RESEARCH REPORT ON MPUMALANGA'S ECONOMIC GROWTH ESTIMATES

June 2017
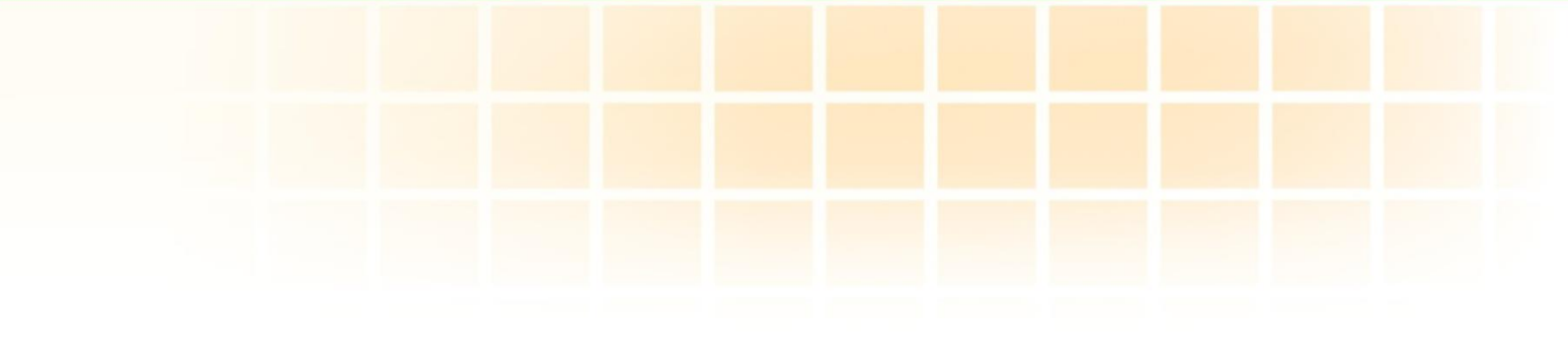
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KEY FINDINGS

- The real GDP (measured by production) of Mpumalanga increased by 1.3 per cent in the first quarter of 2017 compared with the national GDP that declined by 0.7 per cent.

- By posting the positive growth number in the first quarter of 2017, the Mpumalanga economy avoided a technical recession after registering a 2.3 per cent decline in the fourth quarter of 2016.

- However, only two industries (mining and agriculture) made a positive contribution to the 1.3 per cent quarterly GDP growth.

- The largest positive contributor to growth in Mpumalanga in the first quarter was mining which increased by 12.8 per cent and contributed 2.6 percentage points to GDP growth.

- The largest negative contributor to growth in Mpumalanga in the first quarter was trade which decreased by 5.9 per cent and contributed -0.7 percentage points to GDP growth.

- Mpumalanga's annual GDP growth for 2016 was estimated at -0.8 per cent compared with the national figure of 0.3 per cent.

- The largest negative contributor to growth in Mpumalanga in 2016 was mining which decreased by an estimated 4.7 per cent and contributed -1.1 percentage points to GDP growth.

- Trade, finance and government services made the largest positive contributions to growth in Mpumalanga in 2016 with respective contributions of 0.2 percentage points each.

- In the first quarter of 2017, agriculture achieved its first increase after seven quarterly contractions.

- Manufacturing contracted by 3.7 per cent in the first quarter of 2017 to register its third consecutive quarterly contraction.

- In the first quarter of 2017, construction recorded its first contraction since the first quarter of 2012.

- All five industries in the tertiary sector contracted in the first quarter of 2017. The tertiary sector suffered its first combined contraction since the first quarter of 2013.

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1. INTRODUCTION

Statistics South Africa (Stats SA) compiles provincial estimates of Gross Domestic Product (GDP) annually. In the past these results have been published in November of each year at the same time as the estimate of the national third quarter GDP. For example, provincial GDP estimates for 2013 were published on 25 November 2014. Therefore, provincial GDP estimates for a specific year (*n*) were only published 11 months into the next year (*n+1*). With effect from the 2014 provincial GDP estimates, however, the timing of Stats SA's publication changed from November to March of the following year. Thus provincial GDP estimates for 2014 were only published in March 2016 (instead of November 2015), further delaying provincial GDP estimates by a further four months and into year *n+2*. Thus the 2015 provincial GDP estimates were only released when national GDP estimates for 2016 were published.

