The South African Financial Cycle and its Relation to Household Deleveraging

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Abstract

This paper considers the extent to which South African households have deleveraged, since the global financial crisis of 2007/2008. We extend the official South African Reserve Bank business cycle methodology to date financial cycles, from which we identify the peaks and troughs of the South African financial cycle going back to 1966. Our composite financial cycle index peaks in April 1974, January 1984 and May 2007; it has bottomed out in July 1979 and February 1999. Thus, we still await the trough. We further compare and contrast the deleveraging process in the current downward phase to the experiences from previous financial cycles. We find that the average period of the financial cycle in South Africa is much longer (approximately 17.3 years) than that of the business cycle (approximately 5.8 years), and that deleveraging has not yet matched the degree of deleveraging seen in previous downward phases. Our results suggest that further deleveraging is necessary, before we can expect to turn the financial corner.

Keywords

business cycles; macroeconomy; policy coordination; financial crises

1 Introduction

The 2007/2008 global financial crisis raised important questions about the behaviour of financial cycles and the length of time it takes households to deleverage from the peak, especially when the upward phase of a financial cycle is supported by an asset bubble. When an asset price bubble bursts, asset prices fall sharply, making it harder for households to sell off assets (usually not by choice) or to use them as collateral. Interest rates may fall rapidly in an attempt to support the economy, succeeding in lowering general debt levels, but that may not fully describe household financial health. Furthermore, the link between deleveraging and economic activity has not received much attention (see Dynan, 2012), although Brown *et al*. (2011), and Bricker *et al*. (2011) examine balance sheet adjustment while households deleverage. Thus, we add to a small, but growing literature that considers the behaviour of the financial cycle, with a focus on households.

Typical post-war recessions, according to Borio (2014) were triggered by monetary policy attempts to contain inflation. However, when a financial boom originates in an environment of low and stable inflation, but then bursts, it becomes what Koo (2013) refers to as a "balance sheet" or financial cycle recession, where companies seek to repay excessive debts instead of seeking profit. Reinhart and Rogoff (2009) show that financial cycle recessions are deeper and followed by weaker recoveries, because, as Borio *et al*. (2014) suggests, policy makers in these situations have little room for policy manoeuvring. In 24 advanced economies, since the 1960s, Bech *et al*. (2014) find that monetary policy is relatively ineffective in a balance sheet recession and its subsequent recovery. Evidence also suggests that the amplitude, length and potential disruptive force of the financial cycle are closely related to the financial, and possibly also, monetary regimes in place (*e.g*. Lowe and Borio, 2002; Drehmann *et al*., 2012).

Since the global financial crisis, international literature has advanced our understanding of the impact of asset prices and financial markets on the real economy and business cycles. These financial drivers (excessive growth in house prices, credit extension and asset prices – an asset bubble) manifest in what is commonly referred to as the financial cycle (Adarov, 2018). Most empirical research on the financial cycle focuses on developed economies or groups of emerging market economies (see Borio, 2014; Borio *et al*., 2017; Claessens *et al*., 2011, 2012; Drehmann *et al*., 2012; Schularick and Taylor, 2012; Aikman *et al*., 2015; Gonzalez *et al*., 2015),[1] while empirical findings from South Africa are focussed mainly on determining and characterising the financial cycle (Boshoff, 2005, 2010; Kabundi and Mbelu, 2017; Farrell and Kemp, 2018). What is missing for South Africa, is an analysis of the aftermath of the global financial crisis, when policy making and its timing is most crucial. A full analysis of credit supply conditions, however, falls outside of the scope of this paper.

There are a growing number of studies measuring and describing financial cycles. They generally find that such cycles display vastly different properties than business cycles, which have, in general, received more attention.[2] The financial cycle is usually measured by three key financial variables, credit, equity and house prices (*e.g*. Kindleberger and Aliber, 2005; Minsky, 1992; Claessens *et al*., 2011, 2012). Farrell and Kemp (2018) consider similar information, when they determine the financial cycle for South Africa. In this research, we confirm the main points from their analysis, applying different methods. We also extend their research by comparing the behaviour of debt, with a particular focus on the deleveraging process, across the financial cycles that we were able to date. Thus, we are able to provide a series of stylised facts about the behaviour of financial variables during the financial cycle; such information should be of use to policy makers – monetary, regulatory and fiscal – as it can be used to underpin the design of optimal policy.

We uncover a clear debt build-up in the lead-up to the 2007/2008 global financial crisis, preceding a slow and difficult deleveraging process that continues. We identify the peaks and troughs for the South African financial cycle, finding that average financial cycles for South Africa are around three times longer than business cycles. Contrary to Hiebert *et al*. (2018), we find that, on average, financial cycle contractions last longer than expansions. We further show that deleveraging is not the same for every financial cycle period in South Africa. In the current downward phase of the cycle, deleveraging has mainly happened in the mortgage debt sector. However, our results also show that households have not

deleveraged to the extent they did, on average, in previous financial cycles. Thus, further deleveraging is expected.

2 Background

Many countries experienced a credit and housing boom over the 2003–2007 period. After the housing and asset bubble burst, there was a severe credit crunch, resulting in a deep global economic and financial crisis, similar to that seen during the great depression (Claessens *et al*., 2012). For households that made decisions based on overvalued housing stock, deleveraging and an uncomfortable unwinding of imbalances was the order of the day. Those imbalances need to work their way out of the system, before positive momentum can build towards the next upward phase. For policy makers, the end of the deleveraging process is critical, as it has a direct bearing on consumption, growth, inflation and the start of the new credit cycle, and hence, the coordination of monetary policy.

The build-up of the global financial crisis started in 1999 in the US sub-prime market as a result of the securitisation of sub-prime mortgage loans (see Ellis, 2010).[3] The US housing market peaked in 2006, but increasing interest rates exerted pressure on the market, house prices fell and many struggled to repay their loans. Since sub-prime mortgage loans were a large component of portfolios, banks became reluctant to take on debt from other banks; they were unsure of the quality of each others' debtor books. Exacerbated by rising food and fuel prices, higher debt obligations and the credit crunch, the US economy experienced a significant economic slowdown, which quickly spread to other countries, triggering a synchronized global economic slowdown (which advanced economies refer to as the great recession) (Baxter, 2009; Miranda, 2017).

South Africa was already experiencing a slowdown in consumption growth in 2007 (SARB, 2011), so the lack of demand from international markets for commodities, the fall in commodity prices and subsequent job losses intensified South Africa's economic downturn over this period. Domestically, after several years of exceptional house and asset price growth, households drew on their mortgage credit (in the form of access or flexi bonds), believing that house and asset price growth would continue to outgrow their mortgage debt. The resulting sharp increase in household debt-to-income ratios left little room for households to manoeuvre. As property prices started to fall and the slowdown gained momentum, South Africans were left with falling house and asset prices, and over-leveraged household balance sheets.

3 Establishing the Financial Cycle for South Africa

The financial cycle is usually measured by three key financial variables, credit, equity and house prices.[4] This is not an exhaustive list, and it is easy to imagine other financial measures to be included. Drehmann *et al*. (2012) and Borio *et al*. (1994) also consider the ratio of credit to GDP and an index of aggregate asset prices, which combines residential property, commercial property and equity prices.

In order to determine if behaviour after the cycle peak has differed from previous cycles, we need to date the financial cycle periodicity, which tends to be long. Long cycle theory dates

back to the work of Schumpeter (1939), who gave status to the long cycles of Kondratieff (1922, 1926, 1928) Recent empirical work (Drehmann *et al*., 2010; Einarsson *et al*., 2015; Gonzalez *et al*., 2015; Farrell and Kemp, 2018) show that the financial cycle is about four times longer than the business cycle. In general, dating long cycles is more challenging than dating short cycles (Kamada and Nasu, 2011).

To date the financial cycle, similar to Farrell and Kemp (2018), we use credit extension, house prices and equity prices.[5] The selection of these variables is largely based on the work of Drehmann *et al*. (2012) and Claessens *et al*. (2011, 2012). Although other variables can be included to determine the financial cycle, this depends on the availability of historical time series spanning at least a few long cycles.[6]

Similar to the official business cycle dating procedure followed by the South African Reserve Bank (SARB), and based on recent financial cycle work (Farrell and Kemp, 2018), we take a conservative approach to date financial cycle phases. We apply the Bry and Boschman (1971) dating algorithm adapted for financial cycles, as suggested by Drehmann *et al*. (2012). However, where Farrell and Kemp (2018) make use of the popular Christiano and Fitzgerald (2003) trend filter to determine the financial cycle, we use the Hodrick and Prescott (1997) filter with a λ value that most closely resembles the phase average trend (PAT) filter that is used in traditional business cycle dating procedures and by the SARB.[7]

3.1 Data

We use monthly data, similar to the official methodology of the SARB for dating business cycle turning points. We include a composite monthly house price index, total domestic credit extension sourced from the SARB and equity prices from the Johannesburg stock exchange (JSE). All three series have been seasonally adjusted and deflated using the headline consumer price index (CPI). We use these three series over the period 1966 to 2017 to compute a composite financial index for South Africa. Our house price index differs from Farrell and Kemp (2018) in that it includes data from more banks. The three variables used to determine the financial cycle are *house prices*, *equity prices* and *domestic credit extended*. We discuss each variable separately.

3.1.1 House Price Index

House price data in South Africa are sourced mainly from Absa, one of South Africa's largest commercial banks. Homeownership in South Africa during the 1970s and 1980s was largely funded by building societies and not, as they are today, by commercial banks (Luüs, 2005). In 1990, the largest of these building societies, United Building Society, merged with other banks to form Absa.

The Absa house price index is often used in research on house prices in South Africa,[8] as it has a long history and is available on a monthly basis. However, Absa stopped publishing the index in December 2016.[9] From 2000, First National Bank (FNB) and Standard Bank began to publically disseminate their house price data. Boonzaaier (2018) developed a weighted composite house price indicator, using indices produced by South African commercial banks, which have large mortgage books, including Absa, FNB and Standard Bank. Between 1966

and 2000 only Absa data is used, and from 2000 to 2001 a weighted index of Absa and Standard Bank is incorporated. From 2001 to 2017, the index is a weighted composite of all three banks.[10] See Boonzaaier (2018) for the methodology (see Fig. 1 for the series). Luüs (2005) identified a house price bubble in the early 1980's based on house price growth. We identify two additional periods that are similar to Luüs (2005), where peak year-on-year growth is immediately followed by contractions in house prices (mid-1970s and from the mid-2000s).

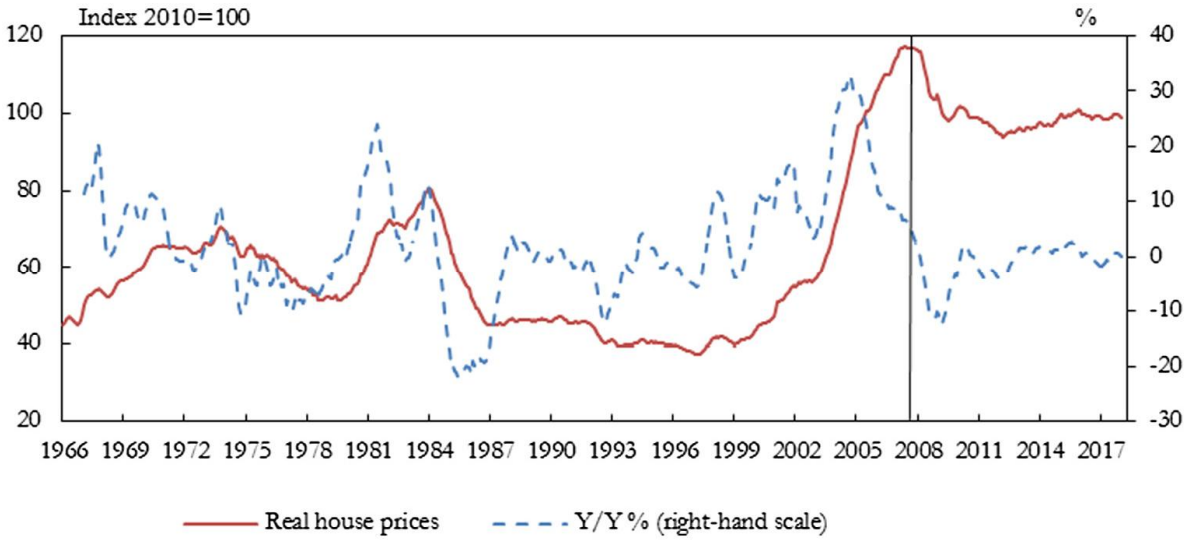

Figure 1. Composite real house price index
Source: Boonzaaier (2018).

