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Abstract

In 2002/03 the yield spread falsely signalled a downswing that never materialised. This paper provides two reasons for this false signal. Firstly, while the Reserve Bank never actually officially declared the start of a downswing, by other important measures a downswing did actually occur. It is to this slowing in economic activity at that time that the yield curve pointed. Secondly, short-term interest rates in 2003 were higher than they should have been because of a mistake made in measuring consumer price inflation. Because South Africa had recently introduced an inflation targeting regime, policy interest rates were as a result of this error kept too high for too long. This policy mistake was rectified as soon as the error in the Consumer Price Index was discovered. Thus, the yield curve in 2002/03 pointed to the reality that short-term interest rates were too high and risked pushing the economy into recession. This is demonstrated by the fact that it was a fall in long bond interest rates that cause the yield spread to turn negative, indicating expectations that short-term interest rates would need to be cut – as indeed they were.

JEL Classification: E32, E37, E43

Keywords: Yield spread, forecasting, economic downswings, interest rates, South Africa

1 Introduction

The ability of the yield spread to accurately forecast economic downswings is well established in the literature (*cf.* Estrella and Hardouvelis, 1991; Hu, 1993; Dombrosky and Haubrich, 1996; Estrella and Miskin, 1996, 1997; Dueker, 1997; Moneta, 2003; Estrella and Trubin, 2006; Khomo and Aziakpono, 2007; Chinn and Kucko, 2009). It is not the intention to repeat here the well-known theoretical explanations for this relationship or the substantial empirical evidence of its accuracy globally.

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For South Africa, Nel (1996) found that the yield curve is positively related to GDP growth and is a successful indicator of current and expected monetary policy. Moolman (2002, 2003), Khomo and Aziakpono (2007), and Clay and Keeton (2011) all found that the yield spread successfully predicts turning points in the South African business cycle two quarters ahead. However, Khomo and Aziakpono (2007) reported that the yield curve had falsely predicted a downswing in South Africa in 2002/03, which suggested that the yield curve might be losing its predictive powers. This false signal was in line with international evidence that the yield curve may be losing its predictive powers (*cf.* Dombrosky and Haubrich, 1996; Estrella and Mishkin, 1997; Moneta, 2003; Chinn and Kucko, 2009). Clay and Keeton (2011) found, however, that the yield curve again successfully predicted the downswing in South Africa in 2007/09. The yield curve has therefore successfully predicted all of the last five economic downswings in South Africa. Only once, in 2002/03, did it signal a downswing that never officially happened. What was different in 2002/03 that caused the yield spread to invert and hence signal an impending economic slump? The objective of this paper is to propose plausible explanations for this question.

2 The 2002/03 "false" signal

We use data on 10-year government bonds and 3-month Treasury Bill (TB) rates, obtained from the South African Reserve Bank (SARB, 2013), as measures of long-term and short-term interest rates, respectively. The sample period comprises monthly data from January 1981 to June 2013. Consistent with existing research (Moolman, 2002; Khomo and Aziakpono, 2007), the yield spread is calculated as the difference between the 10-year government bond and 3-month TB rate. Figure 1 plots the yield spread together with the long- and short-term interest rates, where shaded areas denote official economic downswings as identified by the SARB (see Table 1).

To illustrate the false prediction of the yield spread in 2002/03, we estimate a basic probit model predicting the likelihood of an economic downswing (*cf.* Moolman, 2002; Khomo and Aziakpono, 2007; Clay and Keeton, 2011). The probability of a downswing was regressed on a constant and the lagged yield spread, where the best-fitting probit model predicts downswings five months ahead.[1] The predicted probability of the yield spread forecasting a downswing is shown in Figure 2. As the graph confirms, the yield spread successfully predicted all previous downswings in the South African economy. In 2002/03, however, the model predicts a downswing that in reality never materialised.

It should be noted that the economic downswings identified by the SARB are not the same thing as economic recessions.[2] Bosch and Ruch (2013:491) note

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[1] Since the objective of this paper is to explain the false prediction in 2002/03 rather than directly compare the performance of various possible probit models, the probit results are not reported here but are available on request.

