Savings and economic growth: a historical analysis of the relationship between savings and economic growth in the Cape Colony economy, 1850-1909.

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Abstract

The savings-development nexus is a topical issue in current development literature. No study has yet explored this relationship in nineteenth century 'South African' colonies. An historical analysis of the development of the savings' trends in South Africa may assist in understanding development trends in the twentieth century. Apart from general descriptions of the nature of economic activity in the Cape Colony very little is known about the role of savings and financial sector development in the growing colonial economy. This paper describes and surveys the nature of financial markets in the Cape Colony between 1850 and 1909 and seeks to explain the relationship between savings and economic growth. Savings is defined in the broad sense of monetary and non-monetary savings and would be assumed to be a proxy for financial development in the Cape Colony.

This paper contributes to the economic history literature on the colonial past of South Africa by using recently compiled data on the GDP (Greyling and Verhoef, 2015) as well as monetary savings and non-monetary savings (livestock) to test whether the general view that 'financial development is robustly growth promoting' can be substantiated in the last half of the nineteenth century Cape Colony. The Johansen vector error correction model technique is applied to determine the relationship between savings and economic growth.

It is found that despite the expectations in the literature that financial deepening contributes to economic growth, the Cape Colony did not display such causal relationship in the period under review.

Keywords: Cape Colony, economic growth, finance-growth model~~gross domestic product~~, growth-finance model, monetary and non-monetary savings, Johansen VECM.

JEL; N37

1. Introduction

Savings is generally only considered to be monetary savings in capitalist market conditions, but in African societies savings took on a variety of forms, including consumable commodities which enjoyed special advantages as stores of value, such as livestock, salt bars, metal bars or tools (Austen~~,1987:134~~, 1987:134). An historical analysis of the development of the savings' trends in South Africa may assist in understanding development trajectory in colonial South Africa as it fed into subsequent economic development. The current lack of specific, conceptual and methodological literature dedicated to nineteenth century economic growth in South Africa necessitates the exploration of the legacy of savings and economic growth in the colonial context of 'South Africa'. It requires an analysis of savings in both the capitalist as well as the traditional economic sectors of the colonial economy. This paper seeks to establish the relationship between savings in the Cape Colony and economic growth during the last half of the nineteenth century.

This paper analyses the historical data on monetary savings, as well as non-monetary savings in the form of livestock, in the Cape Colony for the period 1850 -1909. Historical data was collected on different types of personal monetary savings, such as savings in savings deposits at banks, at savings and people's banks, Exchequer and Trust companies,

building societies, insurance companies and non-monetary savings in the traditional sector was calculated by the value of livestock accumulation. The Cape Colony had a well-developed financial system, from small local unit banks to the British imperial banks, which facilitates an analysis of the impact of financial development on the economy. The paper describes and surveys the nature of financial markets in the Cape Colony and seeks to explain the link between this development and savings and economic growth. The aim of this paper is to examine the long-run causality between savings (monetary and non-monetary) and economic growth over the period 1850 –1909 in the Cape Colony. ~~Does savings matter for economic growth? Is there evidence of bi-directional causality between savings and economic growth in the Cape Colony or did savings lead to growth in the short term, but in the long term display bi-directional causality?~~

Several studies explored the development of the banking system in South Africa (Arndt, 1928; Jones, 1996; Solomon, 1983) but no investigation attempted to understand the relationship between the growth of the economy and savings in the nineteenth century, especially savings which includes non-monetary savings in the traditional sector. Schuman (1938:37) relied on indices to illustrate the 'general line of growth' such as population growth, the volume and value of domestic and foreign trade, the development of transport and the link to increased banking activity. Recently compiled GDP data for the Cape Colony for the nineteenth century (Greyling & Verhoef, 2015) for the first time enables an investigation into the relationship between savings and the performance of the economy.

2. Literature review

The theoretical relationships between financial development and economic growth can be summarised in four hypotheses as presented by Chuah and Thai (2004).

The first hypothesis, or the conventional view of a supply-leading hypothesis postulates that the direction of causality flows from financial development to economic growth. A well-developed financial sector provides financial services and improves the efficiency of intermediation. These services result in a more efficient allocation of resources, a more rapid accumulation of physical and human capital, and faster technological innovation, thus inducing faster long-term economic growth.

The second hypothesis, the demand-following hypothesis postulates that economic growth leads to financial development. Robinson argued in 1952 (1952:67-142) that the development of the real economy induces increased demand for financial services, which in turn, generate the introduction of new financial institutions and markets to satisfy the increased demand for financial services. Demetriades and Hussein (1996) confirmed this causality.

Thirdly, a bi-directional causality hypothesis is a combination of the supply-leading and demand-following hypotheses. Greenwood (1990 and 1997) postulated that financial deepening gradually induces economic growth, and this, in turn, feeds back and induces further financial deepening (Greenwood and Jovanovic, 1990; Demetriades and Hussein, 1996; Greenwood and Smith, 1997).

A fourth independent hypothesis postulates that financial deepening and economic growth are causally independent**.** Lucas (1988) argued that, at best, financial deepening plays a limited role in economic growth, while Stern (1989) ignores the role of financial development in the growth process. Lucas distinguishes between 'growth effects' - changes in parameters that alter growth rates along balanced paths - and 'level effects' - changes that raise or lower balanced growth paths without affecting their slope (Lucas 1988:12). This is very similar to identifying a long term relationship and short-term adjustment process using a VAR, as will be done in the paper.

In the empirical literature on the relationship between finance and growth there is general consensus that financial deepening and financial efficiency, promoting more savings, have a positive impact on economic growth (Levine, 2005). Following the determination of a relationship between savings and growth, the more interesting question is in what direction does the causality between savings and growth run. Unidirectional means that only either the supply-led or demand-led hypotheses can be confirmed. Bi-directional causality suggests a two-way causal relationship between savings and economic growth.

A further question is whether the effectiveness of financial development and savings in promoting economic growth depends on the structure or the level of development of the economy. Savings can affect economic growth at a certain stage of development only to find the reverse later on. Some authors conclude that countries at the early stage of development benefit from financial development and savings (McKinnon, 1973 and Fry, 1988). As real growth occurs, the supply-leading pattern gradually becomes less significant and a demand-following one occurs. Zang and Kin (2007), Ang and McKibbin (2007), Güryay et al (2007) and Odhiambo (2004) examined the causality between financial development and savings and economic growth in developing countries, and found no statistically significant evidence of a positive causality running from savings to economic growth.

Thus, in the early stages of development, financial development and savings is expected to lead to economic growth, while the reverse occurs in more advanced stages of development. Authors such as Odedokun (1996), Suleiman and Abu-Qarn (2005); Ghirmay (2004); Christopoulos and Tsianos (2004); Habibullah and Eng (2006) and Agbetsiafa (2003) conducted investigations only in developed countries and found evidence to support the hypothesis that financial development and savings contributed to economic growth.

Cross country and panel data studies find positive effects of savings on output growth even after accounting for other determinants of growth as well as for potential biases induced by simultaneity, omitted variables and unobserved country-specific effects on the finance-growth hypothesis (King and Levine (1993); Khan and Senhadji (2000); Levine (1997, 1998, 1999 and 2003); Levine and Zervos (1996, 1998) and Levine, Loayza and Beck (2000). Stern (1989) was critical of the idea that savings caused growth, due to the fact that the results of cross-sectional correlations were only significant for richer countries (Stern 1989: 618-621).

Time series studies on the relationship between savings and economic growth offer contradictory results. Demetriades and Hussein (1996) did not find any systematic evidence supporting the view that savings is a leading factor in the process of economic growth. They

also found that causality is mostly bi-directional, while in some cases financial development follows economic growth. Luintel and Khan (1999) used a sample of ten less developed countries to conclude that the causality between savings and output growth is bi-directional for all countries.

The empirical results are ambiguous, showing a lack of consensus on the role of financial development and the directional relationship of savings and economic growth. This poses the –question on the historical relationship between savings and growth in the market economy as well as in the traditional economy, during the nineteenth century Cape Colony.

~~Economic growth and savings cannot be analysed in isolation. Various aggregate macro variables may have either a direct or indirect impact on the savings-growth relationship can be determines from literature. Variables such as population growth and dependency rate, the role of government and education, prices and interest rate and external impacts are analysed in section 3 and 4.~~

In this paper time-series analysis and a Johansen VECM model will be used to test for the relationship between savings and economic growth for the period 1850 till 1909. It is important to establish whether in these early stages of development, financial development and savings is leading economic growth. Given the literature the research questions that we are asking are: a) Does savings matter for economic growth? b) Is there evidence of bi-directional causality between savings and economic growth in the Cape Colony and c) Did savings lead to growth in the short-term, but in the long term display bi-directional causality?

3. Financial development in the Cape Colony, 1850 – 1909

The economy of the Cape Colony developed as an agricultural economy since VOC rule in the seventeenth century. By 1850 a variety of financial institutions were offering savings facilities in the Cape Colony and expanded rapidly by 1910. No formal savings institutions existed under Dutch rule. The first financial institution, the Lombard Bank, was established by the VOC in 1793 to address the prevailing scarcity of money in the colony. It was purely a loan bank which granted loans to colonists at five percent interest against mortgage bonds or other suitable security (De Kock 1924:21). After British colonisation in 1806, the dysfunctional Lombard Bank was succeeded in 1808 by the state-controlled Bank of Discount. The bank accepted deposits from the public, primarily the agricultural community. Money was deposited on fixed deposit for periods of no less than three months at five percent interest on sums of more than 1,000 *rijksdalers* (Arndt 1928:486). A definite savings propensity was demonstrated: by December 1811 deposits reached 157,000 *rijksdalers* and by 1823 1,400,000 *rijksdalers*. These deposits facilitated the bank's discounting for trade purposes. The Cape government used savings for short-term credits and encouraged saving by the poorer classes, hoping to promote savings for old age and precautionary spending (Arndt 1928:488).

One of the features of the post-slavery economic growth (slavery was abolished in 1836) was the establishment of local banks and insurance companies, resembling the British financial institutions familiar to the British immigrants/settlers. Financial deepening was

beginning to take shape in response to improved economic performance (demand-led). The first private savings bank, the Cape of Good Hope Savings Bank, was established in Cape Town in 1831. The stated aim of the bank was to mobilise deposits from all segments of the community, including tradesmen, labourers, charitable societies and even slaves. The bank accepted small deposits (as little as a sixpence) at an initial rate of four percent per annum. The growing economic activity in Graham's Town, Somerset East, Stellenbosch and Graaff-Reinet led to the opening of branches in those small towns (Arndt 1928:489-491). In 1838 the Eastern Province Bank was established in Grahamstown and in 1847 the Port Elizabeth Bank, signifying the thriving commercial activity in the Eastern Cape. By 1850 both banks had emerged as banks of deposit, mobilising the savings of more than only successful merchants. Webb observed: "As such, the banks' role in fostering economic expansion was considerably enhanced, while the loan of such funds contributed significantly to the growing profitability of these institutions" (Webb 1992:6-13, 17).

Insurance companies had been active in the Cape since the 1820s. British insurance companies sent agents to the Cape Colony. By 1897 more than 50 foreign insurance companies conducted business in the colony. The South African Fire and Life Assurance Company, established in 1831, was the first South African insurance company. Others, such as the Cape of Good Hope Fire Insurance Company (founded 1835), the Equitable Fire and Life Assurance & Trust Company (established 1844) and the Mutual Life Assurance Society of the Cape of Good Hope in 1845, followed suit (Vivian 1995:17-19). Premiums paid by policy holders constituted contractual savings. By the end of the 19th century life insurance, protection against fire and marine insurance were the principal areas for which provision was made (Vivian 1995:21). Table 1 illustrates the level of insurance performance between 1891 and 1907 in the Cape Colony.

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Table 1: Performance of Life Insurance companies in Cape Colony, 1891–1907

	1891	1893	1895	1897	1899	1901	1903	1905	1907
No of policies	18 814	22 534	27 821	31 873	36 123	49 720	66 716	83 010	84 560
Foreign									
Local	9 518	12 526	13 184	15157	16 995	18 524	22 268	23 253	24 939
	9 296	10 008	14 637	16716	19 140	31 196	44 442	59 737	59 621
Assured	£8 734	£10 181	£10 806	£12233	£13 193	£14 766	£18 213	£19 815	£20 936
Foreign	£4 340	£5 590	£5 762	£6 505	£7 217	£8 111	£9 979	£9 938	£10 491
Local	£4 394	£4 591	£5 044	£5 723	£5 976	£6 654	£8 234	£9 876	£10 444

Source: Cape of Good Hope, Colonial Secretary's Ministerial Division: Returns under the Assurance Act, 1891, for the years ended 1891-1907.

Other financial service intermediaries emerged. The first trust company or board of executors in South Africa, the South African Association for the Administration and Settlement of Estates, was formed by 22 Cape Town residents in 1834 and specialised in the administration of estates. The demand for their services led to the establishment of boards of executors in various towns in the Cape Colony. Between 1834 and 1899 about 30 trust companies and boards of executors were formed, such as the Port Elizabeth Assurance and Trust Company (established 1852), the Graaff-Reinet Board of Executors

(established 1856) and the Malmesbury Board of Executors and Trust Company (established 1864). These companies accepted funds on fixed deposit at competitive interest rates (Ehlers 2000:4-5, 29).

The building society, established to provide savings for housing, was another English institution brought to the Cape Colony by British immigrants. The earliest building societies were similar to the British terminating societies and were established in Natal (1858) followed by societies in Port Elizabeth (1862) and Queenstown (1864). These early building societies soon evolved into permanent societies (Edginton, 1951:21-23). The early terminating societies typically wound up as soon as all the members had been provided with housing. In the case of permanent building societies, they obtained funds through the accumulation of small savings in savings accounts and on fixed deposits (Edginton, 1951:48-50). The savings accounts offered by building societies could not be used as transaction accounts for withdrawals by cheque or draft and earned the lowest interest rate available due to the easy access to withdrawals (Edginton, 1951:167).

The commercial banking landscape changed when the imperial banks entered the Cape Colony from 1861. From this time on it is possible to consider the supply-led explanation for financial development. The London and South African Bank opened for business in Cape Town in 1861 and the Standard Bank of British South Africa was established in October 1862 in Port Elizabeth. In the case of both these banks the motive for their establishment originated in the Cape Colony but the capital had to be raised in England. In contrast to the local banks in the colony, the imperial banks' capital bases were considerably larger. The local banks were unit banks, restricted to one town or district and were set up with local capital. A large number of local banks were started with capital of £50 000 or less. There were, however, exceptions such as the Commercial Bank of Port Elizabeth and the South African Bank, which each had capital of £100 000 (Arndt,1928:241-243). These local banks served local needs by providing a limited range of services – fundamentally the same services offered by traditional British commercial banks. The banks facilitated commercial transactions and provided short-term credit to farmers and merchants, issued bank notes and accepted deposits.

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The imperial banks had a much stronger capital base. The London and South African Bank and the Standard Bank were established with nominal capital of £400 000 and £1 000 000 respectively (Arndt 1928:255-257). More imperial banks followed - the Oriental Bank Corporation (1873), the bank formed to take over the OBC's business in South Africa, the Bank of Africa (1879) and the African Banking Corporation (1890). As pointed out, the imperial banks did not introduce new banking functions to the Cape, but operated as an extension of the English banking tradition. These banks provided short-term loans, collected deposits to extend loans and facilitated the making and receipt of payments. The innovations they introduced at the Cape were organisational and included larger capital bases, branch banking and limited liability (Jones 1996:3-6). The imperial banks could weather the depression of the 1860s and absorbed almost all the small local unit banks, assisted by their extensive and growing branch networks. The subsequent concentration by the close of the nineteenth century in the banking sector wiped out almost all the local banks, except for the

Stellenbosch District Bank. The imperial banks accepted deposits only on fixed term on which interest was earned. These deposits found their way to the banks predominantly from the middle class in society (Jones 1996:94). Funds in current accounts represented the working capital of businessmen. Ordinary small savers thus lost the personal relationship they had with their local banks.