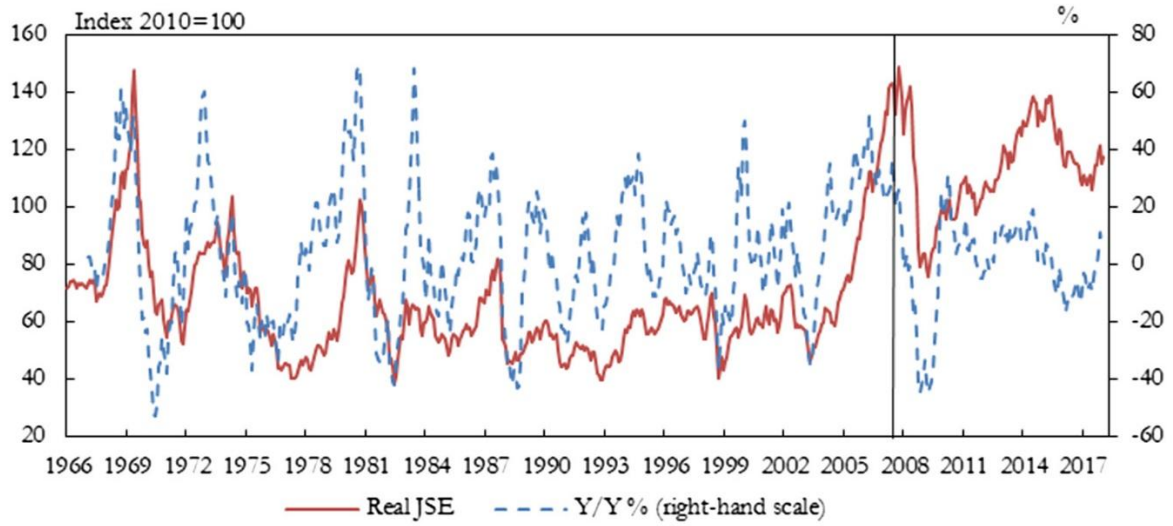

Figure 2. JSE index
Source: SARB.

3.1.2 Equity Prices

We include equity prices in the form of an index of all shares traded on the JSE (Fig. 2). Claessens et al. (2011) find that equity cycles are often not as correlated with business

cycles as credit and house prices. This is also true in South Africa and one of a few reasons why the JSE share prices were dropped from the suite of indicators included in the SARB's composite leading business cycle indicator (see SARB, 2015). We also observe more cycles in equity prices than in house prices and credit extension, while the series is also more volatile. Balcilar *et al*. (2016) show that there is a correlation between the probability that a bubble will burst in the JSE all share index and the relative size of the bubble. They identify 10 past episodes of possible bubbles in the JSE all share index.

3.1.3 Credit Extended

We also use total domestic credit extension by monetary institutions as a measure for credit extension (Fig. 3). The data include mortgage debt, vehicle debt and all other consumer credit extended by South African-registered banks to the domestic private sector, excluding bills (acceptances, commercial paper, similar acknowledgements of debt) and investments. The data have been deflated and seasonally adjusted.

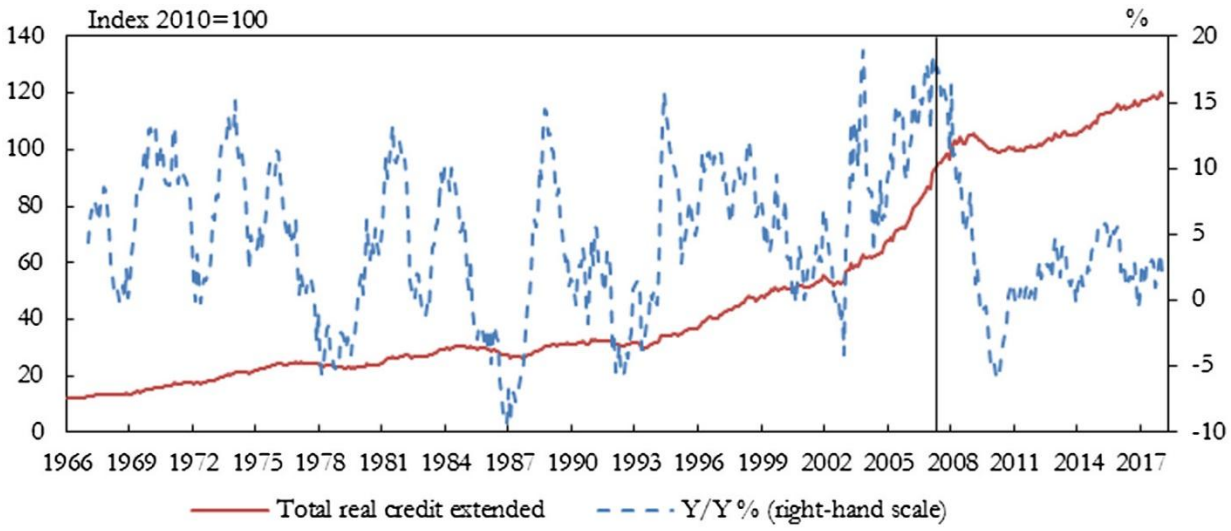

Figure 3. Real credit extended to private sector by all monetary institutions
Source: SARB.

3.2 Methodology

We use a similar approach to the SARB's composite indicator methodology for constructing a composite financial cycle indicator for South Africa.[11] . The approach is based on the indicator approach which was first developed in the 1930s by the National Bureau of Economic Research (NBER), under the supervision of Burns and Mitchell (Moore, 1983; The Conference Board, 2001). Later the production of the indicators was done by the US Department of Commerce and in December 1995 the responsibility was given to the Conference Board.[12] We include the real house price index, the real JSE index and total real credit extended, all in levels. We construct our composite index based on The Conference Board (2001) methodology:

We calculate the symmetrical month-to-month percentage changes, $r_{i,t}$ for each component series $Y_{i,t}$ where *i* = 1 … 3

$$r_{i,t} = 200 * (Y_{i,t} - Y_{i,t-1})/(Y_{i,t} + Y_{i,t-1})$$

Next we calculate the standardised monthly changes, $c_{i,t}$ for each component series:

$$c_{i,t} = r_{i,t}/SD_i, \text{ where}$$

$SD_i =$ the standard deviation of $r_{i,t}$ over the specified standardisation period.[13]
We then calculate the average standardised sum of contributions (SS_t) by adding $c_{i,t}$ across all the components for each month:

$$SS_t = \sum_{i=1}^{n} \frac{c_{i,t}}{N}$$

and compile preliminary levels of the composite index using the standardised sum of contributions (SS_t) and the symmetrical percentage change formula. Start with an initial value $I_t = 100$, then

$$I_{t+1} = I_t * (200 + SS_{t+1})/(200 - SS_{t+1}), \quad \text{for all values of } t.$$

Lastly, we rebase the index to average 100 in base year, which is 2010 in our case.

Different weights may be assigned to component series to reflect their importance in the cycle (Brunet, 2000). Weights can be selected to give more importance to statistically reliable data or data with a broader coverage. Alternatives could include using models such as principal component analysis (PCA) or factor analysis (Nardo *et al*., 2008). We found that PCA suggested that each variable contributed almost equally to the total variation in our composite financial index.[14] Although confirming our equal weighting, these methods could bias the index over the full cycle as the timing relationship of the different indicators are not always the same and in some periods one indicator may dominate the cycle more than another.

Most composite indicators rely on equal weighting where all variables are weighted the same, and therefore their weights are implicitly equal (in other words they are not, unweighted) (Nardo *et al*., 2008). Since 2004, the SARB also follows this weighting methodology for business cycle indicators (Venter, 2019b). We therefore also allow each indicator to add equal value to the index.

In dating the reference financial cycle, most researchers start with the Burns and Mitchell (1946) business cycle dating procedure, although Zarnowitz (1992) formalised the approach, while Laidler (1999) and Besomi (2006) have extended it to apply to financial cycle analysis. The SARB makes use of growth cycle analysis to determine reference turning points in the business cycle, which should not be confused with classical cycle methodology. Growth cycle analysis examines the deviation of an indicator from its long-term trend to determine if it is accelerating or decelerating above or below the trend. In the development of growth

cycles, long-term moving averages were initially used as a trend approximation (Mintz, 1969, 1972). The PAT provides the best results for determining growth cycle turning points (Boschan and Ebanks, 1978; Klein and Moore, 1985). Zarnowitz and Ozyildirim (2006) show that instead of an iterative PAT process, the HP filter could be used.

Different detrending techniques have been used to establish financial cycles, none of them are without drawbacks. Other options include band-pass filters, such as the Christiano and Fitzgerald (2003).[15] or the Baxter and King (1999) filter; however, the HP filter remains a popular choice, when detrending a series.[16] Although many follow the Hodrick and Prescott (1997) standard value of λ, 1,600 for quarterly data, Zarnowitz and Ozyildirim (2006) suggest that λ should be chosen to minimise the difference between the PAT and the HP – for growth cycles with monthly data, 108,000 is more appropriate. Einarsson *et al*. (2015), Stremmel (2015), Gonzalez *et al*. (2015) and Drehmann and Juselius (2014) follow Ravn and Uhlig (2002) to convert λ between monthly, quarterly and annual series; however, each conversion formula starts from the 1,600 quarterly data default proposed by Hodrick and Prescott (1997).[17]

To adapt the HP filter for financial cycles, the Basel Committee on Banking Supervision (2010) suggest following Drehmann *et al*. (2010), as the financial cycle is four times longer than the business cycle.[18] Therefore, a higher λ value of 400,000 for quarterly data ($\approx 4^4 * 1,600$) should be used. Since we are using monthly data, our starting point is 108, 000, as proposed by Zarnowitz and Ozyildirim (2006) for monthly data. We apply the Drehmann *et al*. (2010) conversion for the longer length of the financial cycle. Thus, for financial cycles the λ for monthly frequency data is 27,648,000 ($\approx 4^4 * 108,000$).[19] The trend result is shown in Fig. 4.

