



# **National minimum wage in South Africa: A Computable General Equilibrium Model Analysis**

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# National minimum wage in South Africa: A Computable General Equilibrium Model Analysis

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## Abstract

This paper analyses the economy-wide impact of the national minimum wage on the South African economy. The analysis was conducted using a static computable general equilibrium (CGE) model of South Africa, which captured the observed structure of South Africa's economy. The parameters of the CGE equations were calibrated to observed data from a social accounting matrix (SAM) for 2010. One policy option with three scenarios was considered. The results from the policy scenario highlight that an increase in the national minimum wage has a negative and distortive impact on the reported macro-economic variables. This is particularly seen by a decline in GDP, employment and welfare. For instance, in the first scenario the real GDP decreased by 1.8506% when the national minimum wage was set to R3000 across all sectors.

**JEL Classification:** C68, J08, J31

**Key words:** national minimum wage, CGE model, South Africa

## 1 Background

The introduction of a national minimum wage is an important current national policy issue in South Africa. The national minimum wage is aimed at providing a national wage floor, beyond which no employee can fall. There are two key points of dispute: the level of the national minimum wage and whether there should be a single minimum wage or a differentiated system. Our paper will focus on the second point. Gains made by the labour organisations on these issues are perpetually under conflict and face setbacks (Coleman, 2014), however it is yet to be established what the impact would be on the macro-economy, industries, tax and social security.

According to Isaacs and Fine (2015), setting a minimum wage should not occur in isolation, and other policy procedures to create jobs and stimulate

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high wages must be instigated in sequence. Recently the introduction of a basic wage was discussed in the National Economic Development and Labour Council (Nedlac). The Congress of South African Trade Unions (COSATU) is demanding a R7,000 monthly minimum wage, while all farm and domestic workers are demanding a national minimum wage of between R5,000 and R5,500. It is not a surprise then, when the mineworkers demand unfluctuating wages of between R7,500 and R12,500 (Cosatu, Nactu & Fedusa, 2014: 5; Coleman, 2013: 34). This proposed target range for a national minimum wage must be highlighted by further cautious analysis. Investigation is required into the hypothetical employment impact of distinct levels of minimum wages in different economic states of affairs, of which the actual perspective is but one. As argued by Isaacs and Fine (2015), thus far this has neither been investigated by Coleman (2014), nor by Seekings and Natrass (2015) and other advocates of low minimum wages. They further recommended that such an investigation must comprise of at least an assessment of the actual wage system and the challenges encountering its reform, lessons from other developing countries, policy design, and modelling the impact of a national minimum wage on poverty, inequality and employment (given a variety of economic and policy scenarios).

In this paper we attempt to analyse the impact of the national minimum wage on the South African economy using a Computable General Equilibrium (CGE) model. Section 2 presents the literature review, while Section 3 describes the methodology and interprets the simulation results. The final section discusses these findings and their implications for future research.

## 2 Literature review

A national minimum wage in South Africa has been, and continues to be, a controversial topic of debate. In an attempt to change the apartheid-wage structure, certain reforms have been called for to tackle the growing deadlocks in the bargaining councils and the low wage structures that are symbolic of many sectors in the South African economy. COSATU proposes, amongst other suggestions, the implementation of a national minimum wage. Proponents of a national minimum wage argue that a single labour wage floor would reduce income inequality in the country and increase the bargaining power of unions, inasmuch as there would no longer be various different sectoral minimum wages to divide efforts (Cosatu *et al.*, 2014).

Seekings and Natrass (2015) argue that beyond the labour market implications, a national minimum wage will likely affect macroeconomic indicators (growth, employment and consumption), industry indicators (sectors, competitiveness and investment), government revenue, demand for social security, poverty, inequality, and many other issues. For this reason, this policy should be accompanied by a suitable industrial, macroeconomic and trade policy that ensures that a national minimum wage is a ‘means to an end’ and not the end-product. What is sought is the restructuring of the labour market and not replacing collective bargaining with a national minimum wage.

Most contributors to the debate on a national minimum wage adopt a narrow view of labour markets and assume that the structure of the economy will remain essentially as it is. We question this assumption, therefore this policy note aims to assess the impact that a national minimum wage set at a specific researched rate would have on select macroeconomic variables in South Africa.

The Association of Employers in South Africa (2015) argues that if the government sets the wage threshold too high it will result in job losses, but if it sets the threshold too low it will be worthless. The general perception amongst researchers is that it makes no sense to ‘reward’ or protect an unskilled and poorly educated workforce with inflexible wage arrangements and high wages, because workers in South Africa have a considerable number of rights with one of the most protective dismissal arrangements in the world and imbalances caused by strikes. In this respect, the employment of an unskilled worker seems to be very unattractive, and that is where South Africa’s biggest unemployment challenge resides — in the huge number of unskilled and poorly educated people. The prospects for this category of labour remain constrained due to the persistent slow economic growth.

Wages should be regulated on the condition that minimum wages be adjusted at levels that do not hamper job creation (Seekings and Natrass, 2015). The current debates and literature surrounding the national minimum wage in South Africa engender considerable emotion rather than shedding light, by distorting the challenging decisions facing any policy-maker who is focused on poverty alleviation and inequality. Coleman (2014) tried without substantial evidence to convince the national opinion that anyone focusing on South Africa’s high rates of poverty and inequality would support the demands for the high national minimum wage proposed by COSATU. Regrettably, the options are not as simple as Coleman (2014) – or Isaacs and Fine (2014) – would like researchers have confidence in their findings.

Previous studies indicate that the issue of a national minimum wage can be classified into three key opinions (Isaacs and Fine, 2015). The first relates to the opposition of any regulation of wages because it hampers economic growth and job creation. This opinion, supported by the Free Market Foundation, argues that the current sectoral minimum wages established under the ‘Basic Conditions of Employment Act’ are repulsive, and the search for a national minimum wage is unacceptable. Coleman (2014) and COSATU (2014), being rigorous, put forward the opposite argument by proposing the imposition of a national minimum wage, with the minimum to be fixed between R4,500 and R6,000 per month. Coleman contended that this would not only reduce the exploitation of lower-waged workers, but would also create more jobs through consumption-fueled growth.