Banks provided credit freely, especially during the speculative booms. Accommodation bills were in general use. Several other savings banks, such as the Kimberley Savings Bank or Good Templars Savings Bank (established 1878), Du Toit's Pan Savings Bank (established 1879) and the Graham's Town Savings Bank (established 1873) opened for business in the colony (Jones 1996:494). The private savings banks paid good interest on savings deposits and catered for the smaller saver. The Good Templars Savings Bank, for example, catered for working men and encouraged saving for unforeseen circumstances and property acquisition. Available figures for this savings bank show steady growth. In its first year of business, 1878, the bank received £8 000 on deposit from 550 depositors. Deposits increased to £13 800 in 1879, £25 000 in 1880, £38 000 in 1881 and £50 000 in 1882 (Worger, 1987:155-156).

Apart from the private institutions mentioned above, the Cape Colonial Government established another savings institution in 1875, namely the Cape Government Savings Bank, for the deposit of small savings at government guaranteed interest. The total deposit was limited, however, to £200 without interest and as soon as a deposit reached £250, including interest, no further interest was paid. After its first full year in operation, 1876, the bank had 31 branches, 576 depositors and deposits totalling £8 028. In 1883 the bank had grown to 58 branches, with 1 984 depositors, and it held £27 796 in deposits. In 1883 the government savings banks were merged with the post office system and continued business on the basis described above. The interest rate was periodically fixed by the government. If varied between 1 percent in 1904 and 6 percent. Between 1905 and 1909.It never exceed five percent and was paid only on amounts in excess of £1. On amounts in excess of £200 5 percent interest was paid between 1905 and 1909 and on amounts more than £3000 4 percent was paid during the same period (CCGH Blue Books, 1908: 106). The growing use of this savings bank is also shown in the average balance held by each depositor. During its first year of operation the average balance held by each depositor was £20 (SBA *GMO3/1/29, no.72/93)*. By 1893 this amount had risen to £37. There was however an outflow of funds from the Post Office Savings Bank in 1899 and a consistent outflow between 1905 and 1909. The average balance in accounts at the Post Office Savings Bank was only £20 during 1907.

Banks often granted advances to diamond companies on the security of claims and investors received advances on shares of the same companies (Arndt 1928:286-287). Total discounts of Cape banks rose from £5 389 000 in 1875 to £10 536 000 in 1881 (Schumann 1951:240-256).

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~~**Table 2: Private Bank Activities in Cape Colony, 1850–1909**~~

~~Year~~	~~No. of Banks~~	~~Amount of Private Bank~~	~~Amount of capital~~	~~Amount of paid up~~	~~Amount of Credit &~~	~~Amount of Profit~~

		Paper Currency in circulation £*	£000	shares £000	Interest, Dividends, Rebate £[Δ]	or Loss £[Δ]
1850		90 187				
1851		122 800				
1852		169 624				
1853		203 786				
1854	9	239 668				
1855	13	275 380				
1856	17	265 850				
1857	17	424 943	900	563		
1859	21	346 698	1 299			
1861	28	355 518	1 973	1 124		
1862	29	357 955	1 982	1 349		
1863	31	289 713	4 118	2 019		
1866	29	273 544	4 579	1 526		
1867	27	257 954	4 505	3 767		
1868	26	222 349	4 348	1 898		
1869	25	223 521	3 987	1 733		
1870	25	298 889	3 813	1 695		
1871	25	958 763*	3 691	1 555		
1872	24	1 080 072	4 689	1 517		
1873	21	1 034 089	5 819	2 834		
1874	19	886 697	4 710	2854		
1875	19	695 105	5 117	2 942	102 281	84 622
1876	19	480 106	5 718	2 944	122 950	104 650
1877	14	518 918	5 168	2 457	101 703	76 007
1878	12	685 206	6 144	2 685	116 469	78 259
1879	11	721 469	6 105	2 676	185 392	88 117
1880	11	848 501	9 514	1 795	77 073	87 293
1881	11	1 257 486		2 085	223 602	98 560
1882	10	942 208	6 389	2 032	114 998	77 560
1883	11	787 130	6 403	2 037	71 594	32 590
1884	11	708 797	6 303	1 950	60 658	36 309
1885	11	529 628	6 304	1 950	57 820	56 956
1886	11	506 532	5 761	1 578	45 936	64 497
1887	11	462 982	5 745	1 586	38 633	30 121
1888	11	662 107	6 002	1 710	46 632	24 622
1889	11	1 034 849	6 584	1 763	66 475	30 215
1890	7	740 210	5 781	1 559	40 885	4 041
1891	5	489 609			16 920[@]	3 437
1892	4	589 853			18 792	377
1893	4	1 091 517				
1894	4	1 129 685				
1895	5	612 266			32 635	786
1896	5	762 409			35 007	
1897	5	834 500	7 393	2 935	33 030	
1898	5	845 028	7 393	2 935	25 588	
1899	5	1 120 460	9 126	3 497	91 754	
1900	6	1 361 637	12 167	6 508	74 238	
1901	6	1 466 816	12 167	6 508	50 142	
1902	6	1 583 316	12 150	6 500	69 364	
1903	7	1 155 238	12 994	5 948	45 990	
1904	7	1 064 091	12 994	5 948	35 854	
1905	6	1 065 249	11 494	4 449	26 807	
1906	6	1 111 180	11 494	4 449	26 561	
1907	6	920 021	11 494	4 449	24 491	
1908	6	934 729	11 494	4 457	19 196	
1909	6	1 084 629	11 494	4 457		

Source: Arndt 1928:496 and CCGH:-Blue Book: 1850 p421; 1854 p435; 1856 p505; 1857 pU3; 1859 p Z3;1861-1869 p Z4, 1870 -1909 various

* Circulation of Branch Banks are included since 1871

[Δ] Source: CCGH:-Blue Book for the Colony of the Cape of Good Hope: pU5

[@] Interest, dividend and rebate not reported after 1891

4. Data and Model Specification

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4.1 Data

The bulk of the data for the period 1850 to 1909 were compiled from the Cape of Good Hope Blue Books (CCGH). The data used is for the Cape Colony and the territories annexed, namely British Kaffraria (1866); Griqualand West and East (1877); British Bechuanaland (1895); Transkei; Walfish Bay and Pondoland. It is important to acknowledge that early historical macroeconomic data is much less reliable than comparable figures for the twentieth century, due to underreporting and measurement errors. Reporting was also not done consistently from year-to-year and crucial information was often recorded in a descriptive paragraph rather than a formal table. The archival material containing data on public expenditure (specifically spending on defence and education), wages in the various sectors and banking data, is not complete or consistent, especially for the earlier part of the period. During the period under investigation seven censuses were conducted, namely in 1850, 1855, 1865, 1875, 1881, 1889 and 1904. The main shortcoming of the censuses is their lack of consistency. The individual censuses cannot be compared, especially due to the inclusion of different regional areas. An extensive list of secondary sources on the financial development of the Cape Colony was consulted to provide the general description of the financial conditions in the Cape Colony during the last half of the nineteenth century.

The data is only reported in current values and a cost of living index constructed by De Zwart (2011) was used as a deflator for all information reported in real terms. The data reported as per capita was calculated using the census population information that were linear interpolated for the missing years. The data used in the model will be described in the next part before the empirical analysis in section 5.

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4.2 Model specification

International evidence indicates that the financial system through savings may have both an indirect and a direct effect on economic growth.

Following the literature, a finance-growth model may be specified as:

$$\boldsymbol{GDP_{it} = \alpha_i + \beta_i PPS_{it} + \varepsilon_{it}} \quad \text{....(1)}$$

Where GDP_{it} is Gross domestic product; PPS_{it} is savings (a measure of financial development), and ε_{it} is the error term.

Economic growth and savings cannot be analysed in isolation. Various aggregate macro variables may have either a direct or indirect impact on the savings-growth relationship can be determines from literature. Additional macroeconomic indicators such as interest rates, a price index that measures the inflation rate and indicators of other sectors of the economy is important in the in modelling of the impact of savings on economic growth. Money supply, the role of the government and a human development index should all impact on a finance-growth model. The growth and composition in the population can impact both on GDP and on savings and per capita (pc) data is therefore used throughout the model.

The variables included in the extended finance-growth model based on the theoretical analysis in section 3.1 are:

PPSpc = Real Private and Public savings per capita as the indicator of financial sector development;
GDPpc = Real GDP per capita
UKIRATE = Interest rate in the UK (as a proxy of the interest rates in the Cape Colony;
GexGDP = Ratio of Real Government expenditure to Real GDP
Gedu = Real Public spending on education per capita as a proxy for the development of human capital;
ASTOCK = The real value (£) of livestock per capita as an proxy of non-monetary savings;
MS = Money supply (Coins and paper currency in circulation); and
Shock = An instability dummy variable to capture uncertainty and structural breaks.

The extended finance-growth model is specified as:

$$GDPpc_{it} = \alpha_i + \beta_1 PPSpc_{it} + \beta_2 UKirate_{it} + \beta_3 GexGDP_{it} + \beta_4 Gedu_{it} + \beta_5 ASTOCK + \beta_6 MS_{it} + \beta_7 Shock_{it} + \varepsilon_{it} \quad \ldots.(2)$$

Since the directional causation is not known, the growth-finance model will also be tested. The extended growth-finance model is specified as:

$$PPSpc_{it} = \alpha_i + \beta_1 GDPpc_{it} + \beta_2 UKirate_{it} + \beta_3 GexGDP_{it} + \beta_4 Gedu_{it} + \beta_5 ASTOCK + \beta_6 MS_{it} + \beta_7 Shock_{it} + \varepsilon_{it} \quad \ldots.(3)$$

4.3 Model data

4.3.1 Population and employment

All population data is compiled from the official population censuses conducted in 1850, 1853, 1856, 1865, 1875, 1880, 1885, 1889, 1891 and 1904 and presented in table 3.

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Table 3: Population in Cape Colony, 1850 -1904

Year	Total Population			Employed	%People engaged in:					
	Total	Male	Female	Total	Agric	Manu	Commerce	Prof	Domestic	Indefinite
1850	285 279	141 609	143 670	27 612	81.06	3.55	15.39			90.32
1853	224 827	113 240	111 587	30 943	74.25	3.14	22.61			86.24
1856	267 096			44 055	76.35	3.38	20.26			83.51
1865	566 158	290 966	275 192	130 562	67.19	10.10	5.27	3.58	23.85	64.01
1875	720 984	369 628	351 356	337 914	61.89	7.18	3.94	2.34	24.64	53.13

1880	876 080									
1885	1 252 347									
1889	1 458 823									
1891	1 525 739	766 598	759 141							
1904	2 409 804	1 218 940	1 190 864	1 573 719	64.15	11.30	4.4	2.43	17.71	34.70

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: Various

The average annual population growth in the Cape Colony was 3.94 percent for the period 1850 -1909.The total population rose approximately ten-fold from 1850 to more than 2.4 million by 1909. Both savings and GDP could be affected by changes in the composition of the population and aggregate savings literature provides some evidence that higher dependency rates depress aggregate savings and higher longevity raises aggregate savings. The publication of census data were very inconsistent and irregular in the CCGH over the period under investigation, making a calculation of a dependency rate unreliable.

The sectoral distribution of the population engaged in the principal economic sectors from 186551 to 1904 is quite stable over this six-decade period. The largest portion of the population (more than 60%) was engaged in agriculture. more than 60%. The indefinite category (including labourers and servants) declined quite substantially to 34.7% in 1904. People employed in manufacturing, commerce and the professional sector made up 18.13% or 285 315 of the employed. The total number of the population employed is 65.30% of the population. The wages paid for the different sectors were not published consistently and it was impossible to calculate a reliable per capita income for the sample period.

With the introduction of income tax by the Taxation Act of 31 May 1904 more reliable and complete information was published on the number of tax payers, the average income and the tax payable. The number of tax payers as well as the income levels were published only for the last two years of the sample period namely 1907/98 and 1908/09. This information could be used to calculate an average per capita income which could be compared to the private savings per capita and to calculate a savings rate.Income tax was introduced by the Taxation Act of 31 May 1904 and information on the number of tax payers as well as income levels were published for 1907 and 1908. Analysing the taxable income provides a clearer picture of average income levels and sectoral employment in the Cape Colony and gives an indication of the ability for private monetary savings.

A comparison of the number of taxpayers employed per economic sector for 1908 and 1909 is presented in Table 4 and in figure 1.

Place Table 4 And Figure 1

Table 4: Income and tax per Economic sector in Cape Colony, 1907-1908

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	1908							Total	1907
	£51-£300		£301 -£1000		>£1001				
Source of income	No	Amount	No	Amount	No	Amount	No	Amount	Amount
Trade	16 786	2 210 645	2 470	922 135	299	458 244	19 555	3 591 024	737 922
Legal profession	193	37 025	339	154 226	105	123 503	637	314 754	163 320
Medical	127	25 600	312	157 199	55	62 633	494	245 432	97 613
Other professions	1 784	279 850	574	208 674	49	63 379	2 407	551 903	108 808
Public service	17 468	2 582 300	1 447	614 320	83	80 389	18 998	3 277 009	87 461
Other employment	35 426	4 451 975	2 788	1 171 777	211	256 785	38 425	5 880 537	298 060
Hotels	433	72 475	257	110 266	15	14 904	705	197 645	54 763
Farming	20 782	2 072 456	2 721	964 191	383	287 379	23 886	3 324 026	519 020
Rent	843	121 150	2 606	309 294	496	161 745	3 945	592 189	247 167
Interest	992	277 468	3 514	541 746	757	634 479	5 263	1 453 693	697 867
Miscellaneous	3 477	570 056	1 073	69 680	239	51 889	4 789	691 625	67 596
Total	98 311	12 701 000	18 101	5 223 508	2 692	2 195 329	119 104	20 119 837	3 079 597

~~Source: CCGH: Blue Book for the Colony of the Cape of Good Hope 1909~~

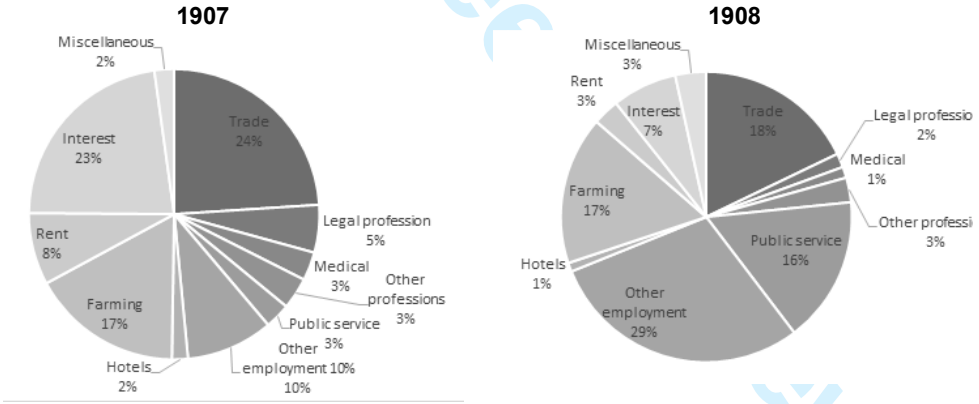

Figure 1: Tax per sector in the Cape Colony in 1907 and 1908
Source: CCGH: Blue Book for the Colony of the Cape of Good Hope 1909

In 1907/08 tax was payable only on income exceeding £1 000, but this was reduced~~lowered~~ to £51 in 1908/09. Subsequently the amount of tax increased from £3mil to £20mil in a single year, following this change in the taxable income base. The total tax paid by individuals was reported as £3 555 327 in 1904/05; £2 297 038 in 1905/06; £3 074 597 in 1907/08 and £20 018 972 in 1908/09.

