Labour compensation growth in the South African economy: assessing its impact through the labour share using the Global Policy Model

Ilan Strauss
and
Gilad Isaacs
July 2016
Labour compensation growth in the South African economy: Assessing its impact through the labour share using the Global Policy Model

Ilan Strauss and Gilad Isaacs

August 2016
Abstract

Using the United Nations Global Policy Model (GPM) we assess what happens when the labour share of South Africa’s economy is increased. This rebalancing offsets the decline in South Africa’s post-apartheid labour share and attempts to bring it in line with other emerging economies. This modelling exercise is undertaken in the context of a debate over whether to institute a national minimum wage in South Africa, a policy that would most likely raise the labour share. The GPM projects that a rising labour share has a positive effect overall on the South African economy in the period under analysis (2015-2025). In particular, the model projects a rise in consumption expenditure as national income shifts towards wage earners who have a lower propensity to save and in turn a higher propensity to consume. This in turn stimulates output and GDP growth, along with rising labour productivity. The effect on employment is marginal, inflation is contained, and the current account deteriorates moderately. Private investment as a share of GDP falls modestly but gross private investment rises and, together with GDP, is left permanently higher. The benefits of the rebalancing of national income are strengthened when accompanied by increased domestic government expenditure and rebalancing elsewhere in the world. While not estimated in this paper, a rising labour share could also help reduce income inequality in South Africa given that wage income is less unequally distributed than capital income. The modelling exercise concludes that policy measures which see wage earners receive a larger share of national income in South Africa, can, at the levels modelled, have an overall positive impact on the economy.

Project information

This paper forms part of the National Minimum Wage Research Initiative (NMW-RI) undertaken by CSID in the School of Economics and Business Science at the University of the Witwatersrand. The NMW-RI presents theoretical and case-study evidence, statistical modelling and policy analysis relevant to the potential implementation of a national minimum wage in South Africa. For more information visit www.nationalminimumwage.co.za.

Authors and Acknowledgements

Ilan Strauss is a PhD candidate at The New School, New York, United States.
Email: strai275@newschool.edu

Gilad Isaacs is a research coordinator at CSID, School of Economic and Business Sciences, University of the Witwatersrand, Johannesburg, South Africa.
Email: gilad.isaacs@wits.ac.za

This paper has benefited from the support of the International Labour Organization (ILO), including Patrick Belser, Rosalia Vazquez-Alvarez, and, in particular, Jeronim Capaldo. Thank you to Servaas Storm, Robert Pollin, James Heinz, Ben Fine, and Ourania Dimakou for helpful comments. All errors are our own.
Executive summary

Using the United Nations Global Policy Model (GPM) we assess what happens when the labour share of South Africa’s economy is increased – with the ‘labour share’ being defined as the share of value added paid to workers in an economy. This rebalancing occurs via a ‘catch-up’ between real labour compensation per worker and labour productivity per worker over a ten-year period (2015-2025), such that real labour compensation outpaces labour productivity growth on average during this period. This offsets the decline in South Africa’s post-apartheid labour share and attempts to bring it in line with other emerging economies, as South Africa’s labour share is approximately 5% (as a share of GDP) below its emerging market peers. South Africa’s low labour share reflects the historically weak position of labour in South Africa amidst a highly imbalanced production structure. A rising labour share can help reduce income inequality in South Africa given that wage income, though incredibly unequally distributed, is still less unequally distributed than capital income.

This modelling exercise is undertaken in the context of the debate over whether to institute a national minimum wage in South Africa. Increasing South Africa’s labour share is one, albeit imperfect, means through which to assess the economy-wide impact of such a measure. Only under very extreme elasticities will an increase in minimum wages not increase the labour share. Nevertheless, the modelling approach adopted here is distinct from modelling a direct increase to the wages of lower-wage workers (see Adelzadeh and Alvillar 2016). South Africa’s labour share may increase for many reasons. We therefore analyse here what happens when, irrespective of its source or cause, wage earners receive a larger share of what is produced in South Africa.

Three different scenarios are modelled and compared to a ‘baseline’ scenario (based on the South African economy’s current trajectory). In scenario 1, we implement ‘catch-up’ only in South Africa: we target a 2 percentage point rise in the labour share (from 42% of GDP to 44%). In scenario 2 we target a 4 percentage point increase in the labour share and combine it with a strong expansion in public investment spending. In scenario 3 we implement ‘catch-up’ in South Africa and globally: the targeted rise in the labour share in South Africa is 5 percentage points (so it reaches 47% of GDP by 2025) and in other economies where the labour share has fallen since 2002 it is raised back to those levels by 2025.

In all scenarios the South African economy benefits overall in the period under analysis from a more equal distribution of income reflected in a higher labour share. ‘Catch-up’ has a positive overall impact on the South African economy and no significant negative impacts on macroeconomic variables. Strong consumption effects outweigh negative investment effects as income flows to those who have a lower propensity to save and in turn a higher propensity to consume.

Scenario 1 involves the smallest adjustment to South Africa’s present growth path and so has the smallest effect on the economy, while scenario 3 has the
largest effect overall. Scenario 1 has a positive overall effect on the South African economy, increasing GDP growth and the labour share without any noticeable negative employment effects. However, the positive impacts are not large. This highlights the strong path dependence of the South African economy and the difficulties in a country changing its economic trajectory with a single modest policy intervention when acting in isolation. Scenario 2 highlights how a complementary policy, in this case public investment spending, reinforces the largely positive gains arising from a higher labour share in South Africa. This suggests government investment spending (through investment multipliers) can enhance the gains from a rising labour share. In scenario 3 we see that ‘catch-up’ in South Africa is much more effective when the rest of the world is implementing a similar policy. This underlines that patterns of distribution and growth are difficult to change within a single relatively small open economy such as South Africa when it acts alone. A supportive global economic policy environment has a strong influence on the effectiveness of policies implemented in South Africa.

In summary, using the GPM model we find that:

- The South African economy not only manages to adjust to an increase in its labour share but **benefits overall from this rebalancing**, as consumption, gross investment, and GDP increase above the baseline. Real wages rise faster than productivity growth for most years, except initially when productivity gains are large as spare capacity is reduced and domestic output expands (so called ‘Kaldor-Verdoon’ effects).

- The rising labour share **spurs private consumption**: a lower propensity to save / a higher propensity to consume by South African wage workers means that a rebalancing of income away from profits reduces South Africa’s overall savings rate and in turn increases consumption rates. Put differently, a change in South Africa’s functional distribution of income has a notable impact on the level and composition of economic activity.

- A higher labour share leads to an **increase in the rate of GDP growth**. This increase in growth rates dissipates in the longer term. However, it still leaves the level of GDP higher.

- Increasing the labour share has a **negative impact on South Africa's current account balance and a marginally negative impact on private investment as a percentage of GDP**. Private investment still expands in absolute terms above the baseline, impacted positively by rising output and supported by an expansion in bank lending.

- **Prices remain below the baseline scenario** throughout, due to sufficient spare capacity, notable productivity effects, reductions in the mark-up by firms, and increases in imports. This helps mitigate the impact of higher labour costs on firms’ competitiveness. So-called ‘Kaldor-Verdoon’ productivity effects, therefore, play a noticeable role in the model.
• **Increases to labour’s share of output goes mostly into incomes rather than employment gains.** This reflects longstanding tendencies in South Africa’s growth path. The employment rate remains largely unchanged in all scenarios; instead, real labour compensation rises.

• **Increasing government investment expenditure supports the positive benefits achieved by ‘catch-up’** through improved ‘multipliers’. This indicates that policies which increase the labour share, including minimum wages, can create an improved economic basis for complementary policies – such as the infrastructural spending in the National Development Plan (NDP).

