

Recovery phases in the South African business cycle

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The empirical literature prior to 2008 is fairly unanimous in finding that deep recessions tend to be followed by strong expansions – at least in the developed world. When the post-crisis expansion turned out to be weak, economists started questioning the stylized facts. In particular, interest has shifted to the link between financial market developments and subsequent business cycle expansions. The literature on the business cycle effects of financial crises generally focuses on business cycle expansions as a whole, as opposed to only the initial recovery. Claessens, Kose and Terrones (2012), for example, find that expansions following recessions related to financial crises are generally weaker than other expansions. However, these findings depend critically on which part of the expansion is being considered. This paper focuses attention on the first stage in business cycle expansions, called recoveries. The paper first develops a taxonomy for existing identification methods for business cycle recoveries, distinguishing between duration- and trend-based approaches and highlighting the limitations of these approaches. Subsequently, the paper introduces an alternative methodology, defining the recovery period as the period until the initial growth acceleration reaches its peak. This definition reaches back to the ‘revival’ concept of Burns and Mitchell and emphasises the increased momentum of an economy ‘gaining speed’ after the trough. The paper applies the method to identify and study recovery phases in the South African business cycle. In particular, the paper focuses on the behaviour of components of real expenditure as well as the role of monetary and fiscal policy in affecting the properties of business cycle recoveries. For comparison purposes, the South African findings are contrasted with those obtained for the US business cycle, using the same methodology.

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The weak upswing following the Great Recession has shifted attention to understanding how financial crises and deep recessions affect subsequent business cycle upswings. One body of literature considers the properties of the first stage of an upswing, called the recovery phase. The properties of recoveries may help economists identify the drivers of weak upswings and develop policy proposals. While South Africa escaped the worst of the financial crisis, the subsequent business cycle upswing has been equally uninspiring. Therefore, a study of South African recoveries may be particularly illuminating.

The following section set out the literature on recoveries, suggesting an alternative method for recovery identification and outlining important properties of recoveries. A subsequent section introduces the methodology for identification and study of recoveries, followed by the South African results.

1. Recoveries

The aftermath of the financial crisis has prompted a response in business cycle research. The empirical literature prior to 2008 is fairly unanimous in finding that deep recessions tend to be followed by strong expansions – at least in the developed world. When the post-crisis expansion turned out to be weak, economists started questioning the stylized facts. One part of the recent academic effort is devoted to studying the first stage in business cycle expansions, called recoveries. Historically, business cycle recoveries in the US and elsewhere are characterized by ‘bounce-back’ growth (Friedman, 1969): deep recessions are followed by strong recoveries (for empirical work, see Zarnowitz (1992), Wynne and Balke (1992) and Sichel (1994)). The recent recovery did not display this regularity, leading economists to investigate how a financial crisis may change the relationship between recession and recovery.

The literature on the business cycle effects of financial crises generally focuses on business cycle expansions as a whole, as opposed to only the initial recovery. Claessens, Kose and Terrones (2012), for example, find that expansions following recessions related to financial crises are generally weaker than other expansions. This finding, however, is sensitive to how much of the expansion is being considered. Bordo and Haubrich (2012) argue that the slow 2009 recovery, together with slow recoveries post-Depression and in the early 1990s, are exceptions: excluding these three, US recoveries since 1880 are typically stronger following recessions related to a financial crisis. Howard, Martin and Wilson (2011) find similarly positive support for bounce-back recoveries, based on a cross-section of 59 countries since 1970. The choice of cycle phase (recovery versus entire expansion) therefore matters when determining stylized facts on the impact of financial crises on business cycles.

Bordo and Haubrich (2012) emphasise that their findings are sensitive to the particular definition of recovery: when recoveries are defined to last as long as preceding recessions, the ‘bounce-back’ result is stronger than when recoveries are defined to last for a fixed duration. In fact, the broader recovery literature employs a variety of definitions for recovery, which can be grouped into duration-based and trend-based definitions.

Duration-based definitions underlie regime-switching models for business cycle identification. Using Markov-switching models with a pre-determined recovery duration of six quarters, Morley and Piger (2012) and Kim, Morley and Piger (2005) model ‘bounce-back’ recoveries in the US. Fatas and Mihov (2013) use similar models, and additional post-crisis data, to argue that the behaviour of recoveries has changed. Furthermore, employing a different methodological approach, Howard, Martin and Wilson (2011) use recovery duration of three years to delineate recoveries. In earlier work, Balke and Wynne (1995) follow a

method similar to that employed by Burns and Mitchell, dividing expansion phases into three equal parts and studying the initial part as recovery.

One of the limitations facing a duration-based analysis is its implicit assumption that the growth acceleration characterizing a recovery phase occurs immediately after the trough. This assumption limits the ability to elucidate recoveries displaying different properties. As shown in this paper, in some cycles (including South African ones), the growth acceleration that ends the recession peters out quickly after the trough, leading to a slow start to the recovery. Growth acceleration then occurs a couple of quarters after the trough. A duration-based identification would ignore these recoveries. A duration-based analysis is also inconsistent with the finding in the empirical literature that cycles and cycle phases are not periodic.

Another part of the literature on recoveries relies on a trend-based definition: this approach views a recovery as a period during which output is returning to its long-run growth path. This body of literature distinguishes between return to peak output levels or to long-run output growth. In addition to using a duration-based definition of four quarters, Sichel (1994), Kannan, Scott, and Terrones (2009) and Claessens, Kose and Terrones (2012), as well as Hall and McDermott (2013), define a recovery as the time required to return output to its peak level prior to the recession. Some studies adjust pre-crisis peak levels to reflect counterfactual trend growth (Fatas and Mihov, 2013). An alternative approach defines recovery instead as the time it takes to return output to a long-run trend growth rate (Papell and Prodan, 2012). This sets a lower benchmark, by accepting that recovery is achieved even if permanent output loss has occurred.

One challenge facing a trend-based definition is the difficulty of identifying the appropriate long-run counterfactual growth rate. In particular, recent work considers the impact of financial crises on potential output (Cerra and Saxena, 2008).

A trend-based definition emphasises a particular property of recovery, namely recovery of recession output loss. This focus departs from the original Burns-Mitchell view of recovery as a revival stage in the expansion. In their original work, Burns and Mitchell (1946) identified three business cycle phases: recession, revival and prosperity. The revival phase was central to their view of the business cycle as a diffused phenomenon across various sectors – the revival stage is that initial stage of the cycle during which output growth is gathering momentum and spreading across sectors. In this view, it is diffusion and momentum that characterise a recovery, rather than its performance relative to a long-run growth benchmark. Such a view enables the identification and analysis of a broader set of recoveries – including weaker recoveries.

Consequently, this paper proposes a definition of recovery that is neither duration nor trend dependent. In particular, as set out below, we define the recovery period as the period until the initial growth acceleration reaches its peak. This definition reaches back to the revival concept of Burns and Mitchell, discussed above, and emphasises the increased momentum of an economy ‘building up speed’ after the trough.