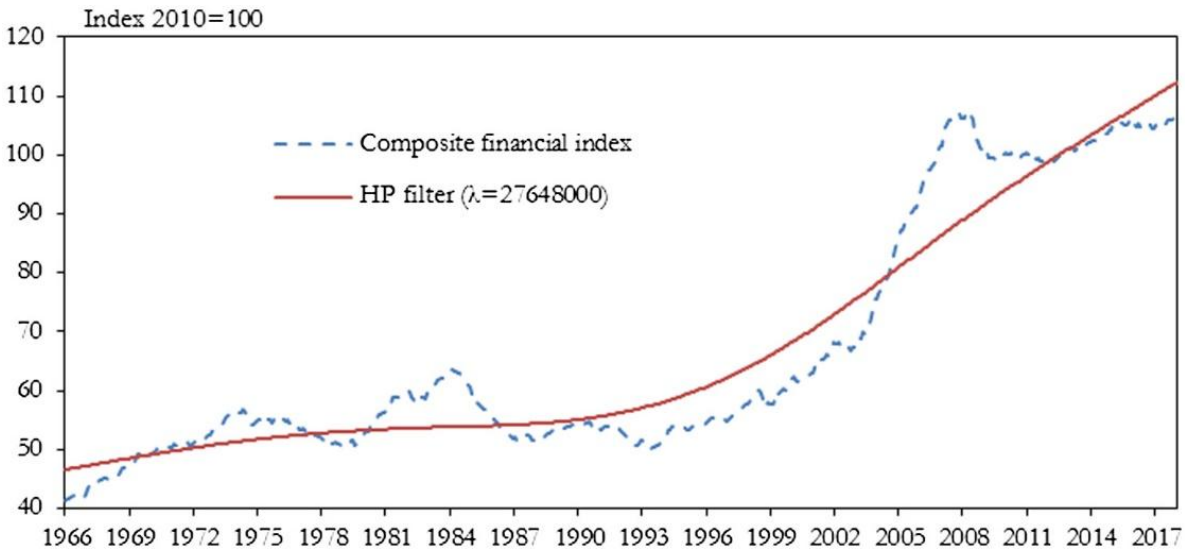

Figure 4. Financial index and HP filter (λ = 27,648,000)
Source: Own calculations, SARB.

The Bry and Boschan (BB) algorithm (usually applied for dating business cycles) is adapted for application to the financial cycle, by multiplying the minimum duration of a cycle and phase by 4. The BB algorithm was designed to replicate the Burns and Mitchell approach to

determine turning points, setting the censoring criteria at a minimum duration of a phase at 6 months (2 quarters), and the minimum duration for a full cycle at 15 months (5 quarters). For financial cycles, we use the Drehmann *et al*. (2012) criteria that the minimum duration of a phase is 27 months (9 quarters) and the minimum for a full cycle is 60 months (20 quarters). Applying this methodology and censoring rules, we find that, over the period 1966–2017, there have been three financial cycles in South Africa (Fig. 5). The financial index's deviation from trend reaches peaks in April 1974, January 1984 and May 2007 (Table 1). Although our cycle is very similar to Farrell and Kemp (2018), our results suggest that the bottom of the current financial cycle has not yet been reached. This is different from Farrell and Kemp (2018) whose financial cycle reached a lower turning point around 2013. This difference at the end could be due to the end of the sample problem, as also noted by Farrell and Kemp (2018).

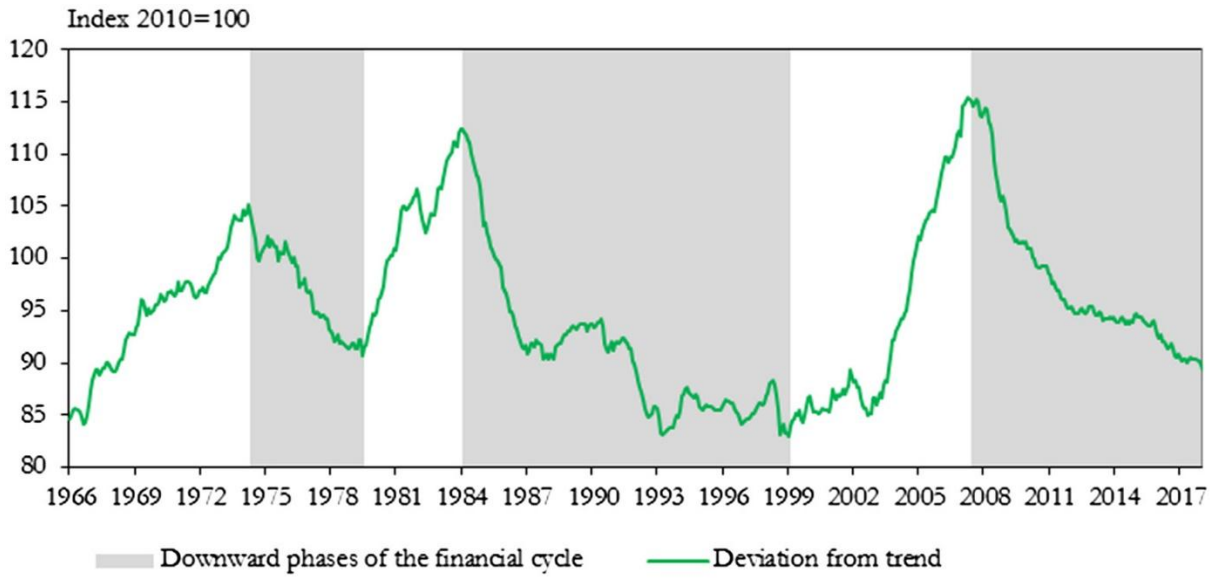

Figure 5. Final financial cycle

Table 1. Financial cycle dates at peaks and troughs

Peak	Trough
April 1974	July 1979
January 1984	February 1999
May 2007	

Table 2 compares the length and dates of the South African business cycles to the financial cycle. We follow Hiebert *et al*. (2018) comparing the average length of the financial cycle to the South African business cycle. Table 3 shows that the overall length of the financial cycle in South Africa is 17.3 years – very close to 17.1 in recent cross country research including South Africa (Gonzalez *et al*., 2015). It is also much longer than the average business cycle length (5.8 years), which is similar to Drehmann *et al*. (2010), who found that the financial cycle lasts between 5 and 20 years, with a median of 15 years. Financial cycles in South Africa are, therefore, around three times longer than business cycles.

Table 2. Dates and length of the business cycle compared to the financial cycle

Business cycle turning points		Financial cycle turning points		Business cycle turning points		Financial cycle turning points	
Upward phase	Duration (months)	Upward phase	Duration (months)	Downward phase	Duration (months)	Downward phase	Duration (months)
Jan 1966–May 1967	17	Jan 1966-Apr 1974	100	Jun 1967–Dec 1967	7		
Jan 1968–Dec 1970	36			Jan 1971–Aug 1972	20		
Sep 1972–Aug 1974	24			Sep 1974–Dec 1977	40	May 1974–Jul 1979	62
Jan 1978–Aug 1981	44	Aug 1979–Jan 1984	53	Sep 1981–Mar 1983	19		
Apr 1983–Jun 1984	15			Jul 1984–Mar 1986	21	Feb 1984–Jan 1999	182
Apr 1986–Feb 1989	35			Mar 1989–May 1993	51		
Jun 1993–Nov 1996	42			Dec 1996–Aug 1999	33		
Sep 1999–Nov 2007	99	Feb 1999–May 2007	98	Dec 2007–Aug 2009	21	Jun 2007-	126
Sep 2009–Nov 2013	51			Dec 2013-	48		
Average duration in years	3.4		7.0		2.4		10.3

Source: SARB (2019), own calculations.

Table 3. Summary of average length of cycles (in years)

Financial cycle			Business cycle		
Peak-to-trough	Trough-to-peak	Overall	Peak-to-trough	Trough-to-peak	Overall
10.3	7.0	17.3	2.4	3.4	5.8

Source: Own calculations.

The average duration of business cycle downturns in South Africa is 2.4 years, and for upturns 3.4 years (Table 3). Contrary to Hiebert *et al*. (2018), we find that, on average, financial cycle contractions (10.3 years) last longer than expansions (7.0 years). The long duration of financial cycle contractions shows us that deleveraging is a longer process (Hiebert *et al*., 2018).

The South African cycle is, therefore, similar in length to the UK (18.1–18.5 years), France (15.4–16.7) and Italy (15.6–19.2), depending on the method (Rünstler and Vlekke, 2018). It is also about the same length as estimated by Schüler *et al*. (2017) for the US and the UK (≈16.4 years).

4 Overview of the Three South African Financial Cycle Downward Phases

This section provides a brief overview of the three main financial variables over the different financial cycle downward phases. Table 4 summarises growth in real house prices, real JSE

all share index and total real domestic credit extended by all monetary institutions over the three financial cycle downward phases.

Table 4. Growth between turning points

Financial cycle phases	Real house prices	Real JSE	Total real credit extended
1969/Q1-1974/Q1	35.7	40.7	69.5
1974Q2-1979Q3 (downward)	−24.6	−41.3	5.1
1979/Q4-1983/Q4	56.6	4.9	29.2
1984Q1-1999Q1 (downward)	−49.6	−22.1	60.3
1999/Q2-2007/Q1	189.2	174.2	94.4
2007Q2- (downward)	−15.2	−19.7	26.4
Upward phases	93.8	73.3	64.3
Downward phases	−29.8	−27.7	30.6

Source: Own calculations.

Table 4 show that during 1974–1979 downward phase of the financial cycle, real house price growth contracted by 24.6%, while the JSE all share index fell by 41.3%, in conjunction with real credit extended slowing markedly to a rate of only 5.1%. During the 1984–1999 downward phase, real house price growth contracted by 49.6%, while the JSE all share index contracted by 22.1%. Unlike the other two downward phases of the financial cycle, real credit extended continued to outperform the preceding upward phase growth, with real credit extended increasing by 60.3% during the period.

In the most recent financial downward phase, real house price growth contracted by 15.2%, while the JSE all share index contracted by 19.7%. However, that might be attributable to the large number of dual-listed companies on the JSE.[20] Growth in real credit extended slowed markedly from 94.4%, over the preceding financial cycle upswing, to 26.4% over this financial cycle downward phase. Unlike the previous two financial cycle phases, the SARB introduced inflation targeting in February 2000 (SARB, 2009), whereby monetary policy aims to keep inflation between 3% and 6%. During the 2007–2017 financial cycle downward phase the average inflation rate was much lower at 6.2%, compared to the previous two financial cycle downward phases (at 11.9% and 15.7%, respectively), despite the rapid rise in house and other asset prices preceding the financial cycle peak.

5 A Brief Description of Debt and Deleveraging Following the 2007 Financial Cycle Peak in South Africa

According to Lo and Rogoff (2015), most of the work done on the role of leverage in worsening financial crisis outcomes has shown the importance in controlling leverage to stabilise the economy. It would therefore also be an important measure at the end of a financial crisis to see if there was a sufficient unwinding of leverage. At a macroeconomic level, to measure deleveraging, ratios such as debt-to-income and debt servicing cost to income are often used (Glick and Lansing, 2009; Fondeville *et al*., 2010). According to (Bhutta, 2012) because deleveraging entails repaying debt (which was accumulated in earlier periods) at a faster pace, the process of deleveraging involves taking resources away

from other parts of economic activity such as consumption or savings in order to repay debt. The next section will evaluate macroeconomic leverage measures to determine to which extent households deleveraged after the recent 2007 financial cycle peak.

South Africa experienced a record length upward phase of the *business cycle* between 1999 and 2007, with the latter part of the upswing being characterised by exceptionally strong economic growth, as inflation moderated and monetary policy became more accommodative. Although the domestic economy at the time was already slowing, due to internal imbalances, the spillover from the global financial crisis had a severe impact on financial variables, such as house and asset prices and household debt.

Total household debt-to-income increased significantly from 51.2% in September 2002 to 87.8% in March 2008 (its highest level measured since 1969) (Fig. 6). Shortly after the South African financial cycle reached its peak in May 2007, households started to deleverage, as their wealth deteriorated, relative to their stock of debt. Household debt-to-income has, however, only decreased to 71.1% by the end of 2017, still about 20% points above pre-financial peak levels. Although household debt grew sharply over the 2002 to 2007 period, debt servicing costs as a share of disposable income remained low, as interest rates stayed fairly accommodative up to 2005. Thus, households did not realise the full extent of their exposure (Fig. 6). Household debt service costs as a proportion of income increased sharply after that, reaching a high of 13.8% in September 2008. As monetary policy became more accommodative following the global financial crisis, debt service costs to income decreased to 8.5% in September 2012, before returning to 9% at end of 2017.

