Reigniting Economic Growth: Lessons from three centuries of data

Roy Havemann and Edward Kerby

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Reigniting Economic Growth: Lessons from three centuries of data*

Roy Havemann† Edward Kerby‡

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Abstract

We estimate that since 1701, South Africa has experienced 163 years of per capita growth of more than 1 per cent a year. These expansions include 55 years of sustained per capita GDP growth of more than 3 per cent a year – windfall periods that were related to the discovery of diamonds and gold, global commodity price booms and inclusion into the global economy following the end of Apartheid. These windfalls and expansions are associated with a combination of favourable global conditions and improvements in domestic policy. Empirically, the policies that matter appear to be increased levels of education, infrastructure investment, the extension of civil rights, property rights and financial liberalisation. Windfalls are, however, also associated with significant increases in inequality. Since Union in 1910, average per capita GDP growth has been about 1.1 per cent; and since 1994 (despite the recent contraction) it has been about 1.7 per cent. Over the same period, the population growth rate has slowed to about 1.5 per cent a year, and with falling fertility, this rate is expected to fall slowly to closer to 1.2 per cent over the next decade. This means that maintaining the post-apartheid GDP growth rate would require real GDP growth of about 3.4 per cent. Based on the historical experience, and with the right policy mix, this can be achieved.

1 Introduction

South Africa has advanced politically by disasters and economically by windfalls

CW de Kiewiet, 1941

Is economic growth a smooth inexorable force along a predefined equilibrium saddle path? Or, a bumpy ride of half-baked starts and sudden pauses and reversals? Theory has tended towards the former: countries should grow by some combination of their pre-programmed attributes of labour, capital and technology. There may well be business and financial cycle fluctuations around this trend, but in general growth is smooth and predictable.

In contrast, the emerging market experience, particularly over long time horizons, has tended to be more like the bumpy ride. For Africa, Jerven (2010) finds evidence of periodic growth spurts between 1690 and 2010. Pinkovskiy and Sala-i Martin (2014), for example, demonstrate a 'growth spurt' in Africa from around 1995, which led to a structural decline in poverty.

*This paper has also been circulated as "South African growth accelerations, 1700 to 2050".

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†Research Fellow, South African Reserve Bank and Stellenbosch University and Western Cape Provincial Treasury.

‡Department of Economics, Stellenbosch University, & Laboratory for the Economics of Africa's Past (LEAP)

Hausmann et al. (2005) undertake a cross-section analysis and show that emerging markets experience reasonably regular accelerations. This matters. Policy prescriptions often rely on the idea of a smooth growth path. In such a world, fiscal and monetary policy should respond to this smooth growth path through countercyclical measures. But what if there is a secular boom; or secular stagnation? Pritchett et al. (2017) observes most developing countries experience distinct growth episodes, with periods of acceleration and deceleration as they transition.

The empirical literature has often explained these booms and busts as simply bad management. The Great Depression was was arguably exacerbated by a inappropriate monetary response (Friedman, 1968; Bernanke, 2002). The Asian economic crisis, for example, seems clearly a case of an inappropriate policy stance (a fixed exchange rate), followed by painful and complex economic adjustment (Kaminsky and Reinhart, 1999; Reinhart and Rogoff, 2009, 2014).

Reluctantly accepting the empirical facts, advances in theory have proposed a number of potential reasons for the bumpy ride. The most notable is Aguiar and Gopinath (2007) that, for emerging markets, 'the cycle is the trend'. Their argument is that emerging markets experience regime switches – and in particular that trend growth shocks are the root of fluctuations rather than transitory fluctuations around a trend. In contrast, political economists have argued that an 'institutional' feedback loop from existing economic conditions place pressure on policy-implementation. Pritchett et al. (2017) argues that this creates a feedback loop, which can either be positive, i.e. with economic growth leading to inclusive growth; or negative, with economic growth leading to worsening conditions for further growth by shutting off the inclusiveness of growth and limiting economic opportunity to existing successes. South Africa's history is a notable case study, with examples of both positive and negative feedback loops to examine.

Yet, even for advanced economies there is clear evidence of rapid expansions and declines in growth. Fouquet and Broadberry (2015), for example, show that Europe experienced periodic booms during the pre-Industrial period. In the United States, the long uninterrupted 2 per cent a year expansion described in the literature seems to have hit a rough patch. Hansen (1939) first postulated this notion of 'secular stagnation' which has been revived by Summers (2014).

This literature focuses on the 'boom and bust', but it is also with an empirical regularity that some emerging markets experience periodic, structural upswings with no hangover. Notable examples are the expansion of China and India, or the long expansion of Australia fuelling the growth of it's Asian neighbour.

In South Africa's case we use a data set stretching back to 1700 to identify economic windfalls, and construct a new measure of the financial cycle that begins in 1700 with a turbulent historical backdrop to expand on. Drawing from this new data, we discuss external and internal factors which both amplified the growth cycle, but also limited inclusiveness, offering policy lessons for future growth cycles.

1.1 What can we learn from these long cycles?

The findings in this paper show that South Africa experienced five distinct cycles: an agricultural takeoff in the 1700s and again in the early 1800s, a mining takeoff in the mid - and late 1800s, an industrial takeoff in the 1960s and a services takeoff in the 2000s. Hence, some stylised facts emerge about South African long-run growth which will inform this papers historical analysis:

First we must acknowledge that global growth is the single most important long-run determinant of South African growth. The growth spurts map directly to the three 'industrial revolutions': (1) the First Industrial Revolution (1770 - 1830) or age of improvement; (2) the Second Industrial Revolution (1860 - 1930) or great leap forward; and (3) the Information and Communications Technology (ICT) Revolution (1970 - 2000). *Second*, accelerations are slower than in other emerging markets, both in per capita and in absolute terms. *Third*, accelerations are related to strong increases in exports to GDP. These are often related to substantial increases in global demand. *Finally*, policy and regime changes matter. Apartheid significantly set back growth in a number of interlinked ways, but we show that it had a significant impact on growth during the 1980s. Conversely, the end of apartheid accelerated growth, particularly a series of post-Apartheid reforms. The extent to which these were inclusive is still an open debate.

And the next takeoff? This long-run growth analysis allows for some tentative conclusions. From the outset globalisation and liberalisation appear to have spurred economic growth. Historical examples such as the loosening of the strictures of the Dutch East India Company in the early 1700s to the opening up of the post-Apartheid economy in 1990s, are a central theme, in that opening up to the world helps growth.

Exports of agricultural commodities in 18th and 19th century gave way to mining. Accelerations are correlated with waves of immigration. Strong growth attracted more skills, and a virtuous cycle ensued. Domestic demand drove diversification in manufacturing, with government policy to shield infant industry. The short-term losses were more than offset by longer term productivity benefits as the economy became more competitive and growth in infrastructure sustained the demand.

Given these dynamics, South Africa presents a unique case study in this literature. It is both African country and an emerging market. It is, however, interesting because it has not had significant takeoffs similar to other countries. This paper therefore contributes to three interlinked literatures. The first is the growth literature, particularly in emerging markets. The second is the historical literature, which allows us to weave new empirical evidence into South Africa colonial legacy. The final one is the large literature on 'potential growth'. Our contribution differs from the this literature in that we estimate long-run GDP growth rates in *per capita* terms, rather than potential GDP growth rates in real terms. Our approach is arguably more consistent with the growth literature. Moreover we engage in the historical context of South Africa's evolving institutions over thee hundred years rather than just focusing on quantitative measures of growth.

2 Related literature

2.1 What is a growth acceleration?

Rostow (1959, 1990) popularised the idea of stages of growth, noting that many European countries experienced a 'takeoff' – the transition from a 'traditional society' to a modern-based society. Pritchett (2000) speaks of the 'searching for hills among plateaus, mountains, and plains', and calls them growth transitions. Hausmann et al. (2005) defines the periods of rapid economic growth as 'accelerations'. In their methodology, accelerations are defined as periods where growth exceeds 3.5 per cent a year for at least seven years. Jerzmanowski (2006) uses a Markov-switching approach to find economic accelerations in the empirical literature. Jones and Olken (2008) note 'start-stop' growth, noting that 'all but the richest countries experience both growth miracles and failures'. They use Bai-Perron statistically methods and the Penn World Tables to identify when growth periods take place. Aizenman and Spiegel (2010) calls them 'takeoffs'. Berg et al. (2012) approaches the question from a different angle – noting that emerging markets experience periodic bursts of growth, their question is 'what sustains this growth', that is what predicts growth *duration*. Economic accelerations should be distinguished from ordinary business cycle upswings and downswings. Business cycles are cyclical fluctuations in growth, driven by changes in the terms-of-trade, demand for goods, or international financial conditions. In contrast, economic accelerations are less common, and create long-lasting changes in living standards. For this reason, output data and trade data are not sufficient. This data needs to be overlaid with measures of living standards.

Table 1: Frequency of growth episodes (%)

Decade	Asia	Africa	Mid. E	Europe	Latin A	Other	Total	Episode	Observations
1950's	8.33	6.25	16.67	12.82	3.57	14.29	8.44	13	154
1960's	5.13	3.7	4.48	0.76	2.63	8.7	3.33	23	691
1970's	2.86	2.51	5.26	0	2.66	2.33	2.42	23	952
1980's	4.43	0.56	1.02	2.78	0.92	0	1.56	16	1026
1990's	2.5	1.14	0	4.26	5.26	5.56	2.92	8	274
Total	4.09	1.91	3.61	2.34	2.4	3.55	2.68	83	3097
Episodes	21	18	10	12	17	5	83		
Observations	514	944	277	513	708	141	3.097		

Source: Hausmann et al. (2005).

2.2 How often do they occur?

Economic accelerations are relatively infrequent, taking place approximately twice a century (Aizenman and Spiegel, 2010; Pritchett, 2000). Summarised in Table 1 above, Hausmann et al. (2005) use a data set for a total of 110 countries during the 36 years between 1957 and 1992. They find that only 54.5 % of their sample had experienced at least one growth acceleration, while 20.9 % have experienced two accelerations.

2.3 Why do they occur?

The economic acceleration literature talks of 'preconditions' – i.e. political, economic, social and technological changes that create the right conditions for a spurt of economic growth. Takeoffs are also often synchronised, that is that many countries experience accelerations at the same time. Hausmann et al. (2005) notes growth accelerations tend to be correlated with increases in investment and trade, and with real exchange rate depreciations. Political-regime changes are statistically significant predictors of growth accelerations. External shocks tend to produce growth accelerations that eventually fizzle out, while economic reform is a statistically significant predictor of growth accelerations that are sustained. However, growth accelerations tend to be highly unpredictable: the vast majority of growth accelerations are unrelated to standard determinants and most instances of economic reform do not produce growth accelerations.

2.4 The approach in this paper

The approaches discussed above are arguably not appropriate for the South African context. For one, South Africa has had only one economic acceleration large enough to qualify by the measure proposed by Hausmann et al. (2005) (average per capita PPP growth of more than 3.5 per cent for seven years), during 2000 – 2009. We therefore adjust the threshold for South Africa downwards, and use a threshold of 3.0 per cent for the growth acceleration:

- *Acceleration* $\dot{y}_t > 3.0\%$ for at least seven years
- *Expansion* $1.0 < \dot{y}_t < 3.0\%$ for at least seven years

For example, the doubling in per capita GDP from the end of the Second Boer War (1902) to the beginning of the Second World War (1939) is a significant growth expansion, but it was slow and steady. Per capita growth averaged 1.9 per cent, close to the US long-term average of 2 per cent.

3 Methodology

Our research question is: what are the factors that significantly raise South African economic growth, and raise it for a sustained period?

$$P(acceleration_t) = \beta_0 + \beta_1 X_t \tag{1}$$

where $P(acceleration_t)$ is the probability of an acceleration at time point t, as a function of a constant β_0, and a vector of variables $\beta_1 X_t$ with values at time t.