• **By itself a modest rebalancing of income** in the South African economy, while beneficial from an economic perspective, **does not radically alter the economy’s trajectory** and does not reduce unemployment – at least not in the period under analysis here. When implemented in conjunction with other major developmental policies these results may change.
# Table of contents

List of figures .................................................................................................................. vi
List of tables .................................................................................................................... vi
Executive summary ......................................................................................................... ii

1  Introduction .................................................................................................................. 1

2  The labour share and the functional distribution of income ........................................ 2

3  South Africa’s labour share and rising inequality ......................................................... 4

4  Existing literature on the impact of minimum wages on the South African economy ................................................................................................................................. 7

5  The Global Policy Model (GPM) .................................................................................. 13

6  Simulation strategy and results ..................................................................................... 15

7  Conclusion ..................................................................................................................... 25

References ....................................................................................................................... 27

Appendix ......................................................................................................................... 33
List of figures

Figure 1 South Africa’s labour share, various estimates (1995 - 2013) .................. 5
Figure 2 Labour share as percentage of GDP in baseline and three scenarios
(2014 - 2025) ........................................................................................................... 17
Figure 3 Private consumption as a percentage of GDP in baseline and three
scenarios (2014 - 2025) .......................................................................................... 18
Figure 4 GDP growth rate in baseline vs. three scenarios (2014 - 2025) ............. 18
Figure 5 Growth rate of nominal unit labour costs (ULC) in baseline and three
scenarios (2014 - 2025) .......................................................................................... 19
Figure 6 Gross private investment (US$ millions) in baseline and three
scenarios (2014 - 2025) .......................................................................................... 20
Figure 7 Private investment as a percentage of GDP in baseline and three
scenarios (2014 - 2025) .......................................................................................... 20
Figure 8 Current account deficit in baseline vs. three scenarios (% of GDP)
2014-2025 ................................................................................................................ 21
Figure 9 Price inflation in baseline and three scenarios (2014 - 2025) ............... 22
Figure 10 Employment rate in baseline and three scenarios (2014 - 2025) ...... 23
Figure 11 Government net lending as a percentage of GDP in baseline and
three scenarios (2014 - 2025) .................................................................................. 23
Figure 12 South Africa’s labour share relative to other economies in GPM
(2000 - 2025) .......................................................................................................... 33
Figure 13 Main modules and linkages in GPM ...................................................... 36

List of tables

Table 1 Summary of results from South African neoclassical CGE models ......... 10
Table 2 Percentage points increase in key variables relative to baseline by 2025 ..................................................................................................................... 24
Table 3 Key variables by 2025 for baseline and all three scenarios ............... 25
Table 4 South Africa’s multiplier analysis using GPM ...................................... 36
1 Introduction

This paper uses the United Nations Global Policy Model (GPM) to assess what happens when the labour share of the South African economy is increased. This rebalancing occurs via a 'catch-up' between real labour compensation per worker and labour productivity per worker over a ten-year period (2015-2025) with real labour compensation\(^1\) outpacing labour productivity growth by a sufficient percentage each year. Such a rebalancing is motivated by two concerns. First, it offsets a decline in South Africa's labour share that has occurred in the post-apartheid period. This, by definition, represents a divergence between average real wage growth and labour productivity growth in South Africa, with the latter growing at a faster pace. The historical position of labour in South Africa was such that businesses under-invested in the capabilities of the majority of Black workers. Second, as shown in Appendix A, South Africa has a labour share on average 5% (of GDP) lower than other emerging economies.

Increases to the labour share may result from a number of policy interventions, including changes in union coverage and labour laws; changing patterns of investment; improvements in educational outcomes; and amendments to South Africa's minimum wage regime. In our simulations we assume an increase in South Africa's labour share occurs through tying a national minimum wage to a gradually increasing percentage of the mean or median wage.\(^2\) This modelling exercise is undertaken in the context of a debate over whether to institute a national minimum wage in South Africa. Understanding how changes to the income distribution affect the macroeconomy is essential if we want to evaluate the impact of a proposed national minimum wage.

The macroeconomic model used in this paper has a number of distinctive features that make it particularly useful to assess the economic consequences of a rising labour share in South Africa (see Section 5). Parameters and causal relationships are estimated in the model using long-run panel data in open behavioural specifications rather than chosen by the researcher or 'calibrated' on the basis of a single base year; aggregate demand plays a meaningful role in economic growth while being subject to supply-side constraints; distribution is explicitly taken into account rather than relying on a 'representative household'; investment is modelled using a detailed and fairly realistic specification; the financial sector is accounted for; productivity is estimated endogenously; and the model is 'globally consistent', which allows for the global feedback effects from a national policy to be taken into account. Global consistency is particularly useful when modelling wage increases.

The scenarios modelled show that an increasing labour share has overall positive consequences for the South African economy. Rebalancing the economy through higher real wage levels provide a demand stimulus through lower

---

1 The GPM calculates its labour share as: 'compensation of employees' – (wages + social security contributions) + mixed income.

2 Even with high price elasticity of labour demand, virtually all models show South Africa's labour share increasing as a result of raising wages for low-skilled workers.
savings rates and in turn rising consumption rates, as incomes shift to those with a higher propensity to consume. This leads to a higher level of real GDP in the longer term and greater GDP growth in the short term. Inflation rates remain subdued given strong productivity increases (due to so-called ‘Kaldor-Verdoorn’ effects), reductions in firms’ mark-ups, sufficient spare capacity, and increases in imports. The positive gains go hand-in-hand with some minor negative effects as the economy rebalances: most notably investment as a share of GDP falls even as the level of investment increases (due to a falling profit rate but a rising level of GDP); employment falls very marginally; and the current account weakens somewhat. None of these countervailing forces is sufficient to outweigh the stimulus to demand that accompanies wage earners receiving a larger portion of national income: on aggregate a rising labour share in the period under analysis raises aggregate domestic demand and economic growth, though all impacts are found to be fairly small.

The paper proceeds as follows: Section 2 introduces the concepts of the labour share and the functional distribution of income. In Section 3 we look at the theory and evidence behind these concepts with reference to South Africa, and address how changes in the functional distribution of income impact the macroeconomy and overall income inequality. Section 4 reviews existing studies on the potential impact of a national minimum wage in South Africa and offers a brief critique of the models used. In Section 5 we describe the Global Policy Model used in this study and go on in Section 6 to explain the modelling scenarios and presents the findings; Section 7 concludes.

2 The labour share and the functional distribution of income

The labour share (also called the ‘wage share’) is defined as the share of value added paid to workers in an economy. The labour share is defined as: $S_L = \frac{WL}{PY}$, where $W$ is total labour income, $Y$ is value added or output, $L$ is the labour input (the latter usually measured in man-hours) and $P$ is the overall price level. The labour share is therefore the nominal wage bill over nominal output or nominal GDP. This fraction is also known as real unit labor costs, since nominal unit labor costs are (nominal) wage costs over real output (instead of nominal output as in the above): $ULC = \frac{WL}{Y}$. The property share (also called the ‘profit share’) is the remaining value added. In the GPM the impact of changes in the labour share are felt throughout the model due to the role of the functional distribution of income in determining the composition and level of economic activity. Below we discuss the importance of this concept in understanding the determination of aggregate output and in shaping personal income inequality.

2.1 The impact of the functional distribution of income

The ‘functional distribution of income’ plays an important role in the GPM. The concept divides the economy into workers who earn wages and the owners of capital who earn profits. This is different to the ‘personal distribution of income’ that focuses on the incomes earned by different individuals or households along the income distribution. The functional
distribution of income may seem like an odd concept given that there is no neat alignment between belonging to a certain class of economic agent (workers vs. capitalists) and receiving a particular source of income (wages vs. property income including profits). Sources of income have become increasingly heterogeneous for both workers and high-income earners: the boom in CEO wage income and the ownership of capital assets by workers through pension funds are two examples of this. Nonetheless, there are several good reasons to study the functional distribution of income (see Atkinson 2009, Glyn 2011), including understanding the drivers of accumulation and inequality in an economy. This approach stands in contrast to much of neoclassical theory which, under certain assumptions, sees equilibrium outcomes as being invariant to the distribution of endowments. Furthermore, within a perfectly competitive neoclassical framework the return to each ‘factor of production’ corresponds to its marginal (revenue) product rather than the outcome of a bargaining process based on power. Class distinctions (strangely) play no meaningful role. As Paul Samuelson (1957, p. 894) noted: “in a perfectly competitive market it really doesn’t matter who hires whom: so let labour hire ‘capital’”.

The functional distribution of income plays an important role in shaping trends in inequality (discussed further below, see also Giovannoni 2010). Increasingly it is recognised that issues of growth and distribution (inequality) should not be separated when understanding and modelling the macroeconomy (see Mian and Sufi 2014, for heterogeneous agent models see Krusell and Smith 2006, and for an overview of a range of neoclassical models Bertola et al. 2014). Recent research led by the IMF (Dabla-Norris et al. 2015) finds a strong link between growth and distribution, drawing on a growing body of evidence on why inequality might be harmful for an economy (Aghion et al. 1999, Galor and Moav 2004, Bourguignon and Dessus 2009, Acemoglu 2011, Ostry and Berg 2011, Ostry et al. 2014).

At the macro level, the distribution of factor income (wages and profits) is a central determinant of demand and in turn output. Evidence indicates that the global contraction in labour shares appears to have harmed global aggregate demand (see ILO 2013, 2014). Underlying the 2007/8 financial crisis and subsequent weak recovery has been an insufficiency in consumer demand, reflected in a long-term decline in the labour share (Dullien et al. 2010, OECD 2012) – even as CEO pay has risen4 (this is consistent with the evidence that richer deciles have a greater propensity to save (see, for example, Dynan et al. 2004, OECD 2012)). This in turn has seen investment levels – which usually follows consumer and government spending – stagnate, including in South Africa (Kantor 2016). These dynamics are estimated in the GPM where a shift in income

---

3 In practice not all types of income can easily be ascribed to either capital or labour. Aggregate income data are generally given as wages, benefits, proprietors’ income, net interest, rents, and corporate profits. There is, therefore, no straightforward counterpart to the wages/profits/rents division used in economic theory (see Giovannoni 2014).