The number of taxpayers per income category for 1908/09 is illustrated in table 5. The average income per capita of the taxable employed workers (110 266) can be calculated as £181.55 and 37 072 workers (or 33.6%) earned less than £51 per annum in 1908/09. Only 1.1 percent of the taxpayers earned more than £1 001 per annum. The estimated population in 1908 was 2 617 903 and with the taxable income for 1908/09 reported as £20 018 982, taxable income per capita can be calculated as approximately £7.6 in 1908/09. If we assume the 37 072 non-tax-paying workers earn between £25 and £49 per annum, a per capita

income of £8 was still realised. This per capita income should be read with the per capita private savings analysed in section 4.3.3.

Place Table 5

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~~Table 5: Number of tax payers and Income per capita of tax payers, 1907/08-1908/09~~

	Income 1908-1909					Income 1907-1908				
Ranges £	No of tax payers 1908	Amount of taxable income 1908	Income per capita 1908	Tax payable 1908	%Tax 1908	No of tax payers 1907	Amount of taxable income 1907	Income per capita 1907	Tax payable 1907	%Tax 1907
< 50	37 072									
51 - 100	47 680	3 576 000	75	23840	0.67%					
101 - 200	35 190	5 278 500	150	35190	0.67%					
201 - 300	15 386	3 846 500	250	15386	0.40%					
301 - 400	5 016	1 732 067	345	16386	0.95%					
401 - 500	2 222	994 271	447	18606	1.87%					
501 - 600	1 402	768 607	548	18803	2.45%					
601 - 700	886	573 407	647	16277	2.84%					
701 - 800	603	451 552	749	14195	3.14%					
801 - 900	391	332 448	850	11149	3.35%					
901 - 1000	286	270 310	945	9534	3.53%					
1001 - 1200	373	407 228	1 092	18876	4.64%	565	625 157	1 106	1 504	0.24%
1201 -1500	327	437 556	1 338	20573	4.70%	404	537 422	1 330	3 336	0.62%
1501 - 2000	234	404 668	1 729	20234	5.00%	340	583 623	1 717	6 091	1.04%
2001 - 2500	107	232 787	2 176	11638	5.00%	150	335 251	2 235	5 072	1.51%
2501 - 3000	51	140 368	2 752	7019	5.00%	78	212 973	2 730	4 086	1.92%
3001 - 5000	76	287 738	3 786	15135	5.26%	111	423 303	3 814	10 324	2.44%
5001 - 10 000	32	216 040	6 751	12310	5.70%	43	286 369	6 660	9 481	3.31%
10 001 - 50 000	4	68 935	17 234	4520	6.56%	5	70 499	14 100	3272	4.64%
Total	110 266	20 018 982	41 866	289 671	1.45%	1 696	3 074 597	33 692	43 166	1.40%

~~Source: CCGH: Blue Book for the Colony of the Cape of Good Hope 1909~~

4.3.2 Gross Domestic Product (GDP)

In terms of data used, most of the financial-growth studies used as the indicator of economic growth, either real GDP or real GDP per capita. In this paper the real GDP per capita (GDPpc) is used. A cost of living index constructed by De Zwart (2011) was used as the price index and all the data are reported in real terms. A full discussion of the calculation of the Cape Colony GDP from 1850– 1909, the economic growth rates as well as the trend in the GDP per capita for the Cape Colony was done in a paper by Greyling and Verhoef (2015). In Appendix A.1 a table with the nominal GDP and the percentage growth in the GDP is included. Following the System of National Accounts (SNA) the GDP was calculated according to the expenditure method using the different categories of expenditure directly from official colonial statistics in the CGH Blue Books. Data was collected on consumption, government expenditure, imports and exports. The largest component of the GDP, accounting for on average 26% of the GDP, is household consumption. The data on private investment (although expected to be small) is incorporated in household consumption. Government expenditure consisted of both current expenditure and government investment.

Greyling and Verhoef (2015) used the real gross domestic product to determine a business cycle for the Cape Colony from 1850 – 1909. The average length of an upswing and downswing was determined as three years. Although the Cape Colony displayed volatile growth as presented in figure 2, an average real GDP growth of 4.77 percent was reported for the period 1850 -1909. The phases of upswings were observed for 1856-1861, 1864-1868~~,1871~~, 1871-1872, 1875-1876~~,1880~~, 1880-1881, 1886-1892, 1894-1899, ~~1902~~and 1902-1904. Two major stimuli for economic growth were found with the discovery of diamonds and gold.

The adverse effects of the 1899-1902 South African War are evident in the decline in real GDP growth since 1898, with a massive negative growth in 1900. The long recession from 1905 to 1909 also resulted in slower and negative economic growth in 1908.

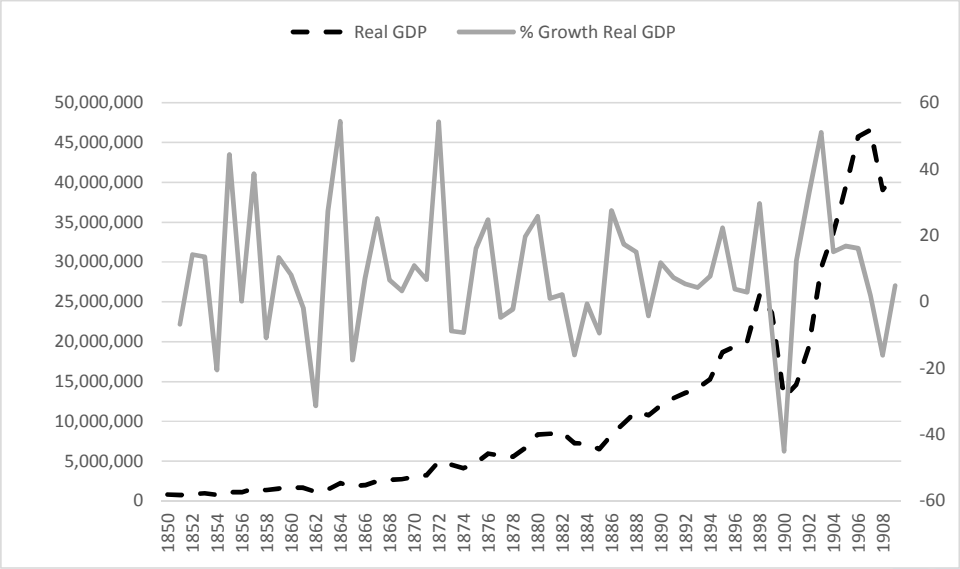

Figure 2: Real GDP and GDP per capita in the Cape Colony, 1850 – 1909~~pe Colony, 1850 -1909~~
Source: Own calculations from CCGH: Blue Book for the Colony of the Cape of Good Hope: Various

4.3.3 Monetary Savings (PPS)

National Savings according to national accounting has three components: private savings, corporate savings and public~~government~~ savings. Corporate savings is excluded from the analysis due to the unavailability of complete information for the period 1850-1909. As a result of the uniqueness of the time period and the amounts spent by government on the development of infrastructure and the financial system, public~~government~~ savings are included in the analysis of the link between financial development and economic growth.

Monetary Savings for the Cape Colony for the period 1850-1909 therefore consists of both private and public savings (PPS).

Place Table 6

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The value of private savings is calculated as fixed deposits at banks and excess deposits in the different savings banks, namely the Post Office Savings Bank, the Savings Bank (King Williams Town) and the Government Savings Bank in table 6. Private bank fixed deposits made up the largest portion of private savings and reflected periods of instability. From 1881 to 1886 fixed deposits declined by £3 251 904 or by 130%, whilst the fixed deposits increased by 57% between 1899 and 1902 during the war.

Table 6: Private and Public Saving (PPS) in Cape Colony, 1865 - 1909

	Private Savings £					Public Savings £	Total Savings £
	Private Banks Fixed deposits £	Post Office Savings Bank £	Savings Bank (King Williams Town) £	Government Savings Bank £	Total Private Savings £		
1865	1 026 361				1 026 361	33 329	993 032
1866	1 026 962				1 026 962	137 435	889 527
1867	1 098 142				1 098 142	267 371	830 771
1868	934 044				934 044	68 706	865 338
1869	724 806				724 806	31 294	756 100
1870	684 165				684 165	58 004	742 169
1871	937 767				937 767	121 588	1 059 355
1872	1 103 664				1 103 664	407 675	1 511 339
1873	1 076 089		742		1 076 831	410 303	1 487 134
1874	1 884 501		1		1 884 500	615 347	2 499 847
1875	2 379 743		11 011		2 368 732	567 234	2 935 966
1876	2 615 504		26 395	8 026	2 597 135	278 403	2 318 732
1877	2 810 166		4 452	5 221	2 810 935	103 922	2 707 013
1878	3 183 966		7 485	2 142	3 193 593	167 737	3 361 330
1879	3 672 156		9 420	10 662	3 692 238	279 832	3 972 070
1880	4 480 986		14 625	1 141	4 496 752	193 880	4 690 632
1881	5 719 004		16 910	260	5 736 174	244 587	5 980 761
1882	5 293 447		7 794	2 553	5 303 794	383 450	4 920 344
1883	4 814 594		1 158	3 124	4 816 560	551 059	4 265 501
1884	3 595 064	92 008	35 663	2 275	3 720 460	51 304	3 669 156
1885	2 899 921	80 018	36 497		3 016 436	308 816	2 707 620
1886	2 467 100	37 778	51 832		2 453 046	11 785	2 464 831
1887	3 122 698	35 620	860		3 157 458	178 139	3 335 597
1888	4 326 163	43 986	36 363		4 333 786	421 562	4 755 348
1889	4 787 596	31 680	24 405		4 794 871	551 125	5 345 906
1890	2 630 018	151 496	87 850		2 693 664	90 373	2 603 291
1891	2 352 048	258 460	1 512		2 612 020	210 481	2 822 501
1892	2 376 996	128 290	4 128		2 509 414	303 338	2 812 752
1893	2 487 257	108 855	17 297		2 613 409	343 868	2 957 277
1894	3 106 898	72 728	25 524		3 205 150	238 436	3 443 586
1895	3 377 487	10 395	24 781		3 412 663	1 152 477	4 565 140
1896	2 920 847	138 563	22 036		3 081 446	537 580	3 619 026
1897	2 709 074	218 187	14 548		2 941 809	545 779	2 396 030
1898	2 731 713	70 215	610		2 802 538	485 467	2 317 071
1899	3 581 213	51 211	1 077		3 531 079	351 377	3 179 702
1900	4 666 709	248 303	22 403		4 937 415	32 662	4 904 753
1901	5 046 734	413 572	31 370		5 491 676	432 745	5 924 421
1902	5 519 239	142 502	3 175		5 658 566	503 180	6 161 746
1903	4 712 029	250 149	9 752		4 452 128	949 011	3 503 117
1904	4 398 780	170 689	27 570		4 200 521	677 195	3 523 326
1905	4 522 166	246 954	4 047		4 271 165	5 161	4 276 326
1906	5 257 305	100 336	5 633		5 162 602	648 125	4 514 477
1907	5 303 651	72 334	7 172		5 224 145	991 855	4 232 290
1908	4 232 386	156 998	627		4 076 015	369 193	3 706 822

1909	— 3 952 156	— 138 970	2 288		3 815 474	-500 000	— 3 315 474

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: Various

The value of private savings is calculated as fixed deposits at banks and excess deposits in the different savings banks, namely the Post Office Savings Bank, the Savings Bank (King Williams Town) and the Government Savings Bank in table 6. Private bank fixed deposits made up the largest portion of private savings and reflected periods of instability. From 1881 to 1886 fixed deposits declined by £3 251 904 or by 130%, whilst the fixed deposits increased by 57% between 1899 and 1902 during the war.

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Public Savings is calculated as per SNA classification as government revenue less government spending. Actual government revenue is published as a complete data series and included information on taxation from 1858, and from 1904 more detailed information on private taxation and mining taxation; revenue from services rendered; income from colonial estate and fines. Total government expenditure is also published as a complete data series and included information on military expenditure (not a complete series); expenditure on works and buildings; expenditure on roads and bridges; public works; education and pensions (not a complete series). The government revenue excludes loans that is published as a separate data category. Public debt is also available from the CCGH: Blue Books.

Monetary savings per capita was consistently low throughout the whole period of analysis. A monetary savings per capita of £1.42 for 1908 and £1.24 for 1909 compared to the calculated per capita income of approximately £8, renders a 15% savings rate for 1909 (refer to section 4.3.1).

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4.3.4 Non-Monetary Savings (Astock)

Assets (similar to savings) are important instruments in measuring households' vulnerability in time of economic disruption or depressed economic growth and influence the extent to which households can smooth consumption in the absence of income (Sherraden 1991:8). The value of livestock (Astock) is established to be an appropriate proxy for non-monetary savings in the Cape Colony as animal stock constitute relatively liquid assets. Savings held in the form of livestock would likely contribute to a smaller financial sector and a negative correlation is expected between monetary savings and non-monetary savings. The relationship between GDP growth and non-monetary savings is expected to be positive as livestock is seen as liquid financial assets. Greyling and Verhoef (2015) reported that animal production and livestock made up a substantial component of the colonial economy, not only for transport and subsistence purposes in the white community, but also as a source of wealth or capital accumulation.

Calculating the animal stock (livestock), the following were included: horses (head), mules (head), oxen (head), milk cows (head), sheep: wool and African (head), goats: Angora and common (head), and pigs (head). Livestock numbers are calculated as the recorded quantities in the censuses of 1855, 1865, 1875, 1881, 1885, 1891, 1899 and 1904. The numbers include the stock in East Griqualand, Tembuland and Transkei. Pondoland and Bechuanaland data is included since 1896. The quantities are not interpolated between the census years but are controlled through the annual reports by the field-cornets in the

individual districts/wards. Civil Commissioners were expected to provide annual returns on livestock numbers from 1887 onwards. The Cape Department of Agriculture collected annual and sometimes monthly statistics on livestock and livestock disease from the time of its establishment in 1887, until that department was replaced by the Union institutions in 1910. This information is reported when available. The recorded quantities are further controlled by information about the quantity of specific animal products such as hides, sheep and goat skins, the harvesting of ostrich feathers and the production of wool. Income tax was introduced by the Taxation Act of 31 May 1904 and livestock numbers were required from farmers at the beginning and end of each year for valuation purposes. Livestock numbers are reported in table 7.

Place Table 7

The livestock numbers of all categories rose between 1855 and 1904. The annual average growth rate of horses is 1.163%, mules 5.794%, oxen 2.445%, milk cows 3.136%, sheep 1.229%, goats 3.818% and pigs 4.909%. Severe droughts in 1893 and 1897 resulted in smaller livestock ~~numbers, that~~numbers that took a few years to return to previous levels. The negative impact of the South African War (1899 -1902) is also clear from livestock numbers. The ostrich industry suffered three notable declines in bird numbers; 1883-1890, 1894-1899 and 1914-1945. The first two were the result of severe droughts and an epidemic of unknown aetiology causing high mortality (Smit 1963). The third slump, was ascribed to World War 1 (Osterhoff 1979). The period between 1875 and 1880 is often described as the First Ostrich Boom with ostrich number totalling 32 247. The second ostrich (feather) boom started in 1897. The South African War (1899 – 1902) had an indirect adverse effect on the industry since feathers could not be moved to auctions. The feather trade recovered after the war.

The price information for all the livestock, except ostriches, was available on a continuous annual basis and reported in table 8.

