Evaluating the general equilibrium effects of a wage subsidy scheme for South Africa

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Unemployment among semi- and unskilled workers has reached severe proportions (over 50 %) and threatens the political and economic stability of the South African economy. In this paper a computable general equilibrium (CGE) model of the South African economy to assess the economy-wide impact of a wage subsidy targeted at semi- and unskilled workers. We find that employment of semi- and unskilled workers can be raised quite significantly, although the financial costs can be substantial. The targeting of the correct sectors as well as the budgetary process (deficit financed versus balanced budget) followed play an important role in the outcome.

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1 Introduction

The extent of unemployment in South Africa has been extensively debated (Bhorat and Leibbrandt, 1996; Standing et al., 1996; Nattrass, 2000). Depending on whether the 'strict' or 'expanded' definition is used, the measured unemployment rate ranges between 25% and 40%. Despite the controversy surrounding the correct measurement of unemployment it is widely accepted that unemployment in South Africa is high compared to international standards and that it currently poses a serious threat to the political and economic stability in South Africa. Many of the country's social problems such as poverty, crime, violence, a loss of morale, social degradation, and political and economic instability can be linked to unemployment (Kingdon and Knight, 2000).

Various factors have contributed to the unemployment problem in South Africa. Economic growth deteriorated consistently during the 1970s, 1980s and the early 1990s and had a substantial negative impact on employment growth (Fallon and Pereira da Silva, 1994). However, employment continued to fall during the late 1990s, a period of improved economic growth, suggesting that economic growth is only one of a range of factors influencing employment. The decline in the capacity of economic growth to generate employment is partly due to strategic economic policies of the past which have raised the capital intensity of production. In an effort to become self-sustained, capital-intensive industries enjoyed tax breaks and could borrow at lower interest rates, thus reducing the relative price of capital. This has caused both a rise in the capital intensity of production within firms throughout the economy as well as a re-allocation of investment towards highly capital-intensive sectors like the chemical sector (Levy, 1992; Fallon and Pereira da Silva, 1994; Kaplinsky, 1995).

Past policies of discrimination and educational inequalities have also contributed greatly to the structural unemployment problem in this country. The level of educational attainment has been shown to be one of the most important determinants of an individual's employment status with the majority of unemployed persons having no skills or job training (Bhorat and Leibbrandt, 1996). This is also reflected in current unemployment figures: 50.1 % of semi- and unskilled labour were unemployed in 1999, compared to 16.2% of skilled labour and zero percent of highly skilled workers (Lewis, 2001).

Rapid changes in the skill composition of employment across all economic

sectors during the 1990s also suggest the presence of skill-biased-technological change. Bhorat and Hodge (1999) and Edwards (2002) find that rising skill intensity of production within industrial sectors rather than changes in the sectoral composition of production are driving the overall increase in the skill intensity of production. This trend is similar to other developing economies (Berman and Machin, 2000) and is commonly attributed to skill-biased-technological change.

The structural nature of unemployment is one aspect of the problem. A further important cause of unemployment, and one that is more important in the context of this paper, is the sharp rise in the real cost of labour over the last two decades. Much of the rising labour costs have been driven by sharp real wage increases of semi- and unskilled workers. Lewis (2001) estimates that the real wage of semi- and unskilled workers increased by 150% between 1970 and 1999. Real wages of highly skilled workers declined while those of skilled workers rose by approximately 10% over the same period. [1] At the same time unemployment among semi- and unskilled workers rose from below 10% in 1970 to over 50% in 1999. [2]

While simple correlation does not prove causation, there is growing econometric evidence of a negative relationship between wages and employment in South Africa (Fallon and Lucas, 1998; Fedderke and Mariotti, 2002). Estimates of the wage-employment elasticities range between -0.5 and -0.7. Some of the decline in employment experienced since the 1980s can thus be attributed to rising real wages.

Rising real wages are not the only cause of rising labour costs. Nattrass (2000) argues that regulation in the labour market has impacted on employment levels by increasing the non-wage cost of employing labour. In a recent survey of 325 large South African manufacturing firms managers indicated that, in response to new labour market legislation, they hired fewer workers, substituted capital for labour when expanding, hired more temporary workers as opposed to permanent workers, and relied on sub-contracting (Chandra *et al.*, 2001).

The textbook solution to the unemployment problem in South Africa is

[1] Edwards and Abdi (2001) use alternative survey data and also find evidence of rising real wages of low-skilled labour during the 1980s and early 1990s.

[2] It must be noted that comparative figures such as these should be analysed with extreme caution. Prior to the 1990's data from the former TBVC states were excluded from most official statistics. This will bias estimates of unemployment during the 1980s downwards.

to lower the wage of semi- and unskilled workers. However, there are some practical (political and economical) limitations. Firstly, lowering wages is a politically sensitive issue and may not feasibly be implemented. Secondly, as Heintz and Bowles (1996) argue, it is possible to have unemployment in the long run. Wages may already be so low that no positive wage rate exists that clears the market. Thirdly, the efficiency wage argument maintains that productivity may decline as a result of lower wages. This can be as a result of nutritional reasons or a lack of incentive to work hard. Finally, wage reductions do not solve for the structural constraints to employment growth. In the long term these constraints need to be addressed through investment in human capital.

Given these problems, one possible short run alternative to encouraging wage reductions is the use of employment subsidies. The effectiveness of employment subsidies stems from the fact that they lower the wage rate faced by the firm while maintaining the real wage received by labour. Employment subsidy schemes have been used widely to address declining employment levels, both in developing and developed countries. Yet, few researchers have explored the suitability of employment subsidy schemes for South Africa (see Heintz and Bowles (1996) and Lewis (2001)). There is also interest from policymakers and policy analysts to further investigate options relating to the implementation of a wage subsidy scheme. After an initial proposal by the National Government in the 2001 Budget Review for the implementation of a 'wage incentive scheme', draft legislation for this scheme was released early in 2002.[3] Provision has also been made for the wage incentive scheme to be extended to a wage subsidy scheme in the future. Further analysis is thus pertinent.

This paper uses a Computable General Equilibrium (CGE) model for South Africa to analyse the economy-wide impact of an employment subsidy scheme. CGE models are employed extensively in policy analysis as they simulate a market economy and serve as a useful tool to analyse "cross-cutting issues" that have an economy-wide impact (Arndt and Lewis, 2000: 4). These models capture the interactions between markets and economic agents while maintaining key macroeconomic balances. They can thus be tailored around analysing specific issues such as the financing of the wage subsidy scheme.

[3]The draft legislation released in February 2002 was a proposed insertion into Act 58 of 1962 (section 12H) and entitled "Deduction in respect of learnership agreements".

In the next section we explore issues relating to the theory and implementation of employment subsidies. Section 3 provides an overview of the model with particular reference to structural features imposed to ensure adequate representation of the South African economy. The results of various simulations are compared in a comparative static fashion and are discussed in section 4. Section 5 draws general conclusions.

2 Employment subsidies: Theory and implementation

2.1 Theory

Employment subsidies aim at expanding employment by reducing the cost of labour to the employer. Typically the state subsidises the wage paid by the firm without lowering the wage received by the worker. This encourages higher labour absorption by firms, the direct employment effect of the subsidy (Heintz and Bowles, 1996). Lewis (2001) describes a further direct effect, namely an accumulation effect. This occurs when lower labour costs raise expected profits, which lead to increased capital investment. Employment is also induced indirectly. Since more workers are employed, household income increases, which in turn leads to an increase in consumption. At the same time firms are able to lower prices, thus increasing the real spending power of households. Firms increase their output to satisfy higher consumption demand, and hence demand more labour indirectly. Employment subsidies therefore have various positive downstream effects, which render them useful to address a number of issues directly and indirectly, including poverty alleviation, income redistribution, and the stimulation of private investment and aggregate demand.