The release of the quarterly national GDP results and statistics by Stats SA enables one to determine the national economic growth rate for that specific quarter. This provides an early indication on national economic growth for the full year as well as signalling which industries are contributing strongly to growth and which are lagging or faltering. However, the provincial GDP estimates, that are already published a year later than national figures, are also not published on a quarterly basis.

In light of these two challenges it is problematic to provide an early indication on provincial economic growth for a quarter and even a full year. Growing or struggling industries are only identified a year later when the growth cycle might have already changed. The possibility exist that ill-timed counter cyclical policy interventions can be administered with unsuccessful and even devastating effects.

This report presents the findings of a provincial economic model that allows one to estimate the GDP for Mpumalanga for years (and quarters) not yet published by Stats SA. Economic growth estimates found in this report can therefore be used for the purpose of economic planning and activate early-response interventions where necessary. The sole data source for the model was Stats SA.

2. STRUCTURAL MODEL

In Economics, a model is a theoretical construct representing economic processes by a set of variables and a set of logical and/or quantitative relationships between them. Given the enormous complexity of economic processes conclusions drawn from models will be approximate representations of economic facts.

The details of model construction vary with every type of model and its application, but a generic process can be identified. Generally any modelling process has two steps: generating a model, then checking the model for accuracy. The diagnostic step is important because a model is only useful to the extent that it accurately mirrors the relationships that it purports to describe.

The structural model developed by Economic Analysis assumes a stable structural relationship for year *n+1* based on the contribution to the national economy for each industry in year *n*. The model further assumes a stable structural relationship for year *n+2* based on the structure for year *n+1*. With the structural relationship determined it is possible to derive estimated quarterly GDP results for each industry in Mpumalanga immediately after the release of national GDP data.

A series of estimates based on the structural model were compared with two other probable models to determine which estimation technique has performed best over the 5-year period from 2010 to 2015. Actual growth rates published by Stats SA for Mpumalanga were compared with the results of the three models using certain statistical measures.

Table 1 presents the results of the statistical test performed on the three models. The average forecasting error (AVE) shows by how much the average forecast over- or understated GDP growth. The mean absolute error (MAE) measures how far estimates or forecasts differ from actual values. The combination of lowest AVE and MAE was *n fixed* with 0.1 per cent and 1.5 per cent, respectively. The numbers tells us that on average over the 5-year period the forecasts overstated GDP growth by 0.1 per cent. The MAE shows that actual GDP growth can be 1.5 per cent higher or lower than the forecast in any given year. It is significant to note that *n fixed* estimated the sign (positive or negative) of economic growth correctly for the measurement period.

The root mean square error (RMSE) is a measure of accuracy, to compare forecasting errors of different models. Large errors have a disproportionally large effect on the RMSE, therefore the model with smallest RMSE will be more accurate. The lowest RMSE was 1.8 per cent[1] and was that of *n fixed*.

After conducting a two-tail test (t-Test) it was found that the observed difference between the respective sample means of all three models and the sample means of the actual growth values were not convincing enough to conclude that the estimates from the three models differ significantly. Therefore, according to the results presented in Table 1 the best estimation was achieved using the structural model called *n fixed*[2].

Table 1: Results of statistical measures

Statistical measure	Structure based on		
	n fixed	*n* + 1 year change	*n* + 2 year average change
Average forecasting error	0.1%	0.2%	0.1%
Mean absolute error	1.5%	2.6%	2.5%
Root mean square error	1.8%	3.1%	2.9%
t-Test: sample means	✓	✓	✓

The following sections will present South Africa and Mpumalanga's quarterly and annual GDP estimates from the first quarter 2016 to the first quarter 2017. The national GDP values are based on published data, however, the GDP values for Mpumalanga are based on the structural model developed by Economic Analysis and therefore are estimates only.