The second opinion argues that wages must be regulated and the level at which wages are fixed must consider the repercussions on employment. This opinion differs from the first in that wage regulation might likely increase unemployment instead of reducing poverty and inequality. This also differs slightly from Coleman’s opinion, as he argued that fixing a high national minimum wage would certainly result in job losses. We can deduce that the real issue lies over

the level and procedures for fixing the minimum wage, not necessarily about the principle of a national minimum wage. The main difference between these two opinions is that the impact of the sectoral minimum wages on employment must be taken into consideration. As recapitulated by Seekings and Natrass (2015), in some of Coleman's various writings we find that he does not make it clear which of these opinions he believes. For example, he rejects as a myth the opinion that a national minimum wage would result in job loss, or it might be because he thinks that there would be no repercussion on employment.

The last opinion argues that remunerating workers with more money would stimulate economic growth and job creation (Coleman, 2014). This has been challenged by Seekings and Natrass (2015), who provided several motives for doubting this opinion. First, if higher wages result in job losses, then the absolute repercussion on expenditure will be minimized, and possibly negligible. Second, recent economic growth in South Africa has been driven primarily by increased consumption, but this growth has generated only modest employment growth. The latest Quarterly Labour Force Survey conducted by Statistics South Africa indicates that the unemployment rate was 26.7% in the first quarter of 2016 (Stats SA, 2016). Consumption-led growth has not led to significant employment growth in South Africa, but Coleman (2014) argues that raised minimum wages would lead to consumption-led growth and job creation in the future. Furthermore, the ambiguous option of unmatched, growth-led job creation barely appears to justify fixing a national minimum at a level that would hamper jobs in exclusive sectors such as agriculture and textiles and would lessen the opportunity of any labour-intensive sectors to expand normally.

Using a microsimulation framework, Pauw and Leibbrandt (2012) found that minimum wages are likely to lead to significant job losses among unskilled workers. Minimum wages may have reduced wage inequality in terms of hourly wages, but perhaps not in terms of total wages, and probably at the expense of diminished demand for unskilled labour. Researchers at the Development Policy Research Unit (DPRU) of the University of Cape Town found no significant negative employment effects in non-agricultural sectors, except in terms of working hours in some cases (DPRU, 2010).

The experience of introducing national minimum wages in other developing countries has not been as destructive as critics originally thought. For instance, in Brazil there was fear that a minimum wage would have negative impacts but this did not materialise. Instead, between 2002 and 2013 inflation fell, while unemployment declined to below 4% for men and 6% for women in 2013 (Seekings and Natrass, 2015).

In terms of the experience in developing countries, the United Kingdom (UK) presents a good example as a minimum wage has been in effect there since 1999, which provides 16 years of research data. The minimum wage in the UK is not universal, but is based on voluntary adoption (KPMG, 2015:1). According to KPMG, the national minimum wage for the UK is set at 6.50 GBP per day. The KPMG research adds that the UK government was the largest beneficiary of the minimum wage, due to increased tax revenues. The KPMG report also states that a minimum wage in the UK has led to an increase in the wages of

employers, especially those employing a larger proportion of low skilled workers. A controversial suggestion from the KPMG research is that the minimum wage will likely lead to an increase in the wages of skilled workers, in order to maintain the pay differential which rewards tenure and incentives striving for promotion. This suggestion is even more controversial for South Africa, which has some of the world's highest levels of inequality.

According to research by COSATU (2014) undertaken between 2007 and 2010, after the introduction of higher minimum wages through sectoral determinations, net employment in the affected sectors rose from 3.45 million to 4.1 million, despite the loss of farming jobs. Another study carried by Statistics South Africa (2015) indicate that despite farmworkers' strikes in 2012 and a 50% rise in the minimum wage in 2013, employment numbers in agriculture increased by 19,500 between 2012 and 2015's first quarter (22%). These findings imply that low declining wages did not create jobs because real wages of low-skilled workers had fallen since the 1990s, but low-skilled jobs had dropped by nearly a million.

### 3 Methodology

The model applied for the purpose of this study was a Computable General Equilibrium (CGE) model, using General Algebraic Modeling System (GAMS). A CGE model is a system of equations that describes the interactions and relationships between different agents in the economy in both the factor and product markets. Foreign markets are included through trade and foreign savings. The parameters of the CGE equations are calibrated to observed data from a social accounting matrix (SAM). A SAM is an economy-wide database that accounts for all monetary flows in an economy within a specific year. It reconciles a wide range of data sources, including official surveys, national accounts, household income and expenditure surveys, and labour force surveys. We used the CGE model which was initially developed by Lofgren, Harris, and Robinson (2001). Although this model is a static model, it nonetheless allows for the observation of inter-temporal changes to the economy and its characteristics as well as the analysis of policy intervention impacts as they unfold during the period under review. We performed a number of enhancements to the model. The first included updating the SAM such that it describes the economy as in 2010. The model provides a simplified representation of the South African because the structure reflected in the model's database is still very reflective of the economy today. The primary data sources used in building the 2010 SAM were the 2010 Statistics South Africa (Stats SA) supply and use tables, 2010 South Africa Reserve Bank (SARB) macroeconomic data and the 2010 Quarterly Labour Force Survey (QLFS). The supply and use tables are used to establish the sector links and relationships while the QLFS data provides information regarding employment levels and average wages across different labour groups and sectors. The 2010/11 Income and Expenditure Survey data is used to model household factor income distribution and consumption behaviour. In this respect, the database

of the model was composed of a SAM for 2010 which is founded on the national accounts data (SARB, 2010). It consisted of 48 activities, 85 commodities, four types of labour (by educational attainment) and 14 representative households (by income). Both corporate and personal income taxes were represented and three indirect taxes were captured: an activity tax, customs duties and a general sales tax. New equations are needed to define government revenue and expenditures. Furthermore, modifications were introduced in the equations for household income (government transfers are a new income source), household consumption demand (owing to the presence of income taxes), commodity market equilibrium (to account for government consumption), and the savings-investment balance (since the government represents a new source of savings). A more detailed specification of the model relationships is provided below.

