reinet district.

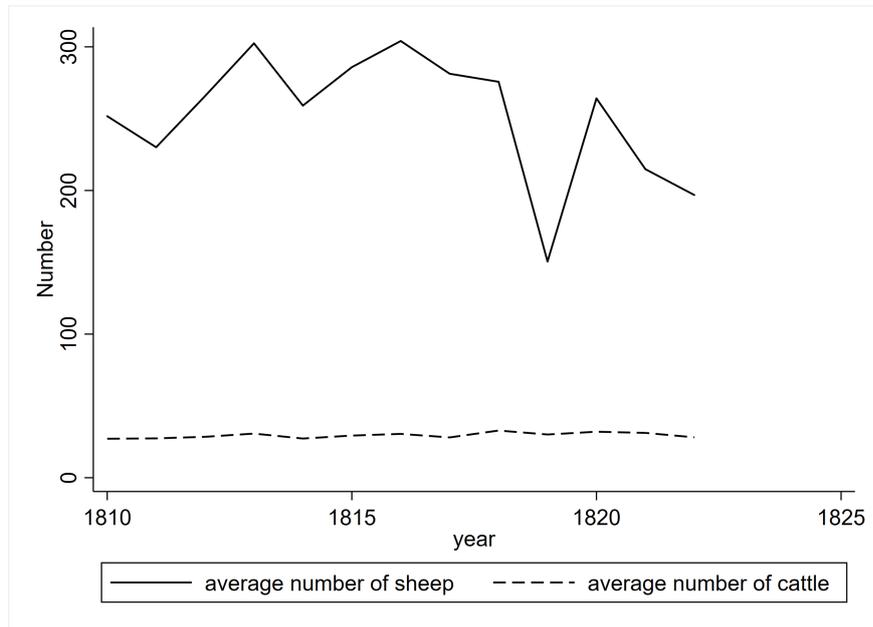
FIGURE 3.1: Graaff-Reinet sheep and cattle stocks



Source: VOC Opgaafrollen

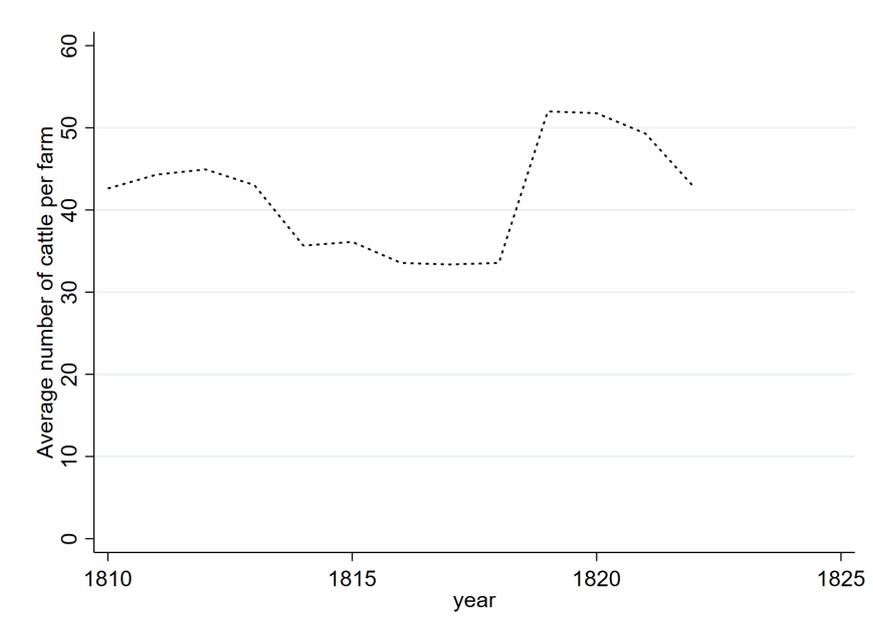
In terms of labour, farmers in both Graaff-Reinet and Tulbagh districts made use of a combination of slave, free European settler, and Khoe labour, although in absolute numbers, the labour force in Tulbagh district was smaller compared to that of Graaff-Reinet district. Figure 3.9 shows that in Graaff-Reinet district the primary source of labour other than the settlers themselves, was Khoe labour. The pastoral nature of the frontier economy would ultimately make stock farming heavily dependent on the Khoe's herding skills. The Khoe were also well suited for animal husbandry since slaves were not allowed to carry any firearms, as per the 1688 VOC decree (reaffirmed in 1794) which was introduced in order to prevent the likelihood

FIGURE 3.2: Tulbagh sheep and cattle stocks



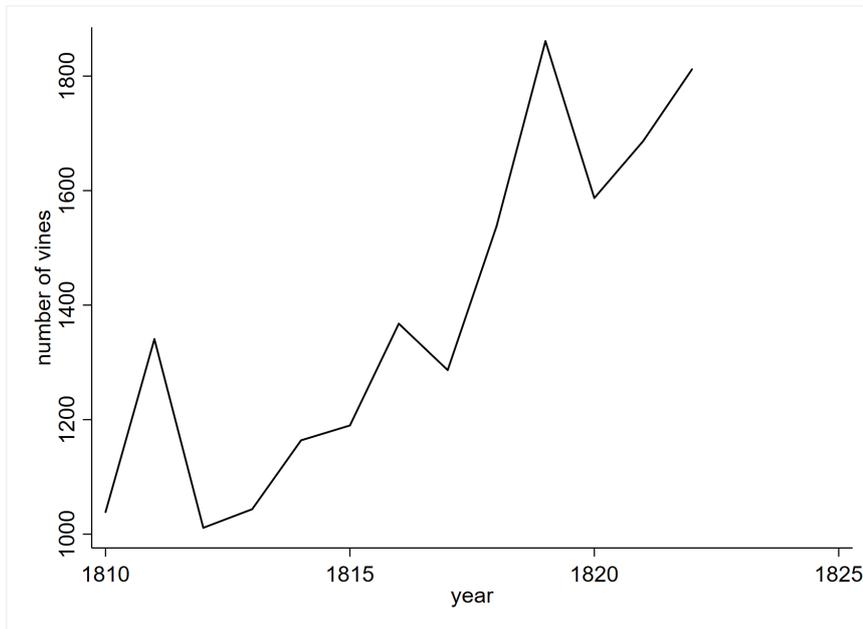
Source: VOC Opgaafrollen

FIGURE 3.3: Graaff-Reinet cattle stocks



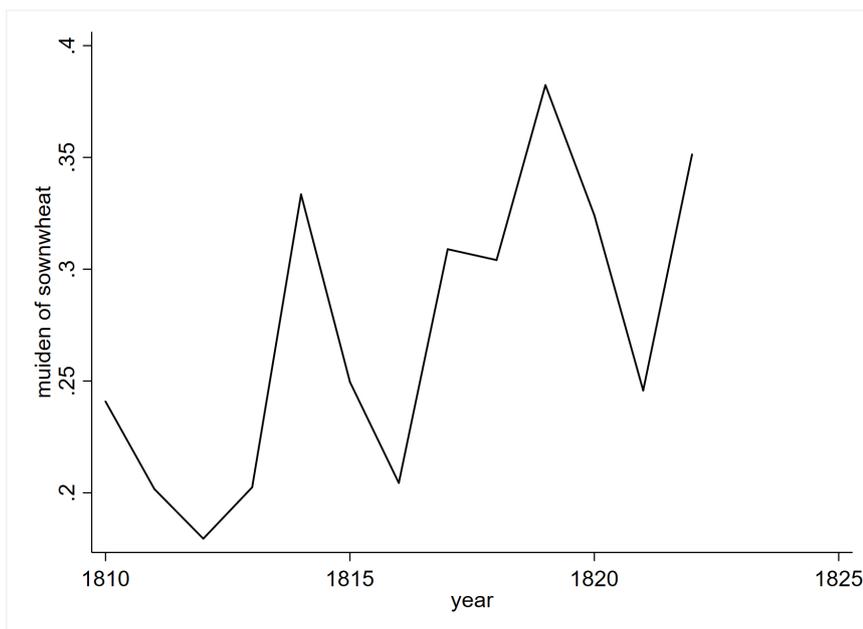
Source: VOC Opgaafrollen

FIGURE 3.4: Tulbagh vines planted



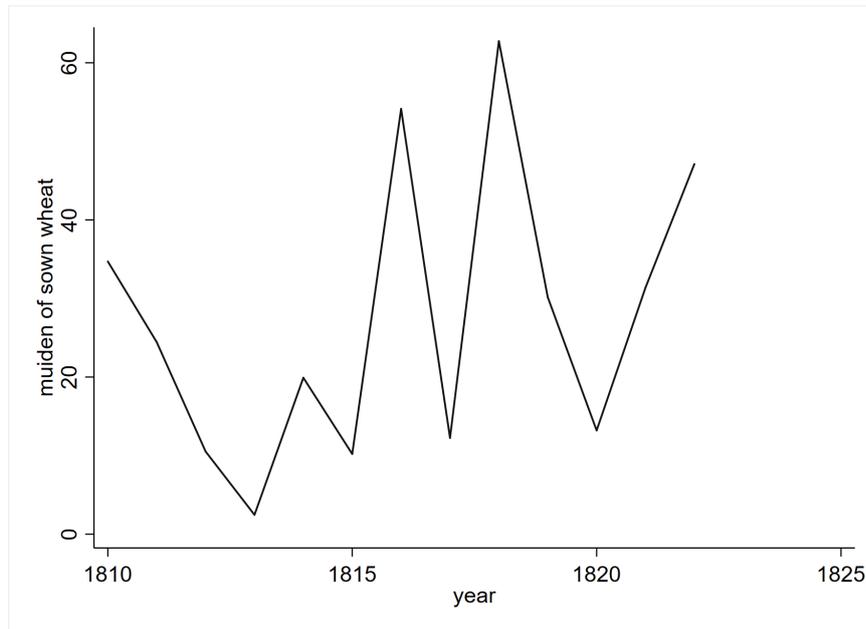
Source: VOC Opgaafrollen

FIGURE 3.5: Graaff-Reinet average wheat sown



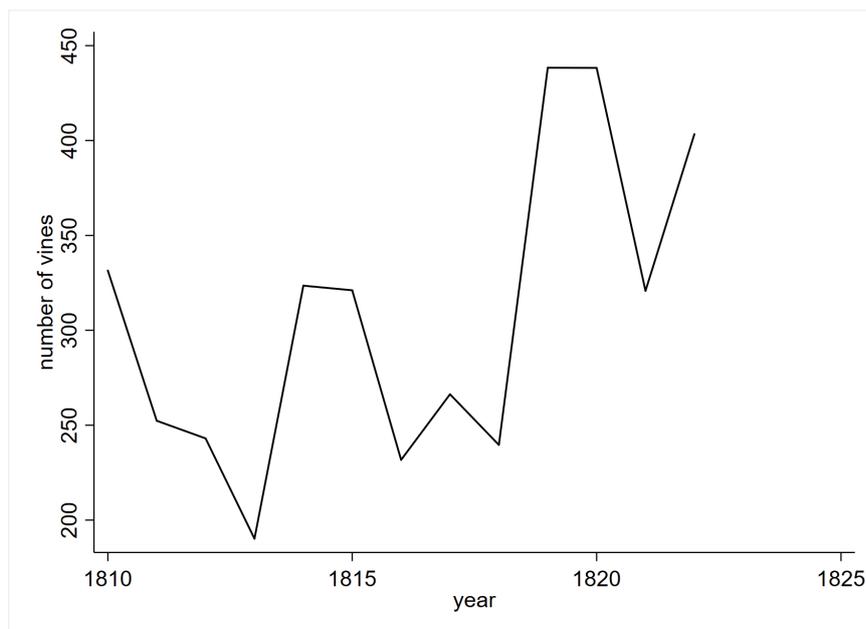
Source: VOC Opgaafrollen

FIGURE 3.6: Tulbagh average wheat sown



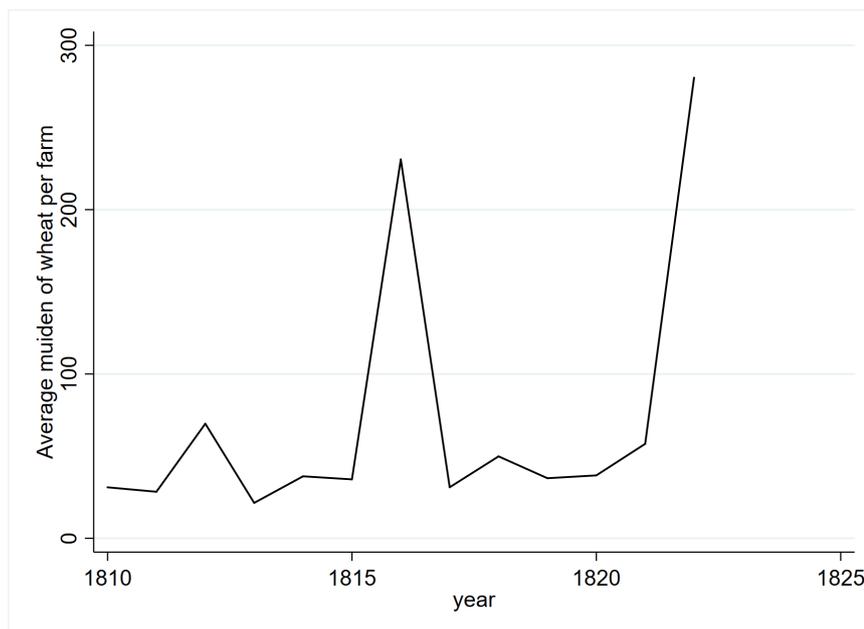
Source: VOC Opgaafrollen

FIGURE 3.7: Graaff-Reinet average vines planted



Source: VOC Opgaafrollen

FIGURE 3.8: Tulbagh average wheat planted



Source: VOC Opgaafrollen

of a slave mutiny (Delius and Trapido, 1982). According to law, the Khoe were indentured but enjoyed greater liberties than slaves, particularly after the Hottentot Proclamation of 1809. Over time, the Khoe were gradually forced into the service of European settlers since their traditional way of life had been decimated by the colonists and they no longer had sufficient grazing for their herds. Animal husbandry at the frontier was particularly strenuous work for which the Khoe were adept as they were particularly skilled at herding and renowned for their resilience in the face of great adversity Malherbe (1997). Additionally, many scholars have noted that the slight built of the Khoe meant that they were poorly suited for wheat cultivation. Nonetheless, data suggest that the Khoe were to some extent also used for vine and wheat cultivation, especially since many frontier settlers could not afford slaves. Khoe labour was easier to acquire than slave labour since Khoe labourers could be captured through raids whenever the need arose Malherbe (1997). In general, though, slave labour was preferred when it came to large scale vine and wheat cultivation.

The Khoe also made up a sizeable portion of the labour force in Tulbagh district where they made a critical contribution to the district's stock farming economy. In the *opgaafrollen* population numbers for this district, the Khoe, European settler,

FIGURE 3.9: Labour force at Graaff-Reinet



Source: VOC Opgaafrollen and MOOC-8 series

and slave numbers stayed roughly similar over the period of this study with one specific source of labour only briefly dominating at any given point in time. Figure 3.10 clearly illustrates this fact in addition to underscoring the importance that slave labour had for this frontier district. Since slave labour was better suited for plough agriculture such as wheat and vine cultivation, settler farmers in Tulbagh district made greater use of slaves than farmers in the Graaff-Reinet district. But the Khoes remained a critical component of the stock farming economy of Tulbagh district, and it remains an indisputable fact that they played a critical role in the promotion of animal husbandry in both districts.

The data also reveal that Khoes outnumbered men on settler farms in the Graaff-Reinet district. Figure: 3.11 shows that, throughout the entire period of concern in this study, settler farms in Graaff-Reinet district had more female than male Khoes labourers. Around 20 percent of farms in the Graaff-Reinet district had a majority female Khoes labourers. Khoes women, therefore, were a critical component of this district's labour force. Figure: 3.12 shows that the opposite was true for Tulbagh district where Khoes men were the dominant source of indigenous labour on settler farms.

This difference in the gender component of Khoes labourers between the two

FIGURE 3.10: Labour force at Tulbagh



Source: VOC Opgaafrollen

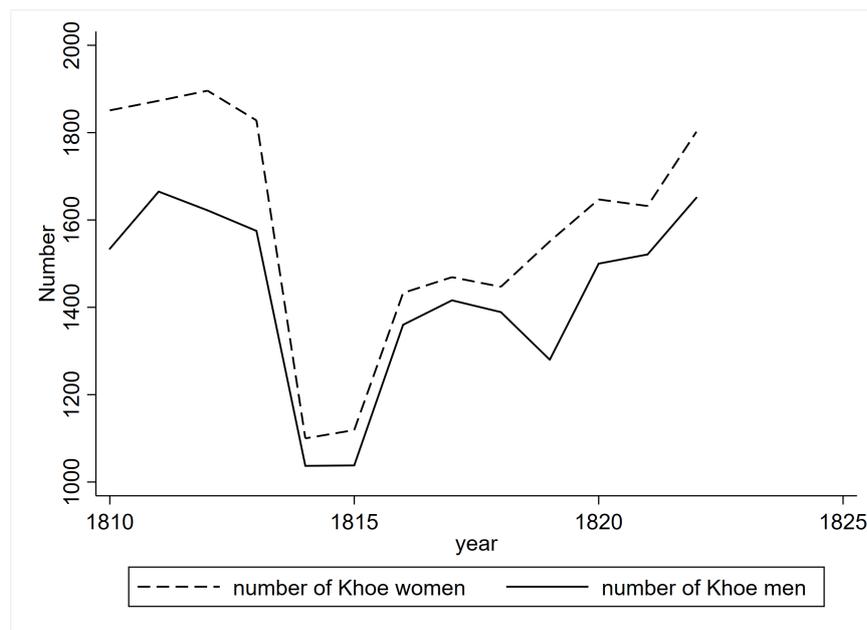
districts was useful for testing whether or not Khoes women were more beneficial to animal husbandry than men. Since Khoes women were also a significant source of labour in Graaff-Reinet district, one would expect them to have had a significant and positive impact on cattle and sheep stocks if the Voigtländer and Voth (2013) hypothesis were to hold.