The vector of variables is drawn from the standard list in the growth literature; *viz.* measures of political and economic rights, political stability (e.g. political fragmentation) education (i.e. enrolment rates, years of education), financial deepening, investment rate and infrastructure investment

This paper is considering a single country. Many of the standard growth variables in the literature control for the nature of country (e.g. distance from sea, ethno-linguistic fragmentation, and so forth). Here, the country is fixed but we are considering a very long period of time.

4 The data

Data over such a long period is difficult to compile. There have, however, been a number of attempts to construct long-run South African data, and we build on these heroic attempts. South African economic history, and by extension the data, divides relatively neatly into six periods:[1] *(i)* the pre-colonial period (prior to 1652); *(ii)* the Dutch Colonial Period, stretching from 1652 to the first British Occupation in 1795; *(iii)* The British Colonial Period (1806 to 1910 – excluding the interregnum between 1795 and 1806); *(iv)* Union of South Africa in 1910 to the election of the National Party (1910 to 1948); *(v)* National Party rule to democracy (1948 to 1994); *(vi)* The democratic period (1994 onwards).

4.1 Data on GDP per capita

In the next few sections, we briefly summarise the existing data sources. Unfortunately, pre-colonial data is still particularly difficult to find, and so we begin with the Dutch Colonial period. At the end of the section, we collate the various data sources to present a consolidated per capita GDP, population, export and inequality indices for the period 1700 to 2017.

4.1.1 The Dutch Colonial Period, 1652 – 1795

Fourie and Obikili (2019) provide a careful comparison of the different approaches to long-term data collection. A particular challenge in the South African context is the poor data on black South Africans.

[1] See, for example, the discussion in Terreblanche (2002)

For example, agricultural output figures include only white farms. That said, economic statistics are not the only source of information, and they note the use of complementary data sets to measure living standards, including anthropometric statistics.

The careful collation of statistics on exports, imports, prices, production and population contained in Ross and van Duin (1987) form the basis of most of the GDP series constructed for the Dutch Colonial Period. Their estimates form the basis for Fourie and Van Zanden (2013), who use a system of national accounts framework to calculate income and production in the eighteenth century Cape Colony. In terms of their estimates, the total population of the Cape rose from 4,500 to nearly 50,000 by 1795. Gross domestic product is estimated using the output approach, summing value added in agriculture, 'government', industrial activies (e.g. beer brewing and construction) and other services. During this period, the 'government' was the Dutch East India Company, the main administrative entity for most of the duration of the period. The estimates from Fourie and Van Zanden (2013) should be read together with similar exercises to collate data on wages (Du Plessis and Du Plessis, 2012; De Zwart, 2013), monetary statistics (Havemann and Fourie, 2015; Swanepoel, 2017) and the wealth estimates contained in Fourie (2013). Fourie and Van Zanden (2013) form the basis for the South African component of the Maddison project,[2] and this provides a broadly comparable data set for a reasonably long period.

4.1.2 The British Colonial Period, 1806 to 1910

The period between 1795 and 1806 was particularly turbulent. In 1795, France occupied the Netherlands. Seeing an opportunity, Great Britain occupied the Cape until 1803. Under the Treaty of Amiens, the British returned it to the Batavian Republic (the Batavian Republic was the Revolutionary period Dutch state). This was relatively short lived. The British invaded again in 1806, and from 8 January 1806 onwards, the Cape was a British Colony. Just over a century later, on 31 May 1910, the Cape Colony merged with three other territories, to create the Union of South Africa. These three were under British control, having previously been in Dutch/Afrikaner control: the Transvaal and the Orange Free State had been under local Afrikaner control until the end of the Second Boer War. Natal became British much earlier – in 1843.

To have any appropriate data for nineteenth-century 'South Africa', it would be necessary to construct GDP and population series for both settler and local territories. This is a monumental task – the borders of the settler territories were deeply porous. Indeed, famously, there was an outflow of people from the Cape Colony to Natal, the Orange Free State and the Transvaal from approximately 1838 onwards. While this was more correctly a series of waves of families moving north, often only a few hundred kilometres from Cape Town, it has commonly become known as the 'Great Trek'.

[2]This project has collated growth data for 167 countries back as far as 1400 in some cases. This provides a relatively comparable data set across countries.

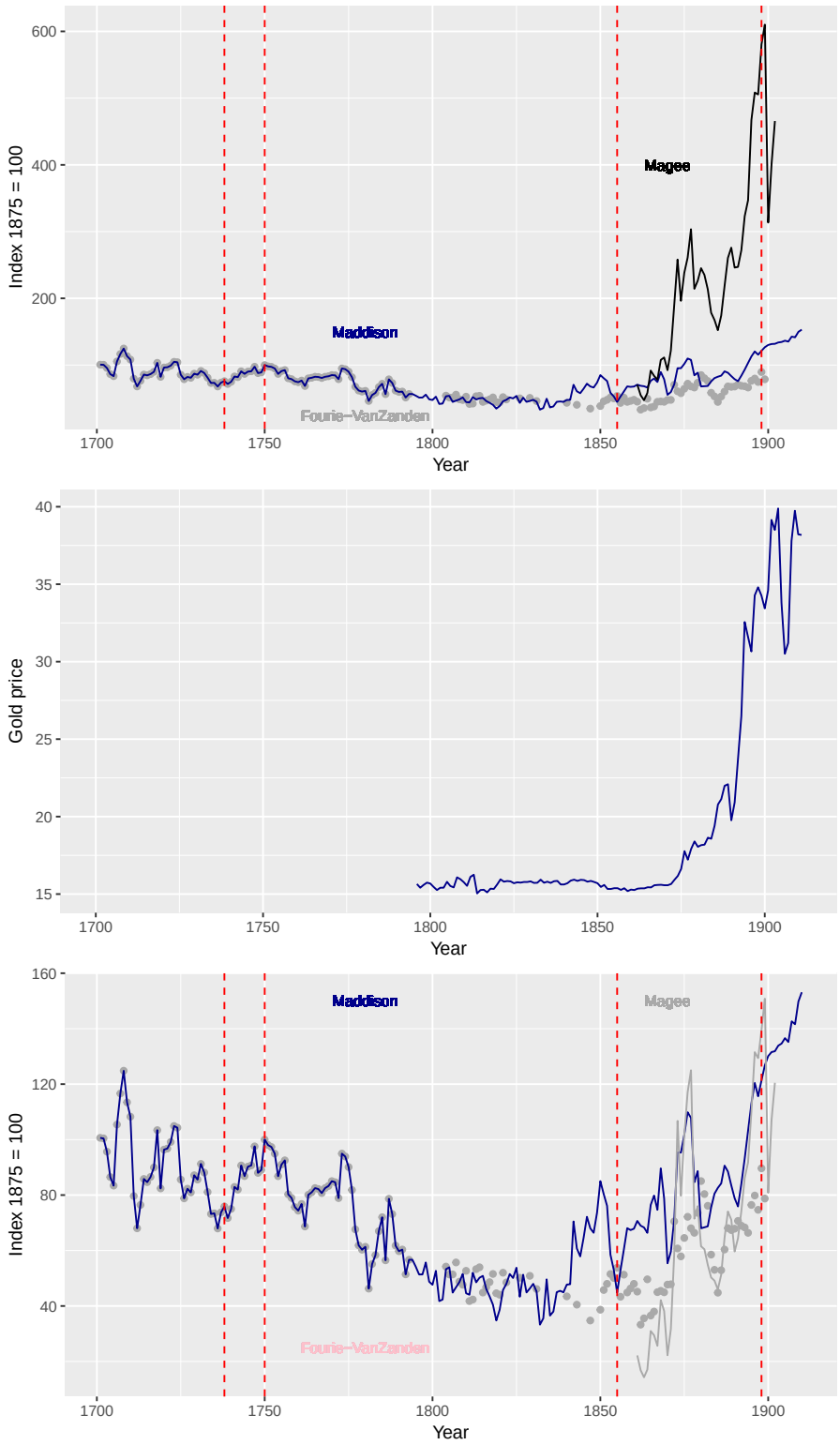

Figure 1: *Pre-Union per capita GDP*

Note: The figure compares three per capita data series for pre-Union 'South Africa' – (1) Fourie and Van Zanden (2013) (2) Bolt et al. (2018); and (3) Magee et al. (2016). Fourie and Van Zanden (2013) form the basis for Bolt et al. (2018), and hence are similar. Magee et al. (2016) is in turn based on Greyling and Verhoef (2015). The unadjusted Magee et al. (2016) data suggests a substantial jump in output per capita (*top panel*). This appears to be largely explained by a spike in the gold price towards the end of the nineteenth century (*middle panel*). Once the Magee et al. (2016) data is adjusted for this spike, the three estimates show relatively similar trends (*lower panel*).

Borders were also movable, and, to say the least, contentious. On the eastern border of the Cape, between 1779 and 1879 there were a series of war between settlers and the various local Xhosa-speaking kingdoms. Similarly there were a series of wars between settlers and the local community in the area now known as KwaZulu-Natal.

Against this background, we date the 'British Colonial Period' as being 1806 to 1910, and focus only on the Cape Colony. Despite these significant challenges, there is a relatively impressive set of attempts to collate macroeconomic statistics for this period. These contributions have been in three areas: GDP estimates, trade estimates and population estimates. We discuss each of these next.

The Cape Colony and Natal Statistical Yearbook form the basis of a number of estimates, particularly those in Greyling and Verhoef (2015); Magee et al. (2016). Greyling and Verhoef (2015) construct their estimates mid 1800s for both the Cape Colony and Natal, while Magee et al. (2016) use these estimates to compare living standards in the South African colonies to those in the Australian territories. This provides an opportunity to benchmark GDP estimates for two very different environments, in a way that provides insights into both. Fourie and Van Zanden (2013) also compile data for this period, and provide point estimates of economic output at particular periods. This work feeds through into the collated Maddison project database. That database smooths the data to create an extrapolated smoothed series for the period (Bolt et al., 2018).

In Figure 1, we compare the three estimates – Fourie and Van Zanden (2013)'s point estimates, the Maddison smoothed estimates (Bolt et al., 2018) and the Greyling and Verhoef (2015); Magee et al. (2016) estimates. It is immediately apparent that the latter shows a substantial and somewhat surprising *quadrupling* of output per person in the last decades of the nineteenth century. It was an extraordinary period – the gold rush certainly caused living standards to rise. However, the estimates of the other two researchers suggest a strong rise of about 20 per cent in output per person. Moreover, while output grew substantially, population also grew as Johannesburg was deluged with immigrants coming to find their fortune. It appears that the increase in growth estimated by Magee et al. (2016) is almost entirely due to the booming gold price. It does seem that the researchers have inadvertently calculated a nominal output series. By adjusting their estimates for the price of gold (as a proxy for output prices), the three sets of estimates are now more similar. As a result, the Maddison numbers appear to be the most reliable, and these are the ones used in the analysis.

4.1.3 1910 to 1948

For the period 1911 to 1950, we use a combination of data sets. Statistics South Africa was created with Union in 1910, and economic data was compiled, albeit not along the scheme used in the post-War period (Keynes had not yet even published *The General Theory*). In 1960, on the silver Jubilee of the

Union, the Bureau of Census and Statistics published the 'Union Statistics for Fifty Years'. It contains extensive data on population by race and employment status. In particular, data is published for per capita GDP in local currency (the South African pound). The GDP series constructed by Boshoff and Fourie (forthcoming) provides a useful starting point. However, two additional data sets are particularly useful – (i) the exports to GDP series found in Reinhart and Rogoff (2014), which is based on the data in Page (1919).