4 The fall in the labour share in most OECD countries took place together with the share of wage compensation going to the top 1% of income earners increasing substantially in nearly all countries for which data are available (Atkinson et al. 2011). This implies that the decline in the labour share for the other 99% is more substantial than the figures would indicate (for example OECD 2012, p. 115).
away from labour changes the aggregate savings rate and in turn the aggregate consumption rate. While the direction and size of the effect is estimated from the data, the general pattern found for most countries it that a higher labour share reduces the aggregate savings rate, thereby increasing aggregate consumption.

At the micro level, changes in the functional distribution of income impact the overall personal income distribution. This follows from the fact that there is generally a far higher concentration of property income (income from owning forms of property, for example, net dividends, interest, rental income, etc.) than of wage income. A higher labour share is, therefore, often associated with less overall income inequality as the composition of aggregate income changes from (more unequally distributed) property income towards (somewhat more equally distributed) wage income. This means that redistribution from the property share of income to the labour share generally reduces (personal) income inequality (Glyn 2011, OECD 2012). Recent trends in wage inequality somewhat mitigate against this positive impact as wages have become more unequally distributed and more important to the rising income share of the top 1% (Piketty 2014). Nevertheless a number of studies find that a higher labour share reduces overall income inequality (Checchi and Garcia-Peñalosa 2005, Dauday and Garcia-Penalosa 2007 cited in Glyn 2011, Schlenker and Schmid 2013). A recent joint ILO and OECD (2015) report for G20 countries (including South Africa) confirms a strong relationship between eroding labour shares and rising inequality.

A national minimum wage in South Africa, therefore, has the potential to decrease overall income inequality as well as expand aggregate demand by increasing the labour share (see below and Section 4). This, however, is by no means certain and depends on the specific configuration of the South African economy.

3 South Africa’s labour share and rising inequality

Labour shares have fallen globally over the past three decades reflecting factors which have weakened the position of workers in society, including biased technical change (OECD 2012, ILO 2015).

Similarly, national accounts data show that South Africa’s labour share has declined notably in the post-apartheid period (Figure 1) (see also Burger 2015). The magnitude of this decline during the period 1995-2013 is 2.8% using an unadjusted factor-cost labour share (as Burger 2015 roughly does); 1.5% of

---

5 Its effect on wage inequality is a different matter.

6 In Burger (2015), Burger finds a declining labour share in the post-apartheid period with labour productivity rising at a faster rate than real wages. In more recent work, Burger (2016) finds that between 1982 and 2014 real wages grew in step with productivity. This is probably because in the latter paper Burger uses household survey data for his wage series while in his previous work he appears to use the SARB’s large-sample firm-level wage series. SARB data, as illustrated in Figure 1, clearly shows a falling labour share, as does the GPM.
GDP) using an *adjusted* factor-cost labour share (i.e. adjusted for mixed income); and by 3.5% using the adjusted market labour share.\(^7\)

**Figure 1. South Africa’s labour share, various estimates (1995 - 2013)**

![Graph showing South Africa's labour share, various estimates (1995 - 2013)](image)

Source: SARB (2015) Online Macroeconomic Timeseries

Notes: Factor-cost labour share = gross compensation of employees / GVA at factor cost; Adjusted factor-cost labour share = Factor-cost labour share adjusted to include mixed income; and Market labour share = mixed income + gross compensation of employees / GDP at (current) market prices.

A number of factors may account for South Africa’s declining labour share, including technical change (Hutchinson and Persyn 2012, OECD 2012, p. 161, ILO 2013, for South Africa see: Rodrik 2006, Burger 2015). A variety of *policies* have also had a significant influence on the evolution of the functional distribution of income in South Africa:

- **Industrial development policies:** Limited industrial diversification and domestic value-added processing has occurred in the South African economy, restraining employment creation, and productivity growth.\(^8\)

- **Taxation policies:** The labour share is a market-income measure, rather than a post-tax concept, but evidence indicates strong interactions between

\(^7\)A number of theoretical complications exist in calculating the labour share (see Krueger 1999, Glyn 2011). How to deal with mixed income is one key issue (Gollin 2002). When including adjustments for this the figure is sometimes called the ‘adjusted’ labour share.

\(^8\)Here we refer predominately to the lack of skills development which has contributed to the poor state of the South African economy and slow employment creation. In general productivity growth can have ambiguous consequences on the labour share. In the short term it may lead to a decrease in the labour share if labour productivity increases with all else equal. However, over the longer term it should produce a more dynamic economy, able to expand employment and output as production becomes more competitive. Over the (very) long run, technical change may result in labour being rendered redundant.
changes in the tax treatment of certain forms of property income and labour income, and changes in the capital and labour shares of income (Hungerford 2012, see also: 2011, 2013, and Piketty et al. 2011 for possible explanations). South Africa’s tax system is only ‘slightly progressive’, with tax rates falling across the board since apartheid and the share of VAT in the tax mix increasing by 2.5% to 3% during this period (see DTC 2014).

- **Labour market policies and trends:** Declining private-sector unionisation rates (Bhorat et al. 2014); growing casualisation of the workforce (Bhorat and van der Westhuizen 2012); poor apparent compliance with current minimum wages (Bhorat et al. 2011); and limitations in minimum wage coverage (Belser and Rani 2015) all work to reduce South Africa’s labour share (for the impact of these factors on increasing income inequality globally see Jaumotte and Buitron 2015 and recent IMF staff estimates). In contrast, appropriately set minimum wages have consistently been shown to raise wages at the lower end of the wage distribution, resulting in lower-income wages rising faster than middle- and higher-income wages and thus reducing income inequality (see Kristensen and Cunningham 2006, Chun and Khor 2010, Lukiyanova 2011, Dickens et al. 2012, Maurizio 2014, Lu 2015, Rani and Ranjbar 2015, and Mudronova 2016 for a review).

Together these factors have resulted in South Africa’s labour share declining since the end of apartheid and being approximately 5% lower than the average for other emerging-market economies (GPM database estimates – see Appendix, Figure 12). This potentially has deleterious effects at both the macro and microeconomic level.

**At the macro level, based on GPM estimates, a declining labour share has negatively affected the South African economy overall.** Similarly, policies which potentially increase the labour share (at least up to a point) can have a positive effect overall on the South African economy, according to the GPM’s estimations (Section 6). Contrary to this, several studies indicate that even if rising wages reduce overall income inequality they could still depress aggregate demand and hence economic growth. For most CGE models (Section 4), as well as in Onaran and Galanis (2012) who employ a simplistic four-equation model, the South African economy is found to be ‘profit led’, meaning that a rising labour share depresses aggregate demand, output, and economic growth. Modelling an increase in the labour share via the GPM offers a more detailed approach to evaluating whether, once endogenous adjustments and feedback effects are taken into account, a rising labour share is beneficial to the South African economy or not.

**At the micro level, the configuration of the South African economy is such that a declining labour share has probably increased income inequality.** The GPM does not model this directly and, as such, it is not the focus of our empirical analysis. South Africa’s data, however, indicates – as suggested by the

---

9 Though this may be partially reduced once potential under-reporting of wage data is accounted for.
theory and international evidence discussed above – that a lower labour share in South Africa implies more income inequality. In South Africa, income inequality, measured by the Gini coefficient,\textsuperscript{10} was 0.66 in 2012, making it the world’s highest (among countries with available data). This has been driven predominantly by wage-income inequality which accounts for just over 90\% (Finn 2015) of total income inequality in South Africa.\textsuperscript{11} While still remarkably high, wage-income inequality in South Africa is lower than overall income inequality (with a Gini coefficient of 0.544 compared with 0.66) (for further details see Finn 2015)\textsuperscript{12}. This shows that other forms of income are more unevenly distributed than wage income. Property and financial assets have Gini coefficients of 0.754 and 0.951, respectively, indicating that the income streams that accrue to the owners of property are highly concentrated (Daniels et al. 2012). Shifting the composition of national income away from such assets and related incomes, and expanding the proportion of wages in the economy by increasing employment and remuneration, can increase South Africa’s labour share and reduce income inequality.

