



Province of KwaZulu-Natal  
Provincial Treasury  
IMES Unit

# THE KWAZULUNATAL ECONOMY – A LEADS AND LAGS ANALYSIS<sup>1</sup> UPDATE 17

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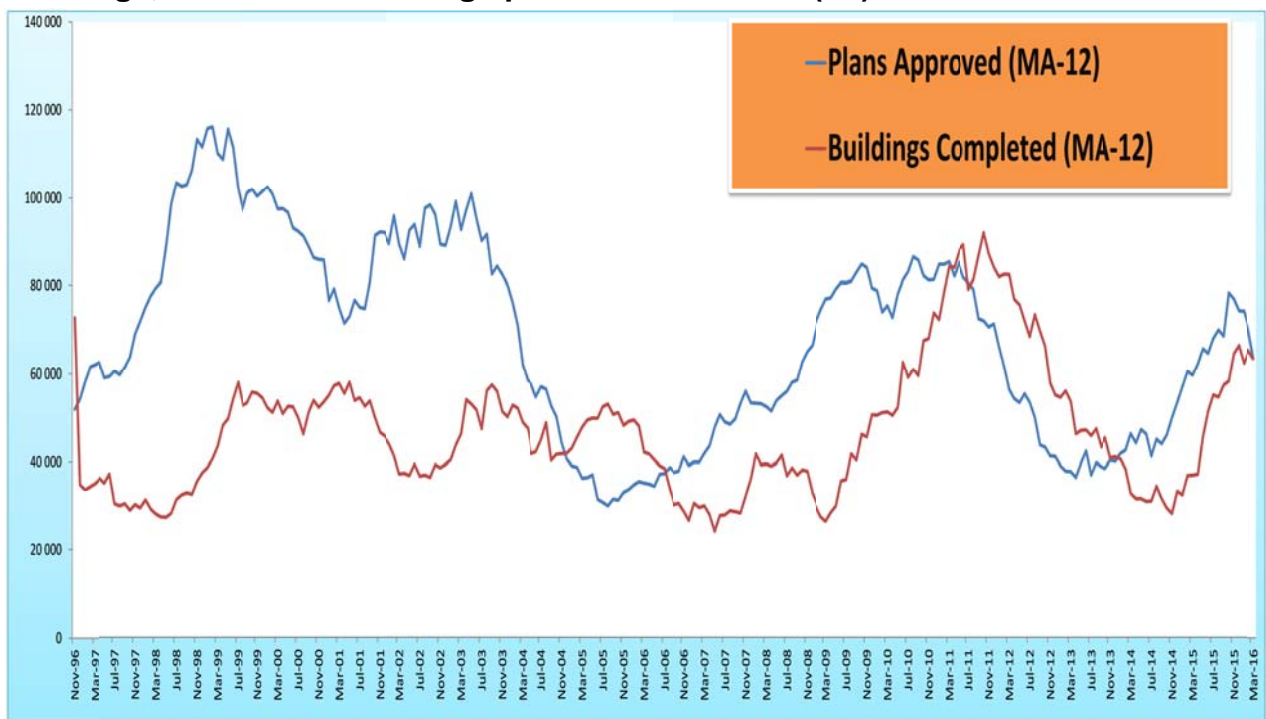
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# KZN LEADS AND LAGS ANALYSIS –1<sup>st</sup> Quarter 2016