Standard producer theory can be used to show the impact of an employment subsidy on the employment level of the individual firm. The firm's short-run labour demand curve is given by the downward-sloping section of the marginal revenue product (MRP) curve that falls below and to the right of the average revenue product (ARP) curve. The firm hires labour at the point where the equilibrium wage, w^*, equals MRP. When the wage is reduced by a factor δ ($\delta < 1$) the firm increases employment up to the point where $\delta w^* = MRP$. In a perfectly competitive environment all firms receiving the subsidy increase their demand for labour and hence the aggregate

labour demand curve shifts to the right.[4] Katz (1998) uses a simple partial equilibrium analysis to show the impact of a wage subsidy in the labour market for unskilled workers (see Figure 1).

Figure 1 covers two scenarios. A supply-side constraint in the labour market would suggest a horizontal supply of labour curve and hence a fixed wage (left-hand panel). A wage subsidy causes the demand for labour to shift to the right. As a result, total employment increases from L1 to L2, while the wage remains constant. The employer benefits from a lower wage and is able to use the extra 'income' from the subsidy to increase employment. This has a positive effect on overall poverty and unemployment. Aggregate households receive a higher total income since there are fewer unemployed household members. Furthermore, the *expected* wage of unemployed persons, defined as wage times the probability of finding work, increases as a result of the subsidy.

Alternatively, if the supply curve slopes upward (right-hand panel), the individual worker's wage will increase, thus counteracting the employment effect to some extent. The subsidy is shared between the worker and the firm. Under this scenario both the wage elasticity of supply and demand for labour should be taken into account to evaluate the total employment effect of the wage subsidy. The more elastic the supply curve, the greater the employment response. Generally supply elasticities are relatively high for low-wage workers (Katz, 1998), a result also expected for South Africa where unemployment among low-skilled workers is very high. This suggests that an employment subsidy scheme in South Africa could have a relatively large impact on employment.

2.2 Targeted employment subsidies

Often employment subsidies are targeted at specific labour categories or industries. Targeting tends to be associated with trade-offs. The basic targeting principle is the following: the narrower the target group is defined, the more effective it will be in reaching the intended beneficiaries. Narrow targeting also lowers the actual cost of the subsidy, as fewer beneficiaries are

[4] An alternative scenario is one where workers receive the subsidy (as opposed to firms). In this case the supply of labour curve will shift to the right. A higher wage implies that the relative cost of leisure increases, thus encouraging individual workers to increase their supply of labour. This allows the aggregate labour supply curve to shift to the right. If markets function perfectly these two effects are similar.

involved. However, narrow targeting is also associated with higher administration cost and administrative complexities. Broad targeting is much easier to administer, but the actual subsidy cost becomes much higher. The choice of targeting strategy requires a balance between administrative capacity, the breadth of the unemployment problem and the financial constraints.

In the light of declining employment and a shift in labour demand towards more skilled labour classes, there is a strong case for targeting a wage subsidy at semi- and unskilled workers. An employment subsidy will assist them in finding employment, gaining experience and increasing their employability. Once employed, the subsequent probability of entering unemployment decreases significantly, as demonstrated by Kingdon and Knight (2000). Targeted wage subsidies could, however, have the negative side effect of stigmatising targeted workers (Burtless as cited in Heintz and Bowles, 1996). Since firms do not have perfect information about workers applying for jobs they might think that targeted groups of workers are less productive than non-targeted groups, which is why they don't find employment and need government assistance to find work.

Because semi- and unskilled workers make up about 40% of the South African labour market, the cost of a 'general' subsidy targeting all these workers will be high. It is possible to reduce the cost by changing it to a 'marginal' subsidy, i.e. one that is only applicable to additional workers employed rather than all workers. One problem with a marginal subsidy is that it may encourage a high turnover of labour in order for firms to continually qualify for a subsidy. Therefore, wage subsidies should ideally be based on net changes in employment to prevent firms taking advantage of the system. Such a scheme could be particularly complex and costly from an administrative point of view (Heintz and Bowles, 1996).

An alternative/complementary approach to reducing costs is the targeting of industries. There are various factors that the policymaker can take into account when selecting industries for targeting. These range from the industry size, labour intensity, wage elasticity of demand and backward- and forward linkages (see Pauw (2002) for further details).

2.3 Payment options

A wage subsidy can be calculated as a lump sum per worker or as a fixed percentage of the wage. The subsidy can be disbursed in the form of a direct cash subsidy or a tax credit towards future obligations. Typically tax credits

are used, as these are easier to administer. The calculation and disbursement of the subsidy are not contentious issues in the literature. More contentious is the debate on whether to pay the subsidy to the employer or the employee (see footnote 5).This is also at present an important issue in the development of South African policy.[5]

In theory there is no difference between a subsidy payable to the firm or the employee. In order to make comparisons between the two approaches, one has to assume that the supply curve for labour is upward sloping. If the subsidy is payable to the employer, the 'derived' labour demand curve will shift to the right (see right-hand panel of Figure 1).The benefit of the subsidy is shared between the firm and the employee. Alternatively, if the subsidy is paid to workers, the aggregate labour supply curve will shift to the right, resulting in a new equilibrium where, as before, the benefit of the subsidy is shared between the employer and the employee. In both instances the worker earns more, the employer pays a lower wage, and employment is increased by the same margin.

However, the employment impact of a wage subsidy differs if the payment procedure (to workers or the firm) enables either the firm or the existing workers to extract the subsidy as a rent. For example, firms receive immediate windfall gains without increasing employment if they receive a subsidy for all workers employed (Heintz and Bowles, 1996). This may induce them to maintain their existing labour force size, thus rendering the subsidy scheme ineffective. This can only be monitored by implementing some form of control which forces firms to increase their workforce by some minimum level before being eligible for a subsidy. Unions can also counteract the employment generating impact by negotiating higher wages if the subsidy is paid to the firm, or prohibiting wage reductions if the wage is paid to the worker. In the extreme case the entire subsidy is extracted as a rent and firms pay the same wage as before with no direct impact on employment. The cost of the subsidy in this case is a deadweight loss, as the objective of increased employment is not realised. There might be indirect employment effects as higher household income will boost consumption demand, but these are likely to be small.

While the optimal method of payment is an important consideration that requires further analysis, this paper makes the simplifying assumption of

[5]In the development of ideas and arguments contained in the section below, the author has benefited from discussions with officials in the National Treasury.

well functioning markets. In this case the employment effect is exactly the same whether the subsidy is payable to the worker (as in this paper) or the employer. The results of the wage simulations are possibly optimistic as they do not take into account market power within product and labour markets.[6]

2.4 Financing an employment subsidy

Phelps (1994: 58) argues that wage subsidies would require a large budgetary outlay, but that savings in welfare entitlements, unemployment benefits, crime fighting, and increased tax revenue "might counterbalance the [impact on the] budget". An effective employment subsidy scheme would allow government to save on welfare outlays and generate more income- and consumption tax due to the reduction in unemployment. Whether these savings would exceed the actual subsidy cost is uncertain. The fiscal cost of an employment subsidy scheme financed purely by government can be quite substantial if employment subsidies are broadly targeted. However, the trade-off between narrow and broad targeting with regard to actual subsidisation cost and administrative cost was highlighted before. Therefore the policy choice should depend on the circumstances.

