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Wage Subsidies to Combat Unemployment and Poverty

Assessing South Africa's Options

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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Contents

List of Tables

List of Figures

ABSTRACT

Wage or employment subsidies have been used in both developed and developing countries to raise employment levels. Various advisers to the South African government have endorsed wage subsidies as a policy measure to deal with this country's massive unemployment problem. This paper takes stock of the international literature and conducts an economywide macro-micro analysis to obtain insights into wage subsidy design and implementation issues facing developing countries. It also investigates whether this policy measure is appropriate in dealing with South Africa's particular sources of unemployment. We argue that although wage subsidies may be successful at creating jobs in South Africa, they should not be seen as the primary or dominant policy instrument for dealing with the broader unemployment problem. To enhance the effectiveness of wage subsidies, they should preferably be linked to structured workplace training, be targeted to industries where employment will be responsive to changes in labor costs, and be focused on the youth. In the long run, addressing unemployment in South Africa requires policies that improve economic growth and the economy's employment absorption capacity, that raise skills of new labor market entrants, that reduce labor market rigidities, and that promote effective job search, especially among the youth.

Keywords: wage subsidies, unemployment, South Africa, computable general equilibrium (CGE) microsimulation modeling

1. INTRODUCTION

Wage or employment subsidies have been used in both developed and developing countries to raise employment levels. In countries facing labor supply constraints due to reservation wages, the subsidy is offered to employees. In a developing country context, where labor market failure is characterized by unemployment, a firm-side subsidy that promotes demand for labor is more appropriate. Furthermore, when poverty is closely associated with unemployment, a wage subsidy scheme may be effective as an antipoverty strategy.

In recent times, several voices of support have gone up for a wage subsidy scheme in South Africa to address this country's unemployment and poverty problems. More than one-third of the labor force is currently unemployed, and over half of the population is below the poverty line. The most recent endorsement comes from the Harvard University–led International Panel on Growth in South Africa (see Levinsohn 2008). Wage subsidies or related policies have also been proposed by Pollin et al. (2006), Lewis (2001), and Heintz and Bowles (1996), with further analyses by Pauw and Edwards (2006) and Go et al. (2009). Several of South Africa's government departments have also shown interest in adopting a policy of this nature, most notably South Africa's Department of Social Development (2004) and National Treasury (2007), with the latter already having implemented a related policy of learnerships in 2000, under the terms of which workplace education is subsidized.

This paper takes stock of the international literature and conducts further analyses to (1) obtain insights into wage subsidy design and implementation issues facing developing countries (Section 2); (2) determine the potential impact of such a policy on employment, income, and poverty in South Africa (Section 3); and (3) critically assess the appropriateness of such a policy, given the various sources of unemployment in South Africa (Section 4). Section 5 draws conclusions.

## 2. WAGE SUBSIDIES IN THEORY AND PRACTICE

Basic Theoretical Concepts

Wage subsidies can be classified either as worker-side or firm-side programs. Worker-side wage subsidy schemes grant workers a subsidy upon successfully obtaining employment. The primary objective of these policies has been to increase participation in the labor market. Examples of these policies include the Working Families Tax Credit program in the United Kingdom and the Self-Sufficiency Program in Canada, which targets parents with children (Smith 2006). The appropriateness of worker-side wage subsidies in South Africa and other developing countries is questionable. In general, the constraint in developing countries is not that low wages deter individuals from seeking employment; rather, the constraint is that unemployed individuals are simply unable to find employment given a lack of labor demand.

The alternative approach is to offer firm-side subsidies, which are granted to firms as an incentive to employ more workers. This policy is appropriate when labor is underutilized or unemployed. Given South Africa's high unemployment rate, firm-side subsidies would appear to be most appropriate. Consequently, the analysis in the remainder of this paper focuses on firm-side wage subsidy programs.

The concept of a firm-side wage subsidy is straightforward. Wage subsidies lower firms' costs of employment without affecting workers' take-home pay, which enables firms to raise employment and output. The direct (firm-level) employment effect is determined by the wage elasticity of labor demand (or the elasticity of substitution in a multiple-factor input context) and the percentage by which the wage is subsidized. Benefits may also spill over into the rest of the economy. Higher employment raises aggregate household income, while the subsidy causes average unit production costs, and hence consumer prices, to decline (assuming competitive product markets). Wage subsidies may therefore ultimately stimulate consumption demand, which in turn leads to secondary increases in labor demand as firms step up production (Heintz and Bowles 1996).

Figure 1 illustrates the employment effects of a subsidy offered for low-skilled workers (L_{LS}). The direct, or substitution, effect is a shift along the production isoquant from point A to point B (high elasticity case, large employment effect) or from point D to point E (low elasticity case, small employment effect). An indirect or scale effect is observed as the firm shifts to a higher production isoquant, which depends on consumer demand response to price and income changes. Positive scale effects cause the demand for all factors of production to increase, possibly even outweighing the negative substitution effects for nontargeted workers. To illustrate how the net employment effect depends on the relative magnitudes of opposing substitution and scale effects, the isoquants in Figure 1 are drawn such that the overall level of skilled employment (L_{SK}) increases in the low-elasticity case, but not in the high-elasticity case.

Figure 1. Direct substitution and indirect employment effects of wage subsidies
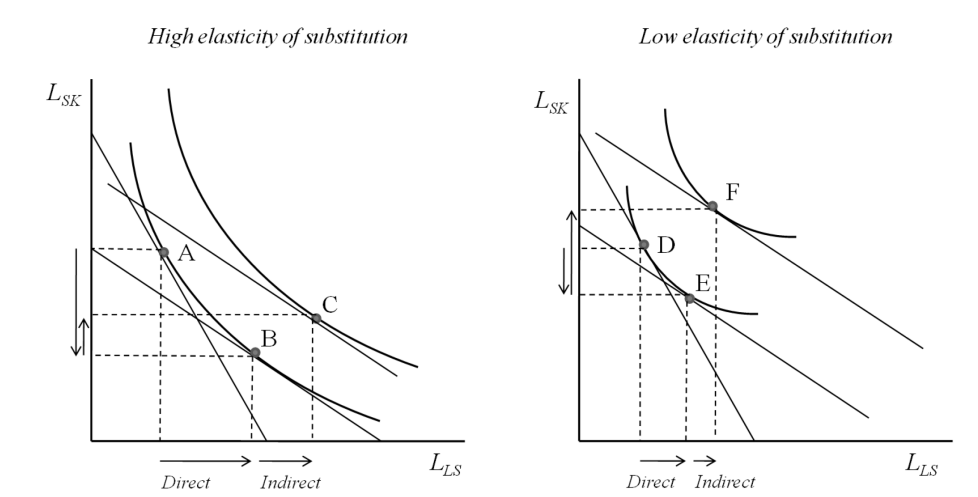
Source: Authors.

At least two other positive externalities or dynamic gains are not typically captured in static labor market models such as those in Figure 1. First, through raising profitability in targeted industries, wage subsidies may, in the long run, induce greater investment in industries via an accumulation effect, which would further amplify the subsidy program's scale effects (see Lewis 2001; Pollin et al. 2006). Second, by providing work experience to people who would have been unemployed in the program's absence, a wage subsidy program raises labor productivity and improves the future employment prospects of workers. In South Africa, for example, past work experience is positively correlated with future employment prospects (Kingdon and Knight 2004). These dynamic effects, if realized, bode well for an economy's future growth potential.

There are, of course, some caveats. First, employment gains among targeted workers may come at the expense of other workers, who are substituted in favor of the subsidized workers (Aislabie 1980). The high-elasticity scenario in Figure 1 is a case in point. Without proper monitoring, subsidized workers themselves might be replaced by new subsidized workers at the end of the subsidy period, in what could be called a churning effect. A second negative effect relates to the need to generate financing for the program. In order to pay for a wage subsidy, a government may have to reprioritize its budget or generate additional revenue through higher taxation. Phelps (1994) argued that savings in welfare entitlements, unemployment benefits, crime fighting, and increased tax revenue might counterbalance the impact of the wage subsidy on the budget. However, it is more realistic to think that higher income or sales taxes would ultimately be necessary to finance the program. This increase would negatively affect households' disposable income levels, thus offsetting at least some of the subsidy program's gains. Thus, the policy's distributional effects depend on the distribution of employment gains and the tax incidence in the economy.

Finally, imperfect market conditions jeopardize the employment-generating potential of a wage subsidy scheme. Firms with some market power may be able to capture some of the subsidy as rent (Go et al. 2009); the higher the degree of noncompetitiveness, the less is the incentive for firms to raise employment or reduce output prices. Workers themselves might also capture some of the subsidy as rent by negotiating (for example, through labor unions) higher wages for themselves at the expense of higher employment (see Pauw and Edwards 2006).

For a wage subsidy program to be effective in mitigating these adverse effects and in maximizing the employment potential, careful consideration should be given to policy design and implementation issues. The following section reviews international and local experience with wage subsidy or related programs to gain further insights into what types of wage subsidy policies might be effective and appropriate in a developing country context.