### 3.1 Consumer and producer behaviour

Production activities use raw materials, intermediate goods and hire factor services to produce commodities. Consumers are assumed to maximise their utility, denoted by a Stone-Geary utility function, subject to their budget constraints. Each of the 14 representative households in the CGE model is assumed to adopt this behaviour. The derived Linear Expenditure System (LES) of demand for each household is given by equation 1 below.

$$P_j \bullet H_{jh} = P_j \bullet \gamma_{jh} + \beta_{jh} \bullet \left( (1 - S_h - td_h) \bullet Y_h - \sum_{jt} P_{j'} \bullet \gamma_{j'h} \right) \quad (1)$$

where  $H$  is consumption of good  $j$  by household  $h$ ,  $\gamma$  is a minimum committed consumption level,  $\beta$  is the marginal budget share,  $P$  is the market price of each good,  $Y$  is total household income and  $S$  and  $td$  are the marginal savings and direct tax rates, respectively. LES functions are widely used in CGE models because they are easier to calibrate than many other functional forms. They allow income elasticities to vary across household groups and price elasticities to vary across goods. Income elasticities in the model are based on a study by Case (2000). All factors are assumed to be owned by households. As a result, total household income is captured by equation 2:

$$Y_h = \sum_j (\omega \bullet W \bullet L_j + \theta \bullet r \bullet Z_j \bullet \bar{K}_j) + st_h \quad (2)$$

where  $st$  are social transfers from the government, and coefficients  $\omega$  and  $\theta$  determine the distribution of factor earnings to individual households of labour and capital respectively. The t-SAGE model also includes enterprises that earn the returns to capital and use these profits to pay corporate taxes, save, and pay dividends to households.

Producers are assumed to maximise profits subject to input and output prices. Following neoclassical theory, a constant elasticity of substitution (CES) function determines output quantity  $A$  from sector  $j$ . The producer production function is represented by equation 3:

$$A_j = \alpha_j \bullet \left( \delta_j \bullet L_j^{-\rho_j} + (1 - \delta_j) \bullet \bar{K}_j^{-\rho_j} \right)^{-1/\rho_j} \quad (3)$$

where  $\alpha$  reflects total factor productivity (TFP),  $L$  and  $K$  are labour and capital demands, and  $\delta$  and  $\rho$  are share and substitution parameters. Such production functions permit technologies to vary across industries. Maximising profits subject to Equation 3 yields the following factor demand equations:

$$L_j/K_j = [(r \bullet Z_j/W) \bullet (1 - \delta_j/\delta_j)]^{1/(1+\rho_j)} \quad (4)$$

where  $W$  is the labour wage and  $r$  is a fixed economy-wide capital rental rate adjusted by a sector-specific (distortion) term  $Z$ . The factor substitution elasticity is a transformation of  $\rho$ . Higher elasticities means that producers can more readily substitute between labour and capital when relative prices change. As indicated previously, the SAGE model differentiates between four education-based labour categories.

Intermediate demand in the model is determined using Leontief technology functions. Fixed input-output coefficients  $io_{jj}$ , reflect the quantity of good  $j$  used to produce one unit of good  $j$ . These technical coefficients are drawn from Stats SA (2010) and Arndt et al. (2011). The producer price,  $PA$ , is the sum of factor and intermediate payments per unit of output.

$$PA_j \bullet A_j = W \bullet L_j + r \bullet Z_j \bullet \bar{K}_j + \sum_j P_j io_{jj} \quad (5)$$

### 3.2 Government and investment demand

The government of our modelled economy earns its revenues from income and sales taxes and spends it on consumption and transfers to the households. Government savings is the difference between its revenues and spending. The government is treated as a separate institution where revenue is the sum of direct ( $td_h$ ) and indirect taxes ( $ts_j$ ) and transfers to government ( $st_g$ ), as shown on the left-hand side of Equation 6:

$$\sum_h td_h \bullet Y_h + \sum_j ts_j \bullet P_j \bullet Q_j + \sum st_g = \sum_j P_j \bullet \bar{G} \bullet g_j + \sum_h st_h + B \quad (6)$$

Revenues are used to purchase goods  $g_j$  and make social transfers  $st_h$ . Any remaining funds are (dis)saved, as shown by  $B$  on the right-hand side of the equation. Our macroeconomic closure for the government assumes that consumption spending is equal to base-year quantities  $g$  multiplied by an exogenous adjustment factor  $G$ . The recurrent fiscal balance  $B$  adjusts to equalise total revenues and expenditures.

A savings-driven investment closure implies that total investment adjusts to the level of total savings. This is shown below where  $i$  is fixed base-year investment quantities multiplied by an endogenous adjustment factor  $I$ .

$$\sum_h s_h \bullet Y_h + B + \bar{F} \bullet X = \sum_j P_j \bullet I \bullet i_j \quad (7)$$



### 3.3 Factor and product market equilibrium

The factors of production are labour and capital. Income flowing to factor accounts (i.e. the remuneration of labour and the return on capital) comes from the employment of these factors (both locally and foreign owned) in domestic activities, or as remuneration for domestically-owned factors employed in the rest of the world. Factor income from foreign countries accrues mainly in the form of interest on capital, whilst remuneration of factors employed locally is made up of remuneration of labour and capital. As described by Alton *et al.* (2012), the total labour supply  $LS$  is determined by upward-sloping supply curves that depend on the prevailing wage  $W$ , the base-year wage  $w$ , base-year labour supply  $ls$ , and a wage supply elasticity  $\varepsilon$ . In equilibrium, total labour supply  $LS$  must equal the sum of all sector labour demands  $L$ :

$$LS = ls \bullet (W/w)^\varepsilon = \sum_j L_j \quad (8)$$

Unlike labour, which is mobile across industries, capital is sector-specific. Both factor demand  $K$  and the rental rate  $r$  are fixed (see Equation 3) and the distortion term  $Z$  (which shows sector specific variation in the rental rate  $r$ ) adjusts to equate capital demand and supply in each sector.

Finally, product market equilibrium requires that the composite supply of each good  $Q$  equals private and public consumption and investment demand. Market prices  $P$  adjust to maintain equilibrium. Producers' abilities to pass-through other taxes to consumer prices are moderated by demand's response to higher prices.

$$Q_j = \sum_h H_{jh} + \bar{G} \bullet g_j + I \bullet i_j \quad (9)$$

All prices in the model are relative to a numeraire; the consumer price index (CPI) was chosen as the numeraire in the model.