2. Methodology

The paper identifies and studies recovery phases in the South African business cycle. For comparison purposes, the paper also contrasts these findings with those obtained for the US business cycle, using the same methodology. A study of recovery phases requires, firstly, a method for the identification of such phases and, secondly, an approach to studying the properties of recovery phases. The following section discuss each in turn.

2.1 Identification of recovery phases

As discussed above, our identification of recoveries relies on growth rate cycles. In particular, we are interested in the growth rate cycle coinciding with and following the trough. We seek specifically to identify the peak of this growth rate cycle (x_t^{GP}), which can be identified using the following calculus rule:

$$\{ (\Delta x_{t-k}, \dots, \Delta x_{t-1}) < \Delta x_t^{GP} > (\Delta x_{t+1}, \dots, \Delta x_{t+k}) \}$$

A set of censoring rules is applied to the series of potential peaks. The censoring rules specify a minimum length of two quarters for a phase and five quarters for a cycle. These rules are similar to the ones conventionally applied to identify classical cycle turning points.

A recovery phase commences with the start of the upswing and ends when the growth rate cycle, coinciding with the start of the upswing, reaches a peak. In other words, the recovery phase is the period of accelerating growth following a business cycle trough. Formally, x_t is part of the recovery phase if it meets the following calculus rule:

$$\{ x_t : x^{T^-} < x_t < x^{GP^+} \}$$

where x^{T^-} is the business cycle trough preceding x_t , as identified by the SARB (for South Africa) or the NBER (for the US) and x^{GP^+} is the first growth rate peak following x_t .

2.2 Analysis of recovery phases

The identification of recovery phases allows a description of the properties of such phases. Stylized facts about recoveries provide a historical standard against which to compare any particular recovery (Sichel, 1994: 277). In deriving stylized facts, the literature focuses on both internal properties and a set of relationships.

2.2.1 Internal properties

A turning point approach to the identification of cycle phases enables a descriptive analysis of recoveries using phase statistics, such as duration, amplitude and steepness. Phase statistics require the definition of an indicator variable, s_t^{recovery} , which equals unity when the cycle is in a recovery phase:

$$s_t^{\text{recovery}} = I \{ x_t : x^{T^-} < x_t < x^{GP^+} \}$$

$$s_t^{\text{recovery}} = 0 \text{ otherwise}$$

The sample average duration of a recovery, $\widehat{D}^{\text{recovery}}$, is then estimated as:

$$\widehat{D}^{\text{recovery}} = n_{\text{recovery}}^{-1} \sum_{t=1}^T s_t^{\text{recovery}}$$

with n_{recovery} the number of recovery phases in the sample period.

Similar statistics can be calculated for recession and prosperity phases. Information on duration is supplemented by sample measures of recovery phase amplitude ($\widehat{A}^{\text{recovery}}$) and steepness ($\widehat{\Omega}^{\text{recovery}}$):

$$\widehat{A}^{\text{recovery}} = n_{\text{recovery}}^{-1} \sum_{t=1}^T s_t^{\text{recovery}} \Delta(x_t)$$

$$\widehat{\Omega}^{\text{recovery}} = \frac{\widehat{A}^{\text{recovery}}}{\widehat{D}^{\text{recovery}}}$$

We also calculate sampling statistics for the sample duration and amplitude measures, capturing the similarity of individual phase duration or amplitude to average phase duration or amplitude (Pagan 2004). For example, sampling variability for recovery duration ($\widehat{\Gamma}_D^{\text{recovery}}$) is defined as:

$$\widehat{\Gamma}_D^{\text{recovery}} = \frac{\sqrt{n_{\text{recovery}}^{-1} \sum_{i=1}^{n_{\text{recovery}}} (\widehat{D}_i^{\text{recovery}} - \widehat{D}^{\text{recovery}})^2}}{n_{\text{recovery}}^{-1} \sum_{i=1}^{n_{\text{recovery}}} \widehat{D}_i^{\text{recovery}}}$$

where $\widehat{D}_i^{\text{recovery}}$ is the duration of recovery i . Similar statistics can be calculated for recession and prosperity phases and for amplitude or steepness (instead of duration).

Following the phase descriptive analysis, we calculate Spearman rank correlation coefficients to study the link between the internal properties of a recovery and the internal properties of the preceding recession. For example, to study the link between recovery duration and the duration of the preceding recession, the Spearman correlation is defined as:

$$\rho = 1 - \frac{6 \sum_i d_i^2}{n_{\text{recovery}}(n_{\text{recovery}}^2 - 1)}$$

where $d_i = \text{rank}(\widehat{D}_i^{\text{recovery}}) - \text{rank}(\widehat{D}_i^{\text{recession}})$ and $\text{rank}(\cdot)$ provides a ranking in ascending order. The statistical significance of the correlation can then be assessed.

2.2.2 Long-run recovery and the drivers of recovery

Beyond studying the internal properties of recovery phases, the paper explores three further themes: (i) the extent to which output returns to long-run levels; (ii) the behaviour of various components of aggregate expenditure over recovery phases; and (iii) the impact of macroeconomic policy on recovery behaviour.

(i) Do recoveries return output to long-run levels?

A salient theme in the recent business cycle literature is the impact of financial crises on subsequent expansions. As discussed extensively in the literature review, this theme is the basis for the trend-based definition of recoveries. The international literature suggests that financial crises may well be followed by weaker business cycle expansions that do not return output to its long-run levels.

The South African economy has not been exposed to a systemic financial crisis since the Great Depression. While the economy has been subject to a sovereign debt crisis in 1985 and has been influenced by a range of international financial crises since, including the most recent global financial crisis, these crises do not meet the requirements for a systemic financial crisis. Consequently, there is no specific South African literature on the impact of local financial crises on business cycle dynamics. The broader business cycle literature dealing with the influence of financial developments on business cycle (such as Akinboade and Makina (2009), Fourie, Botha and Mears (2011), Boshoff (2005), Moolman (2002, 2003 and 2004)) only study the procyclicality of financial variables and their predictive content rather than whether varying financial conditions have implications for the stylised behaviour of cycle phases.