International and Local Experience

In addition to the choice between worker- and firm-side subsidies, four additional policy design decision should be considered (Aislabie 1980; Katz 1998; Heintz and Bowles 1996; and Pauw and Edwards 2006 all give theoretical overviews). The first concerns *targeting* of the subsidy. A wage subsidy can apply to any worker in the economy, or it can apply only to certain types of workers and/or economic sectors. This may be necessary as a cost-saving measure, to increase the program's effectiveness in terms of job creation, or to achieve specific employment objectives. The second concerns *coverage* of the program. One possibility is that only new hires would be subsidized (meaning a marginal subsidy). Another possibility is that all workers in a target group, including existing employees, would be subsidized (a general subsidy).

A third design consideration is the *subsidy value*. In addition to determining how large the subsidy should be, which depends on the program budget, policymakers should first decide how the subsidy should be calculated. A subsidy can be calculated as a fixed amount per worker, in which case it may create an incentive to employ low-wage workers. Conversely, if the subsidy is specified as a fixed percentage of the wage, firms may hire more high-wage workers (Heintz and Bowles 1996). A combined approach may therefore be sensible—in other words, the subsidy is set as a fixed percentage of the wage up to a certain wage level, but then it is capped at a fixed amount at higher wage levels.

The final design issue concerns *financing*. The overall program cost depends on several factors, including the extent of targeting, coverage, the subsidy value, and level of participation by firms (or the employment response). It may therefore be necessary to work backward and define each design parameter subject to the budget constraint. Ultimately, however, wage subsidies should be financed, either through reprioritization of the budget (for example., through a reduction in welfare expenditure) or through increases in direct or indirect taxes. As explained earlier, these financing options will offset some of the subsidy's gains.

Choices relating to each design option are not independent of each other, which implies that trade-offs exist that may have an impact on the program's effectiveness. Some insights into these trade-offs are provided by the international experience with firm-side wage subsidies. Our international review draws on the extensive analysis by Smith (2006), whose literature review covers examples of firm- and worker-side subsidies, as well as job search assistance programs.

Several examples of firm-side wage subsidy programs exist in North America. The New Jobs Tax Credit (NJTC) program in the United States (1977–1978) was one of the few examples of an untargeted, or general, firm-side wage subsidy program (see Katz 1998). Targeted firm-side wage subsidies are far more common. Examples include the Employment Tax Credit Program (ETCP) introduced in Canada in 1978 and the Targeted Jobs Tax Credit (TJTC), which replaced the NJTC in the United States in 1978. The Canadian program targeted people who had been unemployed for eight weeks or longer, while participating firms had to commit to employing workers for a minimum of three months in a full-time job. The TJTC (1978–1994), which was replaced by the current Work Opportunities Tax Credit (WOTC), targeted economically disadvantaged youth, poor Vietnam veterans, handicapped individuals receiving vocational training, and social assistance recipients.

None of the North American programs were as effective as anticipated (Smith 2006). Untargeted subsidies, though easily administered, are generally considered to be less effective than targeted ones, because it is possible that at least some of the workers hired under the auspices of the program would have been hired anyway. A particular design flaw of the NJTC was that the total subsidy amount per firm was capped, which meant that large employers could not benefit as much. The targeted subsidies appear to have been equally unsuccessful. Participating firms were typically large firms that employed targeted workers in abundance and could therefore benefit from economies of scale. Smaller firms found the administrative and compliance costs prohibitive, particularly those costs relating to confirming the eligibility of prospective employees.

A further contributing factor is the fact that firms often considered the subsidy amounts offered to be insufficient to compensate employers for the true hiring and training costs of workers who were

perceived as potentially risky candidates. The suggestion is that stigmatization is an issue—more so for targeted programs than for untargeted programs. Burtless (1985) reported on the outcome of a randomized evaluation of the TJTC program in which jobseekers assigned to a treatment group were issued certificates verifying their disadvantaged status and their eligibility for the subsidy. Employment rates among individuals in the control group were found to be significantly higher than among those in the treatment groups, which Burtless (1985) attributed to the stigmatizing effect of the vouchers.

A feature of many of the European and Eastern European wage subsidy programs is that they are administered through local employment offices, often forming part of more comprehensive employment support programs, such as job search assistance and retraining programs. This certainly characterizes the United Kingdom's New Deal, which was introduced in 1998. A wage subsidy program introduced in Germany after unification required jobseekers and prospective employers to register at local employment offices. The employment office then conducted the matching exercise. Slovakia and Poland had similar program designs.

Although labor offices may be important in facilitating and coordinating several programs, they may also sometimes hamper the wage subsidy's success. For example, in the Polish program, employment prospects of workers actually worsened after participation, which arguably related to the fact that the labor offices would first refer workers with the weakest employment prospects in an effort to ease the burden on the state's unemployment insurance system (Smith 2006). Ultimately, this practice resulted in firms becoming reluctant to hire past participants.

Two other Eastern European programs that do not operate through labor offices include Hungary's wage subsidy for long-term unemployed persons (implemented during the mid- to late 1990s) and a Romanian program that offers participating firms the unemployment benefits that the unemployed would have received (implemented in 1992). Smith (2006) cited evidence from the Hungarian program suggesting that some months after having participated in the program, the employment rates of subsidized workers were no different from those of unsubsidized workers. This does not necessarily point to a failure, especially considering that the subsidized workers (meaning the long-term unemployed) probably started out with lower employment prospects than other labor market participants. As far as the Romanian program is concerned, evidence suggests that little of the hiring that took place under the auspices of the scheme could be considered incremental hiring.

Several South American wage subsidy programs, including those in Chile, Argentina, Peru, and Uruguay, are particularly relevant from a South African perspective. As developing economies, these countries face many of the same kinds of economic challenges that South Africa faces. In addition, some of these subsidy programs explicitly incorporated job training into the scheme, making them similar to South Africa's learnerships program (see discussion below).

Chile Joven is a firm-side training-linked wage subsidy introduced in 1991 in Chile. Under this program, employers that hire and train unemployed youth (aged 15 to 24) receive a subsidy to cover their training costs, while participants receive transportation subsidies. Although no rigorous evaluation has been conducted on this program, Smith (2006) cited evidence showing that half of the participants remained employed three months after receiving training, usually in positions related to their training. Furthermore, between one-third and one-half of participants were employed with the same firm that provided the training.

In Argentina, the Proyecto Joven program provided a full training subsidy for six months to participating firms, conditional on the firm retaining the employee for six months thereafter. This program was never properly evaluated. In 1998, a second program, called Proempleo Experiment, was introduced and was evaluated through a randomized evaluation. Individuals receiving unemployment insurance were targeted and were randomly assigned to either a control group or a treatment group, with the latter receiving wage subsidy vouchers. In contrast to the outcome of the TJTC experiment, employment rates in the treatment group were 6 percent higher than in the control group after 18 months. Interestingly, very few firms claimed on the vouchers, suggesting that vouchers may improve supply-side search but do not necessarily improve the hiring decisions of firms (Smith 2006).

South Africa's experience with learnerships is also worth considering. Learnerships can be loosely classified as training-linked wage subsidies, where subsidized employment is linked to both temporary employment and the provision of structured learning by the employer. Learnerships have also been called *modern apprenticeships*; however, whereas traditional apprenticeships focus only on training and skills acquisition, learnerships have a broader educational focus, aiming to also provide academically accredited learning. The intention is to strengthen the link between structured learning and workplace experience, thus ultimately providing a learner with a nationally recognized academic qualification (Smith, Jennings, and Solanki 2005).

The learnership system has been in place for several years. Based on interviews with several large firms in South Africa (Pauw, Oosthuizen and Van der Westhuizen 2008) the general response to the idea of training-linked subsidized employment is very positive. However, firms are much less enthusiastic about the actual implementation of the learnership program and the way in which it is being administered. In fact, many of the concerns raised by firms mirror the problems that beset firm-side wage subsidy schemes in general—most notably, that subsidy values are considered insufficient to cover the true cost of participation, as well as issues surrounding the large firm bias of these types of programs and the stringent bureaucratic processes. The additional inflexibility of a program linked to structured learning, which often necessitates the involvement of external accredited training institutions, adds significantly to the program's administrative complexity.

In short, the high administrative costs are probably the single greatest factor preventing the learnership program from achieving above-equilibrium employment (Pauw, Oosthuizen, and van der Westhuizen 2008). Participation in the program appears to be motivated, to a large degree, by the Black Economic Empowerment (BEE) charter, which governs equitable behavior by South African firms. Some firms view participation as part of their corporate social responsibility, as opposed to it being a purely economic decision. The actual subsidy on offer, it seems, plays no part in the decision.

This review of the international experience with firm-side subsidies is both insightful and sobering. Dar and Tzannatos (1999) and Smith (2006) conclude that the weight of available evidence shows that firm-side subsidies may not be that effective at stimulating employment. Betcherman, Olivas, and Dar (2004) believe that this is particularly true in developing and transitional economies. Much of the ineffectiveness seems to relate to issues around implementation and administration, as well as to subsidy values being inadequate to cover compliance costs rather than the pure economics of a wage subsidy.

An additional reason that has not been considered in much depth in the international literature is that wage subsidies may not adequately overcome the market failures that give rise to high unemployment in developing countries. A first best policy intervention should directly target the source of the problem. Where this is not possible, second best interventions need to be considered. We explore the appropriateness of wage subsidies in more detail in the context of South Africa.