Place Table 8

The value of livestock is calculated as the quantity of production multiplied by the average market price of stock and categories of animals. The original source of the price information is compiled from returns commissioned by Civil Commissioners and reported annually. The nominal value of the livestock is pro-cyclical for the full research period, but during the time of the South African War and the following two years, the prices of all the animal categories rose substantially. Real livestock increased by an average of 2.78 percent between 1850 and1909, but showed large cyclical fluctuations and periods of negative growth.

~~Table 7: Number of livestock in Cape Colony, 1851 - 1909~~

~~Year~~	~~Horses (head)~~	~~Mules and Asses (head)~~	~~Oxen (head)~~	~~Milk cows (head)~~	~~Sheep (head)~~	~~Goats (head)~~	~~Pigs (head)~~	~~Ostriches (No)~~
~~1851~~	~~122 750~~	~~3 917~~	~~191 586~~	~~198 899~~	~~2 283 232~~	~~711 618~~	~~21 952~~	
~~1852~~	~~122 750~~	~~3 917~~	~~191 586~~	~~198 899~~	~~2 283 232~~	~~711 618~~	~~21 952~~	
~~1853~~	~~150 243~~		~~198 542~~	~~147 077~~	~~5 004 595~~	~~786 549~~	~~23 140~~	

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		7 937						
1854	160 704	8 879	181 977	327 156	5 555 253	1 190 103	33 026	
1855	143 039	9 865	159 603	303 353	6 491 971	1 270 809	35 139	
1865	226 610	24 279	249 307	443 207	9 836 065	2 437 444	78 666	80
1875	205 985	29 318	421 762	689 951	9 986 240	3 065 202	116 738	21 751
1885	226 120	58 534	365 168	926 871	11 162 138	2 428 894	142 479	154 215
1891	354 133	96 345	610 866	581 978	15 194 636	5 972 987	208 299	154 786
1892	354 133	96 345	471 616	800 472	15 194 636	5 972 987	208 299	257 027
1893	267 738	89 557	490 251	761 603	15 164 943	5 037 329	154 103	232 238
1894	252 508	94 773	490 251	761 603	13 354 748	4 340 135	156 570	240 190
1895	254 298	101 743	490 251	761 603	13 726 841	4 314 337	169 205	253 463
1896	242 099	90 407	490 251	761 603	12 274 279	4 155 418	154 076	224 828
1897	235 268	74 312	490 251	761 603	11 851 477	4 397 535	153 240	237 927
1898	238 830	80 720	490 251	761 603	10 780 509	4 510 106	163 550	267 421
1899	242 594	88 244	490 251	761 603	10 673 386	4 804 753	164 137	260 656
1904	255 060	164 903	533 982	1 420 408	11 818 829	7 162 463	385 945	357 808
1909	255 060	164 903	533 982	1 420 408	11 818 829	7 162 463	385 945	357 808

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: Various
Census years are in bold

A problem was encountered with the non-reporting of the price of ostriches. The price information by the Field cornets are ad hoc and of a descriptive nature. It is reported that in the district of Worcester and Graaf-Reinett the price of a six months old ostrich was 10s in 1860. By 1870 a new-born ostrich was £5 and one of 3 - 4 months old, £5 - £10. In 1872 an ostrich in Clanwilliam was sold at £10, and in 1874 between £20 and £50. In 1875 the price of an ostrich was reported as between £34 10s and £38. During the ostrich feather boom of 1875- 1880 a pair of breading ostriches were sold for £1000. Price information for ostriches was included for the first time in the 1909 CCGH Blue Book and reported as between £3 in Piquetberg and £25 in Victoria West. Due to the lack of reliable price information ostriches are not included in the calculation of the value of livestock. It must be noted that non-monetary savings are thus underestimated for the period 1865 till 1909, with the value of ostriches.

Table 8: Prices of livestock in Cape Colony and the Value of Livestock, 1851 - 1909

Year	Horses			Mules			Oxen			Milk cows			Sheep			Goats			Pigs			Animal Stock
	£	s	p	£	s	p	£	s	p	£	s	p	£	s	p	£	s	p	£	s	p	£
1850	13	3		12	6		3	8	2	4	8	2		10	2		6	4	1	10	2	
1851	13	8		12	6		3	4		3	3	8	1	1			6	3	1	5	2	5 586 660
1852	13	10		13	6		3	3		5	3	8	1	-			6	7	1	8	2	5 892 080
1853	13	12	6	15	1	-	3	4	6	8	5	9		15	-		8	-	1	14	-	8 133 120
1854	12	13	11	13	10	2	3	12	4	4	2	7		11	6		8	3	1	1	10	7 890 480
1855	13	2	3	14	-	-	3	11	6	3	16	-		10	8		7	9	1	1	3	7 729 190
1856	15	8	4	15	18	8	4	5		4	5			11	6		8	-	1	8	3	8 620 750
1857	17	18		18	-	3	5	9	9	5	1	3		12	6		8	5	1	7	7	9 790 370
1858	19	1	1	17	9	2	6	12		5	16	11		13	4		10	11	1	13	8	10 805 230
1859	20	3	7	19	1	9	8	1	8	7	4	3		17	2		14	11	2	10	6	13 161 580
1860	20	5	1	18	18	4	8	10	3	7	17	-		17	6		14	5	2	5	6	13 500 140
1861	22	2	4	20	8	3	7	7	-	6	16	1		18	2		16	1	2	10	1	13 608 860
1862	20	18	11	19	7	4	8	18	1	8	12	5		18	4		15	2	2	11	3	14 228 120
1863	17	9	4	17	-	-	7	8	1	7	10	2		15	6		13	5	2	-	3	12 080 030
1864	17	11	8	15	14	7	7	2	9	7	11	9		13	11		11	5	2	2	1	11 427 820
1865	15	9	3	11	11	8	6	3	1	6	10	-		12	5		10	11	1	15	10	15 778 260
1866	15	16	9	11	15	7	6	2	4	7	-	4		12	2		10	10	1	17	10	15 962 400
1867	14	3	2	12	3	6	5	12	5	6	-	2		10	4		9	9	1	16	4	13 981 400
1868	13	14	-	10	17	3	5	6	7	6	4	4		9	5		8	10	1	16	10	13 304 730
1869	13	9	6	10	5	10	4	19	7	4	19	7		6	5		8	9	1	12	11	11 103 170
1870	12	8	9	10	8	-	4	18	-	5	3	3		7	6		8	4	1	13	-	11 414 540
1871	15	-	8	15	1	5	7	1	6	6	8	-		10	9		9	11	1	12	1	14 994 610
1872	18	2	8	15	5	7	8	3	8	7	10	6		14	4		11	3	1	12	1	18 401 870
1873	23	4	10	19	3	7	10	12	1	9	7	10		15	6		15	4	2	6	8	22 213 790
1874	27	4	3	23	8	4	11	9	6	10	17	-		17	8		15	-	2	14	11	25 137 350
1875	27	12	-	24	2	-	11	11	-	11	2	-		19	5		19	-	2	5		32 272 560
1876	22	4		21	3		8	19		9	7			16			15		2	5		25 969 310
1877	22	6		19	5		7	17		7	10			17			14		1	18		24 499 040
1878	23	-		20	5		8	5		9	2			16			17		2	2		25 929 000
1879	23	1		20	17		8	12		9	2			17			16		2	3		26 456 380
1880	23	6		22	8		9	-		9	5			18	6		18	-	2	2		27 875 180
1881	22	18		22	3		9	9		9	10			19	-		17	4	2	2	4	28 379 560
1882	22	7		21	9		9	2	6	8	11			18	6		18	11	2	10		27 408 580
1883	20	1		18	17		7	17	10	8	3	1		17	5		16	8	2	11	9	24 499 730
1884	16	14		15	-		6	10		7	6			16			14	6		40	-	22 102 550
1885	13	10		11	-		6	5		7	5			15	9		13	9		41	6	23 454 280
1886	12	7		12	8		4	12		5	14			11	2		10	6		26	2	18 175 100
1887	11	15		9	-		4	10		5	2			9	6		9	8		34	-	16 272 220
1888	11	8		9	5		4	12		5	8			10	2		9	2		34	4	17 292 000
1889	13	1		10	19		5	15		6	2			12	2		9	11		40	-	22 615 700
1890	13	7		11	6	-	6	-		6	9			13	-		9	1		45	1	23 350 060
1891	12	3		10	3	-	5	12		6	6			13	2		9	11		42	7	25 776 180
1892	13	11	-	10	14		5	13		6	8			12	-		9	8		39	9	26 034 750
1893	13	4		10	7		5	8		6	7			11	9		9	7		37	5	23 556 010
1894	12	8		9	17		4	18		5	18			11	3		9	2		37	8	20 756 450
1895	12	11		10	11		4	19		5	18			11	7		9	9		40	8	21 582 450
1896	13	13		15	5		5	12		6	4			13	4		11	2		41	7	22 974 020
1897	16	15		18	18		7	13		7	19			17	-		14	3		45	11	28 709 210
1898	17	2		17	18		9	14		9	17			19	9		17	7		53	5	32 833 790
1899	20	1		19	11		11	4		11	10			22	2		21	9		63	8	38 415 760
1900	21	19		20	6		12	1		13	14			21	6		21	10		48	-	40 570 780
1901	24	10		20	15		13	13		14	10			21	-		21	-		62	-	42 270 650
1902	30	-		25	4		15	15		18	10			24	6		24	1		66	6	50 719 060
1903	28	19		23	11		16	-		18	16			26	3		25	8		67	2	51 989 560
1904	23	19		18	19		11	13		14	8			22	3		21	2		59	9	57 790 100
1905	23	7		18	15		10	19		13	-			22	3		20	-		54	3	54 717 770
1906	23	19		17	19		10	-		13	1			21	8		18	8		54	5	53 483 630
1907	22	12		17	-		9	-		11	15			19	9		16	4		50	5	47 775 450
1908	22	9		16	18		9	-		11	4	-		19	2		15	9		49	4	47 044 610
1909	22	5		16	16		9	3		10	18			18	8		15	5		48	3	47 282 230

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: Various

A comparison of real GDP per capita, real monetary savings per capita and real non-monetary savings per capita (livestock) is presented in figure 3. It can be observed that savings per capita is relatively stable and at low levels, whilst the economy is growing steadily during the period 1850-1909.

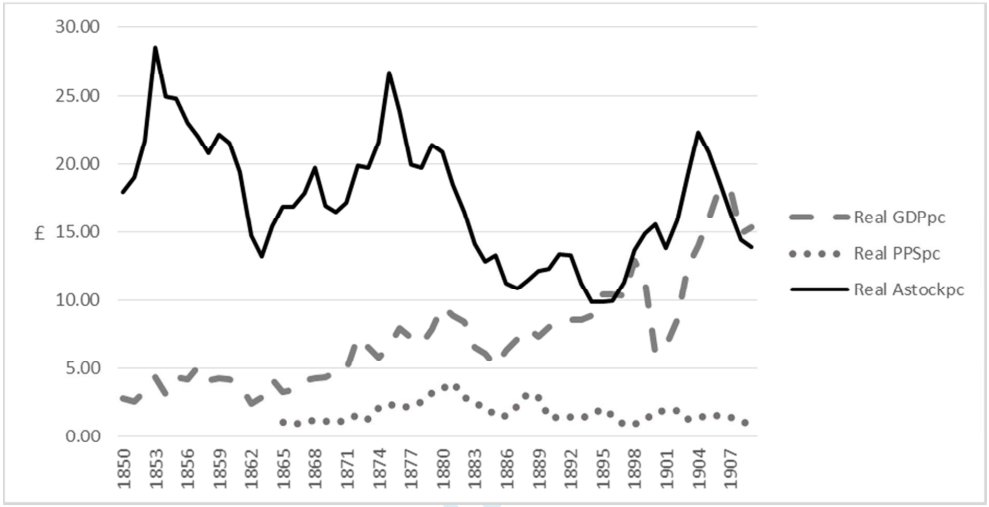

Figure 3: Real GDP per capitapc, Real Monetary Savings per capita (PPSpc) and Real Non-Mmonetary Ssavings per capita (Astockpc), 1850 – 1909
Source: Own calculations from data base

Real non-monetary savings per capita displayed a downward trend from 1850 and where the non-monetary savings per capita were initially much higher than real GDP per capita, in the last three years of the research period, the reverse was the case after that. This is indicative of the change in the structure of the economy with the agricultural sector contracting and industries and mining growing in relative terms. Real monetary savings per capita increased marginally by an average of 1.8 percent from 1850 to 1909 and for the last few years from 1903 to 1909 by only 1.3 percent per annum.

4.3.5 Financial indicators

King and Levine (1993) identified four different financial development indicators: (i) the ratio of liquid liabilities to nominal GDP; (ii) the ratio of domestic bank assets to domestic bank assets plus central bank domestic assets; (iii) the ratio of credit to the non-financial private sector to total domestic credit (excluding credit to banks); and (iv) the ratio of credit to the non-financial sector to nominal GDP (King and Levine 1993:717-732).

Due to a lack of data on the amount of credit extension to the private sector, the amount of coins and paper money in circulation, (M1(a)) - money supply,) is used as a financial development indicator. The British currency, £, was introduced into the Cape Colony in 1825 and amounted at the end of 1829 to £129 800 in silver and £2 205 in copper, a total of £172 005. Between 1830 and 1847 coins to the value of £754 500 were imported from England and Mauritius, bringing the total amount to £926 505. The export of coins to Ceylon, Van Diemen's Land, England, Mauritius, New South Wales and St Helena amounted to £160 000. Merchants imported coins with an approximate value of £300 000 in the period between 1837 and 1849 and exported an amount of £322 605. The coins in circulation is calculated to be £615 012 in 1849. Remittances made by merchants and others were made in specie but never recorded. Large sums were also taken out of the Colony by the emigrant

farmers who sold their farms. The emigrant farmers received compensation for the emancipation of their slaves and they took that out of the colony when they moved into the interior. The coins in circulation is therefore estimated at between £400 000 and £500 000 in 1850 (CCGH 1850:419), £600 000 and £800 000 in 1855 and approximate £800 000 in 1856 (CCGH 1856:504).

Figure 4(a) compared the relationship between the change in coins in circulation and the economic growth for the period 1855 to 1883. It indicates that there is no clear correlation since 1874. In developing countries, a large component of the money supply is currency held outside the banking system. In principle, a rising ratio of coins in circulation to the gross domestic product (GDP) may simply reflect the more extensive use of currency, rather than an increase in the volume of bank deposits. Therefore, in order to obtain a more reliable measure of financial development, coins in circulation should be excluded from the money supply and only paper currency in the banks should be used as a financial indicator.