Let g^{P^-} be the average quarterly growth in $T_{HP}^{P^-}$, the Hodrick-Prescott trend in the 10 years preceding the peak:

$$g^{P^-} = \frac{1}{40} \sum_{n=1}^{40} \Delta T_{HP}^{P^-}$$

Define an indicator variable s_t^* that represents all periods during a recovery phase, for which it is also true that quarterly growth is below g^{P^-} :

$$s_t^* = s_t^{\text{recovery}} I\{x_t : \Delta x_t < g^{P^-}\}$$

$$s_t^* = 0 \text{ otherwise}$$

The number of months required during recovery i to attain long-run HP growth is calculated as:

$$\widehat{D}_i^{HP} = \sum_{x_t \in \text{recovery } i} s_t^*$$

The proportion of months required to re-attain long-run trend growth is then defined as:

$$\widehat{p}_i^{HP} = \frac{\widehat{D}_i^{HP}}{\widehat{D}_i^{\text{recovery}}}$$

(ii) Components of aggregate expenditure and recoveries

To understand why recoveries differ, the paper explores the behaviour of the various components of aggregate expenditure in individual recoveries, i.e. that of consumption, investment, government consumption, exports and imports. Balke and Wynne (1992) show

that durable consumption and residential investment in the US show strong recovery features, with rapid growth during the early stages of an expansion. Hall and McDermott (2013) consider the behaviour of these components over the two most recent recoveries in New Zealand. They find that the stronger recovery of the 1990s was characterised by a combination of private investment and durable consumption, assisted by exports. In the South African context, Burger (2008, 2009) finds no significant role for inventories in explaining the reduced volatility of South African output. This may well be related to the behaviour of South African recoveries, which, as will be shown later, are not characterised by bounce-back growth.

To analyse the impact of components of aggregate expenditure on recoveries, we compare the internal properties of each recovery, as set out previously, with average growth in the various components. This is supplemented by an analysis of the rank correlation between recovery duration and steepness on the one hand and average growth in the various components on the other. The aim is to show that stronger recoveries, as noted by Balk and Wynne (1992) and Hall and McDermott (2013), involve a combination of various components of expenditure, rather than a single driver.

(iii) Impact of macroeconomic policy on recoveries

The recovery literature has explored the role of stabilisation policy in supporting recovery. Fatas and Mihov (2013) set out the welfare cost associated with recovery, making the case for countercyclical policy during both recession and recovery phases.

In the South African context, Du Plessis (2006) and Du Plessis and Smit (2003) investigate the relationship between cycles in monetary and fiscal policy measures and the business cycle. They find limited evidence of countercyclical monetary policy (contemporaneous or forward-looking) in the 1970s and 1980s, but considerable evidence of countercyclicality from the 1990s onward. The papers also report mild evidence for countercyclical fiscal policy. This does not consider countercyclical policy over recoveries, but focus on contractions and expansions. The impact of macro-prudential policy on South African business cycle movements has received some attention, with Liu and Seeiso (2012) finding evidence of procyclicality in Basel II capital regulations. These authors do not focus explicitly on phases or on the impact on recovery.

To analyse the relation between policy and recovery in South Africa, we compare the levels and growth rates of the fiscal and monetary policy stance to the internal properties of recoveries discussed above. This is supplemented by an analysis of the rank correlation between recovery duration and steepness on the one hand and steepness of the fiscal and monetary policy cycle on the other hand.

2.3 *Data*

The paper relies on macroeconomic data from the South African Reserve Bank's Quarterly Bulletin. Table 1 outlines the variables used, together with the available sample period for each:

Table 1: Macroeconomic variables and data description

Variable	Description	Sample period	Quarterly Bulletin reference
Output	Gross domestic product, 2005 prices	1960Q1 to 2013Q4	KBP6006D
Consumption	Final consumption expenditure by households, 2005 prices	1960Q1 to 2013Q4	KBP6007D
Investment	Gross fixed capital formation, 2005 prices	1960Q1 to 2013Q4	KBP6009D
Government	Final consumption expenditure by general government, 2005 prices	1960Q1 to 2013Q4	KBP6008D
Exports	Exports of goods & services, 2005 prices	1960Q1 to 2013Q4	KBP6013D
Imports	Imports of goods & services, 2005 prices	1960Q1 to 2013Q4	KBP6014D
Interest rate	Prime overdraft rate, percentage	1960M1 to 2013M12	KBP1403M
Consumer prices	Consumer price index (all urban areas), percentage change	1960M1 to 2013M12	KBP7174A

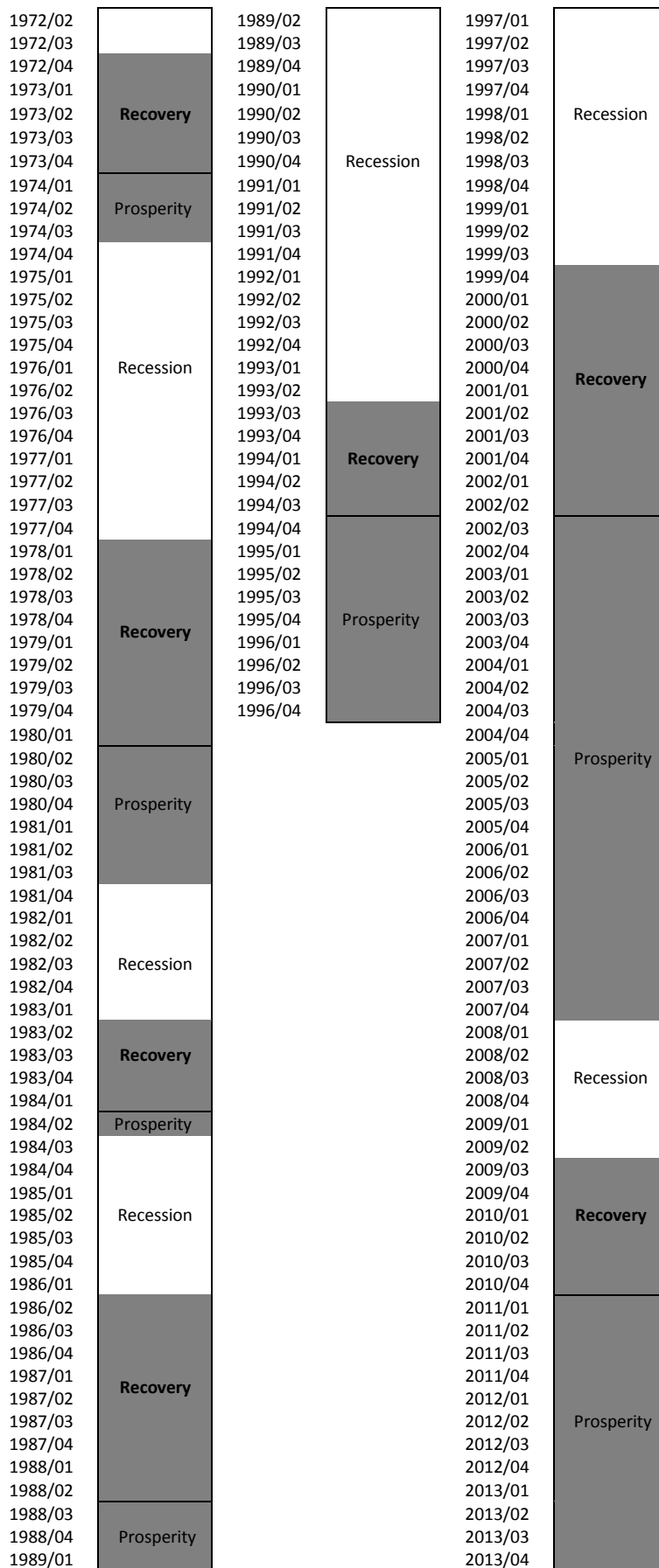
The paper also relies on the business cycle turning points published by the SARB. US data is obtained from the International Financial Statistics database of the IMF and the US business cycle dates are from the National Bureau of Economic Research (NBER).