But first, we simulate the possible economywide effects of a wage subsidy scheme, using a model designed around South Africa's specific economic characteristics. The objective of this simulation is to quantify possible employment and poverty impacts from an effectively applied wage subsidy scheme, while imposing standard assumptions relating to well-functioning markets and buy-in from employees.

3. ECONOMYWIDE EFFECTS OF A WAGE SUBSIDY PROGRAM

A computable general equilibrium (CGE) model is used to evaluate the economywide effects of a wage subsidy program in South Africa. We use the standard general equilibrium (STAGE) model developed by McDonald (2007). We calibrated this model with a South African social accounting matrix (SAM) for 2000, as compiled by the Western Cape Department of Agriculture (PROVIDE 2006). A description of the model appears in the Appendix. An economywide modeling framework is useful in this context, as it allows us to account for the effects of the wage subsidy policy across all markets (meaning factor and product markets), while also considering the cost and financing implications.

To model the effect of a wage subsidy, the supply of low-skilled workers is assumed to be infinitely elastic. This is equivalent to assuming (as is appropriate in South Africa) that there is a large pool of unemployed persons who are ready and able to work at prevailing wages. Hence, once labor demand increases as a result of the wage subsidy, workers are effectively drawn into the model from this pool of unemployed people. Specifics about the simulation design are provided below.

A standard CGE model has an important limitation, in that these unemployed people are essentially considered to be outside of the model. This means there is no explicit link between the unemployed and households; hence, once workers are drawn into employment, the model has no prior information on the basis of which it can distribute gains (in terms of additional wages earned) across household groups, other than to follow the factor income distribution patterns in the base. Put differently, the CGE model only knows how low-skilled workers are distributed among household groups, but not how the unemployed are distributed. Invariably, unemployed persons are more likely to be located in poorer households, while low-skilled workers are largely found in the middle-income households (Pauw 2009). Therefore, CGE model results predict an outcome that is less pro-poor than what we expect to be the reality.

This limitation can be overcome by using the CGE model to explore only the macrolevel effects, including total and sector-level employment and wage effects, aggregate demand shifts, and production changes. Key CGE model results are then linked sequentially with a microsimulation occupational choice model, in which the allocation of sector-specific job gains or losses among individuals, as well as the linkages between individual labor market participants and households, are modeled in an improved fashion. The microsimulation model used here draws on Pauw (2009) and is based on the merged 2000 Income and Expenditure Survey and September 2000 Labor Force Survey (IES/LFS 2000) conducted by Statistics South Africa (Stats SA 2002a, 2002b). The same dataset forms the basis of the household and factor accounts in the SAM, which facilitates the linking of the two models. A description of the microsimulation model's assumptions and features also appears in the Appendix.

Simulation Design

The CGE-microsimulation exercise explores the economywide impacts of a general firm-side wage subsidy offered to all formal sector low-skilled (semi- and unskilled) workers, including those currently employed. Following the proposal in the National Treasury's 2007 Budget Review, only wages of low-skilled workers earning less than R45,000 (or R32,000 in 2000 prices) are subsidized (South Africa, National Treasury 2007). (In 2005, US$1.00 was equivalent to R6.36, or R3.76 in purchasing power parity terms.) The subsidy itself is equal to R5,000 (or R3,500 in 2000 prices) per worker. However, for workers earning less than R10,000 per annum, the subsidy is capped at 50 percent of the wage (a design feature proposed by Levinsohn 2008). We assume that only manufacturing and certain services sectors receive the subsidy. Thus, excluded from the hypothetical program here are the agricultural, forestry, fishing, mining, utility (water and electricity), government services, social services, and domestic services sectors (see Appendix Table 1 for a listing of sectors included in the model).

The subsidy is modeled as a negative ad valorem tax on wages of targeted workers. The effective subsidy rates are calculated outside of the CGE model based on wage and employment data in the IES/LFS 2000 and SAM. Prior to any employment gains, the program translates into a 12.5 percent

subsidization of the total wage bill in targeted manufacturing sectors and a 9.1 percent subsidization in targeted services sectors. At the economywide level, the program subsidizes 5.2 percent of the current wage bill. The government finances the subsidy by raising household income taxes uniformly across household groups.

We consider outcomes under a range of wage elasticity (or elasticity of substitution) values—namely, low ($\eta = 0.3$), medium-low ($\eta = 0.5$), medium-high ($\eta = 0.7$), and high ($\eta = 1$) (the numbers in parentheses are approximate national weighted average wage elasticities). Elasticities are specified separately for economic sectors and are listed in Appendix Table 1. The elasticities in the medium-high elasticity case, which we consider here to be the benchmark scenario, are comparable with much-cited estimates by Fallon and Lucas (1998), while the four modeled scenarios represent a plausible range of wage elasticity values for developing countries in general (see Hamermesh 1993).

The microsimulation model allocates job gains and losses independently from the CGE model. We consider two scenarios: a nontargeted scenario and a youth-targeted scenario. Under the latter, jobs are reserved for unemployed persons under the age of 35 (meaning the youth). Wage earnings of new hires, as well as overall household income, are also estimated independently from the CGE model and at the individual household level, taking into account each household's unique links with the factor market. The model is therefore also used to predict changes in income distribution and poverty.

Results and Discussion

In general, a wage subsidy temporarily lowers the cost of employing targeted labor. The comparative static CGE results should therefore not be interpreted as a permanent outcome. In theory, once the subsidy is removed, the economy will return to its initial state. In practice, however, one would think that employment levels would still be higher than in the base, even after the program is discontinued, because at least some of the subsidized workers would have gained experience or skills that would make them more productive and, hence, employable, even at the unsubsidized wage rate. Such dynamic effects are not explicitly modeled.

Table 1 summarizes some of the key results obtained from the CGE model. The hypothetical wage subsidy scheme simulated can be expected to generate anywhere from 228,638 to 738,235 low-skilled jobs (there are approximately 8.7 million low-skilled workers in the base). In the benchmark scenario, more than half a million jobs are created, which translates into a 6 percent increase in low-skilled employment. Most of the additional employment takes place, as expected, in those sectors targeted by the subsidy. In fact, when the wage elasticity is low, the nontargeted sectors shed low-skilled jobs. Those low-skilled workers released from employment have no guarantee of finding jobs in the growing sectors of the economy. At higher wage elasticity values, larger scale effects ensure that low-skilled employment increases marginally in the nontargeted sectors as well.

Skilled workers, who are assumed to be fully employed at flexible wages, are extracted from nontargeted sectors and are absorbed into the expanding targeted sectors. We can therefore expect some adjustment costs for skilled workers who have to find new employment elsewhere, though in relative terms, this skilled intersector migration is small (there are approximately 2.4 million skilled workers in the model). On the whole, the policy raises overall employment by 4.7 percent in the benchmark scenario. This is equivalent to a reduction in unemployment from 36 percent in the base (expanded definition) to 32.9 percent.

Factor income increases for all factor groups. Low-skilled workers benefit the most, with incomes rising by between 2.1 and 6.6 percent. This gain relates entirely to the net increase in low-skilled employment. Skilled factor income increases by about 1.6 to 2.0 percent, due to skilled wage increases, which reflects an overall increase in skilled labor demand in the economy. This result attests to the policy's positive scale effects, which, in fact, dominate the labor substitution effects (compare Figure 1). Returns to capital and land (also called *gross operating surplus* [GOS]) also increase by about 2 percent in all simulations. The net effect of factor income changes is a 1.9–3.2 percent increase in total factor income in the economy.

Gross domestic product (GDP) at factor costs is defined here as the sum of the domestic wage bill and the sales, import, and production or factor taxes. Because the wage subsidy is, in essence, a negative factor tax, it lowers the GDP estimate; hence, the change in GDP is less than the change in factor income. Nevertheless, the GDP effect is still positive at all elasticity values. For example, in the benchmark scenario, GDP increases by 1.2 percent.

Table 1. Employment, factor incomes, gross domestic product, and program costs

	Low Elasticity	Medium-Low Elasticity	Medium-High Elasticity	High Elasticity
Change in low-skilled employment				
Manufacturing	76,424	121,646	164,921	228,743
Services	155,690	252,026	345,642	484,091
All targeted sectors	232,114	373,672	510,563	712,834
Nontargeted sectors	−3,476	2,308	10,392	25,401
Net employment change	*228,638*	*375,980*	*520,955*	*738,235*
Change in skilled employment				
Manufacturing	2,940	3,789	4,167	4,204
Services	2,298	2,483	2,164	1,091
Nontargeted sectors	−5,238	−6,272	−6,331	−5,295
Net employment change	*0*	*0*	*0*	*0*
Change in real factor incomes and GDP				
Low-skilled labor	2.1%	3.4%	4.7%	6.6%
Skilled labor	1.6%	1.7%	1.8%	2.0%
Gross operating surplus	2.0%	1.9%	1.9%	1.9%
Total factor income	1.9%	2.3%	2.6%	3.2%
Real GDP (value added)	*0.5%*	*0.8%*	*1.2%*	*1.6%*
Program cost and financing				
Subsidy cost (in R billions, 2000 prices)	R11.7	R12.1	R12.5	R13.0
(in R billions, 2007 prices)	R16.9	R17.4	R17.9	R18.7
Cost per job (2000 prices)	R51,364	R32,173	R23,908	R17,627
Required tax rate increase	10.9%	11.4%	11.8%	12.5%

Source: CGE model results.