One suggested approach to funding employment subsidies is through a tax on capital (see Heintz and Bowles, 1996). The rationale behind a capital asset tax is that, in addition to the factor price ratio distortion caused by the wage subsidy, it further increases the relative price of capital. This will complement the substitution process of labour for capital initiated by the employment subsidy. If the government is reluctant to tax all capital goods it is possible to tax only certain goods, for example those capital goods that produce environmentally harmful emissions. This will limit the use of specific capital goods. Although a tax on capital assets reduces the burden on the budget and further contributes to the factor-price distortion of an employment subsidy, it could prove to be difficult to determine the value of the capital assets to be taxed. A capital tax may also be harmful to some of the high-growth capital-intensive sectors in South Africa, which could ultimately have a negative impact on the economy.

An alternative revenue-neutral financing option is an increase in income and profit tax rates. Higher household income tax rates will affect household

[6] See Pauw (2002) for simulations in which the entire subsidy is extracted as a rent by union power.

consumption spending, especially for households in high-income tax brackets. On the other hand, the beneficiaries of the employment subsidy scheme (e.g. semi- and unskilled workers) will increase consumption spending. If the net effect is a decrease in overall consumption, it could counteract the employment generating effect of the wage subsidy. Increased enterprise taxes will also counteract the impact of the wage subsidy on employment, while firms' investment levels may also be affected due to lower after-tax profits. A final financing option is deficit financing. Rather than raising capital or income tax rates, government can opt to finance the subsidy by borrowing funds on the capital market. This, however, may crowd out private investment.

The manner in which the wage subsidy scheme is financed has different repercussions for the domestic economy. In assessing the optimal approach to implementing a wage subsidy scheme it is important to compare the impact arising from these various financing options. In this study we assess the net economy-wide impact of revenue-neutral (income and profit tax increase) and deficit financing methods.

2.5 Concluding remarks

The implementation of a wage subsidy scheme has a number of economy-wide effects. Wage subsidies may reduce product prices by lowering the cost of production. This raises the real income of households and thus boosts consumption and savings. Lower prices also improve export competitiveness and this can have important effects on the domestic currency. Increased employment arising from the wage subsidy raises household income and further boosts consumption and savings. Deficit financing reduces government savings and crowds out investment. In modelling the impact of a wage subsidy scheme it is important to capture some of these inter-sectoral and macroeconomic effects.

In this paper we use a Computable General Equilibrium (CGE) model, which captures the interactions between markets and economic agents, to model various scenarios regarding the targeting and financing of a wage subsidy scheme. In the following section we discusses the methodology and data used in modelling the possible impact of an employment subsidy on the South African economy.

3 Empirical Methodology

3.1 Computable general equilibrium models[7]

General equilibrium analysis is concerned with finding a set of prices that clears all markets simultaneously. Households, producers, factors of production, the government sector, and the foreign sector are interdependent and economic agents act on market signals to solve for the economy-wide equilibrium. As a result, general equilibrium analysis can become very complicated, as choices of consumers and firms need to be co-ordinated across markets on an economy-wide basis (Estrin and Laidler, 1995). The aim of CGE models is to capture the interdependence between economic agents at a microeconomic level in a structural mathematical model that also takes various macroeconomic constraints into account.

In this paper we draw upon a generic model that was initially developed by the International Food Policy Research Institute (IFPRI) (see Löfgren *et al.*, 2001) and adapted for South Africa by Lewis (2001). The format of this standard CGE model has been used extensively in developing countries, although adjustments need to be made to ensure adequate representation of the economy being studied. Once the model is calibrated to the relevant Social Accounting Matrix of the economy, policy shocks can be simulated. A new general equilibrium is calculated, and variables are compared with the base data in a comparative static fashion. The adjustment process and the long-run dynamic effects are not captured in the model used in this analysis.

The standard CGE model works by simulating the interaction of various economic actors across markets (Robinson, 1989). Activities (or producers) maximise profits subject to a production technology. Households maximise utility subject to their budget constraints. Other agents include government and the rest of the world. The factor market is comprised of capital and labour at various degrees of disaggregation. In each case the behavioural rules of the optimising economic agents are specified in the form of equations.

In addition, equilibrium conditions or system constraints are imposed. These ensure, for example, that labour demand equals supply, commodity demand equals supply, savings equals investment, the BOP constraint holds and government income equals expenditure plus government savings. These system constraints define the equilibrium in the relevant markets. In the

[7] A more detailed discussion of the model is provided in Löfgren et al., (2001) and Pauw (2002).

neoclassical model the equilibrating variables are product and factor prices which feed back into supply and demand decisions by producers and households. In a more structuralist model, market rigidities arising from policy or institutional structures may inhibit the response of prices to market forces. To an extent these features can also be captured in the standard CGE model (see later).

The model in this analysis makes use of a "variety of substitution mechanisms" to model producers' and consumers' economic decision-making processes (Arndt and Lewis, 2000: 5). Production and consumption functions are generally modelled as constant elasticity of substitution (CES) function, which nest the Leontief, Cobb-Douglas and perfect substitution functions (see Löfgren *et al*, 2001).[8] The substitution elasticities are not solved endogenously, but are imposed from outside the model. This introduces much of the controversy surrounding CGE analysis, as the results are highly sensitive to the parameters selected (Dawkins *et al.*, 2001; McDaniel and Balistreri, 2001). The model utilised in this analysis maintains the parameters used in Lewis (2001).[9]

[8] The general form of the CES function is the following (see Varian, 1992):

$$y = [\alpha_1 x_1^{\rho} + \alpha_2 x_2^{\rho}]^{\frac{1}{\rho}}$$

In the function above y denotes the output, α_1, α_2 and ρ are parameters and x_1 and x_2 are the two factors of production. The elasticity of substitution is calculated as $\sigma = 1/(1-\rho)$. The CES function is versatile in that it nests various functions with differing degrees of substitutability between factors, e.g. the Leontief production function ($\sigma = 0$), the Cobb-Douglas production function ($\sigma = 1$) and the perfect substitution production function ($\sigma = \infty$).

[9] The elasticity of substitution values for the CES functions range between 0.75 to 4. The elasticity of transformation for the constant elasticity of transformation function that allocates production between export and domestic goods equals 2. The Armington elasticities, which determine the substitution between domestic and imported goods and have drawn the most criticism (McDaniel and Balistreri, 2001), equal 2. This elasticity is relatively unimportant in this study, as the prices of imported relative to domestic goods do not change substantially. The results of the analysis appear robust to changes in the Armington elasticity.

3.2 Model closures, structural features and parameter estimates

The model used in this analysis is "Walrasian and neoclassical in its truest form", but it is possible to incorporate certain "structural rigidities" (Robinson, 1989: 894). Often in developing countries the assumptions of perfect competition and perfectly functioning markets have to make way for more realistic non-neoclassical behavioural assumptions, such as macro imbalances and institutional rigidities. In this section we outline specific structural features and parameter values imposed on the model to ensure as close a representation of the South African economy as possible.[10]

The first process in constructing a representative CGE model is to calibrate it to domestic data. Because basic data drawn from various sources do not generally satisfy the general equilibrium conditions of the model, it is necessary to choose values for particular parameters such that the model replicates a consistent equilibrium data set, the benchmark data set (Dawkins *et al.*, 2001). This process is known as calibration. In this case the model is calibrated using a South African SAM for 1997.[11] The SAM consists of 21 production sectors, 14 household categories, and 4 classes of labour, namely professional (14%), skilled (30%), semi- and unskilled (40%) and informal labour (16%). This enables a reasonable assessment of the production, household and employment impacts arising from a wage subsidy.