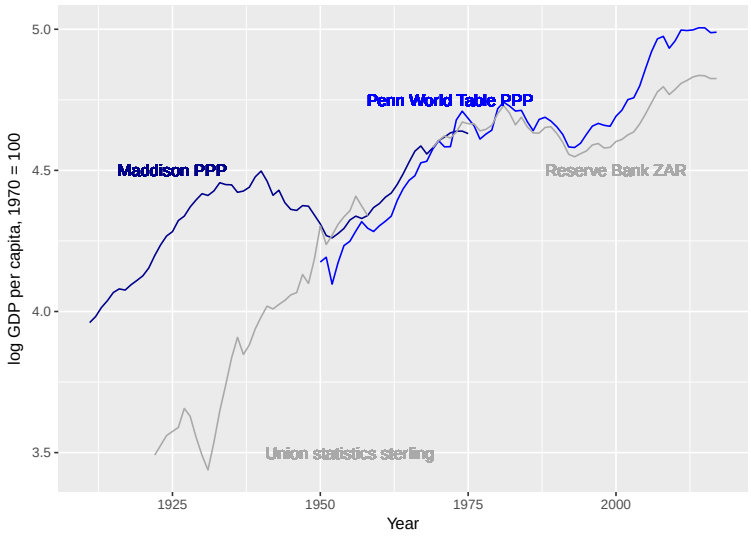

Figure 2: *Post-Union data*

Note: Here we present four post-Union estimates of GDP per capita series: two purchasing power parity series Maddison project and the Penn World Tables, and the official local currency estimates. For 1922 to 1958 from the Union Statistics, and from 1969 onward from the Reserve Bank. The significant divergence between the PPP and local currency series is due to the substantial currency misalignment during the 1930s, due mainly to South Africa being a net gold exporter.

4.1.4 1948 – present

The Second World War ended in 1945, ushering in a period of peace and prosperity. The War also led to significant improvements in data collection and collation. For this reason, international statistical data from around 1946/1947 is relatively consistent and comparable. For South Africa, the period is most notable for the 1948 election, which saw the National Party come into rule. The data for this period is substantially better than previous periods. Annual data from 1947 is published by the South African Reserve Bank. A detailed explanation of this data can be found in their publication South African Reserve Bank (2010). The Penn World Tables project[3] provides consistent data for a cross section of countries from 1950 onwards. This includes critical growth variables for South Africa such as GDP per capita in purchasing power parity (PPP) terms. while the International Monetary Fund data and the IMF data from the package *IMFdata*. The Reserve Bank Quarterly Bulletin provides a

[3]The Penn World Tables data set used in this paper is from the *R* package *pwt*

consistent, usually quarterly, series across all variables, and the scheme adopted in 1960 is still largely the template for the quarterly updates that the Reserve Bank publishes in the modern era. This gives nearly sixty years of data, or 240 data points. This provides a very useful data set for the modern era, and most of the work on modern South African economic growth uses this data set. In Table 2, we provide summary statistics on the growth per capita in PPP terms, in nominal rand terms (from 1970 onwards) and compare it to population growth. The decline in population growth is particularly notable, as is the two 'good' decades (the 1960s and the 1990s) – whereas the remaining period of economic growth was pedestrian at best.

Table 2: Summary of Post-union economic growth

Decades	PPP	ZAR PC	Pop. growth	PPP + Pop
1911-1919	1.8			
1920-1929	2.9			
1930-1939	0.8			
1940-1949	-1.3			
1950-1959	0.9		2.5	3.4
1960-1969	3.0		2.7	5.7
1970-1979	0.8	0.8	2.7	3.5
1980-1989	0.4	0.0	2.4	2.8
1990-1999	-0.2	-0.7	2.1	1.9
2000-2009	2.8	1.9	1.2	4.0
2010-2018	0.7	0.6	1.3	2.0
Post-Union				
1911-2017	1.1			
Post-Apartheid				
1994-2017	1.7	1.1	1.4	3.1
Accelerations*				
1922-1930	3.0			
1960-1970	3.2		2.7	5.9
2000-2008	3.6	2.4	1.3	4.9

* See discussion below

4.2 The accelerations: growth $>$ 3.0 per cent

The six accelerations are presented in Figure 3. The diamond boom and the gold boom stand out as substantially larger than all the other economic accelerations in South African history. GDP per capita doubled during the six short years of the diamond boom. Interestingly, the gold boom of 1891 to 1897 was less significant, with per capita GDP rose by more than half from 1891 to 1897. The remaining four accelerations were all between 3 and 3.6 per cent.

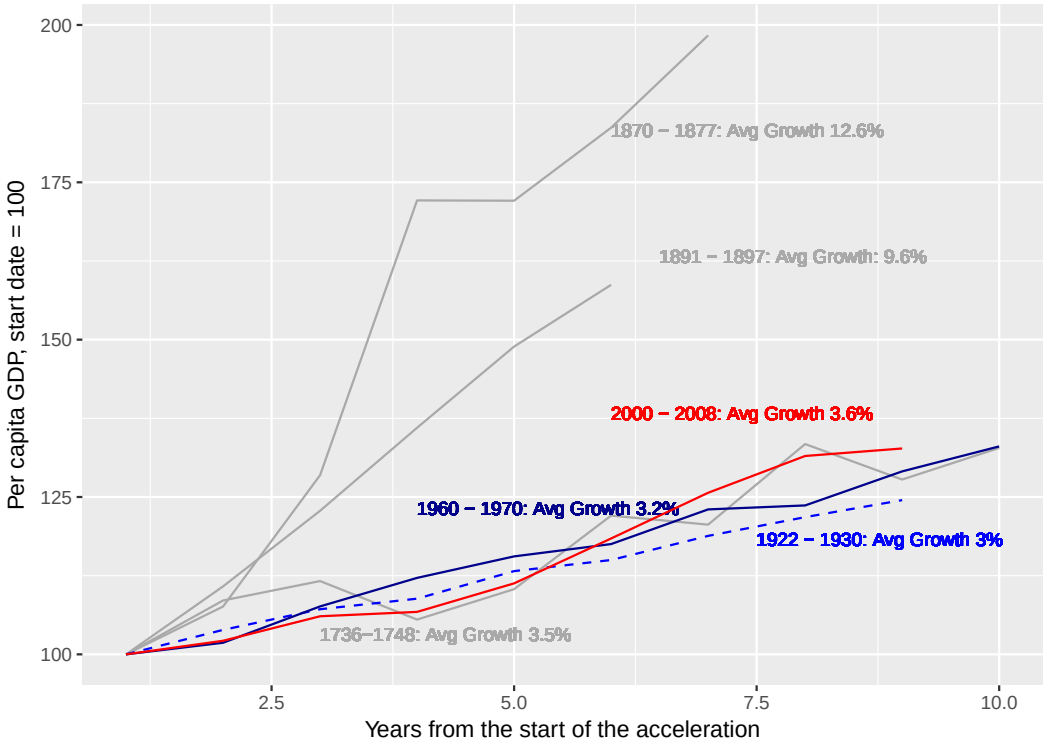

Figure 3: *The six accelerations*

Note: The figure presents the six identified economic accelerations. The accelerations are defined as period of per capita GDP growth of more than 3 per cent for a minimum of 7 years. Given the data issues, the three pre-Union accelerations are indicated in grey

The results are presented in two parts. First, we discuss each acceleration in some detail, where possible drawing lessons for future accelerations. Secondly, we undertake econometric analysis of the determinants of the accelerations. The methodology requires *periods of acceleration* – at least seven years of growth averaging over 3 per cent. There could also be short-lived accelerations, and short-lived expansions. In Table 3, we separate out the data set into 'sustained accelerations', 'short accelerations', 'expansions', and 'stagnations'. Overall, from the table it is clear that the frequency of accelerations has increased. Over the entire sample period, South Africa only experienced 55 years of sustained economic accelerations, 17.4 per cent of the time. In the post-Apartheid era, sustained accelerations were experienced 37.5 per cent of the time. Approximately half of the post-Apartheid period has seen per capita GDP growth of more than 1 per cent; a similar percentage is seen for the post-War period; while post-Union there have been more expansion years.

Table 3: Accelerations, expansions and stagnations

		Years	Total years	% of years
Full sample				
Sustained acceleration	Growth > 3% for at least 7 years	55	317	17.4%
Short acceleration	Growth >3%	109	317	34.4%
Expansion	Growth > 1%	163	317	51.4%
Stagnation	Growth < 1%	153	317	48.3%
Post Union (1910 onward)				
Sustained acceleration	Growth > 3% for at least 7 years	28	108	25.9%
Short acceleration	Growth >3%	29	108	26.9%
Expansion	Growth > 1%	62	108	57.4%
Stagnation	Growth < 1%	46	108	42.6%
Post War (1946 onward)				
Sustained acceleration	Growth > 3% for at least 7 years	20	72	27.8%
Short acceleration	Growth >3%	22	72	30.6%
Expansion	Growth > 1%	36	72	50.0%
Stagnation	Growth < 1%	36	72	50.0%
Post Apartheid (1994 onward)				
Sustained acceleration	Growth > 3% for at least 7 years	9	24	37.5%
Short acceleration	Growth >3%	8	24	33.3%
Expansion	Growth > 1%	12	24	50.0%
Stagnation	Growth < 1%	12	24	50.0%

4.3 Additional data

We now attempt to make additional data available about the social, political and economic basis for the growth episodes. At the outset we noted that data over such a long period is difficult to collect, and then harmonise over the evolution of South Africa's political economy. For example even recent economic history has been limited by inaccessible or embargoed apartheid sources (Mariotti and Fourie, 2014). Although imperfect we present this additional data by motivating its historical significance and highlighting its limitations. This is then summarised in Figure 6.

4.3.1 Global growth

Global growth estimates are derived from the Maddison and Penn World Tables. Global growth is assumed to be a function of trading partners – the structure of South African trade was particularly

skewed towards the United Kingdom, although in recent years strong demand from Asia for gold and metal related products has stimulated demand. We create a global economic indicator, comprising the United Kingdom, the United States and China. This indicator is weighted according to the relative shares of three countries over time. Various growth rates are calculated from this index – in particular, a straightforward annual growth rate and a moving average of growth over the preceding seven years (to align with our definition of accelerations).

4.3.2 Inequality

South Africa has a particularly unequal distribution of income, related to the historic political and economic disenfranchisement of the majority of South Africans. A discussion on economic growth in South Africa cannot take place without a discussion on the distributional effects of this growth, particularly the racial distributive effects. Some research on this shows that per capita distribution by race is substantially different as shown in Table 4. More recent research by Leibbrandt et al. (2010) suggests this disparity in per capita income has increased between 1993 and 2008. Moreover, Seekings and Nattrass (2015) note how in this period race has ceased to be the only factor in structural income inequality in South Africa, with class, based on access to employment, replacing racial discrimination.

Table 4: Per capita income by race, 1917 to 2008 (2000 Rands)

	Whites	**Coloureds**	**Indians**	**Blacks**	**Average**
1917	R 13 069	R 2 875	R 2 894	R 1 184	R 5 006
1924	R 13 853	R 2 770	R 2 694	R 1 099	R 5 104
1936	R 19 212	R 3 000	R 4 443	R 1 462	R 7 029
1946	R 26 252	R 4 280	R 6 037	R 2 331	R 9 725
1946	R 30 494	R 5 158	R 6 668	R 2 627	R 11 237
1960	R 31 230	R 4 977	R 5 340	R 2 532	R 11 020
1970	R 39 217	R 8 184	R 9 595	R 3 133	R 15 032
1975	R 44 242	R 8 630	R 11 244	R 4 479	R 17 149
1980	R 46 670	R 8 822	R 13 296	R 5 107	R 18 474
1985	R 48 370	R 9 855	R 15 113	R 5 423	R 19 690
1990	R 51 951	R 11 404	R 17 637	R 6 008	R 21 750
1995	R 53 840	R 12 722	R 20 592	R 6 704	R 23 465
2000	R 62 360	R 14 126	R 23 938	R 7 283	R 26 927
2008	R 75 297	R 16 567	R 51 457	R 9 790	R 38 278

Source: van der Berg and Louw (2004) and Leibbrandt et al. (2010).