In conclusion, policies exist which can work to raise South Africa’s labour share. Improved industrial development strategies, more progressive taxation, and labour market policies such as increasing the level and coverage of minimum wages through a national minimum wage, can increase South Africa’s labour share. These policies are likely to have positive macroeconomic and distributional impacts. Section 6 investigates whether increasing South Africa’s labour share via real wages rising faster than labour productivity would be beneficial for South Africa’s macroeconomy. Before proceeding to that, the following section explores existing evidence on the predicted impact of minimum wages in South Africa.

4 Existing literature on the impact of minimum wages on the South African economy

Studies looking at how minimum wages impact the macroeconomy generally fall into two categories. The first set use ‘quasi-experimental’ techniques. These involve case studies of instances where minimum wages were implemented or increased in order to analyse (econometrically) how minimum wages affected

\textsuperscript{10}The Gini coefficient is the most common measure of inequality, with 0 representing perfect equality and 1 perfect inequality.

\textsuperscript{11}Growing wage inequality in South Africa reflects both the increase in the share of households without any wage income (at 28\% of all households) and an increase in wage-income inequality among the 72\% of households that do receive wage income. In 2008, the presence of households without a wage earner accounted for 38\% of wage-income inequality while unequally distributed wage income among households who did receive a wage accounted for 62\% (Leibbrandt et al. 2012).

\textsuperscript{12}Using data from the National Income Dynamics Survey (NIDS) for 2008, Liebbrandt et al. (2012) show that in 2008 the wealthiest 10\% of households accounted for 58\% of total income. In contrast, the top 10\% received 43\% of wage income in the second half of 2007 (QLFS 2007:2 – data not available for 2008).
employment in a specific sector or geographical area after the fact ('ex post'). The second set of studies are modelling exercises: they construct models of the economy to see how, within this 'model economy', employment and other economy-wide aggregates are affected by a minimum wage. One can intuitively see that the degree of correspondence between the model's assumptions and characteristics and the actual economy in question is vital. Most policy-orientated studies employ a class of models called 'computable general equilibrium' (CGE) models and use 'neoclassical' assumptions that impose particular behavioural assumptions. There is a vast difference in the findings between ex-post studies, based on data from actual events, and CGE models. Ex-post studies tend to find a marginal impact on employment in either direction while CGE models predict extremely adverse employment effects by virtue of stringent theoretical assumptions. This is true of the South African minimum wage literature too.

This modelling exercise differs from other exercises modelling the potential impact of a national minimum wage for three reasons. First, here we model an increase to South Africa's labour share. This is one means through which to assess the economy-wide impact of an increase in minimum wages: only under extremely large (negative) elasticities will an increase in minimum wages not increase the labour share. This is distinct from modelling a direct increase to the wages of lower-wage workers, as is done in the CGE studies reviewed (see below) and other macroeconometric studies (see Adelzadeh and Alvillar 2016). Second, due to the modelling approach adopted in this paper, this paper reports results for a range of macroeconomic variables. This is in contrast to existing CGE minimum wage modelling exercises which (in the main) predominately focus on the employment effect of the policy change (a number of the studies also consider the affect on household welfare). Third, again in contrast to most existing studies, the UN GPM used here is not neoclassical in its theoretical assumptions.

These distinguishing features mean that a direct comparison between the output presented in this modelling exercise and that found in previous studies is not possible (with the partial exception of MacLeod 2015). Nevertheless it is useful to contrast the UN’s GPM model and its findings with the findings of CGE models on the narrower question of the impact of a minimum wage on employment. This helps, however imperfectly, to illustrate the implications of the different modelling assumptions and approaches adopted in the competing models. Below we review the results of the South African quasi-experimental and CGE studies, followed by a discussion of why CGE models uniformly report large negative consequences.

---

13 For a review of this literature see Isaacs (2016) which summarises the seven recent meta-analyses: Doucouliagos and Stanley (2009), Boockman (2010), Belman and Wolfson (2014), Leonard et al. (2014), Nataraj et al. (2014), Chletsos and Giotis (2015), and Broecke et al. (2015).
4.1 Quasi-experimental and CGE studies in South Africa

Bhorat and Mayet (2013)\textsuperscript{14} provide an overview of several key South African quasi-experimental studies (see also work by Dinkelman and Ranchhod 2010, Garbers 2015). The studies reviewed find that sectoral minimum wages generally have a positive impact on wages and employment conditions with no discernible impact on employment, with the agricultural sector being a notable exception. They highlight countervailing mechanisms sometimes used by firms to deal with the increase in input costs, such as reducing work hours. The studies are, however, only of limited use for addressing the economy-wide question we wish to answer: a national minimum wage might affect the South African economy as a whole very differently to how it affects specific sectors. This is because, while wages are a cost to individual firms, they are also the major source of income and demand for the economy as a whole. In addition, most quasi-experimental studies assess the impact of minimum wages on the economy over a relatively short time span (Garbers 2015, p. 8 for brief discussion), with no sense of its long-run impact. This is why macroeconomic models such as CGE and econometric models are used to project the possible impact of a national minimum wage.

In South Africa, at least five CGE studies have estimated the macroeconomic impact of a minimum wage,\textsuperscript{15} with a sixth illuminating the poor predictive power of such models with respect to a similar question: South Africa’s ‘employment tax incentive’ (ETI). All studies come to very similar conclusions: as wages of low-skilled workers rise, employment shrinks dramatically. These results are summarised in Table 1, where $\epsilon$ refers to the given employment elasticity. Modest rises in wages are so detrimental to the South African economy that it contracts. The near-identical nature of the results found in the studies makes sense given that they all use variants of two very similar models (the STAGE and SAGE models), which make similar assumptions and use similar equations and calibrated parameters.

The CGE models predict substantial job losses even at very low national minimum wage levels. In the South African National Treasury’s presentation (MacLeod 2015) the lowest national minimum wage modelled, R1 258 – entailing an average wage increase of only R31 to 16% of the workers in the sample – results in a loss of 96 000 jobs. In DPRU (2016), a national minimum wage of R1 619 results in up to 451 000 job losses. These levels fall well below the current lowest sectoral determinations of R2 230 and R1 993 for domestic workers in areas A and B, respectively.

\textsuperscript{14}Bhorat and Mayet (2013) draws on Basu et al. (2010), Bhorat et al. (2011, 2013, 2013) and Stanwix (2013).

\textsuperscript{15}DPRU (2008), Pauw and Leibbrandt (2012) and DPRU (2016) are published studies. Pauw (2009) is a PhD thesis and MacLeod (2015) is a presentation from National Treasury on their CGE modelling, the full details of which they have declined to make public.
### Table 1. Summary of results from South African neoclassical CGE models

<table>
<thead>
<tr>
<th>Aim</th>
<th>Short-run employment impact</th>
<th>Long-run employment impact</th>
<th>CGE Model type</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPRU (2008)</td>
<td>Estimate impact of a NMW (increase in real wages) on employment and output.</td>
<td>Unskilled employment declines by 455 915. A 4.8% decline in low-skilled (and total) employment. (\varepsilon = -0.7)</td>
<td>Unskilled employment declines by 514 923. A 5.4% decline in low-skilled (and total) employment. (\varepsilon = -0.7)</td>
</tr>
<tr>
<td>Pauw (2009)</td>
<td>Estimate impact of a NMW (increase in real wages) on poverty and employment.</td>
<td>Low-skilled employment declines by 488 991 where (\varepsilon = -0.7) (and for higher and lower amounts when the elasticity is higher or lower)</td>
<td>Low-skilled employment declines by 502 130 where (\varepsilon = -0.7) (and for higher and lower amounts when the elasticity is higher or lower)</td>
</tr>
<tr>
<td>Pauw and Leibbrandt (2012)</td>
<td>Estimate impact of a NMW (increase in real wages) on poverty and employment.</td>
<td>5.2% of low-skilled workers lose their jobs or 448,991 workers. (\varepsilon = -0.7)</td>
<td>Results are assumed to be short-run but this is not specified in the paper.</td>
</tr>
<tr>
<td>Macleod (2015)</td>
<td>Estimate impact of a NMW (increase in real wages) on employment and other macroeconomic indicators.</td>
<td>Job losses range from 0.8% to 10.1% (96 000 to 1 168 00 workers). All economic indicators slide, with real GDP falling by up to 3.7%. (\varepsilon = -0.5)</td>
<td>Employment impact not given. All economic indicators slide, with real GDP falling by up to 13%. (\varepsilon = -0.5)</td>
</tr>
<tr>
<td>DPRU (2016)</td>
<td>Estimate impact of a NMW (increase in real wages) on employment and welfare.</td>
<td>Job losses range from 0.8% to 6.8% (100 446 to 997 068) depending on level and elasticity. (\varepsilon = -0.1, -0.3, -0.5)</td>
<td>Presumed short-run only.</td>
</tr>
<tr>
<td>Pauw and Edwards (2006)</td>
<td>Estimate impact of a youth wage tax incentive (i.e. a reduction in real wages).</td>
<td>Employment increases between 2-10% across sectors. (\varepsilon = -0.7)</td>
<td>Short-run only.</td>
</tr>
</tbody>
</table>

Source: Author based on cited studies.

