

Note on unit labour cost measurement in South Africa

1 The views expressed are those of the authors and do not necessarily reflect the views of the South African Reserve Bank (the Bank).

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1. Introduction

Changes in the cost of labour per unit of real output – unit labour cost or ULC – provide a good indication of price pressures emanating from labour market conditions in an economy. Consequently, ULC is an important macroeconomic indicator for monetary policy purposes and as such serves as a key explanatory variable in a number of equations within the Bank's suite of macroeconomic models. The Bank's Economic Research and Statistics Department currently calculates two different nominal ULC measures²: an economy-wide measure compiled by the Macro Models Unit that feeds into the econometric models, and a formal non-agricultural sector measure based on the Quarterly Employment Statistics (QES) survey, compiled by the Business Cycle Analysis Division that is published regularly in the *Quarterly Bulletin*.

2 All ULC analyses are in nominal terms, unless stated otherwise.

2. Definitions and economic relevance

Labour costs are the costs incurred by employers in the employment of labour. Labour costs are of particular interest as they impact on the competitiveness of organisations and also on employers' willingness to invest and employ workers. Labour costs, i.e. salaries and wages earned by employees, also contribute most to household income, and as such have a significant impact on household consumption expenditure and saving decisions. Thus, understanding changes in wages and labour costs is important in assisting the formulation of macroeconomic policy.

2.1 Unit labour cost and labour productivity

Unit labour cost is defined as the total labour cost per unit of output. Nominal unit labour cost (NULC) can be calculated as the ratio of total labour cost to real output (equation 1).

$$NULC = \left\{ \frac{\text{Total labour cost}}{\text{Real output}} \right\} \quad (1)$$

Alternatively, NULC can be calculated as the ratio of average labour cost per hour worked³ to real output per hour worked (i.e. labour productivity). Since it is difficult to obtain data on hours worked for some countries (including South Africa), the number of persons employed is usually used as an alternative measure of labour input when calculating labour productivity. The alternative calculation for NULC is expressed in equation 2.

$$NULC = \frac{\left\{ \frac{\text{Total labour cost}}{\text{Number of employees}} \right\}}{\left\{ \frac{\text{Real output}}{\text{Number of employees}} \right\}} \quad (2)$$

where

$$\text{Labour productivity} = \left\{ \frac{\text{Real output}}{\text{Number of employees}} \right\} \quad (3)$$

As shown in equations 2 and 3, ULC represents a direct link between labour productivity and the cost of labour used in producing output. An increase in ULC implies that growth in average employee compensation exceeds growth in labour productivity, which may create pressure on producer prices. Thus, a rise in ULC represents an increased reward for labour's contribution to output. However, a rise in labour cost that is higher than the rise in labour productivity may threaten a country's cost competitiveness, if other costs are not adjusted to compensate.

3 Average labour cost per hour worked is calculated as the ratio of total labour cost to hours worked.



2.2 Building blocks of the Bank's two unit labour cost measures

As mentioned, the Bank currently calculates two different ULC measures; an *economy-wide ULC* measure utilised in the Bank's econometric models, as well as a *formal non-agricultural ULC measure* published regularly in the *Quarterly Bulletin*. In calculating the economy-wide ULC measure, equation 1 is applied:

$$\text{Economy-wide ULC} = \left\{ \frac{\text{Total compensation of employees}}{\text{Real gross domestic product}} \right\} \quad (4)$$

Similarly, the formula for calculating the formal non-agricultural ULC measure is:

$$\text{Formal non-agricultural ULC} = \left\{ \frac{\text{Gross earnings in the formal non-agricultural sector}}{\text{Real non-agricultural gross value added}} \right\} \quad (5)$$

When comparing the two numerators, it should be noted that *total compensation of employees* is obtained from the national accounts, and thus covers the whole economy. According to the 2008 System of National Accounts (SNA) (page 139), compensation of employees is defined as:

"the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period. Compensation of employees has two main components:

a. wages and salaries payable in cash or in kind, including enhanced payments and special allowances (e.g. overtime), regular supplementary allowances (e.g. housing), ad hoc bonus payments, as well as commissions, gratuities or tips received by employees; and

b. social insurance contributions payable by employers, which include contributions to social security schemes; actual social contributions to other employment-related social insurance schemes and imputed social contributions to other employment-related social insurance schemes."