## Introduction

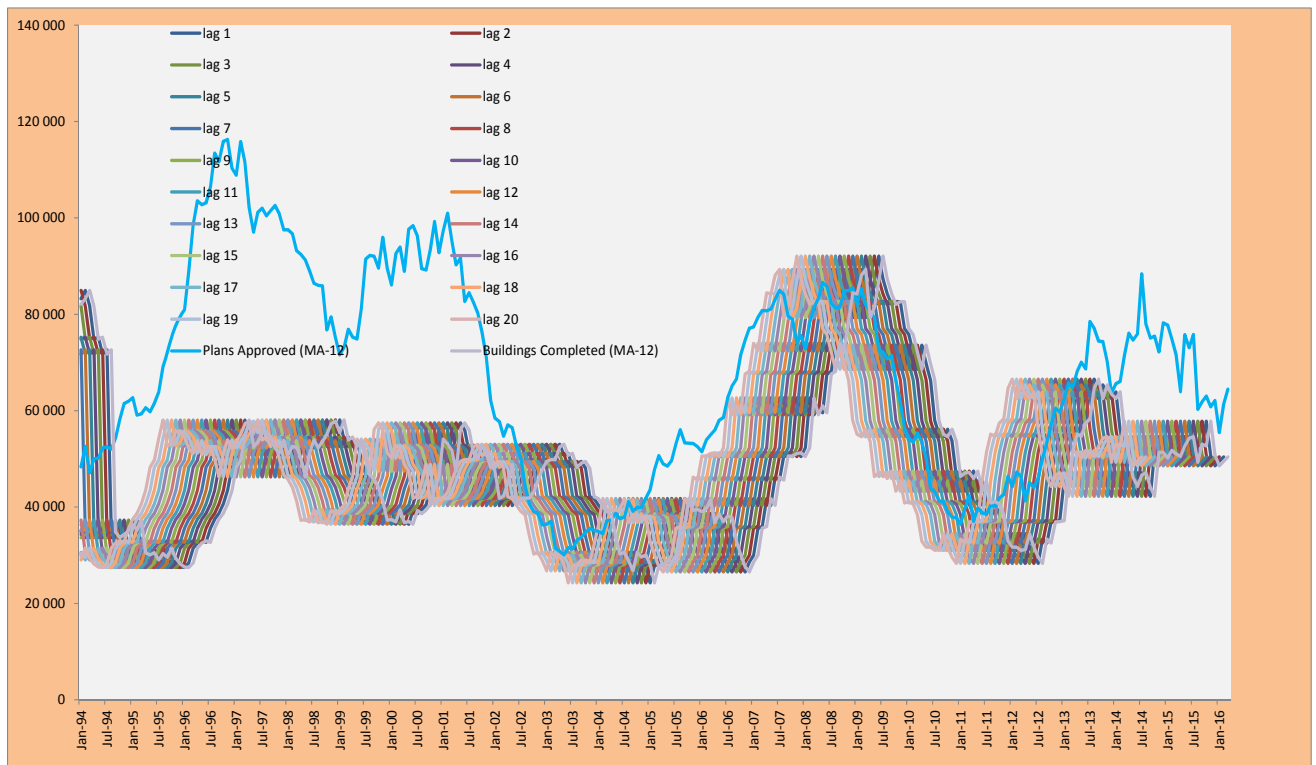
There is natural time delay between when a building plan is approved and completed. The following graph illustrates this.

**Graph 1: Building Plans Approved and Completed for Non-Residential Buildings, Offices and Banking space – South Africa (m<sup>2</sup>)**



This analysis attempts to calculate the average time delay between building plans approved and completed by using various lags of the building plans completed variable. The total number of lags ranges from 20 to 29. This is illustrated in the graph below.

**Graph 2: Building Plans Completed for Non-Residential Buildings, Offices and Banking space and Lags 1 to 15– South Africa (m<sup>2</sup>)**



All things equal a building plan approved should become a building plan completed. The reality is however that some approvals might not be completed for whatever reason. However, the percentage of non-completed approvals is both unknown and most likely fairly unstable. This analysis therefore assumes that all approvals will be completed i.e., zero percent non completed approvals.

The analysis further assumes that the average time delay stays constant over time for example the average time delay between a building plan approved and completed in 2015 was the same as in 1994.