### 3.4 Savings and investment

The equality of savings and investment follows from the standard definitions of GDP and income. As long as researchers adhere to these definitions, investment must always equal saving. This theory holds true in the framework of our SAM as it has to adhere to the fundamental national accounting principle. The total savings (including depreciation) in the SAM is equal to the total investment (including capital flows to the rest of the world) depicted in the capital account.

The quantity demanded of the composite good  $Q$  is equal to the demand for intermediate goods, consumption demand, public demand, investment demand and inventory investment.

$$Q(i) = INT(i) + CD(i) + GD(i) + ID(I) + DST(i) \quad (10)$$

Exogenous balance of payments is equal to the world price of imports less the world price of exports, and  $SAVING = INVEST$ .

$$SAVINGS = HHSAV + GOVSAV + DEPREC + FSAV.EXR \quad (11)$$

General conventions adhered to were:  $i$  and  $j$  represent the sectors,  $h$  represents households endowed with labour and capital,  $f$  represents the factor's capital, and low income, middle income and high income groups.  $HHSAV$  represents the household savings,  $GOVSAV$  represents the government savings,  $DEPREC$  represents the depreciation,  $FSAV$  represents foreign savings,  $EXR$  is the exchange rates, and  $mps$  represents marginal propensity to save, where  $p$  is price,  $q$  quantity and  $t$  the tax rate. The sectors, households and factors will be shown in brackets.

$$HHSAV = \sum_h \sum_i Y_h(i)(1 - t_h(i))(1 - mps_h(i)) \quad (12)$$

$$GOVSAV = GR - \sum_i P_q(i).GD(i) \quad (13)$$

Foreign savings are determined exogenously.

### 3.5 Closures and shocks

The CGE model can be used to analyse a specific situation in the economy when it is compared to the “policy” situation in which a shock, such as a decrease or increase in the national minimum wage is applied. Responses are reported in variations from the initial condition, and should be inferred as the difference between the conditions following the shock. The CGE model is remarkably suitable for acquiring the allocative effects of policy changes.

According to Horridge (1993), the number of variables and equations in the CGE model is essential from the theoretical description of the CGE model. Usually, the researcher must select which variables will be considered endogenously within the model, and which variables will be considered exogenously. The number of exogenous variables must be selected so that the economic setting in which the policy shock is tested best reflects the true economic setting to which the policy shock pertains. In the context of modelling methodology, the assumptions with reference to exogenous and endogenous variables are known as ‘model closure’. Different closures may be used for different purposes and that there is not a unique or correct closure. Notwithstanding, the choice of closure is bound by certain restrictions of which an important one is that the price variables in the model's equations always appear as price ratios, and that there has to be at least one exogenous variable measured in local currency in order to determine the overall price level. Furthermore, the behaviour of the model is dependent on the macroeconomic and factor closures chosen. These closures allow for the placement of constraints into the model which is crucial in the analysis of large-scale policy changes (Alton *et al.*, 2012). Within the factor closure we have the choice between making factors fully employed and mobile, fully employed and activity-specific, unemployed and mobile, or partially unemployed whereby supply is increased according to an upward-sloping supply

curve. In our case, when considering the labour market situation, we assume that capital and initially all labour is fully employed, while semi-skilled (labour with middle school education) and low-skilled (labour with primary school education) labours are assumed to be unemployed. Therefore, the nominal wages for semi- and low-skilled labour should remain constant as their factors experience high levels of unemployment. Overall, we considered the following closures for factor markets, the macro savings-investment balance, the government, and the rest of the world that are more or less consistent with the macroeconomic conditions in South Africa:

- ***Savings and investment:*** we assume investment driven savings and government expenditure being fixed shares of absorption.
- ***Government:*** we allow for a flexible budget deficit in which tax rates are fixed and government savings is allowed to vary, regardless of tax revenues and values of government expenditure.
- ***Current Account:*** we assume that the exchange rate is flexible with the consequence that foreign savings is fixed.

In addition to the closures mentioned above, the wage (price) of each factor is assumed to be uniform across all activities that use it, in other words, every activity paid the average wage. In the real world, wages tend to be "distorted", in the very broad sense that they differ across activities. A treatment that permits this feature (with no distortions as a special case) is introduced in this paper. We assume that wages are distorted for labour but uniform across activities for capital in a setting with full (or fixed) employment for both factors. Furthermore, we consider the time frame under which economic variables are allowed to adjust to a new equilibrium after the shock. This assumption affects the manner in which factor markets are modelled. We consider the appropriate closure to analyse the effect of national minimum wage policy shock on South African economy because the fixed capital takes time to adjust to economic shocks. Therefore, this case will be treated as short run. Employment, however, is allowed to change in the short-run as firms can employ more labour, or workers could supply more labour. In such a scenario, the price of capital is allowed to vary in order to keep the stock of capital constant, while the price of labour is fixed. If the time frame under consideration is deemed to be of long-run nature, capital stock is allowed to vary, while labour supply is assumed to be fixed. This reflects the economic reality that capital can adjust over time, but that employment is bound by demographic constraints over longer period of time (the natural rate of employment). In a long-run scenario, the price of labour is allowed to vary, while the price of capital remains fixed. We therefore limit our analysis to the short-run because our CGE model is of static nature. Nonetheless, long-run analysis can be done through dynamic CGE model.

Regarding the shock, we performed our simulations based on the proposed minimum wage from a median wage of R2400 (Stats SA, 2015). This is based on the wages of the low percentage of people that do have jobs, bearing in mind the

true reflection of the multitude of unemployed South Africans. Three scenarios are considered in this study. The minimum wages proposed are R3000, R3440 and R5500 respectively. The main reason is that CGE models are particularly suited for answering “what if” questions as they have become workhorses for policy analysis. All results are compared relative to the base (baseline) scenario which represents a business as usual scenario.