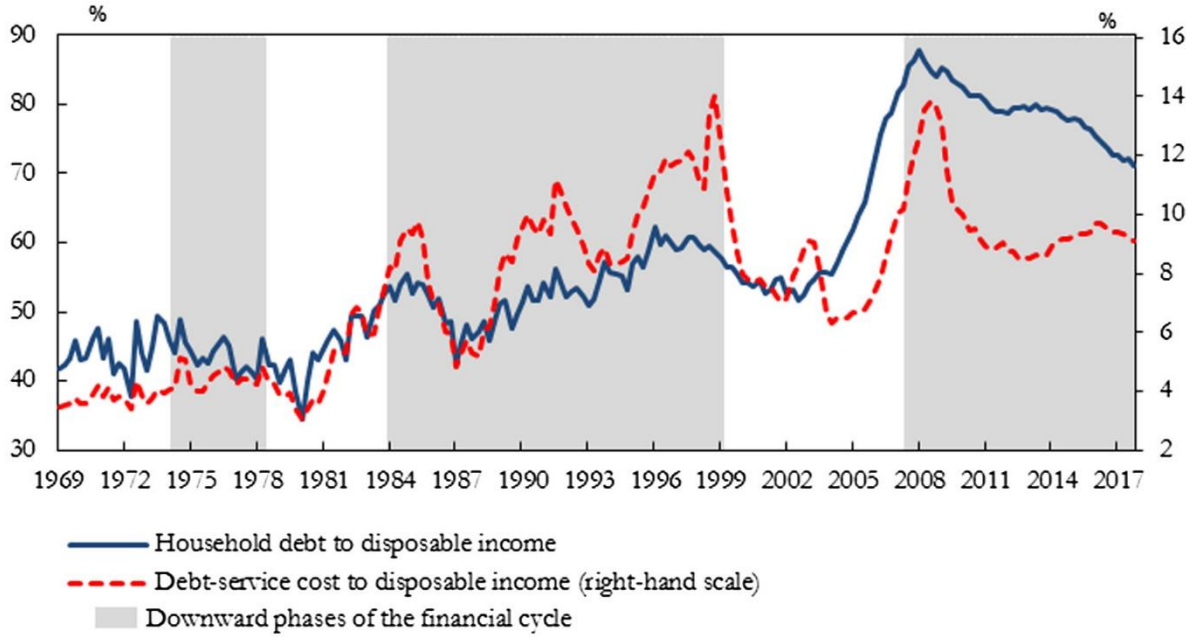

Figure 6. Ratio of total household debt-to-disposable income and total debt service cost to disposable income*
*Disposable income is a national accounting aggregate measure and includes those with and without debt
Source: SARB.

Mortgage advances are the single largest debt category, comprising around 43% of total credit extended by all monetary institutions, while vehicle loans contribute 12% and the remaining share belongs to other credit. Fig. 7 shows that the ratio of both mortgage- and vehicle debt-to-income increased at a much faster pace than other consumer debt-to-income.[21]The increase in vehicle and other consumer debt-to-income was mostly driven by imports (mostly durable goods) as the exchange rate appreciated during this period, and leading up to the financial cycle peak (SARB, 2009). Mortgage- and vehicle debt-to-income decreased at a faster pace than other consumer credit after the financial cycle peak.

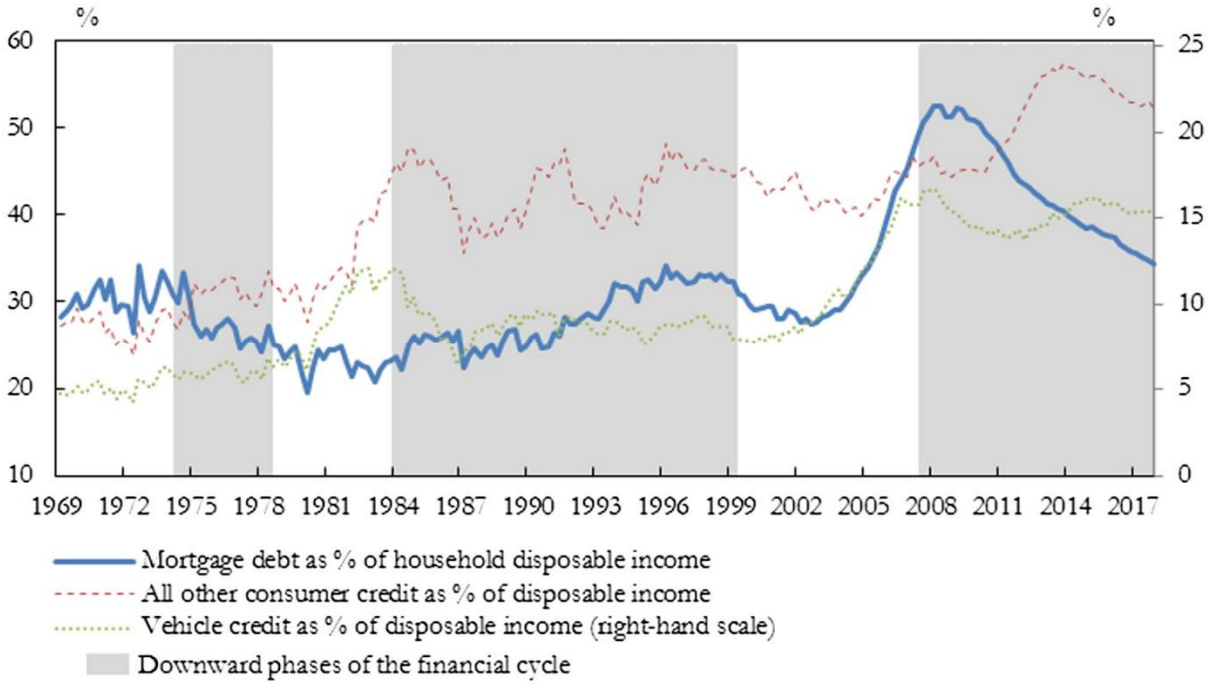

Figure 7. Ratio of household credit to disposable income* by debt category
*Disposable income is a national accounting aggregate measure and includes those with and without debt
Source: SARB.

In South Africa, most mortgage loans have a variable interest rate, wherein households can deposit and are typically allowed to withdraw surplus funds. As house prices increased sharply pre-financial peak, households used surplus funds for consumption purposes, believing that the value of their houses would continue to grow quickly. After the housing bubble burst, house prices declined sharply, resulting in many households not being able to sell their homes as they were left with little or even negative equity. Furthermore, banks put more stringent lending criteria in place.[22] Other household deleveraging resulted from paying off more capital in the initial high interest rate environment. Fig. 7 shows a sharp increase in other consumer debt-to-income ratio at the end of 2009. It is likely that alternative credit sources were the only accessible funds for highly indebted households and/or households who did not meet the stricter lending criteria set by banks.

In March 2003, mortgage debt as a share of household income stood at 25.7%, before doubling to 52.5% in March 2008. By December 2017, households had only reduced their mortgage debt, as a percentage of income, to 34.4%.

The ratio of financing costs (interest and other lending costs) to income for mortgages, vehicles and other consumer credit, decreased between 2008 and 2013. This was in line with the fall in the repo rate (the rate to which banks link their prime lending rates) to historically low levels, from 12% to 5% (Fig. 8).

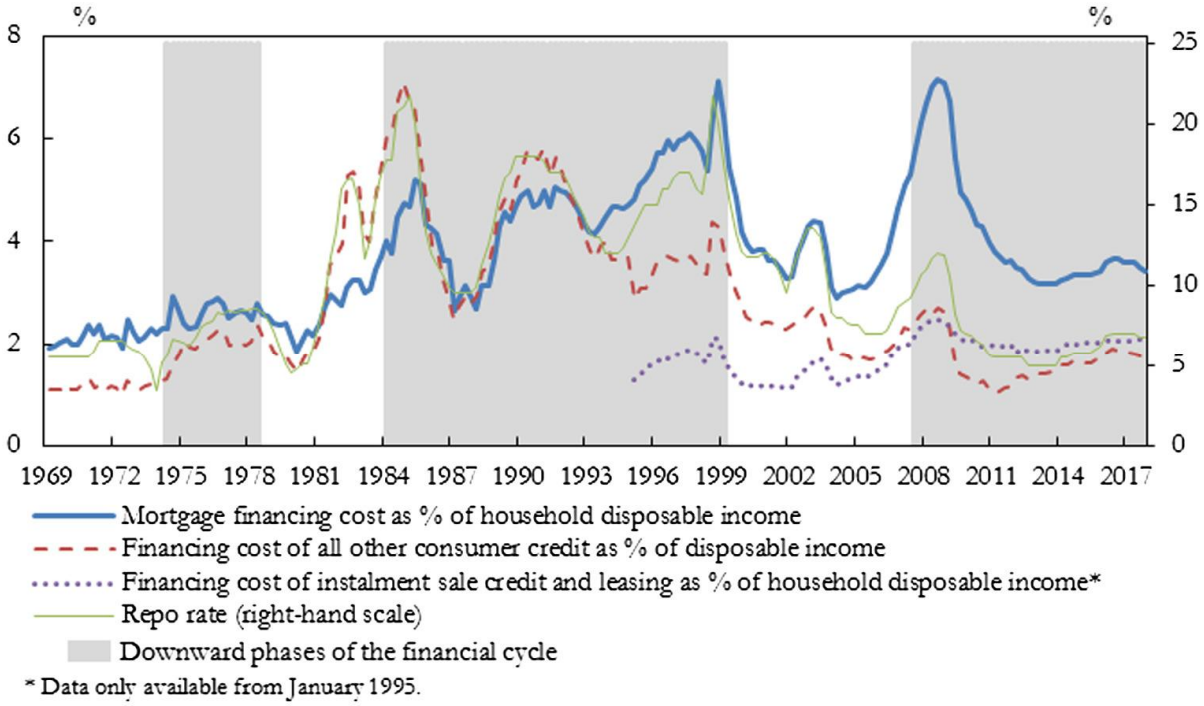

Figure 8. Household debt service cost to disposable income* by debt category
*Disposable income is a national accounting aggregate measure and includes those with and without debt
Source: SARB.