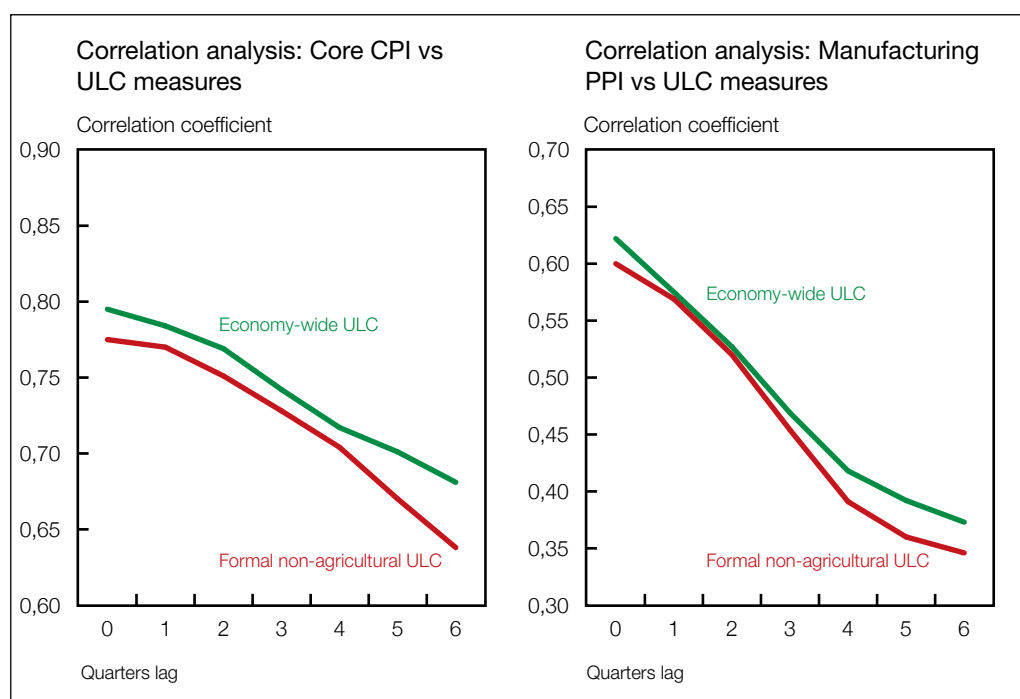
Gross earnings of employees in the formal non-agricultural sector are obtained from the Statistics South Africa (Stats SA) Quarterly Employment Statistics (QES) survey and are defined in Stats SA's QES as:

"the payments for ordinary-time, standard or agreed hours during the reference period for all permanent, temporary, casual, managerial and executive employees before taxation and other deductions for the reference period. This includes salaries and wages; commission if a retainer, wage or salary was also paid; employer's contribution to pension, provident, medical aid, sick pay and other funds; allowances; etc., but excludes earnings of sole proprietors or partners of unincorporated businesses; commission where a retainer, wage or salary was not paid; payments to subcontractors and consultants who are not part of the enterprise; and severance, termination and redundancy payments. Gross earnings are the total sum of the earnings, including performance and others bonuses, as well as overtime payments for the three months of the reference quarter."

Although the scope of the compensation of employees and gross earnings measures is fairly similar (both exclude earnings of business owners and the self-employed, while differences relate mainly to certain types of allowances and commissions), the methodology applied to compile each variable differs noticeably. Gross earnings is the sum of earnings measured directly from the payrolls of companies surveyed in Stats SA's QES survey. Conversely, as a national accounts estimate compensation of employees is very seldom the result of direct measurement but rather estimated using a variety of sources for the various economic sectors.

3. Analysis of correlation with inflation measures

Unit labour cost currently feeds into the Bank's macroeconomic models as explanatory variable for core consumer price inflation as well as for final manufactured producer price inflation. In both instances, the economy-wide ULC measure is used. In this section, both ULC measures are compared with the two dependant variables in the models to see which ULC measure correlates better with each dependant variable. Correlation coefficients were calculated between each dependant variable and each ULC measure, using quarterly data over the period 1980 to 2015. In addition, the two ULC measures were lagged for up to six quarters in order to ascertain the degree to which current ULC changes explain future changes in the inflation measures.