3. Results

3.1 *Identification of recovery phases in the South African cycle*

Figure 1 reports business cycle phases in South Africa, as defined by the SARB (recessions and the end of expansions) and using our recovery identification methodology:

Figure 1: SARB business cycle upswings, growth rate cycle upswings and recoveries



Following our methodology, recovery phases are delineated by the peak of the initial growth rate cycle. However, for at least three business cycles since 1970 (1978, 1993 and 1999), growth rate cycle upswings ended at the start of expansion. These growth rate cycles were sufficient only in halting recession. For these cases, we delineate recovery phases by considering the end of the subsequent growth rate cycle upswing.

3.2 *Internal properties*

Tables 3-5 (next pages) report the amplitude, duration and steepness properties of the three business cycle phases since 1970. Averages and standard deviations are also reported, although these sampling moments should be interpreted with care, given that business cycles do not have fixed frequencies.

Figure 3 suggested that recovery phases account for an important portion of traditional business cycle expansions. Table 3 confirms that recovery phases in the 1970s and 1980s were longer in duration than prosperity phases, reflecting the lacklustre performance of the South African economy, leading to early termination of business cycle expansions. From the 1990s onwards, recovery phases were, on average, half the duration of subsequent prosperity phases.

The average growth achieved, as measured by steepness, suggests that growth during recovery phases is not statistically significantly different from growth during subsequent prosperity phases. The most recent recovery of 2009/2010 is the exception, with subsequent growth being lower than during the recovery phase.

The level of growth is also remarkably stable during both recoveries and prosperity phases (around 1% per quarter), but much more variable during recessions. Table 6 reports the variance of the individual phase measures relative to the average phase measure for duration, amplitude and steepness. As noted, these measures are unit-less and should be interpreted on a relative basis. The table confirms that recovery phases are the most stable of the three business cycle phases in terms of amplitude, steepness and duration. The amplitude and steepness of recoveries are quite comparable, and much more so than recessions. The duration of recoveries is quite stable compared to prosperity phases.

As mentioned previously, some recovery phases (in this case, 1978, 1993 and 1999) start with slow growth and only later enters growth acceleration. These 'slow start' recoveries can be distinguished from 'fast start' recoveries, where the growth acceleration that ended the recession continues well into the expansion. This distinction does not appear to have any predictive power concerning the nature of the recovery, at least in the small sample of cycles available. As Table 6 shows, a 'slow start' recovery precedes the strong expansion post-1999, while a 'fast start' recovery precedes the current weak expansion. The pace of growth during the growth rate cycle acceleration seems to be more important than the exact timing of the growth rate cycle.

Table 6: Comparative properties of ‘slow start’ and ‘fast start’ recoveries

‘Slow start’ recoveries			‘Fast start’ recoveries		
Recovery - start	Duration	Steepness	Recovery - start	Duration	Steepness
1978Q1	9	1.2%	1972Q4	5	1.5%
1993Q3	5	0.8%	1983Q2	4	1.4%
1999Q4	11	0.9%	1986Q2	9	0.7%
			2009Q3	6	0.9%

Table 3: Duration of business cycle phases, 1970-2014

Recession - start	Recession - end	Recession - duration	Recovery - start	Recovery - end	Recovery - duration	Prosperity - start	Prosperity - end	Prosperity - duration
1971Q1	1972Q3	7	1972Q4	1973Q4	5	1974Q1	1974Q3	3
1974Q4	1977Q4	13	1978Q1	1980Q1	9	1980Q2	1981Q3	6
1981Q4	1983Q1	6	1983Q2	1984Q1	4	1984Q2	1984Q2	1
1984Q3	1986Q1	7	1986Q2	1988Q2	9	1988Q3	1989Q1	3
1989Q2	1993Q2	17	1993Q3	1994Q3	5	1994Q4	1996Q4	9
1997Q1	1999Q3	11	1999Q4	2002Q2	11	2002Q3	2007Q4	22
2008Q1	2009Q2	6	2009Q3	2010Q4	6	2011Q1	ongoing	12
<i>Average</i>		9.6			7.0			8.0
<i>Standard deviation</i>		4.2			2.6			7.3
<i>St dev : average</i>		0.44			0.38			0.91

Table 4: Amplitude of business cycle phases, 1970-2014

Recession - start	Recession - end	Recession - amplitude	Recovery - start	Recovery - end	Recovery - amplitude	Prosperity - start	Prosperity - end	Prosperity - amplitude
1971Q1	1972Q3	-3.2%	1972Q4	1973Q4	7.4%	1974Q1	1974Q3	4.3%
1974Q4	1977Q4	-2.9%	1978Q1	1980Q1	10.6%	1980Q2	1981Q3	8.6%
1981Q4	1983Q1	4.9%	1983Q2	1984Q1	5.7%	1984Q2	1984Q2	2.1%
1984Q3	1986Q1	3.2%	1986Q2	1988Q2	6.2%	1988Q3	1989Q1	2.9%
1989Q2	1993Q2	2.7%	1993Q3	1994Q3	4.2%	1994Q4	1996Q4	8.6%
1997Q1	1999Q3	4.2%	1999Q4	2002Q2	9.6%	2002Q3	2007Q4	25.5%
2008Q1	2009Q2	0.5%	2009Q3	2010Q4	5.2%	2011Q1	ongoing	7.4%
<i>Average</i>		1.3%			7.0%			8.5%
<i>Standard deviation</i>		3.3%			2.3%			8.0%
<i>St dev : average</i>		2.45			0.34			0.94

Table 5: Steepness of business cycle phases, 1970-2014

Recession - start	Recession - end	Recession - steepness	Recovery - start	Recovery - end	Recovery - steepness	Prosperity - start	Prosperity - end	Prosperity - steepness
1971Q1	1972Q3	-0.5%	1972Q4	1973Q4	1.5%	1974Q1	1974Q3	1.4%
1974Q4	1977Q4	-0.2%	1978Q1	1980Q1	1.2%	1980Q2	1981Q3	1.4%
1981Q4	1983Q1	0.8%	1983Q2	1984Q1	1.4%	1984Q2	1984Q2	2.1%
1984Q3	1986Q1	0.5%	1986Q2	1988Q2	0.7%	1988Q3	1989Q1	1.0%
1989Q2	1993Q2	0.2%	1993Q3	1994Q3	0.8%	1994Q4	1996Q4	1.0%
1997Q1	1999Q3	0.4%	1999Q4	2002Q2	0.9%	2002Q3	2007Q4	1.2%
2008Q1	2009Q2	0.1%	2009Q3	2010Q4	0.9%	2011Q1	ongoing	0.6%
<i>Average</i>		<i>0.2%</i>			<i>1.0%</i>			<i>1.2%</i>
<i>Standard deviation</i>		<i>0.4%</i>			<i>0.3%</i>			<i>0.5%</i>
<i>St dev : average</i>		<i>2.45</i>			<i>0.30</i>			<i>0.38</i>