The final section of Table 1 presents the program cost estimates, which range from R11.7 to R13.0 billion. These estimates are equivalent to R16.9 and R18.7 billion, respectively, in 2007 prices, which are considerable amounts relative to the 2007 total welfare budget of about R90.0 billion. The range of costs are, however, still well below the R20–R30 billion estimated by the South African National Treasury (2007) for a program that is admittedly somewhat larger in scope (meaning the exclusion of the large agricultural and mining sectors in our simulations brings the program costs down significantly).

In the benchmark scenario, the R12.5 billion price tag translates to a cost-per-job estimate of R23,860, which is marginally higher than the average low-skilled wage of about R20,000 (Stats SA 2002a, 2002b). The cost-per-job estimate more than doubles (to R51,264) in the low-elasticity scenario, at which point the program becomes difficult to justify. Of course, because the subsidy is available to existing workers and new hires, it can, in reality, be seen as both a production subsidy and a marginal wage subsidy. Thus, the program's welfare gains cannot be measured only in terms of the employment effect; significant gains are also passed on to consumers in the form of lower commodity prices, at least in this model framework, which assumes perfect pass-through of prices.

The subsidy program is financed by raising average household income tax rates by between 10.9 and 12.5 percent. The bulk of taxes in South Africa are paid by middle- and high-income households (for example, 83 percent of taxes come from the wealthiest one-third of household groups in the SAM). Thus, in the benchmark scenario, households in the top one-third see their average tax rate increase from 15 percent in the base to 16.8 percent (that is, a 1.8 percentage point or 11.8 percent increase). Because the tax rate increase is uniform across all households in the model, these households will also finance the bulk of the wage subsidy cost in absolute terms.

The microsimulation model allows us to evaluate the possible poverty and distributional effects of the modeled wage subsidy program in more detail. Several factors determine how the income distribution changes. These factors include (1) the way in which employment and wage income gains are distributed among individuals; (2) the tax incidence in the economy, as well as the burden that higher tax rates place on taxpayers; and (3) consumption patterns and preferences in the economy. Consumption patterns determine how relative price changes affect different consumers in terms of their disposable income or welfare levels.

The cumulative job distributions shown in Figure 2 compare how new jobs are distributed among household per capita income deciles. All the results are from the medium-high elasticity case, or the benchmark scenario. For simplicity, we treat the bottom four deciles, which represent the poorest 40 percent of households and which is home to approximately 56 percent of the population, as poor. The two microsimulation model scenarios (meaning the nontargeted and youth-targeted scenarios) yield very similar outcomes, with approximately 54 to 55 percent of new jobs accruing to the poor. This job distribution closely matches the distribution of the unemployed, which is also shown in Figure 2.

For comparative and demonstrative purposes, we also show the (implicit) allocation of jobs in the CGE model. Under this model, the outcome is less pro-poor, with only 40 percent of new jobs going to poor households. Unlike the microsimulation model, the CGE model disregards distribution of the unemployed and simply allocates new jobs following the distribution of the employed in the base (or, in this instance, targeted jobs). The CGE model's bias is therefore fairly obvious.

Figure 2.Distribution of jobs and income (medium-high elasticity case)
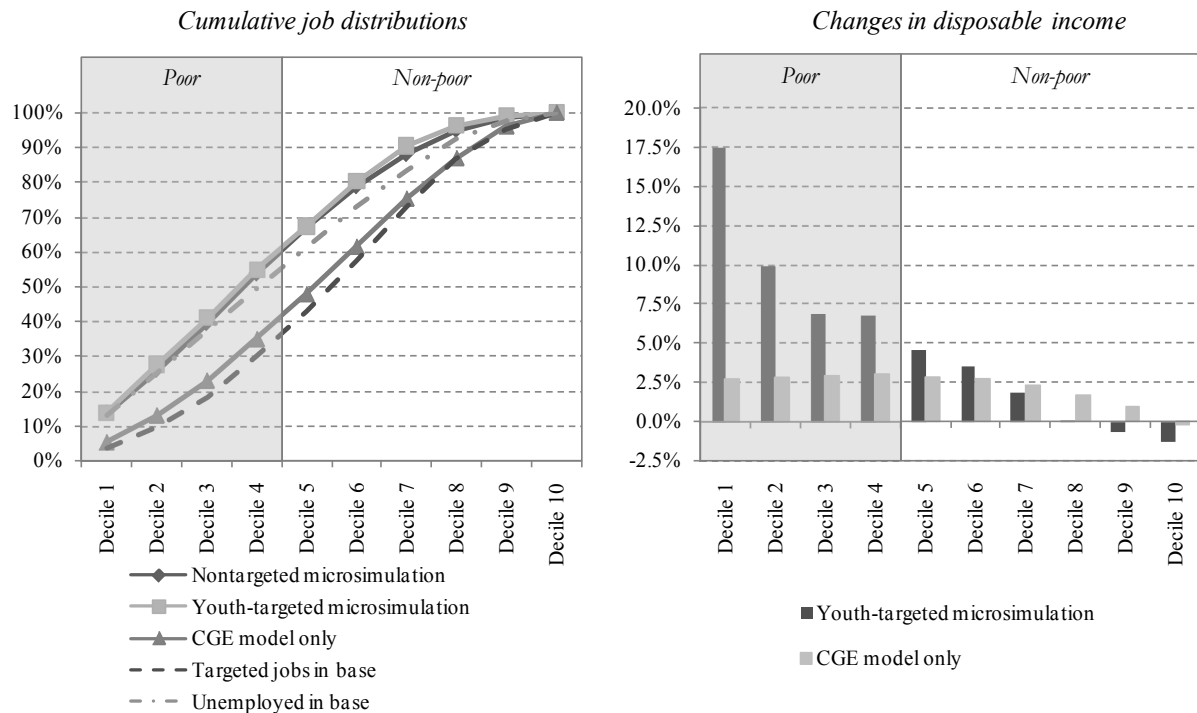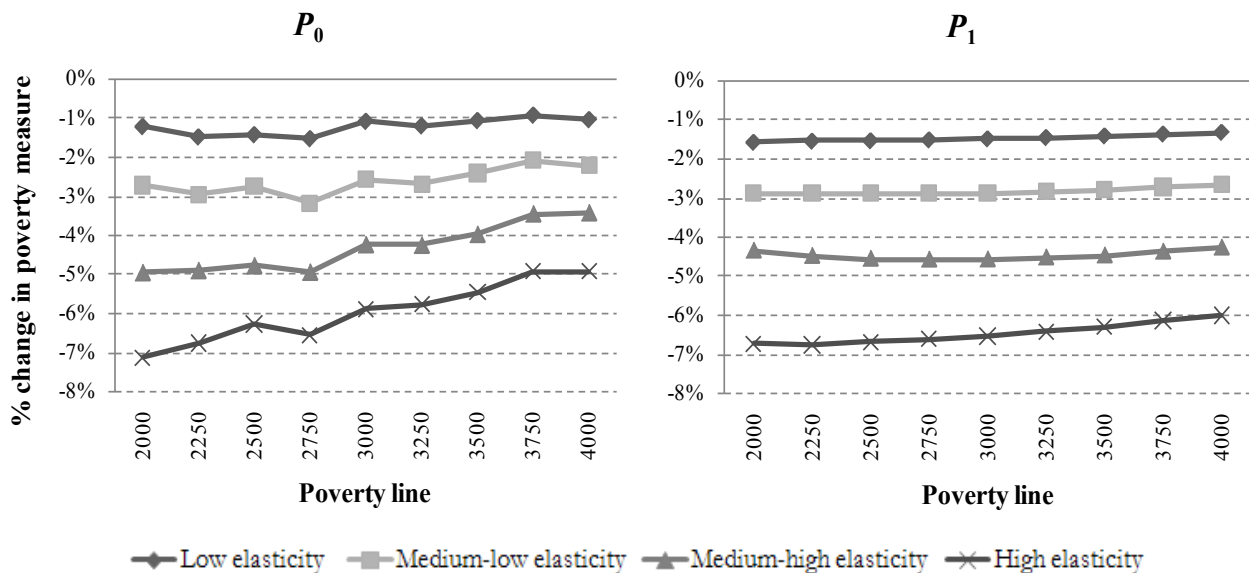

Source: CGE model results.

Returning to the microsimulation results, it is worth pointing out that similarity in the outcomes under the nontargeted and youth-targeted scenarios does not imply that the same people gain under both scenarios. In the nontargeted scenario, only 31 percent of the beneficiaries are youth (medium-high elasticity case), even though they make up three-quarters of the unemployed or potential beneficiaries. This reflects the youth's relative disadvantage in securing employment. The suggestion here is that youth targeting has no distributional implication, though it is important in determining who benefits from the policy.

The other panel in Figure 2 compares changes in aggregate real disposable income across the household deciles. Real disposable income is a simplistic, yet useful, welfare measure, as it takes into account income, price, and tax changes. The CGE model results show that aggregate real disposable household income increases by 1.1 percent in the medium-high elasticity case. This translates into gains of from 2.7 to 3.0 percent for households in the bottom six quintiles. In the seventh to ninth quintiles, gains decline rapidly; real disposable income declines by 0.2 percent in the highest income group, due to the adverse effect of a higher tax burden.