It is also important to select closures to ensure that the macroeconomic constraints hold: Balance of Payments, savings-investment, government income-expenditure and factor supply-demand. The behaviour of CGE models depends crucially upon the model's description of the causal linkages in the macroeconomic system. To ensure adequate representation of the relevant economy "*the model's 'closure' has to be chosen and justified on the basis of empirical and institutional analysis of the economy at hand*" (Taylor, 1990: 7). This is important as "preliminary experiments suggest that the choice of the macroclosure 'matters' " (Decaluwe et al., 1988: 71. See also Adelman and Robinson, 1988).

Behind the choice of closures lie a number of different theoretical paradigms. The standard CGE model, although neoclassical in origin, is versatile

[10] Macroeconomic closures and certain parameter values need to be imposed as the system is overidentified.

[11] This SAM was developed by WEFA, a global economics consulting firm, and is based on the SARB's national statistics for 1997.

enough to incorporate limited structural features of an economy. However, the model still retains essential neoclassical features: economic agents substitute in response to relative price shocks, decisions are based on real values and prices in general adjust to clear markets. The adjustment processes within the model will, thus, differ substantially from structuralist models, such as that of Gibson (2000), for South Africa. Further, the policy conclusions arising from neoclassical and structuralist models will necessarily differ (Gibson and Van Seventer, 2000).

The model includes three macroeconomic balances, namely the government balance, the external balance and the savings-investment balance. The following closures were selected for each of these:

Government budget: The government balance ensures that the budget deficit (negative savings) or surplus remains equal to the difference between government revenue and expenditure. We model two closures. In the first closure, government savings are flexible. An increase in the government expenditure (*ceteris paribus*) is financed by an increase in government borrowing which raises the deficit. Alternatively, a 'balanced budget' closure is modelled. Under this closure taxes on households and enterprises are allowed to vary in order to maintain the budget deficit of the base model. In all simulations we assume government expenditure on goods and services (excluding the cost of the subsidy) are fixed. Government revenue varies as tax receipts change due to changes in income or consumption and in the balanced budget case due to changes in average tax rates.

External balance: The external balance (balance of payments) ensures that the domestic value of foreign currency receipts match local currency outflows. Capital flows as well as trade flows are included. We model a flexible exchange rate regime with foreign savings assumed fixed. This reflects the flexible exchange rate regime of the South African Reserve Bank (SARB). As the trade balance changes, the exchange rate adjusts to maintain the Balance of Payments.[12]

Savings-investment balance: In the model savings equal investment. An investment function is not modelled explicitly and current period investment does not feed into changes in the capital stock, i.e. the medium-term dynamics are not captured. The savings-investment closure can be modelled in two ways. In an investment-driven model institutions (households and

[12] In an alternative closure the exchange rate can be fixed and the Balance of Payments equilibrium will be maintained through changes in the flow of foreign savings.

firms) change their marginal propensity to save (MPS) in order to meet targeted investment levels. The level of investment is therefore exogenous. The equilibrating process differs slightly from a Keynesian style model as the required savings are realised through changes in the propensity to save rather than increases in national income. If unemployment is modelled some of the required savings will be generated via increased employment and national income. Alternatively, a neoclassical savings-driven closure can be modelled. In this case investment is endogenous and responds to changes in aggregate savings. Aggregate savings is the sum of institutions' savings, government (dis-)saving, foreign savings and enterprise savings. In the simulations presented in this study, the neoclassical savings-driven closure was selected.

The standard neoclassical model assumes full employment in all factor markets. However, this assumption is not valid for semi- and unskilled workers in South Africa. To model semi- and unskilled unemployment we assume a fixed real wage and an unlimited supply of labour at this wage (i.e. the left-hand diagram of Figure 1). This assumes that the wage elasticity of supply is infinite. We assume all other sub-classes of labour (professional, skilled and informal workers) are mobile and fully employed at flexible wages.

In the neoclassical model, capital is assumed to be fully employed and mobile across sectors. In the long run this assumption may be valid. However, in the short term rigidities prohibit both the re-allocation of capital across sectors and substantial changes in the capital stock. In this paper we take the short-run approach and assume firms (and by extension industries) are unable to adjust the level of capital stock employed in the production process. Capital is thus activity specific.

A further structural feature was introduced in the mining sector. Most analyses on South Africa using CGE models (Arndt and Lewis, 2000; Lewis, 2001; Thurlow, 2002) assume that South African producers and consumers are price-takers in the international market. This assumption is valid for most South African commodities, but is questionable for certain mining products (especially diamonds, coal, gold and uranium ore) given South Africa's dominance in world trade of these products. Thus, in contrast to the standard treatment of exporting industries, mining sector exports are modelled as a function of the relative price of world exports and foreign substitute goods.[13]

[13] Export demand is defined as a function of the relative price of South African exports to foreign exports. Following McDonald (2002) the elasticity of demand for exports in the mining sector is assumed to equal 2.

Initial simulations have shown that a failure to model mining in this fashion results in overwhelmingly large increases in exports (over 25 %) and employment (over 40 %) in the mining sector.[14]

4 Simulation set-up and results

A general wage subsidy reduces the wage paid by the firm, while maintaining the wage earned by the employee. This is modelled by lowering the wage rate in the firm's profit maximising equation ($w^* = MRP$), while maintaining the wage level in the factor income equation (wage times quantity of labour employed). As discussed, firms respond to lower wages by increasing employment to the point where the subsidised wage is equal to the marginal revenue product (MRP). This causes in an outward shift in the aggregate demand for labour curve (as shown in Figure 1).

We use the standard CGE model adjusted to South Africa to perform three wage subsidy simulations. In all the simulations government subsidises 10% of the wage of semi- and unskilled workers. The transfer from government to firms is therefore 10% of the total income (wage bill) of semi- and unskilled workers. The "cost of the subsidy" varies depending on the employment impact of each scenario. Previously employed individuals gain nothing from the subsidy as they still earn the same wage as before. However, newly employed (formerly unemployed) individuals gain in the form of a wage income. In the analysis that follows we discuss the following simulations:

1. In the first simulation the subsidy is granted to all industries and financed via a budget deficit, i.e. the state borrows funds to pay for the subsidy.

2. In the second simulation the subsidy is granted to all industries, but is financed via an endogenous increase in direct taxes on institutions. Households thus pay a higher average income tax and firms pay higher profit taxes. This is the so-called balanced budget closure.

[14]The significant increase in mining exports is driven by unrealistic reductions in the domestic price of gold products which given fixed world prices raises the export price relative to the domestic price. The significant reduction in the domestic price is largely driven by low (almost zero) domestic consumption of gold products that would otherwise counteract the decline in domestic prices through increased consumption.

3. The third simulation assumes a balanced-budget closure, but industry targeting takes place. Four industries were targeted: (1) agriculture, forestry & fishing, (2) textiles & apparel, (3) leather goods & footwear, and (4) wood & furniture.

The results of the various simulations are summarised in Table 2, Table 3 and Table 4.

4.1 Simulation 1: 10% wage subsidy with deficit financing

This simulation models a scenario where government subsidises 10% of the wage of all semi- and unskilled workers in all industries. Government finances the scheme by increasing the budget deficit. As expected the effect of the wage subsidy is an increase in semi- and unskilled employment in all sectors (Table 3 and Figure 2). The increase in employment of semi- and unskilled labour ranges from a low of 2.8% in the construction industry to a high of 11.1% in the medical and health services sector, with an economy-wide average increase of 8.7%. Full employment of all other classes of labour (and capital) is imposed by assumption. However, an increase in demand for labour in response to improved output growth raises the wage rates of professional workers (0.74%), skilled workers (1.07%) and informal workers (0.80%).