One would expect firms to be able to accommodate minor wage increases without necessarily engaging in widespread job cuts. This intuition is confirmed by local and international *ex-post* studies on the relationship between increasing
minimum wages and employment. As DPRU notes, according to this body of evidence: “overall... moderate increases in minimum wages result in little or no decrease in employment” (2016, p. 12). Given this, the dramatic job losses predicted by CGE models should be viewed with caution.

**Substantial employment gains are also predicted from lowering the effective cost of labour through the youth wage subsidy/employment tax incentive.** Pauw and Edwards (2006) predict employment gains of 2-10% across sectors; and Pauw (2009) estimates over a million jobs created (at an elasticity of -0.7). However, current evidence indicates no employment gains from the ETI (Ranchhod and Finn 2014, 2015). This further illustrates, how – when estimating employment gains/losses as a consequence of changes to effective wage levels – the CGE models employed do not accurately capture the real workings of the South African economy.

**These models also predict broad economic deterioration from a minimum wage.** In Macleod (2015) progressively higher national minimum wage levels result in greater economic harm. In the ‘short-run’ a national minimum wage of R4 303 results in serious economic contraction with real GDP, household consumption, gross fixed capital investment, government investment, imports, and exports all declining by between 3-4%, in the 'long run' these indicators slide by between 11-15%. These results stand in sharp contrast to the output from the GPM, given in Section 6, in which increases to the labour share have positive, or very moderately negative, effects on these variables.

### 4.2 Why CGE models predict employment losses

**The results from these modelling exercises reflect the strong assumptions and casual relations imposed by the neoclassical CGE models used** (see Taylor and von Arnim 2007, and Taylor 2011; and Storm and Isaacs 2016 for a critique of the South African models discussed here). Within these models higher wages result in employment losses and lower aggregate demand irrespective of the calibrated price, wage, and substitution elasticities. This predisposition towards deflationary outcomes means that as aggregate demand declines, output and employment invariably fall. Key assumptions within the neoclassical CGE models include:

- Demand for all factors is largely determined by relative prices. In the models, as the price of labour rises employers are only able to respond by raising output prices or shedding workers, or, more likely, some combination of the two (Pauw 2009, pp. 141–142). These two responses

---

16 Recent meta-analyses confirm the minimal employment impact of minimum wages, including in emerging markets. See Doucouliagos and Stanley (2009), Boockmann’s (2010), Leonard et al. (2014), Cheletsos and Giotis (2015), Nataraj et al. (2014), Broecke et al. (2015) and Isaacs (2016) for a review.

17 A general wage subsidy reduces the effective wage paid by the firm (so that it can employ workers up until a lower marginal product), while maintaining the wage earned by the worker (i.e. its factor income remains constant).
to rising minimum wages have been shown to occur only very moderately (on employment see above, on prices see Lemos 2008).

- Real-world adjustment mechanisms employed by firms to accommodate rising wage costs are poorly captured or entirely neglected. These include: productivity increases where production techniques are altered to raise productivity levels;\(^{18}\) so-called efficiency wage affects through which higher wages improve performance and reduce job turnover irrespective of any action taken by management; redistribution from high earners to low earners within firms; small changes to the number of hours worked or non-wage benefits; and increases in output as a response to higher domestic demand (all of these have been shown to occur in practice, see Broecke et al. 2015, Low Pay Commission 2015)

- Job losses arise from two interrelated processes: firms employ relatively more machines and less workers – a ‘substitution effect’; and price rises erode real incomes and reduce demand (a ‘scale effect’). Demand falls because: (a) employment falls (through capital-labour substitution) leading to a loss of consumer income; (b) a higher price level makes production inputs and the final product more expensive and so reduce demand for both; (c) higher output prices mean the real wage increase is less than the nominal wage increase, thereby eroding the buying power of consumers; (d) price-sensitive net exports potentially decline depending on the assumptions made regarding the trade balance; and (e) a necessary depreciation in the exchange rate in order to maintain a constant trade balance (if the assumption of a constant trade balance is imposed). These negative effects on demand outweigh positive effects that may have occurred due to increased incomes from higher wages with any other outcome precluded. All of this results in falling aggregate demand, depressed output and growth, lower firm profits and rising unemployment.

- The dynamics above result in a fall in firm savings as profits fall. The models’ assume (based on neoclassical theory) that savings determine investment and, given this ‘macroeconomic closure’, aggregate demand can only be depressed further when savings fall. When investment as a percentage of domestic demand is assumed to be fixed (as in DPRU (2008, 2016), Pauw (2009), Pauw and Leibrandt (2012), and in the ‘short run’ in MacLeod (2015)) this fall in demand occurs because overall investment falls to keep investment as a percentage of domestic demand constant (in the context of declining domestic demand) and because household savings must rise to compensate for a fall in firm savings (as noted in Leibbrandt et al. 2012, p. 774). The former results in reduced investment expenditure and the latter results in a decline in household disposable income and consumption demand. When investment is simply set equal to savings (as in the ‘long run’ in Macleod (2015)) a fall in firm savings

\(^{18}\) Pauw (2009) and DPRU (2008) do model productivity increases but are only able to do so by exogenously imposing them.
results in a fall in investment. The assumption that firm investment is determined solely on the basis of firm savings highlights the absence of any meaningful account of the financial sector and how firms invest on the basis of borrowing. These dynamics are explained in detail in Storm and Isaacs (2016). It is possible that alternate assumptions, for instance a Keynesian closure where investment drives savings (rather than the reverse assumed by neoclassical theory) may result in a different outcome. Despite how heavily these modelling assumptions determine the direction of the results the modellers never test alternative closures.

The above highlights how negative outcomes derive, not from the specifics of the South African economy, but from the assumptions made; given these, non-negative results are not possible.

5 The Global Policy Model (GPM)

An alternative theoretical approach is provided by the United Nations Global Policy Model (GPM) (see for example UNCTAD 2014). The GPM is a demand-driven, global econometric model that draws on a UN-compiled dataset of consistent macroeconomic data for every major country or economic bloc. It is used by the G20 and the UN as a medium-term forecasting and modelling tool on a range of issues including trade policy, shifts in the sources of energy generation, and demographic change.

Given that the GPM contains dozens of equations, we do not detail each here. Instead we provide a brief overview of the modelling approach and key relevant features (for further details see the Appendix and Cripps and Izurieta 2014). The model has a number of unique features that make it well suited to assess the complex macroeconomic effects of a policy change in a country such as South Africa. Seven key strengths of the GPM stand out.

First, the estimation of the behavioural relationships and parameters are informed by the data in fairly open specifications and estimated econometrically, rather than imposed exogenously using rigid assumptions.

Second, aggregate demand is allowed to have a far greater effect on the level of economic activity. This is subject to supply-side constraints through endogenously determined labour productivity growth and inflation. This means that any stimulus to aggregate demand will affect productivity, jobs, wages, and prices and, through these, have an impact on exports, imports, consumption, and investment. Allowing aggregate demand to play a significant role in the level of economic activity is particularly relevant in the South African context. As Kantor (2012) notes:

‘...sometimes the economic problem becomes one of too little spending rather than of dismal constraints on spending. Too little demand is now the major problem in many of the developed economies and also for us in

---

The above highlights how negative outcomes derive, not from the specifics of the South African economy, but from the assumptions made; given these, non-negative results are not possible.

5 The Global Policy Model (GPM)

An alternative theoretical approach is provided by the United Nations Global Policy Model (GPM) (see for example UNCTAD 2014). The GPM is a demand-driven, global econometric model that draws on a UN-compiled dataset of consistent macroeconomic data for every major country or economic bloc. It is used by the G20 and the UN as a medium-term forecasting and modelling tool on a range of issues including trade policy, shifts in the sources of energy generation, and demographic change.

Given that the GPM contains dozens of equations, we do not detail each here. Instead we provide a brief overview of the modelling approach and key relevant features (for further details see the Appendix and Cripps and Izurieta 2014). The model has a number of unique features that make it well suited to assess the complex macroeconomic effects of a policy change in a country such as South Africa. Seven key strengths of the GPM stand out.

First, the estimation of the behavioural relationships and parameters are informed by the data in fairly open specifications and estimated econometrically, rather than imposed exogenously using rigid assumptions.