## 4 Simulation results

Our prior expectation was that the introduction of the national minimum wage would impact the wage bill of companies differently, depending on the labour intensity of the business operations. The national minimum wage is a sensitive issue among the business community; labour intensive companies are likely to see their wage bill grow faster and this will have an impact on the absorption rate. However, such development stands little chance of success if inadequate steps are implemented, more especially if no or little quantification of such measures are assessed through a specific tool such as a CGE model. One way to ensure a proper understanding of intervention to resolve the national minimum wage problem, which may be a reflection of poor, inappropriate or bad government policies, is to quantitatively evaluate its effects into the economy, and more importantly, to determine its influence on the total economy. We performed three separate simulations in order to isolate and measure the impact of any scenario. In the first scenario the minimum wage is set to R3000 (25%) from the median wage of R2400, R3440 (43%) in the second and R5500 (129%) in the last. As indicated earlier, all results are compared relative to the base (baseline) scenario which represents a business as usual scenario in the absence of the shock under investigation. The three simulations impose the exogenous shock on the economy, in this case, the increase in the national minimum wage. Results quantifying the impact of the shock are then reported as percentage changes between the values in the baseline simulation and the policy simulation for each variable. Table 1 reports the results from the CGE model simulations of the three scenarios on main macroeconomic variables. In column 2 (Base 2010 R billion) of the table we report values at base-year prices while the other columns (sim1, sim2 and sim3) show percentage deviations from the base.

Table 1 indicates that all the macroeconomic variables such as gross domestic product, consumption, exports and indirect taxes were negatively impacted by the introduction of a national minimum wage. For instance, in the first scenario the real GDP decreased by 1.8506% when the national minimum wage was set to R3000 across all sectors. This shows that the GDP depends on other variables such as consumption and export, which likewise are negatively affected by this shock. Total absorption in the economy followed the same trend, resulting in non-adjustment in investment as investment is allowed to change with absorption. The increase in the national minimum wage impacted on the investment through the price of capital. Hence, the change in investment will mean that any adjustment in capital stock will affect the production and demand for labour

that might impact on the standard of living of all income categories. It is no wonder, then, while consumption is affected and if it is regarded as a proxy for welfare, its negative result implies that welfare will be negatively affected as a result of the national minimum wage. Nevertheless, the decline in exports can be ascribed to the fact that the increases in domestic demand push up domestic prices and producers are then tempted to switch away from exports, according to the Constant Elasticity of Transformation (CET) function. Likewise, the decline in exports did not prompt a slight depreciation of the real exchange rate to support exports, but discourages imports which also declined significantly. Our simulation results indicate that the policy related to increase in national minimum wage across sectors will not directly stimulate growth in output of various economic sectors. Table 2 reports the results of the three scenarios on government revenues.

The results indicate a decrease in tax revenues received by the government across all scenarios. This shows the sensitivity of national minimum wages in the South African economy. Indeed, the results of the simulations reported in Table 2 indicate a decrease in tax revenue emanating from direct tax, activity tax, import duty, sales tax (VAT) and transfers received from the factors of production. For instance, in the first scenario where the national minimum wage was set to R3000, sales tax revenues decreased by 2.26%, followed by activity tax revenues (-1.95%), import duty revenues (-1.76%) and direct tax revenues (-1.43%). According to SARS (2013), sales tax (VAT) is one of the key contributors to total tax revenue and is also the biggest indirect tax in South Africa. These results imply that all sectors are negatively impacted by the increase in national minimum wages with regard to demand for labour and return on investment.

Furthermore, government finances will not benefit from the national minimum wage increase in two ways – firstly, higher rates are unlikely to increase tax revenues, despite some people moving into the taxable threshold in contrast to losses of jobs from more active taxpayers. Secondly, the introduction of the minimum wage could bring marginal welfare payments relief, as the number of people previously eligible for grants could marginally fall. However, the government will face challenges in meeting some of its key objectives from the national development plan, such as addressing inequality and alleviating poverty. Table 3 includes the results of the three scenarios on labour and capital.

Employment and job loss is a crucial factor in evaluating the viability of policy options. The simulation results indicate that the increase in the minimum wage will result in a loss of jobs. These job losses will occur across all labour categories as a direct result of the demand shock, also known as the initial effects. Because of the inter-linkages between sectors, this contraction will resound throughout the economy and more jobs will be lost due to declining production, income and consumption. Table 3 illustrates these different scenarios. For instance, in the first scenario the hardest hit by the shock is labour with primary school education (grades 1 – 7) with a significant drop of 35.64%, followed by labour with tertiary education (-0.36%), labour completed secondary school education (-0.31%) and labour with middle school education (-0.13%). In the

second and third scenarios, the simulation results indicate that the labour with primary school education will drop sharply by 52.05% and 72.32% respectively.

These findings confirm the real situation of the South African labour market, because almost half of the population is unemployed and youth unemployment is even higher (Stats SA, 2015). There is a large combination of a low-skilled workforce, poor education and extremely rigid labour law arrangements.

Fourie and Green (2015) argued that any policy hoaxing with minimum wages in an out-of-proportion interference is definitely short-sighted, and even reckless. South Africa is already riding on the unemployment wave of too high salaries; raising the minimum wage will ensure some workers receive higher wages, but will guarantee that even more will remain jobless. Our simulation results confirm that the higher minimum wage destroys the labour market while unemployment worsens. Instead of creating more jobs, both poverty and inequality will be on the rise. Table 4 includes the results of the three scenarios on households.

Table 4 reports that the introduction of national minimum wages will have a negative impact across all income household categories. The rise in prices reduces households' purchasing power and as a result private consumption declines relative to the baseline scenario. The negative impact on real GDP however is reflected in the short-run of the modelled scenarios. Our simulation results contradict the arguments put forward by Coleman (2014), which stipulate that paying workers more money will fuel consumption and thus stimulate economic growth and job creation. There are many reasons for doubting the strength of any such effect in South Africa, as supported by Seekings and Nattrass (2015). First, our three scenarios with higher minimum wages result in job destruction, and the net effect on spending power is reduced and even turns negative. The low income household categories are the hardest hit by the shocks. The reduction in social welfare burden for the government is not reflected through these scenarios as more people are not rescued from poverty; according to StatsSA (2014), 10.2 million people were defined as living in poverty as of 2011.