[2] Moolman (2002) and Khomo and Aziakpono (2007) are technically incorrect in their claim that the yield curve is forecasting "recessions" in South Africa. It is in fact forecasting official

that the SARB makes use of 186 variables and "a combination of methods" when dating turning points in the business cycle. They note, too, that while GDP growth is much slower in downswings than upswings, business cycle downswings may be periods in which average GDP growth is still marginally positive (Bosch and Ruch, 2013). While the period around 2002/03 did not meet the SARB's official requirements to be declared a downswing, other measures indicate that economic activity slowed at this time. Real quarterly GDP growth slowed to an average seasonally adjusted annualised 2.2% for quarter two to four in 2003 – from 3.7% in 2002.

Bosch and Ruch (2013) examine a variety of alternative methods for measuring turning points in the business cycle in South Africa. They apply principal components analysis on 123 stationary variables of the 186 used by the SARB to officially date business cycles, which, they note, "allows for the uncovering of the correlation structure determining the aggregate business cycle" (Bosch and Ruch, 2013:492). They show that the resultant measure was negative in all officially declared downturns. It fell sharply in 2003 but remained slightly positive (Bosch and Ruch, 2013:504). They then apply a Markov-Switching procedure and the Bry-Boschan method to derive 6 alternative methods for dating business cycles in South Africa (Bosch and Ruch, 2013:512-3). The important finding for this paper is that five of the six alternative methods they examine for dating the business cycle reveal that there was indeed an economic downswing in 2002/03 (Bosch and Ruch, 2013). It is to the slowdown in economic activity captured by these alternative measures that the negative yield curve at that time was correctly pointing.

Thus, while SARB methodology did not classify the period 2002/03 officially as a downswing, the negative yield curve was in fact correct in warning about a downswing in terms of these alternative measures. The "false" signal is therefore only false in terms of the technical definition of an economic downswing used by the SARB. It does not reduce the powers of the yield spread in predicting economic slowdowns in South Africa.

This finding does not mean the yield curve is now always correct in identifying downswings. The six alternative methodologies used by Bosch and Ruch (2013) suggest there may have been between seven and eleven downswings in South Africa since 1980. A negative yield curve occurred only six times and the SARB officially declared only five downswings.

3   The incorrect measure of CPI in 2002/03

A second point to note is the manner in which the yield curve turned negative in 2002/03. A key pattern emerging from the data in Figure 1 is that in general both short-term and long-term rates rose during the times the yield spread inverted. However, in each case (apart from 2002/03) the former rose at a faster rate than the latter. In 2002/03, however, long-term interest rates *decreased* while short-term rates kept rising, thus causing the yield spread to turn negative.

downswings in the business cycle which may include recessions, but may also not.

Why did long-term interest rates fall while short-term rates were still rising during 2002/03?

It is important to note that South Africa introduced a system of inflation targeting in February 2000, which targeted an inflation band of 3-6% for a measure of consumer price inflation termed CPIX.[3] In 2003 the monetary authorities were anxious to establish the credibility of this inflation target. As a result, despite the slowing in GDP growth and the evidence of an economic downswing provided by Bosch and Ruch's (2013) alternative measures of dating business cycles discussed above, the authorities were reluctant to cut interest rates in the face of stubbornly high CPIX inflation.

However, at the end of May 2003 it was revealed that there was a methodological error in the calculation of South African consumer inflation that had distorted upwards the measure of CPI inflation by 1.5 percentage points (SARB, 2003:65). This error was corrected and the Monetary Policy Committee reacted by cutting the repo rate by 1.5 percentage points in June 2003.

The fall in the long bond rate over this period which, unusually, was responsible for turning the yield curve negative, suggests that bond market participants were aware that, by other measures, the economy was in an economic downswing and correctly anticipated that short-term interest rates would soon be cut. As a result, long-term rates fell even though short-term rates were still rising.

4   Conclusion

The aim of this paper was to examine why the South African yield spread falsely signalled an economic downswing in 2002/03 when the spread successfully predicted all previous downswings as well as the subsequent downswing in 2007/09. We argue that even though the SARB never officially identified the start of the forecast economic downswing, by other measures, a downswing may actually have occurred. We argue too that the inversion of the yield curve in 2002/03 was unusual in that it was caused by a decline in long-term interest rates rather than a rise in short-term rates. A drop in short-term interest rates was delayed at the time because of the mis-measurement of CPI inflation. Long-term interest rates fell because bond market participants correctly anticipated that the SARB would cut short-term interest rates. These realities, plus the subsequent success of the yield curve in forecasting the 2007/09 economic downswing, suggest that the yield spread remains a powerful forecasting tool in South Africa.