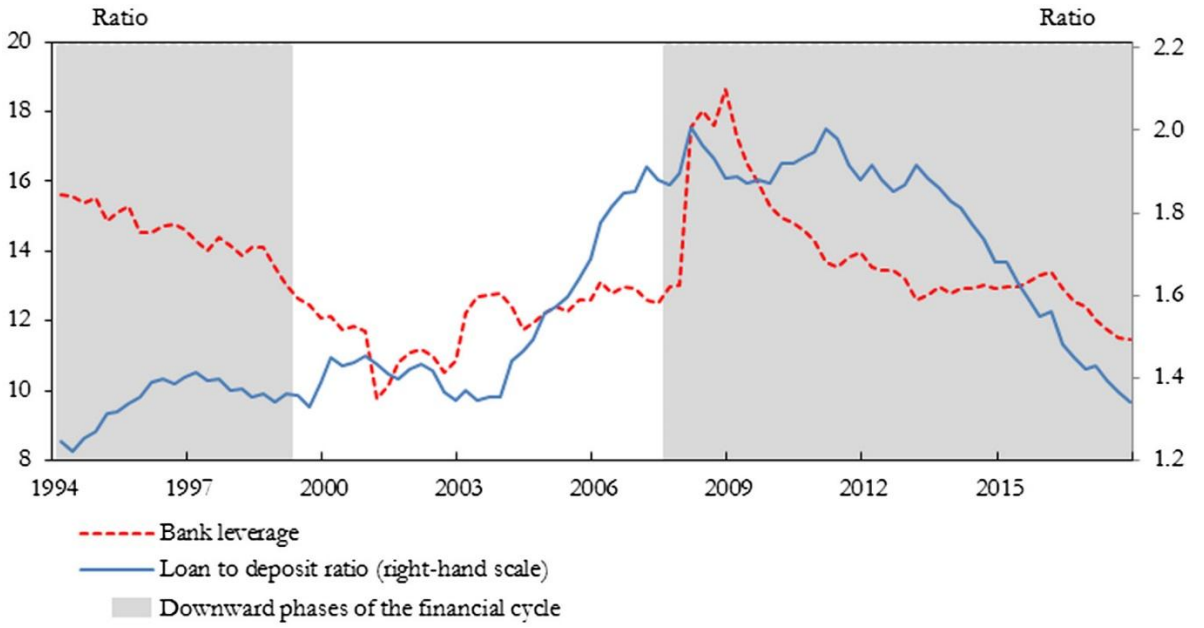

Figure 9. Bank capital to total asset ratio (bank leverage) and loan to deposit ratio
Source: SARB.

It is not only the demand for credit that slows after a financial bust, but also the level of credit supplied by the banking sector. Following Einarsson *et al*. (2015), we show in Fig. 9 that the asset to capital ratio of banks (bank leverage) rose sharply from 9.7% in 2001 to 18.6% in December 2008. Bank assets (mainly loans) increased sharply, before falling back to pre-financial peak levels only at the end of 2017. Supporting our earlier findings, Fig. 9 shows that banks have managed to bring this ratio down through credit repayment, limited or reduced lending, bad debt write-offs or a combination. The decrease in the household loan to deposit ratio, since its peak in January 2008, also suggests that banks are only now finding room to provide credit again.

6 Results

6.1 Comparing Household Debt Deleveraging Across Downward Phases of the Financial Cycle

We re-index our cycle peaks, setting each to 100 for our three debt variables, and compare how far South Africa has deleveraged during financial cycle downward phases. For the remainder of the paper income refers to disposable income as a national aggregate and includes those with and without debt. We find that the mortgage debt-to-income ratio fell much faster and for a longer period (10 years) in the current downward phase compared to the two previous phases (Fig. 10). Our finding supports earlier claims that mortgage advances played a crucial role in the financial downswing, and that most of the deleveraging took place in this debt category.

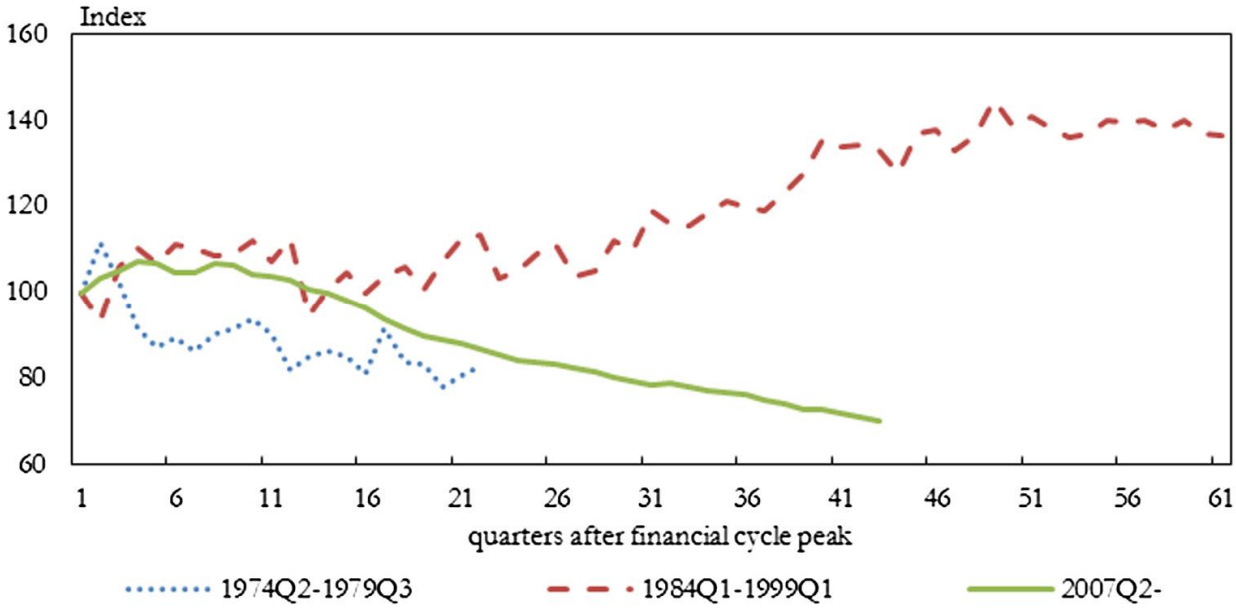

Figure 10. Financial cycle phase comparisons: Mortgage debt-to-income ratio
Source: Own calculations, SARB.

The vehicle debt-to-income ratio declined only marginally following the latest financial cycle peak; however, it continued to hover around the 100 level, suggesting that very little deleveraging took place in the South African vehicle finance market. During the previous financial trough, the vehicle debt-to-income ratio initially fell more sharply, before

stabilising at a lower level (Fig. 11), suggesting that there was initial deleveraging in this phase, which has not been as prominent in the current phase.

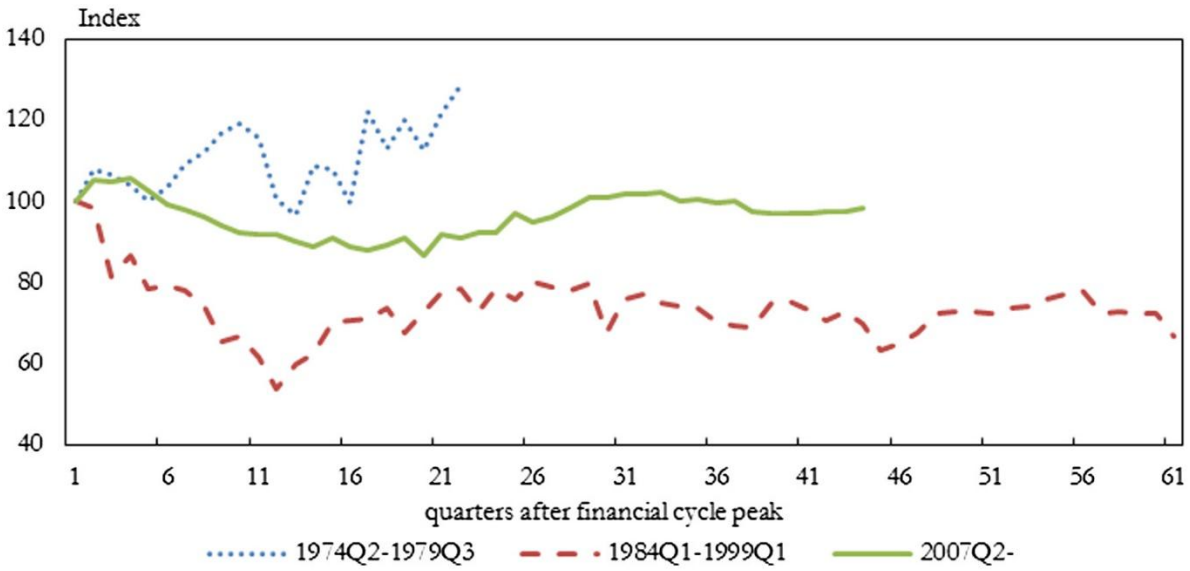

Figure 11. Financial cycle phase comparisons: Vehicle debt-to-income ratio
Source: Own calculations, SARB.

The other consumer credit-to-income ratio initially declined (Fig. 12), but picked up sharply about three years after May 2007, possibly due to distress borrowing or debt consolidation. During the previous financial downward phase (January 1984–February 1999) consumer credit initially fell much faster, compared to the other two phases. The 1984–1999 downward phase was likely driven by consumer credit, as opposed to mortgage credit. However, it is clear that mortgage credit rose during that downward phase, rather than fully unwinding by the start of the (March 1999–May 2007) financial cycle upswing.

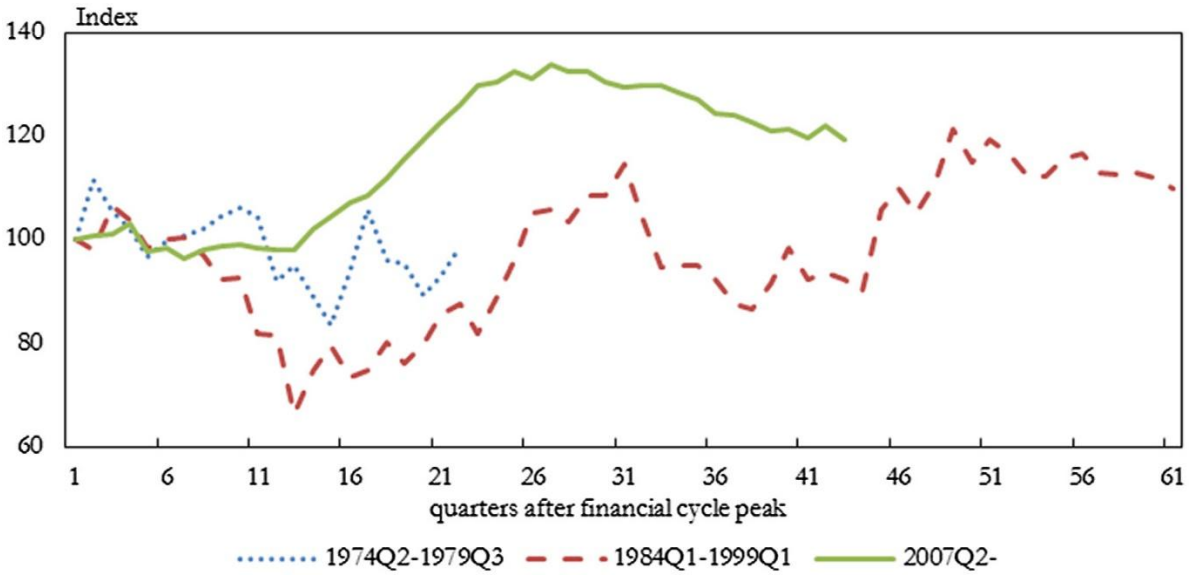

Figure 12. Financial cycle phase comparisons: All other consumer debt-to-income ratio *Source*: Own calculations, SARB.

6.2 Results: Phase Average Comparisons for Financial Sector Variables

Figs. 13–15-13–15 represents the average, or typical, behaviour of our three financial variables (20 quarters[23] before and 20 quarters after the three financial cycles that we have dated) to examine financial variable deflation paths. We follow Einarsson *et al*. (2015) using both the mean and median over the three cycles, although the mean and median are fairly similar for our three financial indicators. On average, see Fig. 13, we find that the JSE index peaked at the same time as the financial cycle peaked and decreased sharply thereafter. These results are similar to Reinhart and Rogoff (2009), who show that equity prices fall by 55%, on average, over a downturn period of three and a half years.