Why exactly the majority of Khoes labourers in Graaff-Reinet were female, remains a matter of debate. The most plausible explanation is that Khoes women were less likely to rebel since they would not readily have left their children behind in order to escape beyond the border. Since female Khoes performed the same work as men, and seeing that they were easier to subdue and more likely to stay with their children, they would have formed the majority of Khoes labourers on settler farms (Giliomee, 1963). It is also likely that female Khoes may have been preferred because they performed better in animal husbandry. If this were indeed the case, it would support the Voigtländer and Voth (2013) hypothesis.

In Tulbagh district, Khoes women were not in the majority – as is illustrated by Figure 3.12. The explanation for this is twofold. On the one hand, Khoes labour was generally not as important for this region as it was for the Graaff-Reinet district given that the Tulbagh district's primary agricultural outputs were vines and wheat

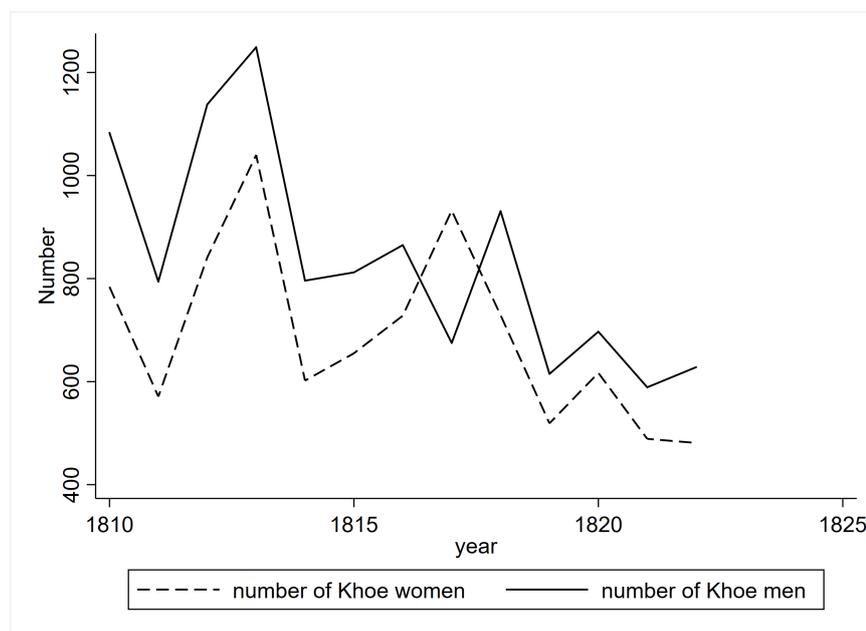
which were better suited to slave labour. On the other hand, for the Khoes who were employed, geography played an important role. Much of the Tulbagh district is bordered by the Cape fold mountains beyond which a barren wasteland existed in which it would have been difficult to survive. Since escape was not really an option for Khoes labourers, stock farms in the Tulbagh district could therefore rely more heavily on male Khoes labour.

FIGURE 3.11: Adult Khoes labour force at Graaff-Reinet



Source: VOC Opgaafrollen

FIGURE 3.12: Proportion of Khoe women on Tulbagh farms



Source: VOC Opgaafrollen

3.5 Khoe women and livestock wealth

3.5.1 Method

In order to empirically test whether or not Khoe women were more beneficial for animal husbandry than Khoe men, this chapter considers the contribution Khoe women made to the generation of cattle and sheep wealth in both Graaff-Reinet and Tulbagh districts. I computed the sheep and cattle wealth variable by taking the sheep and cattle stocks value for each year between 1812 and 1822 and multiplying that value by the average sheep and cattle price. Prices were obtained from the Member of Orphan Chambers Eight (MOOC-8) probate records. These probate records were compiled after the death of an individual when the field-cornet compiled an inventory of the individual's assets at the time of death. Since the methodology used by the field-cornet or their designated agent to compile the probate record is unknown, the data must be treated with a measure of circumspection. For instance, it is clear that valuations were often determined by precedent, that is, by earlier probate asset valuations. This means that prices contained in the records may not be market related prices; they could be carried over from earlier valuations, or reflect some

other bias on the part of the appraiser. That said, where auction rolls are not available, these probate inventories are the most reliable source for livestock pricing in the Cape Colony at the time. It should also be noted that, throughout the period covered by this study, the prices of cattle and sheep remained relatively stable at a median cattle price of seven rixdollars and sheep price of three rixdollars.

After plotting the sheep and cattle wealth variables against the total number of Khoe women on farms in the Graaff-Reinet and Tulbagh districts, it does appear as if there is some positive relationship between sheep and cattle stocks. As expected, this correlation is weaker in Tulbagh district (see Figure 3.13 and 3.14). That said, further investigation is required into the direction of causality of this relationship before any definite conclusions can be arrived at. As a first empirical test of whether or not Khoe women were more beneficial to animal husbandry than their male counterparts, I performed a simple pooled Ordinary Least Squares (OLS) regression with controls for the different types of frontier labour sources: slaves, settlers, Khoe, wagons, Khoe child labour, and horses. The rationale for including wagons derives from the fact that supplies were often stored on wagons while the herds of cattle were shepherded to grazing and watering spots. Horses were also frequently used to drive herds over vast distances. Both wagons and horses, therefore, served as capital inputs. Khoe child labour was also a central part of the economy of the Graaff-Reinet and Tulbagh frontier districts. This is evident from the fact that colonial authorities had formalised Khoe child labour relations through the Cradock laws of 1812 - which is sufficient justification for the inclusion of Khoe children as labourers in the herding economy. Since slave and settler labour also had an impact on sheep and cattle stocks when and where Khoe labour was not available, these controls also had to be included.

The first empirical strategy followed incorporated the number of Khoe women and men as regressors. That Pooled OLS regression is as follows:

$$\text{Log}(Y_i) = \beta_1 \text{khoe} \text{women}_i + \beta_2 \text{khoe} \text{men}_i + \mathbf{X}'_i \gamma + \lambda_i + \epsilon_i \quad (3.1)$$

In equation 3.1, $\text{Log}(Y)$ represents the log of cattle and sheep wealth. The regressors which equation 3.1 focuses on is the number Khoe women and men who were employed on settler farms. \mathbf{X}' represents a vector of control variables such as slave labour, settler labour, and wagons which were included in the final empirical specification for the Pooled OLS regression. In the second empirical strategy, instead of regressing the number of Khoe women and men labourers on farms, I included the proportion of the Khoe adult labour force that were women (*prop kw*) or men (*prop km*) as the main regressor of focus with controls. The second regression specification enabled me to test whether or not increasing the share of women or men on a cattle or sheep farm resulted in higher numbers of cattle or sheep stock. The inclusion of the *prop kw* or *prop km* variable therefore clearly illustrates whether or not including comparatively more Khoe women in the labour force was beneficial to livestock wealth. In order to delve deeper into the livestock rearing process, I ran additional regressions in which cattle and sheep stocks were separated as the output variable, and also included regressions with crop output variables.

The second empirical strategy followed incorporated the proportion of Khoe women and men as regressors. That Pooled OLS regression is as follows:

$$\text{Log}(Y_i) = \beta_1 \text{Prop_kw}_i + \beta_2 \text{Prop_km}_i + \mathbf{X}'_i \gamma + \lambda_i + \epsilon_i \quad (3.2)$$

In the second empirical strategy, instead of regressing the number of Khoe women and men labourers on farms, I included the proportion of the Khoe adult labour force that were women (*prop kw*) or men (*prop km*) as the main regressor of focus with controls. The second regression specification enabled me to test whether or not increasing the share of women or men on a cattle or sheep farm resulted in higher numbers of cattle or sheep stock. The inclusion of the *prop kw* or *prop km* variable therefore clearly illustrates whether or not including comparatively more Khoe women in the labour force was beneficial to livestock wealth. In order to delve deeper into the livestock rearing process, I ran additional regressions in which cattle and sheep stocks were separated as the output variable, and also included regressions with crop output variables.

3.5.2 Threats to the specification

The biggest threat to the above regression specification was the fact that the simple pooled OLS regressions did not control for endogeneity bias. Merely employing this strategy did not allow me to establish causality between cattle and sheep stocks, and Khoe labour. To solve this problem, I had to conceptualise either an instrumental variable analysis, or a regression discontinuity design. This allowed me to establish the direction of causality between Khoe labour, and sheep and cattle stocks.

In terms of the instrumental variable approach, I attempted to use 'distance to the frontier' as an instrument that would correlate with the number of Khoe women on farms but not with sheep and cattle wealth stocks. Ultimately, this strategy was unsuccessful since the instrument had an F-statistic of below 10, and performed extremely poorly in a two-stage least squares analysis. Conceptualising any other credible instrument also proved difficult because of a lack of data. As for the regression discontinuity design, this technique, too, proved difficult to deploy since no credible threshold could be established at which a clear structural break occurred in the data. In the end, I opted to rest my empirical conclusions on correlations, rather than causation. In my opinion, this proved sufficient to test the hypothesis of this chapter, namely that Khoe women had a advantage in animal husbandry above men.

3.5.3 Main results

In Table: 3.1, the number of Khoe women variable is significant and positive in each of the four regressions I ran. The first regression incorporated the combined sheep and cattle indicator as the dependent variable. The second and third regressions split the dependent variable into cattle and sheep. In the last instance, I performed a regression on wheat outputs (reaped). The resulting interpretation here is that in Graaff-Reinet district, having more women on a farm had a positive and significant impact on sheep and cattle wealth (the log of sheep and cattle wealth was the dependent variable). It is interesting to note that the Khoe men variable was also positive and significant. Contrary to the Voigtländer and Voth (2013) hypothesis, the coefficient of the number of Khoe men on farms in the Graaff-Reinet district and its impact on the log of sheep and cattle wealth is much larger in size (the coefficient is bigger

than in the case of women). In terms of animal husbandry, then, Khoe women did not have a perceived advantage over Khoe men.

VARIABLES	(1) sheep and cattle	(2) cattle	(3) sheep	(4) wheat
Khoe women	0.0362** (0.0146)	0.0186*** (0.00652)	0.0454*** (0.00826)	0.0433*** (0.0118)
Khoe men	0.209*** (0.0148)	0.0902*** (0.00675)	0.0789*** (0.00854)	0.0730*** (0.0123)
Khoe children	0.0260*** (0.00664)	0.0187*** (0.00309)	0.00809** (0.00377)	0.0453*** (0.00588)
Slaves	0.0310*** (0.00547)	0.0560*** (0.00256)	0.0228*** (0.00357)	0.0979*** (0.00560)
Settlers	0.362*** (0.00565)	0.0467*** (0.00242)	0.116*** (0.00320)	0.0127*** (0.00320)
horses	0.0852*** (0.00301)	0.0398*** (0.00121)	0.0474*** (0.00164)	0.0352*** (0.00190)
Constant	3.028*** (0.0339)	4.652*** (0.0136)	5.122*** (0.0182)	-0.110*** (0.0101)
Observations	18,246	14,348	13,287	18,246
R-squared	0.388	0.427	0.377	0.381

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

TABLE 3.1: Graaff-Reinet regression

Source: VOC Opgaafrollen and MOOC-8 series

When I performed this analysis solely on the log of sheep as the dependent variable, the advantage that men held in animal husbandry significantly narrowed when viewing the size of the coefficients, which suggests that the male advantage dissipated somewhat for sheep-rearing in the Graaff-Reinet district. This is reported in Table: 3.1 panel 3, and supports the notion that, compared to Khoe men, Khoe women did not hold an advantage in animal husbandry and that men appear to have held a significant advantage in cattle-rearing.

In the case of Graaff-Reinet district, when the size of the coefficients for slave labour and Khoe women labour are compared, slaves appear to have been more important for cattle rearing than Khoe women. The advantage that women may have had over men in terms of animal husbandry – Voigtländer and Voth (2013) – seems not to have been present here. This is also the case for wheat farming, where the coefficient for Khoe men is larger than the coefficient for Khoe women (see

Table 3.1, panel 4). The Khoer labour coefficients for wheat reaping is also significant due to the fact that Khoer labour was much more readily available to the relatively poor frontiersmen. Even though slaves were preferred – as is evident from the slave labour coefficient which is positive and the largest out of all the labour inputs – settler farmers had to make do with labour that was relatively abundant and less costly. A combination of poor environmental conditions and the unsuitability of Khoer labour may have been the reason why large scale wheat cultivation never took off. Ultimately, the regression results support the notion that the physical strength advantage of men over women mattered for all types of agriculture – both crop farming, and animal husbandry.

The OLS results for the Tulbagh district as presented in Table 3.2 are similar to those obtained for the Graaff-Reinet district for the combined cattle and sheep wealth variable. The coefficient for the Khoer men variable is larger than that for Khoer women. Since the coefficient for Khoer men in Tulbagh district remains positive, significant, and larger than that of Khoer women, it is evident that Khoer men there had an advantage over their female counterparts in both sheep and cattle rearing. In Tulbagh district, considered a major wheat and grape producer, the Khoer were insignificant for wheat output, as was expected. Khoer men also seem to have had a negative and significant effect on both wine and brandy production in Tulbagh district. According to the regression results, Khoer women appear to have had no significant impact on wine or brandy making in the Tulbagh district. Here, Khoer women also held no significant advantage over Khoer men in animal husbandry. The Tulbagh district regression results also confirm that slave labour was important for wheat farming, wine making and brandy distilling; more specifically, that slaves appear to have been particularly important for wine making and brandy distilling processes in Tulbagh district.

VARIABLES	(1) sheep and cattle	(2) sheep only	(3) cattle only	(4) wheat	(5) brandy	(6) wine
Khoe men	0.244*** (0.0175)	0.302*** (0.0230)	0.117*** (0.0103)	-0.0225 (0.0162)	-0.0351** (0.0143)	-0.0392*** (0.00978)
Khoe women	0.0681*** (0.0170)	0.102*** (0.0225)	0.0229** (0.00995)	-0.000626 (0.0160)	-0.000802 (0.0136)	0.00225 (0.00952)
Khoe children	0.0259*** (0.00841)	0.0791*** (0.0130)	0.0123** (0.00527)	0.0223*** (0.00829)	0.0175** (0.00870)	0.0142** (0.00643)
Settlers	0.230*** (0.00975)	0.213*** (0.00996)	0.118*** (0.00545)	0.0810*** (0.00655)	0.0104** (0.00530)	0.00509 (0.00371)
Slaves	-0.0361*** (0.00492)	-0.0268*** (0.00575)	0.000552 (0.00286)	0.0700*** (0.00486)	0.0554*** (0.00442)	0.0430*** (0.00305)
wagons	1.065*** (0.0326)	0.612*** (0.0358)	0.716*** (0.0186)	0.764*** (0.0242)	0.288*** (0.0232)	0.207*** (0.0154)
horses	0.0175*** (0.00265)	0.0295*** (0.00293)	0.0132*** (0.00164)	0.0109*** (0.00189)	-0.00870*** (0.00116)	-0.00583*** (0.000794)
Constant	1.802*** (0.0347)	0.639*** (0.0289)	0.859*** (0.0190)	0.0185 (0.0156)	-0.0497*** (0.0125)	-0.0320*** (0.00901)
Observations	12,578	12,578	12,578	12,578	12,578	12,578
R-squared	0.514	0.451	0.594	0.540	0.197	0.205

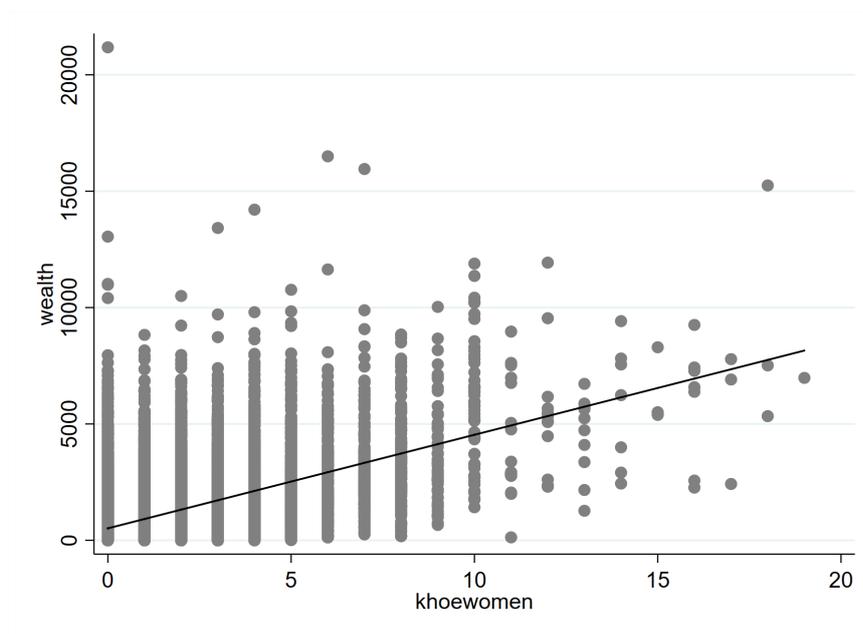
Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE 3.2: Tulbagh regression