The analysis then attempts to compute this average time delay for each of the 5 categories of building plans approved and completed, i.e.,

- Residential Buildings, Dwelling-Houses>80 square metre
- Residential Buildings, Flat and Townhouses
- Non-Residential Buildings, Offices and Banking space

- Non-Residential Buildings, Shopping space
- Non-Residential Buildings, Industrial and Warehouse

The average time delay between a building plan approved and building plan completed is calculated by computing a correlation coefficient matrix and root mean square error matrix between the building plans approved variable and the various lagged building plans completed variables.

The analysis will compute this average time delay on both a national and provincial level and then compare the two average time delays for each of the 5 categories of building plans approved and completed.

One would assume that the average time delay between a building plan approved and building plan completed on a national and provincial should be the same. However this might not be true. There might be provincial factors that might increase or decrease the average time delay between a building plan approved and building plan completed on a provincial level compared to the national level.

## **Methodology Employed**

The steps followed in the analysis are as follows:

- Step 1 = Capture SA and KZN Building Plans Approved data from Stats SA (Jan 1994 to Feb 2015) for each of the 5 categories
- Step 2 = Capture SA and KZN Building Plans Completed data from Stats SA (Jan 1994 Feb 2015) for each of the 5 categories
- Step 3 = Apply 12 month moving average to each of the 10 variables
- Step 4 = Construct a lagged (lags 1 – 30) time series of building plans completed variable for each of the 5 categories
- Step 5 = Calculate correlation coefficient between the approved and lag building plans completed time series for each of the 5 categories
- Step 6 = Determine the highest lagged correlation coefficient

- Step 7 = Calculate the root mean square error (RMSE) between building plans approved and lag building plans completed
- Step 8 = Determine the least lagged RMSE value
- Step 9 = Compare the best fit lagged building plans completed between SA and KZN, based on the correlation and RMSE methods

## Results of the Analysis

The results of the analysis can be interpreted as follows;

- The average time delay between a building plan approved and completed on a national level for Dwelling-Houses  $\geq 80$  square metre based on the correlation coefficient is 12 months and based on the RMSE it is 12 months compared to 12 and 12 months on a provincial level, respectively.
- The average time delay between a building plan approved and completed on a national level for Flats and Townhouses based on the correlation coefficient is 10 months and based on the RMSE is 14 months compared to 14 and 17 months on a provincial level, respectively.
- The average time delay between a building plan approved and completed on a national level for Office and Banking Space based on the correlation coefficient is 15 months and based on the RMSE is 17 months compared to 22 and 26 months on a provincial level, respectively.
- The average time delay between a building plan approved and completed on a national level for Shopping Space based on the correlation coefficient is 13 months and based on the RMSE is 14 months compared to 29 and 29 months on a provincial level, respectively.
- The average time delay between a building plan approved and completed on a national level for Industrial and Warehouse Space based on the correlation coefficient is 11 months and based on the RMSE is 14 months compared to 14 and 14 months on a provincial level, respectively.

## Summary

The analysis indicates that the average time delay between building plans approved and building plans completed (all categories) based on the correlation coefficient method is **12** months on a national level and **14** months provincial level and based on the RMSE method is **18** months on a national level and **20** months provincial level.

This suggested that on average the time delay between national and provincial is **6** months i.e., it takes **6** months longer for a building plan to be completed on a provincial level compared to the time it takes on a national level.

<b>1<sup>st</sup> Quarter 2016</b>	<b>SA (Correlation)</b>	<b>KZN (correlation)</b>	<b>SA (RMSE)</b>	<b>KZN (RMSE)</b>
<b>Residential Buildings, Dwelling-Houses&gt;=80 square metre</b>	12	12	12	12
<b>Residential Buildings, Flat and Townhouses</b>	10	14	14	17
<b>Non-Residential Buildings, Offices and Banking space</b>	15	22	17	26
<b>Non-Residential Buildings, Shopping space</b>	13	29	14	29
<b>Non-Residential Buildings, Industrial and Warehouse space</b>	11	14	14	14
<b>Average</b>	<b>12</b>	<b>18</b>	<b>14</b>	<b>20</b>