~~Between 24h April 1828 and May 1841 the *Rijksdaaler* paper money was gradually replaced by British Sterling Promissory Notes. The *Rijksdaaler* was deprived of its value as a medium of exchange in 1835 and by proclamation notice was given that no *Rijksdaaler* notes would be paid or exchanged after 31st March 1841(CCGH 1850:419). Private bank paper placed in circulation by Joint Stock Bank establishments that issued their own £5 and larger denomination notes, payable on demand. The Government had no control over these issues. The banks' shareholders were liable for demands on their bank to the extent of their respective shares. Table 2 reported the private bank paper in circulation, the capital and paid up capital of the banks between 1850 and 1909.~~

~~A comparison in figure 4(b) between Nominal GDP and Paper Currency in circulation indicates a possible correlation.~~

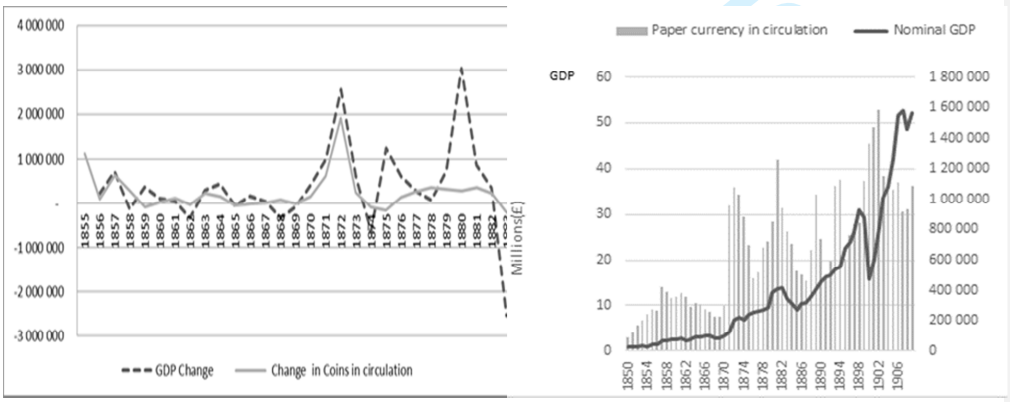

Figure 4: Monetisation in Cape Colony, 1855 – 1909~~1855 - 1909~~
Source: CCGH: Blue Book for the Colony of the Cape of Good Hope, various.

Between 24h April 1828 and May 1841 the *Rijksdaaler* paper money was gradually replaced by British Sterling Promissory Notes. The *Rijksdaaler* was deprived of its value as a medium of exchange in 1835 and by proclamation notice was given that no *Rijksdaaler* notes would be paid or exchanged after 31st March 1841(CCGH 1850:419). Private bank paper placed in

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4.3.6 Interest rate and Inflation rate

In line with Luintel and Khan (1999:381-387), an interest rate will be included in our analysis and be used to measure financial repression. A positive real interest rate increases monetary savings and promotes growth by increasing the volume of capital. In this paper, the deposit rate in the United Kingdom (UKIRATE) is considered to be a proxy of the nominal interest rate in the Colony, since the banks in the Cape Colony were British-controlled. Figure 5 shows the UK interest rate and the inflation rate in the Cape Colony for the period 1850 – 1909.

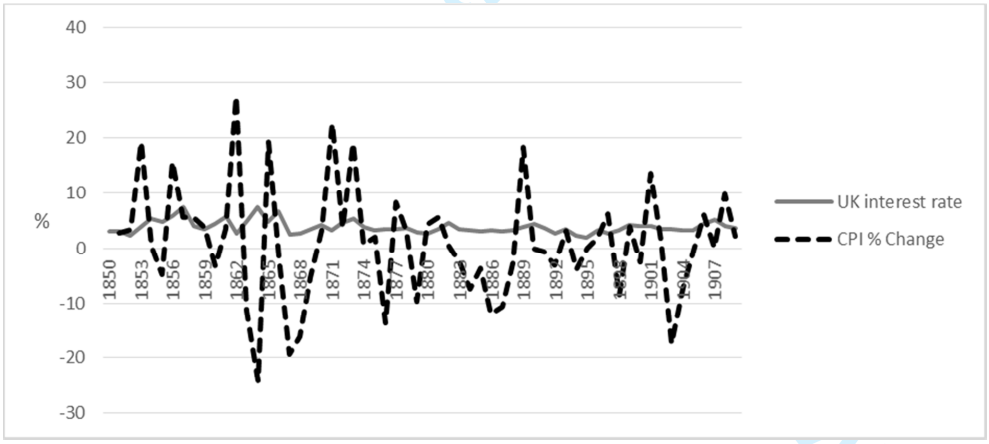

Figure 5: Interest rate and Inflation in the Cape Colony, 1850 – 1909 ~~1850-1909~~
Source: CC Inflation rate: de Zwart (2011)

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The volatility of price changes in the Cape Colony is clear from figure 5. There are an equal amount of positive real interest rates and negative real interest rates. The impact of interest rates on monetary savings directly and on economic growth indirectly will be determined empirically in section 5.

4.3.7 Government expenditure

The ratio of Government expenditure to GDP (GexGDP), as a proxy for the role of government in the economy, is included as a possible growth factor in the model. In the provision of collective goods such as infrastructure and education, the government improves performance, promotes growth and enables private savings. ~~Barro and Lee (1994:14) advised that government capital expenditure on infrastructure development (with an~~

~~expected positive impact on growth) should be reported separately from government consumption expenditure (with an expected negative impact on growth).~~

The nineteenth century specifically was a time of new infrastructure development through the construction of railroads and telegraph lines which enhanced the colonial growth potential. The Government was also involved in the protection of property and persons during this time. Military expenditure made up a large portion of Government spending in certain years. In 1854 the establishment of representative government marked the constitution of the new polity in the Cape Colony and the beginning of a period generally described as a period of stability and growth. This paper combines government consumption expenditure (including spending on defence) and government infrastructure development into one indicator and expects a positive impact on growth. [1]

Human capital is central to economic growth of any country. A variable to measure the quality of human capital should be included in a growth model. Barro and Lee (1997:26) were of the opinion that the best available data to assess the quality of schooling are the pupil teacher ratios and public spending on education. The data on pupil-teacher ratio is not available for the period 1850 – 1909. Public expenditure on education (Gedu) will thus be included as a proxy for the development of human capital. A positive effect on economic growth and monetary savings is expected.

Total government expenditure and government expenditure on education is presented in table 9.

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Public expenditure on education by the state and local authorities is published in the CCGH Blue Books. The number of scholars on the roll is published for the full period as a continuous set. Zhang and Zhang (2005) analysed the impact of life expectancy and school enrolment on savings and economic growth and found an inconclusive effect on the saving rate but a robust effect on growth. The number of scholars attending school in the Cape Colony grew by approximately 4.7 percent per annum. The number of scholars on the roll is reported as 18 757 in 1860, 40 412 in 1870, 78 479 in 1883 (displaying a racial composition of 21 999 white and 44 133 non-white scholars attending school). By 1907 187 816 scholars attended school, in the Cape Colony. Education as a percentage of total government expenditure increased from 1.6 percent in 1850 to nearly 10 percent in 1909.

~~Total government expenditure and government expenditure on education is presented in table 9.~~

4.3.8 Instability in the Cape Colony

[1] Barro and Lee (1994:14) advised that in a more modern economic context, government capital expenditure on infrastructure development (with an expected positive impact on growth) should be reported separately from government consumption expenditure (with an expected negative impact on growth). The expenditure on new infrastructure and the maintenance of infrastructure is a crucial difference since the maintenance aspect may not necessaries have similar positive effects as new infrastructure investments. The mid nineteenth century is however mainly a time of capital investment in new infrastructure.

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Monetary savings is expected to be stimulated by any uncertainty about the future as consumers will seek to provide against shocks. Economic growth may be negatively affected by a loss of production or quality of production or by additional cost due to the same shock. The Cape Colony experienced quite a few shocks and uncertainty as reflected in table 10.

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The uncertainty is proxied by an instability variable (Shock) in the form of a dummy variable that takes the value 0 or 1 to indicate the absence or presence of some categorical effect that may be expected to influence either savings or economic growth. In constructing a dummy variable it is important not to include every fluctuation that occurred during the period, since it is not a smoothing technique. Dummy variables are "proxy" variables for qualitative factors.

Year	Government Expenditure £	Military Expenditure £	Public Works £	Education Total £
1850	245 655	-	43 530	3 930
1851	223 116	-	36 315	3 570
1852	252 495	-	38 914	4 028
1853	268 111	13 943	49 323	3 972
1854	312 521	35 167	50 532	4 688
1855	360 041	31 499	44 282	5 401
1856	333 151	31 073	26 623	7 329
1857	460 676	50 773	33 670	10 135
1858	505 783	40 467	61 554	14 524
1859	664 645	-	110 214	19 075
1860	729 690	521 061	153 215	23 620
1861	763 237	504 748	152 099	26 206
1862	683 792	400 860	135 868	29 331
1863	682 866	310 651	93 653	28 329
1864	633 937	260 909	87 244	35 734
1865	870 089	242 165	78 978	42 423
1866	691 733	74 179	47 461	51 951
1867	885 197	103 495	28 489	51 209
1868	668 086	206 808	29 493	51 695
1869	648 732	192 948	26 180	49 542
1870	795 695	132 070	18 445	47 190
1871	764 915	69 076	37 019	51 063
1872	922 568	78 622	49 926	53 609
1873	2 159 658	70 096	1 048 779	59 227
1874	1 357 455	78 530	383 767	65 709
1875	2 272 275	-	1 298 583	83 859
1876	3 640 532	-	848 235	116 342
1877	3 667 725	-	2 358 929	119 659
1878	3 841 595	-	1 805 876	130 362
1879	3 794 430	464 260	1 831 910	151 094
1880	5 530 688	171 242	1 758 158	163 556
1881	5 673 559	-	1 486 456	174 678
1882	6 346 453	-	1 759 534	208 740

1883	5 255 709	-	-	210 915
1884	4 108 377	166 186	85 139	201 562
1885	3 804 141	108 644	-	195 523
1886	3 332 607	-	-	203 978
1887	3 260 759	-	-	186 508
1888	3 621 019	-	-	196 347
1889	5 327 496	-	-	202 548
1890	6 436 007	-	-	245 317
1891	6 371 220	-	-	259 297
1892	5 734 503	-	-	280 854
1893	5 823 449	-	-	309 480
1894	5 388 157	-	-	250 809
1895	6 360 404	-	-	276 664
1896	8 637 854	211 264	-	298 495
1897	8 613 659	275 474	-	317 127
1898	8 190 124	306 308	-	354 466
1899	7 773 230	-	165 248	563 401
1900	10 161 043	-	171 391	709 680
1901	11 950 745	-	159 044	767 652
1902	14 149 924	-	307 378	670 873
1903	14 458 229	-	242 270	790 106
1904	10 914 785	1 242 429	112 473	792 870
1905	9 603 548	-	72 346	793 870
1906	10 158 269	-	60 855	819 417
1907	9 795 169	-	36 830	849 505
1908	7 938 638	-	37 484	789 877
1909	7 250 000	-	-	716 000

The shock dummy variable includes both political instability as well as economics shocks. The severest political shocks were in the form of the wars with the indigenous people as well as the South African War. Military expenditure during the 1871 annexation of the Zuid-Afrikaansche Republiek (ZAR), two subsequent wars against the indigenous people (the most notorious were the 1879 Anglo-Zulu war and the first war of independence against the Transvaal Republic, 1880 -1881), resulted in capital inflows from Britain (SBA: GMO 3/1/1/9: No 72/79). These wars disrupted society, caused massive loss of life and property, and also cost the British government £5 500 000 of which a substantial portion found its way into the local market.

Table 9: Government expenditure in Cape Colony, 1850-1909

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1889	5 327 496	-	-	202 548
1890	6 436 007	-	-	245 317
1891	6 371 220	-	-	259 297
1892	5 734 503	-	-	280 854
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1906	10 158 269	-	60 855	819 417
1907	9 795 169	-	36 830	849 505
1908	7 938 638	-	37 484	789 877
1909	7 250 000	-	-	716 000

Economic shocks were experienced in the form of drought, livestock pests and international depressions with a spill-over effect to the Cape Colony. Excessive speculation in diamonds caused a “diamond crisis” around 1881. Insolvencies rose from 259 in 1880 to 1 000 in 1883 and remained in excess of 700 every year between 1884 and 1886. During the South African War the GDP plummeted by 86.29% in the first year (1900) and only returned to the 1899 level in 1903. A severe drought led to a sharp decline in livestock numbers and a poor harvest of agricultural produce.

Table 10: Political and economic instabilities in Cape Colony

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Period	Instability
1850-1853	Eighth frontier war
1854	Copper mining collapse
1865	Severe banking crash in Port Elizabeth as a result of intensified speculation
1866-67	Economic depression
1867	Discovery of diamonds in Griqualand West on the lower Vaal
1870s	Subjugation of African kingdoms (Anglo-Zulu War, control of Basutoland)

1877	Invasion of the *Zuid-Afrikaansche Republiek*
1881	British annexation of Transvaal and the first First Anglo Boer War
1884	Bechuanaland disturbances
1881-86	Diamond bubble and speculation crisis – shares dropped from £400 to £25
1899 -1902	Second Anglo Boer War
1903	Severe drought

Source: C.G.W. Schumann (1938, 63-74)

5. Methodology

This paper uses the Johansen vector error correction model (VECM model) to explore the association and casual relationship between savings and economic growth with annual time series data from 1850 to 1909. This method has been proven in the literature to be the best when studying tests of causality between various variables and also to determine the feedback effects between the variables (Johansen, 1991). The advantages of using the multivariate vector autoregressive framework in economic analysis are that it can deal with the endogeneity problem between savings and other domestic variables and thus avoid the difficult task of determining which variables are truly exogenous. It permits the identification not only of the short-term effect but also the long-term cumulative effect of savings on domestic variables by allowing interaction among these variables.

The methodology used in this paper starts by identifying the order of co-integration of variables involved in the system, testing of lag lengths and the construction of a VECM to analyse the structural relationship between the variables.

5.1 Panel Integration Analysis (the stationary test)

The univariate nature of the data is tested using augmented Dickey-Fuller test statistics and are reported for the variables in levels and first differences separately in Appendix A.2. We tested a restricted model, a model with an intercept and a model with an intercept and trend. First differencing the series removes the non-stationary components in all cases and the null hypothesis of non-stationarity is rejected at the 5% significance level as illustrated in Appendix A.2, suggesting that all the variable are integrated of order I(1).

5.2 Panel Co-integration Analysis (Lag length selection)

The selection of the optimal lag length is extremely important and careful attention to non-normality, autocorrelation, heteroskedasticity and stability of the root is needed. The sequential modified LR test statistic, Akaike Information criterion (AIC), and the Schwarz Bayesian information criterion (SC) were used in order to determine which appropriate maximum lag length to use for each variable as in Appendix A.3.

The model is initially estimated with a large number of lags, which are then reduced until the optimal lag length is identified. The lag length suggested by AIC is 5, but inspection of autocorrelation and normality of residuals in Appendix A.3 indicated a lag length of 1 to be optimal. The optimal lag length of 1 was chosen according to the Schwarz information

criteria. Theoretically and logically, a lag of one year makes more economic sense, due to the use of annual data and a smaller data sample.

5.3 Panel Causality Analysis *(The bivariate cointegration test)*

The Johansen maximum likelihood co-integration technique is used to test for the existence of co-integration as well as the number of cointegrating vectors. Also important in the formulation of the dynamic model is to determine whether an intercept and/or a trend should enter either the short run or the long run or, or both models. The Johansen test of both rank order and the deterministic components is performed and the Pantula principle applied.

The trace statistics and maximum eigenvalue test for all three models are presented in Appendix A.4. Both the trace test and the maximum eigenvalue test statistics reject the null hypothesis of non-co-integration (i.e. r = 0) at the 5% level of significance. The trace test and probabilities indicates two co-integrating equations at the 5% level and the maximum eigenvalues confirm the trace test results. According to the trace test results, Model 3 is found as the best model for the analysis. The best model is thus one with an intercept, but no trend and two co-integrating equations.

5.4 Johansen VECM Estimation

After identifying two co-integrating relationships among the variables in the system, we use a vector error correction model (VECM) that characterises the equilibrium relationship between our variables of interest, namely savings and economic growth. The dependent variables in each of the co-integrating vectors will be the LGDPpc and LPSS respectively as specified in the finance-growth model and growth-finance model in equation 2 and equation 3 in section 4.2[2].