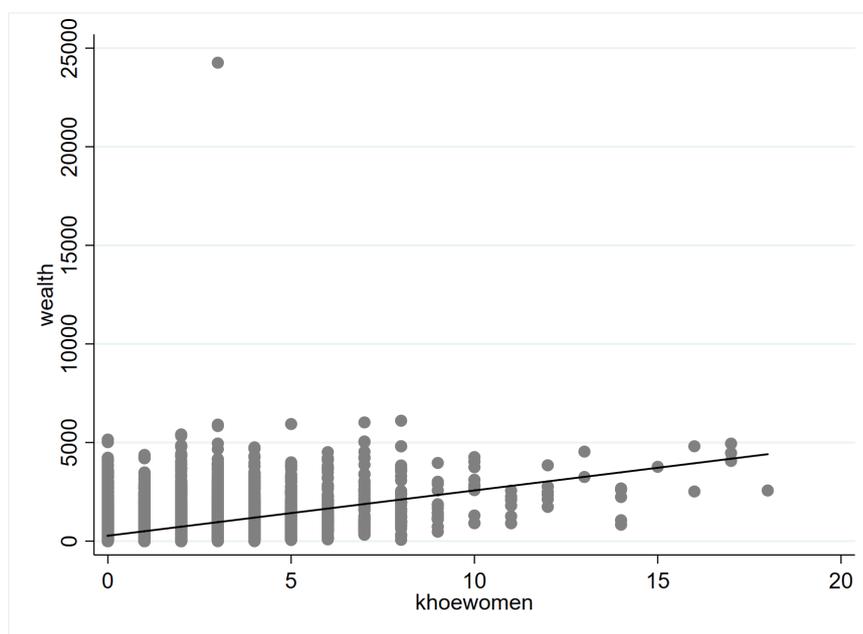
Source: VOC Opgaafrollen and MOOC-8 series

FIGURE 3.13: Wealth vs Khoe women Graaff-Reinet



Source: VOC Opgaafrollen and MOOC-8 series

FIGURE 3.14: Wealth vs Khoe women Tulbagh



Source: VOC Opgaafrollen and MOOC-8 series

If, instead of using the absolute number of Khoe women who were present on farms, the proportion of *working* Khoe women as opposed to working Khoe men is used, the OLS results (with the same controls as before) show that increasing the

proportion of Khoe women significantly and positively correlates with sheep and cattle wealth stocks.

However, in Graaff-Reinet district, the results for the regressions where the proportion of Khoe men variable *prop km* is used, show that the positive and significant correlation with increasing the proportion of Khoe men on settler farms is greater than that of increasing the proportion of women. The results are reported in table 3.3. In the case of Tulbagh district, when the same regression is performed, the results are similar to those that obtain for Graaff-Reinet district (see Table 3.4). The coefficient for the *prop kw* variable for farms in the Tulbagh district, although positive and significant, is also smaller than for the *prop km* variable. Ultimately, in both districts, the results of increasing the number of Khoe men on farms were more favourable than the results obtained by increasing the number of Khoe women. Khoe women did not hold an advantage over their male counterparts with regard to animal husbandry.

VARIABLES	(1) OLS	(2) OLS	(3) Controls	(4) Controls	(5) Cattle	(6) Cattle	(7) Sheep	(8) Sheep
Prop_kw	3.551*** (0.0870)		1.510*** (0.0680)		1.342*** (0.0582)		1.320*** (0.0832)	
Prop_km		3.361*** (0.0579)		1.674*** (0.0477)		1.471*** (0.0425)		1.442*** (0.0617)
Khoe children			0.0994*** (0.00554)	0.0712*** (0.00550)	0.0888*** (0.00475)	0.0641*** (0.00469)	0.118*** (0.00696)	0.0938*** (0.00704)
Slaves			0.0363*** (0.00534)	0.0365*** (0.00518)	0.0759*** (0.00469)	0.0761*** (0.00456)	-0.0401*** (0.00769)	-0.0398*** (0.00756)
Settlers			0.343*** (0.00562)	0.338*** (0.00551)	0.279*** (0.00481)	0.275*** (0.00472)	0.322*** (0.00670)	0.318*** (0.00659)
horses			0.0901*** (0.00302)	0.0882*** (0.00309)	0.0740*** (0.00242)	0.0723*** (0.00248)	0.114*** (0.00387)	0.112*** (0.00393)
Constant	4.641*** (0.0259)	4.435*** (0.0266)	2.958*** (0.0340)	2.881*** (0.0340)	2.283*** (0.0290)	2.217*** (0.0289)	2.276*** (0.0331)	2.211*** (0.0332)
Observations	18,246	18,246	18,246	18,246	18,246	18,246	18,246	18,246
R-squared	0.100	0.150	0.394	0.410	0.395	0.410	0.348	0.357

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE 3.3: Graaff-Reinet proportion one

Source: VOC Opgaafrollen and MOOC-8 series

VARIABLES	(1) OLS	(2) OLS	(3) Controls	(4) Controls	(5) Cattle	(6) Cattle	(7) Sheep	(8) Sheep
Prop_kw	4.131*** (0.0759)		1.540*** (0.0809)		0.841*** (0.0479)		1.283*** (0.109)	
Prop_km		3.883*** (0.0532)		2.008*** (0.0521)		1.091*** (0.0322)		1.619*** (0.0738)
Khoe children			0.123*** (0.0127)	0.125*** (0.0113)	0.0641*** (0.00757)	0.0653*** (0.00680)	0.187*** (0.0177)	0.190*** (0.0162)
Slaves			0.0703*** (0.00436)	0.0626*** (0.00433)	0.0725*** (0.00309)	0.0683*** (0.00310)	0.0340*** (0.00472)	0.0279*** (0.00471)
Settlers			0.318*** (0.0105)	0.289*** (0.0105)	0.178*** (0.00621)	0.162*** (0.00617)	0.264*** (0.0101)	0.242*** (0.0101)
horses			0.0408*** (0.00329)	0.0378*** (0.00305)	0.0279*** (0.00212)	0.0262*** (0.00200)	0.0466*** (0.00342)	0.0441*** (0.00323)
Constant	3.315*** (0.0288)	3.018*** (0.0296)	1.860*** (0.0377)	1.757*** (0.0372)	0.901*** (0.0212)	0.845*** (0.0209)	0.670*** (0.0306)	0.588*** (0.0298)
Observations	12,578	12,578	12,578	12,578	12,578	12,578	12,578	12,578
R-squared	0.168	0.240	0.449	0.483	0.516	0.543	0.421	0.443

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE 3.4: Tulbagh proportion one

Source: VOC Opgaafrollen and MOOC-8 series

3.6 Discussion

3.6.1 Explaining the absence of Khoe women's advantage in animal husbandry

The empirical data obtained and analysed in this study do not support the hypothesis advanced by Voigtländer and Voth (2013) which, in this case, would have implied that Khoe women had an advantage over men in animal husbandry. Despite the fact that the Khoe had been nomadic pastoralists for centuries, women did not seem to have developed an advantage in this domain. It therefore becomes critically important to ascertain what made Khoe women so integral to frontier farming practices.

Firstly, apart from the fact that women from time to time also herded cattle and sheep – they were, after all, still beneficial to this process – and that they attended to household chores such as cooking and cleaning, it is my contention that one of the major activities that would have made them indispensable, was child care. Settler families tended to be large because settler women's fertility levels were much higher than those of Khoe women. It is very likely that Khoe women servants may have worked as caregivers, particularly in the case of large settler families (Cilliers and Green, 2018)

Secondly, another reason why Khoe women did not develop an advantage in animal husbandry over men may be the fact that it was easier to compel women to stay on farms – especially when their children were held captive as well. While farmers would have preferred Khoe labourers because they were more beneficial to livestock holdings, women were easier to coerce into remaining on the farms, less likely to rebel, and still beneficial to livestock production. As a consequence, they would have made up a large portion of the labour force. (Giliomee, 1963; Arnott, 1937).

In the third and last instance, women's particular value on farms may also have derived from their role as proto-industrialists. Lee (1979) notes that during the 1960s, !Kung San women of the Kalahari were involved in manufacturing the eggshell canteens used by the men on the hunt. They also maintained the karosses men used for storage purposes while out on the hunt. Although the subjects of this study were a more contemporary hunter-gatherer group from the twentieth century,

the observations by Lee do offer us a glimpse into the role that Khoe women in general played in the daily functioning of the family or camp unit. In terms of historical support for this proto-industrialist thesis Neumark (1957) notes that the soap and candle trade was relatively large in Graaff-Reinet district, with the British colonial emissary Robert Barrow noting in the early nineteenth century that consignments of candles were transported to Cape Town in 'large green cakes'. Malherbe (1997) also writes that Khoe women were central to the manufacturing of a type of white soap for which they would combine and boil the ash from the salsola or 'Kannabosch' and sheep tail fat. Similar to the !Kung women of the Kalahari, the Khoe women of Graaff-Reinet district were responsible for manufacturing blankets, clothing, rugs, and more from the treated hides of both domesticated and wild animals in addition to which they plucked the feathers of geese for pillow-making at least three times per year. It is evident that Khoe women formed a critical component of the household manufacturing system on the frontier. They seem to have played a less important role on farms in the Tulbagh district where wheat was the major agricultural output and for which Khoe labour was never the preferred labour.

3.7 Conclusion

The emergence of the EMP and the concomitant increase in female labour force participation rely heavily on the assumption that Voigtländer and Voth (2013) make regarding the competitive edge that European women supposedly had in animal husbandry and which allowed them to enter the labour market after the Black Death. This was a defining moment in the evolution of gender roles and would ultimately be one of the factors that paved the way to Europe's long-term economic success. Since the animal husbandry hypothesis is so central to the Voigtländer and Voth argument, testing it is vital.

In this chapter I used the Tulbagh and Graaff-Reinet districts of the Cape Colony to test their hypothesis. Graaff-Reinet district in particular became renowned during the nineteenth century for its lucrative pastoral farming economy, while Tulbagh district became a major wheat, wine, and brandy producer. In light of the fact that the Khoe of this region had been nomadic pastoralists for centuries prior to the arrival of Europeans, the researcher is presented with an almost ideal setting in

which to comment on the validity of the Voigtländer and Voth hypothesis that Khoe women had an animal husbandry advantage over Khoe men.

The availability of transcribed Cape colonial records such as the tax censuses or *opgaafrolle* of the Dutch East India Company, and the MOOC8-series probate inventories enabled me to assess the impact Khoe women had on cattle and sheep wealth stock levels in these two districts. In the district of Graaff-Reinet I found that Khoe women did not exhibit any advantage in cattle and sheep-rearing over their male counterparts. The results are confirmed through a number of robustness checks. This finding is true even for the Tulbagh district where cattle and sheep farming was not practised to the same extent as in Graaff-Reinet district. These results show that the Voigtländer and Voth (2013) advantage hypothesis does not hold.

I also showed that Khoe labourers were inconsequential for wheat farming and wine making – as was expected. Slaves were the most critical labour inputs in these processes. In both districts the presence of men mattered more in both animal husbandry and plough based agriculture and women do not appear to have held any competitive advantage in either of these domains. Ultimately, it is my contention that women's advantage lay not in animal husbandry but in the manufacturing of household products such as candles, soaps, and textiles. Khoe women were well versed in the manufacturing of soap, medicine, clothing from animal hides, and candles from animal fats and plants from the surrounding areas (Malherbe, 1997). This echoes the argument that peasant women were the backbone of the British Industrial revolution because they produced textiles by means of the spinning jenny (Humphries and Schneider, 2019). Formulated more generally, women's status as proto-industrialists ultimately meant the undoing of conventional gender roles.

Does household structure influence inequality estimates? The case of Khoe of Swellendam, 1825

4.1 Introduction

There is a large body of literature which asserts that household structure and the life cycle of a family matter for the measurement of inequality in a given society (Muellbauer, 1974; Lerman, 1996; Headey, Marks, and Wooden, 2005). Kuznets (1976) has noted that in any analysis of inequality, whether based on wealth or income, the household serves as the basic recipient or unit of account. Very often, contemporary individual income or wealth estimates neglect to account for the contribution made by non-income earning household members (for instance, women who undertake home production, and children), and even when estimates do take these into account, non-traditional household structures are seldom considered in economic history. Additionally, measured inequality is also affected by *when* children in a specific household decide to exit, or whether a conjugal unit or household is headed by a female. In other words, for inequality estimates to be meaningful, it is important that they should incorporate the nuances of a variety of different kinds of household structures.

In recent times, investigations into economic inequality in pre-industrial societies have become popular — in part, because new data sources have become available, and in part, due to a greater academic interest in the possibility of identifying the origins of contemporary forms of inequality (Milanovic, 2006; Milanovic, 2011; Milanovic, 2018; Berry, 1990; Booth, 1988). The majority of these studies have

been concerned with examining the relationship between long-run economic development, and inequality – a strand of research initiated by Kuznet's seminal work in 1955 (Milanovic, 2011; Ryckbosch, 2016; Alfani, 2015; Goda and García, 2017; Kuznets, 1955). Yet, very little attention has been given to the impact that different household structures may have on observed inequality estimates. Very often, studies which examine pre-industrial inequality are either simply aggregated or calculated on a per capita basis, making very little or no adjustment for household or family structure (Milanovic, Lindert, and Williamson, 2011; Lindert and Williamson, 1982; Milanovic, 2018; Bolt and Hillbom, 2016).

The fact that economic historians tend to neglect to incorporate household structures into income or wealth inequality studies may well explain the general consensus that overall economic inequality trends have shifted away from being driven by between-country inequality, to within-country inequality (Milanovic, 2011; Milanovic, Lindert, and Williamson, 2011; Van Zanden, 1995; Van Zanden et al., 2014). Studies, such as the one by Alfani (2015), which find that, for example, income inequality in the Piedmont region of Italy grew over the period 1300-1800, and that this bears a striking similarity to contemporary trends, neglect to account for the size and structure of the households in their study. At the other end of the spectrum, there is Saito (2015) according to whom income inequality in Japan remained largely unchanged after industrialisation – a study which falls prey to the same omission(s). It is clear that studies of pre-industrial inequality fail to take a critical component into account, namely household structure.

This omission is understandable, since historical income or wealth data are not only scarce, but may contain very little information on household structure(s). Much of the information regarding historical household structure is either anecdotal, or classified, interpreted, and encoded in terms of the requirements of cognate disciplines such as Anthropology or Archaeology. As a result, the original income or wealth data required by studies in Economics, specifically Economic History, are already aggregated, and very little can be done to relate the data obtained to the micro-level household structures of which the data are a function. One of the implications of this lack of micro-level data is that most pre-industrial inequality studies focus on inequality between groups, rather than inequality *within* groups. This is particularly worrying in the case of pre-industrial societies (Kuznets, 1976).

Family structures across time and space have evolved substantially, with the result that pre-industrial societal structures may differ materially from their contemporary counterparts. The concept of household is, at its core, a dynamic one. Co-habitation patterns, fertility trends, and marriage conventions have not remained static throughout the ages (Burch and Matthews, 1987; Alderson and Sanderson, 1991). In fact, Skinner (1997) notes that family systems are constantly in flux, and that they may vary over time according to class, ethnicity, and region of the world – incorporating, in the process, the household structure that is appropriate to its time and context. Taking cognisance of all these varied nuances is vital for any study concerned with the calculation of inequality.

The availability of micro-level household data in the form of British tax records for the Khoe of Swellendam in 1825 makes it possible to investigate the impact that varying household structures may have had on inequality estimates. That said, and despite the fact that individual level data for the Khoe are available, we do not have much definitive information on the structure of Khoe households during the early nineteenth century. This chapter demonstrates that the Khoe became an impoverished people who were forced into servitude by the European colonists. It also demonstrates that the Khoe society of the Swellendam region in 1825 was highly unequal. Because of the lack of information on Khoe households for the period under study, I theorise this inequality comparatively in terms of three different household structures: the typical nuclear household, and two variations of the extended household. An important result produced by this comparative exercise is that the level of inequality declines as the household structure is extended.

It is my contention that the Khoe's diminished economic status compelled them to devise coping strategies that would enable them to compensate for increased levels of poverty. Because, prior to contact with Europeans, the Khoe had moved around as small groups of nomadic pastoralists and in order to spread resources across a now extended group of individuals, the Khoe resorted to the use of extended household structures. Such a strategy for responding to adverse economic shocks is not unique to the Khoe of Swellendam but is, in fact, quite a common strategy which has been employed by households in different societies throughout human history.