Once again, because the nontargeted and youth-targeted scenarios yield similar distributional outcomes, only the results for the youth-targeted scenario are shown. The microsimulation model suggests a much more pro-poor distribution of gains. Here, poor households see their disposable income levels increase by an average of 9 percent, while households in the ninth and tenth deciles both see a decline in their disposable income levels. The result is a decline in national income inequality, with the Gini coefficient declining marginally from 0.66 to 0.65 and the Theil-L index declining from 0.9 to 0.87 (medium-high elasticity case).

The large income effects for poor households suggest a strong potential for a wage subsidy program to reduce poverty. Conventionally, South African poverty lines range from R2,000 (extreme poverty) to R4,000 (normal poverty line) in 2000 prices (see, for example, Hoogeveen and Özler 2006 and van der Berg et al. 2005). Measured at these two extremes and using per capita disposable income as the welfare measure, the poverty head-count rate (P_0) is between 0.29 and 0.53 percent. Similarly, the depth of poverty (P_1) ranges from 0.11 to 0.27 (Stats SA 2002a, 2002b). Figure 3 shows the percentage changes in the poverty measures relative to the base estimates.

Figure 3. Percentage changes in poverty head count (P_0) and depth of poverty (P_1): youth-targeted scenario

Source: CGE model results.

Figure 3 makes it evident that the poverty-reducing potential of a wage subsidy program is much greater at higher wage elasticity levels when more jobs are created. In the medium-high elasticity scenario, the extreme poverty rate (R2,000 poverty line) declines by 5 percent (to 0.28), whereas at the R4,000 poverty line, the rate declines by 3.4 percent to 0.52. This is equivalent to about 630,000 fewer people in extreme poverty and 800,000 fewer poor people (recall that just more than 520,000 jobs are created in this scenario). In addition, in the medium-high elasticity scenario, the depth of poverty (P_1) declines by just over 4 percent at all poverty lines.

Summary

Some preliminary conclusions can be drawn from the CGE microsimulation exercise. First, the size of the wage elasticity parameter is important for the success of the policy in terms of creating jobs (and at what cost per job). If employers' responses to wage changes are lower than what econometric estimates of South Africa's wage elasticity suggest (many believe an elasticity of $\eta = 0.7$ to be a good guess), the cost becomes difficult to justify. A low employment response may, in fact, be quite likely if the administrative burden of participating in the program is high (as is the case in the learnerships program), while firms may simply be unable to find suitable workers.

A second, related issue concerns the assumptions about efficient markets and perfect pass-through of prices in the economy. When wage subsidy gains are captured by employers, rather than being reflected in lower prices and higher employment, careful targeting, monitoring, or a more complex marginal wage subsidy program may have to be considered. These simulations further assume that the unemployed possess the skills necessary to immediately engage in employment. In reality, a large part of South Africa's unemployment is considered structural, in that workers simply lack the skills necessary to find work. This issue is explored in more depth in Section 4.

Finally, the model results show that the funding burden falls predominantly on wealthy households, while the gains accrue to the unemployed, who are more likely to be located in poorer households. This means the policy is relatively pro-poor and reduces inequality. Although the decline in poverty is not negligible, it should be clear that wage subsidies will hardly be able to achieve ambitious goals, such as halving poverty by 2015. Not all jobs accrue to the poor, while some of the poor who do benefit may remain poor due to income-sharing responsibilities at home. The average poor household has more than five members and typically only one income earner. This means the average low-skilled wage of R20,000 per annum is only barely sufficient to allow the typical poor household to escape poverty.

4. IS THIS THE APPROPRIATE POLICY?

The modeling simulations show that a wage subsidy scheme can significantly raise employment under the conditions of well-functioning markets, high wage elasticities, buy-in from firms, and the availability of suitable workers to fill vacancies. However, the international evidence is less sanguine about the merits of wage subsidies in a developing country context. Part of the reason is that the wage subsidy scheme may not adequately deal with the various sources of the country's employment problem. In this section, we first take stock of South Africa's unemployment problem, drawing on recent literature defining its nature and causes; then we consider the appropriateness of a wage subsidy in addressing each particular source of unemployment identified.

A Snapshot of the Unemployed

Despite South Africa's relative wealth, its unemployment rate dwarfs those of other developing countries (Bhorat 2008). In 1995, South Africa's unemployment rate was 38.8 percent, which includes discouraged or inactive jobseekers. Although this number declined to 35.6 percent by 2007 (Stats SA, 2008), it is likely to increase in the aftermath of the global economic recession. Unemployment almost exclusively affects previously disadvantaged individuals, while women and rural labor force participants remain at a distinct disadvantage. The youth, defined here in line with the 1996 South African National Youth Commission Act No. 19 as people under the age of 35, accounts for 55.9 percent of the overall labor force, yet they make up 72.7 percent of the unemployed (see Table 2).

Table 2. Unemployment shares and rates by age and education (2005)

	Youth		Adults		All	
Participants (%)	55.9		44.1		100.0	
Unemployed (%)	72.7		27.3		100.0	
	Distribution of all youth participants (%)	*Broad unemployment rate (%)*	*Distribution of all adult participants (%)*	*Broad unemployment rate (%)*	*Distribution of all participants (%)*	*Broad unemployment rate (%)*
None	3.2	45.1	11.3	28.8	6.8	33.1
Grade 1–8	22.1	57.0	36.5	30.9	28.4	42.2
Grade 9–11	33.0	59.0	20.1	28.6	27.3	49.2
Grade 12 (Matric)	32.7	46.7	18.0	17.7	26.2	38.0
Dipl./Cert. w/o Gr. 12	1.0	27.0	1.0	7.0	1.0	18.1
Dipl./Cert. with Gr. 12	5.6	21.2	6.9	5.0	6.2	13.2
University degree	2.4	8.7	6.2	2.3	4.1	4.4
Total	100.0	50.4	100.0	24.0	100.0	38.8

Source: Labor Force Survey 2005 (Stats SA 2006).
Notes: Youth include people under the age of 35.

The age-education interaction is of particular interest. Evidence from South Africa's labor force surveys consistently supports the notion that wage and employment prospects improve with levels of educational attainment (Mlatsheni and Rospabe 2002; Lam, Leibbrandt, and Mlatsheni 2007; Bhorat 2008). However, youth employment prospects are also weaker than those of adults at every level of education, as is evidenced in Table 2. Any unemployment is undesirable, but high levels of youth unemployment are seen as a particularly worrying socioeconomic problem. For example, in *Global Employment Trends for Youth*, the International Labor Organization (ILO 2004) noted that the inability to find employment can create a sense of uselessness and idleness, especially among the youth. This is even

more true when, as is the case in South Africa, the youth are becoming better educated over time and enter the labor market with high expectations of success (see further discussion below).

South Africa's unemployment situation is somewhat unique in the developing world. Whereas in most developing countries, informal activities and subsistence farming offer some respite for those unable to find employment in the urban or formal sector, the same is not true for South Africa (see, for example, Kingdon and Knight 2007). Even for those who do manage to access informal employment, earnings are vastly inferior compared with formal-sector wages (Casale, Muller, and Posel 2004). The implication is that job creation in the formal sector is crucial to the well-being of South Africans today.

There are also good economic reasons to promote formal-sector employment. For example, Kingdon and Knight (2004) illustrate how past formal labor market experience greatly reduces the probability of a person becoming unemployed in the future. Formal-sector employment opportunities thus raise earnings, develop appropriate skills, and improve people's employment prospects. These gains arguably stretch beyond those that can be garnered from job opportunities in the informal sector.

Sources of Unemployment and the Appropriateness of Wage Subsidies in Addressing Each

Unemployment is a serious concern and should be addressed by policies that improve the absorption of labor into full-time employment, preferably in the formal sector. When designing the most appropriate policy response to a particular market failure, it is necessary to understand what contributes to a problem in the first place. The sources of South Africa's unemployment are certainly multiple and complex. Although running the risk of oversimplifying the matter, we group these into four main (but not independent) sources of unemployment; we then assess whether a wage subsidy program is the appropriate response in each instance.

Weak Economic Growth

South Africa's economic growth over the past 16 years has not been as susceptible to shocks as during the apartheid period; and yet an average growth of around 2 to 3 percent per year during the 1990s remained low compared with the goals outlined in the Growth Employment and Redistribution (GEAR) program implemented in 1996 (South Africa, Ministry of Finance 1996). Taking a longer-run comparative perspective, South Africa only experienced a 0.3 percent growth in per capita GDP (purchasing power parity prices) from 1980 to 2008, as compared with 1.15 percent growth in other upper middle-income countries and 2.5 percent in low- and middle-income countries.

Weak economic growth, therefore, certainly explains part of the unemployment outcome. Statistical decompositions of growth, wage, and employment trends reveal another part of the problem—namely, that the output-employment elasticity was insignificantly different from zero for the 1990–1998 period (Fields, Leibbrandt, and Wakeford 2000). Thus, the little growth that did materialize did not translate into higher employment. Since 2001, however, there has been a marked shift in the economy, with a recovery in both economic growth and employment creation relative to the 1990s. Strong employment growth persisted throughout the 2000–2005 period, more or less matching the economy's growth rate (Oosthuizen 2005). This growth is indicative of the importance of output growth in stimulating employment demand, especially in more recent years. More important, however, is the fact that more than half of the employment growth was in low-paid informal or self-employment jobs (Casale, Muller, and Posel 2004). The formal sector output-employment elasticity has therefore remained low.