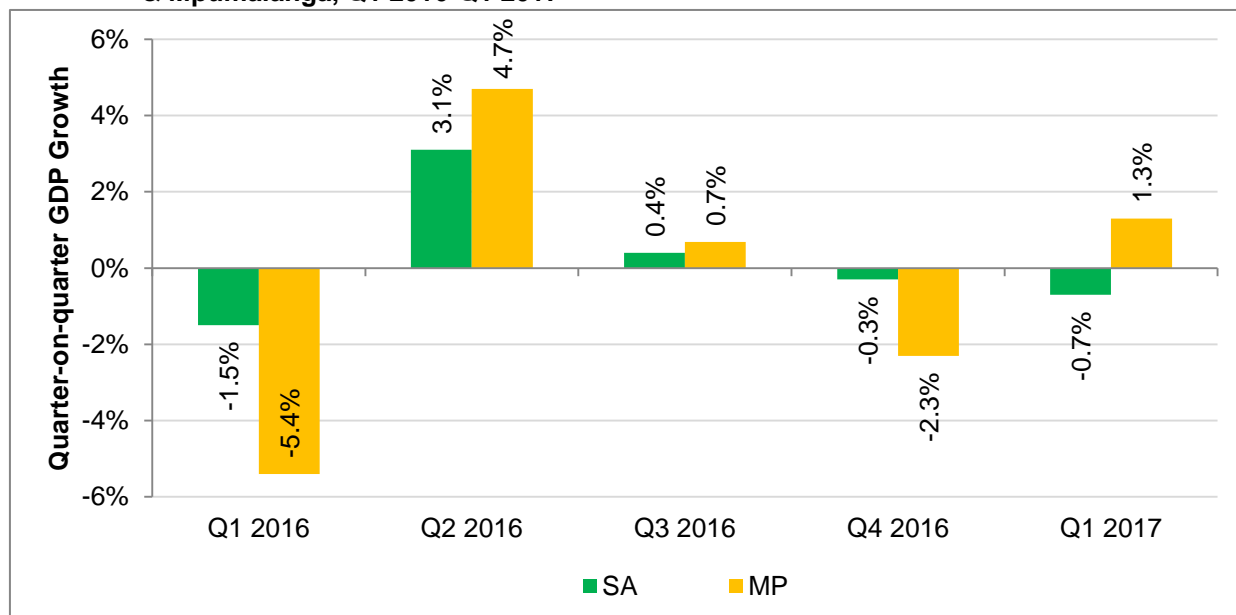## 3. ESTIMATED GDP GROWTH IN MPUMALANGA

Quarter-on-quarter growth

The quarter-on-quarter GDP growth in South Africa and Mpumalanga is displayed in Figure 1. Figure 1 indicates that the real GDP (measured by production) of South Africa decreased by 0.7 per cent in the first quarter of 2017, following a decrease of 0.3 per cent in the fourth quarter 2016. In contrast, Mpumalanga's GDP growth is estimated to have increased by 1.3 per cent in the first quarter of 2017 after the 2.3 per cent decline estimated for the fourth quarter 2016. Therefore, the South African economy is in technical recession based on the two consecutive quarters not achieving positive growth, whereas the structure of Mpumalanga's economy staved off a second consecutive quarterly decline.

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[1] Unlike MAE, RMSE does not describe the average error alone and therefore can't be added to or subtracted from the estimate.
[2] In understandable terms, the *n fixed* structural model assumes the 2015 structure of Mpumalanga's economy for 2016 and 2017.

Figure 1: **Quarter-on-quarter GDP at market prices growth (constant 2010 prices) in South Africa & Mpumalanga, Q1 2016-Q1 2017**
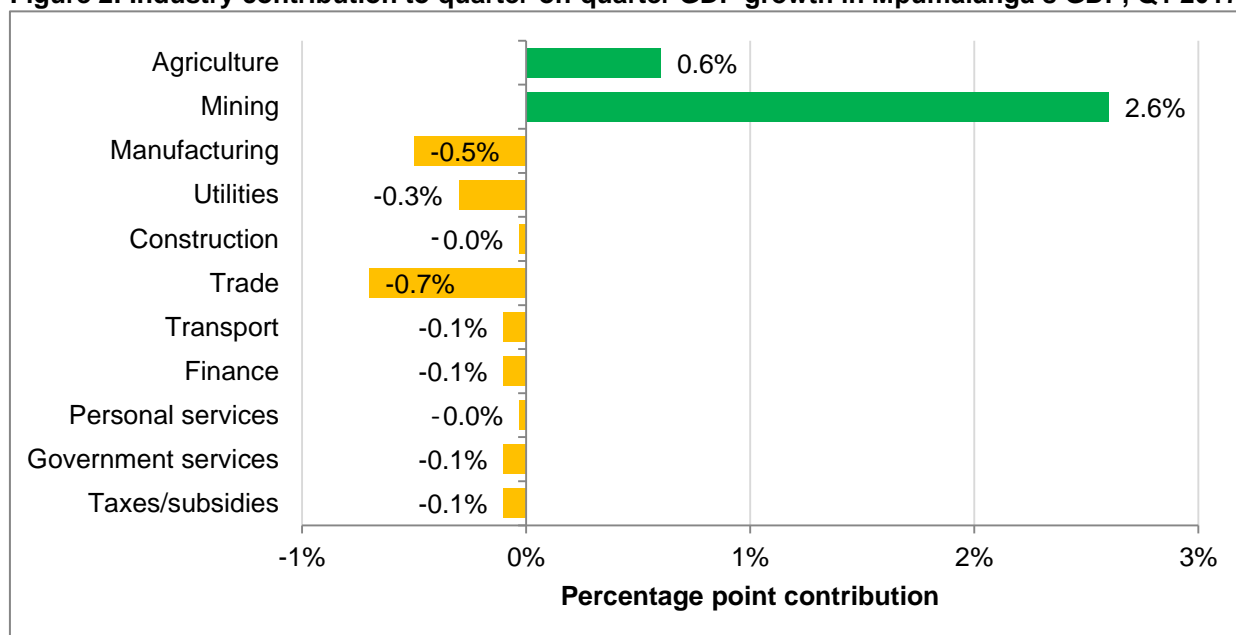