Secondly, while recent economic growth in South Africa has been driven predominantly by heightened consumption, this growth has engendered only restrained employment growth. As a matter of fact, the ratio between employment growth and economic growth in South Africa is small, just about 0.5 (Stats SA, 2014). In addition, consumption-led growth has predictably not led to substantial employment growth in South Africa (Seekings and Nattrass, 2015). Table 5 reports the results of the three scenarios on the sectoral contribution to the GDP.

Generally, in these kinds of scenarios there should be winners and losers, however we can observe that the higher minimum wage has a negative impact on all sectors; the shock destroys jobs while South Africa has a very high unemployment rate. Although in the USA and Brazil most poor people work because they are low-unemployment economies, our simulation shows that substantially raising the wages of the working poor in growing economies with challenging labour markets such as South Africa results in significant job destruction. For instance in the first scenario (see Table 5), our simulation results indicate that

the policy will not directly stimulate demand for output of economic sectors, especially in manufacturing (-0.3509%) and private services (-0.9846%). For all economic sectors, the negative employment impacts of sector output decreases did not outweigh the direct impact of marginally higher sectoral average real wage rates. Seekings and Natrass (2015) argue that South Africa's lack of competitiveness (and the subsequent poor performance) in agriculture sector is mainly the consequence not of high wages but of unsuitable and unaccommodating policies. Government support for farms has worsened to very low levels – with the value of producer support as a share of the value of total gross farm receipts being about 3% in 2008–2010, well below the OECD average of 20% (Isaac and Fine, 2015). Outstandingly most middle-income developing economies heightened their support over the past decade (Sender, 2014). Similarly, between 1993 and 2006 funds for agricultural research and development declined progressively, together with a striking decline in the number of agricultural researchers engaged in South Africa institutions. Furthermore, Sender (2014) argues that the failure to expand irrigation and fertilizer production, coupled with under-investment in farming capital goods, is part of the series of policy failures that are ignored by Seekings and Natrass (2015) but which account for this sector's bland performance.

#### **Policy implication**

The primary research question was to determine to what extent is South African economy influenced by national minimum wage, institutions and/or policies. The answer is important, for if it is national minimum wage, it could imply that current inequalities will persist or even worsen. This has significant implications for policy efforts such as the National Minimum Wage.

The simulation results although powerful must be understood before developing policy. In other words they must be used in conjunction with research output. The hypothesis of testing the impact of the national minimum wage on the South African economy was performed within a short-run setting. The reasons are:

- The literature on the national minimum wage indicates that the improvement in minimum wage hold positive benefit for South Africa economy regardless of the effects of institutions and policies. Because the possibility of setting a national minimum wage cannot be ignored over a long-run perspective, a short-run analysis is deemed appropriate.
- The possibility of setting a national minimum wage is appealing from both institutions and policies perspective. Higher national minimum wage can be imposed by the government. In this respect, the government time-horizon is usually short-term (Horridge, 1993).

International studies on the impact of the minimum wage on GDP using CGE model technique are not extensive. It is evident that the setting of a national minimum wage is one of the most challenging decisions for any policy-maker dealing with unemployment, poverty and inequality. The reassessment of the labour market in South Africa shows that the supply of unskilled labour is

flexible, while that of skilled labour is entirely inflexible. This assumption was taken into consideration in this policy simulation because raising the national minimum wage could result in significant political and economic consequences for policymakers in the short run. The results from this study indicate that South African policymakers should approach the issue of setting the national minimum wage with caution. It is clear that any policy that attempts to increase the national minimum wage would achieve few socio-economic benefits.

Our results from policy simulations have indicated that the increase in the national minimum wage impacts negatively on the GDP, employment and welfare. Although these results have important consequences for policymakers, it is evident from the macroeconomic aggregates that the wage policy would have negative effects on the South African economy; arguing for a high national minimum wage floor will result in unemployment disaster. As stated by Nattrass and Seekings (2015), the main reason is that poverty in South Africa is first and foremost the result of colossal unemployment, as opposed to the case of Brazil and the USA, where poverty is due mainly to low wages. We performed our simulation based on the proposed minimum wage from a ‘median wage’, based on the wages of the low percentage of people who do have jobs, bearing in mind the true reflection of the multitude of unemployed South Africans.

## 5 Conclusion

As the stakeholders at the bargaining table can attest, adherents and detractors often have intuitive reactions to calls for a national minimum wage, often without ample information or understanding of the full effects that such a policy could have. This paper attempted to fill that gap by examining the consequences of introducing a national minimum wage across all sectors in South Africa. To interrogate and understand the impact of a national minimum wage policy, a CGE modelling technique was used to quantify the potential impact of introducing a national minimum wage in South Africa. The goal of the paper is not only to assess the potential impact, but ultimately to help assess whether instituting a national minimum wage is good economic policy.

In this paper we used a static CGE model with a disaggregated labour factor for the South African economy. The model captures actual labour factors relatively well and provides for a richer ‘simulation laboratory’ for understanding the impacts of policy changes. The model includes 48 activities, 85 commodities, four types of labour (by educational attainment) and 14 representative households (by income). Both corporate and personal income taxes are represented and three indirect taxes are captured: an activity tax, customs duties and a general sales tax. The structure reflected in the model’s database is still very reflective of the economy today. The results from the policy scenario highlight that an increase in the national minimum wage would have a negative and distortive impact on the South African economy. This is particularly seen by the decline in GDP, employment and welfare. For instance, in the first scenario the real GDP decreased by 1.8506% when the national minimum wage was set



to R3000 across all sectors. This shows that the GDP depends on other variables such as consumption and export, which likewise are negatively affected by this shock. Total absorption in the economy follows the same trend, resulting in non-adjustment in investment as investment is allowed to change with absorption.

Regarding employment, the simulation results indicate that a higher national minimum wage will result in a loss of jobs. These job losses will occur across all labour categories as a direct result of the demand shock, also known as the initial effects. Because of the inter-linkages between sectors, this contraction will resound throughout the economy and more jobs will be lost due to declining production, income and consumption. For instance, in the first scenario the hardest hit by the shock is the labour with primary school education (grades 1 – 7), with a significant drop of 35.64%.