Are wage subsidies appropriate to address the unemployment consequences of weak growth? The CGE simulation of a wage subsidy shows a positive output growth response (1.2 percent in the benchmark scenario). However, this is largely a once-off effect that relates to the absorption of excess (unemployed) labor into formal employment. A temporary wage subsidy will not necessarily induce sustained growth in employment demand. It is conceivable—and many proponents of wage subsidies make this case—that workers gain experience and skills during their period of subsidized employment. This experience may enhance their employability, even at nonsubsidized wage rates. Ultimately, however,

a wage subsidy is not the first best policy response to addressing inadequate employment demand associated with slow economic growth. Rather, investment, education, infrastructure, market power, and industry concentration and openness have all been found to be important determinants of South Africa's growth process (Fedderke 2006). Nevertheless, the wage subsidy, by raising the employment intensity of output, may enhance the rate of employment growth—particularly formal employment growth— associated with output growth.

The Changing Structure of Employment in South Africa

Although economic growth itself is important, it is also insightful to reflect on the nature of economic growth in South Africa over the past two decades. Throughout the post-apartheid period, output has shifted away from low-skilled, labor-intensive primary and secondary sectors toward skill-intensive services, or tertiary sectors (see Bhorat and Oosthuizen 2004). Rodrik (2008) argued that the weak performance of the export-oriented manufacturing sector, in particular, has deprived South Africa of growth opportunities and job creation at the relatively low end of the skill distribution. The structural shifts in the economy have thus not only lowered the growth rate, but the general shift toward the services sector has been at the disadvantage of less-skilled labor and the overall employment intensity in the economy. This process may have been complemented by skill-biased technological change within sectors—that is, at every level of output, the demand for skilled relative to low-skilled labor increased (Rodrik 2008). Although the net impact on employment depends on the growth effects of this technological change, Edwards (2006) has shown that employment growth between 1994 and 2002 was probably about 4 percent lower per annum than it would have been at a constant labor-output ratio and at observed output levels.

The source of unemployment is not the structural change in itself—such changes are natural for developing countries; rather, it is that South Africa's workforce has failed to adjust to the changing labor demand patterns. Semi- and unskilled workers remain in excess supply and do not have the skills necessary to compete for the kinds of vacancies that exist. By nature, structural unemployment is unlikely to correct itself without some form of policy intervention (Banerjee et al. 2007). In this regard, Go et al. argued that structural unemployment "cannot be solved by macroeconomic management or temporary swings in aggregate demand" (2009, 5), as this would only perpetuate the labor market problems associated with South Africa's current growth path. Rather, they argued, policies that directly affect labor demand or supply are required, including wage subsidies, job search subsidies, relaxation of labor market regulation, and government employment programs.

Certainly, wage subsidies will, through raising the attractiveness of low-skilled jobseekers relative to others, lead to an increase in overall employment. However, such a policy still does not address the underlying problems of inadequate or irrelevant education, skills, and experience that lie at the heart of the structural unemployment problem. Whether the subsidization of wages will provide enough of an incentive for firms to lower their expectations and employ people without the right skills also remains debatable. At best, a wage subsidy policy will ensure that people just below the minimum skill threshold are absorbed into the workforce. The primary, long-term intervention must be in education and training.

Unemployment Due to Wage Costs

A further source of unemployment, particularly among low-skilled workers, relates to wage and nonwage costs of employment rising more rapidly than labor productivity. Several South African econometric analyses support the notion of a trade-off between real wages and employment (Fallon and Lucas 1998; Fedderke and Mariotti 2002; Fields, Leibbrandt, and Wakeford 2000). Although South African wage data spanning long periods are weak, some evidence does indicate that wages of semi- and unskilled workers have risen sharply relative to those of skilled workers (see Lewis 2001). This may explain, in part, the poor employment prospects of low-skilled workers. Fedderke (2006) concurs, attributing large-scale job losses in agriculture and mining—two sectors that have traditionally been important employers of low-skilled workers—to the fact that real wage costs (driven in part by union demands) outstripped

17

improvements in labor productivity. The post-1994 period has also seen increases in nonwage costs of employment due to stricter labor market legislation and regulation, the emergence of a strong trade union movement, and rigidities imposed by bargaining councils (see Bhorat 2008; Fedderke 2006; Nattrass 2000). The implication is that unemployment in South Africa is not entirely a structural problem; it also relates to relative employment costs of skilled versus low-skilled workers. On the basis of the evidence, Pollin et al. tentatively concluded that reducing unit labor costs "could be a central feature of policies to attack mass unemployment" (2006, 32) in South Africa.

A wage subsidy is one such policy that reduces the cost of labor. Once again, however, a wage subsidy does not address the root cause of the problem—namely, overly high costs of employment caused by rigidities in the market. To this effect, Levinsohn (2008) proposed that a wage subsidy program include a probationary period during which a no-questions-asked dismissal policy is in effect. We discuss this idea further with reference to youth-targeted wage subsidies in the next subsection.

Youth Unemployment

South African unemployment is highly concentrated among the youth, which is indicative of a general reluctance among firms to employ youth labor market participants. Within the context of structural shifts and skill-biased technical change, the high rate of youth unemployment is closely associated with educational attainment (both the quantity of education and the quality or appropriateness of qualifications are concerns), skills, and work experience among the youth. A supply-side factor is the effectiveness of job search strategies among the youth. We briefly consider these factors; we then consider how a wage subsidy might be the appropriate intervention to address youth unemployment.

Many youth may have insufficient educational attainment, due either to early exit from the schooling system or to poor quality and coverage of instruction in basic literacy and numeracy. Those who leave school early are hugely disadvantaged (see Table 2); but even those who are better qualified face poor prospects relative to more experienced adults. Several analyses have shown that young people are entering the labor market at an earlier age but with higher education levels than in the past (Branson 2006; Pauw, Oosthuizen, and van der Westhuizen 2008). In an economy where labor demand is constrained and has shifted toward higher-skilled labor, competition for entry-level jobs is fierce; thus, a matric (the qualification obtained in the final high school year) may simply no longer be enough to guarantee employment.

All of this raises the question of whether the youth have appropriate skills or sufficient experience relative to the needs of employers. The skills-mismatch hypothesis encompasses issues around the quality and appropriateness of education, as well as the trade-off between general versus job-specific experience or skills (Burns 2008). Quality of education is a major concern in South Africa. Four out of five school-leavers are considered functionally illiterate (that is, they lack the language skills required to be successful at tertiary institutions) and 60 percent have inadequate mathematics and science skills as they exit high school (Mlatsheni 2005). Kraak argued that this "perceived poor quality of South African schooling (particularly in the former African school system) serves as a major disincentive on the demand-side for employing large numbers of first-time entrants to the labor market" (2005, 31). Closely related to the quality issue is the appropriateness of courses offered or, indeed, selected by students. Constant evaluation of school curricula and proper career advice to students are crucial.

Education is, of course, not the only means through which skills are obtained. Early labor market experience in the form of part-time employment eases the transition from school to work, assists youth with choosing career paths, and instills work ethics considered desirable by employers (Burns 2008). Employers faced with high labor costs and labor market rigidities may become more selective in their hiring decisions by placing greater weight on prior experience. It is for this reason that young jobseekers are disadvantaged: Three-quarters of the unemployed youth surveyed in the LFS 2007 (Stats SA 2008) reported that they had never worked before, compared with less than half of unemployed adults.

Once again, there is a racial dimension to this factor. Lam, Leibbrandt, and Mlatsheni (2007) documented large differences in the school-to-work histories across race groups in South Africa's

Western Cape province. By age 20, only 20 to 30 percent of Africans had ever done any paid work, compared with close to 90 percent of whites. Anderson, Case, and Lam (2001) found similar low work rates among African youth in the rest of South Africa. The implication is that to the extent that employers might be willing to hire youth, white youth will be at a significant advantage due to a higher incidence of prior job experience.

Limited work experience may also reflect ineffective job search strategies of the youth. Burns (2008) argued that material job search costs in South Africa are high, due to the large geographical distances between areas where employment opportunities mostly exist and areas where people reside. In particular, the youth are vulnerable given their lack of mobility and limited resources. Many youth rely on word-of-mouth from friends and family to learn about job opportunities. Successful job search through such social networks requires good-quality networks, which places those youth living in isolated areas or in communities with limited attachment to the formal employment sector at a relative disadvantage.

The health status of jobseekers and their family members is a further important consideration. For instance, the high prevalence of HIV/AIDS among the youth may contribute to unemployment, since poor health impedes active job search. Some people may also be unable to take up employment because they need to care for sick or elderly family members (Burns 2008).