Output increases in most industries with the exception of the construction industry. The economy-wide increase in production is equal to 1.1%. This increase in production is mainly driven by a 2.3% growth in domestic consumption demand (Table 2).Due to lower production costs associated with the lower wage paid by the firm, domestic prices for most products decline.[15] This affects the export-domestic price ratio, causing firms to shift production towards the export market. Particularly high growth in exports is experienced in labour-intensive industries where the wage subsidy has a relatively large impact on domestic prices. At the same time consumers demand more domestic produced goods in response to a rise in the relative price of imports. The joint effect of increased exports and lower imports

[15] A weighted index of domestic prices is selected as the numéraire. Thus, not all commodity prices can decline. Relatively large domestic price declines are experienced in sectors with large shares of semi- and unskilled labour while price increases are experienced in most service related activities.

leads to a positive effect on the balance of payments. Since foreign savings are fixed, the exchange rate appreciates by 1.2% to correct the imbalance on the foreign account. Overall, rising import prices as well as the domestic price of services lead to a (negligible) 0.2% increase in the CPI (Table 2).

The significant employment effect of the wage subsidy has an important impact on household income levels. Since relatively poor households (often defined as the first four income deciles) derive most of their income from semi- and unskilled wages, these households benefit the most from the subsidy. Although wages of semi- and unskilled workers remain constant, more individuals are employed in every representative household group (or decile), thus increasing the income of the group as a whole. High-income households also experience an increase in their incomes, mainly via the increase in wages of other labour classes from which they derive most of their income. Relatively speaking the increase in the income of high-income households is slightly less than for low-income households (Table 4 and Figure 3).The wage subsidy is therefore effective in reducing inequality by favouring poor households more than it favours the rich. The growth in consumption demand is mainly spurred by the increase in household income, with low-income households able to increase consumption slightly more (in relative terms) than high-income households.

The government budget closure selected has various important indirect effects. In order to finance the subsidy, government has to increase its borrowings by R6.1 billion or 28.0% (Table 2). This translates into an increase in the deficit from 3.0% to 3.8% of GDP. Roughly 68% of the subsidy cost is financed via this deficit increase. The remainder of the R9.1 billion cost of the subsidy (1997 prices) is financed via increased tax receipts. Although the various direct and indirect tax rates remain unchanged in this simulation, the higher household income and consumption demand allows government to increase its revenue from direct taxes, consumption taxes and excise taxes. Overall government revenue increases by 1.7%.

The large increase in the budget deficit has an important impact on national savings. Despite small increases in enterprise and household savings, national savings decrease by 3.8% (Table 2). By assumption investors can only draw or borrow funds for investment from the pool of savings. Due to the savings-investment closure selected, the level of investment is determined by the change in the level of savings, i.e. investment is 'savings-driven'. Therefore, when the pool of savings in the economy decreases by 3.8%, investment

also decreases by the same percentage.[16]

Investment is modelled as expenditure on goods and services in the economy. Thus, a decline in investment negatively affects the demand for goods and services. Typically industries that supply investment-type goods, such as the construction industry and the machinery and equipment industry, are hardest hit by sharp decreases in investment demand. The drop in demand has an adverse effect on employment (the so-called indirect employment effect of the wage subsidy) in all industries, but especially those that specialise in investment goods (construction industry). However, the dominating effect remains the direct employment effect of the wage subsidy, as well as a positive indirect employment effect associated with the increase in private consumption.

Since the model is comparative static, the decline in investment does not affect the growth potential of the economy in the short run. GDP growth is measured at 0.8%. It is generally recognised that poor investment growth will have a detrimental effect on the growth of capital stock and GDP growth in the long run. These important affects are not captured in this model.

4.2 Simulation 2: 10% wage subsidy with balanced budget

In the second simulation government raises taxes on enterprises and households in order to finance the increased government expenditure on the wage subsidy scheme.

As in the previous simulation, employment of semi- and unskilled labour responds positively to the wage subsidy, rising by 9.0 % on average (Figure 2 and Table 3).Important sectoral differences from the deficit-financed simulation emerge, with relatively high employment growth experienced in industries that typically supply investment goods (construction, machinery & equipment). The services sectors and those supplying 'normal' consumption goods have a slightly lower employment effect (Figure 2).The differences between the deficit-financed and balanced budget simulations reflect the composition effects arising from higher domestic investment combined with lower disposable income in the latter simulation. As before, an increase in demand

[16]Note that fixed investment declines by 4.0%, while the 'change of inventories' entry in the GDP table is 1.4%. The figure of -3.8% is a weighted average of these two numbers (see Table 2).

for the other fully employed classes of labour leads to a rise in their nominal wages.

Output increases by 1.3%, which is also slightly higher than before. As in the previous simulation, firms shift production towards the export market, while consumers substitute domestic goods for imported goods. Exports and imports increase by approximately 0.8% with the higher import impact partly reflecting improved investment that is relatively import intensive. The currency appreciates (0.8%) but slightly less than before.

The increase in household income levels is also very similar to the previous simulation (Table 4).All households experience an increase in income, with lower-income households benefiting more from the subsidy. However, clear differences between the simulations emerge when comparing consumption levels (Figure 3).Consumption in low-income households rises by similar amounts in both simulations. In contrast, consumption of middle-income and high-income households is significantly lower in the balanced budget simulation. This difference reflects the impact of increased taxes on disposable income within these households.

The total cost of the subsidy is R9.2 billion (Table 2), which is marginally higher than the first simulation. In order to finance the subsidy the direct tax rates on institutions need to be raised by 5.4%. As a result of this tax rate increase, as well as the 2.1% overall increase in real household income (Table 4), direct tax receipts increase by 7.4%. Increases in excise, import and consumption taxes also contribute to the higher government revenue. Government revenue receipts from all sources together increase by 5.1%. If indirect taxes had not increased, (endogenous) direct taxes would have had to increase more to balance the budget.

With an assumed fixed savings rate and higher income, household and enterprise savings are slightly higher, contributing to the 0.6% increase in national savings. This allows investment to increase by the same percentage via the savings-driven investment closure. Fixed investment increases by 0.6%, while the change in inventories is 1.6%. The impact of higher taxes is clear when comparing the growth in consumption demand, which now 'only' increases by 1.3%, compared to the 2.3% increase before. However, the shift towards investment made possible by increased savings contributes towards GDP, which increases by 0.9% in this simulation.

4.3 Simulation 3: Targeted 10% wage subsidy with balanced budget

Four industries were targeted in this simulation. The agriculture, forestry & fishing industry is the largest employer of unskilled workers. It also has a fairly low capital-labour ratio and a high labour-output coefficient for unskilled workers. The other targeted industries, namely textiles & apparel, leather goods & footwear, and wood & furniture may not be very large in terms of their employment or value-added structures, but they have low capital-labour ratios and high labour-output coefficients. These factors make these industries suitable for targeting.[17] The targeted industries together employ roughly one third of all semi- and unskilled workers in the economy.