The charts above show the results of the correlation analysis between core consumer price inflation and the two ULC measures, and between manufacturing producer price inflation and the two ULC measures respectively. Both ULC measures correlate better with core consumer price inflation than with manufacturing producer price inflation. Over the full sample period, the contemporaneous correlation coefficients of both ULC measures with both inflation measures are the highest, deteriorating slightly as the lag period is increased. It should be noted that this result is dependent on the sample period used. The more relevant finding, however, is that the correlation coefficients of the economy-wide ULC measure with both inflation measures are consistently higher than those of the formal non-agricultural ULC measure. This could largely be due to the fact that the economy-wide ULC measure is much smoother than the formal non-agricultural measure, which would make it more desirable for modelling and forecasting purposes.

4. Empirical analysis of the link between unit labour cost, wages and productivity growth

As discussed in section 2.1, ULC can be calculated using either equation 1 or 2. Expressing each term in equation 2 in natural logarithms, it can be rewritten as:

$$\ln ULC = \ln \left\{ \frac{\text{Total labour costs}}{\text{Number of employees}} \right\} - \ln \left\{ \frac{\text{Real output}}{\text{Number of employees}} \right\} \quad (6)$$

Since natural logarithms can be substituted for growth rates, the formula can be rewritten further as:

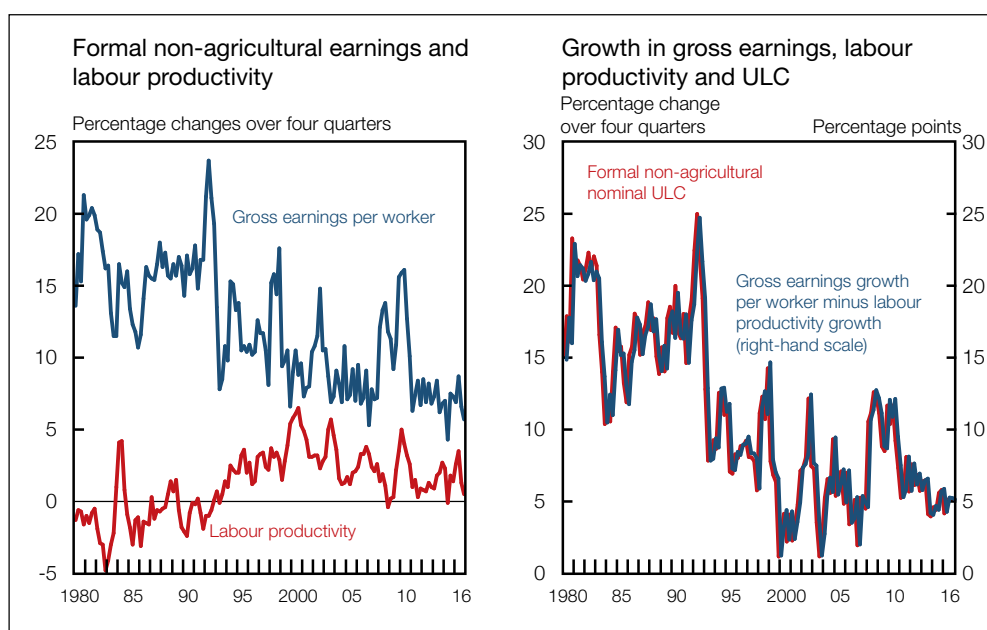
$$\Delta ULC = \Delta \left\{ \frac{\text{Total labour costs}}{\text{Number of employees}} \right\} - \Delta \left\{ \frac{\text{Real output}}{\text{Number of employees}} \right\} \quad (7)$$

where Δ = the percentage change over four quarters.