Once again we should ask ourselves whether a youth-targeted wage subsidy is the appropriate policy tool to address youth unemployment. In well-functioning labor markets, educational qualifications signal youth labor market participants' productive capacity, especially where participants have limited work experience. When these signals are weak, the price of labor would normally adjust, such that firms would still provide individuals with an opportunity to reveal their productive capacity. The problem in South Africa is that these processes do not seem to be working for young people. The market failure, therefore, lies in the fact that individuals are unable to properly signal their productive capacity to firms and are unlikely to be given opportunities to do so by risk-averse employers. Employers thus look for signals elsewhere, placing particular emphasis on past work experience and networks, leaving many youth at a disadvantage. A highly regulated labor market contributes to employment costs and the risks associated with hiring youth labor market participants.

Wage subsidies may be effective in allowing young people to access the labor market for the first time, because the subsidies compensate firms for the risk associated with being unable to identify the productive capacity of prospective employees. However, a wage subsidy alone may not be adequate. For example, firms may continue to be unwilling to employ new labor market entrants, even with the subsidy, if the costs associated with retrenchment are high. A relaxation of the labor legislation enabling firms to readily lay off workers may thus be required to enhance the subsidy's effectiveness.

A wage subsidy, however, still does not address the most important source of youth unemployment—namely, that of inadequate or inappropriate educational qualifications. There is a need to evaluate academic qualifications in South Africa and to align them to the needs of the market. Proper career advice will enable young people to choose relevant courses; if young people do not meet the entry requirements for courses with good career prospects, educational institutions should provide bridging courses. The signaling problem can also be addressed through standardization of examinations. Externally administered tests, such as the Standard Aptitude Test (SAT) or the Graduate Record Examination (GRE) in the United States, could be adopted in South Africa.

Effective job search, in turn, is best facilitated through the provision of job search assistance or job placement services. This assistance could be combined with a job search subsidy (not to be confused with a worker-side wage subsidy) that would reduce the material job search costs. Such job search subsidies have been shown to be very effective elsewhere (see Smith 2006), though there must be proper coordination between employers and the agencies that provide such assistance . Clearly, this area requires further investigation in South Africa, where much of the focus in the area of active labor market policy intervention has been around wage subsidies and structured workplace training initiatives, such as learnerships.

5. CONCLUSIONS

South Africa's unemployment situation is untenable. It constitutes a significant loss in current output in the economy, while the long-term unemployed themselves lose their skills. This loss negatively affects the economy's future production capacity. Unemployment is further closely associated with various socioeconomic problems—in particular, the high incidence of poverty. Lowering unemployment is therefore of utmost importance.

Various government advisers and researchers have endorsed wage subsidies as a means to address unemployment. Analyses in this study have shown that under conditions of well-functioning markets and buy-in from firms, a wage subsidy program could significantly raise total employment (by 4.7 percent in our benchmark scenario). The program would also lead to an expansion of GDP by 1.2 percent, despite the additional burden of higher taxes.

The wage subsidy program is further associated with reductions in poverty and inequality, both of which are important goals of broader public policy in South Africa. In this regard, Pauw and Edwards (2006) found that compared with a wage subsidy scheme, a targeted-income grant scheme with a similar total cost would be more pro-poor, but its growth and employment impacts would be negligible.

The implication is that even a temporary wage subsidy scheme is likely to have more sustained long-term benefits than targeted welfare programs, because wage subsidies temporarily draw people into employment, where they can gain experience. Such experience raises future employability of individuals and raises overall labor productivity in the economy. Compared to a welfare transfer of similar cost, wage subsidies have a lower burden on taxpaying households, because some of the benefits spill over to skilled workers and the owners of capital, which is not the case under a welfare transfer scheme.

Although the international experience of wage subsidies is less positive, it does not necessarily predict failure for a South African wage subsidy scheme. Many important lessons can be drawn from international examples, especially around design and implementation. Proper targeting of industries is important—that is, care should be taken to target sectors where employment will be responsive to lower costs of labor. In addition, the subsidy value should be high enough and administrative requirements should be minimal enough to promote participation by firms.

An additional consideration is linking a training component to the wage subsidy scheme, which may have several benefits. For example, improved skills obtained through mandatory training may enable workers to adjust to the changing job requirements associated with technological advances and structural changes in the composition of production. In addition, a training component of a wage subsidy scheme could help tackle the market failure of underinvestment in training by firms.

A youth-targeted wage subsidy is advisable for South Africa, as this would facilitate first-time access into employment. It is important, though, that this subsidy be accompanied by a relaxation of the labor legislation, as this would maximize the opportunities for the youth to reveal their productive capacities within a work environment. A youth subsidy has the further advantage of absorbing people into the workforce at a younger age, thus permitting full use of their productive capabilities over their entire working life span. A youth wage subsidy could be complemented by a job search assistance program that supports the youth in accessing employment.

Ultimately, however, wage subsidies should not be regarded as permanent solutions to unemployment, nor are they necessarily the first best solution to the true underlying sources of unemployment. These subsidies do not overcome the various constraints to economic growth and job creation, which are best addressed through long-run initiatives that enhance the absorptive capacity of firms and that improve workers' skills and education. Subsidies only temporarily lower the cost of employing low-skilled workers, when in reality labor market rigidities and low productivity levels are significant contributors to high unit labor costs. Wage subsidies also do not directly address the signaling problems faced by employees, which is ultimately indicative of the education system's failure. What is required is a comprehensive overhaul of South Africa's education and vocational training institutions; this overhaul would also contribute to the goal of broadening the overall skills base. Nonetheless, a wage subsidy scheme may be an indirect way of stimulating employment while complementary growth, education, and labor market policies with a longer-run focus are being implemented.

APPENDIX

CGE Model

The standard general equilibrium (STAGE) model is a member of the class of single-country computable general equilibrium (CGE) models that are descendants of the approach to CGE modeling described in Dervis, de Melo, and Robinson (1982). CGE models capture all the linkages between agents and markets in an economy. Agents include producers (typically referred to as *activities*), households, government, and incorporated business enterprises. Markets for commodities (both domestic and international) and factors of production are also specified in detail. When faced with economic shocks, the agents in the model respond according to the behavioral assumptions specified in the model. These behavioral assumptions are based on microeconomic theoretical principles. The entire modeling system is set up within a consistent macroeconomic framework. These features make CGE models ideal for analyzing policy shocks with complex economywide effects.

For this particular study, the model is calibrated with the PROVIDE social accounting matrix (SAM) for South Africa with 2000 as base-year. This particular SAM was chosen for several reasons. Firstly, it is based on the same data on which the microsimulation model is based (IES/LFS 2000). This facilitates the linking of the CGE and microsimulation models. The IES and LFS 2000 were the last household and labor force surveys that could be merged, a necessary condition for a properly-specified microsimulation model. Although the data is fairly dated, this is generally less of a concern in comparative static analyses where changes are reported relative to the base data. As long as it remains plausible to think that the broader economic *structure* as represented by the base remains relevant, the results can be considered realistic even in a modern-day context.

Secondly, the SAM contains very rich information; the version used here includes 22 different types of productive activities, representing different economic sectors (see Appendix Table A.1). More importantly in the context of this paper, the model also includes 162 representative household groups, disaggregated across province, race, education of household head, and household income, as well as 88 labor groups, disaggregated across province, race, occupation, and skill. This rich specification allows for great precision when specifying the wage subsidy shock. Details about the household and factor group categorizations can be found in PROVIDE (2006).

Given the focus of this study, the labor behavioral relationships in the STAGE model are of particular interest. First, with respect to the production side, activities maximize profit subject to a two-tiered nested production function where, at the top level, output (QX) is defined as a constant elasticity of substitution (CES) function of value added (QVA) and aggregate intermediate inputs ($QINT$). At the second level, $QINT$ is made up of individual commodities (C_1, C_2, …, C_k) consumed in fixed proportions (Leontief function) to the level of $QINT$, while QVA is a CES function of factors of production (F_1, F_2, …, F_n). The elasticity of substitution parameter in the value-added function (σ_{QVA}) is of central importance in this study, as it largely determines the nature and extent of the employment effect of the minimum wage. (The relationship between the elasticity of substitution and the own-price wage elasticity is defined by $\eta_L = -(1 - \tau)\sigma_{QVA}$, where τ represents labor's share in the value of output.) Sectoral elasticity values for the different wage subsidy scenarios are listed in Appendix Table A.1.

Table A.1. Sectoral elasticities of substitution in the CGE model

Sectors	Elasticity Level				Sectors (continued)	Elasticity Level			
	Low	Med-low	Med-high	High		Low	Med-low	Med-high	High
Agriculture	0.15	0.26	0.36	0.51	* Nonmetals	0.24	0.39	0.55	0.79
Forestry	0.15	0.25	0.35	0.50	* Metals	0.24	0.39	0.55	0.79
Fishing	0.16	0.26	0.37	0.53	* Mach. & equip.	0.23	0.39	0.54	0.77
Mining	0.09	0.15	0.21	0.30	Electricity & water	0.27	0.45	0.63	0.90
* Food products	0.24	0.39	0.55	0.79	* Construction	0.29	0.49	0.68	0.97
* Bev. & tobacco	0.23	0.38	0.53	0.76	* Ret. & wholesale	0.28	0.47	0.66	0.94
* Textiles	0.25	0.41	0.58	0.83	* Accommodation	0.29	0.49	0.68	0.97
* Wood & paper	0.24	0.39	0.55	0.79	* Transp. & comm.	0.28	0.46	0.65	0.93
* Petroleum	0.22	0.37	0.52	0.74	* Fin. & bus. serv.	0.28	0.46	0.65	0.93
* Fert. & pest.	0.22	0.37	0.52	0.74	Gov. & social	0.30	0.50	0.70	1.00
* Pharm. & chem.	0.23	0.38	0.53	0.76	Domestic services	0.18	0.29	0.41	0.59

Note: The asterisks (*) indicate sectors targeted in our wage subsidy simulations.