Beyond their policy implications, our empirical findings reveal that government should consider the issue of setting up national minimum wage with caution. As suggested by Isaac and Fine (2015), it is crucial to have a nuanced government policy that would provide the necessary incentives and regulation combined with direct investment in skills, research and development and world-class infrastructure, as well as a stable, corruption- and crime-free environment. Scope for further research on the impact of national minimum wage on South African economy will depend greatly on using dynamic CGE model. Finally, our results highlight the importance of capturing differences in minimum wage across all sectors in the economy, as well as the need to consider both labor and production market conditions when designing policies to address South Africa's national minimum wage challenge.

## References

- [1] Alton, T., Arndt, C., Davies, R., Hartley, F., Makrelov, K., Thurlow, J. and Ubogu, D. 2012. *The Economic Implications of Introducing Carbon Taxes in South Africa*. UNU-WIDER World Institute for Development Economics Research, Working Paper No. 2012/46
- [2] Arndt, C., Davies, R. and Thurlow, J. 2011. *Energy Extension to the South Africa General Equilibrium (SAGE) Model (Version 2.0)*. Helsinki: UNU-WIDER. Unpublished mimeo.
- [3] Association of Employers in South Africa. 2015. [www.businessdictionary.com/definition/employers-association.html](http://www.businessdictionary.com/definition/employers-association.html) date of access: 22 November 2015.
- [4] Bhorat, H., Kanbur, R. and Mayet, N. 2013. The impact of sectoral minimum wage laws on employment, wages, and hours of work in South Africa. *IZA Journal of Labour and Development* 2:1.

- [5] Bhorat, H., Kanbur, R. and Stanwix, B. 2012. *Estimating the impact of minimum wages on employment, wages and non-wage benefits: the case of agriculture in South Africa*. DPRU Working Paper 149.
- [6] Bolsheva, A. 2012. Minimum Wage Development in the Russian Federation. [http://www.global-labour-university.org/fileadmin/GLU\\_working\\_papers/GLU\\_wp\\_No.15.pdf](http://www.global-labour-university.org/fileadmin/GLU_working_papers/GLU_wp_No.15.pdf) date of access: 15 October 2015
- [7] Case, A. 2000. *Income Distribution and Expenditure Patterns in South Africa*. Princeton, NJ: Princeton University. Unpublished mimeo.
- [8] Coleman, N. 2013. *Towards new collective bargaining, wage and social protection strategies in South Africa – Learning from the Brazilian experience*. Working Paper 17. Global Labour University.
- [9] Coleman, N. 2014. Myths and so-called ‘facts’ about the national minimum wage. *Daily Maverick*, November 10.
- [10] Cosatu, Nactu and Fedusa. 2014. *Labour fact paper on the national minimum wage for The labour indaba 4 November 2014*. Briefing document (not a position document).
- [11] DPRU. 2010. *Addressing the plight of vulnerable workers: the role of sectoral determinations*. Report for the Department of Labour. University of Cape Town.
- [12] Fine, B. 1998. *Labour market theory: a constructive reassessment*. Taylor & Francis.
- [13] Herr H, Kazandziska M & Mahnkopf-Praprotnik S. 2009. *The theoretical dbate about minimum wages*. Working paper 6. Global Labour University.
- [14] Fourie, F. Cv. N. and Green, P. 2015. Flexibility needed to find consensus for workers’sake. *Business Day*, 25 June 2015, p. 11. <http://www.bdlive.co.za/opinion/2015/06/25/flexibility-needed-to-find-consensus-for-workers-sake>.
- [15] Horridge, J.M., Parmenter, B.R. & Pearson, K.R. 1993. ORANI-G: A general equilibrium model of the Australian economy. Generic version. Revised March 1997.
- [16] ILO. 2014. *Minimum wage systems*. International labour conference, 103rd session. International Labour Organisation.
- [17] IMF. 2014. *World Economic Outlook (WEO), October 2014: Legacies, clouds, uncertainties*. International Monetary Fund.
- [18] Isaacs, G. and Fine, B. 2014a. The minimum wage debate – logic, evidence and need. *Daily Maverick*, November 25.

- [19] Isaacs, G. and Fine, B. 2014b. Minimum wage debate: the old cheap labour system will Get us nowhere. *GroundUp*, December 17.
- [20] Isaacs, G. and Fine, B. 2015. The minimum wage debate: looking beyond a narrow focus on labour markets. See <http://www.econ3x3.org>. Date of access: 23 November 2015.
- [21] Jones, P. 1997. “The Impact Of Minimum Wage Legislation In Developing Countries Where Coverage Is Incomplete,” WPS/98-2. Centre for the Study of African Economies, Institute of Economics and Statistics. University of Oxford. See <http://www.econ.ox.ac.uk/CSAEadmin/workingpapers/pdfs/9802text.pdf>.
- [22] Kaufman, B. E. 2010. Institutional economics and the minimum wage: broadening the theoretical and policy debate. *Industrial & Labor Relations Review* 63 (3): 427–53.
- [23] KPMG. 2015. The Living Wage: an economic impact assessment. <http://www.statssa.gov.za> Date of access: 10 October 2015
- [24] Labour Force Survey. 2016. Stats SA: <http://www.statssa.gov.za> Date of access: 10 May 2016
- [25] Lavoie, M. and Stockhammer, E. 2012. *Wage-led growth: concepts, theories and policies*. ILO working paper 470936. International Labour Organization.
- [26] Leonard, T. 2000. The very idea of applying economics: the modern minimum-wagecontroversy and its antecedents. *History of Political Economy* 32 (5): 117–44.
- [27] Lester, R.A. 1947. Marginalism, minimum wages, and labor markets. *American Economic Review* 37(1): 135–48.
- [28] Lofgren, H., Harris, R.L., and Robinson, S. 2001. “A Standard Computable General Equilibrium (CGE) Model in GAMS,” Trade and Macroeconomics Division Discussion Paper No.75. <http://www.ifpri.org>
- [29] Manyika, J., Woetzel, J., Dobbs, R., Remes, J., Labaye, E. and Jordan, A. 2015. *Global growth: can productivity drive the day in an aging world?* McKinsey Global Institute.
- [30] Nattrass, N. and Seekings, J. 2014. Job destruction in Newcastle: Minimum wage-setting and low wage employment in the South African clothing industry. *Transformation* 84: 1-30.
- [31] ONS. 2015. Labour Market Statistics. <http://www.ons.gov.uk/ons/rel/lms/labour-market-statistics/march2015/statistical-bulletin.html>. Date of access: 12 November 2015.