4.2 Household structure and inequality

The structure of the family unit or household matters for inequality measurement. The failure to account for household structure in inequality calculations distorts both the within-group as well as the between-group economic differentials observed (Angel and Tienda, 1982). One serious omission in particular is the phenomenon of multiple-earner households. As more members of the household enter employment, so downward pressure is placed on both within-household inequality as well as overall inequality. This is especially true for households where wives/spouses or non-nuclear members of the household enter the labour market (Mincer, 1962; Hryshko, Juhn, and McCue, 2017).

An additional factor which may influence the structure of the household and the measured inequality, is a specific society's propensity to include non-nuclear family members in the household. Non-nuclear members include any individual(s) other than the husband/s, wives or children which form part of the household. Historically, the incorporation into the household structure of non-nuclear family members seems to have been more characteristic of marginalised or relatively impoverished communities, that is, societies which extended the household as a coping measure against negative economic shocks. Farley (1977) shows how African-Americans hedged against the negative impact of the economic downturn of the 1970s in the USA by making use of extended family networks of non-nuclear households. This allowed a greater number of extended family members to achieve a certain standard of living. Extended family systems are therefore important mechanisms for the reduction of both poverty, and within-household inequality (Abanokova and Lokshin, 2015; Akresh, 2009; Angel and Tienda, 1982). What further complicates matters is that even such changes are not permanent, and the household structure devised in response to prevailing economic conditions are not static.

At a very general level, family structures have always been prone to changes over time. The pre-industrial Basque family system was very different when compared to contemporary French and Spanish household structures. Similarly, Chinese family systems have changed over time as more than 50% of families had a grand or *frereches* ('sibling co-resident) family structure until as recently as 1946 (Zhao, 2000).

Ultimately, no region of the world has ever displayed a completely static family system. Family structures have been fluid in Africa, Asia, the America's, and Europe for millennia precisely in order to respond to economic challenges.

At a more specific level, households often combine temporarily in order to mitigate the effect of economic crises – such as the manner in which Indonesian households responded to the economic crisis in Asia at the end of the 1990s (Frankenberg, Sikoki, and Suriastini, 2003), while wealthier societies tend to have smaller family units or households since the trade-off between privacy and economic survival becomes less costly the richer a society becomes (Abanokova and Lokshin, 2015). Adding to this flexibility is the decision that comes with deciding when to exit the household as an adult, or whether or not to release children into the care of more resourced guardians – both of which play a significant role in determining the structure of the household unit being observed (Akresh, 2009).

In short, inequality studies in economic history generally do not take into account these changing family structures and the complexities they bring to calculations of inequality. Omitting such complexities from inequality analysis places an upward bias on the inequality trends observed.

A further complexity which studies on pre-industrial inequality pay very little attention to, is the impact that intra-household resource distribution have on observed inequality levels in a society (Hammel and Laslett, 1974). Here, considerations on the stage of the household life cycle is extremely important since it ultimately determines how much of the resources available to the household is apportioned to each co-resident individual (Kuznets, 1976). How domestic household units function matters for the ultimate inequality observed. Debates on within-household resource allocation have largely been conducted in the domains of Anthropology, Sociology, and History. Extending this debate into Economic History faces a significant limitation, namely that the lack of historical data linked specifically to within-household resource distribution, poses an almost insurmountable hurdle to approximating true inequality.

Given that income and wealth data for pre-industrial Western societies are already scarce, the task is infinitely more difficult when considering pre-industrial

Africa. Of course, there are exceptions, such as the inequality study of the eighteenth-century Cape Colony (Fourie and Von Fintel, 2010). Yet, even this ground-breaking study fails to incorporate both a general consideration of household structures as well as the non-European people who were very much part of Cape Dutch society at the time. Other studies which have included non-European African groups have been limited to studying aggregate income levels (and therefore inequality) without incorporating household structures of the time. This is true for both Bolt and Hillbom (2016) and Bigsten (1986) who studied inequality in twentieth-century Botswana and Kenya, respectively. The point of departure of this chapter, then, is that it is no longer acceptable to conceptualise inequality in Africa without paying due attention to the particular nature of (changing) household structures.

4.3 Swellendam in the nineteenth century

The Swellendam district of the Cape Colony lies approximately 218 km to the north-east of Cape Town, beyond the Hottentots-Holland mountain range. Before Europeans settled in this area it was already inhabited by Khoe tribes such as the Hesequa, Chainouqua, and Gorouqua. Prior to the seventeenth century, these Khoe tribes were relatively prosperous, livestock (pastoral) owning people. But trade and barter with Europeans throughout the eighteenth century brought about a decline in their economic, political, and social status. The main factors that ultimately led to their impoverishment were beyond their control, as the decline of widespread crop farming opportunities in the Cape and immediate surroundings made life very challenging for the recently arrived European settlers, forcing them to move inland where they came into contact with the Khoe (Viljoen, 2001).

The disenchanting Europeans – or *trekboere*, as they would later become known – were forced further inland by the allure of stock-farming opportunities. As Penn (2005) notes, cattle and sheep farming became the cornerstone of the Cape frontier economy. Many of these settler free burghers had failed as commercial crop farmers in and around Cape Town and a combination of poor weather conditions, lack of capital, and persistent levels of indebtedness played a critical role in their exodus (Viljoen, 2001) to the Swellendam district which had relatively abundant sources of

water and grazing. From almost none earlier in the century, the number of independent livestock farmers in the Swellendam district grew to about 600 by the 1770s, and brought these new arrivals in contact with the Khoe (Viljoen, 2001).

As pointed out in the previous chapter, the Khoe of the region had a vast knowledge of livestock farming which made their services invaluable to the European stock farmers as they tried to establish themselves in the region. This exploitative relationship would become one of the major causes of the Khoe's economic and social demise, in part, because the system of clientelism which had existed prior to contact with Europeans could be, and was, easily exploited in order to denigrate the Khoe into a position of servitude. The practice of clientelism – according to which poorer members of society entered the service of wealthier members, thereby receiving some payment in-kind, or in order to repay a prior debt – was well established in Khoe society prior to the arrival of Europeans (Viljoen, 2001; Viljoen, 2007). It was easy for European settler livestock farmers to enter into informal labour agreements with the Khoe in order to leverage their pastoral knowledge so as to grow their flocks of sheep and herds of cattle, and, since the Khoe did not have the means to enforce these informal contractual relationships, instances of settler farmers not honouring these agreements became frequent throughout the late eighteenth century. These 'failed contractual relationships' created opportunities for settlers to claim repayments for debts that did not exist, or to force the Khoe into service for periods that suited the Europeans. This exploitative relationship played a significant role in the systematic impoverishment of the Khoe in general and those of the Swellendam district in particular (Viljoen, 2007).

Throughout the eighteenth and early nineteenth century, the Khoe's nomadic pastoral existence gradually disintegrated as the competition for grazing and water resources in Swellendam district increased. Since settlers were in need of a cheap and efficient labour force for their various agricultural endeavours, the dispossession of Khoe was an obvious solution (Viljoen, 2001; Newton-King, 1999). As a result, throughout the eighteenth century the Swellendam Khoe were systematically impoverished and politically disenfranchised so that by the start of the nineteenth century, many of the Khoe had been reduced to a class of impoverished, indentured labourers. Free Khoe of the Swellendam district were also compelled by poor circumstances to work as seasonal or wandering labourers on settler farms. The result

of this reduced social and economic position of the Khoe meant that they were soon significantly poorer than their settler counterparts (Newton-King, 1999).

Within the Khoe community there was also a significant level of inequality, which necessitated survival strategies for those who had been left completely destitute. Since, prior to the arrival of Europeans, the Khoe had been nomadic pastoralists who moved around in small tribes of kin, it would not be unrealistic to expect that the Khoe would have avoided smaller family formations, and that, in order to survive, they would instead have become more reliant on extended family networks. Larger households or kinship units which extended beyond the conjugal pair and their offspring would have been an effective strategy to reduce inequality and hedge against the risk of starvation.

By 1825, Swellendam district was no longer a frontier district such as Graaff-Reinet or Tulbagh districts. On the contrary, the district borders had been well established by the time Cape authorities conducted its 1825 tax census of the Khoe. Despite the closing of the frontier, however, independent Khoe communities continued to co-exist alongside the newly established settler farmers and cultivated both barley and wheat since the climate and relatively abundant fertile soil of the district made that possible (Theal, 1891).

4.4 The data

For the analysis in this chapter, a unique data set for the indigenous population of the sub-district of Swellendam in the Cape Colony of 1825 was used. The data was transcribed from tax census data which had been compiled by the British colonial authorities, and the tax administration system itself was quite similar to the system employed by the Dutch in the eighteenth century (Theal, 1891). What makes the tax census data extremely unique is the fact that it recorded the micro-level information for each indigenous Khoe individual for any given year – in this instance, 1825. The asset holdings, more specifically the livestock holdings (number of cattle, sheep, goats, horses, pigs, and mules), would then be used to calculate the ultimate tax burden of the household/individual in question. That said, the critical detail *not* recorded in the data set, is the household structure of the observed Khoe. The large

number of apparently single women and men recorded in the data, none of whom seem to have possessed any assets at all, is a particularly peculiar, even perplexing, feature of the data. This lack of information on household structure may have been a result of bias on the part of the person who recorded the information – in this instance, a European *feldcornet* – who could have encoded his own notions of what constitutes a household into the way in which the information was gathered. For 1825, the data set contains 1,266 Khoe households (a total of 3,341 individuals) across 26 sub-districts, with the sub-district of Swartrivier having the largest number of Khoe inhabitants (2,210).

In order to understand how household formation in general influences pre-industrial inequality estimates, I was uniquely positioned to test the impact of changing household structures on inequality on the basis of data provided about the Khoe in the Opgaafrollen for the Swellendam district for 1825. The ultimate strength of this study lies in the fact that I attempted to apply a flexible concept of household structure to inequality estimates. I assumed that familial structure was, to a large extent, dependent on exogenous shocks, such as impoverishment or indenturing and I made informed guesses about the hypothetical structure of households at the time on the basis of historical and anthropological literature. This simplifying assumption allowed for flexibility in selecting household structure.

Even if the family structure is assumed to have been determined by exogenous influences, the *size* of the theoretical household still matters as far as income and health distribution within that specific household is concerned. At the most basic level, it is logical to assume that the larger the household (especially households which consisted of more than just the conjugal pair and their offspring), the more resources would have had to have been stretched in order to meet the needs of all co-residents. Aside from the size of the specified household, it would also have been unrealistic to assume that household resources were shared equally (Thomas, 1993). Studies have shown that, in patriarchal societies, *within-household distribution* of resources generally favours children and men at the expense of women (Findlay and Wright, 1996). Findlay and Wright (1996) as well as Becker and Becker (2009) have also demonstrated that, to assume that within-household sharing was equal amongst all household members, can produce a distorted picture of true poverty. In other words, both the *size* and *within-household distribution* of resources matter for

determining the ultimate inequality observed. For the purposes of the analysis in this chapter, I did not make assumptions regarding within-household distributions of resources, in part, because of a lack of information about the degree of access each Khoe household member had to the assets reported in the tax data. The analysis offered here would not have stayed true to the imperative to move away from imposing contemporary biases on a past phenomenon such as household dynamics, if some twentieth-century notion of resource distribution within households were allowed to influence the analysis.

4.5 The demographics of the Khoe in Swellendam, 1825

The Khoe people of the Cape Colony typically organised their lives in large kinship networks. Much of the information with respect to Khoe inheritance and family sharing practises in these networks stem from archaeological or anthropological studies about the way these networks existed and functioned prior to the arrival of the settlers (Carstens, 1983; Kent, 1993; Barnard, 1992). In addition, there is the study by Carstens (1983) which offers a more contemporary account of inheritance traditions practiced by the Nama people during the early twentieth century, based mainly on information gleaned from the diary of a certain Mrs A. W. Hoernle.¹ The following basic set of facts can be concluded from these journal entries: (i) the woman who may also be described as the 'chief wife' typically inherited the homestead and was free to move it wherever she chose to; (ii) the youngest child usually inherited from the mother, and (iii) the eldest from the father, irrespective of their sex, should both parents die; lastly, (iv) resource sharing also appears to have been very egalitarian irrespective of the sex of those that stood to inherit. These facts alone serve as justification for *not* making any assumptions regarding the within-household distribution of Khoe assets.

The scant concrete evidence on household structures for the Khoe leaves much room to theorise what type of family structure was dominant in 1825. What the British tax records do show, are roughly how many Khoe were present in Swellendam district at the time. As a cautionary note, the following. I am aware that tax

¹Mrs A.W. Hoernle was an Anthropologist based at Witwatersrand University during the first half of the twentieth century

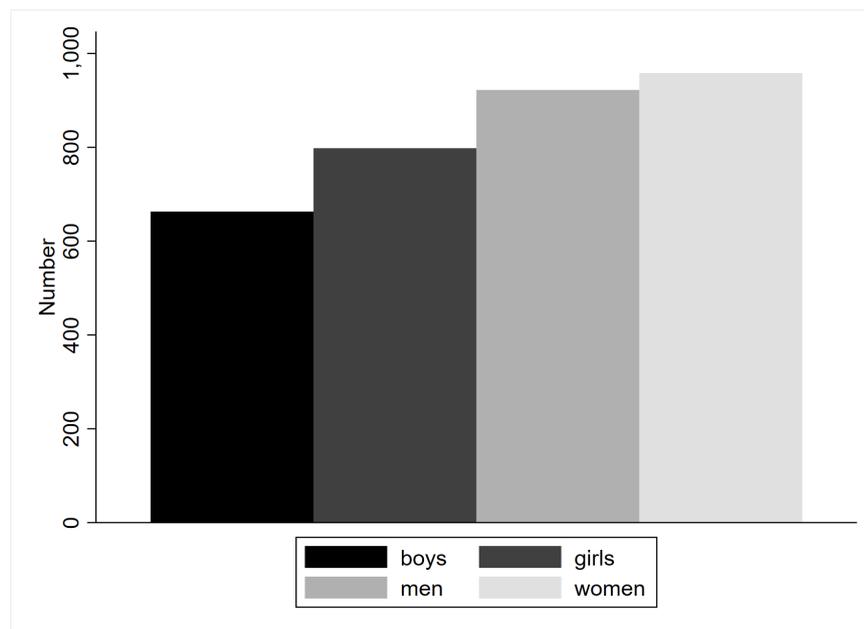
records, by their very nature, may not offer a true or accurate reflection of the size of the Khoe population since many Khoe were still nomadic and many would have tended to evade taxation when and where possible. Theal (1891) has argued that as much as two-thirds of assets were omitted from the tax data as a result of the combined facts that the records were dependent largely on self-reporting and whether or not individuals could be located.

Figure: 4.1 shows the population numbers of Swellendam district for 1825. What immediately stands out, is that women slightly outnumbered men. This is evident, for example, in the large number of single women who were linked to what was traditionally seen as the conjugal pair and their offspring. Khoe women also outnumbered men in the Graaff-Reinet district, albeit for different reasons. What is unclear from the data is whether these women should be considered part of the household, or the houseful². Another interesting demographic phenomenon highlighted by figure: 4.1 is the fact that Khoe children outnumbered Khoe adults in Swellendam district – something which starkly contrast with the same demographic in Graaff-Reinet and Tulbagh districts. This is particularly interesting since high fertility (and mortality) rates were also prevalent during the nineteenth century for the settler population (Cilliers and Green, 2018).

The Khoe of Swellendam district also owned a number of livestock which they primarily used in their agricultural production processes. Figure: 4.2 shows that the largest groups of livestock owned were saddle and breeding horses, oxen, breeding sheep, and breeding cattle. Since the Khoe of this district also practised crop based agriculture (wheat and barley) it is likely that the oxen were used for ploughing. The fact that breeding horses seem to have been the most prevalent livestock owned by Khoe in Swellendam district reveals something important about their adapted livelihoods. Horses were not native to southern African and only arrived in the Cape Colony with European settlers in 1652. Horse breeding was therefore not part of Khoe livelihood prior to their contact with European settlers (Swart, 2003). The fact that horses are listed in the Khoe tax census may indicate that they bred horses for transport purposes and/or that they sold these horses to individuals who needed them for that purpose. As noted earlier, the town of Swellendam lies 219 km south-east of Cape Town and the journey was quite arduous, both on

²The houseful will refer to families living together outside of a conjugal pair and their offspring

FIGURE 4.1: Swellendam Khoe population

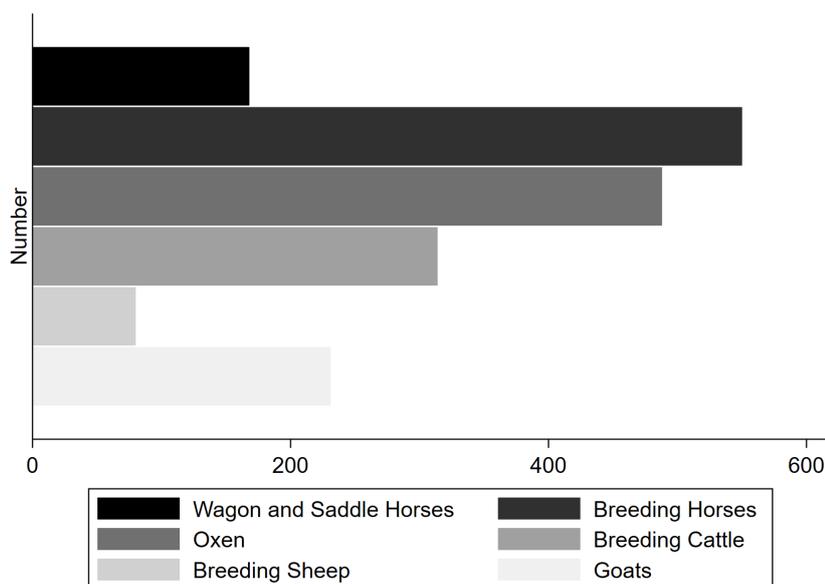


Source: British tax census

foot and on horseback. Travellers coming from Graaff-Reinet district would often have passed through the Swellendam district on their way to Cape Town. Since the Hottentots-Holland mountains presented a considerable barrier between the colonial interior and Cape Town, horses would have been of the utmost importance for driving livestock and travelling to the colonial capital (Guelke, 1976). The probability that the Khoe adopted horse breeding after coming into contact with European settlers should be seen as part of a larger phenomenon of adaptive change since crop farming was also not part of the Khoesan life-style prior to their contact with European settlers (Carstens, 1983; Penn, 2005).