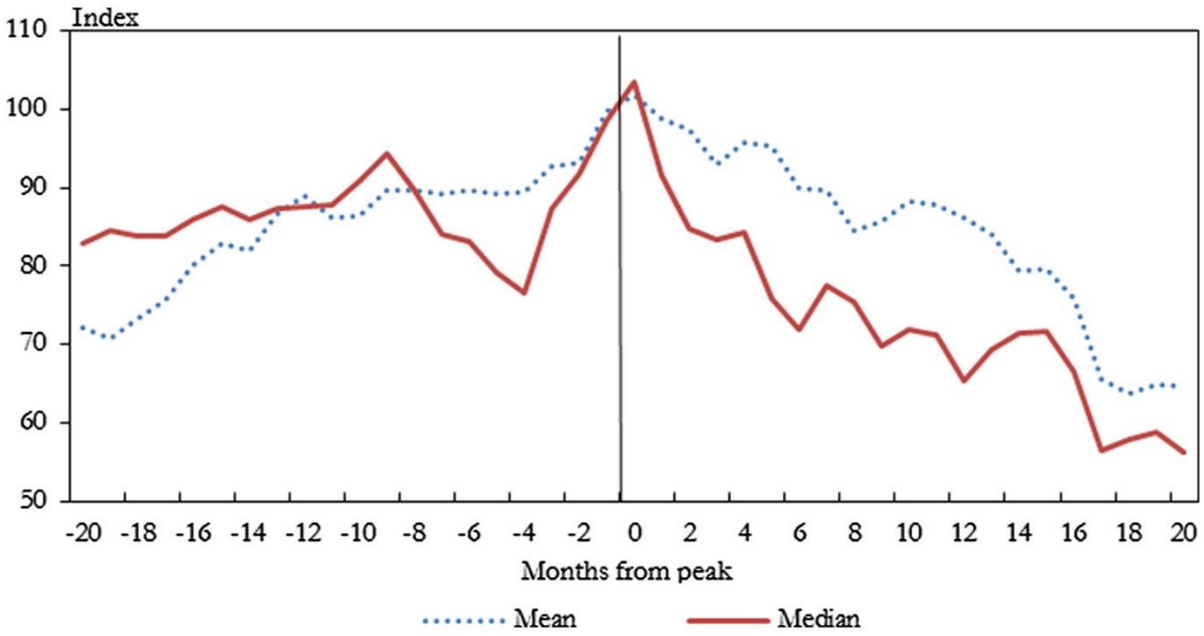

Figure 13. JSE: mean and median comparison
Source: Own calculations, SARB.

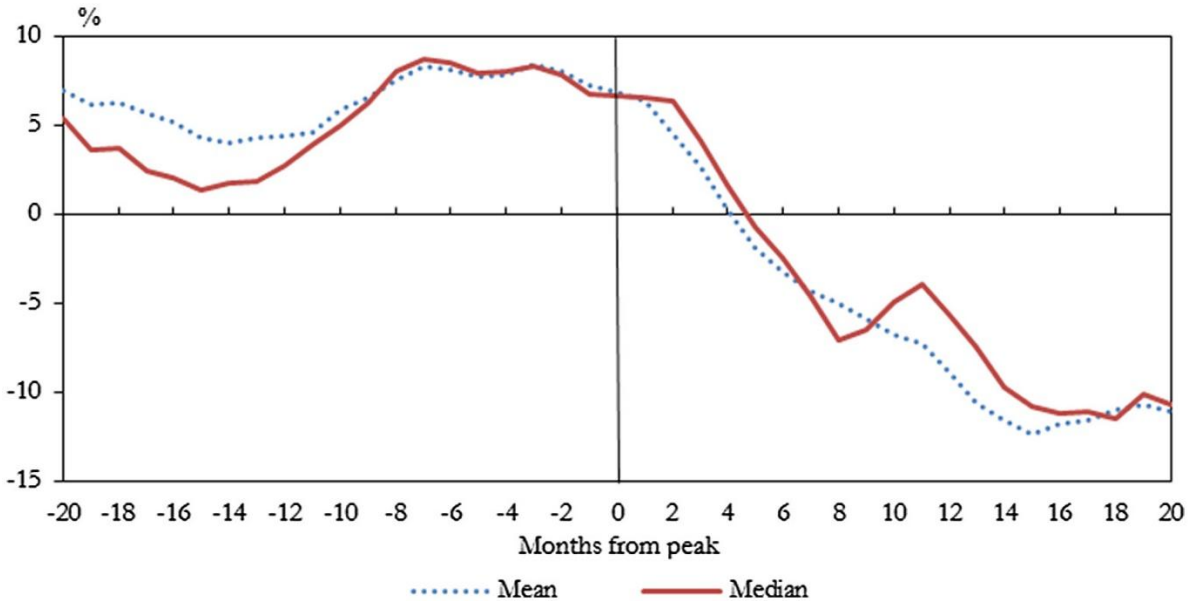

Figure 14. House price growth (y/y): mean and median comparison
Source: Own calculations, SARB.

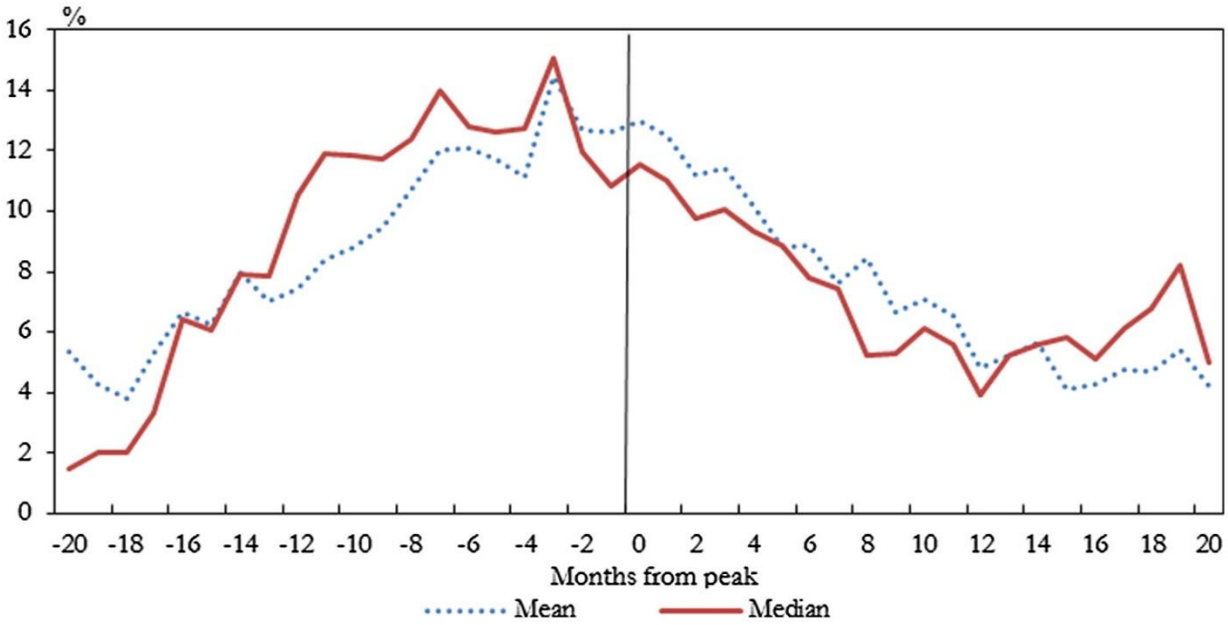

Figure 15. Credit growth (y/y): mean and median comparison
Source: Own calculations, SARB.

Einarsson *et al*. (2015) find that real house prices peaked four quarters before a peak, falling significantly during the aftermath. We see a similar trend in South Africa's real house prices, where the peak is about eight quarters before and growth, on average, falls sharply after a financial cycle peak is reached, see Fig. 14.

For credit, we see a sharp initial increase that peaks 3 quarters before a financial cycle peak, (see Fig. 15), followed by a sharp decline for about 12 quarters. According to Reinhart and Rogoff (2009), more often than not, house prices fall by about 35% over a six-year period following a financial crisis. It does seem that house prices in the US and in other emerging economies declined more than in South Africa following the collapse of the most recent house price bubble, suggesting that South African house prices have not yet fully normalised.

6.3 Results: Phase Comparison Around Turning Point for Debt Variables

Similar to Einarsson *et al*. (2015), we compare movements in the recent downward phase in our three debt variables over the financial cycle to the other two downward phases. Because we only have three phases, we compare each phase directly, instead of using the mean and median as in Einarsson *et al*. (2015) (as used for the phase average comparisons of the financial sector variables in Section 6.2). The ratio of mortgage debt-to-income during the current phase differs substantially from the previous two phases (Fig. 16). Preceding the recent financial downward phase there was a sharp increase in the debt-to-income ratio, providing evidence that this phase was to a large extent driven by mortgage debt. Since the most recent peak, mortgage debt-to-income has moderated slightly, but remains elevated, compared to the other two phases. Although the mortgage debt-to-income ratio remained high, growth in mortgage debt declined sharply after the recent financial cycle peak (see Fig. A2).

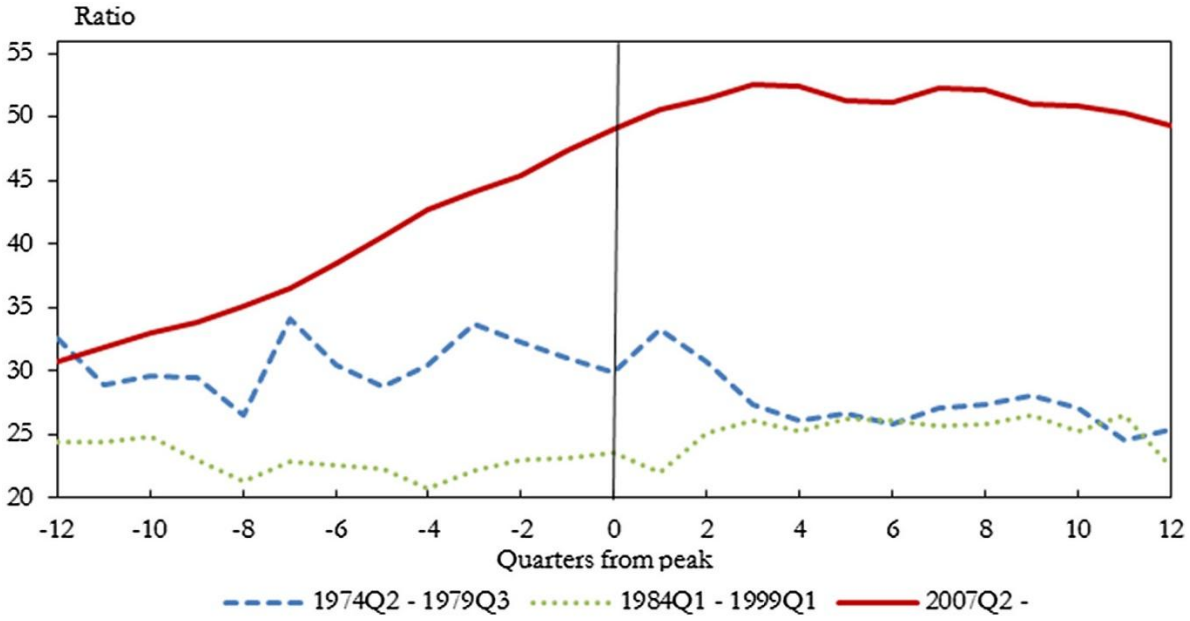

Figure 16. Phase comparison around turning point: Mortgage debt-to-income ratio
Source: Own calculations, SARB.

Fig. 17 shows that the vehicle debt-to-income ratio in the current phase increased at a faster pace than in the other two phases and also remained at high levels after the financial cycle peak. However, Fig. A3 shows that the growth rate of vehicle debt over four quarters decreased sharply, even contracting seven quarters after the financial cycle peak was reached.

