

### Box 1 Statistical linking of formal non-agricultural employment and earnings time series

The analysis on formal non-agricultural employment and earnings in the *Quarterly Bulletin* is based on employment and earnings data from the *Quarterly Employment Statistics (QES)* survey, a business enterprise survey published by Statistics South Africa (Stats SA). In addition, time series measuring public and private sector formal non-agricultural employment and earnings are published in the statistical tables section of the *Quarterly Bulletin* on pages S-136 and S-137. However, these time series contain numerous structural breaks, rendering them inadequate for long-term analysis of South African labour market conditions.

The structural breaks in the data occurred in the third quarter of 2002, the fourth quarter of 2004, the second quarter of 2006, the second quarter of 2013 and, most recently, the second quarter of 2015. These structural breaks (which usually increase the overall level of employment and earnings) were the result of ongoing improvements by Stats SA to the measurement of formal non-agricultural employment and earnings.

Initially, Stats SA published formal non-agricultural employment and earnings data in the Survey of Total Employment and Earnings (STEE). In March 2001, the STEE was renamed the Survey of Employment and Earnings (SEE) in selected industries, as Stats SA replaced its business register (based on sectoral economic censuses and updated with other sources) with an integrated business frame. From June 2005, the SEE was replaced by the QES survey. The QES survey covers only employing businesses registered for value-added tax (VAT) at the South African Revenue Service (SARS), whereas the SEE covered both employing and non-employing VAT-registered businesses.

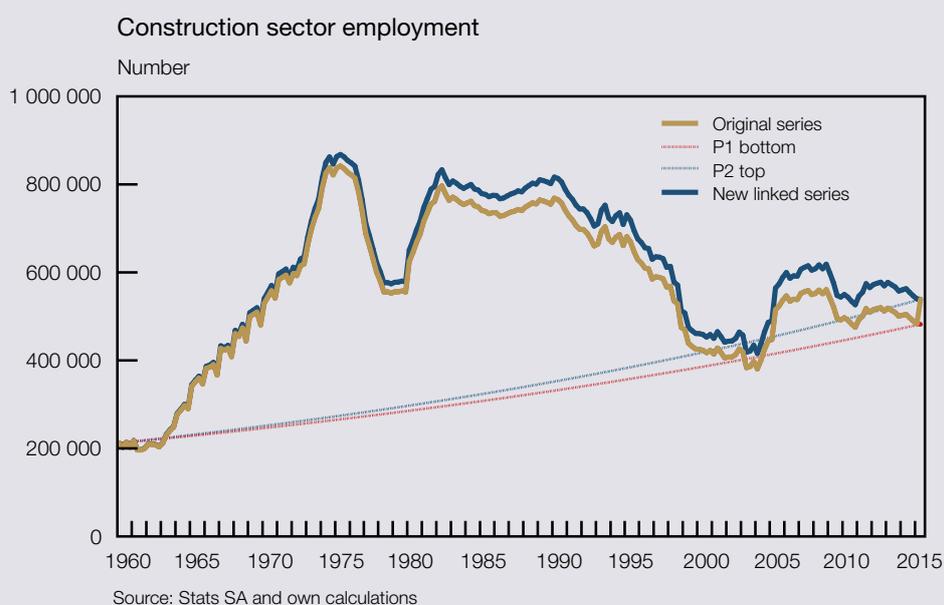
Stats SA has sporadically updated the business sampling frame (BSF), from which the sample of the QES survey is drawn, by adding new enterprises and removing dormant enterprises to ensure the relevance and quality of the BSF. These enhancements to the coverage of the BSF have consequently resulted in a number of structural breaks in the time series measuring formal non-agricultural employment and earnings. According to Stats SA, the level shifts in the employment and earnings estimates may be assumed to be, but not limited to, the following:

- general growth in the South African economy;
- small businesses growing to the extent that they are captured in the registration process;
- greater compliance with administrative requirements to register as an employer;
- increased coverage of employer entities on Stats SA's business register through enhanced use of administrative data; and
- an extension of the boundary of the formal sector due to legislative changes.

The most recent update of the QES survey's BSF was published in the March 2016 release of the QES survey. The new sample, which was introduced from the second quarter of 2015, resulted in an upward adjustment of roughly 200 000 in the level of total formal non-agricultural employment, and is therefore not directly comparable to historical data.

Up to the December 2016 *Quarterly Bulletin*, the South African Reserve Bank (SARB) published the formal non-agricultural employment and earnings time series containing the structural breaks in the statistical tables. However, the analysis in the Quarterly Economic Review section was based on formal non-agricultural employment and earnings time series that were statistically linked by the SARB for internal use. The SARB analyses and publishes separate employment and earnings time series for the private and public sectors as well as their respective subsectors. The structural breaks occurred mostly in the private subsectors, since public sector employment and earnings have always been measured quite comprehensively in the QES survey. The employment and earnings time series of each subsector were linked individually, for each structural break, and then aggregated to obtain total formal non-agricultural employment and earnings.

The statistical linking methodology employed by the SARB will briefly be explained using the linking of employment in the construction sector at the most recent structural break as an example. The historical starting point of the time series (the first quarter of 1960) was kept unchanged, since revising the data from the beginning would lift the starting point of the time series to an unrealistic level appropriate for that period. A line is then projected from the starting point of the time series to the end point of the time series based on the old frame (P1 in the accompanying figure). Likewise, another line is projected from the starting point of the time series to the end point of the time series based on the new frame (P2 in the accompanying figure). The original time series is divided by P1 to obtain a linking factor. The linking factor is then multiplied by P2, yielding the new linked time series. Although this methodology results in a slightly steeper long-term trend in the linked time series, the cyclical movement and the seasonal pattern of the original time series are retained.



To facilitate better analysis of labour market developments by users, the SARB decided to publish the linked formal non-agricultural employment and earnings time series. From the March 2017 *Quarterly Bulletin*, tables KB701, KB702 and KB814 on pages S-136, S-137 and S-156 respectively will contain the statistically linked time series.

#### References

Statistics South Africa. 2005. Statistical release P0275. 'Survey of employment and earnings, March 2005'. Pretoria: Statistics South Africa.

Statistics South Africa. 2015. Statistical release P0277. 'Quarterly employment statistics (QES), December 2014'. Pretoria: Statistics South Africa.

Statistics South Africa. 2016. Statistical release P0277. 'Quarterly employment statistics (QES), March 2016'. Pretoria: Statistics South Africa.