The fact that the free Khoe were also planting wheat and barley shows that their lifestyle had changed in a fundamental way since the arrival of Europeans. This way of adapting in order to survive bears a striking resemblance to the adaptation of the Choctaw tribe of the Ohio basin in North America who adapted to, and were eventually fully integrated into, the cattle economy introduced by European settlers in the seventeenth century (Carson, 1997). As I have mentioned, the Swellendam Khoe crop cultivation focused mainly on wheat and barley. Figure: 4.3 shows that, in 1825, the average crop yields for 1 muid of barley sown was significantly higher than that of wheat. In fact, the mean yield for barley was around 20 muids while the

FIGURE 4.2: Swellendam Khoer livestock numbers



Source: British tax census

mean yield for wheat was only an approximate 8 muids.

Tax data is primarily a wealth indicator and as such gives little to no indication of household income or within-household distribution of resources. That said, the data does present significant scope to theorise household structure in particular. In order to put the relative poverty of the Khoer of Swellendam district into perspective, I took the sheep and cattle stocks for Khoer and settlers in Swellendam, Graaff-Reinet and Tulbagh districts respectively and multiplied the number of livestock assets by average prices obtained from the MOOC-8 probate inventories in the Cape Town archives. The average price of sheep and cattle from each district was obtained and multiplied by the number of animals. These figures were then added together and divided by the number of farms or households per district.

Overall, table: 4.1 shows that the Khoer population of Swellendam district were significantly poorer than their settler counterparts in all districts. The average sheep and cattle wealth of the Khoer in Swellendam district was around 22.86 rixdollars (Rd), which was four times lower than that of the poorest settler district, namely Tulbagh. In 1825, the average settler in Swellendam district was 38 times richer than the average Khoer. While the figure substantially underestimates wealth given that other assets were also excluded, it does illustrate the vast disparity in wealth

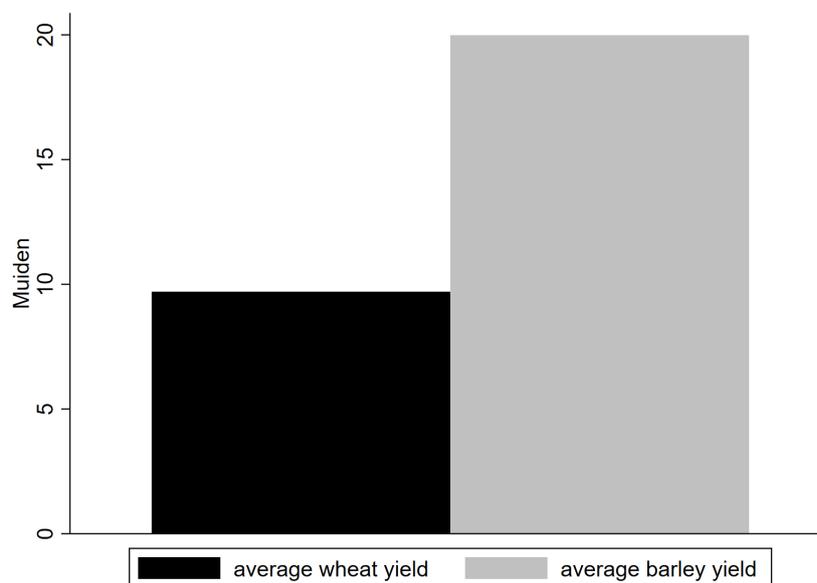
between the groups. Additionally, these figures support the historical accounts of severe poverty among the Khoe community at the time (Penn, 2005). It is therefore theoretically sound to presume that the Khoe would have resorted to extended family households in order to mitigate the effects of abject poverty.

	(Khoe) Swellendam	(Settlers) Swellendam	(Settlers) Graaff-Reinet	(Settlers) Tulbagh
Wealth (Rd)	22.86	875.23	294.10	96.16

TABLE 4.1: Wealth levels for Swellendam vs Frontier

Source: British tax census and MOOC-8 series

FIGURE 4.3: Khoe crop yields



Source: British tax census

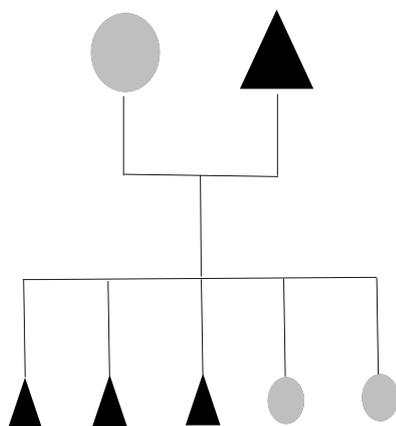
4.5.1 Household structure and the eighteenth-century Khoe of the Cape

Since it is not entirely clear what the household structure of the Khoe of Swellendam district was in 1825, I made some theoretical assumptions regarding household structure for the purpose of this chapter. In order to illustrate the theoretical representations of the household and houseful structure, this chapter uses the anthropological schematic conventions designed by Hammel and Laslett (1974) as refined by Yanagisako (1979) and Brettell (2018). In the diagrammatic representations of the

various theoretical households, a circle represents males, and a triangle, females. A solid line connecting males to females represents a married or other clearly defined conjugal unit. Their offspring are illustrated as originating from the original conjugal pair. Where the relationship between a pair is not clearly defined, the solid line is interrupted.

The first theoretical household structure that will be utilised is the typical nuclear household. Figure: 4.4 household structure one (1) consists of the typical conjugal pair and their offspring. In this theoretical household it is also assumed that each member of the household received an equal share of household resources (Becker and Becker, 2009).

FIGURE 4.4: Household structure 1

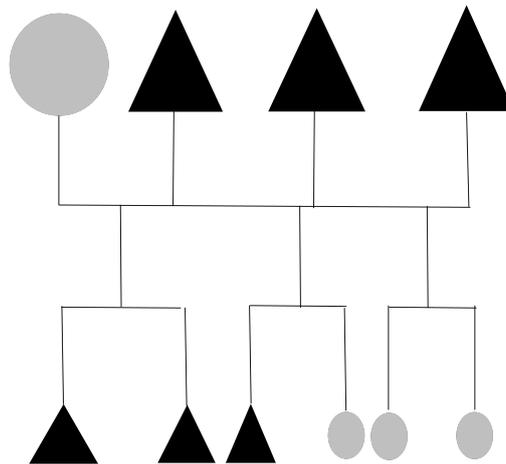


Source: Hammel and Laslett (1974)

The second (2) theoretical household structure (represented in Figure 4.5) assumes an extended family structure and refers to a polygamous household unit. This theoretical household consists of a male head, his wives, and the offspring assigned to each of specific male-female pair. For the purpose of analysis, in this household structure I continued to assume that each member received an equal share of the household resources. I acknowledge that the assumption of a 'polygamous household structure' is quite contentious since many scholars would consider the household associated with each wife a separate household unit altogether (Morton, 1997). However, I opted to consider the husband and all associated wives and children as one household for two reasons: firstly, the data for family units may have been recorded in specific groups that shared resources, which would imply that splitting these seemingly polygamous units up into smaller sub-households would have

been incorrect; secondly, since in this configuration the male head of the household is common to all women, it is reasonable and justifiable to assume that some level of resource sharing would have occurred between all individuals in this theoretical polygamous household.

FIGURE 4.5: Household structure 2



Source: Hammel and Laslett (1974)

The literature further suggests that a broad application of the polygamous household assumption may be incorrect since polygamy was often practised only by the elites or wealthy members of a society (Morton, 1997). Contrary to this, more recent studies of African societies have consistently pointed out that polygamous households tended to be relatively poorer and more likely to be food insecure (Morrison and Laiglesia, 2008; Hogan, Berhanu, and Hailemariam, 1999). In this chapter I advance an alternative hypothesis regarding household formation which may explain why large numbers of single females appeared to have been attached to Khoe households in the Swellendam district. Wealthier Khoe men might have taken more wives, both as a show of prestige, but also as a means of assisting other poor families in the Khoe community. I am not forwarding this hypothesis as a definitive explanation but as one of a number of alternative hypotheses, that is, a proposed explanation which, based on the available evidence, could assist us in theorising the impact of changing household structure on inequality measurement.

Another possible explanation for the peculiar household structure observed in the data may be that a central household could have supported many connected but semi-dependant households which I refer to collectively as the 'houseful'. As with

the alternative hypothesis advanced above, this explanation, too, remains hypothetical. Read in conjunction with each other, the 'household formation hypothesis' and the 'houseful hypothesis' would explain why a large number of women are listed individually next to the traditional conjugal pair in the tax census. If the co-residential pair hypothesis that I put forward here is a true explanation of the relevant data, many of these women may well have been the partners and/or mothers of Khoe seasonal workers on white settler farms in Swellendam district. Such an interpretation would to some extent be supported by the work of historians who have written on the history of Swellendam district and who have specifically mentioned wandering Khoe farm workers (Viljoen, 2001; Viljoen, 2007).

Yet, what makes this hypothesis difficult to prove is the fact that the Khoe located on white settler farms in the Swellendam district in 1825 had a 1:1 adult sex ratio. This does not indicate the presence of a large number of single, male adults on white settler farms. A large, single, Khoe male, adult presence would at least partially have supported my hypothesis. My contention is that the relevant tax data do not accurately capture the activity or presence of seasonal Khoe workers since it is possible that they may not have been formally indentured to white settler farmers and would therefore not appear in any of the official records. However, assuming either a polygamous household or hypothetical co-residential pairs will not change the inequality estimate if all resources were divided equally between individuals, regardless of whether the unit is considered to have constituted a household or a houseful. It is only when we consider differences in *within-household* distributions of resources that the distinction between these two theories will become meaningful and clear.

This section of the chapter has emphasised the fact that Khoe household formation would have been highly dependent on their economic situation – which is, of course, not to suggest that other social norms, such as tribal customs, did not also influence the coping strategy or household structure they opted for. Despite the tentative and hypothetical nature of my speculation regarding the exact nature of Khoe households, I demonstrate in the following section how introducing varied household structures influences the inequality observed.

4.6 Empirical strategy

As the start to the descriptive statistics, the first empirical strategy followed incorporated a simple OLS regression with wealth per capita for the Khoe as the dependent variable. The estimating equation is as follows:

$$\text{Log}(Y_i) = \beta_1 \text{Khoewomen}_i + \beta_2 \text{married}_i + \beta_3 \text{Khoe_boys}_i + \beta_3 \text{Khoe_girls}_i + \epsilon_i \quad (4.1)$$

In equation 4.1, $\text{Log}(Y)$ represents the log of wealth per capita wealth for the Khoe at Swellendam. The regressors which equation 4.1 focuses on is the number of Khoe women residing on a homestead, whether there was a married couple present, as well as the impact the number of Khoe boys and girls had on per capita wealth.

4.7 Results

At this point I have already established that in 1825, the Khoe of Swellendam district were relatively poor compared to their settler counterparts. As a baseline comparison I took a standard wealth measure for each household and divided the total household wealth by the number of individuals in it. Each asset owned by the household, whether livestock or physical objects such as wagons, was included in that calculation. I took care to treat each child in the household the same as the adults. I obtained the wealth measure for each household by taking the physical assets owned by that household and multiplying that number by the average price of the asset obtained in the MOOC 8 probate inventory for Swellendam, 1825³. I posited that Khoe families with more children tended to be richer in terms of the assets they owned. The output of a simple cross sectional OLS regression analysis on wealth per capita for Khoe farms with controls for sub-districts, is presented in table: 4.2.

The results clearly show that when the number of Khoe boys and girls in the household is regressed on the wealth per capita, it is positive and significant (at

³The list of prices used appears in the Appendix A

VARIABLES	(1) OLS
Khoe women	-7.455*** (2.671)
Married	8.663*** (2.303)
Khoe boys	0.974 (1.078)
Khoe girls	1.273 (0.986)
Constant	2.877 (3.354)
Sub-district Controls	YES
Observations	1,266
R-squared	0.259
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

TABLE 4.2: OLS Regression Swellendam on Wealth per Capita

Source: British tax census and MOOC-8 series

a level of 1%). When the sizes of the coefficients are considered, the number of Khoe girls appear to have been more beneficial to wealth per capita than the number of boys. According to the OLS regression, households with traditional marriage structures (one male and one female) also tended to be wealthier. The regression results also confirm that the presence of adult, Khoe women had a negative and significant effect on per capita wealth levels, which is probably due to the fact that the data set contains a large number of single, Khoe women with no assets. This result does not distinguish between different household structures.

Wealth Quintile	Per Capita	Household Structure 1
1	0.00%	0.00%
2	0.00%	0.00%
3	1.82%	3.78%
4	14.08%	17.01%
5	84.10%	79.25%

TABLE 4.3: Percentage share of wealth

Source: British tax census and MOOC-8 series

After aggregating all asset wealth and dividing it by the entire population of

1,266 individuals, it is clear from table: 4.3 that wealth inequality is quite high within the Swellendam Khoer population of the time. In 1825, around 84.1% of the per capita wealth of the Khoer population was concentrated among the wealthiest 20% of the population. The bottom 40% of individuals held no wealth whatsoever. At this point it is worth mentioning that a significant proportion of the population, particularly single females, did not report owning any assets at all. According to the analysis, when observing wealth inequality at the individual level, 866 individuals had no assets to report. Based on these figures, the reported per capita Khoer wealth Gini coefficient in 1825 was 0.8. This figure may appear quite high but compares with inequality between adult males in the USA in the 1860s (0.83) and 1870s (0.81) (Shammas, 1993). Piketty (2014) also notes that in 1827 Paris, the top 10% of wealthy households owned around 98% of the wealth. What does make this result unique is that, despite the wealth inequality being high for a largely stock farming community, it is similar to wealth inequalities in contemporary North America and France (Borgerhoff Mulder and Irons, 2010).

As a next level of analysis I considered the between-household wealth (suggested Household Structure 1) of the Khoer as I would argue this is the most appropriate level of analysis for inequality. The household structure assumed here still resembles contemporary households and may not be particularly reflective of the true situation prevalent among the Khoer of Swellendam district in 1825. I assumed that all members of the household received or had access to an equal share of the household resources. Table: 4.3 shows that when wealth inequality is analysed at the household level, it is still quite high but lower than the per capita estimate, with 79.25% of the wealth concentrated in the hands of the top 20% of the Khoer population. Assuming Household Structure 1 reduces the inequality estimate from a wealth Gini coefficient of 0.80 to one of 0.77. Roughly 912 households were included in the analysis and it shows that sub-dividing assets at the household level would have reduced the observed wealth inequality. What remains a matter of great concern is that around 538 Khoer households still had no assets to report in 1825.

In terms of polygamous Household Structure 2, I assumed that all the single female households became co-wives to a male, aside from the traditional conjugal pair. I also assumed that all the single female names in the tax census which are listed below the male name referred to a co-wife, and that the offspring of that single

female also formed part of the polygamous household. Only when the next male head name appears in the data did I assume that the next listed family unit began. I also continued to assume that each member of the household, including the children, received or had access to the same proportion of household resources.

Table: 4.4 reports the wealth distribution of these Khoe polygamous households and shows that 79.75% of the reported wealth was owned by the top 20% of wealthy Khoe households. In this case, the only major change is that the third quintile increases in size – from 3.78% of the population in the case of Household Structure 1, to 6.44% in the case of Household Structure 2. This would suggest that at least some portion of assets was reallocated to single women with no assets. The reported wealth Gini coefficient for Household Structure 2 is 0.77. These figures are only applicable for as long as one assumes that each member of the Khoe household had equal access to family resources. The reported Gini coefficient remains virtually the same between the two different assumed household structures because of the high number of households which reported zero assets. In the case of Households Structure 2, 532 households reported owning no assets.

Wealth Quintile	Per Capita	Household Structure 1	Household Structure 2
1	0.00%	0.00%	0.00%
2	0.00%	0.00%	0.00%
3	1.82%	3.78%	6.44%
4	14.08%	17.01%	13.81%
5	84.10%	79.25%	79.75%

TABLE 4.4: Percentage share of wealth

Source: British tax census and MOOC-8 series

The next step in the analysis was to consider whether or not Household Structure 2 may be an appropriate assumption to make with regard to Khoe families in the Swellendam district in 1825. I suspect that a number of co-residential families were grouped together to form a houseful which shared resources equally. In this data set, such a household structure is very difficult to meaningfully differentiate from a polygamous household structure. If one were to assume that each of the single females in the tax census data represented a member of a separate conjugal pair within the houseful, it becomes quite difficult to determine the wealth or income levels of the missing male partner and vice versa. Since this group of migrant labourers was not captured in the data set, there is no way of knowing what they contributed

to household's wealth. Once we assume a scenario in which the main conjugal pair supported the survival of the females whose partners were absent, this household is reduced to a model that is similar to the one assumed for a polygamous household.