Table 6: Sampling variance of business cycle phase measures, 1970-2014

Business cycle measure	Recession	Recovery	Prosperity
Duration	0.41	0.35	0.84
Amplitude	2.27	0.31	0.87
Steepness	2.27	0.27	0.35

As far as the relation between the growth experience during recoveries and preceding recessions are concerned, we do not find any support that amplitude or duration of preceding recessions matter for recovery performance. In particular, we run a set of non-parametric tests for correlation between the properties of recovery (duration and steepness) and the properties of preceding recession (duration, amplitude and steepness). The tests do not suggest any significant linkage.

Table 7: Spearman rank correlation, with 95% confidence level, between properties of recoveries and properties of preceding recession, 1972-2013

	Recession duration	Recession amplitude	Recession steepness
Recovery duration	-0.46	-0.07	-0.11
Recovery steepness	-0.11	-0.25	-0.36

** Significant at 95% level (critical value 0.786) *** Significant at 99% level (critical value 0.929)

3.3 US comparison

We compare the South African results with similar results for US output. A preliminary analysis of average growth following recession, suggests that the recovery experience may be quite different for the US. Table 8 compares average growth in each of the eight quarters following recessions in South Africa and the US (taken from Kim *et al* (2005)). The table shows that South African growth is slow to start and only gradually gains momentum, in contrast to the US experience of a strong growth spurt after recession, which then transitions into a more moderate growth pattern.

Table 8. South African and US output growth following official recessions

Quarters after recession	South Africa		US	
	Average growth	Observations	Average growth	Observations
1	1.73	10	7.01	10
2	2.60	10	6.34	10
3	2.94	10	6.12	10
4	4.26	10	6.03	9
5	4.50	10	4.32	9
6	4.08	9	4.36	8
7	4.75	8	4.00	8
8	4.41	8	3.32	7
Full sample	3.10	212	3.33	217
Sample period	1960:Q1 to 2013:Q4		1949:Q1 to 2003:Q1	

Figure 2 reports the business cycle phases in the US, as defined by the NBER (recessions and end of expansions) and the identified recovery phases based on our methodology. The 1980 cycle is rather peculiar, being short in duration and with growth very soon turning negative again after the start of the upswing.

Tables 9 to 11 set out the phase properties of US business cycles. Consistent with earlier findings in literature, US business cycle recessions and recoveries are much shorter than subsequent prosperity phases. Also, consistent with the arguments above, US business cycle recoveries are steeper than subsequent prosperity phases, lending support to the ‘bounce-back’ theory. Similar to the South African results, Table 12 confirms that recovery and recession duration are more stable than the duration of prosperity phases, while the amplitude and steepness of recovery and prosperity phases are more stable than those of recession. Put differently, average phase duration, amplitude or steepness is more reflective of the behaviour of individual recovery phases than it would be of any individual recession or prosperity phase.

Figure 2: US business cycles as defined by the NBER, with recoveries according to our methodology