Sources: ***Statistics South Africa – GDP, 2017***
Economic Analysis Structural Model

Contribution to quarter-on-quarter GDP growth

Figure 2 displays the percentage point contribution by industries to growth in Mpumalanga's GDP in the first quarter of 2017. The largest positive contributor to growth in Mpumalanga's GDP in the first quarter was mining which increased by 12.8 per cent and contributed 2.6 percentage points to GDP growth. Similarly the agriculture industry increased by 22.2 per cent and contributed 0.6 of a percentage point to GDP growth in the first quarter. In contrast, the trade industry decreased by 5.9 per cent, and contributed -0.7 percentage points to GDP growth. Finance, transport and government services were negative contributors to growth with respective -0.1 of a percentage point contributions.

Figure 2: Industry contribution to quarter-on-quarter GDP growth in Mpumalanga's GDP, Q1 2017
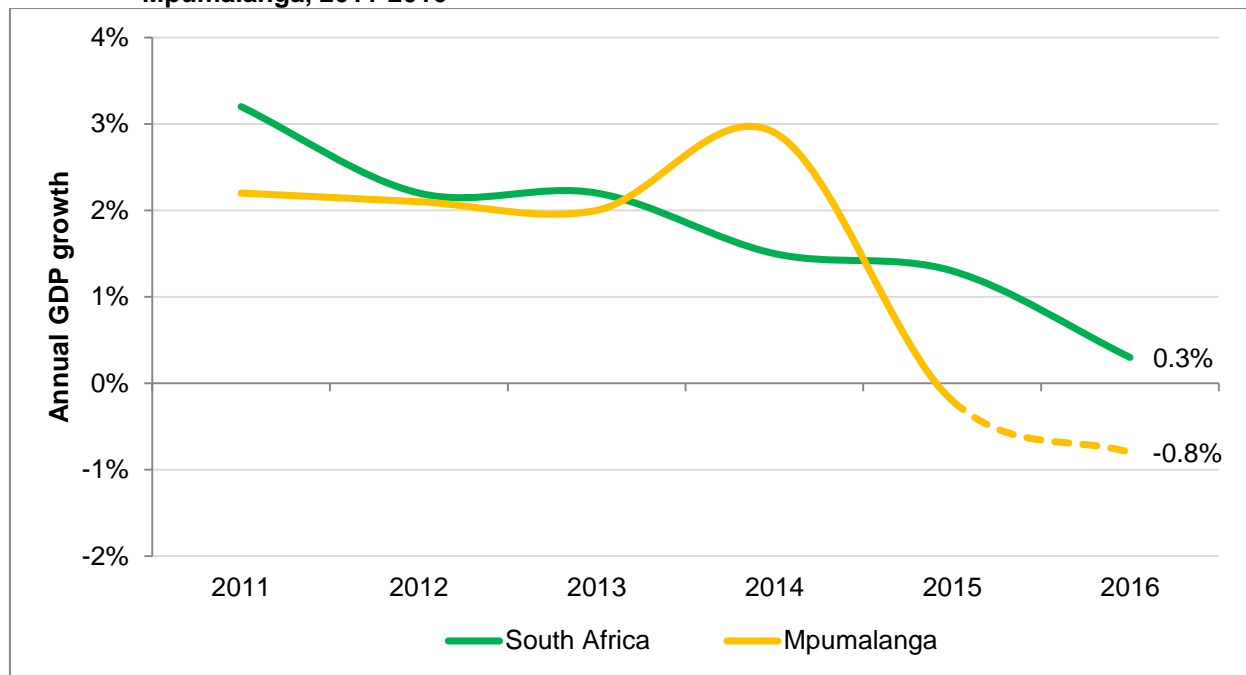