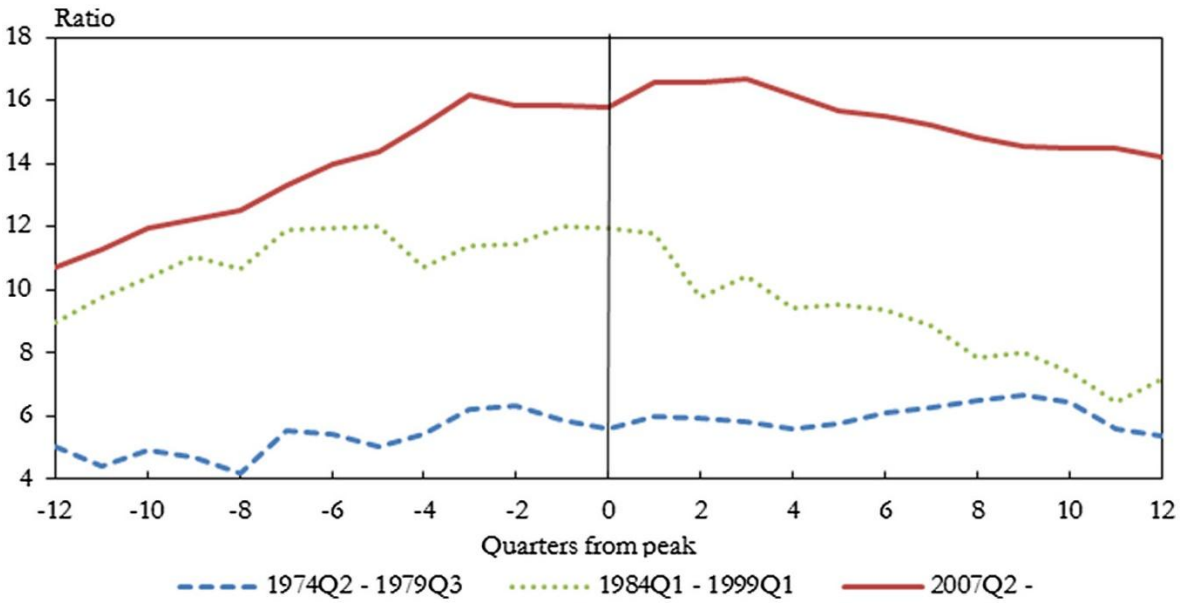

Figure 17. Phase comparison around turning point: Vehicle debt-to-income ratio
Source: Own calculations, SARB.

The ratio of all other consumer debt-to-income reacted very similar to the 1974 financial downward phase. The all other consumer debt-to-income ratio remained high up to the

financial cycle peak, however instead of declining as in the 1984 phase, this ratio started to increase soon after the peak was reached (Fig. 18). In the recent phase, this could be attributed to distress borrowing of households.

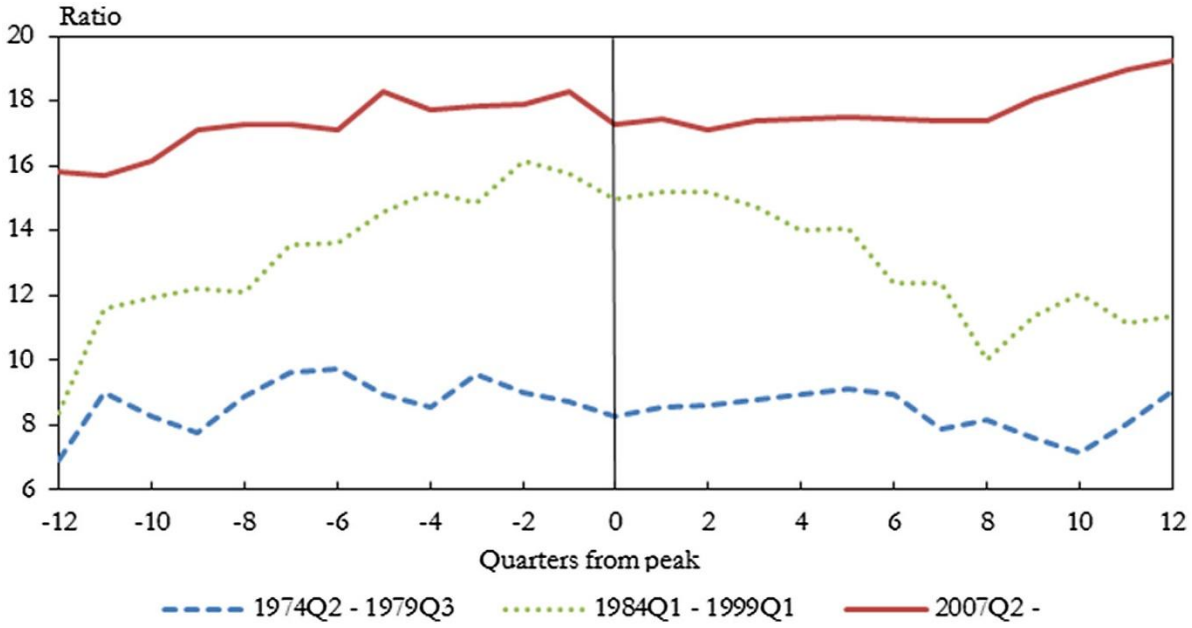

Figure 18. Phase comparison around turning point: All other consumer debt-to-income ratio *Source*: Own calculations, SARB.

Table 5. Averages over the phases

Financial cycle phases	Total debt-to-income ratio	Mortgage debt-to-income ratio	Vehicle debt-to-income ratio	Other consumer debt-to-income ratio
1969/Q1-1974/Q1	44.2	30.4	5.2	8.7
1974Q2-1979Q3 (downward)	43.3	26.4	6.2	8.2
1979/Q4-1983/Q4	46.0	22.8	10.1	12.1
1984Q1-1999Q1 (downward)	53.7	28.3	8.8	15.0
1999/Q2-2007/Q1	60.3	32.9	10.7	16.3
2007Q2- (downward)	79.5	43.4	15.2	20.9
Upward phases	50.2	28.7	8.7	12.4
Downward phases	58.8	32.7	10.0	14.7

Source: Own calculations.

Table 5 represents the average debt-to-income ratios over the various phases. The average total debt-to-income ratio in the latest downward phase is about 8.6% points higher than the average over all the downward phases and higher than the average over the upward phases. This is due to debt levels becoming higher as the economy goes into a financial cycle downswing. The mortgage debt-to-income ratio is the one that stands out. During the latest

financial cycle downswing the mortgage debt-to-income ratio was 10.7% points higher than the average over all the downward phases as mortgage credit grew at a much faster pace than income over this period. Vehicle debt-to-income was also 5.2% points above the average, while other consumer credit registered 6.2% points above the average over all downward phases.

We show in Table 6 that the total credit growth in the latest downward phase slowed sharply from the preceding upward phase of the financial cycle. Total credit growth slowed from 7.3% in the preceding upswing to 2%.[24] Mortgage credit growth fell from 8.1% to 1.2%, while vehicle debt growth slowed from 10.9% at 2.5%. Other consumer credit slowed marginally from 4.3% to 3.3%. Consumers relied on other types of debt, likely unsecured debt, when they fell into financial difficulty, while at the same time banks implemented stricter lending criteria on credit lines.

Table 6. Growth over the phases

Financial cycle phases	Total credit growth	Mortgage growth	Vehicle debt growth	Other consumer credit growth
1969/Q1-1974/Q1	4.8	4.8	6.1	4.3
1974Q2-1979Q3 (downward)	3.3	2.5	6.4	4.7
1979/Q4-1983/Q4	9.3	6.0	12.7	14.8
1984Q1-1999Q1 (downward)	12.9	16.6	6.8	12.1
1999/Q2-2007/Q1	7.3	8.1	10.9	4.3
2007Q2- (downward)	2.0	1.2	2.5	3.3
Upward phases	7.1	6.3	9.9	7.8
Downward phases	6.1	6.8	5.3	6.7

Note: The growth rates are standardised by dividing the growth between the upper (lower) and lower (upper) turning point with the number of months in between the phases.

Source: Own calculations.

7 Conclusion

This paper establishes a financial cycle for South Africa using growth cycle methodology as used by the SARB in dating the business cycle. We use real house prices, equity prices and credit extended to the household sector to create a composite financial index. By applying an HP filter adapted for financial cycles, we identify peaks and troughs for the South African financial cycle. Our financial cycle reaches peaks in April 1974, January 1984 and May 2007. Using our methodology, our financial cycle is very similar to (Farrell and Kemp, 2018). However, for our financial cycle, a lower turning point has not been reached as at the end of 2017. We find that the overall length of the financial cycle in South Africa of 17.3 years. The financial cycle duration is much longer than the 5.8 year average business cycle. Financial cycles in South Africa are therefore around three times longer than business cycles. We find that on average financial cycle contractions (10.3 years), last longer than expansions (7.0

years). The long duration of financial cycle contractions show that deleveraging is a longer process.

We use these financial cycle turning point dates to determine to what extent South African households have deleveraged, with the emphasis on the most recent financial cycle downswing. We find that mortgage debt as a percentage of income was a large driver of the build-up of debt, peaking at 52.5% in March 2008. Since then, households have managed to bring this ratio down to 34.4% by December 2017. The vehicle debt-to-income ratio declined only marginally following the financial cycle peak, suggesting that very little deleveraging took place in the South African vehicle finance market as vehicles are likely more cyclical with the business cycle than the financial cycle. The sharp increase in the other consumer debt-to-income ratio at the end of 2009 is probably a result of households seeking alternative credit sources due to stricter lending criteria from banks or having to make ends meet. Our results show a clear build-up of debt in the lead-up to the 2007/2008 global financial crisis, and a slow and difficult deleveraging process that is still continuing.

Most of our variables behaved similarly across the different financial cycles, except for mortgage debt and other consumer credit, which show the extent to which households came under credit pressure. We also see that, as banks started to tighten their lending criteria, there was a sharp increase in other consumer credit. It should be noted that South Africa has a unique housing market and funding system with variable interest rates, increasing the elasticity between mortgages and interest rates. The deflation in house prices following the financial cycle peak is what most likely caused households to deleverage more in their mortgage bonds.

Lastly we find that on average during financial cycle downward phases in South Africa, real house prices fall by 30%, while real stock prices fall by 28%. Total real domestic credit extended by all monetary institutions slows to about 31% on average over a downward phase (compared to 64% growth during an upward phase in the financial cycle). In the recent financial cycle downward phase, growth in real house prices only fell by 15%, about half of the average. Similarly, stock prices fell by 20%, also not as much as average deleveraging over all financial downswings. The mortgage debt-to-income ratio was 10.7% points higher than the average over all the downward phases as mortgage credit grew at a much faster pace than income over this period. Vehicle debt-to-income was also 5.2% points above the average, while other consumer credit registered 6.2% points above the average over all downward phases.

The fact that we could find evidence that households mostly deleveraged in the mortgage debt market assists us to understand the vulnerability of institutions and households regarding this type of debt, especially when the period coincides with a house price bubble. Having to deleverage from such high debt levels is a challenge, and we saw that even though households did manage to deleverage at a macroeconomic level (whether by choice, or by force in some instances, if their homes got repossessed) it was not an instantaneous process. At a macroeconomic level, our conclusions can only stretch so far. One might be able to say that policy makers had to play a more active role in containing the house price bubble, despite no evidence of any other inflationary pressures, or that financial institutions should have been more prudent. The latter at least gave rise to most countries establishing

macro-prudential authorities to keep a closer eye on the risks associated with financial instruments and institutions.