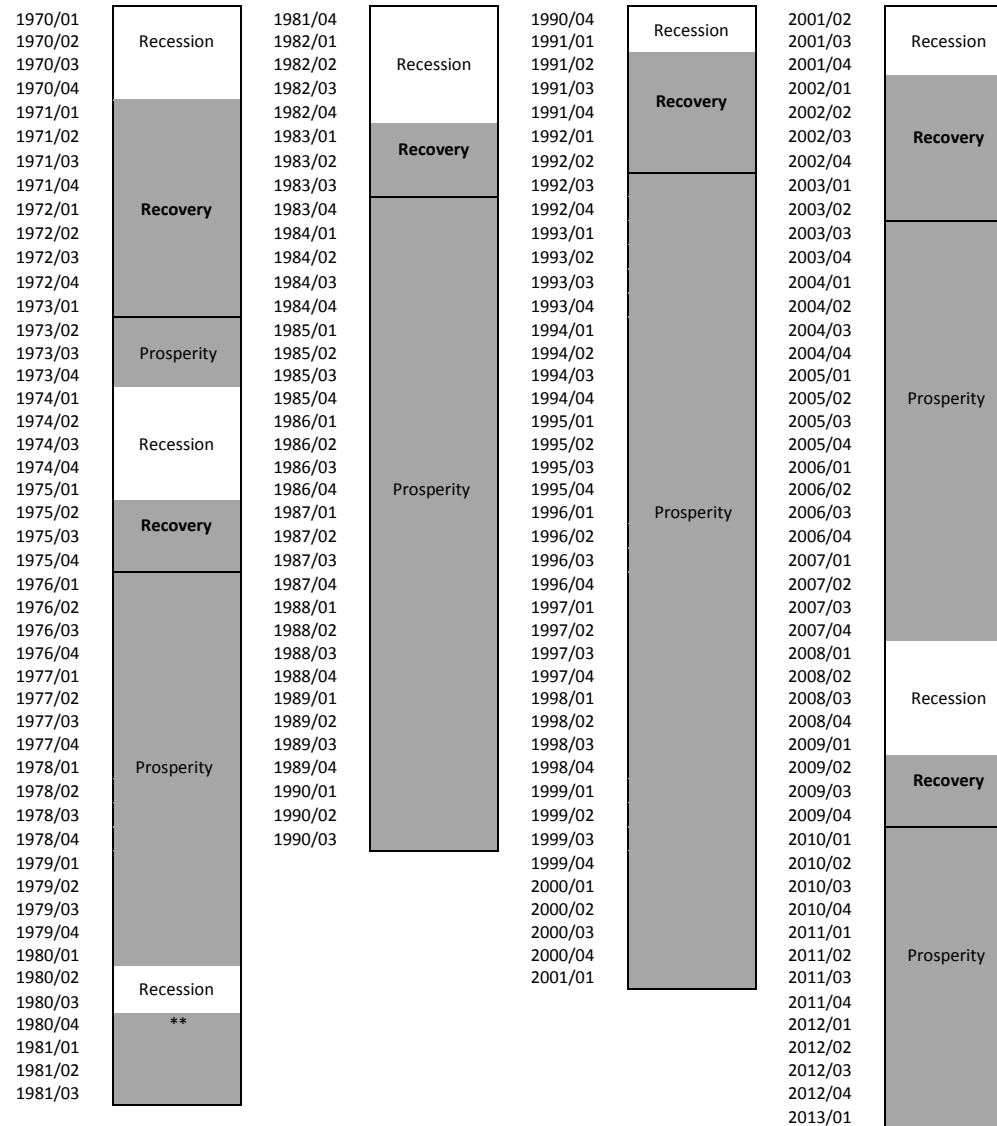


Table 9: Duration of US business cycle phases, 1970-2014

Recession - start	Recession - end	Recession - duration	Recovery - start	Recovery - end	Recovery - duration	Prosperity - start	Prosperity - end	Prosperity - duration
1970Q1	1970Q4	4	1971Q1	1973Q1	9	1973Q2	1973Q4	3
1974Q1	1975Q1	5	1975Q2	1975Q4	3	1976Q1	1980Q1	16
1980Q2	1980Q3	2	1980Q4	1981Q3	4			
1981Q4	1982Q4	5	1983Q1	1983Q3	3	1983Q4	1990Q3	28
1990Q4	1991Q1	2	1992Q1	1992Q2	5	1993Q3	2001Q1	35
2001Q2	2001Q4	3	2002Q1	2003Q3	7	2003Q4	2007Q4	17
2008Q1	2009Q2	5	2009Q3	2010Q1	4	2010Q2	ongoing	12
<i>Average</i>		3.7			5.0			18.5
<i>Standard deviation</i>		1.4			2.2			11.4
<i>St dev : average</i>		0.37			0.45			0.62

Table 10: Amplitude of US business cycle phases, 1970-2014

Recession - start	Recession - end	Recession - amplitude	Recovery - start	Recovery - end	Recovery - amplitude	Prosperity - start	Prosperity - end	Prosperity - amplitude
1970Q1	1970Q4	-0.2%	1971Q1	1973Q1	13.6%	1973Q2	1973Q4	1.6%
1974Q1	1975Q1	-3.2%	1975Q2	1975Q4	3.7%	1976Q1	1980Q1	17.1%
1980Q2	1980Q3	-2.3%	1980Q4	1981Q3	4.3%			
1981Q4	1982Q4	-2.7%	1983Q1	1983Q3	5.4%	1983Q4	1990Q3	26.3%
1990Q4	1991Q1	-1.4%	1992Q1	1992Q2	3.5%	1993Q3	2001Q1	31.5%
2001Q2	2001Q4	0.7%	2002Q1	2003Q3	4.8%	2003Q4	2007Q4	11.1%
2008Q1	2009Q2	-4.7%	2009Q3	2010Q1	1.8%	2010Q2	ongoing	5.8%
<i>Average</i>		-2.0%			5.3%			15.6%
<i>Standard deviation</i>		1.9%			3.8%			11.7%
<i>St dev : average</i>		-0.95			0.72			0.75

Table 11: Steepness of US business cycle phases, 1970-2014

Recession - start	Recession - end	Recession - steepness	Recovery - start	Recovery - end	Recovery - steepness	Prosperity - start	Prosperity - end	Prosperity - steepness
1970Q1	1970Q4	0.0%	1971Q1	1973Q1	1.5%	1973Q2	1973Q4	0.5%
1974Q1	1975Q1	-0.6%	1975Q2	1975Q4	1.2%	1976Q1	1980Q1	1.1%
1980Q2	1980Q3	-1.1%	1980Q4	1981Q3	1.1%			
1981Q4	1982Q4	-0.5%	1983Q1	1983Q3	1.8%	1983Q4	1990Q3	0.9%
1990Q4	1991Q1	-0.7%	1992Q1	1992Q2	0.7%	1993Q3	2001Q1	0.9%
2001Q2	2001Q4	0.2%	2002Q1	2003Q3	0.7%	2003Q4	2007Q4	0.7%
2008Q1	2009Q2	-0.9%	2009Q3	2010Q1	0.5%	2010Q2	ongoing	0.5%
<i>Average</i>		<i>-0.5%</i>			<i>1.1%</i>			<i>0.8%</i>
<i>Standard deviation</i>		<i>0.5%</i>			<i>0.5%</i>			<i>0.2%</i>
<i>St dev : average</i>		<i>-0.91</i>			<i>0.45</i>			<i>0.32</i>

Table 12: Sampling variance of US business cycle phase measures, 1970-2014

Business cycle measure	Recession	Recovery	Prosperity
Duration	0.34	0.41	0.64
Amplitude	0.88	0.66	0.74
Steepness	0.84	0.42	0.46

Table 13: Comparison of average phase properties of South African and US business cycles

	Recession	Recovery	Prosperity
<i>Duration</i>			
SA	9.6	7.0	8.0
US	3.7	5.0	18.5
<i>Amplitude</i>			
SA	1.3%	7.0%	8.5%
US	-2.0%	5.3%	15.6%
<i>Steepness</i>			
SA	0.2%	1.0%	1.2%
US	-0.5%	1.1%	0.8%

The average properties of South African business cycles differ substantially from those of US business cycle. Historically, SA recessions last about three times as long as US recessions, while SA recoveries were longer in duration than US recoveries. In contrast, prosperity phases are about half as long as US prosperity phases. As far as amplitude and steepness is concerned, US recessions are more severe, while recoveries are stronger than prosperity phases. This contrasts with the SA experience, where recessions may be milder in steepness terms (though longer), and where recovery and prosperity phases are not significantly different.

Furthermore, from a temporal perspective, South African recoveries in the 1990s and later were shorter compared to prosperity phases, but longer in the 1970s and 1980s. This change in behaviour is not evident for the US.

3.4 Long-run growth

An important external performance criterion for a recovery phase is the speed with which output growth is returned to long-run levels. Table 14 sets out the time required for output growth to reach HP-trend growth rates. The table suggests that, prior to nineties, the full recovery period was required to return to long-run growth. This declines during the 1990s, mostly due to the lower benchmark determined by a lower trend growth in the 1980s. The table also highlight the unique feature of the current recovery: it is the first recovery, during which long-run growth is not attained at the end of or very soon after the recovery.

Table 14: Recoveries and long-run growth

Recovery start date	Duration	Quarters from start of recovery until long-run growth is re-attained	Proportion of recovery period required for re-attainment of long-run growth
1972Q4	5	7	100%
1978Q1	9	9	100%
1983Q2	4	4	100%
1986Q2	9	9	100%
1993Q3	5	3	60%
1999Q4	11	3	27%
2009Q3	6	ongoing	100%

3.5 Expenditure components

The behaviour of recoveries can be analysed by reference to the behaviour of individual components of aggregate expenditure. Table 15 (next page) reports the average growth for consumption, investment, government expenditure, exports and imports over the various recovery phases identified earlier.

Firstly, recoveries where growth is diffused are stronger: when growth is evident across various components of aggregate expenditure, the recovery is stronger than when it is limited to only one component. The stronger recoveries in the 1970s and early 1980s are related to the combined performance of consumption and investment or consumption and government expenditure. It is particularly interesting that, historically, exports did not ensure strong recovery – mostly because strong export growth (in any of the 1990 recoveries or 2009 recovery) was not supported by growth in a number of other expenditure categories.