Two co-integrating relationships mean that we have to impose at least four restrictions for the just-specification of the system. In the finance-growth model weak or zero restrictions are imposed on the interest rate (UKirate) and the human capital proxy (Gedu) since none of these variables are expected to have a direct effect on economic growth. The interest rate impact might be indirectly through savings and the human capital proxy through economic growth. In the growth-finance model weak or zero restrictions are imposed on government expenditure to GDP (GexGDP) and on the human capital proxy (Gedu) since neither government expenditure components should have a direct effect on savings.

The VECM model has two parts: the co-integrating relations part (co-integrating equations), which describes the long-run dynamics between the two co-integrating relations; and the VAR part, which describes the short-run dynamics between these variables. The coefficients of the cointegrating equations represent the speed of adjustment in response to a deviation from long-term equilibrium.

The results of the different estimations give the following long-run relationships.

[2] The first round of modelling results indicated that paper currency (MS) should be treated as weakly exogenous in the co-integrating model and is thus excluded from the final model.

Finance-growth model:

LGDPpc (-1) = -2.6692 + 0.00000106LPPSpc (-1) - 8.8247GEXGDP (-1) + 0.000000102LASTOCK (-1) + 1.1447 SHOCK (-1).....(4)

Growth-Finance model:

LPPSpc (-1) = +0.9059 - 2.5675LGDPpc (-1) + 0.1375UKIRATE (-1) + 7.44E-08LASTOCK (-1) - 0.9518SHOCK (-1) .....(5)

The output of the first part of the VEC models is reported in Table 11 and Table 12 for the respective models.

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Table 11: Long-term relations from the VECM: Finance-Growth model

DEPENDENT VARIABLE: LGDPpc(-1)		
VARIABLES	**COEFFICIENTS**	**ELASTICITIES**
LPPSpc(-1)	-0.00000106	-5.974694135
GEXGDP(-1)	8.824685	0.945699212
LASTOCK(-1)	0.000000102	-6.991399828
SHOCK(-1)	-1.144722	0.058700029
C	2.669248	0.426388926

Table 12: Long-term relations from the VECM: Growth-Finance model

DEPENDENT VARIABLE: LPPSpc(-1)		
VARIABLES	**COEFFICIENTS**	**ELASTICITIES**
LGDPpc(-1)	2.567514	0.40951282
UKIRATE(-1)	-0.137529	-0.861605715
LASTOCK(-1)	-7.44E-08	-7.128427064
SHOCK(-1)	0.95176	-0.021472551
C	-0.905947	-0.042897209

The results reported in Table 11 show that there was a stable long-term relationship between real monetary savings per capita and the real GDPpc in the Cape Colony and also between real non-monetary savings (livestock) and real monetary savings, according to table 12, during the last half of the nineteenth century. The elasticities show that in the long run the UK interest rate and real non-monetary savings (real livestock) are the main drivers of monetary savings in the Cape Colony and non-monetary savings (real livestock) and monetary savings are the main drivers of economic growth in the Cape Colony. Non-monetary savings therefore has both a direct and indirect effect on GDP with the indirect effect through monetary savings. This observation has a very significant implication in that non-monetary savings constituted a substantial form of savings in the colonial context at the end of the nineteenth century.

Non-monetary savings is a strong explanatory variable for both monetary savings and economic growth, and clearly indicates the importance of livestock in the developing settler colony during the last half of the nineteenth century.

Table 13 reports the output of the second part of the VECM of both the finance-growth and the growth-finance models, i.e. the coefficients of the two co-integrating equations as well as the coefficients of the short-run dynamics.

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Table 13: Short-run dynamics in the Finance-Growth and Growth-Finance models of the Cape Colony

Error Correction:	Finance-growth(LGDPpc)	Growth-Finance (LPPS)
CointEq1	355336.9 [3.00013]	-0.079582 [-3.08063*]
CointEq2	70925.74 [1.23839]	0.035597 [-1.56088]

The coefficient of the first co-integrating equation in the growth-finance model has the expected negative sign. This is an indication that there is a correction mechanism to any external shock that may affect monetary savings. The magnitude of the coefficient of the first co-integrating equation suggests that the speed of adjustment is rather sluggish (0.07). Monetary savings were not rapidly recovering from weakened economic performance. This slow speed indicates that there are some impediments to financial sector development. This means that the late nineteenth century Cape economy was extremely volatile over the short run.

The coefficient of the first co-integrating equation in the finance-growth model however has a positive sign indicating that there is no adjustment back to the long-run equilibrium position after a shock to the GDP occurred. The coefficient of the second co-integrating equation in both models show a non-adjustment process with a positive sign.

Answering our first research question, wAlthough we have found a thatstable long-term relationship between real monetary savings per capita and the real GDPpc in the Cape Colony and that monetary savings depended largely on non-monetary savings (livestock) and the UK interest rate., Tthe most important question however is whether savings this financial development led the economic growth or was it the reverse trend? The answer to the researchis questions on directional causality is found in the next section.

5.5 The causality test

Engle and Granger (1987) showed that if two series are individually I(1) and co-integrated, a causal relationship exists in at least one direction, but it does not indicate the direction of causality between variables. The direction of causality can be detected only through the error correction model derived from the long-run co-integrating vectors.

In this paper the Granger causality tests are tested by the joint significance of the error correction term and the lagged variables in each VECM variable through a joint Wald or F-test. The causality for the finance-growth model is reported in Table 14 and for the growth-finance model in Table 15.

Place Table 14

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Table 14: VEC Granger Causality/Block Exogeneity Wald Tests: Finance-Growth model

	Dependent Variable						
	LGDPpc	LGEDU	LPPS	SHOCK	UKIRATE	GEXGDP	LASTOCK
LGDPpc		0.5204	*0.6901*	0.6712	0.4848	0.7112	0.3298
LGEDU	**0.0810***		*0.9609*	0.7902	0.8637	0.8611	**0.0204****
LPPSpc	0.8918	0.2646		0.4035	0.9009	0.2746	0.1361
SHOCK	0.3914	0.5602	**0.0438****		**0.0989***	0.2083	0.7628
UKIRATE	0.6559	0.1750	0.4540	0.1418		**0.0912***	**0.0851***
GEXGDP	0.7597	**0.0231****	0.1330	0.5908	0.4717		0.1862
LASTOCK	0.5873	**0.0000*****	0.4887	0.5234	0.9444	*0.1972*	
ALL	0.6988	**0.0000*****	0.2907	0.5597	0.6951	0.2213	**0.0207****

*Denotes the rejection of the null hypothesis of no causality at 90%
**Denotes the rejection of the null hypothesis of no causality at 95%
***Denotes the rejection of the null hypothesis of no causality at 99%

Granger causality tests can be inferred either from the joint significance of lagged independent variables (ALL) or from the lagged ECM term. Analysing GDP, the overall result row (ALL) indicates no feedback or bi-directional causality, as well as no impact on any of the explanatory variables in the model. Although the Cape Colony is in the early stages of development there is no indication of monetary savings leading the economic growth. The biggest impact and statistical significant impact on economic growth is through government spending on education. As expected the instability variable (Shock) has a profound and significant impact on savings. The joint significance (ALL) of livestock as non-monetary savings is statistical significant and is uni-directional influenced by the interest rate. This observation has a very significant implication in that non-monetary savings constituted a substantial form of savings in the colonial context at the end of the nineteenth century.

Place Table 15

Table 15: VEC Granger Causality/Block Exogeneity Wald Tests: Growth-Finance model

	Dependent variable						
	LPPS	LGDPpc	LGEDU	SHOCK	UKIRATE	GEXGDP	LASTOCK
LPPS		0.4014	**0.0487****	0.9421	0.5910	**0.0705***	0.6226
LGDPpc	*0.4640*		**0.0503***	0.1994	0.8924	0.1735	0.6382
LGEDU	*0.2390*	**0.0091*****		0.3114	0.8204	0.2662	0.1780
SHOCK	0.2245	0.2957	0.5623		0.1855	**0.0204****	0.5626
UKIRATE	0.9335	***0.0711****	0.7929	0.5092		0.2178	0.5503
GEXGDP	**0.0999***	0.6560	0.3463	0.5668	0.6448		**0.0048*****
LASTOCK	0.4536	0.5051	**0.0000*****	0.5970	0.8757	*0.0412***	
ALL	0.1291	**0.0644***	**0.0000*****	0.3997	0.8007	**0.0010*****	**0.0153****

*Denotes the rejection of the null hypothesis of no causality at 90%
**Denotes the rejection of the null hypothesis of no causality at 95%
***Denotes the rejection of the null hypothesis of no causality at 99%

Analysing the overall (joint significance) Granger causality result row (ALL) of savings, no feedback or bidirectional causality exists for monetary savings. For the variable processes,

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monetary savings only bears an influence on government spending on education and government spending overall but has no influence on any of the independent variables in the Cape Colony during the last half of the nineteenth century. Real GDP per capita is statistically significant in the model and mostly influenced by the UK interest rate and government spending on education. Non-monetary savings (Livestock) is jointly statistically significant in the growth-finance model and again indicates the importance of non-monetary savings in the economy.

6. Conclusion

The paper investigates the causal linkages between savings (monetary and non-monetary) and economic growth in the Cape Colony for the period 1850 – 1909. The economic literature provided ample evidence that the improvement in financial systems should contribute to higher savings leading to efficient resource allocation and hence growth.

The empirical methodology is based on the Johansen vector error correction (VECM) framework in order to identify the relationship and the causality. The VECM model found co-integration, and a stable long-term relationship between savings and economic growth during the last half of the nineteenth century. The results of the short-term feedback effect indicated that in the case of real GDPpc there is no automatic adjustment back to equilibrium after a shock, while monetary savings are mostly affected by lagged savings (Savings (t-1)), but with a very sluggish adjustment. This trend was clearly demonstrated in the slow recovery of the Cape Colony after the dramatic international collapse in the wool price in the early 1860s, and later weakening in the terms of trade between the colony and the metropolis. The settler economy experienced limited financial development by the last half of the nineteenth century. Economic recovery depended on exogenous stimuli.

Using the Granger augmented causality test, no causality was found between monetary savings and real GDPpc (neither uni-directional nor bi-directional). In both the finance-growth and the growth-finance models, non-monetary savings (livestock) was found as jointly statistically significant emphasising the importance of non-monetary savings in the economic system. The banking sector was unable to stimulate savings efficiently possibly because of the lack of confidence in the banking sector, although efforts were made to attract savings, as indicated in the historical description of the emergence of a variety of financial services institutions. It was found that the economic shocks that hit the Colony in the mid-1880s affected the financial sector significantly, as the banks were capitalised overseas and responded to the needs of foreign shareholders as a matter of priority. A seriously weakened economic position of the predominantly agricultural population resulted in protracted recovery in monetary savings as well as an inability to grow the most important indirect form of savings, namely livestock. The adjustment period after the financial crises took a very long time, as confirmed by the short-term speed of adjustment coefficient. Furthermore, the real interest rate was mostly negative throughout the period under review, which explains the sluggish domestic monetary savings recovery. Even when the real interest rate returned to positive the expected economic growth as well as monetary savings did not recover significantly. Finally, no causality between monetary savings and economic growth is displayed in the economy of the Cape Colony during the last half of the nineteenth century. This suggests a very immature economy, an under-developed financial system and

no or very little confidence in the banking system. The results imply that by 1909 the Cape Colony has not yet reached the level of sophistication where financial development could affect economic growth. The results also underline the dependence on the agricultural sector of the economy and the dependence on livestock as a store of value or non-monetary savings. GDP growth was fairly consistent overall for the last half of the nineteenth century and relative to other settler economies (Greyling and Verhoef 2015), quite strong, but yet insufficiently diversified to generate broad-based savings across different sectors of the economy. The period since the mineral discoveries (13 years, including the disruption of the economically devastating Anglo-Boer war) was too short to have a notable impact on savings behaviour and the causal relationship between economic growth and savings. A savings-growth comparison with other settler economies for this same period could provide interesting results about either the uniqueness of the Cape Colony or a general world trend on financial integration. This was however not the focus of this paper.

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Appendix A.1: ~~Cape Colony~~ Nominal GDP and GDP % growth in the Cape Colony

	Nominal GDP (Expenditure method)	Nominal GDP %growth		Year	Nominal GDP (Expenditure method)	Nominal GDP %growth
1850	802 326			**1881**	13 595 479	6.38%
1851	768 876	-4.35%		**1882**	13 936 823	2.45%
1852	907 552	15.28%		**1883**	11 407 624	-22.17%
1853	1 228 778	26.14%		**1884**	10 501 194	-8.63%
1854	979 301	-25.48%		**1885**	9 163 773	-14.59%
1855	1 346 936	27.29%		**1886**	10 286 715	10.92%
1856	1 560 098	13.66%		**1887**	10 784 423	4.62%
1857	2 282 675	31.65%		**1888**	12 061 395	10.59%

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1858	2 146 506	-6.34%	**1889**	13 668 953	11.76%
1859	2 523 258	14.93%	**1890**	15 281 076	10.55%
1860	2 641 870	4.49%	**1891**	16 301 139	6.26%
1861	2 687 933	1.71%	**1892**	16 633 895	2.00%
1862	2 354 317	-14.17%	**1893**	17 893 770	7.04%
1863	2 656 684	11.38%	**1894**	18 533 490	3.45%
1864	3 106 743	14.49%	**1895**	22 667 354	18.24%
1865	3 054 451	-1.71%	**1896**	23 970 202	5.44%
1866	3 214 671	4.98%	**1897**	26 213 721	8.56%
1867	3 243 540	0.89%	**1898**	31 054 167	15.59%
1868	2 902 220	-11.76%	**1899**	29 460 250	-5.41%
1869	2 835 055	-2.37%	**1900**	15 813 851	-86.29%
1870	3 250 658	12.79%	**1901**	20 192 713	21.69%
1871	4 256 099	23.62%	**1902**	27 104 104	25.50%
1872	6 813 895	37.54%	**1903**	33 785 911	19.78%
1873	7 398 916	7.91%	**1904**	36 101 407	6.41%
1874	6 762 260	-9.41%	**1905**	41 996 645	14.04%
1875	8 003 416	15.51%	**1906**	51 688 034	18.75%
1876	8 614 759	7.10%	**1907**	52 709 766	1.94%
1877	8 894 406	3.14%	**1908**	48 548 752	-8.57%
1878	8 969 954	0.84%	**1909**	52 082 903	6.79%
1879	9 702 185	7.55%			
1880	12 728 236	23.77%			

~~**Appendix A.2: Augmented Dickey-Fuller unit root test statistics**~~

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Appendix A.2: Augmented Dickey-Fuller unit root test statistics ~~Note: * Denotes significance at the 5% level and the rejection of the null hypothesis of non-stationary. Critical values are~~

Augmented Dickey-Fuller Unit-root tests at levels			
Variables	**Intercept**	**Intercept and trend**	**None: Restricted model**
PPS	-1.1133	-4.2706	0.2955
GDPpc	-1.8916	-3.6122*	0.9537
GEXGDP	-2.6861	-2.6263	-1.1055
UKIRATE	-5.0169*	-5.3687*	-0.36412
ASTOCK	-0.5652	-2.9939	0.7954
GEDU	1.5632	-1.3389	3.3926
MS	-2.2992	-4.2507*	0.5903
Augmented Dickey-Fuller Unit-root tests at first differences			
Variables	**Intercept**	**Intercept and Trend**	**None: Restricted model**
LPPS	-6.6817*	6.6119*	-6.5670*
LGDPpc	-7.1113*	-7.079*	-6.9334*
LGEXGDP	-8.0762*	-8.0531*	-8.1359*
UKIRATE	-6.3158*	-6.5008*	-6.3338*
LASTOCK	-5.2126	-5.1999*	-4.9991*
LGEDU	-7.4443*	-7.9948*	-6.4526*
MS	-6.3323*	-6.2695*	-6.3355*