Historiography offers no indication that polygamy was widespread among the Khoes of southern Africa (Carstens, 1983). Assuming that the Khoes of Swellendam engaged in polygamous partnerships in 1825 would therefore be unrealistic. The probability of co-residential pairs residing in a *kraal*-type of setup would probably be closer to the truth (Carson, 1997). Many of these Khoes households were probably dependent on wandering labourers for survival and it is likely that the absent men generated a large portion of their income. It is also very likely that these men did not appear in the settler tax records because they were not resident, indentured labourers. The resources of the main conjugal pair were also likely shared among the co-residential pairs. Another clue that the co-residential pairs may have had a familial link is to be found in the fact that many of the single women bore the same surname as the wife of the presumed head of the household.

4.8 Conclusion

Ignoring household structure in estimating inequality for a given society often distorts the picture of inequality in that society and may lead to incorrect inferences. Household structures are by no means a static concept since they change according to the prevalent economic shocks and the customs and norms of a particular society. As a means of coping with adverse economic shocks, households may come to include non-nuclear members who contribute additional resources. It therefore becomes paramount to incorporate household structure considerations in estimating Gini coefficients, Lorenz curves, and other inequality metrics.

Many studies on pre-industrial inequality neglect to incorporate different household structures into their inequality calculations. One of the reasons for this is probably because the quality of available data often makes it difficult to obtain micro-level estimates for households and individuals. In the case of African societies, where information on household formation is scant and household level data even more scarce, this problem becomes more acute. In this chapter I tried to overcome this

limitation through the use of British tax census data for the Khoe people of Swellendam in 1825 in conjunction with probate inventory estimates of asset values. This allowed me to demonstrate that household structure indeed plays a significant part in the ultimate inequality observed.

I found that in 1825, the Khoe of Swellendam were significantly poorer than their settler counterparts. Khoe households that did own livestock or crops tended to have more children and smaller numbers of single, adult, Khoe females attached to them. I also found that wealth inequality among this cohort of Khoe, although high, was not out of line with observed wealth inequality levels elsewhere in the world at the time. In the absence of specific knowledge about nineteenth-century Khoe household structures, the analysis proceeded on the basis of a number of simple but plausible assumptions regarding household formation patterns for the Khoe. One of the main conclusions of this chapter is that extended household structures, be they polygamous or inclusive of other non-nuclear members, tended to exert downward pressure on inequality estimates, albeit to a modest degree.

Concluding remarks

Contribution

As twentieth century historians dispelled the long held belief that the Khoe of the Cape presented very little resistance to the advancement of colonial expansion, one of the major contributions of this study consists in presenting the Khoe as an active and significant contributor to the Cape colonial economy (Marks, 1972; Ross, 1979; Newton-King, 1999). Since Ross (1981) notes that stock farming was the hallmark of the eighteenth and early-nineteenth Cape colonial frontier economy, it would be a significant omission not to take into account the vital role the Khoe played in the initial formation of that economy. Along with the studies by Fourie and Green (2015) and La Croix (2018), the analysis offered here emphasises the valuable role the Khoe played in South Africa's economic history.

This study also provides a quantitative analysis of the degree to which coerced labour is in fact flexible. I have demonstrated how the location-specific skills of the Khoe, who were nomadic pastoralists for centuries, made their labour particularly desirable and difficult to substitute with imported slave labour. Another critical contribution of this study lies in highlighting the fact that labour coercion can indeed exist in pastoral agriculture. This goes contrary to the Nieboer-Domar hypothesis which suggests that in a labour-saving agricultural environment, coercion should not occur (Domar, 1970).

Another important contribution this dissertation makes is to show how effort or productivity can be quantitatively defined in pastoral agriculture. Traditionally, it has been thought very difficult, if not impossible, to measure productivity estimates in stock farming, especially in a data poor historical context. Having demonstrated that such measurement is indeed possible, I proceeded to show that, even in pastoral agriculture, greater coercion leads to greater effort – or inversely, that a 'loosening'

of coercion, leads to a decrease in effort levels.

On the basis of the data available to me I was also able to test whether or not Khoe women had any advantage over their male counterparts in animal husbandry. The findings presented here show that, in this specific agricultural context, woman had no such advantage. This is important because of its incipient potential for generalisation. There is an untested body of literature in which it is assumed that women historically enjoyed a comparative advantage over men in stock farming – an assumption which has major implications for our understanding of the development of gender roles in history and which is contested by the empirical findings presented here.

The major contribution of Chapter Four is that it shows how family structure matters when it comes to conceptualising the calculation of inequality metrics. Although this issue has been addressed to some extent in contemporary inequality literature, it is often neglected in pre-industrial inequality studies which assume, either a simple per capita comparison, or a nuclear household structure. These simplifying assumptions may often be inaccurate when studying inequality in indigenous communities or communities with unconventional family systems. Resource sharing in these instances work differently and this has to be factored in when determining pre-industrial inequality.

Impact on literature

The thesis as a whole demonstrates how using colonial archival records can give a voice to historically marginalised indigenous communities. I was able to use settler and Khoe tax census data and probate records to focus attention on the indigenous Khoe people of Southern Africa. This enabled me to make a novel contribution to major research themes in economic history such as labour coercion and effort; the historic evolution of gender roles; expanding the scope of coercive regimes beyond that of just crop-based agriculture, and the need to incorporate different family structures into inequality estimates.

Chapter One in particular considered how slave labour should not be considered suitable to any type of working environment. Often, imported enslaved

labour may have been well-suited to one task, but not to another. Factors such as location-specific skills and experience should also be taken into consideration when investigating the productivity of enslaved labourers in different settings.

One of the important re-considerations in the greater body of economic history literature that this study brings to light in Chapter Two relates to labour coercion and pastoralism. The existence and persistence of labour coercion on northeastern frontier of the Cape compels us to expand the Nieboer-Domar hypothesis to include the possibility that slavery may also exist in a pastoral economy. The analysis presented here has demonstrated that this is the case even in labour-saving agricultural practices such as stock farming. The indenturing of the Khoe of Graaff-Reinet and Tulbagh districts, along with the presence of enslaved labour, is testament to this fact.

I further showed how effort or productivity can be calculated or conceptualised in livestock-rearing. The scarcity in economic history literature pertaining to the examination of productivity in livestock economies needs to be addressed. The study of cattle and sheep economies is also relevant for economic history literature on the western frontier of the USA where cattle farming was critical to the economy and subsistence of both settler and Native American populations (Carson, 1997). I acknowledge that studies in this domain are often hampered by a lack of sufficient data and it is my fervent hope that in time even more vigorous academic investigations of productivity in pastoralism will come to the fore as data quality and analysis techniques improve.

Chapter Two also adds to the literature on coercion and effort. What emerges here is that loosening coercion reduces effort even in stock farming scenarios. Where no outside options for escape or employment exist, coercive mechanisms remain effective. This expands the scope of effectiveness of coercive regimes and may also explain why coercion has persisted to the extent that it has..

In Chapter Three, I tested whether, generally speaking, women have some advantage over men in animal husbandry. In this particular empirical context I found that women do not have such an advantage – which seriously questions the care hypothesis advanced by (Voigtländer and Voth, 2013) Considering alternatives, such as the fact that women may have been better at home production, may present a better

alternative than a blanket generalisation regarding women and livestock-rearing.

Chapter Four emphasises that the failure to incorporate information on household structure for pre-industrial societies in inequality estimates may in fact overestimate observed inequality. This is particularly important when studying communities which have endured considerable economic hardship. Such adverse economic conditions often force families with greater access to resources to absorb families with less access. Extended household structures therefore mitigate the impact of extreme hardship and may reduce eventual inequality. Since studies like Milanovic (2006) and Milanovic (2011) ignore micro-level characteristics of households, it is likely that they give a distorted view of pre-industrial inequality levels.

Avenues for future research

Many avenues for research remain, especially with regard to the role of the Khoe in the Cape Colony. One of the biggest opportunities for future economic history research may stem from the study by Carlos and Lewis (2012), which takes issues of Native American agency as a point of departure. They show how the needs of the Native American tribes who traded with the British fundamentally informed considerations of the Hudson Bay Company during the seventeenth century. What this implies for research on the Khoe is whether or not they, too, had the ability to influence the colonial economy as independent economic agents. Approaching indigenous populations through this lens moves away from the victim iconography often created about indigenous populations in history. Indeed, some South African historiographies hint at the fact that the Khoe were not passive participants in the frontier economy. Giliomee (1963) for instance, notes that the settler farmers of the Graaff-Reinet district often used methods of appeasement - such as the gifting of livestock - as a method of quelling conflict or maintaining peace with the Khoe. This suggests that the Khoe may have been much more influential in the frontier economy than they are conventionally credited with having been. Indigenous trade theory may well be a new and exciting avenue for future research.

The settler tax census data which has already been transcribed also makes it possible to study the role of child labour in the frontier economy. This focus can add to the role of child labour in Economic History pioneered by authors such as

Humphries (2010). The promulgation of the Cradock laws of 1812 strongly indicates that child labour – in particular that of Khoe children – played a central role in the frontier economies of Graaff-Reinet and Tulbagh districts. The settler tax records report extensively on the number of slave and Khoe children who worked on settler farms. I suspect that Khoe children were often used as shepherds for settler flocks and had to work off their room and board from farmers to whom they were indentured (Ross, 1981), but since I am unsure of their status and obligations, further investigation is warranted..

The question regarding the role of child labour on frontier farms also focuses attention on the fertility levels of Khoe women. The currently transcribed tax census data for Graaff-Reinet and Tulbagh districts give the impression that Khoe women on settler farms had lower fertility rates than their settler counterparts. This opens yet another avenue for investigation into the demography of the Khoe. The significant destitution of many of the Khoe as a result of persecution and indenturing may have led to issues such as malnutrition – which, in turn, may have led to lower fertility levels among Khoe women on settler farms. Since there may be other or additional explanations for these lower fertility rates, this is a further topic for future research.

What is encouraging is the fact that colonial authorities kept meticulous records, not only of settler farms, but also of the Khoe – as is shown by the 1825 Swellendam data used in this thesis. These records are also available at the Cape Archives for further transcription. It appears that, as the Khoe were incorporated into the colonial economy of the Cape at the turn of the nineteenth century, authorities saw the need to generate records of the contributions made by the Khoe to the colonial economy. This meant that both the VOC and the British kept a series of tax records and wage registers for Khoe seasonal labourers in almost all districts of the colony. In this study I just mentioned two sources that I have discovered in the archives but there is no reason to assume that there may not be more useful records. Such records open up more areas for inquiry into both the involvement of the Khoe in the colonial economy as well as Khoe living standards at the dawn of the nineteenth century.

These Khoe records also make it possible to look more closely at Khoe family structures over time. We can now investigate how the Khoe were paid for work done, what they valued, what did income and wealth inequality look like as the

century progressed, the impact of colonial extraction on the Khoe society, what the fertility levels were, what types of work they generally performed for the settlers, and how they sustained themselves as the colonial frontier closed. This wealth of research opportunities will hopefully make a great impact on economic history and will bring about exciting new research questions that will occupy my mind as well as those of future scholars of the Khoe in economic history.

These research suggestion only really represents the tip of the proverbial iceberg. The wealth of records kept at the Cape archives are sure to contain many more treasures with respect to the Khoe in particular. Ultimately, this wealth of possibilities and dare I say path-breaking moment will enable current and future scholars to position the Khoesan at the center of the Economics of indigenous communities.

These research suggestions really represent only the tip of the proverbial iceberg. The wealth of records kept at the Cape Archives are sure to contain many more treasures with respect to the Khoe in particular. Ultimately, this wealth of possibilities and, dare I say, the path-breaking moment of historical data interpretation, will enable current and future scholars to eventually do justice to the Khoe by recognising their rightful place in the economics of indigenous communities.

Appendix

Estate Number	Wagon and saddle horses	Breeding cattle	Breeding Horses	Oxen	Breeding sheep	Wheat	Barley	Goats	Wagons	Carts
MOOC8/69.36		7.69		20.00		8.00				
MOOC8/69.34						8.00				
MOOC8/69.33	100.00		15.00						250.00	
MOOC8/69.31	40.00	8.00	15.00	20.00	1.50	5.00	2.00	1.00	400.00	
MOOC8/69.30		12.00	12.00	20.00	2.00			2.00		
MOOC8/69.24a	40.00	10.00		20.00						
MOOC8/70.6a										30.00
Average prices	60.00	9.42	14.00	20.00	1.75	7.00	2.00	1.50	325.00	30.00

TABLE A.1: Prices Swellendam 1825 in Rixdollars

Year	Sheep	Cattle	Slaves	Horses
1799	0.83	4.05	327.27	31.83
1800	0.95	4.89		27.5
1801	0.95	5.26		45.83
1802	1.13	5.45		42.50
1803	1.15	6.14		38.33
1805	1.31	5.82	379.77	30.00
1806	1.47	4.93	419.58	40.71
1807	1.54	6.18	451.63	37.69
1809	1.72	6.95	544.35	37.15
1810	1.50	7.18	660.09	38.54
1811	1.41	8.38	592.59	42.19
1812	1.18	6.20	824.44	45.00
1813	1.09	7.46	890.78	56.04
1814	1.08	7.61	890.78	45.98
1815	1.01	7.56	857.40	48.66
1816	1.03	7.09	977.40	54.88
1817	1.08	7.11		47.45
1818	1.15	6.91	1,113.00	52.96
1819	1.14	4.65	998.00	51.86
1820	1.36	7.54	998.00	66.49
1821	1.50	7.24	1,019.00	50.79
1822	1.63	5.2	1,019.00	53.33
1823	1.49	7.22	924.60	54.11
1824	1.50	7.53	924.60	50.71
1825	1.64	8.15	755.75	55.54
1826	1.97	8.45	731.67	52.18
1828	1.42	6.15	585.00	39.86

TABLE A.2: Average price series Graaff-Reinet and Tulbagh in Rix-dollars

Variable	Observations	Mean	Standard deviation	Min value	Max value
Slaves	22,638	1.17	2.89	0.00	35.00
Settlers	22,638	4.01	2.83	0.00	15.00
Khoe	22,622	3.80	6.21	0.00	63.00
Wagons	22,628	0.81	1.51	0.00	186
Horses	22,638	5.44	8.57	0.00	128

TABLE A.3: Summary statistics for regressors in chapter 3

Variable	Observations	Mean	Standard deviation	Min value	Max value
Slaves	30,294	1.17	2.98	0.00	57.00
Settlers	30,294	4.03	2.83	0.00	15.00
Khoe	30,277	3.76	6.14	0.00	63.00
Wagons	30,269	0.81	1.40	0.00	186
Horses	22,638	5.75	13.95	0.00	186

TABLE A.4: Summary statistics for regressors in chapter 2

TABLE A.5: Regression tables for elasticities from chapter one

VARIABLES	(1) 1805	(2) 1806	(3) 1807	(4) 1809	(5) 1810	(6) 1811	(7) 1812	(8) 1813	(9) 1814	(10) 1815
log Slaves	1.295*** (0.101)	1.034*** (0.143)	0.961*** (0.126)	0.840*** (0.125)	0.771*** (0.119)	0.718*** (0.111)	0.707*** (0.0969)	0.698*** (0.0948)	0.704*** (0.0961)	0.715*** (0.0955)
log Khoe	0.596*** (0.0739)	0.704*** (0.0791)	0.725*** (0.0700)	0.705*** (0.0688)	0.690*** (0.0683)	0.710*** (0.0653)	0.742*** (0.0574)	0.713*** (0.0577)	0.733*** (0.0590)	0.736*** (0.0587)
log hh labour	1.601*** (0.0763)	1.416*** (0.0937)	1.532*** (0.0816)	1.701*** (0.0800)	1.842*** (0.0763)	1.937*** (0.0721)	1.909*** (0.0630)	1.898*** (0.0628)	1.860*** (0.0637)	1.812*** (0.0638)
log Slaves*log khoe	-0.169*** (0.0222)	-0.106*** (0.0318)	-0.103*** (0.0284)	-0.0765*** (0.0283)	-0.0629** (0.0278)	-0.0352 (0.0263)	-0.0308 (0.0228)	-0.0164 (0.0228)	-0.0236 (0.0233)	-0.0306 (0.0232)
log Slaves*log hh labour	-0.213*** (0.0363)	-0.118** (0.0537)	-0.102** (0.0466)	-0.0692 (0.0457)	-0.0891** (0.0436)	-0.0724* (0.0413)	-0.0665* (0.0360)	-0.0679* (0.0358)	-0.0742** (0.0367)	-0.0622* (0.0368)
log Khoe*log hh labour	-0.0843*** (0.0278)	-0.0955*** (0.0343)	-0.0887*** (0.0303)	-0.110*** (0.0295)	-0.104*** (0.0288)	-0.142*** (0.0270)	-0.167*** (0.0238)	-0.184*** (0.0239)	-0.198*** (0.0245)	-0.226*** (0.0248)
log Slaves ²	-0.0593* (0.0359)	-0.0750 (0.0493)	-0.0641 (0.0439)	-0.0595 (0.0433)	-0.0308 (0.0412)	-0.0562 (0.0382)	-0.0591* (0.0332)	-0.0685** (0.0329)	-0.0662* (0.0339)	-0.0825** (0.0347)
log Khoe ²	0.0346 (0.0242)	0.00317 (0.0255)	-0.00133 (0.0228)	0.00750 (0.0228)	0.00949 (0.0234)	0.0142 (0.0226)	0.0133 (0.0199)	0.0231 (0.0202)	0.0253 (0.0209)	0.0430** (0.0208)
log hh labour ²	-0.367*** (0.0372)	-0.311*** (0.0451)	-0.359*** (0.0394)	-0.409*** (0.0389)	-0.447*** (0.0371)	-0.462*** (0.0352)	-0.439*** (0.0306)	-0.421*** (0.0305)	-0.402*** (0.0308)	-0.377*** (0.0309)
Constant	0.504*** (0.0419)	1.662*** (0.0496)	1.612*** (0.0474)	1.572*** (0.0506)	1.524*** (0.0485)	1.733*** (0.0435)	1.728*** (0.0412)	1.635*** (0.0394)	1.649*** (0.0393)	1.358*** (0.0378)
Observations	4,426	3,126	4,447	4,745	5,368	5,978	7,645	7,501	7,269	7,071
R-squared	0.603	0.510	0.500	0.503	0.503	0.512	0.518	0.519	0.516	0.511