The STAGE model also follows neoclassical tradition in assuming that households choose consumption bundles that maximize utility. A Stone-Geary utility function that incorporates an income-independent level of consumption (sometimes called *subsistence* or *nondiscretionary consumption*) is adopted. This functional form is considered appropriate when there are a substantial number of very poor consumers in the economy. Only the remainder of the budget (supernumerary income) is allocated among consumption items, following the law of fixed budget shares. This consumption demand system is calibrated by setting appropriate household- and commodity-specific income, price, and Frisch elasticities (the last of which determines the sensitivity of the marginal utility of income to changes in income). Consumption responses (for example, to income and price changes associated with the wage subsidy) therefore crucially depend on the parameter values selected. Sensitivity testing in this regard is beyond the scope of this study; instead, the focus of our sensitivity analysis is on behavioral responses in the factor market.

The STAGE model is set up with a range of flexible closure rules that assign causality and ensure that the number of equations and variables in the model are consistent. In the context of this study, the labor market closures are particularly important. For the purpose of setting up the closure rule, the model's 88 labor accounts are grouped into skilled, semi-skilled, and unskilled workers. The latter two are referred to in this study as low-skilled workers. An unemployment closure is selected for low-skilled workers whereby their wages are fixed, and an infinite supply of this class of workers is assumed. This closure is appropriate in the South African context of high unemployment among low-skilled workers. In contrast, skilled wages are endogenous and adjust to ensure full employment in the market for skilled labor. The pool of skilled workers therefore remains fixed, and there is no labor market entry or exit for skilled workers in response to wage subsidies.

Per convention, the capital stock closure in static CGE models determines whether the simulation period is short or long. Under a short-run closure, capital stock is assumed to be immobile (or activity specific), while under a long-run closure, capital stock is mobile, with capital being attracted to those sectors in which the return to capital is the highest. The long-run results are omitted due to space considerations. The factor *land* is only employed in the agricultural sector and is assumed to always be fully employed and, by nature, not mobile across sectors.

The foreign exchange market assumes a flexible exchange rate regime in line with current practices of the South African Reserve Bank. A balanced savings-investment closure is selected, whereby investment is fixed relative to the level of domestic demand, with household savings rates adjusting to

reach targeted investment levels. The government account assumes a flexible budget deficit level—that is, all tax rates in the model are fixed. All prices in a CGE model are expressed relative to the numéraire, which, in this study, is the consumer price index (CPI).

Microsimulation Model

The microsimulation model draws from Pauw (2009) and has five distinct stages. In the first stage, low-skilled job losses in contracting sectors (as predicted by the CGE model) are distributed among existing low-skilled workers in the model (there are virtually no job losses in the wage subsidy simulations, expect in the low-elasticity case; see Table 1). These workers join the pool of unemployed, where they compete with other unemployed persons for any new jobs that might be created in expanding sectors. The guiding principle is that personal characteristics will determine which workers lose their jobs or gain employment. For this purpose, employed and unemployed persons must be assigned probabilities of being employed (in specific sectors) or unemployed. Those with the highest unemployment probabilities lose their jobs first when sectors contract; those among the unemployed with the highest sector-specific employment probabilities are selected first as new job opportunities arise.

To estimate these various probabilities, a multinomial logit occupational choice model is estimated for all low-skilled labor market participants (that is, the employed and unemployed). The dependent variable includes 23 discrete outcomes—that is, participants can either be employed in any one of the 22 economic sectors in the CGE model or be unemployed. The independent variables include dummies for age, race, gender, location, and education. These are all fairly standard in South African occupational choice models; hence, a discussion of the merits and rationale behind each is omitted (see, for example, Bhorat 2008). Once the econometric model is estimated, the probabilities of an individual being allocated to or choosing any one of the 23 outcomes are predicted for each low-skilled labor market participant. Because the microsimulation model is run separately from the CGE model, it is possible to introduce specific hiring or firing criteria to emulate a specific policy design or situation. For example, in our wage subsidy simulations, we impose restrictions in that only previously disadvantaged and/or youth labor market participants can be selected, even when other jobseekers have higher employment probabilities.

In the second stage, wage income levels of low-skilled workers affected by employment changes are adjusted. Those who lose their jobs and remain unemployed now earn no income. For those who gain employment, wage earnings are predicted with the aid of an econometric earnings function. The earnings function is a simple regression on hourly wages earned and is estimated with the same set of independent variables as the multinomial logit model, except for the addition of sector dummy variables, with unemployment as a reference case. This model is therefore also specified across all low-skilled labor market participants; thus, once an unemployed person is selected for employment, his or her predicted wage is simply adjusted upward by the relevant sector coefficient.

The third component of the microsimulation model concerns skilled workers. The skilled labor market closure allows workers to move between sectors, but the overall level of skilled employment is fixed. This means the national average wage for skilled workers adjusts to ensure full employment. However, as workers move between different sectors, their wage levels may adjust due to differences in average sector-specific wages. In the STAGE model, the activity-specific wage of factor f employed in activity a is defined as the product w_f x $wd_{f,a}$, where w_f is the national average wage of the specific skilled labor group and $wd_{f,a}$ is the wage distortion factor that accounts for wage variations across sectors. Changes in average skilled wages (w_f) are easily captured in the microsimulation model. The only requirement is a mapping between individual skilled workers (*skill*) in the microsimulation model and the relevant factor group (*SKILL*) in the CGE model. Thus, for *skill* $\in$ *SKILL*, a new skilled wage variable is generated in the microsimulation model by applying the percentage changes in skilled wages observed in the CGE model to the individual reported wages in the survey data:

$$w^*_{skill} = w_{skill}(1 + \%\Delta w_{SKILL}).$$

As sectors contract and expand, some skilled workers are released from sectors and are reemployed elsewhere. Theoretically, a multinomial logit occupational choice model can once again be used to identify those skilled workers who are most likely to migrate between sectors, while an earnings function can be used to estimate the wage impact for migrating workers. However, given the small employment changes for skilled workers in the wage subsidy simulations (see Table 1), this was not worthwhile, especially considering that each survey observation in the microsimulation model represents between 50 and 500 individuals. Hence, only average wages are adjusted, which is tantamount to saying that those workers who do migrate still earn the same wage.

The fourth stage in the model adjusts household-level income sources, including returns to capital and agricultural land, jointly referred to as *gross operating surplus* (GOS). Household incomes from these sources are adjusted based on the change observed in the CGE model. Thus, in the equation below, ΔN and ΔK represent the percentage changes in the returns to land and capital as observed in the CGE model. Households in the microsimulation model that report earnings from either of these two sources in the base will receive increases consistent with the CGE model result.

$$GOS_h^* = N_h^* + K_h^* = N_h(1 + \%\Delta N) + K_h(1 + \%\Delta K)$$

In the final stage, all income sources are combined in the household income generation function, which includes skilled wages, unskilled wages, and returns to land and capital owned by the household. It also includes exogenous incomes (Y_0), which mainly includes transfer income from government and remittance income. The equation below shows how the new household income value (Y_h^*) is calculated. Skilled and low-skilled wages earned by employed household members are aggregated to form a single household-level wage income variable. The new level of GOS income is added, as are real exogenous incomes (Y_0), which are unaffected by the policy shock.

$$Y_h^* = \sum_f (w_{skill}^* + w_{lowsk}^*) + GOS_h^* + Y_0$$

Next, the total household income level must be transformed into a measure of per capita disposable income. This requires that taxes and savings be deducted from the measure of total household income before dividing by the household size parameter. This is achieved by adjusting the relevant tax (ty_h) and savings rate (sav_h) parameters in the microsimulation model by the percentage change in the related parameters (subscript H) in the CGE model—that is, $ty_h^* = ty_h(1 + \%\Delta ty_H)$ and $sav_h^* = sav_h(1 + \%\Delta sav_H)$. (Note: The savings rate is expressed as a share of after-tax income.)

$$PCDISP_h^* = [Y_h^*(1 - ty_h^*).(1 - sav_h^*)/HHSIZE_h].(1 + \%\Delta CPIH_H)$$

Because the CPI is the numéraire in the CGE model, all income values are already expressed in real terms. However, the CPI as a measure of inflation is limited, as the weights reflect consumption preferences of households at the upper end of the income distribution, given the dominance of these households in aggregate expenditure. It is thus necessary to further adjust the per capita income measure by a household group-specific index ($CPIH_H$), which is calculated in the CGE model using household-specific consumption weights. This measure essentially shows how the average cost of different household groups' consumption bundles change relative to the national CPI; hence, it is able to, for example, capture the fact that poor households benefit more from declining food prices than do wealthy households. The resulting per capita disposable income measure ($PCDISP_h^*$) is used throughout this study as a welfare measure against which poverty and inequality changes are measured.

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