Table 16 summarises the above findings, showing Spearman rank correlations between growth in the various expenditure components and output growth. It confirms that there is no single expenditure component that is systematically associated with recovery performance, except for government consumption. We return to the relationship between recoveries and the fiscal stance in a subsequent section.

Table 16: Spearman rank correlation, with 95% confidence level, between steepness in cycles of output and of expenditure components during recoveries

C	I	G	X	M
0.61	0.11	0.82**	-0.46	0.29

** Significant at 95% level (critical value 0.786) *** Significant at 99% level (critical value 0.929)

Secondly, slow-start recoveries (1978, 1993 and 1999) were characterised by fairly pedestrian consumption growth, but strong investment growth. Put differently, it is rapid growth in consumption expenditure that characterises fast-start recoveries (1972, 1983, 1986 and 2009). Government expenditure and trade varies and there is no apparent systematic relation between these variables and the nature of the recovery (slow or fast start).

Lastly, only the 1993 and 1999 cycles were characterised by the re-attainment of long-run growth during the recovery phases. The above table shows that these recoveries were characterised by a return to strong investment growth. In fact, the 1999 recovery registers the strongest increase in gross fixed capital formation of all recoveries since the 1970s. Export growth was not particularly strong in either of these recoveries.

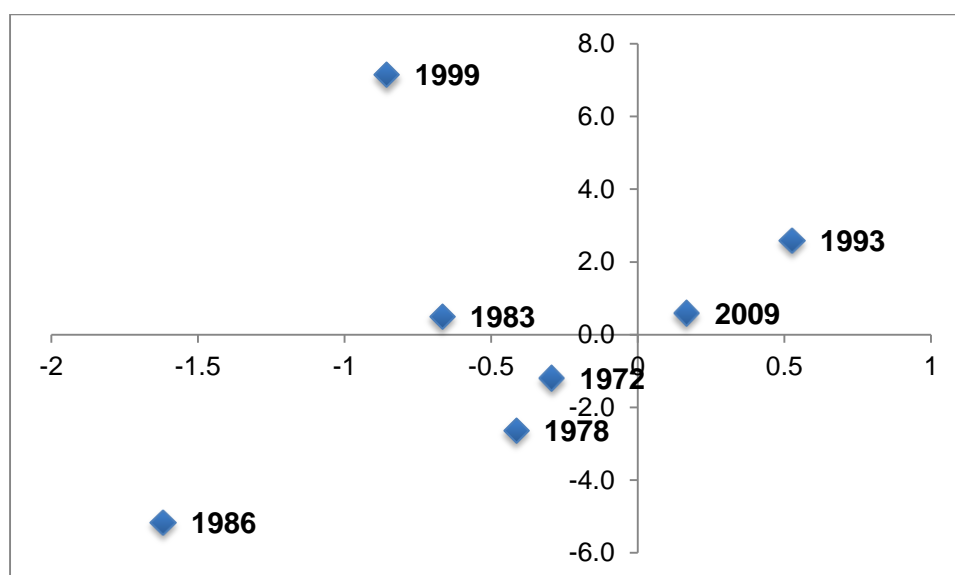
Table 15: Average quarterly growth of individual components of GDP and recovery properties

Revival - start	Recovery - end	C	I	G	X	M	Y	Recovery duration	Recovery steepness	Fast start or slow start?	Return to long-run growth during recovery?
1972Q4	1973Q4	1.99%	1.70%	1.22%	-1.72%	5.17%	1.47%	5	1.5%	Fast	No
1978Q1	1980Q1	0.91%	1.23%	0.93%	0.85%	-0.78%	1.17%	9	1.2%	Slow	No
1983Q2	1984Q1	1.58%	-0.23%	1.61%	1.23%	6.37%	1.44%	4	1.4%	Fast	No
1986Q2	1988Q2	1.10%	0.44%	0.46%	1.49%	3.32%	0.69%	9	0.7%	Fast	No
1993Q3	1994Q3	0.73%	2.02%	0.22%	0.71%	4.58%	0.84%	5	0.8%	Slow	Yes
1999Q4	2002Q2	0.87%	0.93%	0.86%	1.06%	1.01%	0.88%	11	0.9%	Slow	Yes
2009Q3	2010Q4	1.15%	-0.38%	1.07%	2.25%	2.98%	0.86%	6	0.9%	Fast	No

3.6 Policy

The final dimension along which we evaluate recovery phases is that of stabilization policy. Figure 3 contrasts the average level and average change in the real repo rate for each of the recoveries since 1970. The real repo rate is lagged by four quarters relative to the recovery. The main impression from this graph is that, in most recoveries, real rates either decline or, at worst, remain constant. The levels of real rates, shown on the vertical axis, have differed significantly. One may therefore ask whether those recoveries with lower initial levels of real rates have performed better.

Figure 3: Average growth (horizontal axis) versus average level (vertical axis) of real SARB policy rate (%) for each recovery (lagged by 4 quarters)



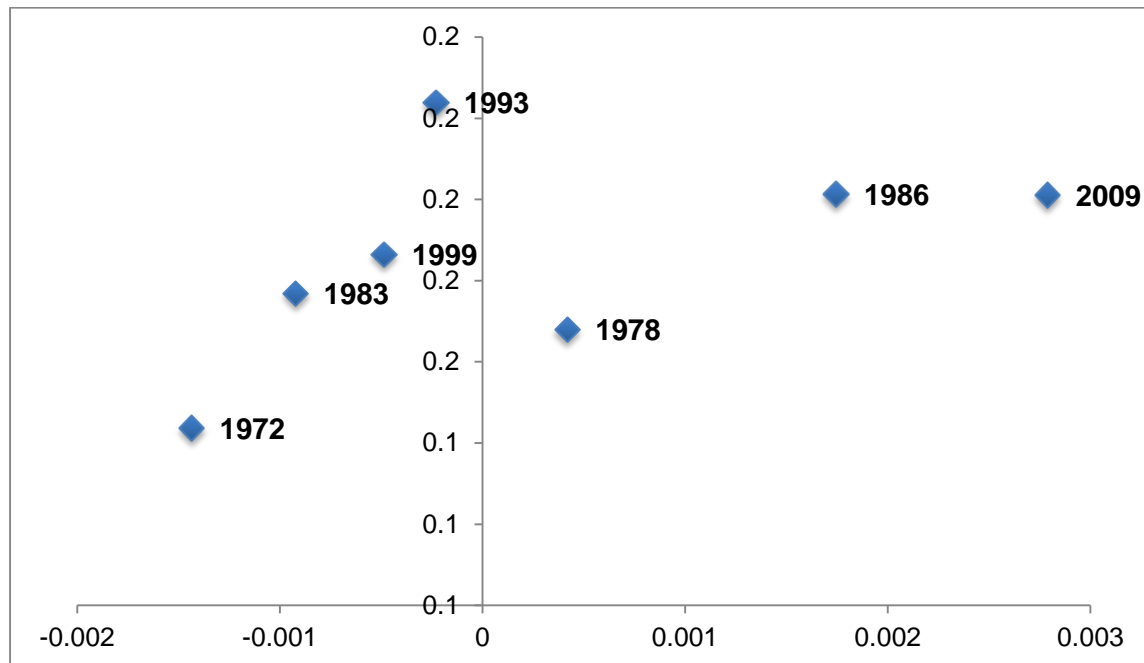
One can unpack the relation between monetary policy and recovery strength along a number of dimensions. Firstly, there is no systemic relation between the duration of recovery and the stance of monetary policy. While the longest recovery (1999) is indeed correlated with the highest initial policy rates, the other long recoveries (1986 and 1972) are associated with the lowest (and negative) real interest rates. Furthermore, while the steeper recoveries of the 1970s and early 1980s seem to be associated with quite low and negative rates, weaker recoveries (1986 and the most recent one) are associated with similar interest rate levels. Consequently, we do not find a systematic relationship between the duration and steepness of recoveries and monetary policy.