Notes

1 Borio et al. (2017) looks at the US, while Borio (2014) and Drehmann et al. (2012) look at 7 developed countries. Claessens et al. (2011) analyses 21 advanced economies and Claessens et al. (2012) divide 44 countries into 21 advanced countries and 23 emerging market economies. Schularick and Taylor (2012) and Aikman et al. (2015) look at 14 developed economies, while Gonzalez et al. (2015) groups South Africa together with 27 other countries.

2 Burns and Mitchell (1946) originally proposed the business cycle definition that has supported decades of research on the business cycle.

3 Sub-prime mortgage loans provided funding to poorer US families, and these riskier loans were packaged with higher rated instruments and sold as collateralised debt obligations to investors.

4 It is also possible to focus on only one variable such as credit and date the credit cycle – although not covered in this paper, Borio and Drehmann (2009), Borio (2014), Alessi and Detken (2009) and Drehmann et al. (2012) find that the ratio of credit to GDP and especially property prices make for likely leading indicators of financial crisis. Drehmann and Juselius (2014) also find that together with the credit to GDP ratio, the debt service ratio also makes for a promising early warning indicator (see Aikman et al., 2015; Schularick and Taylor, 2012; Jorda et al., 2011; Dell'ariccia et al., 2012). A recent paper by Borio et al. (2018) highlights that the predictive capabilities of the financial cycle for recession risk outperforms the generally used interest rate spread. Their finding suggest that financial cycle proxies, especially the debt service ratio, could benefit policy makers and forecasters in a meaningful way when looking for early recession warning signs.

5 Related work includes Boshoff (2005, 2010) who base their cycle on frequency-based filters, while Kabundi and Mbelu (2017) and Thompson et al. (2015a) estimate a financial conditions index for South Africa. Thompson et al. (2015b) showed that the forecasting ability of their con-structed financial conditions index can possibly be used as an early warning indicator for macro-economic instability, while Balcilar et al. (2016) points to the importance of allowing for nonlinear effects when forecasting. Balcilar et al. (2018) show that it is not only the size of the financial shock that matters, but how the policy response accounts for the nonlinearities in the South African economy and subsequent policy reaction.

6 See Einarsson et al. (2016) and Borio et al. (2001, 2010).

7 See Zarnowitz and Ozyildirim (2006) for the translation of the PAT to the Hodrick–Prescott (HP) filter. Also see Lowe and Borio (2002) and Goodhart and Hofmann (2008) for using HP filters to detrend financial variables.

8 Also see Simo-Kengne et al. (2014), Aye et al. (2014) and Patterson and Steenkamp (2017) for research on South African house prices and macro shocks.

9 Boonzaaier (2018) draws attention to two big drawbacks in the Absa methodology. One is that the arithmetic mean is not ideal for a series that is likely skewed in its distribution and likely contains outliers. Boonzaaier (2018) also highlights that the unconventional stratification process together with the likelihood that the use of headline CPI for adjusting the bands can result in a series that may not be a true representation of house price movements in South Africa.

10 Overlapping periods were required for splicing purposes.

11 See Venter (2019a) for the full chronology of business cycle dating in South Africa.

12 The OECD started publishing leading indicators in 1987 (Mongardini and Saadi-Sedik, 2003). Although there are slight differences in the methodologies of dating classical or growth cycles, the indicator approach is broadly followed by all three of these institutions.

13 The standardisation period should cover a number of complete financial cycles, i.e. an equal amount of upward and downward phases.

14 The author would like to thank a reviewer who suggested we test the contributions of each variable to the total. Each variable contributed around 1/3 to the total variation.

15 See Drehmann et al. (2012); Einarsson et al. (2015, 2016); Aikman et al. (2015); Hiebert et al. (2015); Strohsal et al. (2017) for examples of these.

16 Hamilton (2018) proposes an alternative to the HP filter. The author would like to thank a reviewer for suggesting that we test the HP procedure against the Hamilton (2018) regression. We applied this methodology (adjusted for the financial cycle length). As used by Schüler (2018), based on the Basel III recommendation (see Hamilton, 2018), we used (for monthly data) a five-year regression period. We therefore take h = 60 and p = 12 for monthly frequency to get to the Hamilton cycle (Hamilton, 2018). Our turning points remained the same (see Fig. A1 for a graphical comparison).

17 $\lambda_{\text{quarterl}}$y=1,600; λ_{annual}=1,600⁄4^4=6.25 and λ_{monthly}=1,600∗3^4=129,600.

18 Other studies that apply this methodology include Gerdrup et al. (2013), Alessi and Detken (2009), Claessens et al. (2011, 2012), Drehmann et al. (2012) and Hiebert et al. (2014).

19 We find that the HP filter provides robust turning points at these large λ values. We also tested a λ of 352 proposed by du Toit (2008) (7,299,072 when converted to financial cycles) and the turning points remain unchanged. A very small λ will result in many additional short cycles

20 These are companies with both local and foreign operations where performance is driven by both local and international developments, including the impact of exchange rate movements. These companies typically have large market capitalisation on the JSE.

21 Other consumer debt includes general loans and overdrafts from banks as well as credit extended by non-banks such as retail accounts and accounts payable.

22 It is difficult to measure the impact of the national credit act which came into effect in 2007, as it coincided with the economic slowdown. Stricter lending criteria also limited households' ac-cess to credit and households who did not qualify for credit, were basically forced to take up unsecured credit at much higher interest rates.

23 This is an arbitrary number of quarters. It is longer than what would usually be shown in business cycle literature as financial crises take much longer to build up and unwind.

24 These growth rates are standardised by dividing the growth rate for each phase with the number of months in that phase.

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Appendix A:

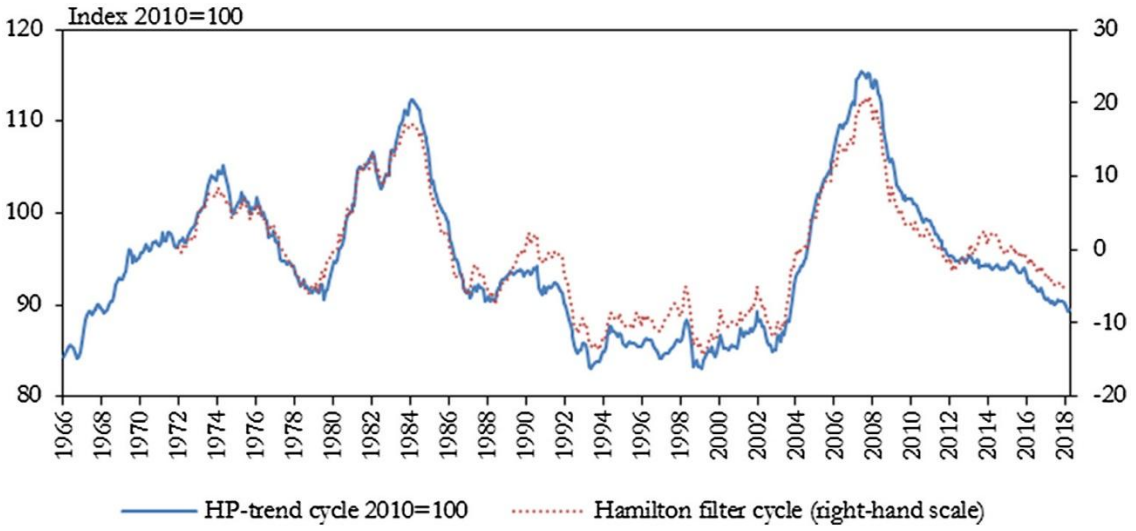

Figure A1. HP filter vs. Hamilton regression
Source: Own calculations, SARB.

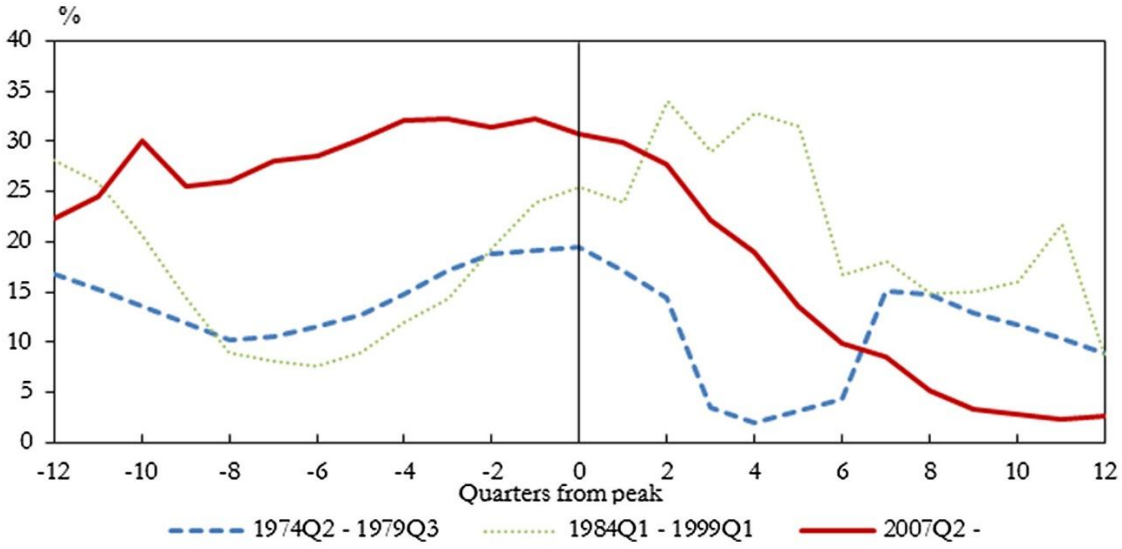

Figure A2. Average phase comparison: Mortgage debt growth over 4 quarters

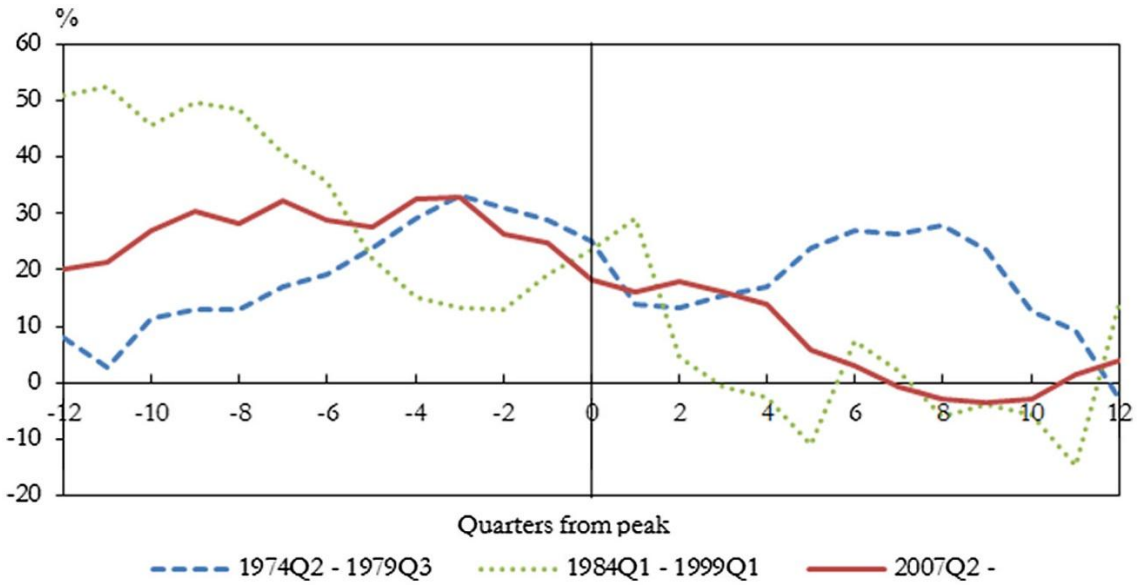

Figure A3. Phase comparison around turning point: Vehicle debt growth over 4 quarters