Total semi- and unskilled employment increases by 2.4% (Table 2). Compared to the previous simulations, the increase in semi- and unskilled employment is smaller in all the targeted industries. This is due to the indirect employment effects that were lost because fewer industries were included in the wage subsidy scheme. By excluding certain industries inter-industry employment multipliers are reduced. Further, lower increases in household income reduce the consumption expenditure impact on output. However, it is equally interesting to see that most of the other non-targeted industries still report increased employment levels, despite not receiving a subsidy. This is due to the multiplier effect in the economy as well as the indirect employment effect of increased investment and consumption. As expected, output growth is lower for all industries when the subsidy is targeted at a few select industries.

Households are affected in a similar way as before, although the impact on income and consumption is much smaller (Figure 3). Low-income households are again favoured by the subsidy and high-income households experience almost no increase in consumption. As a result of the higher income levels, households and enterprises save more and overall national savings increase by 0.1%. This allows investment to increase by the same percentage. Private consumption increases by 0.2% and exports and imports increase by 0.1% and 0.2% respectively. The growth in GDP is 0.2%.

Government revenue increases by 0.7%, with direct tax rates adjusted upwards by 0.7% to fund the subsidy cost of R1.3 billion (1997 prices). Just

[17] Note that the selection of industries here was not necessarily done in any systematic way.

more than 87 000 jobs are created. Under the non-targeted scenario the cost was R9.2 billion, while just over 324 000 jobs were created. Some interesting comparisons are shown in Table 1. In the non-targeted simulation with a balanced budget, the per capita subsidy cost was R2 328. This drops significantly to R927 when selected industries are targeted. The lower subsidy per worker reflects lower wages for semi- and unskilled workers in the targeted industries than in the remaining industries.[18] An alternative measure of the efficiency of the subsidy is the cost per job created, which is almost half the cost of the non-targeted scenario (R14 826 vs R28 259) (see Table 1). The results suggest that, despite the smaller economy-wide impact, the targeted subsidy is the most efficient strategy.

5 Conclusions

Unemployment has reached extremely high levels during the last decade, especially among semi- and unskilled workers. Some of this unemployment is structural in origin. Capital biased strategic intervention in the economy and poor education policies combined with skill-biased-technological change have negatively affected employment of less-skilled labour. However, rising real wages of semi- and unskilled workers have also arguably contributed to rising unemployment levels.

In this paper we evaluate the impact on employment of a wage subsidy scheme currently being considered by the South African government. Employment subsidies aim to increase employment levels directly by subsidising the wage paid by the employer. This counteracts the effect that increased labour costs have on employment levels and encourages firms to hire more workers. Apart from the direct employment effect of employment subsidies, various indirect effects also exist. Changes in the cost of production arising from the employment subsidy scheme affect export and import performance. Wage income generated through increased employment can have a demand stimulus effect on the economy. This, however, depends on the manner in which the employment subsidy scheme is financed. If financed through deficit spending, domestic savings will decline which negatively affects investment. If financed through increased taxation, disposable income of wealthy house-

[18] Wages of all semi- and unskilled workers are fixed by assumption, but provision is made in the standard CGE model for industry specific wages via the use of a so-called wage distortion parameter.

holds may decline. These economy-wide impacts suggest the use of general equilibrium models to simulate the economic impact of various wage subsidy schemes.

CGE models should, however, be used with caution, as model assumptions regarding various market closures and elasticities can have significant effects on the results. In this paper we use a CGE model with strong neoclassical foundations to evaluate the impact of various wage simulation scenarios. In constructing the model we impose various restrictions in order to adequately represent certain structural features of the South African economy. In particular, we model the presence of unemployment amongst semi- and unskilled labour. We also model a flexible exchange rate regime and impose a saving driven investment closure. Finally, we model an export demand function for the mining sector (largely gold and platinum) to reflect South Africa's international importance in this sector.

Three scenarios were simulated: a deficit financed wage subsidy scheme, a balanced budget wage subsidy scheme and a targeted wage subsidy scheme. In all simulations semi- and unskilled wages were subsidised by 10%. The results of the various simulations provided some interesting comparisons.

The deficit financed and balanced budget wage subsidy simulations had similar outcomes on employment levels. In each case total employment of semi- and unskilled labour rose by approximately 9% (324 000 jobs). This implies a general equilibrium wage elasticity of approximately -0.9, which is slightly higher than the econometric based partial estimates for South Africa that range between -0.5 and -0.7.

The different approaches to financing the wage subsidy have important composition effects. The deficit financed option increases the budget deficit, which in turn reduces national savings. This impacts negatively on private fixed investment. In the balanced budget option direct household and enterprise taxes are raised endogenously to cover the subsidy cost. Investment does not decline, but household consumption, particularly in high-income households, declines relative to the deficit-financed simulation. Important sectoral differences arise as a result. Output and employment growth in investment-intensive sectors such as construction and machinery & equipment is higher in the balanced budget simulation than the deficit financed simulation.

The targeting of labour-intensive industries reduces the cost of the subsidy significantly, but at the expense of employment gains. A 10 % wage subsidy in agriculture, forestry & fishing, textiles & apparel, leather goods & footwear,

and wood & furniture raises employment of semi- and unskilled labour by 2.4 % or 87 000 jobs. However, we show that it is more efficient to target industries that are responsive to real wage changes and have lower average wages, as this reduces the per capita cost of the subsidy as well as the cost per job created. As progressively more industries are added to the target group, industries with higher average wages and lower wage elasticities of demand are included, thus reducing the effectiveness of the wage subsidy. The targeted wage subsidy thus yields the more efficient outcome.

The results suggest that a wage subsidy scheme can have a substantial positive impact on employment in South Africa. It is thus one possible approach that can be used to help alleviate the unemployment problem in South Africa. However, some caveats remain. The employment subsidy targets wage induced unemployment and not structural unemployment. Structural unemployment arising from skill-biased-technological change requires investment in human capital accumulation. If initiated, the wage subsidy scheme ought to be seen as a temporary measure to alleviate unemployment in the short run while alternative long-run policies (such as investment in education) facilitate labour market adjustments to correct for structural unemployment.

The effectiveness of a wage subsidy scheme also needs to be considered relative to alternative policies. For example, will a policy of increased investment in social infrastructure combined with a basic income grant yield a superior result? Rather than attempting to influence employment through distorting relative factor payments, it may be better for the government to directly target social infrastructure such as education, roads, harbours, etc. The negative welfare impacts arising from unemployment may be alleviated through direct grants. These alternatives need to be assessed in conjunction with a wage subsidy scheme. This is particularly important as the wage subsidy scheme, particularly a targeted scheme, may be characterised by high administration costs. Administration costs are not modelled in the current simulations and as result the subsidy cost per employment gained is likely to be underestimated.

Alternative measures that shift out the demand curve for less skilled labour also need to be considered. The wage subsidy leads to a shift down the firm's labour demand curve. An alternative approach is to shift out the labour demand curve, i.e. increase labour demand at all wage levels (Nattrass, 2000). Export markets are potentially an important source of demand for South African products, and thus labour demand (Fields, 2000). Factors that restrict export growth need to be explored. Edwards and Golub (2002),

for example, find that rising unit labour costs have a large negative impact on export growth. Improved productivity combined with wage moderation will improve labour demand through export growth.

Finally, the current simulations assume that economic agents within the labour or product market do not capture the wage subsidy as a rent. In alternative simulations Pauw (2002) finds that the employment impact declines to zero when the subsidy is fully captured as a rent. The model assumptions also influence the outcomes. As noted the model is neoclassical in origin. Structuralist models such as that of Gibson (2000) may give alternative results. The impact of wage subsidies using these alternative models also needs to be explored.