4.3.3 Property rights

South Africa has a complex history of property rights which adversely impacted growth, exacerbating racial inequality and political rights over subsequent centuries. Beginning with the VOC, who intended the Cape to merely be a refreshment station, evolved into the *de facto* colonisers, creating a property rights system at the expense of the indigenous population.[4] On 21 February 1657, nine 'free burghers' received grants of 15 morgen of land (11.5 ha), tax-free for twelve years. They could cultivate any crop, except vegetables and tobacco. Importantly the property could be mortgaged for credit, mainly to buy subsidised farming implements or guns, effectively entrenching dominion. Duly (1965) explains how VOC land tenure, and continued by the British, with its loan places, was the most extensively used to force indigenous peoples from the land. From around 1713 onward Farmers leased farms (for a fee), obtaining relatively large areas of land – a minimum of 6,000 acres (2,420 hectares). In 1732, these rights over indigenous lands were strengthened in favour of the colonisers, creating long-lease, and improvements could be sold but not the underlying property. In 1743, Van Imhoff allowed the conversion of these long leases to essentially freehold with no rights for the indigenous populations.

The British further expedited the loss of native land tenure. In 1809, DuPre Alexander, second Earl of Caledon, a "seeker of order" was the first British governor to challenge the existing system, and control "Hebraic-like culture of the Boers".[5] Sir John Francis Cradock, his successor in 1813 enacted wide ranging reforms with the conversion of loan places to a Perpetual Quitrent Proclamation. McLachlan (2019) explains how this racially discriminatory legislation disregarded the rights in land conferred on indigenous communities by their customary law system. Instead it formalised non-indigenous settlers grazing land by a 'sworn surveyor' in order to convert their loan places into perpetual quitrent places, limiting access to new land for the boers until they had been brought into the Imperial land system.

While apartheid is often made the culprit when explaining an unequal distribution of land, the colonial period created all the elements required for territorial separation, and its division came into sharp focus at the turn of the 20th century. The starting point for this form of social engineering using spatial policies was the Lagden Commission.[6] This commission recommended the enactment of the Native Reserve Locations Act in the Cape (1902), The Native Locations Act in Natal (1904) and the Orange Free State Municipal Ordinance (1903). These acts were imposed before Union in 1910 as the government tightened urban segregation, giving "the native location [homeland] regular status on the South African landscape."[7] However, the most infamous legislative innovation of the new Union government was the Land Act of 1913.[8] The Act is placed in its historical importance with a quote from the black intellectual

[4] McLachlan (2018) provides an extensive discussion on the development of land rights in the Cape. As the Cape expanded, there was pressure to provide security of tenure for non-indigenous settlers.
[5] Duly (1965, p. 358)
[6] Freund (2011, p. 241)
[7] Davenport (1991, p. 2) notes that this commission formalised the African reserves before apartheid.
[8] Prohibiting Africans from buying or hiring land in 93 % of South Africa.

Sol Plaatje:

> *"[...] awakening on Friday morning, June 20th, 1913, the South African Native found himself, not actually a slave, but a pariah in the land of his birth."*[9]

The 1913 Land Act is widely held as the catalyst for racial segregation in the towns and native reserves of South Africa, however, a series of other pieces of legislation continually reduced the legal rights of various non-white groups. These included the Development Trust and Land Act of 1936, the Black (Urban Areas) Consolidation Act of 1945, the Coloured Persons Settlement Areas Act of 1946, and the Asiatic Land Tenure Act of 1946. And finally the Group Areas Act, no. 41 of 1950 forcing all population groups into their relevant restricted areas.

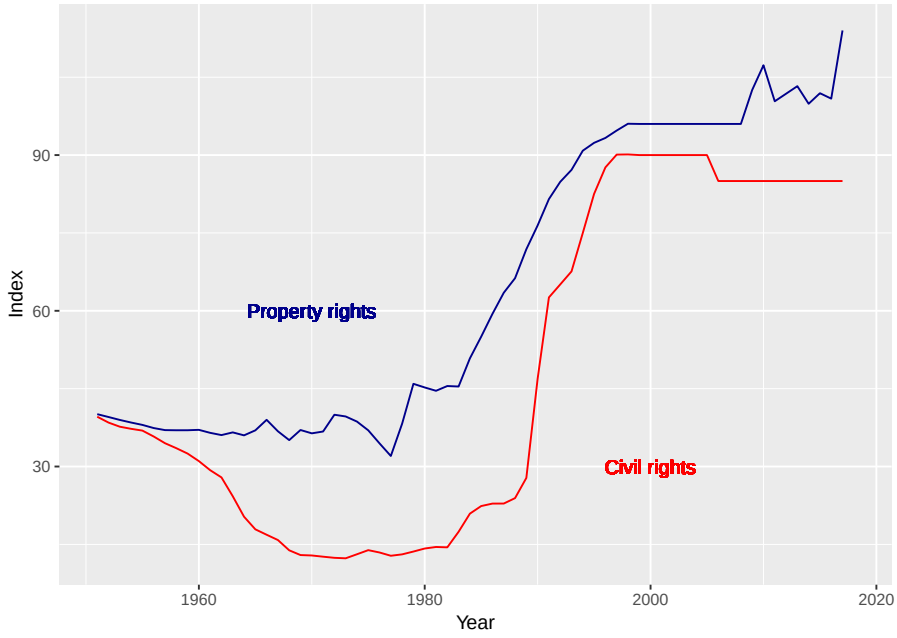

Figure 4: *Property rights and civil rights in South Africa*

Source: Fedderke (2001)

To illustrate this, Fedderke (2001) creates a series for property rights, taking into account these various political developments. Their series extends from 1950 to 1998. Following their methodology, we update the property rights index to 2017 in Figure 4. Their approach defines ownership based on two factors – the availability of the land to a racial grouping, and the population distribution between the groupings. Furthermore, following their definition, we apply the methodology to pre-1950 data. Although not a perfect measure, prior to 1950, local authorities owned the majority of land made available for the occupation of racial categories other than Whites, leasing rather than selling it to Blacks thereby restricting access to property rights.[10]

[9] Solomon Tshekisho Plaatje, (9 October 1876 -19 June 1932). Cited in Tatz (1962)
[10] Fedderke (2001, p. 119)

4.3.4 Civil and political rights

A feature of the South African history of civil and political rights is that these have varied over time. Similar to property rights, civil and political rights were withdrawn by successively more repressive governments, and then expanded as South Africa shifted to a democratic system.

Five major political events led to substantial changes in civil and political rights. These five are: (i) the control of the Cape by the VOC; (ii) the introduction of domestic government in the Cape (in 1853, and then extended in 1872); (iii) the Union in 1910; (iv) the election of the National Party in 1948; (v) the transition to democracy in 1994.

During the VOC period, local inhabitants had limited political rights. The change to British control in 1806 changed the nature of government, but did not necessarily bring with it substantial increase in domestic political rights. The Cape was under the control of a British Governor during the first British occupation (1797 – 1803), and then again during the second, from 1806. However, in 1853, the British colonial administration introduced representative government. Although there were elections, the Colony was still under the control of a British Governor. In the 1853 system, the Cape Qualified Franchise, all males with property of at least £ 25 could vote or stand for election.

In 1872, with the introduction of 'responsible government' came the first election of a Cape Prime Minister, John Molteno. Responsible government was also non-racial (although still only men with some property could vote). The £ 25 rule included Xhosa communal land, and was not regarding as particularly binding. From 1872 onward, however, there was a gradual erosion of rights for non-white males. The annexation of the Xhosa-speaking Eastern Cape brought with it many more voters. The Cape Parliament was the scene of vigorous debate on the rights of non-whites, essentially between the liberals Cape Town voices of Molteno and his close ally, Saul Solomon; and a more conservative group from the Eastern Cape, led by Gordon Sprigg, and supported by Cecil John Rhodes.

A series of restrictions were introduced – Cape Parliamentary Registration Act of 1887, the Cape Franchise and Ballot Act of 1892, and the Glen Grey Act of 1894. These eroded voting rights related to communal land – indeed the Glen Grey Act introduced individual land tenure, rather and communal land tenure, and introduced a labour tax to force rural Xhosa men to work on farms and the mines (this is not to be confused with the Natal hut tax of 1857).

The Union of 1910 fundamentally altered rights. Although the Cape had had a system of non-racial franchise, the other three colonies did not. (Feinstein, 2005) notes that in the pursuit of political unity, 'equality before the law' which had been paramount in earlier Cape and Natal British policy in the Cape and Natal in the nineteenth century was discarded. The Constitution of the union (the South Africa Act of 1909), allowed the Cape to keep some residual elements of the franchise for Africans and coloureds, but they were too limited by educational and property qualifications to be of much consequence.

In the 1948 the National Party came to power through a narrow electoral victory in 1948 which

precluded Africans from the franchise. The post-1948 period was associated with a particular form of *'Grand Apartheid'*, synonymous with nationalist ambitions, such as the removal of African people from white areas and the creation of African homelands (Feinstein, 2005). Posel (2011) notes how from the beginning, the project was "animated by a hankering for rigorous and uncompromising social, economic and political order, which entailed a process of institutional refashioning."

By the 1980s, the administrative and defence costs of implementing apartheid were enormously costly and ultimately collapsed because of the inefficiencies created by the racist policies (Lowenberg, 1997). The political and economic reform which began incrementally in the late 1970s, culminated in the 1990s with the dismantling of the apartheid system, and the democratic election of a black majority government in 1994.

4.3.5 Population

Population estimates for the early 1700s are from Ross and van Duin (1987), which feed through into the Maddison project data.

Reinhart and Rogoff (2011) use data from Page (1919) and elsewhere to construct a long-term debt-to-GDP analysis.

4.3.6 Infrastructure

There is a well-established literature on the interrelationship between infrastructure and economic growth (Barro, 1990; Banerjee et al., 2012). Perkins et al. (2005) collates extensive infrastructure data from 1870 to 2005, which we present in Figure 5. This can be complemented by data from the Blue Books, and the Ross and van Duin (1987) information that collates the role of state, together with information from Page (1919) and Reinhart and Rogoff (2011).

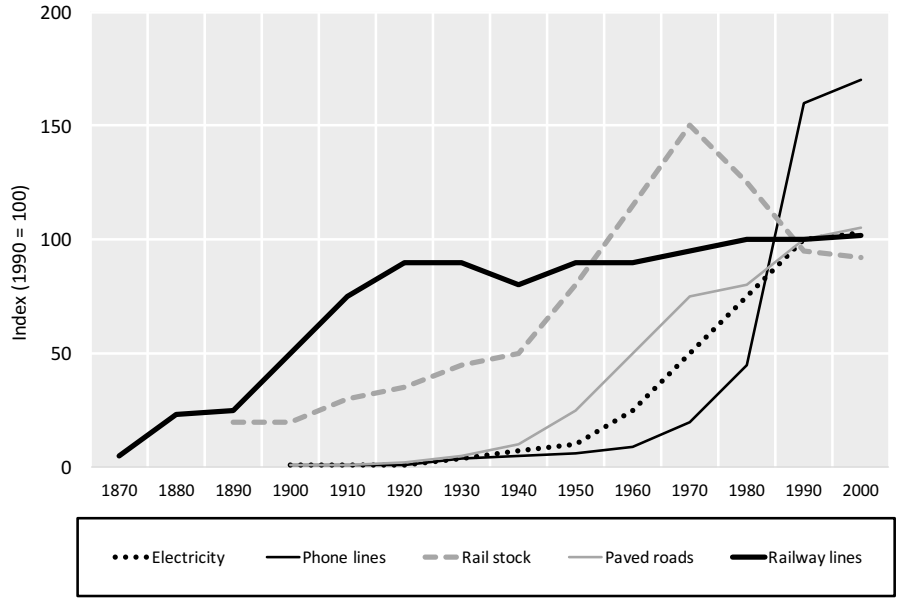

Figure 5: *Infrastructure by type, 1870 to 2005*

Note: As the economy developed, different types of infrastructure was built by successive administrations.