Second, aggregate demand is allowed to have a far greater effect on the level of economic activity. This is subject to supply-side constraints through endogenously determined labour productivity growth and inflation. This means that any stimulus to aggregate demand will affect productivity, jobs, wages, and prices and, through these, have an impact on exports, imports, consumption, and investment. Allowing aggregate demand to play a significant role in the level of economic activity is particularly relevant in the South African context. As Kantor (2012) notes:

‘...sometimes the economic problem becomes one of too little spending rather than of dismal constraints on spending. Too little demand is now the major problem in many of the developed economies and also for us in
Third, issues of income distribution are meaningfully incorporated into the model with the level of economic activity varying depending on the functional distribution of income and related constraints. The savings function, determined by nine variables including the distribution of income, becomes important: a shift in income away from labour sees the overall savings rate increase and in turn the consumption rate fall. This is consistent with the notion that richer deciles have a greater propensity to save (see, for example, Dynan et al. 2004, OECD 2012). This is particularly relevant for the present context in South Africa and globally.

Fourth, investment is modelled in a fairly realistic manner. Investment is neither fixed as a share of GDP nor limited by available savings, as in typical neoclassical CGE models. Instead it exhibits an accelerator response to the growth of GDP with some additional influence from growth in profits. In addition, the presence of a financial sector – absent from most CGE models in any meaningful way – allows bank lending to play an important role in determining the level of investment. Financial conditions, the real bond rate, changes in external flows, and changes in lending from the domestic financial sector are all included in the investment function, creating a more realistic and integrated investment specification.

Fifth, employment and the unemployment rate are impacted by a wide range of variables. These include: urbanisation, GDP per capita, population growth, economic activity, investment, and global cyclical conditions (measured through world inventory changes). Employment is differentiated by age and gender. This is a far more realistic specification than in neoclassical CGE models in which employment levels are driven by the wage rate, the wage-employment elasticity (or capital-labour elasticity of substitution), and price levels.

Sixth, changes in productivity are made endogenous to the model and respond not only to supply-side forces. This approach differs from the hypothesis that productivity growth is due to progress in science and technology, or imposed exogenously. Kaldor-Verdoorn effects for South Africa play an important role in the model. They are derived using historical data and estimate how changes in output affect changes in labour productivity. This effect means that the aggregate impact of changes in the labour share on output becomes amplified in the GPM as the latter impacts productivity growth.

---

19 A number of studies try to estimate this relationship. See, for example, Storm and Naastepad (2007), Pianta and Crespi (2008), Millemaci and Ofria (2012) and Magacho (2016).
Seventh, the GPM model is globally consistent, so that the benefits (or costs) of a policy to a single country always take into account their impact on other countries and the resulting feedback effects. As a result the GPM allows us to assess whether a given policy strategy is globally sustainable. For example, the GPM shows that, when sought by every country, a strategy of export-driven growth through holding down real labour compensation may lead to adverse effects at the aggregate level, making such a strategy unsustainable (UNCTAD 2014). Similarly, we find that any policy to increase the labour share in South Africa is far more effective when other countries implement similar policies (scenario 3).

Note that the model does not assume, a priori, that an increase in the labour share leads to an economic expansion, in South Africa or elsewhere. The GPM allows us to interrogate in a more considered manner whether a particular economy can be said to be ‘wage-led’ or ‘profit-led’. Each country’s behavioural specification is determined endogenously and uniquely adjusted through the inclusion of additional ‘state’ variables based on the specificities of that economy. The economy’s behaviour is resolved within the model and data-driven, rather than imposed by the researcher. The data for particular countries may suggest that a reduction in compensation generates a large and positive response in private investment. In India, for example, an increase in the mark-up (and hence property share) leads to an increase in GDP growth, according to the GPM; in South Africa this is not the case (see full GPM description in Cripps and Izurieta 2014, for further discussion of this theoretical approach see Bhaduri and Marglin 1990).

The model is estimated using annual data from 1970 to 2013 for South Africa and all other major countries and blocs (with 2014 being a forecast in this version of the model). It is estimated using a panel structure with fixed effects (T=43; N=190). The data for South Africa include Swaziland, which is unfortunate but of negligible influence. The data comes from national accounts submitted to the United Nations. Employment data is from the International Labour Organization (via Statistics South Africa household survey data, the OHS/LFS/QLFS). Data is in US$ PPP unless stated otherwise.20 For further description of the model see the Appendix as well as Cripps and Izurieta (2014).

6 Simulation strategy and results

6.1 Scenario outlines

We model three different scenarios and compare them with a baseline ‘business-as-usual’ scenario based on the economy’s current trajectory. South Africa’s baseline trajectory is made consistent with the global baseline projections and

---

20 GDP is measured at base-year dollar prices divided by a different base-year purchasing power parity adjustment for each country. Real incomes and expenditures in each country are measured by dividing current dollar values by the domestic expenditure deflator for the country, to convert the figures to base-year values, and further dividing by the base-year purchasing power adjustment to make them more comparable across countries.
can be found in UNCTAD (2014). In all three scenarios, beginning in 2015, we set a target growth path for the economy that aims to increase the labour share of national income by a prescribed percentage above the baseline by 2025. This simulates a ‘catch-up’ between real wages and labour productivity, as the labour share can only increase if real wage growth outstrips labour productivity growth (which itself grows endogenously). This reverses the decline in the post-apartheid labour share. The GPM is programmed so that a larger share of the adjustments occurs in the initial years; this is done to avoid another adaptation when the policy stops, as is common in econometric modelling. This means that in all three scenarios the impact of the policy simulation tapers off. The effects of the policy simulation also subside due to Kaldor-Verdoorn effects diminishing.

In scenario 1 we implement ‘catch-up’ only in South Africa. The labour share is targeted to reach a level 2 percentage points higher than the baseline scenario by 2025 (therefore reaching 44% of GDP). In scenario 2 we target a labour share 4 percentage points above the baseline (so that it reaches 46% of GDP by 2025) and also strongly expand public expenditure on fixed capital in South Africa. This is done through increasing expenditure on fixed government investment by an extra 5% of GDP, sustained for seven years. This is used as a heuristic to indicate the implementation of an NDP-style infrastructure expansion plan. This investigates whether complementary policies can accentuate the gains from an adjusted wage structure. In scenario 3 we target a labour share 5 percentage points above the baseline in South Africa (so that it reaches 47% of GDP by 2025) and for all countries who experienced a fall in the labour share since 2002 we set individual growth paths so that each country’s labour share returns to its 2002 level by 2025. This investigates whether such policies are globally sustainable, as well as the sensitivity of the South African economy to the global environment. The GPM finds that implementation of such policies globally has a large supportive effect on the South African economy.\textsuperscript{21}

\textbf{Note that the simulation ‘targets’ or aims for a higher labour share in South Africa of a specific magnitude, but this outcome is not certain to be achieved.} The scenario may not be able to be completed if the model dynamics become unstable – for example if consumption-led growth encourages a debt-led financial bubble – or if variables are constantly being pushed outside of the permissible bounds of their probability distribution. In our case the targeted labour share is achieved with only moderate impermissible variable values. In addition, we find that the targeted adjustment to the labour share can be achieved for South Africa without producing significant economic imbalances.

\textsuperscript{21}The implementation of ‘catch-up’ internationally is not without a basis in reality. There are large ongoing increases in federal minimum wages in the United States; Germany just established a national minimum wage; the UK raised its national minimum wage again with advisory inputs given via the Low Wage Commission; and the minimum wage was increased strongly in Israel, India, Malaysia, and again in China’s latest (12th) Five Year Plan – where it was stipulated that average annual increases in minimum wages be 13% (the same as in the previous Five Year Plan).
6.2 Summary of results for all scenarios

In all three scenarios modelled here the basic sequence of events is similar while magnitudes differ. For all variables the change is least pronounced for scenario 1 and most pronounced for scenario 3. This is not surprising given the nature of the scenarios described above. A summary of the results can be found in Table 2 and Table 3 and are shown in Figure 2 through Figure 11 below.

The most immediate effect of a rising labour share (Figure 2) is a strong consumption effect as income flows to those who have a lower propensity to save and in turn a higher propensity to consume. The increase in the labour share is not due to increases in the employment rate, instead real labour compensation rises at a faster rate than productivity growth. Private consumption increases in all scenarios (Figure 3). In scenario 1 it rises by 2% and as a share of GDP is 0.5 percentage points higher by 2025. Relative to the baseline projection, consumption grows by 4% in scenario 2 and is 1 percentage point higher as a share of GDP by 2025. In scenario 3 the respective increases are 5% and 1.2 percentage points. This consumption growth naturally leads to an increase in domestic demand as it relies on the savings rate falling.22

Figure 2. Labour share as percentage of GDP in baseline and three scenarios (2014 - 2025)

Higher demand expands domestic output and in turn raises growth. As such, in all three scenarios the GDP growth rate increases: by around 0.5 percentage points at its peak in scenario 1 (from 2.5% in the baseline to 3% in scenario 1) and by almost 1 percentage point at its peak in scenario 3 (thereby reaching 3.4%) (Figure 4), scenario 2 lies in between this range. In scenario 1

22 In the model, savings increase with inflation. However, because inflation is contained (see below) this does not play a strong role.
GDP is 1.1% larger in 2025 than in the baseline scenario. By 2025, in scenario 2 South Africa’s GDP is 2.3% larger than in the baseline scenario. In scenario 3, GDP is 2.9% larger in 2025 than in the baseline scenario – the largest increase out of all the scenarios.