The formula can be simplified further to relate growth in ULC to growth in remuneration per worker and growth in labour productivity:

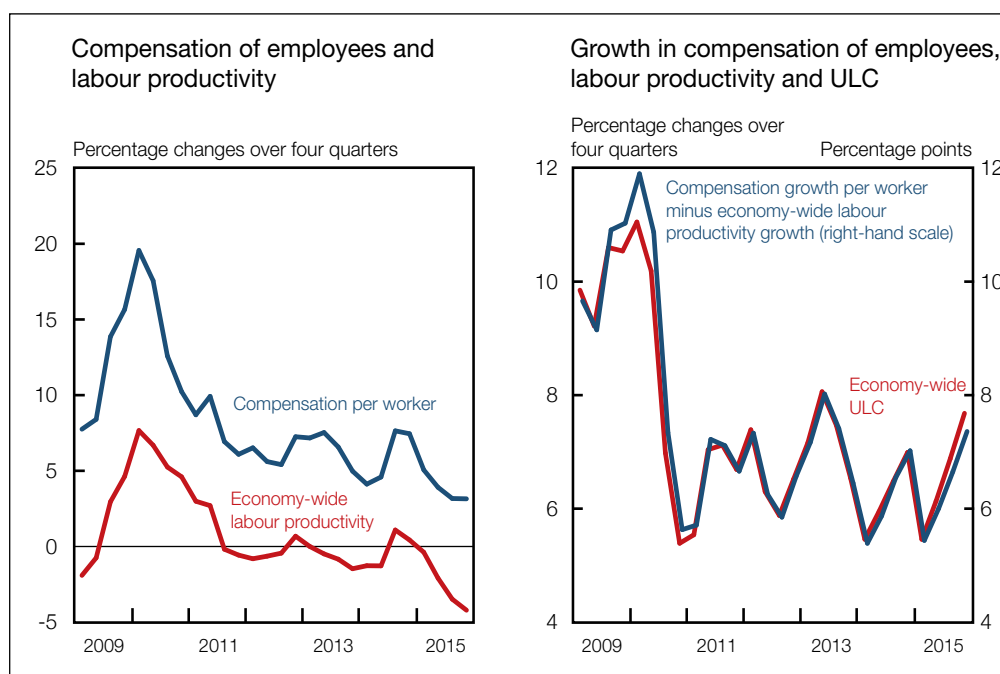
$$\Delta ULC = \Delta \{ \text{Remuneration per worker} \} - \Delta \{ \text{Labour productivity} \} \quad (8)$$

The formal non-agricultural ULC measure is calculated using equation 1. However, to confirm whether changes in this ULC measure are consistent with wage and labour productivity growth, it can also be calculated using equation 2.



The chart on the left-hand side above shows year-on-year growth in quarterly gross earnings per worker and in labour productivity from 1980 to 2015, while the chart next to that depicts the difference between these two indicators, representing ULC calculated with equation 2, together with the standard formal non-agricultural ULC measure, calculated with equation 1. These two measures are virtually identical, illustrating the relationship between ULC, gross earnings growth and labour productivity growth. The relationship holds so closely because both gross earnings and employment are obtained from the same source, namely the QES survey, where earnings are surveyed directly from enterprise payrolls and matched to employment.

A similar calculation was done with the economy-wide ULC measure. The left-hand chart below illustrates year-on-year growth in quarterly compensation of employees per worker and in economy-wide labour productivity from 2009 to 2015. Economy-wide labour productivity was calculated by dividing total GDP by total employment as published in Stats SA's Quarterly Labour Force Survey (QLFS), which is only available from 2008. Contrary to formal non-agricultural labour productivity, economy-wide labour productivity has mostly contracted since mid-2011 as QLFS employment growth has largely outpaced GDP growth over the period. This was particularly pronounced in 2015, exacerbated by the sharp rise in total employment following the implementation of a new master sample for the QLFS. The right-hand chart below depicts the difference between annual growth in quarterly compensation of employees per worker and in economy-wide labour productivity (representing ULC calculated using equation 2), together with the standard economy-wide ULC measure (calculated using equation 1). Although these two measures correlate fairly well, they are not as close to each other as the two formal non-agricultural measures shown in one of the previous charts. The main reason for the occasional differences lies in the fact that the sources of total employment and that of compensation of employees are completely different, while earnings and employment are matched from the QES payroll data in the formal non-agricultural calculation.



5. Conclusion

The Bank currently calculates two different nominal ULC measures since both are useful, each in its own unique way. The economy-wide ULC measure is important for modelling purposes, since it correlates slightly better with inflation variables, reduces series 'noise' and represents a more broad-based measure of ULC. Likewise, the formal non-agricultural ULC measure provides an empirical reflection of the theoretical link between ULC, wage and labour productivity growth and is thus published in the *Quarterly Bulletin* and used when analysing wage growth and labour productivity developments in the South African economy.