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) 1815	(2) 1816	(3) 1817	(4) 1818	(5) 1819	(6) 1820	(7) 1821	(8) 1822	(9) 1823	(10) 1824
log Slaves	0.686*** (0.0966)	0.689*** (0.0981)	0.661*** (0.0968)	0.634*** (0.0953)	0.541*** (0.0960)	0.549*** (0.0963)	0.457*** (0.0953)	0.421*** (0.0932)	0.447*** (0.0911)	0.531*** (0.0888)
log Khoe	0.772*** (0.0588)	0.772*** (0.0587)	0.752*** (0.0573)	0.751*** (0.0565)	0.757*** (0.0589)	0.723*** (0.0610)	0.739*** (0.0615)	0.813*** (0.0606)	0.845*** (0.0605)	0.861*** (0.0598)
log hh labour	1.809*** (0.0646)	1.814*** (0.0658)	1.772*** (0.0668)	1.777*** (0.0682)	1.803*** (0.0715)	1.818*** (0.0743)	1.835*** (0.0758)	1.964*** (0.0735)	2.029*** (0.0726)	2.092*** (0.0711)
log Slaves*log Khoe	-0.0351 (0.0235)	-0.0333 (0.0240)	-0.0516** (0.0234)	-0.0725*** (0.0232)	-0.0882*** (0.0240)	-0.0986*** (0.0243)	-0.118*** (0.0244)	-0.143*** (0.0238)	-0.157*** (0.0233)	-0.158*** (0.0226)
log Slaves*log hh labour	-0.0494 (0.0367)	-0.0497 (0.0371)	-0.0648* (0.0368)	-0.0666* (0.0365)	-0.0572 (0.0375)	-0.0786** (0.0384)	-0.0621 (0.0385)	-0.0389 (0.0373)	-0.0147 (0.0365)	-0.00954 (0.0357)
log Khoe*log hh labour	-0.246*** (0.0250)	-0.251*** (0.0253)	-0.244*** (0.0249)	-0.231*** (0.0248)	-0.227*** (0.0260)	-0.209*** (0.0273)	-0.182*** (0.0281)	-0.189*** (0.0277)	-0.176*** (0.0277)	-0.199*** (0.0274)
log Slaves ²	-0.0768** (0.0368)	-0.0875** (0.0392)	-0.0638 (0.0394)	-0.0483 (0.0388)	-0.0149 (0.0391)	-0.0112 (0.0388)	0.0231 (0.0380)	0.0421 (0.0364)	0.0273 (0.0356)	-0.0118 (0.0339)
log Khoe ²	0.0475** (0.0209)	0.0545*** (0.0209)	0.0724*** (0.0202)	0.0820*** (0.0197)	0.0879*** (0.0205)	0.105*** (0.0211)	0.106*** (0.0213)	0.101*** (0.0211)	0.0962*** (0.0210)	0.109*** (0.0207)
log hh labour ²	-0.366*** (0.0312)	-0.359*** (0.0318)	-0.339*** (0.0325)	-0.344*** (0.0333)	-0.358*** (0.0350)	-0.365*** (0.0366)	-0.390*** (0.0375)	-0.442*** (0.0364)	-0.477*** (0.0358)	-0.472*** (0.0348)
Observations	6,844	6,596	6,645	6,751	6,761	6,757	6,833	7,134	7,342	7,585
R-squared	0.515	0.510	0.512	0.518	0.502	0.497	0.499	0.520	0.528	0.545

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) 1825	(2) 1826	(3) 1828
log Slaves	0.565*** (0.0984)	0.601*** (0.114)	0.596*** (0.140)
log Khoe	0.858*** (0.0693)	0.822*** (0.0827)	0.784*** (0.105)
log hh labour	2.225*** (0.0790)	2.252*** (0.0929)	2.289*** (0.113)
log Slaves*log khoe	-0.168*** (0.0244)	-0.161*** (0.0285)	-0.138*** (0.0350)
log Slaves*log hh labour	-0.0146 (0.0395)	-0.0111 (0.0466)	-0.0396 (0.0578)
log Khoe*log hh labour	-0.246*** (0.0312)	-0.252*** (0.0373)	-0.302*** (0.0484)
log Slaves ²	-0.0185 (0.0369)	-0.0453 (0.0426)	-0.0467 (0.0510)
log Khoe ²	0.133*** (0.0237)	0.145*** (0.0282)	0.174*** (0.0354)
log hh labour ²	-0.490*** (0.0379)	-0.488*** (0.0442)	-0.457*** (0.0536)
Constant	0.575*** (0.0462)	0.629*** (0.0511)	0.788*** (0.0574)
Observations	6,171	4,644	3,118
R-squared	0.543	0.532	0.531

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE A.6: Regression tables for elasticities from chapter one: 1814 shock

VARIABLES	(1) 1805	(2) 1806	(3) 1807	(4) 1809	(5) 1810	(6) 1811	(7) 1812	(8) 1813	(9) 1814	(10) 1815
log Slaves	0.954*** (0.290)	0.761*** (0.266)	0.674*** (0.247)	0.518** (0.222)	0.397** (0.202)	0.473*** (0.169)	0.484*** (0.154)	0.480*** (0.146)	0.537*** (0.137)	0.540*** (0.133)
log Khoe	0.00246 (0.154)	0.177 (0.145)	0.171 (0.140)	0.196 (0.134)	0.292** (0.122)	0.358*** (0.104)	0.383*** (0.0948)	0.454*** (0.0897)	0.473*** (0.0828)	0.514*** (0.0811)
log hh labour	0.959*** (0.271)	1.304*** (0.224)	1.534*** (0.198)	1.694*** (0.175)	1.770*** (0.154)	1.781*** (0.127)	1.776*** (0.111)	1.738*** (0.102)	1.604*** (0.0968)	1.518*** (0.0965)
log Slaves*log khoe	0.0371 (0.0607)	0.0703 (0.0585)	0.0161 (0.0563)	-0.0123 (0.0520)	-0.0320 (0.0457)	-0.0227 (0.0388)	-0.0472 (0.0355)	-0.0382 (0.0332)	-0.0595* (0.0311)	-0.0553* (0.0304)
log Slaves*log hh labour	-0.287*** (0.110)	-0.229** (0.0999)	-0.181* (0.0942)	-0.142* (0.0849)	-0.0551 (0.0787)	-0.0713 (0.0661)	-0.0239 (0.0601)	-0.00716 (0.0564)	-0.0139 (0.0529)	-0.0211 (0.0505)
log Khoe*log hh labour	0.141* (0.0778)	0.114 (0.0719)	0.0745 (0.0675)	0.0259 (0.0611)	-0.0366 (0.0560)	-0.0580 (0.0467)	-0.111*** (0.0421)	-0.139*** (0.0390)	-0.162*** (0.0364)	-0.181*** (0.0351)
log Slaves ²	0.00850 (0.0946)	-0.0116 (0.0887)	0.0110 (0.0826)	0.0550 (0.0743)	0.0496 (0.0665)	0.0228 (0.0564)	0.0106 (0.0523)	-0.0105 (0.0501)	-0.0168 (0.0480)	-0.0164 (0.0474)
log Khoe ²	0.0220 (0.0456)	-0.00772 (0.0439)	0.0446 (0.0420)	0.0814** (0.0412)	0.0899** (0.0372)	0.0789** (0.0320)	0.0995*** (0.0302)	0.0859*** (0.0291)	0.0901*** (0.0268)	0.0849*** (0.0262)
log hh labour ²	-0.262*** (0.101)	-0.362*** (0.0881)	-0.431*** (0.0822)	-0.448*** (0.0734)	-0.457*** (0.0666)	-0.441*** (0.0556)	-0.416*** (0.0499)	-0.396*** (0.0462)	-0.342*** (0.0443)	-0.296*** (0.0441)
Constant	2.771*** (0.190)	2.520*** (0.146)	2.331*** (0.120)	2.165*** (0.104)	1.990*** (0.0870)	1.827*** (0.0706)	1.625*** (0.0594)	1.512*** (0.0529)	1.456*** (0.0502)	1.406*** (0.0506)
Observations	508	801	1,000	1,266	1,593	2,221	2,727	3,176	3,413	3,464
R-squared	0.394	0.360	0.365	0.378	0.388	0.406	0.416	0.415	0.407	0.403

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(11) 1816	(12) 1817	(13) 1818	(14) 1819	(15) 1820	(16) 1821	(17) 1822	(18) 1823	(19) 1824
log Slaves	0.474*** (0.132)	0.474*** (0.132)	0.406*** (0.135)	0.309** (0.140)	0.310** (0.147)	0.260* (0.156)	0.256 (0.165)	0.388** (0.173)	0.637*** (0.179)
log Khoe	0.541*** (0.0800)	0.501*** (0.0815)	0.550*** (0.0856)	0.590*** (0.0938)	0.607*** (0.102)	0.727*** (0.112)	0.923*** (0.119)	0.963*** (0.127)	0.996*** (0.133)
log hh labour	1.420*** (0.0987)	1.275*** (0.108)	1.159*** (0.124)	1.132*** (0.143)	1.000*** (0.165)	0.857*** (0.197)	1.162*** (0.216)	1.099*** (0.231)	0.957*** (0.248)
log Slaves*log khoe	-0.0664** (0.0298)	-0.0884*** (0.0300)	-0.112*** (0.0305)	-0.103*** (0.0316)	-0.0951*** (0.0329)	-0.104*** (0.0345)	-0.141*** (0.0347)	-0.172*** (0.0365)	-0.223*** (0.0367)
log Slaves*log hh labour	-0.00562 (0.0498)	-0.0223 (0.0503)	-0.00724 (0.0516)	0.0231 (0.0540)	0.0516 (0.0568)	0.106* (0.0597)	0.134** (0.0620)	0.133** (0.0653)	0.133** (0.0664)
log Khoe*log hh labour	-0.204*** (0.0346)	-0.180*** (0.0351)	-0.176*** (0.0367)	-0.162*** (0.0394)	-0.148*** (0.0429)	-0.141*** (0.0474)	-0.189*** (0.0510)	-0.209*** (0.0549)	-0.278*** (0.0579)
log Slaves ² (0.0476)	0.00533 (0.0488)	0.0148 (0.0496)	0.0367 (0.0507)	0.0361 (0.0517)	-0.00520 (0.0521)	-0.0203 (0.0520)	0.00170 (0.0530)	-0.0184 (0.0543)	-0.0650
log Khoe ²	0.0898*** (0.0256)	0.109*** (0.0253)	0.111*** (0.0256)	0.0975*** (0.0274)	0.100*** (0.0290)	0.0791** (0.0308)	0.0622* (0.0323)	0.0747** (0.0342)	0.119*** (0.0354)
log hh labour ²	-0.248*** (0.0451)	-0.195*** (0.0487)	-0.146*** (0.0540)	-0.153** (0.0604)	-0.120* (0.0680)	-0.0991 (0.0782)	-0.183** (0.0849)	-0.135 (0.0911)	-0.0142 (0.0973)
Constant	1.386*** (0.0526)	1.436*** (0.0604)	1.471*** (0.0753)	1.562*** (0.0915)	1.654*** (0.110)	1.724*** (0.137)	1.377*** (0.150)	1.235*** (0.158)	1.069*** (0.169)
Observations	3,389	2,999	2,563	2,236	1,965	1,696	1,541	1,391	1,251
R-squared	0.393	0.385	0.380	0.359	0.354	0.359	0.393	0.417	0.453

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(20) 1825	(21) 1826	(22) 1828
log slaves	0.713*** (0.214)	0.788*** (0.255)	0.901*** (0.320)
log Khoe	0.885*** (0.162)	0.827*** (0.199)	0.891*** (0.251)
log hh labour	0.971*** (0.301)	0.852** (0.376)	0.943* (0.505)
log Slaves*log khoe	-0.236*** (0.0424)	-0.231*** (0.0504)	-0.225*** (0.0622)
log Slaves*log hh labour	0.0935 (0.0805)	0.0770 (0.0976)	0.0543 (0.122)
log Khoe*log hh labour	-0.287*** (0.0697)	-0.301*** (0.0853)	-0.378*** (0.116)
log Slaves ²	-0.0599 (0.0641)	-0.0941 (0.0762)	-0.136 (0.0957)
log Khoe ²	0.163*** (0.0450)	0.186*** (0.0554)	0.213*** (0.0708)
log hh labour ²	0.0219 (0.116)	0.0869 (0.142)	0.0950 (0.186)
Constant	1.028*** (0.200)	1.111*** (0.251)	0.967*** (0.350)
Observations	825	571	358
R-squared	0.464	0.453	0.442

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE A.7: Regression tables for elasticities from chapter one: Slaveowners only

VARIABLES	(1) 1805	(2) 1806	(3) 1807	(4) 1809	(5) 1810	(6) 1811	(7) 1812	(8) 1813	(9) 1814	(10) 1815
log Slaves	0.314** (0.140)	0.219* (0.124)	0.00855 (0.122)	-0.115 (0.118)	-0.115 (0.114)	-0.107 (0.100)	-0.114 (0.101)	-0.0304 (0.104)	0.0799 (0.106)	0.108 (0.112)
log Khoe	0.510*** (0.103)	0.530*** (0.0923)	0.547*** (0.0906)	0.666*** (0.0905)	0.748*** (0.0888)	0.760*** (0.0789)	0.754*** (0.0816)	0.715*** (0.0856)	0.665*** (0.0871)	0.678*** (0.0915)
log hh labour	1.075*** (0.167)	1.230*** (0.151)	1.293*** (0.153)	1.391*** (0.147)	1.414*** (0.146)	1.385*** (0.130)	1.222*** (0.132)	1.125*** (0.138)	1.059*** (0.142)	1.028*** (0.149)
log Slaves*log khoe	-0.0289 (0.0318)	-0.0190 (0.0288)	0.0201 (0.0284)	0.0115 (0.0290)	0.0123 (0.0288)	0.0119 (0.0251)	0.0298 (0.0259)	0.0161 (0.0273)	0.0134 (0.0280)	0.0304 (0.0298)
log Slaves*log hh labour	-0.0788 (0.0545)	-0.0635 (0.0481)	0.000454 (0.0471)	0.0150 (0.0463)	0.0292 (0.0450)	0.0437 (0.0397)	0.0408 (0.0406)	-0.000989 (0.0424)	-0.0158 (0.0435)	-0.00931 (0.0457)
log Khoe*log hh labour	-0.0781* (0.0404)	-0.0742** (0.0373)	-0.117*** (0.0374)	-0.159*** (0.0371)	-0.214*** (0.0361)	-0.238*** (0.0317)	-0.245*** (0.0321)	-0.227*** (0.0335)	-0.233*** (0.0346)	-0.228*** (0.0363)
log Slaves ²	0.0736* (0.0421)	0.0900** (0.0377)	0.0981*** (0.0367)	0.138*** (0.0354)	0.108*** (0.0339)	0.0975*** (0.0298)	0.0866*** (0.0305)	0.0856*** (0.0321)	0.0512 (0.0336)	0.0365 (0.0372)
log Khoe ²	0.0141 (0.0263)	0.00514 (0.0239)	0.00268 (0.0237)	-0.000940 (0.0248)	0.00716 (0.0250)	0.0154 (0.0222)	0.0117 (0.0231)	0.0213 (0.0245)	0.0392 (0.0252)	0.0271 (0.0268)
log hh labour ²	-0.209*** (0.0612)	-0.269*** (0.0548)	-0.282*** (0.0548)	-0.291*** (0.0532)	-0.265*** (0.0530)	-0.250*** (0.0469)	-0.178*** (0.0483)	-0.133*** (0.0508)	-0.0977* (0.0529)	-0.0880 (0.0559)
Constant	2.555*** (0.136)	2.589*** (0.125)	2.715*** (0.128)	2.612*** (0.122)	2.451*** (0.120)	2.387*** (0.107)	2.352*** (0.108)	2.236*** (0.110)	2.063*** (0.112)	1.928*** (0.118)
Observations	981	1,384	1,443	1,622	1,762	2,248	2,166	2,060	1,941	1,832
R-squared	0.379	0.351	0.330	0.342	0.338	0.335	0.329	0.323	0.319	0.318