~~2.9135, -3.4892 and -1.9467 for the first, second and third models, respectively~~

Note: * Denotes significance at the 5% level and the rejection of the null hypothesis of non-stationary.
Critical values are: -2.9135, -3.4892 and -1.9467 for the first, second and third models, respectively

Appendix A.3: VAR Lag Order Selection Criteria

Lag	LR	AIC	SC
0	NA	90.6640	90.9195
1	415.5731	83.6039	**85.6477***
2	**80.9264***	83.3625	87.1947
3	56.6542	83.4276	89.0481
4	44.6457	83.4922	90.9011
5	49.3261	**82.6779***	91.8752

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
AIC: Akaike information criterion
SC: Schwarz information criterion

Appendix A.4: Johansen maximum likelihood co-integration test

Trace Test					Maximum eigenvalue				
Null	**Alt Hyp**	**Model 1 No Intercept, No Trend**	**Model 3 Intercept, No trend**	**Model 4 Intercept, Trend**	**Null**	**Alt Hyp**	**Model 1 No Intercept, No Trend**	**Model 3 Intercept, No trend**	**Model 4 Intercept, Trend**
H_0: r = 0	Ha :r = 1	128.0507 (0.0031)	140.0584 (0.0049)	159.9606 (0.0132)	H_0: r = 0	Ha:r > 0	41.9804 (0.0609)	38.9797 (0.2417)	42.7860 (0.2564)
H_0: r = 1	Ha :r = 2	86.0703 (0.0348)	101.0787 (0.0204)	**117.1746 (0.0540)**	H_0: r ≤1	Ha:r > 1	**33.1929 (0.1193)**	34.5793 (0.1828)	36.4806 (0.2839)
H_0: r = 2	**Ha :r = 3**	**52.87751 (0.1743)**	**66.4994 (0.0894)**	80.6940 (0.1667)	**H_0:** r ≤ 2	Ha :r > 2	21.3956 (0.4265)	26.6318 (0.2836)	29.8999 (0.3326)
H_0: r = 3	Ha :r = 4	31.4819 (0.2819)	39.8677 (0.2273)	50.7941 (0.3792)	H_0: r ≤ 3	Ha :r > 3	18.1897 (0.2613)	17.4187 (0.5442)	18.5532 (0.7620)
H_0: r = 4	Ha :r = 5	13.2922 (0.5968)	22.4489 (0.2742)	32.2409 (0.3755)	H_0: r ≤ 4	Ha :r > 4	8.8179 (0.6149)	13.9428 (0.3697)	14.3825 (0.6893)
H_0: r = 5	Ha :r = 6	4.4743 (0.6423)	8.5061 (0.4130)	17.8584 (0.3535)	H_0: r ≤ 5	Ha :r > 5	4.4269 (0.5616)	8.5056 (0.3296)	10.4239 (0.5736)
H_0: r = 6	Ha :r = 7	0.0474 (0.8585)	0.0005 (0.9835)	7.4344 (0.4014)	H_0: r ≤ 6	Ha :r > 6	0.0474 (0.8585)	0.0005 (0.9835)	7.4344 (0.3014)

Note: r is the number of co-integrating vectors
(Probabilities in parentheses)
*Indicates the first time that the null cannot be rejected

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Tables to be placed:

Table 1: Performance of Life Insurance companies in Cape Colony, 1891 – 1907

	1891	1893	1895	1897	1899	1901	1903	1905	1907
No of policies	18 814	22 534	27 821	31 873	36 123	49 720	66 716	83 010	84 560
Foreign									
Local	9 518	12 526	13 184	15157	16 995	18 524	22 268	23 253	24 939
	9 296	10 008	14 637	16716	19 140	31 196	44 442	59 737	59 621
Assured	£8 734	£10 181	£10 806	£12233	£13 193	£14 766	£18 213	£19 815	£20 936
Foreign	£4 340	£5 590	£5 762	£6 505	£7 217	£8 111	£9 979	£9 938	£10 491
Local	£4 394	£4 591	£5 044	£5 723	£5 976	£6 654	£8 234	£9 876	£10 444

Source: Cape of Good Hope, Colonial Secretary's Ministerial Division: Returns under the Assurance Act, 1891, for the years ended 1891-1907.

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Table 2: Private Bank Activities in Cape Colony, 1850 – 1909

Year	No. of Banks	Amount of Private Bank Paper Currency in circulation £000*	Amount of capital £000	Amount of paid up shares £000	Amount of Credit & Interest, Dividends, Rebate £000^	Amount of Profit or Loss £000^
1850		90				
1851		123				
1852		170				
1853		204				
1854	9	240				
1855	13	275				
1856	17	266				
1857	17	425	900	563		
1859	21	347	1 299			
1861	28	356	1 973	1 124		
1862	29	358	1 982	1 349		
1863	31	290	4 118	2 019		
1866	29	274	4 579	1 526		
1867	27	258	4 505	3 767		
1868	26	222	4 348	1 898		
1869	25	224	3 987	1 733		
1870	25	299	3 813	1 695		
1871	25	959*	3 691	1 555		
1872	24	1 080	4 689	1 517		
1873	21	1 034	5 819	2 834		
1874	19	887	4 710	2854		
1875	19	695	5 117	2 942	102	84
1876	19	480	5 718	2 944	123	105
1877	14	519	5 168	2 457	102	76
1878	12	685	6 144	2 685	116	78
1879	11	721	6 105	2 676	185	88
1880	11	849	9 514	1 795	77	87
1881	11	1 257		2 085	224	99
1882	10	942	6 389	2 032	115	78
1883	11	787	6 403	2 037	72	33
1884	11	709	6 303	1 950	61	36
1885	11	530	6 304	1 950	58	57
1886	11	507	5 761	1 578	46	64
1887	11	463	5 745	1 586	39	30
1888	11	662	6 002	1 710	47	25
1889	11	1 035	6 584	1 763	66	30
1890	7	740	5 781	1 559	41	4
1891	5	490			17[a]	3
1892	4	590			19	0.4
1893	4	1 092				
1894	4	1 130				
1895	5	612			33	0.8
1896	5	762			35	
1897	5	835	7 393	2 935	33	
1898	5	845	7 393	2 935	26	
1899	5	1 120	9 126	3 497	9	
1900	6	1 362	12 167	6 508	74	
1901	6	1 467	12 167	6 508	50	
1902	6	1 583	12 150	6 500	69	
1903	7	1 155	12 994	5 948	46	
1904	7	1 064	12 994	5 948	36	
1905	6	1 065	11 494	4 449	27	
1906	6	1 111	11 494	4 449	27	
1907	6	920	11 494	4 449	24	
1908	6	934	11 494	4 457	19	
1909	6	1 085	11 494	4 457		

Source: Arndt 1928:496 and CCGH: Blue Book: 1850 p421; 1854 p435; 1856 p505; 1857 pU3; 1859 p Z3;1861-1869 p Z4, 1870 -1909 various. Note: Complete information was not published for all the years

* Circulation of Branch Banks are included since 1871

^ Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: pU5

[a] Interest, dividend and rebate not reported after 1891

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Table 3: Population in Cape Colony, 1850 – 1904

Year	Total Population			Employed	%People engaged in:					
	Total	Male	Female	Total	Agric	Manu	Commerce	Prof	Domestic	Indefinite
1850	285 279	141 609	143 670	27 612	81.06	3.55	15.39			90.32
1853	224 827	113 240	111 587	30 943	74.25	3.14	22.61			86.24
1856	267 096			44 055	76.35	3.38	20.26			83.51
1865	566 158	290 966	275 192	130 562	67.19	10.10	5.27	3.58	23.85	64.01
1875	720 984	369 628	351 356	337 914	61.89	7.18	3.94	2.34	24.64	53.13
1880	876 080									
1885	1 252 347									
1889	1 458 823									
1891	1 525 739	766 598	759 141							
1904	2 409 804	1 218 940	1 190 864	1 573 719	64.15	11.30	4.4	2.43	17.71	34.70

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: Various

Table 4: Income and tax per Economic sector in Cape Colony, 1907/08 and 1908/09~~1907-1908~~

	1908						Total		1907
	£51-£300		£301 -£1000		>£1001				
Source of income	No	Amount	No	Amount	No	Amount	No	Amount	Amount
Trade	16 786	2 210 645	2 470	922 135	299	458 244	19 555	3 591 024	737 922
Legal profession	193	37 025	339	154 226	105	123 503	637	314 754	163 320
Medical	127	25 600	312	157 199	55	62 633	494	245 432	97 613
Other professions	1 784	279 850	574	208 674	49	63 379	2 407	551 903	108 808
Public service	17 468	2 582 300	1 447	614 320	83	80 389	18 998	3 277 009	87 461
Other employment	35 426	4 451 975	2 788	1 171 777	211	256 785	38 425	5 880 537	298 060
Hotels	433	72 475	257	110 266	15	14 904	705	197 645	54 763
Farming	20 782	2 072 456	2 721	964 191	383	287 379	23 886	3 324 026	519 020
Rent	843	121 150	2 606	309 294	496	161 745	3 945	592 189	247 167
Interest	992	277 468	3 514	541 746	757	634 479	5 263	1 453 693	697 867
Miscellaneous	3 477	570 056	1 073	69 680	239	51 889	4 789	691 625	67 596
Total	**98 311**	**12 701 000**	**18 101**	**5 223 508**	**2 692**	**2 195 329**	**119 104**	**20 119 837**	**3 079 597**

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope 1909

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Table 5: Number of tax payers and Income per capita of tax payers, 1907/08 and 1908/09

	Income 1908-1909					Income 1907-1908				
Ranges £	No of tax payers 1908	Amount of taxable income 1908	Income per capita 1908	Tax payable 1908	%Tax 1908	No of tax payers 1907	Amount of taxable income 1907	Income per capita 1907	Tax payable 1907	%Tax 1907
< 50	37 072									
51 - 100	47 680	3 576 000	75	23840	0.67%					
101 - 200	35 190	5 278 500	150	35190	0.67%					
201 - 300	15 386	3 846 500	250	15386	0.40%					
301 - 400	5 016	1 732 067	345	16386	0.95%					
401 - 500	2 222	994 271	447	18606	1.87%					
501 - 600	1 402	768 607	548	18803	2.45%					
601 - 700	886	573 407	647	16277	2.84%					
701 - 800	603	451 552	749	14195	3.14%					
801 - 900	391	332 448	850	11149	3.35%					
901 - 1000	286	270 310	945	9534	3.53%					
1001 - 1200	373	407 228	1 092	18876	4.64%	565	625 157	1 106	1 504	0.24%
1201 -1500	327	437 556	1 338	20573	4.70%	404	537 422	1 330	3 336	0.62%
1501 - 2000	234	404 668	1 729	20234	5.00%	340	583 623	1 717	6 091	1.04%
2001 - 2500	107	232 787	2 176	11638	5.00%	150	335 251	2 235	5 072	1.51%
2501 - 3000	51	140 368	2 752	7019	5.00%	78	212 973	2 730	4 086	1.92%
3001 - 5000	76	287 738	3 786	15135	5.26%	111	423 303	3 814	10 324	2.44%
5001 - 10 000	32	216 040	6 751	12310	5.70%	43	286 369	6 660	9 481	3.31%
10 001 - 50 000	4	68 935	17 234	4520	6.56%	5	70 499	14 100	3272	4.64%
Total	**110 266**	**20 018 982**	**41 866**	**289 671**	**1.45%**	**1 696**	**3 074 597**	**33 692**	**43 166**	**1.40%**

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope 1909

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Table 6: Private and Public Saving (PPS) in Cape Colony, 1865 – 1909

	Private Savings £					Public Savings £	Total Savings £
	Private Banks Fixed deposits £	Post Office Savings Bank £	Savings Bank (King Williams Town) £	Government Savings Bank £	Total Private Savings £		
1865	1 026 361				1 026 361	-33 329	993 032
1866	1 026 962				1 026 962	-137 435	889 527
1867	1 098 142				1 098 142	-267 371	830 771
1868	934 044				934 044	-68 706	865 338
1869	724 806				724 806	31 294	756 100
1870	684 165				684 165	58 004	742 169
1871	937 767				937 767	121 588	1 059 355
1872	1 103 664				1 103 664	407 675	1 511 339
1873	1 076 089		742		1 076 831	410 303	1 487 134
1874	1 884 501		-1		1 884 500	615 347	2 499 847
1875	2 379 743		-11 011		2 368 732	567 234	2 935 966
1876	2 615 504		-26 395	8 026	2 597 135	-278 403	2 318 732
1877	2 810 166		-4 452	5 221	2 810 935	-103 922	2 707 013
1878	3 183 966		7 485	2 142	3 193 593	167 737	3 361 330
1879	3 672 156		9 420	10 662	3 692 238	279 832	3 972 070
1880	4 480 986		14 625	1 141	4 496 752	193 880	4 690 632
1881	5 719 004		16 910	260	5 736 174	244 587	5 980 761
1882	5 293 447		7 794	2 553	5 303 794	-383 450	4 920 344
1883	4 814 594		-1 158	3 124	4 816 560	-551 059	4 265 501
1884	3 595 064	92 008	35 663	-2 275	3 720 460	-51 304	3 669 156
1885	2 899 921	80 018	36 497		3 016 436	-308 816	2 707 620
1886	2 467 100	37 778	-51 832		2 453 046	11 785	2 464 831
1887	3 122 698	35 620	-860		3 157 458	178 139	3 335 597
1888	4 326 163	43 986	-36 363		4 333 786	421 562	4 755 348
1889	4 787 596	31 680	-24 405		4 794 871	551 125	5 345 996
1890	2 630 018	151 496	-87 850		2 693 664	-90 373	2 603 291
1891	2 352 048	258 460	1 512		2 612 020	210 481	2 822 501
1892	2 376 996	128 290	4 128		2 509 414	303 338	2 812 752
1893	2 487 257	108 855	17 297		2 613 409	343 868	2 957 277
1894	3 106 898	72 728	25 524		3 205 150	238 436	3 443 586
1895	3 377 487	10 395	24 781		3 412 663	1 152 477	4 565 140
1896	2 920 847	138 563	22 036		3 081 446	537 580	3 619 026
1897	2 709 074	218 187	14 548		2 941 809	-545 779	2 396 030
1898	2 731 713	70 215	610		2 802 538	-485 467	2 317 071
1899	3 581 213	-51 211	1 077		3 531 079	-351 377	3 179 702
1900	4 666 709	248 303	22 403		4 937 415	-32 662	4 904 753
1901	5 046 734	413 572	31 370		5 491 676	432 745	5 924 421
1902	5 519 239	142 502	-3 175		5 658 566	503 180	6 161 746
1903	4 712 029	-250 149	-9 752		4 452 128	-949 011	3 503 117
1904	4 398 780	-170 689	-27 570		4 200 521	-677 195	3 523 326
1905	4 522 166	-246 954	-4 047		4 271 165	5 161	4 276 326
1906	5 257 305	-100 336	5 633		5 162 602	-648 125	4 514 477
1907	5 303 651	-72 334	-7 172		5 224 145	-991 855	4 232 290
1908	4 232 386	-156 998	627		4 076 015	-369 193	3 706 822
1909	3 952 156	-138 970	2 288		3 815 474	-500 000	3 315 474

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: Various

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Table 7: Number of livestock in Cape Colony, 1851 – 1909