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[3]CPIX was CPI excluding interest rates on mortgage bonds. This measure was adopted because South African CPI measurement at the time used the mortgage interest rate as a proxy for the cost of home ownership. This created the problem that a tightening of monetary policy would automatically lead to a rise in measured headline CPI while a cut in interest rates would cause CPI to fall. An improved measure of home ownership costs was introduced in January 2009 and the CPIX measure of inflation was no longer relevant.

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Table 1: Upswing and downswing phases of the South African business cycle

Upward phase	Downward phase
January 1978 – August 1981	September 1981 – March 1983
April 1983 – June 1984	July 1984 – March 1986
April 1986 – February 1989	March 1989 – May 1993
June 1993 – November 1996	December 1996 – August 1999
September 1999 – November 2007	December 2007 – August 2009
September 2009 – present	

Source: SARB (2013)

Figure 1: The yield spread, 10-year government bond and 3-month TB rate

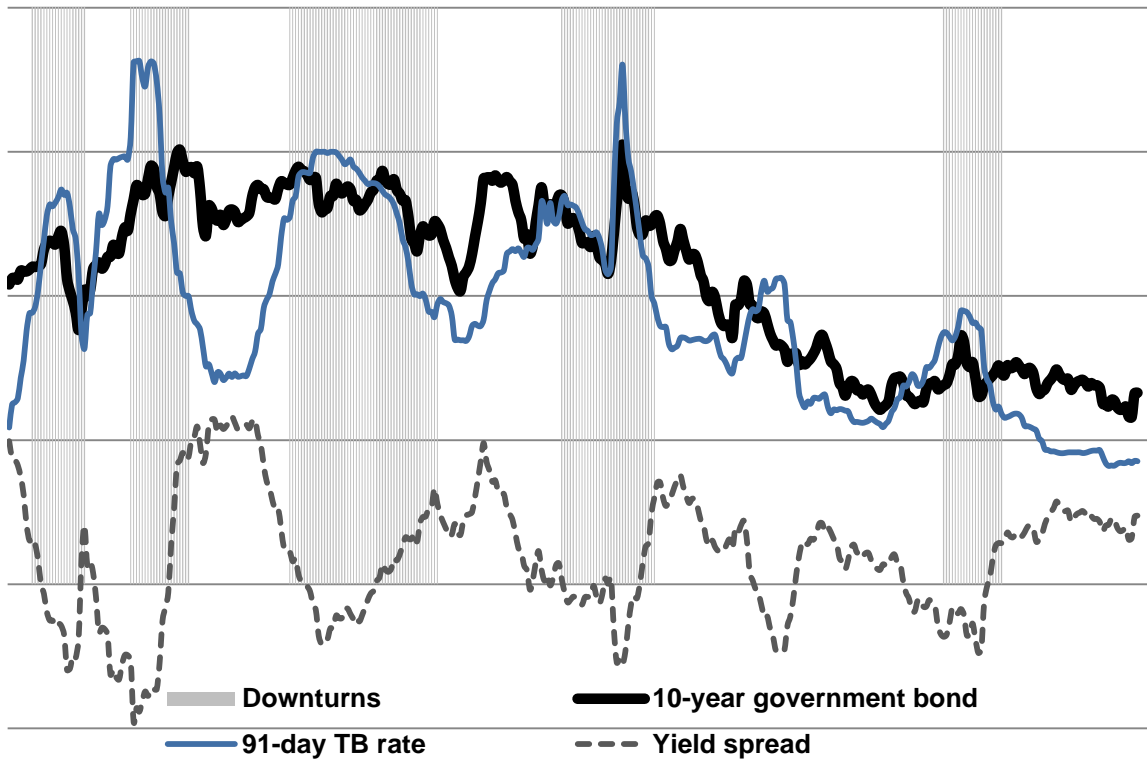Downturns   10-year government bond
91-day TB rate   Yield spread

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Figure 2: Probability of a downswing five months ahead