**Figure 3. Private consumption as a percentage of GDP in baseline and three scenarios (2014 - 2025)**

**Figure 4. GDP growth rate in baseline vs. three scenarios (2014 - 2025)**
Endogenous changes in monetary policy act as a positive reinforcing mechanism to economic adjustment as the financial sector adjusts. Changes in the policy rate follow a Taylor rule determined by capacity utilisation and domestic inflation. Capacity utilisation increases as the labour share increases, while the real price of capital responds to changes in capacity utilisation. The covered position of lending from banks to the private sector expands as income grows, with loans and deposits rising together.

Investment increases in all scenarios, although it falls as a percentage of GDP. The fall in the rate of investment as profit growth declines is partly mitigated by the investment ‘accelerator’, such that investment expands as GDP growth accelerates. In a neoclassical closure the decline in firms’ savings rate would lead to a decrease in investment or a fall in consumption demand, both resulting in lower aggregate demand (as discussed in Section 0). In contrast, in this model investment is not passively determined by savings. Rather, it increases in absolute terms above the baseline projection owing to stronger GDP growth (Figure 6), itself arising from a fall in the savings rate as the functional distribution of income rebalances. Investment as a share of GDP still declines (relative to the base scenario) as firms’ mark-ups and the profit rate decline, thereby reducing the incentive to invest (Figure 7).23 For more on the profit mark-up see the Appendix. Scenario 1 has a more benign impact on the share of private investment in GDP, as it decreases by less than in the other scenarios. While the effects differ by scenario the relative declines are all marginal. This indicates that in the case of South Africa investment responds

23 This will help dampen the deterioration in the current account given that investment, by requiring capital goods, is found to be more import-intensive in the model.
strongly enough to expansions in output that rising input costs do not unduly dampen investment.

Figure 6. Gross private investment (US$ millions) in baseline and three scenarios (2014 - 2025)

![Graph showing gross private investment in US$ millions from 2014 to 2025 with three scenarios: baseline, Scenario 1, Scenario 2, and Scenario 3.]

Source: GPM

Figure 7. Private investment as a percentage of GDP in baseline and three scenarios (2014 - 2025)

![Graph showing private investment as a percentage of GDP from 2014 to 2025 with three scenarios: baseline, Scenario 1, Scenario 2, and Scenario 3.]

Source: GPM
A worsening current account balance, due to a loss in international price competitiveness on the back of higher wages, could offset domestic economic gains in output. The current account balance does suffer in all three scenarios as imports increase relative to exports, although not always by much (Figure 8). This happens as the overall distribution of income shifts toward wages and as consumption spending increases. Developing economies are more prone to weakening current account balances when domestic spending suddenly increases, although the GPM shows this to be muted in the South African case. In scenario 1 the current account is affected less harshly, deteriorating relative to GDP by a minimal amount of 0.23% of GDP; in scenario 2 it is 0.45% of GDP lower than in the baseline. The current account deteriorates most significantly in scenario 3 (0.57% of GDP); in absolute terms the deterioration appears substantial but its relative size (as a share of GDP) is not. The deterioration in the current account highlights the importance of complementary industrial development and trade-facilitation policies to boost domestic supply capacity and its flexibility.

Deterioration in the current account is contained in part because price competitiveness is maintained through strong productivity increases. An increase in output and GDP growth raises productivity through the so-called ‘Kaldor-Verdoorn’ effects estimated for South Africa. Such productivity growth helps to contain the unit labour costs (ULC) facing firms as well as maintain external competitiveness by alleviating pressure on the exchange rate. Slight declines in investment as a share of GDP will also dampen the deterioration in the current account given that investment, by requiring capital goods, is found to be more import-intensive in the model.

**Figure 8. Current account deficit in baseline and three scenarios as a percentage of GDP (2014 – 2025)**

![Current account deficit graph](image-url)
Inflation falls in the model due to productivity increases, reductions in the profit mark-up, sufficient spare capacity, and increases in imports (Figure 9). This finding is important since inflation is one possible outcome of rising wages if firms pass on labour costs, and productivity growth is mild. Productivity increases occur through the Kaldor-Verdoorn effects, already discussed. Reductions in profit mark-ups are a well-established response by certain firms to rising costs and hence incorporated into the model’s specifications. The South African economy is open and has sufficient spare capacity in certain branches of production that extra demand can also be absorbed through domestic production and imports rather than inflation.

Potential job losses risk reducing spending and consumption but this does not occur; the employment rate (employment/population) remains fairly constant across all three scenarios (Figure 10). The estimated 'Okun’s Law' means that as GDP grows so does employment, even though the relationship is very weak for South Africa. This provides a positive feedback effect between growth and employment.

The aggregate effect on government net lending (as a percentage of GDP) is positive in all scenarios (though in absolute terms net lending increases as GDP increases). It improves the most in scenario 3, by approximately 0.6% of GDP by 2025, while in scenario 1 it improves by around 0.2% (Figure 11). The government net balance improves as direct revenue net of transfers and interest payments rises with increases in gross national income (with a lag). Moderate reductions in the unemployment rate give rise to moderate savings on transfers.

**Figure 9. Price inflation in baseline and three scenarios (2014 - 2025)**

![Figure 9, Price inflation in baseline and three scenarios (2014 - 2025)](source: GPM)
Figure 10. Employment rate in baseline and three scenarios (2014 - 2025)

Figure 11. Government net lending as a percentage of GDP in baseline and three scenarios (2014 - 2025)

The adjustments witnessed in the model are generally in line with the observed adjustments to increased minimum wages (even though such a policy change is not directly implemented): productivity increases, \(^{24}\) minimal effects on employment, limited price rises, modest reductions in firm profit mark-ups, and

\(^{24}\)Labour productivity increases is in almost all instances synonymous with, and caused by, a growing relative use of machinery in production.
increases in demand and output. On aggregate, the policy of ‘catch-up’ has a positive effect on South Africa’s economy.

The relatively small effects in scenario 1 indicates the limitations of influencing a small-open economy through modestly adjusting a single domestic policy variable. The somewhat larger effects in Scenario 2 highlights that a domestic policy of ‘catch-up’ can be amplified by supporting policies, in this instance large public expenditure on fixed capital. A higher labour share also helps improve multipliers in the economy so that such expenditure has more beneficial knock-on effects. Scenario 3 has the greatest effect on the South African economy highlighting how the path-dependent nature of smaller open economies makes it difficult for a single domestic intervention to improve economic indicators when implemented in isolation from other countries’ policies. The new global policy environment in scenario 3, whereby the labour share is increased in various other countries, has significant spill-over benefits for South Africa.

These results are summarised in Table 2 and Table 3. Table 2 shows by how many percentage points key variables differ from the baseline scenario by 2025 (except for real GDP which shows a percentage rise). For instance, in the baseline the labour share reached 42.1% of GDP by 2025, while in scenario 3 it reached 47.1% of GDP, meaning that labour share was 5 percentage point above the baseline in scenario 3. Table 3 shows the actual levels reached by the key indicators by 2025. In both ‘≈’ indicators no change.

Table 2. Percentage point change in key variables relative to baseline by 2025

<table>
<thead>
<tr>
<th>Labour share</th>
<th>GDP</th>
<th>Private Consumption</th>
<th>Government net lending to GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>2.0</td>
<td>1.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>4.0</td>
<td>2.3</td>
<td>1.0</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>5.0</td>
<td>2.9</td>
<td>1.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employment rate</th>
<th>Private investment to GDP</th>
<th>Current account deficit to GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>≈</td>
<td>≈</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>≈</td>
<td>-0.1</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>≈</td>
<td>-0.1</td>
</tr>
</tbody>
</table>

Source: GPM model
Table 3. Key variables by 2025 for baseline and all three scenarios

<table>
<thead>
<tr>
<th></th>
<th>Labour share (%)</th>
<th>GDP (USD PPP)</th>
<th>Private Consumption to GDP (%)</th>
<th>Government net lending to GDP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>42.1</td>
<td>739 956</td>
<td>60.8</td>
<td>-7.0</td>
</tr>
<tr>
<td>Scenario 1</td>
<td>44.1</td>
<td>748 431</td>
<td>61.3</td>
<td>-6.7</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>46.1</td>
<td>757 078</td>
<td>61.8</td>
<td>-6.5</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>47.1</td>
<td>761 522</td>
<td>62.1</td>
<td>-6.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Employment rate (%)</th>
<th>Private investment to GDP (%)</th>
<th>Current account deficit to GDP (%)</th>
<th>Price inflation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>40.4</td>
<td>14.5</td>
<td>-6.1</td>
<td>7.6</td>
</tr>
<tr>
<td>Scenario 1</td>
<td>40.4</td>
<td>14.4</td>
<td>-6.3</td>
<td>7.4</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>40.4</td>
<td>14.4</td>
<td>-6.6</td>
<td>7.3</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>40.4</td>
<td>14.3</td>
<td>-6.7</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Source: GPM model.