Year	Horses (head)	Mules and Asses (head)	Oxen (head)	Milk cows (head)	Sheep (head)	Goats (head)	Pigs (head)	Ostriches (head)
1851	122 750	3 917	191 586	198 899	2 283 232	711 618	21 952	.
1852	122 750	3 917	191 586	198 899	2 283 232	711 618	21 952	.
1853	150 243	7 937	198 542	147 077	5 004 595	786 549	23 140	.
1854	160 704	8 879	181 977	327 156	5 555 253	1 190 103	33 026	.
1855	**143 039**	**9 865**	**159 603**	**303 353**	**6 491 971**	**1 270 809**	**35 139**	.
1865	**226 610**	**24 279**	**249 307**	**443 207**	**9 836 065**	**2 437 444**	**78 666**	**80**
1875	**205 985**	**29 318**	**421 762**	**689 951**	**9 986 240**	**3 065 202**	**116 738**	**21 751**
1885	**226 120**	**58 534**	**365 168**	**926 871**	**11 162 138**	**2 428 894**	**142 479**	**154 215**
1891	**354 133**	**96 345**	**610 866**	**581 978**	**15 194 636**	**5 972 987**	**208 299**	**154 786**
1892	354 133	**96 345**	471 616	800 472	15 194 636	5 972 987	208 299	257 027
1893	267 738	89 557	490 251	761 603	15 164 943	5 037 329	154 103	232 238
1894	252 508	94 773	490 251	761 603	13 354 748	4 340 135	156 570	240 190
1895	254 298	101 743	490 251	761 603	13 726 841	4 314 337	169 205	253 463
1896	242 099	90 407	490 251	761 603	12 274 279	4 155 418	154 076	224 828
1897	235 268	74 312	490 251	761 603	11 851 477	4 397 535	153 240	237 927
1898	238 830	80 720	490 251	761 603	10 780 509	4 510 106	163 550	267 421
1899	**242 594**	**88 244**	**490 251**	**761 603**	**10 673 386**	**4 804 753**	**164 137**	**260 656**
1904	**255 060**	**164 903**	**533 982**	**1 420 408**	**11 818 829**	**7 162 463**	**385 945**	**357 808**
1909	255 060	164 903	533 982	1 420 408	11 818 829	7 162 463	385 945	357 808

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: Various
Census years are in bold

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Table 8: Prices of livestock in Cape Colony and the Value of Livestock, 1851 – 1909

Year	Horses			Mules			Oxen			Milk cows			Sheep			Goats			Pigs			Animal Stock
	£	s	p	£	s	p	£	s	p	£	s	p	£	s	p	£	s	p	£	s	p	£
1850	13	3		12	6		3	8	2	4	8	2		10	2		6	4	1	10	2	
1851	13	8		12	6		3	4		3	3	8	1	1			6	3	1	5	2	5 586 660
1852	13	10		13	6		3	3		5	3	8	1	-			6	7	1	8	2	5 892 080
1853	13	12	6	15	1	-	3	4	6	8	5	9		15	-		8	-	1	14	-	8 133 120
1854	12	13	11	13	10	2	3	12	4	4	2	7		11	6		8	3	1	1	10	7 890 480
1855	13	2	3	14	-	-	3	11	6	3	16	-		10	8		7	9	1	1	3	7 729 190
1856	15	8	4	15	18	8	4	5		4	5			11	6		8	-	1	8	3	8 620 750
1857	17	18		18	-	3	5	9	9	5	1	3		12	6		8	5	1	7	7	9 790 370
1858	19	1	1	17	9	2	6	12		5	16	11		13	4		10	11	1	13	8	10 805 230
1859	20	3	7	19	1	9	8	1	8	7	4	3		17	2		14	11	2	10	6	13 161 580
1860	20	5	1	18	18	4	8	10	3	7	17	-		17	6		14	5	2	5	6	13 500 140
1861	22	2	4	20	8	3	7	7	-	6	16	1		18	2		16	1	2	10	1	13 608 860
1862	20	18	11	19	7	4	8	18	1	8	12	5		18	4		15	2	2	11	3	14 228 120
1863	17	9	4	17	-	-	7	8	1	7	10	2		15	6		13	5	2	-	3	12 080 030
1864	17	11	8	15	14	7	7	2	9	7	11	9		13	11		11	5	2	2	1	11 427 820
1865	15	9	3	11	11	8	6	3	1	6	10	-		12	5		10	11	1	15	10	15 778 260
1866	15	16	9	11	15	7	6	2	4	7	-	4		12	2		10	10	1	17	10	15 962 400
1867	14	3	2	12	3	6	5	12	5	6	-	2		10	4		9	9	1	16	4	13 981 400
1868	13	14	-	10	17	3	5	6	7	6	4	4		9	5		8	10	1	16	10	13 304 730
1869	13	9	6	10	5	10	4	19	7	4	19	7		6	5		8	9	1	12	11	11 103 170
1870	12	8	9	10	8	-	4	18	-	5	3	3		7	6		8	4	1	13	-	11 414 540
1871	15	-	8	15	1	5	7	1	6	6	8	-		10	9		9	11	1	12	1	14 994 610
1872	18	2	8	15	5	7	8	3	8	7	10	6		14	4		11	3	1	12	1	18 401 870
1873	23	4	10	19	3	7	10	12	1	9	7	10		15	6		15	4	2	6	8	22 213 790
1874	27	4	3	23	8	4	11	9	6	10	17	-		17	8		15	-	2	14	11	25 137 350
1875	27	12	-	24	2	-	11	11	-	11	2	-		19	5		19	-	2	5		32 272 560
1876	22	4		21	3		8	19		9	7			16			15		2	5		25 969 310
1877	22	6		19	5		7	17		7	10			17			14		1	18		24 499 040
1878	23	-		20	5		8	5		9	2			16			17		2	2		25 929 000
1879	23	1		20	17		8	12		9	2			17			16		2	3		26 456 380
1880	23	6		22	8		9	-		9	5			18	6		18	-	2	2		27 875 180
1881	22	18		22	3		9	9		9	10			19	-		17	4	2	2	4	28 379 560
1882	22	7		21	9		9	2	6	8	11			18	6		18	11	2	10		27 408 580
1883	20	1		18	17		7	17	10	8	3	1		17	5		16	8	2	11	9	24 499 730
1884	16	14		15	-		6	10		7	6			16			14	6		40	-	22 102 550
1885	13	10		11	-		6	5		7	5			15	9		13	9		41	6	23 454 280
1886	12	7		12	8		4	12		5	14			11	2		10	6		26	2	18 175 100
1887	11	15		9	-		4	10		5	2			9	6		9	8		34	-	16 272 220
1888	11	8		9	5		4	12		5	8			10	2		9	2		34	4	17 292 000
1889	13	1		10	19		5	15		6	2			12	2		9	11		40	-	22 615 700
1890	13	7		11	6	-	6	-		6	9			13	-		9	1		45	1	23 350 060
1891	12	3		10	3	-	5	12		6	6			13	2		9	11		42	7	25 776 180
1892	13	11	-	10	14		5	13		6	8			12	-		9	8		39	9	26 034 750
1893	13	4		10	7		5	8		6	7			11	9		9	7		37	5	23 556 010
1894	12	8		9	17		4	18		5	18			11	3		9	2		37	8	20 756 450
1895	12	11		10	11		4	19		5	18			11	7		9	9		40	8	21 582 450
1896	13	13		15	5		5	12		6	4			13	4		11	2		41	7	22 974 020
1897	16	15		18	18		7	13		7	19			17	-		14	3		45	11	28 709 210
1898	17	2		17	18		9	14		9	17			19	9		17	7		53	5	32 833 790
1899	20	1		19	11		11	4		11	10			22	2		21	9		63	8	38 415 760
1900	21	19		20	6		12	1		13	14			21	6		21	10		48	-	40 570 780
1901	24	10		20	15		13	13		14	10			21	-		21	-		62	-	42 270 650
1902	30	-		25	4		15	15		18	10			24	6		24	1		66	6	50 719 060
1903	28	19		23	11		16	-		18	16			26	3		25	8		67	2	51 989 560
1904	23	19		18	19		11	13		14	8			22	3		21	2		59	9	57 790 100
1905	23	7		18	15		10	19		13	-			22	3		20	-		54	3	54 717 770
1906	23	19		17	19		10	-		13	1			21	8		18	8		54	5	53 483 630
1907	22	12		17	-		9	-		11	15			19	9		16	4		50	5	47 775 450
1908	22	9		16	18		9	-		11	4	-		19	2		15	9		49	4	47 044 610
1909	22	5		16	16		9	3		10	18			18	8		15	5		48	3	47 282 230

Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: Various

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Year	Government Expenditure £	Military Expenditure £	Public Works £	Education Total £
1850	245 655		43 530	3 930
1851	223 116		36 315	3 570
1852	252 495		38 914	4 028
1853	268 111	13 943	49 323	3 972
1854	312 521	35 167	50 532	4 688
1855	360 041	31 499	44 282	5 401
1856	333 151	31 073	26 623	7 329
1857	460 676	50 773	33 670	10 135
1858	505 783	40 467	61 554	14 524
1859	664 645		110 214	19 075
1860	729 690	521 061	153 215	23 620
1861	763 237	504 748	152 099	26 206
1862	683 792	400 860	135 868	29 331
1863	682 866	310 651	93 653	28 329
1864	633 937	260 909	87 244	35 734
1865	870 089	242 165	78 978	42 423
1866	691 733	74 179	47 461	51 951
1867	885 197	103 495	28 489	51 209
1868	668 086	206 808	29 493	51 695
1869	648 732	192 948	26 180	49 542
1870	795 695	132 070	18 445	47 190
1871	764 915	69 076	37 019	51 063
1872	922 568	78 622	49 926	53 609
1873	2 159 658	70 096	1 048 779	59 227
1874	1 357 455	78 530	383 767	65 709
1875	2 272 275		1 298 583	83 859
1876	3 640 532		848 235	116 342
1877	3 667 725		2 358 929	119 659
1878	3 841 595		1 805 876	130 362
1879	3 794 430	464 260	1 831 910	151 094
1880	5 530 688	171 242	1 758 158	163 556
1881	5 673 559		1 486 456	174 678
1882	6 346 453		1 759 534	208 740
1883	5 255 709			210 915
1884	4 108 377	166 186	85 139	201 562
1885	3 804 141	108 644		195 523
1886	3 332 607			203 978
1887	3 260 759			186 508
1888	3 621 019			196 347
1889	5 327 496			202 548
1890	6 436 007			245 317
1891	6 371 220			259 297
1892	5 734 503			280 854
1893	5 823 449			309 480
1894	5 388 157			250 809
1895	6 360 404			276 664
1896	8 637 854	211 264		298 495
1897	8 613 659	275 474		317 127
1898	8 190 124	306 308		354 466
1899	7 773 230		165 248	563 401
1900	10 161 043		171 391	709 680
1901	11 950 745		159 044	767 652
1902	14 149 924		307 378	670 873
1903	14 458 229		242 270	790 106
1904	10 914 785	1 242 429	112 473	792 870
1905	9 603 548		72 346	793 870
1906	10 158 269		60 855	819 417
1907	9 795 169		36 830	849 505
1908	7 938 638		37 484	789 877

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1909	7 250 000			716 000

Table 9:

Government expenditure in Cape Colony, 1850 – 1909

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Source: CCGH: Blue Book for the Colony of the Cape of Good Hope: Various and own calculations

Table 10: Political and economic instabilities in Cape Colony

Period	Instability
1850-1853	Eighth frontier war
1854	Copper mining collapse
1865	Severe banking crash in Port Elizabeth as a result of intensified speculation
1866-67	Economic depression
1867	Discovery of diamonds in Griqualand West on the lower Vaal
1870s	Subjugation of African kingdoms (Anglo-Zulu War, control of Basutoland)
1877	Invasion of the *Zuid-Afrikaansche Republiek*
1881	British annexation of Transvaal and the First Anglo Boer War
1884	Bechuanaland disturbances
1881-86	Diamond bubble and speculation crisis – shares dropped from £400 to £25
1899 -1902	Second Anglo Boer War
1903	Severe drought

Source: C.G.W. Schumann (1938, 63-74)

Table 11: Long-term relations from the VECM: Finance-Growth model

Dependent variable: **LGDPpc(-1)**		
Variables	**Coefficients**	**Elasticities**
LPPSpc(-1)	-0.00000106	-5.974694135
GEXGDP(-1)	8.824685	0.945699212
LASTOCK(-1)	0.000000102	-6.991399828
SHOCK(-1)	-1.144722	0.058700029
C	2.669248	0.426388926

Table 12: Long-term relations from the VECM: Growth-Finance model

Dependent variable: **LPPSpc(-1)**		
Variables	**Coefficients**	**Elasticities**
LGDPpc(-1)	2.567514	0.40951282
UKIRATE(-1)	-0.137529	-0.861605715
LASTOCK(-1)	-7.44E-08	-7.128427064
SHOCK(-1)	0.95176	-0.021472551
C	-0.905947	-0.042897209

Table 13: Short-run dynamics in the Finance-Growth and Growth-Finance models of the Cape Colony

Error Correction:	Finance-growth(LGDPpc)	Growth-Finance (LPPS)
CointEq1	355336.9	**-0.079582**
	[3.00013]	**[-3.08063*]**
CointEq2	70925.74	0.035597
	[1.23839]	[1.56088]

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Table 14: VEC Granger Causality/Block Exogeneity Wald Tests: Finance-Growth model

	Dependent Variable						
	LGDPpc	LGEDU	LPPS	SHOCK	UKIRATE	GEXGDP	LASTOCK
LGDPpc		0.5204	*0.6901*	0.6712	0.4848	0.7112	0.3298
LGEDU	**0.0810***		*0.9609*	0.7902	0.8637	0.8611	**0.0204****
LPPSpc	0.8918	0.2646		0.4035	0.9009	0.2746	0.1361
SHOCK	0.3914	0.5602	**0.0438****		**0.0989***	0.2083	0.7628
UKIRATE	0.6559	0.1750	0.4540	0.1418		**0.0912***	**0.0851***
GEXGDP	0.7597	**0.0231****	0.1330	0.5908	0.4717		0.1862
LASTOCK	0.5873	**0.0000*****	0.4887	0.5234	0.9444	*0.1972*	
ALL	0.6988	**0.0000*****	0.2907	0.5597	0.6951	0.2213	**0.0207****

*Denotes the rejection of the null hypothesis of no causality at 90%
**Denotes the rejection of the null hypothesis of no causality at 95%
***Denotes the rejection of the null hypothesis of no causality at 99%

Table 15: VEC Granger Causality/Block Exogeneity Wald Tests: Growth-Finance model

	Dependent variable						
	LPPS	LGDPpc	LGEDU	SHOCK	UKIRATE	GEXGDP	LASTOCK
LPPS		0.4014	**0.0487****	0.9421	0.5910	**0.0705***	0.6226
LGDPpc	*0.4640*		**0.0503***	0.1994	0.8924	0.1735	0.6382
LGEDU	*0.2390*	**0.0091*****		0.3114	0.8204	0.2662	0.1780
SHOCK	0.2245	0.2957	0.5623		0.1855	**0.0204****	0.5626
UKIRATE	0.9335	***0.0711****	0.7929	0.5092		0.2178	0.5503
GEXGDP	**0.0999***	0.6560	0.3463	0.5668	0.6448		**0.0048*****
LASTOCK	0.4536	0.5051	**0.0000*****	0.5970	0.8757	***0.0412****	
ALL	0.1291	**0.0644***	**0.0000*****	0.3997	0.8007	**0.0010*****	**0.0153****

*Denotes the rejection of the null hypothesis of no causality at 90%
**Denotes the rejection of the null hypothesis of no causality at 95%
***Denotes the rejection of the null hypothesis of no causality at 99%

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Response to reviewer's comments of March 2017.

We thank you for the responses to our paper.

We addressed each comment carefully, as indicated by the numerous track changes in the revised manuscript.

We also moved all the tables to the end to allow the layout technicians to place the tables where required and appropriate.

Thank you for the opportunity to submit our research and for the opportunity to publish in EHDR

Lorraine Greyling ad Grietjie Verhoef