Source: Perkins et al. (2005)

4.3.7 Trade

Trade and terms of trade data can also be obtained. Ross and van Duin (1987) provide an estimate of export prices from 1749 to 1793, as 'exports in money value'. The Colony was not a significant export hub – distance from Europe and a lack of ready to ready marketable commodities meant that it mainly focussed on the domestic market. Nevertheless, as recorded in (Ross and van Duin, 1987, Appendix 5, Table 2), there were exports of grain before 1749, overwhelmingly wheat, but with some diversification in agricultural commodities from the ealry 19th century as highlighted in Table 5.

Thus, in calculating terms of trade, we use a wheat price until 1749, noting that the majority of exports were wheat. From 1749 until 1800s, we construct export and import baskets using the trade data estimates in Ross and van Duin (1987). From the 1800s, we use the estimates of trade activity in Page (1919) and prices contained in Clark (2004) to estimate the export prices of agricultural exports. From 1860 onwards, the export basket changes significantly, as diamonds begin to dominate exports, and then from around 1890, gold becomes the dominant export. Indeed, gold remains the single largest export item by value from 1890 until today. For trade data, we use the estimates in Page (1919) collated in Reinhart and Rogoff (2014).

4.4 Summary of data

Figure 6 summarises the compiled data sets, noting the existing long-run data set that is available for South Africa.

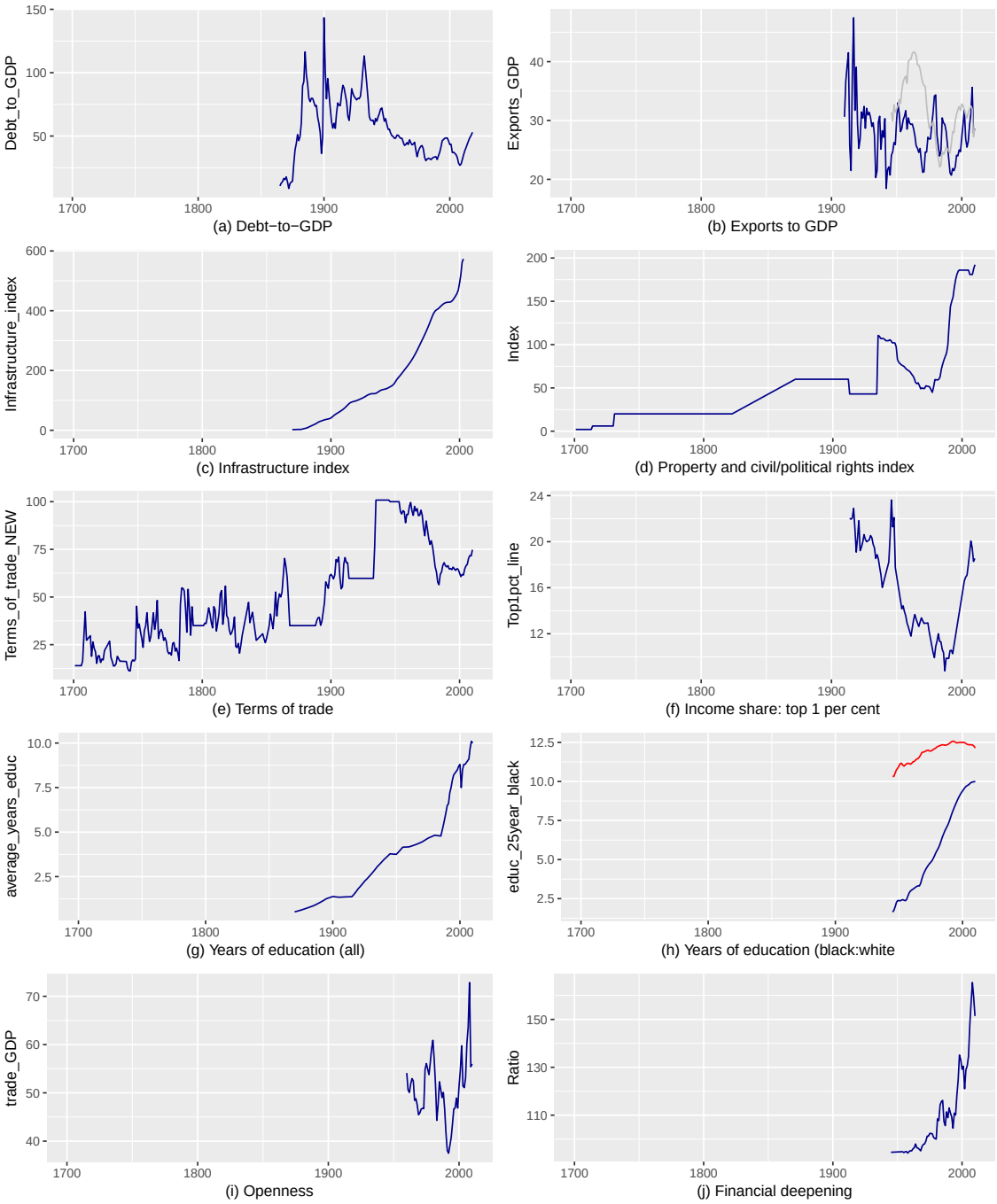

Figure 6: *Data series*

Note: The figure summarises the main long-term economic data collated for this paper. **(a)** Long-term debt-to-GDP adapts data from Reinhart and Rogoff (2011) & Page (1919). **(b)** Exports to GDP from Reinhart and Rogoff (2014) & Page (1919). **(c)** Infrastructure index created from data in Perkins et al. (2005) & Fedderke et al. (2006). **(d)** Property and civil rights is adapted from Fedderke (2001). **(e)** Trade data estimates from Ross and van Duin (1987), Page (1919) & Clark (2004) with estimates of agricultural export prices. From 1860 we use the estimates in Page (1919) & Reinhart and Rogoff (2014). **(f)**. **(g)** Education attainment from Van der Berg (2011). **(h)** Education black: white from Van der Berg (2011). **(i)** Openness is calculated by dividing GDP with the terms of trade. **(j)** Financial deepening is calculated by Kularatne (2002) with Union Statistics for Fifty Years (1910 - 60).

5 The accelerations

5.1 The 1736 – 1748 acceleration

In 1755, the government of the Cape Colony issued a sumptuary law. The text stated that the 'splendour and pomp amongst various company servants reach such a peak of scandal', while visitors noted the sheer magnificence of the homes, clothes and carriages (Fourie and Von Fintel, 2010). These great homes can still be seen today. This capped the end of a great leap forward in the wealth of the Cape, which had come a long way from the refreshment station of 1652.

By 1755, the Cape had experienced a nearly unbroken 11 year expansion. The strongest period of growth took place between 1741 and 1748. The need for law to ban the display of fine clothes reflects Cape Town nearly a century after it was established a refuelling station – a small but 'remarkably' wealthy city at the centre of an expanding colony.

Indeed, the 1736 - 1748 acceleration is reasonably well-covered in the literature, (Du Plessis and Du Plessis, 2012; Fourie and Swanepoel, 2018; Ross and van Duin, 1987). The slow collapse of the Dutch East India Company (VOC) created substantial new opportunities. Many of the sailors working of the ships left the Company, and exploited many of these.The city became rapidly more cosmopolitan, as more immigrants arrived, swelling the ranks of the original settlers. The expansion of the Colony is shown in Figure 7. Gradually through a number of forces, the boundaries widened, and a domestic economy developed.

French Huguenots arrived in early 1688, diversifying the local skills base substantially, and bringing knowledge of a whole new wine-making industry (Hausmann, 2018). This is borne out in the export records compiled by Ross and van Duin (1987), who note a substantial increase in both wine production and the number of vines from about 1740 onwards. By 1749 wine made up about half of all exports. The VOC also gradually liberalised the economy, allowing non-indigenous settlers more and more rights to trade, farm and work in the settlement. Monetary arrangements were also strengthened, and the introduction of domestic currency was initially reasonably successful (Havemann, 2014). Du Plessis and Du Plessis (2012) focus on the long-run increase in living standards during the course of the eighteenth century. But they note a reasonably sharp increase in living standards in about 1740 and 1743.

5.2 The 1870 – 1877 acceleration

The two nineteenth century accelerations are exhaustively covered in the literature, and indeed De Kiewiet (1941) in his famous quote at the beginning of this paper refers to South Africa's two great windfalls – the discovery of a diamonds in 1871 and the discovery of gold in 1886. These two events transformed a group of struggling colonies at the southern tip of Africa into thriving economies, and set the scene for the Union of South Africa in 1910, and modern industrial South Africa.

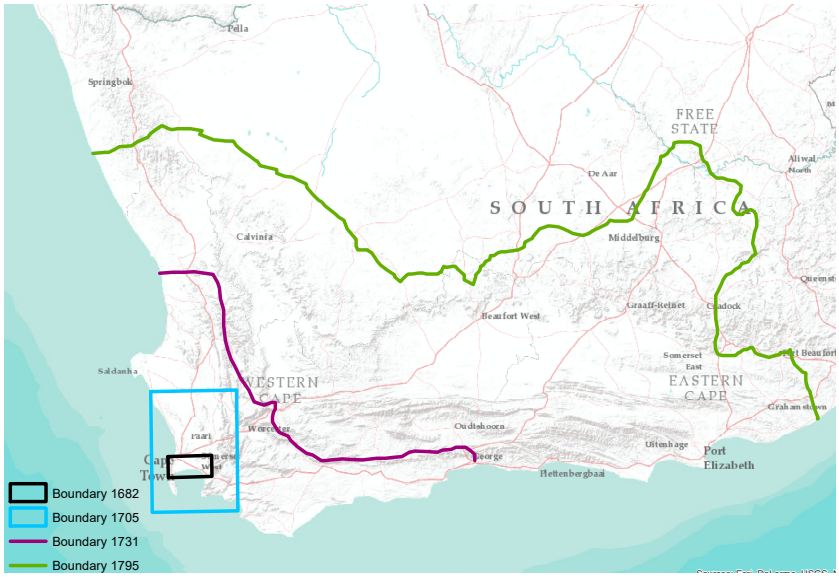

Figure 7: *The boundaries of the Cape settlement*
The Cape expanded during the course of the early eighteenth century, stimulating economic activity

Source: Authors with De Kock (1924); Fourie (2013) and Legassick (2010)

The decade of 1871 – 1877 was a period of expansion and prosperity in South Africa. A spirit of optimism emerged when the Cape Colony was granted responsible government in 1872.

Production and export of diamonds was rapid: between 1866 and 1870 the average annual export of diamonds was £35,700 but rose to £1,306,000 between 1871 and 1875 and to £3,242,000 between 1881 and 1885. The prison-like labour compounds introduced a new and frightening level of control over Africans. This new discipline contributed to a sharp rise in productivity as, during the period 1882 - 1892, the output of Kimberley mine workers doubled.

At the structural level, development of the diamond fields accelerated some forces for change, such the expansion of state capacity. Between 1875 and 1895, the extent of Cape railways increased from 150 to 2 253 miles. In the short run, the spin-offs of diamond mining were twofold. First, it induced a range of activities from agriculture to small manufacturing to services designed to meet Kimberley's needs. Demand for labour pushed up wages and expanded markets for African agricultural production (Table 5). Second, it created accumulations of capital useful in the development of gold mining. These forces created internal demand and cushioned South Africa from external headwinds. While Europe, the USA and Britain suffered a severe depression with falling general price levels between 1873 and 1879, South Africa was only moderately affected.