7 Conclusion

The overall impact on the South African economy of ‘catch-up’ between real labour compensation and labour productivity is positive, though modest, even when coupled with an additional policy domestically or abroad. Notably, the ‘catch-up’ manages to increase South Africa’s labour share in a manner that can be sustained over some time (although we do not explore if the increase will be sustained beyond the ten-year forecast period). That the labour share can increase without negative economic effects overall is notable and shows that the South African economy is, on aggregate and for the estimated period, ‘wage-led’. One potential means by which to increase the labour share in South Africa is the implementation of a national minimum wage. Such a policy can have positive aggregate effects within the South African economy through improving the functional distribution of income and, in turn, as this model shows, in stimulating economic growth.

This paper illustrates the benefits of using the GPM over CGE models for the specific question at hand. As a panel-data econometric model, the results of the GPM are based on relationships estimated using a long-run data series rather than exogenously imposed at the researchers discretion or calibrated on the basis of a single base year. The model avoids the deflationary biases inherent in neoclassical CGE models and captures some – but certainly not all – of the real-life adjustment mechanisms shown to occur in practice as real wages rise in an economy. The results clearly reveal the importance of explicitly modelling the relationship between growth and distribution for the South African economy: changes in the functional distribution of income towards labour have a very real and mostly positive effect on the workings of South Africa’s macroeconomy. These results caution against using policy models that largely treat issues of
growth as separate from issues of distribution. Researchers need to think carefully about using the most appropriate model for the question at hand, as J.M. Keynes (1938) noted, “economics is a science of thinking in terms of models joined to the art of choosing models which are relevant to the contemporary world”.
References


Burger, P., 2016. Have real wages fallen behind or increased out of line with productivity? A macroeconomic perspective. Econ3x3.


McDonald, S., 2006. STAGE Static CGE Model V1.


Ostry, J.D. and Berg, A., 2011. Inequality and Unsustainable Growth; Two Sides of the Same Coin? International Monetary Fund, IMF Staff Discussion Notes No. 11/08.


Appendix

The first version of the GPM was created by the Department of Economic and Social Affairs of the United Nations in 2007. It drew heavily from the experience of more than 30 years of global modelling undertaken by the Department of Applied Economics (DAE) at the University of Cambridge, UK. One of the primary architects of DAE’s global modelling work, Francis Cripps, has been the principal investigator behind all versions of the UN GPM, including this one (version 5.c). Francis Cripps was joined by Alex Izurieta while at the University of Cambridge and afterwards; and by Rob Vos, then Director of the Department of Policy Analysis of UNDESA, with whom earlier versions of the GPM were co-authored. Apart from UNDESA, other partners have collaborated in the development of the model, most notably UNDP’s International Policy Centre (IPC), Cambridge Endowment for Research on Finance (CERF, University of Cambridge), UNCTAD, the ILO, and the Global Development and Environment Institute (GDAE) of Tufts University (MA, US). From December 2013 onwards, the responsibility for the maintenance and revisions of the model resides with UNCTAD. UNCTAD is committed to make the databank and model programmes available to a wider audience.

Figure 12. South Africa’s labour share relative to other economies in GPM (2000 - 2025)

Source: GPM
Expanded Non-Technical Model Description

Here we offer an expanded, mostly non-technical, description of key facets of the UN Global Policy Model that have not yet been discussed in the main text.

**Wages** are not determined by marginal revenue products in the GPM, as they would be in a neoclassical model. In the GPM, average earnings per person employed respond to increases in output per person employed and to price inflation (with a lag), with negative pressure exerted by a higher real exchange rate.

In the GPM labour income includes the national accounting categories ‘compensation of employees’ and ‘mixed income’, with profits being represented by the ‘operating surplus’. This means that the labour share is calculated in the GPM as the ratio of the following two variables summed as a percentage of GDP: (i) compensation of employees, as defined in the national accounts; and (ii) mixed income (or income of unincorporated enterprises), also defined in the national accounts. Value added is measured at market prices as data on taxes are more difficult to come by globally.

**An important feature of the GPM is that employment responds to changes in economic growth,** as determined by the historical data and structural relationships. Using ILO data, the GPM estimates how, for a given change in GDP growth, the employment rate responds, and vice versa.

**Unemployment rates** are modelled explicitly as a function of economic activity, and employment is derived as the number of persons in the labour force less those unemployed. Employment is analysed separately for male and female members of the labour force, distinguishing young persons aged 15-24 and adults aged 25 and over. The unemployment rate for each gender and age group increases with population growth and fluctuates in response to growth of activity and investment, with a significant impact of the global economic cycle represented by world inventory changes. There is also a coefficient that multiplies activity and investment terms to indicate heightened respective responses as relative income levels increase. Employment includes employees, self-employed and family workers.

**Domestic cost inflation** is modelled as the outcome of increases in unit labour costs, determined by changes in average money earnings and output per person employed, along with a variable profit mark-up and a further mark-up for indirect taxes less subsidies. Put simply, the price level responds to changes in wages, productivity, and the mark-up of firms. The annual change in the domestic expenditure deflator is mainly a function of cost inflation and changes in the terms of trade (to the extent that import prices fall relative to exports and domestic prices).

---

25 Exports and trade in manufactured goods react to changes in unit costs, among other things.
The (profit) mark-up on average unit labour cost is strongly path-dependent and in the short run responds to the interaction between forces driving wage costs, on the one hand, and productivity growth, on the other. The mark-up is also affected by credit conditions, government policies (including social protection and government employment), movements in the terms of trade, and energy exports. The profit mark-up in turn largely determines the distribution of income between labour and profits in the model.

The real exchange rate represents the combined effect of changes in domestic and external price levels and changes in nominal exchange rates. The real exchange rate rises in the long run with GDP growth and increases in relative per-capita income. In the short run it fluctuates in response to nominal exchange rate changes and changes in global inflation.

The ability of the model to estimate the impact of a policy change on financial variables is fairly sophisticated and far more so than in most general equilibrium models. Finance and financial flows are modelled explicitly, and dynamically integrated into the model to ensure that changes in income, government expenditure, and investment by the private sector fully translate into changes in net lending or borrowing positions of sectors. Such flow ‘closures’ may directly influence economic activity; as flows accumulate on balance sheets these feed back into the adjustment behaviour of the real economy. Both a short-term ‘policy’ rate and a long-term bond interest rate, as well as changes in external flows, are included in the model and these form part of the investment function. Given the impact of the financial crisis, omitting the financial sector from a macroeconomic model (as in CGE models) is a pivotal shortcoming, especially given the role of credit expansion found in previous studies on the impact of minimum wages.26

Financial balances affect net government lending in the GPM, which represents the difference between net revenue (taxes less subsidies, transfers and debt interest) and spending on goods and services, as well as additional terms which represent autonomous policy divergences and shocks.

Based on the data for South Africa the general behaviour of the model to a ‘shock’ is shown in Table 4. This indicates how a country’s GDP, consumption, fixed private investment, government expenditure and net lending, and the current account (the rows in the table) respond to one of the following: an increase (or decrease) in government expenditure (by $1 bn); an increase in net direct taxes (by $1bn); an increase in the rate of indirect taxation (by 1%), or an increase in the profit mark-up(by 1%) (the columns in Table 4). Figure 13 graphically depicts the main modules and linkages with the GPM.

26 As Aaronson et al. (2012, p. 2) note: “First, a $1 minimum wage hike increases household income by roughly $250 and spending by approximately $700 per quarter in the year following a minimum wage hike. These findings are corroborated by independent data showing that debt rises substantially after a minimum wage increase.”
Table 4. South Africa's multiplier analysis using GPM

<table>
<thead>
<tr>
<th>Impact of the shock on:</th>
<th>Resulting from:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>government expenditure $1bn shock</td>
</tr>
<tr>
<td></td>
<td>GDP</td>
</tr>
<tr>
<td></td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>-0.14</td>
</tr>
</tbody>
</table>

Source: Cripps and Izurieta (2014)

Figure 13. Main modules and linkages in GPM

Source: Cripps and Izurieta (2014)