In conclusion, it is clear that under conditions of well-functioning labour markets a wage subsidy scheme could have positive effects on employment and various other economic aggregates. Increased consumption, investment, income, savings and employment could contribute towards higher output and GDP. The method of financing as well as the scope of the subsidy can potentially have important indirect effects and should be considered carefully. However, it is important to realise that wage subsidy schemes are only one of a possible array of policy options to reduce unemployment. Careful evaluation of the alternatives is important prior to the implementation of a wage subsidy scheme.

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Table 1: Total subsidy cost and per capita subsidy cost	
Wage subsidy with balanced budget, no targeting (Simulation 2)	
Number of semi- and unskilled workers in base	3,612,068
Total number of semi- and unskilled after subsidy	3,936,300
Jobs created	324,232
Total subsidy cost	R9.2 billion
Per capita subsidy cost	R 2,328
Cost per job created	R 28,259
Wage subsidy with balanced budget, targeting (Simulation 3)	
Total number of semi- and unskilled after subsidy	3,699,251
Jobs created	87,183
No. of semi- and unskilled workers in base (targeted industries)	1,072,043
Number of workers receiving subsidy (targeted industries)	1,393,900
Jobs created in 5 industries	83,300
Total subsidy cost	R1.3 billion
Per capita subsidy cost	R 927
Cost per job created	R 14,826

Note: In the case of a 5% subsidy, the estimated cost of the full subsidy falls to about R4.4 billion, slightly less than half the cost of a 10% subsidy.

Table 2: Aggregate price data, savings-investments; government accounts, factor demand and GDP							
		Actual figures			Percentage changes		
	Base	Deficit financing	Balanced budget	Targeted	Deficit financing	Balanced budget	Targeted
Aggregate Price Data							
Exchange rate (EXR)	1.00	0.99	0.99	1.00	-1.2%	-0.8%	-0.1%
Consumer prices (CPI)	1.00	1.00	1.00	1.00	0.2%	0.1%	0.0%
Domestic prices (DPI)	1.00	1.00	1.00	1.00	0.0%	0.0%	0.0%
Savings-Investment Components							
Savings	115,818	111,460	116,557	115,972	-3.8%	0.6%	0.1%
Household savings	6,883	7,025	6,942	6,895	2.1%	0.9%	0.2%
Enterprise savings	120,547	122,330	121,305	120,703	1.5%	0.6%	0.1%
Government savings	-22,039	-28,202	-22,039	-22,039	28.0%	0.0%	0.0%
Foreign savings	10,427	10,307	10,348	10,413	-1.2%	-0.8%	-0.1%
Investment	115,818	111,460	116,557	115,972	-3.8%	0.6%	0.1%
Household investment	8,461	8,125	8,512	8,473	-4.0%	0.6%	0.1%
Enterprise investment	89,714	86,150	90,250	89,845	-4.0%	0.6%	0.1%
Government investment	13,104	12,584	13,183	13,123	-4.0%	0.6%	0.1%
Stock changes	4,539	4,601	4,612	4,530	1.4%	1.6%	-0.2%
Investment adjustment factor	1.00	0.96	1.01	1.00	-4.0%	0.6%	0.1%
Government Accounts							
Total Budget Revenue	177,947	180,894	187,109	179,239	1.7%	5.1%	0.7%
Direct taxes	113,340	115,498	121,679	114,502	1.9%	7.4%	1.0%
Excise tax	9,103	9,120	9,166	9,094	0.2%	0.7%	-0.1%
Import tax	5,619	5,589	5,657	5,623	-0.5%	0.7%	0.1%
Consumption tax	53,224	53,988	53,922	53,355	1.4%	1.3%	0.2%
Transfer (from ROW)	-3,339	-3,300	-3,314	-3,335	-1.2%	-0.8%	-0.1%
Tax adjustment factor	1.000	1.000	1.054	1.007	0.0%	5.4%	0.7%
Total Budget Expenditure	199,986	209,096	209,149	201,279	4.6%	4.6%	0.6%
Government consumption	177,054	177,054	177,054	177,054	0.0%	0.0%	0.0%
Cost of subsidy	0	9,110	9,163	1,293			
Transfers	22,932	22,932	22,932	22,932	0.0%	0.0%	0.0%
Budget deficit	-22,039	-28,202	-22,039	-22,039	28.0%	0.0%	0.0%
Budget deficit as % of GDP	3.0%	3.8%	3.0%	3.0%	27.0%	-0.8%	-0.2%
Factor Demand							
Capital stock	1,398,818	1,398,818	1,398,818	1,398,818	0.0%	0.0%	0.0%
Labour (thousands of workers)	9,098	9,414	9,422	9,185	3.5%	3.6%	1.0%
Labour - professional	1,237	1,237	1,237	1,237	0.0%	0.0%	0.0%
Labour - skilled	2,763	2,763	2,763	2,763	0.0%	0.0%	0.0%
Labour - unskilled	3,612	3,928	3,936	3,699	8.7%	9.0%	2.4%
Labour - informal	1,486	1,486	1,486	1,486	0.0%	0.0%	0.0%
Real GDP							
Private consumption	431,072	441,046	436,654	432,069	2.3%	1.3%	0.2%
Government consumption	177,054	177,054	177,054	177,054	0.0%	0.0%	0.0%
Fixed investment	111,279	106,859	111,944	111,442	-4.0%	0.6%	0.1%
Change in inventories	4,539	4,601	4,612	4,530	1.4%	1.6%	-0.2%
Exports	168,415	168,265	169,679	168,657	-0.1%	0.8%	0.1%
Imports	-160,716	-160,655	-162,039	-160,968	0.0%	0.8%	0.2%
Gross Domestic Product	731,643	737,170	737,906	732,785	0.8%	0.9%	0.2%

Table 3: Sectoral output and factor use: percentage changes

Sector	Wage subsidy (deficit financing)			Wage subsidy (balanced budget)			Targeted Subsidy		
	Output	Employment semi- & unskilled	Total Employment	Output	Employment semi- & unskilled	Total Employment	Output	Employment semi- & unskilled	Total Employment
Agriculture, forestry and fishing	2.3%	10.0%	9.1%	2.1%	9.5%	8.6%	1.7%	7.7%	6.9%
Mining and quarrying	2.7%	8.2%	6.2%	2.9%	8.7%	6.7%	-0.1%	-0.2%	-0.2%
Food processing	2.2%	9.9%	5.9%	1.9%	9.2%	5.2%	0.6%	1.5%	1.4%
Textiles and apparel	4.6%	9.0%	7.0%	4.5%	8.8%	6.7%	4.1%	7.8%	5.9%
Leather goods and footwear	4.7%	9.9%	8.5%	4.6%	9.4%	8.1%	4.2%	8.5%	7.2%
Wood and furniture	2.8%	7.6%	4.7%	3.4%	8.8%	5.9%	3.0%	7.7%	5.0%
Paper and printing	0.8%	8.3%	2.8%	0.9%	8.5%	2.9%	0.1%	0.4%	0.2%
Petroleum products	1.1%	10.3%	5.0%	0.9%	9.7%	4.4%	0.0%	0.2%	0.1%
Chemicals	1.0%	9.0%	3.7%	1.1%	9.3%	4.0%	0.1%	0.3%	0.2%
Rubber, glass, plastic, non-metal	1.2%	6.3%	3.3%	1.8%	8.1%	5.0%	0.1%	0.3%	0.2%
Basic metals	1.2%	6.6%	3.1%	2.0%	8.2%	4.7%	-0.1%	-0.1%	-0.2%
Machinery and equipment	0.6%	5.9%	2.0%	2.4%	8.9%	4.8%	-0.2%	-0.2%	-0.2%
Electricity, gas and water	1.7%	10.9%	6.2%	1.6%	10.6%	5.8%	0.1%	0.3%	0.2%
Construction	-1.0%	2.8%	-2.1%	1.8%	7.6%	2.3%	0.1%	0.2%	0.1%
Trade	1.1%	10.0%	2.7%	1.1%	9.9%	2.6%	0.1%	0.4%	0.2%
Tourism	1.2%	10.5%	2.6%	0.6%	9.3%	1.5%	0.1%	0.3%	0.2%
Transport and storage	1.0%	8.8%	2.5%	1.1%	9.3%	2.4%	0.0%	0.1%	0.1%
Financial and business services	0.5%	10.6%	1.6%	0.3%	10.1%	1.0%	0.0%	0.3%	0.1%
Medical and health services	0.9%	11.1%	2.4%	0.4%	9.9%	1.2%	0.1%	0.3%	0.2%
Social and personal services	2.9%	10.1%	5.5%	1.9%	9.0%	4.4%	0.1%	0.2%	0.1%
General government & other	0.4%	8.3%	0.7%	0.4%	8.3%	0.7%	-0.1%	0.0%	-0.1%
TOTAL/AGGREGATE	**1.1%**	**8.7%**	**3.5%**	**1.3%**	**9.0%**	**3.6%**	**0.2%**	**2.4%**	**1.0%**