The "diamond crisis", lasting from 1881 to 1886 exposed unsound banking practices, ushered in insolvencies, which resulted in heavy credit losses.[11] The depression was further exacerbated by factors in Europe and the USA, which were both suffering depressions until 1886 (Schumann, 1938).

[11]Insolvencies rose from 259 in 1880 to 1 000 in 1883 and remained in excess of 700 every year between 1884 and 1886. Discounts of the Cape banks declined from £ 10,536,000 in 1881 to £ 3,000,000 in 1887.

Table 5: Agricultural production (1820 - 1922)

	1820	**1875**	**1880**	**1891**	**1904**	**1911**	**1922**
Ostriches	80*	22,000	—	155,000	361,000	776,000	268,000
Horses	70,000	206,000	—	800,000	450,000	719,000	988,000
Mules & Asses	—	—	—	96,000	285,000	427,000	940,000
Pigs	5,700	117,000	—	288,000	679,000	1,082,000	941,000
Angora	8*	978,000	920,000	3,900,00	3,393,000	4,275,000	2,272,000

Source: De Kock (1924)

*Approximate date and quantity

5.3 The 1891 – 1897 acceleration

With the discovery of gold, the Witwatersrand was transformed from a peripheral agricultural economy into one that was industrialised around mineral exports. International financial connections established in Kimberley were a significant factor in raising capital for Johannesburg (Feinstein, 2005). Between 1886 and 1890 £ 22,634,000 was invested in the industry with a substantial proportion of this capital was directed through the imperial banks in the Cape Colony.

By the end of 1887, 270 gold mining companies were established and had a market capitalisation in excess of £ 24 million by the end of 1889 (Arndt, 1928). An economic depression followed in 1890. Government revenue, imports and rail traffic declined marginally, but by 1893 the economy was back on track. Exports were boosted by railway links between the ports of Cape Town, Port Elizabeth, East London and Durban in 1895 (Figure 8). The rising prosperity was accompanied by a surge in credit and equity speculation, with a stock market bubble in 1895. Deep-level mines relied upon infusions of new capital, and banks again provided credit without insisting on prudent guarantees.

This upward trend in the financial cycle came to an end in 1896. A number of factors precipitated the contraction of credit: the Jameson Raid, a blunder of epic proportions unsettled business confidence, the rinderpest, compounded by a drought, killed 80 to 90 per cent of all cattle, and tension between the Boer Republics (the ZAR and the Orange Free State), disrupted the internal transport of goods to and from coastal ports.

An escalation in political tension between Britain and the Boer Republics reached a point of no return, culminating with the Anglo-Boer War of 1899 – 1902. The war brought gold production to a complete standstill and decimated the economies of the Boer Republics while prosperity reigned in the two British colonies of Natal and the Cape.

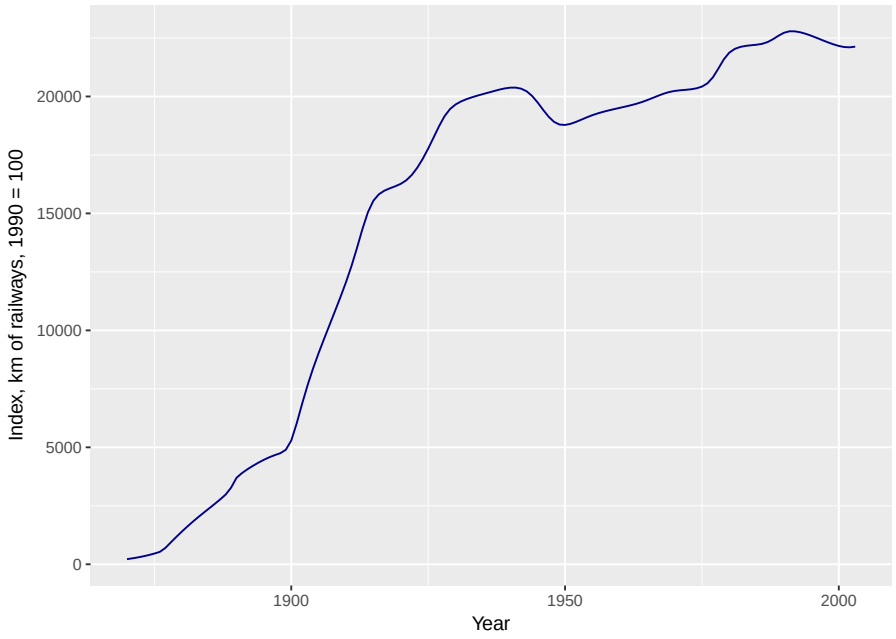

Figure 8: *Expansion of the railways*
Construction of railways accelerated between 1900 and 1920, largely paid for by the revenues from mining. By 1921, 15,000 km of railways had been built, 75 per cent of South Africa's existing railway stock. Gautrain, in comparison, is 80 km.
Source: Perkins et al. (2005)

5.4 The 1922 – 1930 acceleration

Fuelled by the output of the gold mines and a recovery after the First World War, South Africa's economy had expanded rapidly until the postwar depression struck in 1918, when the Spanish influenza pandemic struck, compounded by the fall in the world price of gold from £ 6 10s per fine troy ounce in 1919 to £ 4 15s in December 1921.

However, by 1922, the base of the South African economy had broadened significantly (Jones and Muller, 1992). The larger political grouping following Union in 1910 also boosted growth through the free movement of factors of production, tariff free trade between the former colonies and population growth of 23 per cent over the decade.[12] Summarised in Table 6, the agricultural share of national product declined almost continuously after 1912, while the proportion contributed by manufacturing doubled. The most notable contribution to the development of manufacturing was the state creation of an iron and steel industries. ISCOR (the Iron and Steel Corporation) was established in 1928 to boost the productivity of heavy industry. Unpopular with the heavily taxed mining industry, industrial protectionism advocated economic self-sufficiency through import substitution via import tariffs (Trapido, 1971). Imported mining machinery supported and subsidised the local manufacturing of substitute goods, in effect made possible by the depression of mine-workers' wages. The highest manufacturing growth rate, but not GDP, occurred in the period 1926/7 – 1936/7, which included the Great Depression (Du Plessis, 1965).

[12]Between 1920 and 1930 the population grew from 7 million to 9.1 million citizens.

Table 6: Per capita income by kind of economic activity, 1912 - 33

	Agriculture	**Mining**	**Manufacturing**	**Commerce**
1912	17.4 %	27.1 %	6.7 %	13.5 %
1918	20.2 %	20.7 %	9.8 %	15.8 %
1921	22 %	16.9 %	12.2 %	14 %
1924	19.8 %	19.4 %	11.6 %	14.5 %
1927	18.2 %	18 %	13.1 %	5.5 %
1930	13.9 %	17.3 %	15.4 %	14.5 %
1933	12.9 %	23.8 %	13.5 %	12.3 %

Source: Union Statistics for Fifty Years

5.5 The 1960 – 1970 acceleration

The 1960s and 1970s were boom years for the South African economy. The 'golden 1960s' saw rapid expansion of Black employment, and investment in South Africa's economic infrastructure rose as a percentage of GDP between 1960 and 1976 (van der Berg, 1989; Perkins et al., 2005).[13] Conditions for growth were very favourable in the 1970s. The price of gold increased from about $ 52 in 1972 to $ 613 in 1980. Commodity prices also followed this upswing, with huge foreign exchange windfalls, only interrupted by declines from late 1974 through to 1976. This spilled over to other sectors. The manufacturing sector was particularly striking, benefiting from a ready pool of funds from mining (Schneider, 2000). Both GDP and manufacturing growth rates reached their peaks between 1960 – 1965, with the average annual growth rates during the 1960s as a whole averaging 5.7 and 8.6 per cent respectively. However, academic research from this period was divided on the relationship between growth, distribution and apartheid policy in South Africa, and framed by the *'Liberal versus Radical'* debates. Elegantly summarised by Nattrass (1991), Liberals contended that the apartheid regimes systematic racial discrimination had a retarding effect on the development of capitalism. While the Radicals maintained that by forcibly creating a suppressed, cheap labour supply, apartheid served the benefits of capitalism. Engaging in this debate, Moll (1991) also questioned the growth rates during this period, arguing that the apartheid superstructure impeded economic development calling for "urgent empirical research [...] in South Africa". As Figure 9 shows, South Africa did experience a strong upswing in growth between 1960 and 1970. It was, however, slower than peer emerging markets, but quicker than advanced economies such as Australia, the UK and the US. Bell and Farrell (1997) use the comparative experience of South Korea to put the growth and diversification of South Africa's economy into perspective. In 1970, 58.3

[13]Labour force participation rates for Black females increased from 15.5 per cent in 1960 to 25.5 per cent in 1970 (Republic of South Africa, South African Labour Statistics).

per cent of South Korea's value added manufacturing was still contributed by sub-sectors producing non-durable consumer goods, higher than for any year in South Africa since 1916/7; while the various capital goods sectors in South Korea was only 12.4 per cent, compared with 33.3 per cent in South Africa in 1972. Finally, from 1964 to 1974, foreign investment contributed 8 per cent of the country's gross domestic investment. Foreign investment averaged 14 per cent during the first five years of the 1970s and peaked at 24.5 per cent in 1975-76, before collapsing to 2 per cent during the unrest after Steve Biko was killed in 1977. Foreign investment brought with it technical expertise. Some economists attributed much of South Africa's annual growth during the 1960s and 1970s to this infusion of technical know-how. However, political stability required that the state both improve opportunities for upward occupational mobility and for rising incomes for some African inhabitants. The distributional regime started to shift in a slow, but more balanced way. For example, the value of social expenditure per capita on Africans relative to whites rose from approximately 14 per cent in 1975 to over 30 per cent by the late 80s (Van der Berg, 2001; Nattrass and Seekings, 2011). Despite the growth accelerations of this period, shielded behind controls on imported competition, South Africa failed to convert the windfall into competitive mass industrial employment, further entrenching the broader system of racial discrimination and inequality.

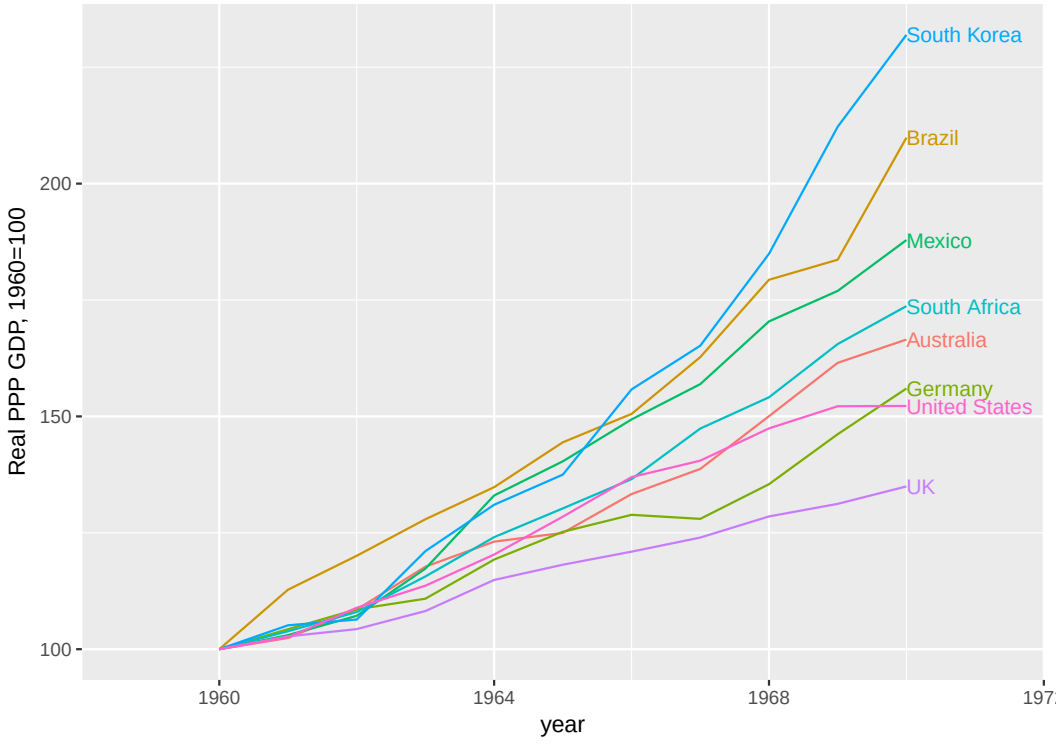

Figure 9: *1960s growth acceleration*
Note: In common with many countries, South Africa experienced a strong upswing in growth between 1960 and 1970. It was, however, slower than peer emerging markets, but quicker than advanced economies.