Sources: ***Statistics South Africa – GDP, 2017***
Economic Analysis Structural Model

Annual GDP growth

The annual growth for 2016 can now also be calculated based on the quarterly growth estimations. Figure 3 displays the real GDP growth numbers for South Africa and Mpumalanga between 2011 and 2016. South Africa's GDP growth numbers up to 2016 are the actual values as published by Stats SA, whereas Mpumalanga's figures are actual up to 2015 and estimated for 2016. According to the structural model employed, Mpumalanga's real GDP growth for 2016, as calculated from the estimated quarterly figures, was -0.8 per cent. This was lower than the national growth rate of 0.3 per cent and the second consecutive negative annual economic growth number by the province.

Figure 3: Annual GDP at market prices (constant 2010 prices) growth rates for South Africa & Mpumalanga, 2011-2016

Sources: Statistics South Africa – GDP, 2017
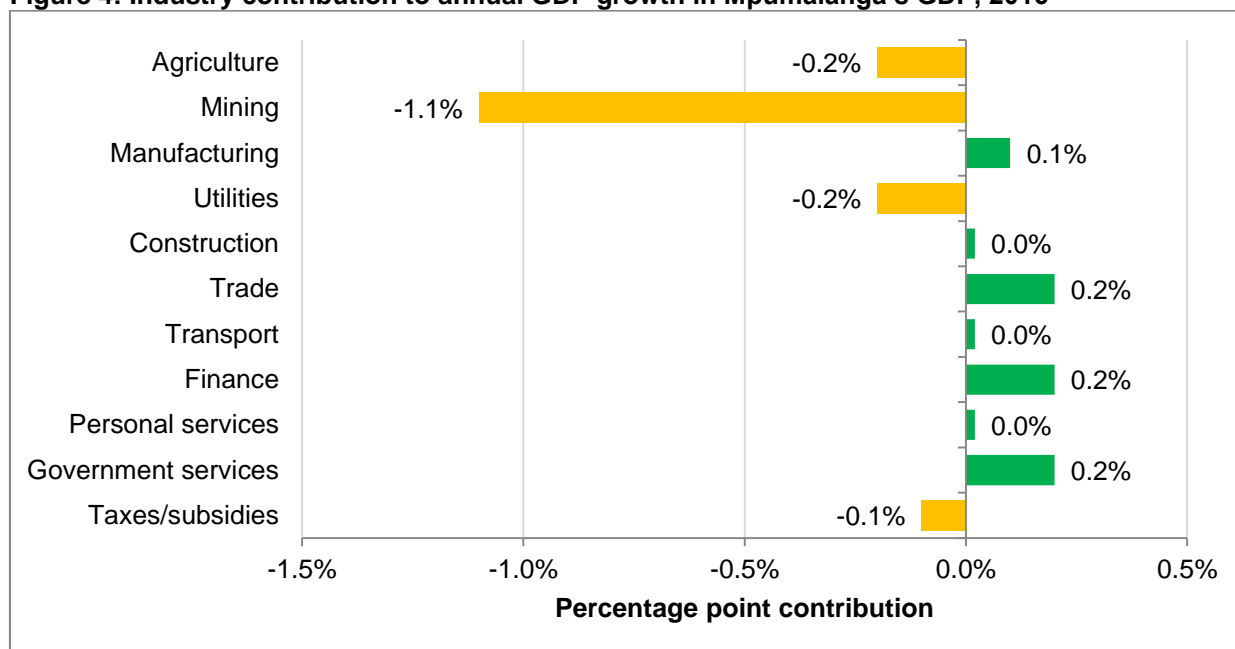*Economic Analysis Structural Model*