Table 4: Household consumption, cost of living and real income: percentage changes									
	Wage subsidy (deficit financing)			Wage subsidy (balanced budget)			Targeted subsidy (balanced budget)		
Household percentiles	**Real consumption**	**Cost of living**	**Real income**	**Real consumption**	**Cost of living**	**Real income**	**Real consumption**	**Cost of living**	**Real income**
HH 0-10%	3.0%	0.0%	3.0%	3.2%	-0.1%	3.2%	0.7%	-0.2%	0.7%
HH 10-20%	2.5%	0.0%	2.5%	2.6%	-0.1%	2.7%	0.6%	-0.2%	0.6%
HH 20-30%	3.2%	0.0%	3.2%	3.2%	-0.1%	3.4%	0.7%	-0.2%	0.7%
HH 30-40%	3.0%	0.0%	3.0%	2.9%	-0.1%	3.2%	0.6%	-0.2%	0.6%
HH 40-50%	3.2%	0.1%	3.2%	2.9%	-0.1%	3.4%	0.6%	-0.2%	0.7%
HH 50-60%	3.1%	0.1%	3.1%	2.7%	-0.1%	3.3%	0.6%	-0.2%	0.6%
HH 60-70%	3.0%	0.1%	3.0%	2.4%	0.0%	3.1%	0.5%	-0.1%	0.6%
HH 70-80%	2.6%	0.1%	2.6%	1.9%	0.0%	2.7%	0.4%	-0.1%	0.5%
HH 80-90%	2.0%	0.1%	2.0%	0.9%	0.0%	2.0%	0.2%	0.0%	0.4%
HH 90-95%	1.7%	0.2%	1.7%	0.5%	0.1%	1.7%	0.1%	0.0%	0.3%
HH 95-96.25%	1.7%	0.2%	1.7%	0.7%	0.1%	1.8%	0.1%	0.0%	0.3%
HH 96.25-97.5%	1.5%	0.3%	1.5%	0.4%	0.2%	1.4%	0.1%	0.0%	0.2%
HH 97.5-98.75%	1.6%	0.2%	1.6%	0.2%	0.1%	1.4%	0.1%	0.0%	0.2%
HH 98.75-100%	1.3%	0.3%	1.3%	-0.2%	0.2%	0.7%	0.0%	0.0%	0.1%
TOTAL	**2.1%**	**0.2%**	**2.1%**	**1.2%**	**0.1%**	**2.1%**	**0.3%**	**-0.1%**	**0.4%**

Figure 1: Labour demand analysis – market for unskilled workers

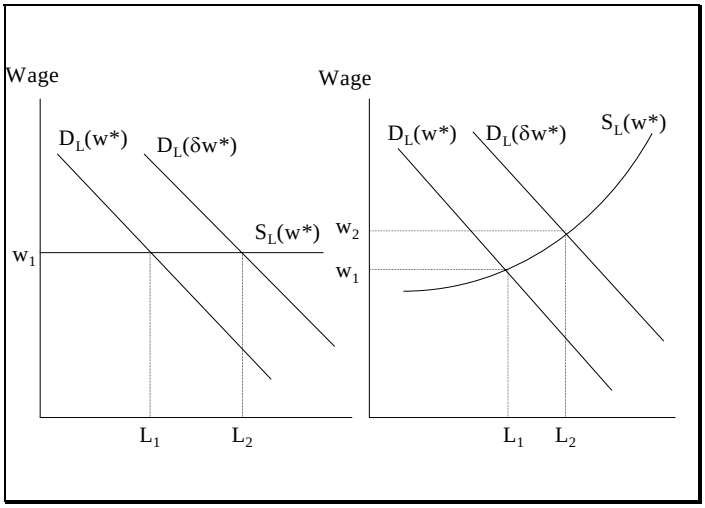

Figure 2: Employment effects of a 10% wage subsidy across different sectors

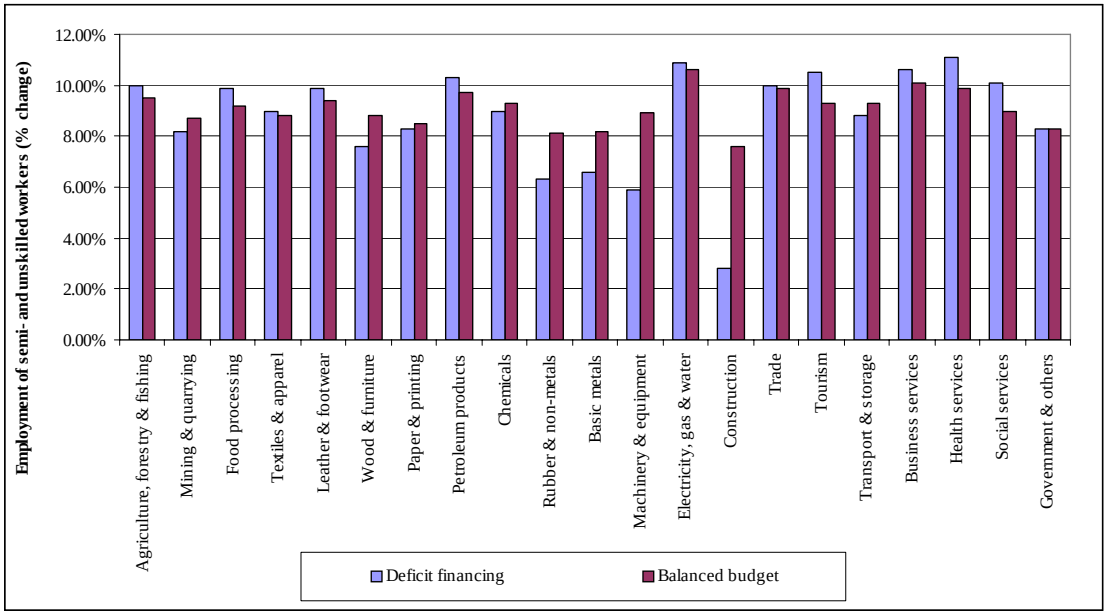

Figure 3: Real consumption changes across different household groups