5.6 The 2000 – 2007 acceleration

The most recent acceleration was the 2000 to 2007 acceleration. It remains South Africa's most significant economic expansion since the discovery of diamonds and gold, and accelerations of the late 1800s. Over the period 2004 to 2007, real GDP growth averaged 5.2 per cent per annum. Domestically, household consumption expenditure and fixed investment activity elevated economic growth substantially, with the export sector also providing considerable impetus over the years 2005 to 2007. The tertiary sector, led by financial services came to dominate, accounting for close to 22 per cent of overall GDP in 2012 (up from a 12 per cent share in 1994). This was a result of a number of internal and external factors.

First was the significant restructuring of the South African economy that took place in the 1994 to 2000 period (Faulkner and Loewald, 2008). The post-apartheid government instituted a range of economic reforms. Amongst these was a significant reduction in the fiscal deficit, and a sharp fiscal consolidation. The literature highlights that such policy measures have two effects, which work in opposite directions. The first is the Keynesian/Krugman effect – that fiscal contractions harm growth by taking out aggregate demand. The second effect is a financial markets effect – fiscal contractions lead to a reduction in long-term interest rates. This, in turns, spurred a cycle of healthy investment-led growth. As a result, gross fixed capital formation reached 9.5 per cent in the 2000's, double from that of the prior decade.

Second, the period was characterised by a strong bull-market and booming commodities markets. Despite the enormous wealth and diversity of South Africa's rich mineral endowment the sector did not contribute as it should of during the commodities boom period (2003 to 2008), failing to provide employment. Other primary sectors like the highly labour-intensive agricultural sector lost 1.1 million jobs since 1994, particularly through mechanisation of farming activities. As such, the expansion in economic growth appears to be largely related to an expansion in total factor productivity. In 2001 Fedderke and Vaze (2001) noted the rise in productivity growth, in part because South Africa integrated into the global economy. This period is relatively intensively researched, in part because the government commissioned a series of studies at the twentieth anniversary of democracy. By that stage, economic growth was comfortably around 3 per cent per year. The general consensus was that this was 'not enough'. The literature however shows that productivity growth was particularly strong, substantially stronger than in both the preceding and subsequent periods (see Table 7).

Table 7: Productivity growth estimates, different periods

Study	Method	Period	TFP growth (%)
Steenkamp (2018)	CES	2000Q1-2017Q1	Factor Augmenting: 1.7%
			Hicks neutral: 1.6%
			Harrod neutral: 1.6%
			Solow neutral: 1.3%
Botha et al. (2018)	Cobb-Douglas	2000-2017	1.1% on average for the period
Anvari et al. (2014)	CRS Cobb-Douglas	1990-2013	1990-1999: 0.4%
			2000-2008: 2.0%
			2009-2013: 0.2%
Kemp and Smit (2016)	Cobb-Douglas	2001-2014	2001-2003: 1.1%
			2004-2005: 1.9%
			2006-2007: 1.4%
			2008-2010: -0.2%
			2011-2014: 0.0%
Gabriel (2017)	CGE model	1993-2013	1993-2013: 1.2%
			1998-2013: 1.2%
			2003-2013: 0.6%
			2008-2013: 0.1%
Tsebe and Biniza (2015)	Index based	1994-2013	0.5% p.a

Note: Meta study compiled from sources cited in table.

The growth in the late 2000s was associated with a number of social costs. Figure 10 highlights how inequality rose, particularly *within group* inequality. Despite employment gains in the formal and informal sectors of the economy since 1994, the unemployment rate stood at 24.9 per cent by the end of 2012, amongst the highest in the world. Unemployment and therefore also income inequality have strong geographic dimensions, with insiders being largely urban and outsiders rural (Leibbrandt et al., 2009). A declining combined share of GDP in manufacturing, mining and agricultural activities which had historically attracted less skilled migrant and rural employment further exacerbated this trend.

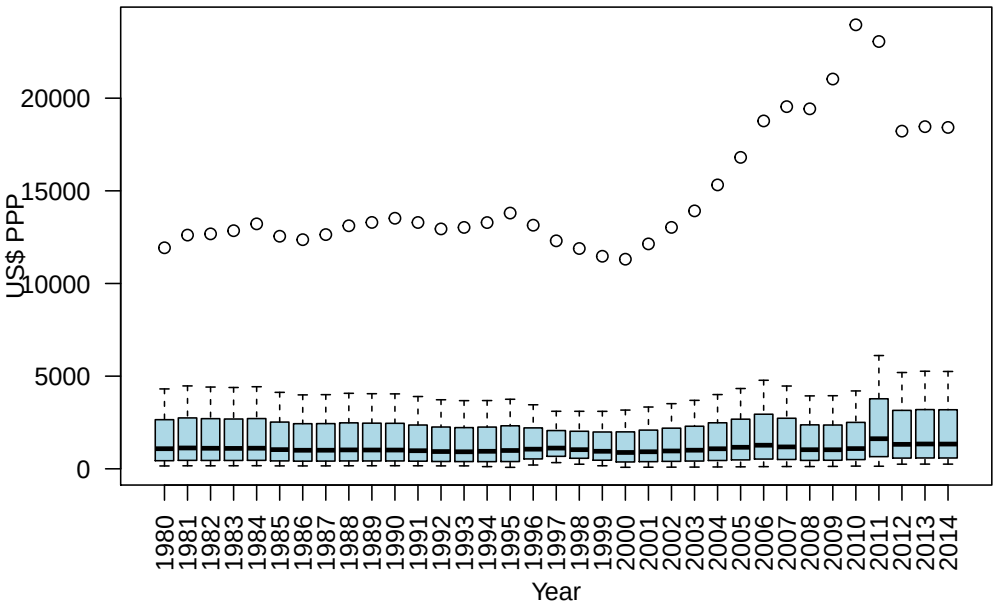

Figure 10: *Income distribution: 2000s*

Note: The acceleration appeared to have increased inequality. Incomes in the top deciles rose faster than those in lower deciles.

However, with these growth accelerations came the additional ability to implement a very high level of redistribution by means of the government budget (Seekings and Nattrass, 2005). A progressive and efficient tax system allowed the government to distribute the tax income with an exceptionally generous system of public welfare provision. In fact, if inequality is measured after taxation, cash transfers, and the benefits in kind of public services, then South Africa ceases to be at the top end of the international inequality league. Burger et al. (2012) finds that real public health spending in this period reach 5 percent per year. However, the political disaster of the infamous anti-scientific approach to HIV/AIDS under the Mbeki presidency (1999 - 2008) and late rollout of mass treatment must have put a damper on growth. It was extremely costly in terms of lives, especially those of poor people. In 2000, a quarter of all deaths were due to AIDS, while life expectancy had fallen to 58 in 1994 to 63 , and child mortality had risen from 62 in 1994 to 74 per thousand (Nattrass, 2003, 2007). With the end of the acceleration in 2007, a looming global financial crisis in 2008, deteriorating fiscus, and ballooning income deficit, South Africa has seen further deterioration in income equality as the pro-poor programmes were scaled back. As Seekings and Nattrass (2015) points out, poverty and inequality remain rooted in the labour market, and these were further exacerbated by the economic downturn.

6 Econometric evidence

The relationships between the variables can be assessed more formally econometrically. The econometric methodology is important – the pre-1947 data is estimated using a variety of data sources. We are, however, reasonably confident that the six accelerations are correctly captured – as discussed in the previous section, the dates correspond with other quantitative and qualitative evidence of an increase in economic growth and living standards. For this reason, we choose logistic regression, following Hausmann et al. (2005). The empirical question is thus what factors change the *probability* of a once-off accelerated period of growth. By design, this is a different question from much of the other literature, which is what are the factors that increase the rate of growth. It is important to note that logistic regression does not deal very well with the question of causation, and does not *necessarily* imply causation. However, additional econometric tests are undertaken to establish causation which we deal with in Section 7.2.

7 Results

In Table 8, we present estimates of the variables that are associated with sustained accelerations. In specification **(1)** to **(3)**, we present the logistic regression results showing that the extension of property rights had a substantially positive effect on growth. However, this variable becomes statistically insignificant in specifications **(4)** and **(5)**, which are limited samples of post-Union data.

The interaction between variables is notable. Property rights and civil/political rights are independently significant, but not together. This suggests multicollinearity, which is borne out by a correlation coefficient of 0.75, suggesting the somewhat unsurprising co-movement of these two sets of rights over time. For this reason we create an aggregate 'Rights' index, which simply sums the two. Rights and education are similarly not jointly significant.

We then test for terms of trade effects. Over the very long term, there appears to be evidence that global demand matters more than purely export prices; that is to say it is the quantity of South Africa's exports, not just a price effect through foreign exchange earnings. This finding concurs with more recent literature that finds a complex relationship between price effects (e.g. exchange rate depreciations) on exports.

We also test for the role of infrastructure, in light of findings by Perkins et al. (2005) and Fedderke et al. (2006). Their analysis shows complex causality. Economic booms often provide the impetus for infrastructure expansion in part because government revenue rises, providing the fiscal space for an infrastructure expansion. In turn, this expansion brings with it more growth and new opportunities, an a virtuous cycle can ensue. There appears to be some, albeit weak, relationship between feedback – that is that output growth leads to infrastructure growth. The results here also suggest that infrastructure leads growth. However, one should be careful not to interpret these results as implying causality. Probits

are not designed for the purpose of causality. Rather, they suggest correlation or at best association – an increase in infrastructure spending is thus associated with an increased probability of a boom; and the increase.

In the post-War period (more specifically 1949 to 2017) we adapt our analysis to include expansions of sustained growth of more than 1 per cent. The construction of the acceleration variable assumes a sustained economic acceleration of more than 3 per cent in per capita terms, sustained for more than seven years. While this follows the approach in the literature, its is still relatively arbitrary. A lower or higher threshold may lead to different results. In table 8, we therefore replicate specification **(6)**, but with a lower bound.

As discussed above, we classify these as 'expansions'. Given the data constraints, we now limit the analysis to the post-War period (1949 to 2017). The results are contained in specifications **(9)** and **(10)**. Again, the dominant factor appears to be be world growth, which is statistically significant and positive. Furthermore, terms of trade are also positive and significant. Two other variables come up as important – the education variable and the financial deepening variable. It is notable that the black:white education ratio comes up as significant again. This possibly shows how the improvement in education levels may have supported a rise in total factor productivity. The education variable is a quantity variable not a quality one. That said, as a first cut at strengthening education, quantity is quite important, but in the longer run quality will be important.

As logistic regressions are non-linear, the parameter estimates from cannot be interpreted in this way. To sensibly interpret the estimated coefficients, we can estimate the logistic regression in the form of marginal effects, defined as the dy/dx, where the marginal effect of an increase in the independent variable. For continuous variables, the marginal effects measure the instantaneous rate of change, i.e. the impact of a very small change on the dependent variable. The calculation provides a good approximation of the partial effect of impact of changes.