Contribution to annual GDP growth

The largest negative contributor to growth in Mpumalanga's GDP in 2016 was mining which decreased by an estimated 4.7 per cent and contributed -1.1 percentage points to GDP growth. Similarly, both agriculture and utilities decreased and contributed -0.2 of a percentage point to GDP growth in 2016, respectively. In contrast, trade, finance and government services each contributed 0.2 of a percentage point to lessen the decline. Figure 4 displays the percentage point contribution by industries to growth in Mpumalanga's GDP in 2016.
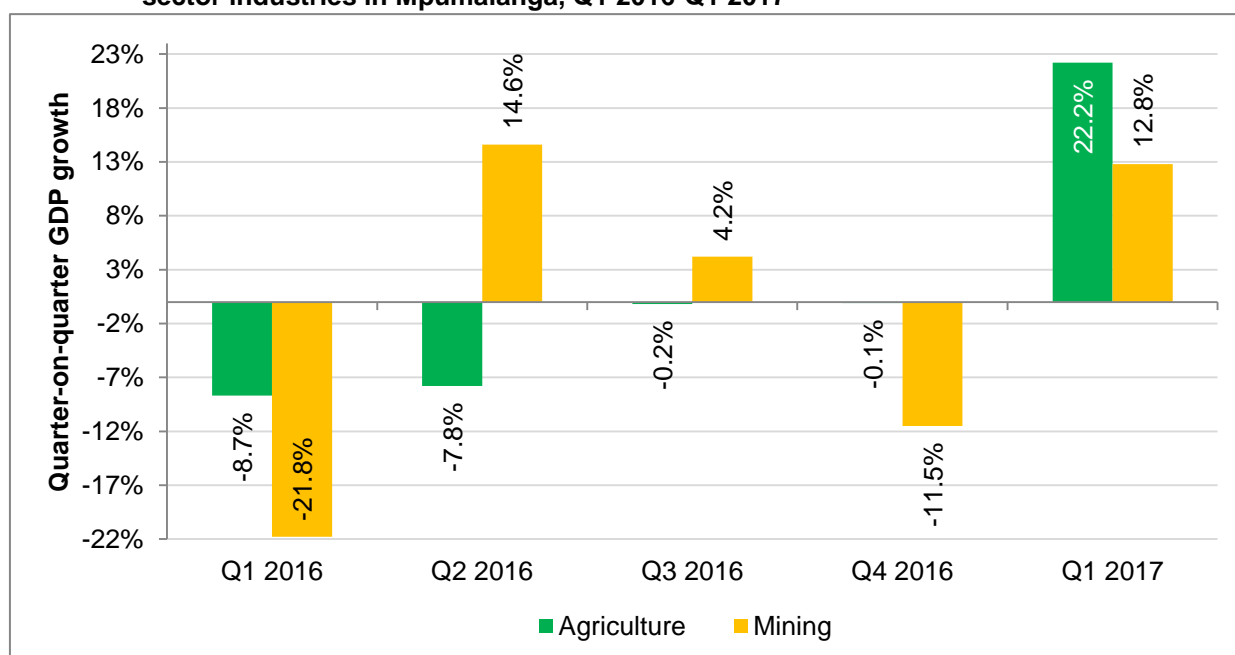
Primary sector

It is estimated that agriculture recorded an increase of 22.2 per cent in the first quarter of 2017. This was the first increase after seven quarterly contractions mainly as a result of increases in the production of field crops and horticultural products after good summer rains. Mpumalanga' mining increased by 12.8 per cent in the first quarter after an 11.5 per cent contraction in the fourth quarter of 2016. The quarter-on-quarter GDP growth of agriculture and mining in Mpumalanga is displayed in Figure 5.

Figure 4: Industry contribution to annual GDP growth in Mpumalanga's GDP, 2016

Agriculture	-0.2%
Mining	-1.1%
Manufacturing	0.1%
Utilities	-0.2%
Construction	0.0%
Trade	0.2%
Transport	0.0%
Finance	0.2%
Personal services	0.0%
Government services	0.2%
Taxes/subsidies	-0.1%

Percentage point contribution

Sources: Statistics South Africa – GDP, 2017
Economic Analysis Structural Model

Figure 5: Quarter-on-quarter GDP at market prices growth (constant 2010 prices) by primary sector industries in Mpumalanga, Q1 2016-Q1 2017