Secondly, those recoveries that do in fact return output to long-run growth (1993 and 1999) are incidentally the same recoveries associated with high policy rates. Given that these are also recovery phases characterised by strong investment growth, it would suggest that the re-attainment of long-run growth following a recession does not depend much on policy rates *per se*.

A similar analysis can be performed for fiscal policy. Figure 4 contrasts the average growth (horizontal axis) with the average level (vertical axis) of the fiscal policy stance for each of

the recoveries since 1970. The fiscal policy stance is measured by the ratio of government consumption expenditure to output and is lagged by four quarters. The graph presents a mixed picture, with negative fiscal policy growth (shown on the horizontal axis) for four of the recoveries and positive growth for three. As with monetary policy, levels of the fiscal policy stance, shown on the vertical axis, have differed significantly over various recoveries.

Figure 4: Average growth (horizontal axis) versus average level (vertical axis) of government consumption relative to total output (%) for each recovery (lagged by 4 quarters)



We again describe the relation between fiscal policy and recovery strength along three dimensions. Firstly, there is no systematic relation between recovery duration and the stance of fiscal policy. For example, the high ratio of government expenditure to output in the short 1993 recovery contrasts with the low ratio of government expenditure to output in the short 1978 recovery. Furthermore, the steeper recoveries of the 1970s and early 1980s occur in the context of a weak fiscal policy stance, while the weaker recoveries (including the most recent one) are associated with a stronger fiscal policy stance. Consequently, we find no systemic relationship between the duration and steepness of recoveries and fiscal policy.

The analysis above relies on a comparison of levels rather than changes. Presumably, fiscal policy can only be considered supportive of a recovery if there is, in fact, an increase in expenditure relative to output *during* the recovery. If one focuses on changes, fiscal policy does not appear to be expansionary during the 1993 and 1999 recoveries. At the same time, fiscal policy appears quite expansionary during the most recent recovery, which does not achieve return to long-run growth. These impressions are confirmed in Table 17, which finds no systematic relation between the steepness of fiscal or monetary policy cycles and the corresponding cyclical properties of output during recoveries. In this sense, changes in the stance of stabilisation policy have not been directly supportive of recovery.

Table 17: Spearman rank correlation, with 95% confidence level, between steepness in the monetary and fiscal policy cycles and duration, amplitude and steepness of the output cycle during recoveries

	Recovery Duration	Recovery Amplitude	Recovery Steepness
Monetary policy	-0.64	-0.68	-0.25
Fiscal policy	0.21	-0.32	-0.68

*** Significant at 99% level (critical value 0.929)

4. Conclusions

This paper characterises a recovery phase as the initial phase in the business cycle during which output growth is accelerating. It therefore delineates the recovery phase by searching for the first local maximum in the output growth rate following the trough. This contrasts with duration and trend-based definitions of recovery in literature. The duration-based view assumes that growth acceleration necessarily occurs directly after the trough, which need not be the case: in a number of cycles growth may fail after recession ends and growth may only pick up a number of quarters later. The trend-based view is heavily dependent on the long-run growth estimate and emphasises output loss rather than growth acceleration. To our mind, the latter is more closely related to the idea behind Burns and Mitchell’s revival phase, which they argue represents that initial period of an expansion during which increasing growth is still gaining momentum and spreading through markets.

The paper produces a chronology of business cycle phases for South Africa, focusing on the properties of recovery phases. The paper finds that recoveries account for an important part of traditional expansion phases. Recoveries in the 1970s and 1980s were longer in duration than subsequent prosperity phases, but much shorter from the 1990s onwards – about one half of the subsequent prosperity phase. In South Africa, the steepness of recovery phases are not different from the steepness of subsequent prosperity phases, i.e. there is no sense of bounce-back growth after the recession. The duration and amplitude properties of recoveries are the most stable of all of the phases: the amplitude and steepness of individual recoveries are quite similar, much more so than those of recession. The duration of individual recoveries is also quite stable compared to those of prosperity phases. Stylised facts about recovery phases in South Africa are, to a surprising extent, more representative of individual recoveries than is the case for recessions or prosperity phases. Furthermore, the behaviour of recoveries is not affected by the properties of preceding recessions in South Africa: the amplitude, duration and steepness of recessions have no predictive power for the duration and steepness of recoveries.

The recovery experience in the US differs significantly from that in South Africa. South African growth is slow to start and only gradually gains momentum, in contrast to the US experience of a strong and short growth spurt after recession, which then transitions into moderate growth over longer periods. However, similar to South Africa, the properties of

individual recovery phase are far closer to the average measures than is the case for recessions and prosperity phases.

Prior to the 1990s, the full recovery period was required to return growth to its long-run level (estimated using an HP 10-year trend, ending at the preceding peak). This changed somewhat after 1990, although the most recent recovery was the weakest, as long-run growth was never attained, even at the end or very soon after the recovery.

What drives South African recoveries? Strong recoveries, consistent with our focus on diffusion and momentum, are those recoveries driven by a multitude of components of aggregate expenditure. Stronger recoveries in the 1970s and early 1980s are driven by a combination of consumption and investment or consumption and government expenditure. Exports do not ensure strong recoveries on its own, contrary to popular belief. In fact, no single expenditure components have a systematic relationship with recovery performance. Interestingly, the 1993 and 1999 recoveries were characterised by early re-attainment of long-run growth, and this can be linked to the strong investment growth of this period.

In most recoveries, South African monetary policy was either loosened or, at worst, maintained. Interestingly, however, the average level of rates varies significantly. There is no systematic relation between the duration and steepness of recoveries and changes in monetary policy. The same result holds for fiscal policy.