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(11) 1816	(12) 1817	(13) 1818	(14) 1819	(15) 1820	(16) 1821	(17) 1822	(18) 1823	(19) 1824
log Slaves	0.224* (0.118)	0.245** (0.120)	0.305** (0.121)	0.213* (0.124)	0.187 (0.125)	0.0816 (0.124)	0.0673 (0.121)	0.0651 (0.120)	0.176 (0.117)
log Khoe	0.620*** (0.0950)	0.562*** (0.0949)	0.523*** (0.0955)	0.461*** (0.0985)	0.400*** (0.0999)	0.418*** (0.0997)	0.481*** (0.0985)	0.517*** (0.0985)	0.579*** (0.0983)
log hh labour	0.943*** (0.155)	0.908*** (0.160)	0.940*** (0.165)	0.918*** (0.170)	0.827*** (0.175)	0.761*** (0.175)	0.770*** (0.171)	0.713*** (0.167)	0.755*** (0.164)
log Slaves*log Khoe	0.0568* (0.0322)	0.0266 (0.0331)	-0.000196 (0.0330)	0.00267 (0.0341)	-0.0210 (0.0337)	-0.0495 (0.0332)	-0.0770** (0.0320)	-0.103*** (0.0315)	-0.126*** (0.0310)
log Slaves*log hh labour	-0.0426 (0.0481)	-0.0656 (0.0497)	-0.0899* (0.0502)	-0.0715 (0.0521)	-0.0789 (0.0531)	-0.0571 (0.0529)	-0.00999 (0.0506)	0.0521 (0.0502)	0.0661 (0.0497)
log Khoe*log hh labour	-0.190*** (0.0382)	-0.185*** (0.0388)	-0.170*** (0.0388)	-0.155*** (0.0402)	-0.149*** (0.0412)	-0.166*** (0.0420)	-0.171*** (0.0415)	-0.149*** (0.0414)	-0.194*** (0.0414)
log Slaves ²	-0.00371 (0.0410)	0.0125 (0.0427)	0.0133 (0.0426)	0.0320 (0.0433)	0.0449 (0.0426)	0.0812* (0.0416)	0.0846** (0.0397)	0.0678* (0.0392)	0.0325 (0.0376)
log Khoe ²	0.0204 (0.0282)	0.0597** (0.0285)	0.0857*** (0.0285)	0.100*** (0.0296)	0.138*** (0.0297)	0.164*** (0.0297)	0.164*** (0.0293)	0.162*** (0.0292)	0.180*** (0.0292)
log Settlers ²	-0.0544 (0.0592)	-0.0251 (0.0615)	-0.0224 (0.0629)	-0.0280 (0.0654)	0.0112 (0.0670)	0.0434 (0.0680)	0.0222 (0.0664)	0.00447 (0.0656)	0.0252 (0.0642)
Constant	1.817*** (0.122)	1.738*** (0.126)	1.663*** (0.133)	1.766*** (0.139)	1.822*** (0.146)	1.834*** (0.145)	1.803*** (0.144)	1.828*** (0.140)	1.710*** (0.136)
Observations	1,706	1,729	1,756	1,794	1,807	1,852	1,901	1,945	1,983
R-squared	0.322	0.326	0.331	0.312	0.320	0.338	0.351	0.365	0.385

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(20) 1825	(21) 1826	(22) 1828
log Slaves	0.243* (0.132)	0.273* (0.156)	0.281 (0.193)
log Khoe	0.579*** (0.114)	0.584*** (0.136)	0.599*** (0.170)
log hh labour	0.849*** (0.185)	0.873*** (0.218)	0.876*** (0.270)
log Slaves*log Khoe	-0.131*** (0.0341)	-0.126*** (0.0402)	-0.0951* (0.0503)
log Slaves*log hh labour	0.0537 (0.0564)	0.0534 (0.0679)	0.0123 (0.0851)
log Khoe*log hh labour	-0.217*** (0.0468)	-0.224*** (0.0560)	-0.313*** (0.0727)
log Slaves ²	0.0230 (0.0414)	0.00361 (0.0483)	0.00276 (0.0585)
log Khoe ²	0.192*** (0.0340)	0.194*** (0.0406)	0.223*** (0.0520)
log hh labour ²	0.00567 (0.0715)	0.00864 (0.0842)	0.0749 (0.104)
Constant	1.652*** (0.151)	1.644*** (0.175)	1.573*** (0.218)
Observations	1,598	1,205	809
R-squared	0.374	0.370	0.358

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE A.8: Graaff-Reinet regression tables for VMP calculations from chapter two

VARIABLES	(1) 1804	(2) 1805	(3) 1806	(4) 1807	(5) 1809	(6) 1810	(7) 1811	(8) 1812	(9) 1813	(10) 1814
log livestock _{t-1}	0.761*** (0.0235)	0.733*** (0.0171)	0.733*** (0.0171)	0.758*** (0.0235)	0.779*** (0.0180)	0.777*** (0.0133)	0.778*** (0.0114)	0.776*** (0.0105)	0.767*** (0.0110)	0.783*** (0.0119)
log Slaves	0.143*** (0.0404)	0.126*** (0.0298)	0.126*** (0.0298)	0.0746* (0.0404)	0.109*** (0.0261)	0.0771*** (0.0200)	0.0407** (0.0174)	0.0513*** (0.0166)	0.0683*** (0.0175)	0.108*** (0.0190)
log Khoe	0.140*** (0.0255)	0.0963*** (0.0187)	0.0963*** (0.0187)	0.0626** (0.0253)	0.0274 (0.0187)	0.0754*** (0.0142)	0.0926*** (0.0122)	0.108*** (0.0114)	0.0891*** (0.0119)	0.0659*** (0.0128)
log hh labour	0.201*** (0.0332)	0.151*** (0.0249)	0.151*** (0.0249)	0.0478 (0.0348)	0.127*** (0.0255)	0.0996*** (0.0191)	0.0845*** (0.0164)	0.0535*** (0.0152)	0.0540*** (0.0159)	0.0337** (0.0171)
log wagons	0.0158 (0.0866)	0.109* (0.0634)	0.109* (0.0634)	0.156* (0.0854)	-0.0146 (0.0538)	0.0452 (0.0445)	0.102** (0.0402)	0.129*** (0.0416)	0.160*** (0.0441)	0.0925* (0.0479)
Constant	1.003*** (0.146)	1.451*** (0.102)	1.451*** (0.102)	1.605*** (0.134)	1.282*** (0.113)	1.349*** (0.0836)	1.216*** (0.0720)	1.241*** (0.0652)	1.205*** (0.0679)	1.218*** (0.0718)
Observations	611	1,249	1,249	638	803	1,706	2,710	2,988	2,749	2,415
R-squared	0.821	0.793	0.793	0.800	0.830	0.806	0.777	0.780	0.768	0.758

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) 1815	(2) 1816	(3) 1817	(4) 1818	(5) 1819	(6) 1820	(7) 1821	(8) 1822
log livestock _{t-1}	0.777*** (0.0132)	0.827*** (0.0116)	0.912*** (0.00813)	0.932*** (0.00996)	0.909*** (0.0103)	0.798*** (0.0132)	0.813*** (0.0123)	0.844*** (0.0157)
log Slaves	0.0484** (0.0212)	0.0211 (0.0184)	-0.0123 (0.0131)	-0.0548*** (0.0156)	-0.0437*** (0.0166)	-0.0470** (0.0208)	-0.0197 (0.0196)	-0.0417* (0.0242)
log Khoe	0.0516*** (0.0141)	0.0464*** (0.0123)	0.0295*** (0.00884)	0.0432*** (0.0105)	0.0689*** (0.0112)	0.0971*** (0.0145)	0.115*** (0.0139)	0.0964*** (0.0174)
log hh labour	0.0413** (0.0196)	0.0334* (0.0173)	0.0271** (0.0121)	0.00906 (0.0146)	0.00968 (0.0157)	0.0106 (0.0208)	0.0472** (0.0198)	0.0581** (0.0250)
log wagons	0.207*** (0.0524)	0.137*** (0.0459)	0.127*** (0.0328)	0.135*** (0.0378)	0.121*** (0.0387)	0.193*** (0.0468)	0.138*** (0.0444)	0.176*** (0.0556)
Constant	1.223*** (0.0793)	1.001*** (0.0679)	0.503*** (0.0459)	0.452*** (0.0560)	0.654*** (0.0591)	1.341*** (0.0796)	1.118*** (0.0760)	0.811*** (0.0983)
Observations	2,052	2,218	2,583	2,506	2,424	2,174	2,336	1,588
R-squared	0.736	0.786	0.887	0.853	0.843	0.747	0.768	0.764

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

TABLE A.9: Tulbagh regression tables for vmp calculations from Chapter two

VARIABLES	(1) 1805	(2) 1806	(3) 1807	(4) 1808	(5) 1809	(6) 1810	(7) 1811	(8) 1812	(9) 1813	(10) 1814
log livestock _{t-1}	0.822*** (0.0313)	0.879*** (0.0262)	0.879*** (0.0262)	0.894*** (0.0417)	0.798*** (0.0215)	0.837*** (0.0179)	0.847*** (0.0155)	0.725*** (0.0174)	0.710*** (0.0178)	0.633*** (0.0170)
log Slaves	0.101*** (0.0325)	0.0329 (0.0261)	0.0329 (0.0261)	0.0242 (0.0404)	0.0444* (0.0253)	0.00219 (0.0207)	0.0162 (0.0184)	0.0303 (0.0209)	0.0770*** (0.0211)	0.0773*** (0.0202)
log Khoe	0.0607** (0.0245)	0.0312 (0.0201)	0.0312 (0.0201)	0.00620 (0.0295)	0.0701*** (0.0210)	0.0850*** (0.0174)	0.0885*** (0.0153)	0.145*** (0.0170)	0.142*** (0.0171)	0.130*** (0.0159)
log hh labour	-0.00751 (0.0400)	0.0328 (0.0310)	0.0328 (0.0310)	0.0885** (0.0428)	0.00776 (0.0296)	0.0248 (0.0247)	0.0186 (0.0217)	0.0461* (0.0244)	0.0322 (0.0244)	0.0288 (0.0236)
log wagons	-0.0486 (0.0680)	-0.0502 (0.0544)	-0.0502 (0.0544)	-0.0388 (0.0776)	0.0328 (0.0584)	0.0612 (0.0471)	0.0358 (0.0406)	0.0648 (0.0451)	0.0419 (0.0453)	0.0822* (0.0433)
Constant	0.904*** (0.170)	0.731*** (0.149)	0.731*** (0.149)	0.718*** (0.244)	1.187*** (0.121)	0.839*** (0.100)	0.713*** (0.0864)	1.409*** (0.0950)	1.496*** (0.0980)	2.027*** (0.0942)
Observations	171	315	315	144	385	714	1,032	1,075	1,072	1,051
R-squared	0.900	0.872	0.872	0.872	0.874	0.860	0.853	0.785	0.769	0.748

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) 1815	(2) 1816	(3) 1817	(4) 1818	(5) 1819	(6) 1820	(7) 1821	(8) 1822
log livestock _{t-1}	0.749*** (0.0191)	0.800*** (0.0169)	0.789*** (0.0154)	0.780*** (0.0142)	0.700*** (0.0159)	0.807*** (0.0208)	0.770*** (0.0210)	0.762*** (0.0246)
log Slaves	0.0377* (0.0213)	0.0221 (0.0191)	0.0312* (0.0177)	0.0189 (0.0164)	0.0339* (0.0174)	0.0426** (0.0201)	0.0328 (0.0209)	0.0399 (0.0243)
log Khoe	0.102*** (0.0169)	0.0774*** (0.0163)	0.0632*** (0.0153)	0.0471*** (0.0144)	0.0585*** (0.0144)	0.0479*** (0.0170)	0.0774*** (0.0175)	0.0926*** (0.0208)
log hh labour	0.0469* (0.0252)	0.0279 (0.0234)	0.0120 (0.0207)	0.0106 (0.0190)	0.0129 (0.0198)	0.0350 (0.0239)	0.0140 (0.0262)	0.0446 (0.0312)
log wagons	0.0529 (0.0458)	0.0297 (0.0417)	0.0440 (0.0386)	0.119*** (0.0355)	0.152*** (0.0368)	0.0400 (0.0413)	0.0777* (0.0428)	0.0525 (0.0510)
Constant	1.377*** (0.106)	1.128*** (0.0952)	1.186*** (0.0860)	1.165*** (0.0786)	1.658*** (0.0848)	1.017*** (0.108)	1.192*** (0.110)	1.075*** (0.128)
Observations	1,017	1,152	1,312	1,219	974	773	732	516
R-squared	0.752	0.775	0.781	0.819	0.815	0.822	0.820	0.830

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

	Settler men	Settler women	Khoe men	Khoe women	Slave men	Slave women
1805	1,146	831	1,149	1,458	716	458
1806	920	670	1,394	1,570	536	313
1807	1,056	790	1,205	1,539	682	387
1809	1,264	907	1,313	1,642	805	473
1810	1,428	1,013	1,534	1,851	869	544
1811	1,555	1,119	1,665	1,873	937	569
1812	1,666	1,187	1,622	1,896	965	627
1813	1,666	1,208	1,575	1,828	959	609
1814	1,175	856	1,037	1,100	652	412
1815	1,208	892	1,038	1,119	661	413
1816	1,341	994	1,360	1,433	662	442
1817	1,437	1,057	1,416	1,469	668	445
1818	1,413	1,045	1,389	1,447	660	440
1819	1,220	887	1,280	1,551	638	444
1820	1,310	966	1,500	1,647	623	446
1821	1,347	1,011	1,521	1,632	699	468
1822	1,428	1,060	1,651	1,802	721	478
1823	1,488	1,116	1,790	1,866	747	493
1824	1,519	1,132	1,590	1,704	699	519
1825	1,521	1,164	1,691	1,788	740	501
1826	1,594	1,243	1,606	1,696	774	564
1828	1,500	1,190	1,100	1,134	715	506

TABLE A.10: Labour force at Graaff-Reinet

Source: VOC Opgaafrollen

	Settler men	Settler women	Khoe men	Khoe women	Slave men	Slave women
1805	440	321	650	485	1,001	340
1806	528	378	748	585	1,094	401
1807	429	283	594	469	475	192
1808	892	606	868	654	1,593	576
1809	988	658	1,020	773	1,625	538
1810	1,013	700	1,083	784	1,516	560
1811	809	585	794	571	1,455	524
1812	1,074	727	1,138	841	1,676	592
1813	1,136	778	1,249	1,040	1,710	616
1814	828	586	796	602	1,480	497
1815	902	667	812	655	1,460	560
1816	912	683	865	728	1,502	595
1817	986	715	675	932	660	845
1818	956	687	931	729	1,556	639
1819	724	548	615	519	1,270	563
1820	670	465	697	617	1,012	433
1821	591	420	589	489	957	422
1822	574	418	628	481	954	446

TABLE A.11: Labour force at Tulbagh

Source: VOC Opgaafrollen

Year	Number	Mean	Standard Dev	Min	Max
1805	1,146	1	0	1	1
1806	921	0.999	0.033	0	1
1807	1,059	0.997	0.053	0	1
1809	1,266	0.998	0.04	0	1
1810	1,432	0.997	0.045	0	1
1811	1,544	1	0.104	1	1
1812	1,669	0.998	0.035	0	1
1813	1,667	0.999	0.024	0	1
1814	1,177	0.998	0.058	0	1
1815	1,212	0.996	0.057	0	1
1816	1,346	0.996	0.061	0	1
1817	1,442	0.997	0.059	0	1
1818	1,419	0.996	0.065	0	1
1819	1,226	0.995	0.070	0	1
1820	1,318	0.993	0.078	0	1
1821	1,356	0.993	0.090	0	1
1822	1,438	0.993	0.083	0	1
1823	1,495	0.995	0.068	0	1
1824	1,527	0.995	0.068	0	1
1825	1,526	0.997	0.051	0	1
1826	1,599	0.997	0.083	0	1
1828	1,519	0.994	0.077	0	1

TABLE A.12: Settler farms at Graaff-Reinet

Source: VOC Opgaafrollen

Year	Number	Mean	Standard Dev	Min	Max
1805	483	0.911	0.285	0	1
1806	576	0.920	0.272	0	1
1807	459	0.935	0.248	0	1
1808	980	0.910	0.286	0	1
1809	1,084	0.997	0.045	0	1
1810	1,134	0.893	0.309	0	1
1811	909	0.890	0.313	0	1
1812	1,198	0.896	0.024	0	1
1813	1,258	0.903	0.296	0	1
1814	940	0.881	0.324	0	1
1815	1,016	0.888	0.316	0	1
1816	1,024	0.891	0.312	0	1
1817	1,105	0.892	0.310	0	1
1818	1,093	0.875	0.331	0	1
1819	833	0.869	0.337	0	1
1820	754	0.889	0.314	0	1
1821	663	0.891	0.311	0	1
1822	651	0.882	0.323	0	1

TABLE A.13: Settler farms at Tulbagh

Source: VOC Opgaafrollen

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