	Agriculture	Mining
Q1 2016	-8.7%	-21.8%
Q2 2016	-7.8%	14.6%
Q3 2016	-0.2%	4.2%
Q4 2016		-11.5%
Q1 2017	22.2%	12.8%

Note: Q4 2016 Mining value labelled -0.1%

Sources: Statistics South Africa – GDP, 2017
Economic Analysis Structural Model

Secondary sector

It is estimated that manufacturing in Mpumalanga contracted by 3.7 per cent in the first quarter to register the third consecutive quarterly contraction. Utilities decreased by 4.8 per cent, largely due to less electricity produced in the first quarter of 2017. It is estimated that construction recorded its first contraction since the first quarter of 2012. The secondary sector suffered its third consecutive contraction as a sector. The quarter-on-quarter GDP growth of manufacturing, utilities and construction in Mpumalanga is displayed in Figure 6.

Figure 6: **Quarter-on-quarter GDP at market prices growth (constant 2010 prices) by secondary sector industries in Mpumalanga, Q1 2016-Q1 2017**
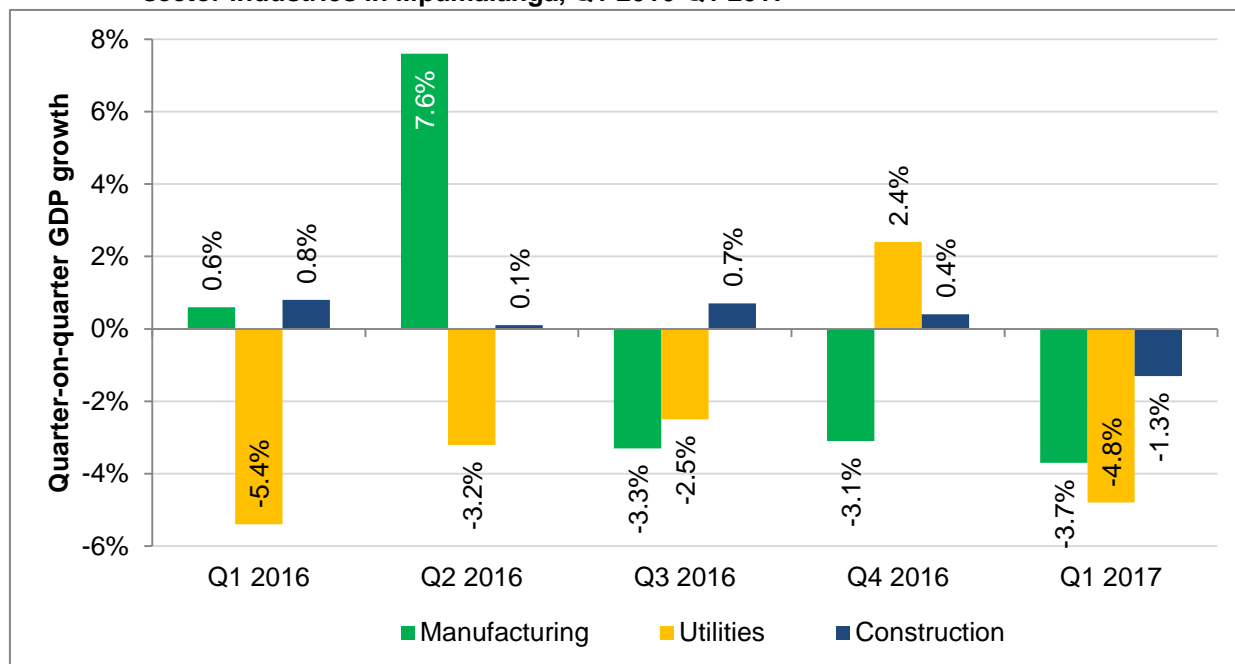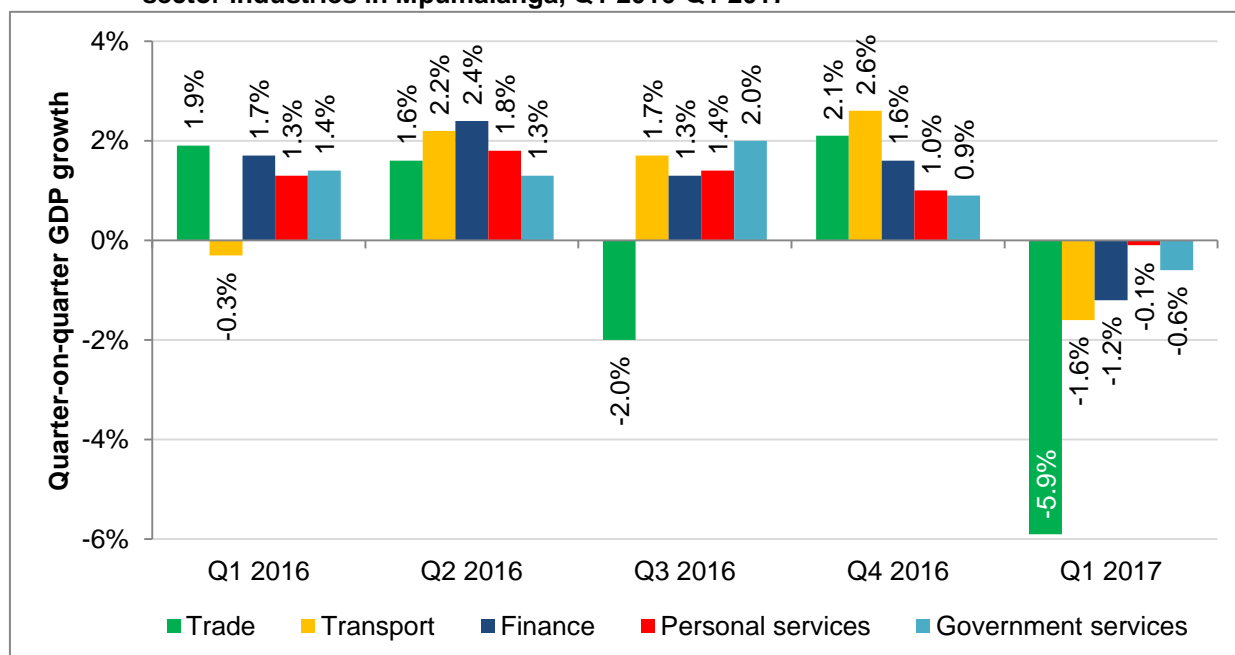