- [32] Pauw, K. and Leibbrandt, M. 2012. Minimum wages and household poverty: general equilibrium macro-micro simulations for South Africa. *World Development* 40(4):771-83.
- [33] Seekings, J. and Natrass, N. 2014. What is at issue in the minimum wage debate? <http://www.econ3x3>, date of access: 15 November 2015.
- [34] Seekings, J. and Natrass, N. 2015. What is at issue in the minimum wage debate? <http://www.econ3x3>, date of access: 15 November 2015.
- [35] Sender J. 2014. *Backward capitalism in rural South Africa: prospects for accelerating accumulation in the Eastern Cape*. Eastern Cape Socio-Economic Consultative Council (ECSECC), East London.
- [36] Stats SA. 2010. <http://www.statssa.gov.za/publications/statsdownload.asp?ppn=P0100&SCH=5371> date of access: 11 October 2016.
- [37] Stats SA. 2015. <http://www.statssa.gov.za/publications/statsdownload.asp?ppn=P0100&SCH=5371> date of access: 25 November 2016.
- [38] Stats SA. 2016. <http://www.statssa.gov.za/publications/statsdownload.asp?ppn=P0100&SCH=5371> date of access: 25 November 2016.
- [39] The national minimum wage debate: looking beyond a narrow focus on labour markets, *Gilad Isaacs, Wits University & Ben Fine, SOAS, University of London*, on **[www.econ3x3.org](http://www.econ3x3.org)**
- [40] UNCTAD. 2014. *Trade and development report, 2014*. UN Conference on Trade and Development.

**Table 1: Macroeconomic variables**

	<b>Base (2010 R billion)</b>	<b>Sim 1 (R3000)</b>	<b>Sim 2 (R3440)</b>	<b>Sim 3 (R5500)</b>
Absorption	2 690	-1.8297	-4.0760	-4.5881
Consumption	1 574	-3.1259	-6.9635	-7.8384
Investment	527	0	0	0
Stocks	(3)	0	0	0
Government	591	0	0	0
Exports	645	-2.0177	-4.4764	-5.0348
Imports	(676)	-1.9271	-4.2755	-4.8088
GDP at market prices	2 659	-1.8506	-4.1225	-4.6405
Indirect taxes	287	-2.2622	-5.0098	-5.6341
GDP at factor cost	2 372	-1.7992	-4.0154	-4.5199

*Source: Simulation results from the CGE model*

**Table 2: Impact on government revenues (taxes)**

	<b>Base (2010 R billion)</b>	<b>Sim 1 (R3000)</b>	<b>Sim 2 (R3440)</b>	<b>Sim 3 (R5500)</b>
Direct revenue excl. dividend tax	396	-1.43134	-3.15922	-3.55263
Activity tax revenues	38	-1.95164	-3.95451	-4.39627
Import duty revenues	23	-1.76150	-4.01006	-4.52573
Sales tax revenues	226	-2.26390	-5.05639	-5.69193
Transfers received from factors	52	-0.78275	-1.68081	-1.88382
Transfers received from ROW	-30	0.36823	0.75962	0.84781

*Source: Simulation results from the CGE model*

**Table 3: Impact on labour**

<b>Variable</b>	<b>Description</b>	<b>Base (2010 R billion)</b>	<b>Sim 1 (R3000)</b>	<b>Sim 2 (R3440)</b>	<b>Sim 3 (R5500)</b>
flab-p	Labour with primary school education (grades 1-7)	77	-35.64	-52.05	-72.32
flab-m	Labour with middle school education (grades 8-11)	208	-0.13	-0.36	-0.17
flab-s	Labour completed secondary school education (grade 12)	382	-0.31	-0.41	-0.73
flab-t	Labour with tertiary education (certificates, diplomas or degrees)	532	-0.36	-0.50	-0.77
fcap	Capital	1174	-0.78	-1.10	-1.68

*Source: Simulation results from the CGE model*

**Table 4: Impact on households**

<b>Variable</b>	<b>Description</b>	<b>Base (2010 R billion)</b>	<b>Sim 1 (R3000)</b>	<b>Sim 2 (R3440)</b>	<b>Sim 3 (R5500)</b>
hhd-0	Decile 1	27	-8.59	-27.65	-32.31
hhd-1	Decile 2	46	-8.20	-26.33	-30.76
hhd-2	Decile 3	56	-7.34	-23.13	-26.98
hhd-3	Decile 4	64	-5.94	-18.07	-21.02
hhd-4	Decile 5	76	-5.75	-17.26	-20.04
hhd-5	Decile 6	88	-4.57	-12.84	-14.82
hhd-6	Decile 7	107	-3.77	-9.69	-11.09
hhd-7	Decile 8	150	-2.56	-5.50	-6.16
hhd-8	Decile 9	287	-1.80	-2.85	-3.05
hhd-91	Percentile 90-92	84	-1.54	-1.97	-2.01
hhd-92	Percentile 92-94	98	-1.64	-1.75	-1.71
hhd-93	Percentile 94-96	117	-1.73	-1.92	-1.89
hhd-94	Percentile 96-98	142	-2.08	-2.01	-1.90
hhd-95	Percentile 98-100	229	-2.56	-2.33	-2.16

*Source: Simulation results from the CGE model*

**Table 5: Sectoral contribution to the GDP**

<b>Description</b>	<b>Base (2010 R billion)</b>	<b>Sim 1 (R3000)</b>	<b>Sim 2 (R3440)</b>	<b>Sim 3 (R5500)</b>
Agriculture	2	-0.1123	-0.2822	-0.3221
Mining	10	-0.1960	-0.4344	-0.4884
Manufacturing	14	-0.3509	-0.8282	-0.9385
Other industries	6	-0.0785	-0.1798	-0.2030
Private services	48	-0.9846	-2.1454	-2.4078
Public services	19	-0.0770	-0.1454	-0.1600
<b>GDP</b>	<b>100</b>	<b>-1.7992</b>	<b>-4.0154</b>	<b>-4.5199</b>

*Source: Simulation results from the CGE model*