The marginal effects are not constant – the impact on the dependent variable will be different at different values of the independent variable. Here, we present the marginal effects in three ways. First, as the average marginal effect is presented in Figure 11. Secondly, in Figures 12 and 13, we present the conditional expected values of the probability of failure, given a set of different values for financial liabilities as a proportion of total liabilities and the ratio of short-term liabilities to long-term liabilities respectively. Both these plots show the strong positive relationship between the probability of failure.

Table 8: Probability of an acceleration

	Dependent variable:									
	Acceleration, 1700-2017			Acceleration, 1949-2017					Expansion, 1949-2017	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
World growth	0.773***	0.567*	0.623***	4.354***	3.377***	2.937***	2.994***	3.065***	2.409***	2.158***
	(0.268)	(0.289)	(0.191)	(1.363)	(1.067)	(0.939)	(0.872)	(0.872)	(0.746)	(0.705)
Terms of trade	−0.009	−0.012		0.223***	0.174***	0.153***	0.134***	0.092***	0.128***	0.172***
	(0.008)	(0.009)		(0.078)	(0.063)	(0.054)	(0.049)	(0.033)	(0.034)	(0.047)
Infrastructure (lag)	9.068*									
	(5.198)									
Rights (Property)		0.016**			0.056*					
		(0.007)			(0.029)					
Rights (Property 2)			2.302*							
			(1.277)							
Rights (Civil and political)				0.074**						
				(0.032)						
Black:white education ratio						5.551*	6.578**			8.107***
						(3.150)	(2.861)			(2.552)
Inequality (1 p.c.)				2.007**	1.670**	1.639**				
				(0.972)	(0.798)	(0.751)				
Financial deepening								0.052**	0.072***	
								(0.022)	(0.021)	
Constant	−2.125***	−2.317***	−2.313***	−31.967***	−25.716***	−22.324***	−21.301***	−20.524***	−23.573***	−22.672***
	(0.360)	(0.389)	(0.282)	(10.402)	(8.537)	(7.145)	(6.514)	(5.884)	(5.815)	(5.913)
Observations	317	317	317	68	68	68	68	68	68	68
Log Likelihood	−136.826	−136.097	−137.428	−23.744	−26.536	−27.280	−30.162	−29.769	−32.610	−33.862
Akaike Inf. Crit.	281.652	280.194	280.855	57.489	63.073	64.560	68.324	67.539	73.220	75.725

Note: *p<0.1; **p<0.05; ***p<0.01

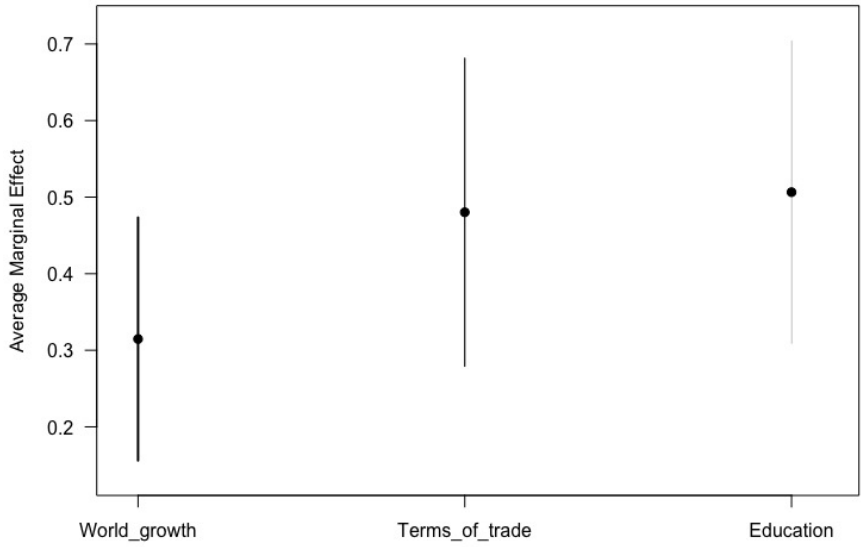

Figure 11: *Average marginal effects and standard error bands, derived from specification 7 in Table 8.*

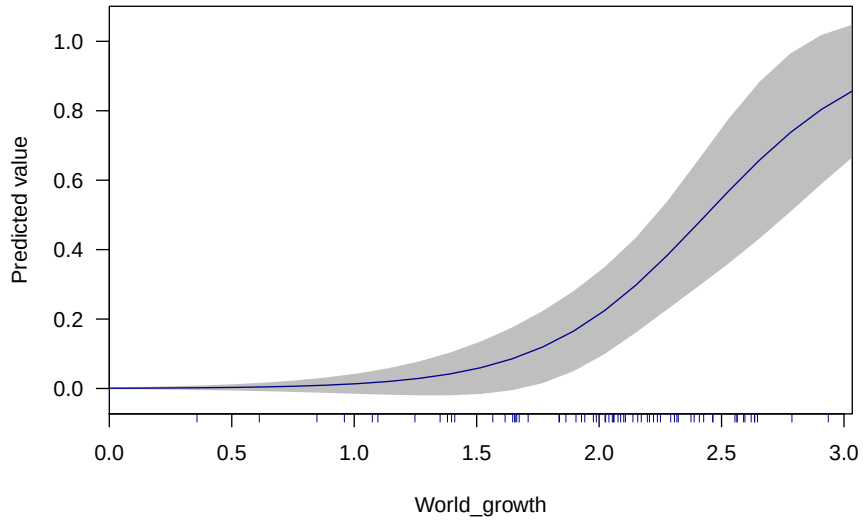

Figure 12: *The probability of an acceleration is an increasing function of world growth, the terms of trade and education. Here we present the probability of an acceleration as the conditional expected value. The conditional expected value is derived from the marginal effects model.*

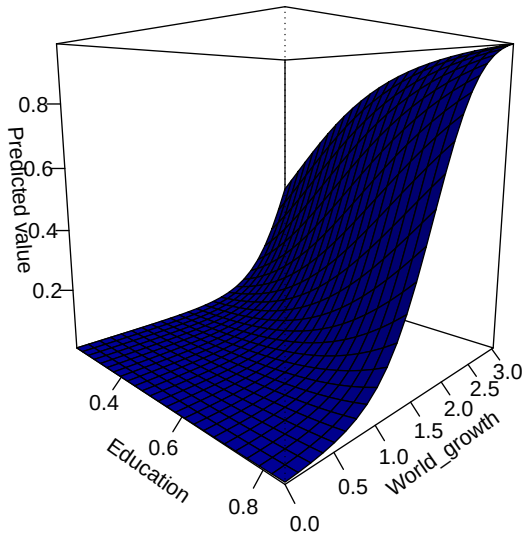

Figure 13: *The probability of an acceleration shown as a result of the joint effects of an increase in both the ratio of black to white education attainment and world growth. The model predits that together, these variables will almost assure South Africa of an acceleration.*

7.1 Robustness checks

Logit and probit models require less econometric tests, particularly as there are fewer assumptions about the distribution of the residuals. That said, the use of these techniques with time series data is commonplace, but should be treated carefully. A particularly common application is high-frequency time series data, where the dependent variable is the probability of a price rise or fall, rather than the magnitude of the fall. There is no formal cointegration test. That said, in this data there is a clear 'time trend'. The probability of an acceleration is an increasing function of time – as noted in Table 3, accelerations were more likely after 1994 than before. For this reason, we use detrended series throughout.

This is a further contribution of the paper. Internationally, the index for civil rights and property rights is usually non-stationary, as in most countries rights have been progressively realised. This is not the case in South Africa – political and civil rights were extended during the 1800s, under the liberal Molteno and Merriman administrations, and then progressively reduced post Union, first by the Smuts administration, and then significantly under the Verwoerd administration. From 1980, rights were extended once again, with full civil and political rights granted with the post-Apartheid period.

A second time series related concern is the possible presence of autocorrelation. A standard test for the presence of autocorrelation shows it is not present.

7.2 Association or causality?

The econometric specification may not prove causality, even if it is possibly implied. Moreover, endogeneity is an important concern. It is perfectly possible to argue that accelerations create fiscal resources that are used for public goods (i.e. education and infrastructure are of particular concern in regards to endogeneity).

To establish the causality better, we under take some simple econometric tests, testing for both bivariate and multivariate causality. In the first instance, we undertake a simple Granger causality tests. Thereafter, we will test more formally using standard econometric techniques. As expected, the evidence suggests that our rights index, global growth and terms of trade granger cause an increase in economic growth.

Table 9

Statistic	N	Mean	St. Dev.	Min	Max
Res.Df	2	302.500	3.536	300	305
Df	1	−5.000		−5	−5
F	1	1.215		1.215	1.215
Pr(>F)	1	0.302		0.302	0.302

Table 10

Statistic	N	Mean	St. Dev.	Min	Max
Res.Df	2	302.500	3.536	300	305
Df	1	−5.000		−5	−5
F	1	0.337		0.337	0.337
Pr(>F)	1	0.891		0.891	0.891

Table 11

Statistic	N	Mean	St. Dev.	Min	Max
Res.Df	2	307.500	2.121	306	309
Df	1	−3.000		−3	−3
F	1	2.297		2.297	2.297
Pr(>F)	1	0.078		0.078	0.078

Table 12

Statistic	N	Mean	St. Dev.	Min	Max
Res.Df	2	302.500	3.536	300	305
Df	1	−5.000		−5	−5
F	1	2.984		2.984	2.984
Pr(>F)	1	0.012		0.012	0.012

8 Conclusion

> *One tentative conclusion from this [economic acceleration] literature is that what matters for getting growth going may be different from what is important to keep it going. Berg et al. (2012)*

The South African growth literature has tended to focus on how to raise the growth rate. This paper takes a different approach – we argue rather that, as with many emerging markets, and to paraphrase Pritchett (2000), economic growth can be seen as a series of peaks, plateaus and valleys.

It is difficult to draw definitive lessons for modern day growth over such a long period. However, some notable similarities for the accelerations stand out:

Financial liberalisation and opening of the economy spurred growth. From the loosening of the strictures of the Dutch East India Company in the early 1700s to the opening up of the post-Apartheid economy, a central theme is that opening up to the world helps growth. The short-term losses were more than offset by longer term productivity benefits as the economy became more competitive.

Accelerations were correlated with waves of immigration. Correlation is not causation – indeed, strong growth would attract more skills, and in turn the skills influx would create further growth. However, there are clear instances of immigration, notably the French refugees.

Despite decades and decades of attempts to diversify the economy, South Africa's export basket, and revealed comparative advantage, is *remarkably* persistent. For example, wine exports made up about half of exports in 1750. It was displaced by gold from 1880. A single product, *Vin de Constance*, a sweet dessert wine from the Groot Constantia winery was sold to the King of Prussia in 1750 and is still sold today. Krugerands are still the dominant gold coinage, with prices quoted daily in global markets.

In the South African context, growth often accrued unequally. In the most recent acceleration, income inequality rose significantly. Tax rates were lowered at top incomes, exacerbating the effect. This tax decrease also structurally reduced personal income tax revenue, and tax revenue was particularly affecting during the 2008 slowdown. Moreover, race has ceased to be the only factor in structural income inequality in South Africa, but class replacing racial discrimination based on those with employment, versus the mass unemployed that have limited access to welfare.

South Africa needs to do better in addressing these issues through more inclusive economic growth. Leveraging existing human capital, infrastructure and continental linkages, it should not squander its place in the inevitable rise of Africa. Counter cyclical investment where windfalls are spent on growth-promoting infrastructure, increasing levels of education, and improving the social compact through civil rights and property rights will amplify economic growth in a global upturn. As Berg et al. (2012) suggests, this might sustain an economic acceleration.

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