Sources: *Statistics South Africa – GDP, 2017*
Economic Analysis Structural Model

Tertiary sector

It is estimated that all five industries in Mpumalanga's tertiary sector recorded quarterly decreases in the first quarter of 2017. Trade is estimated to have decreased by 5.9 per cent and recorded its second quarterly decline in three quarters. The tertiary sector suffered its first contraction since the first quarter of 2013. The quarter-on-quarter GDP growth of trade, transport, finance, personal services and government services in Mpumalanga is displayed in Figure 7.

Figure 7: **Quarter-on-quarter GDP at market prices growth (constant 2010 prices) by tertiary sector industries in Mpumalanga, Q1 2016-Q1 2017**

Sources: *Statistics South Africa – GDP, 2017*
Economic Analysis Structural Model

4. CONCLUSION

It is estimated that the Mpumalanga economy achieved real GDP growth of 1.3 per cent in the first quarter of 2017 after the 2.3 per cent decline for the fourth quarter 2016. The Mpumalanga economy is therefore, unlike the South African economy, technically not in recession. The large contribution that mining makes to the provincial economy was the saving grace in the first quarter of 2017. Without mining's positive contribution the provincial economy would have contracted by 1.3 per cent and would technically be in recession.

It is further estimated that Mpumalanga's real GDP recorded a decline of 0.8 per cent in 2016 compared with the annual national growth of 0.3 per cent. It was the second consecutive annual contraction and again mining's large contribution to the provincial economy was the reason why the provincial and national growth trends diverged. Mining's single contribution of -1.1 percentage points to the 2016 GDP growth number was larger than the positive contributions of seven industries combined.

Agriculture came out of a recession that spanned seven quarters and mining avoided a technical recession with a strong rebound in the first quarter of 2017. Of all the industries in Mpumalanga, only manufacturing is technically considered to be in recession following three consecutive quarters with negative growth rates. However, the weakness in the economy is widespread and seven industries stare recession in the face should growth in the second quarter of 2017 also disappoint.

Despite the business and consumer uncertainty currently prevalent in the South African economy, it would be prudent to assume that economic activity will improve somewhat off the low base in the second quarter of 2017. On the production side, the main boost will probably come from the continued recovery in agriculture and mining, however, manufacturing specifically and the tertiary sector in general will contribute positively should they return to positive territory.