FORMAL–INFORMAL ECONOMY LINKAGES AND UNEMPLOYMENT IN SOUTH AFRICA

ROB DAVIES[†] AND JAMES THURLOW[*]

Abstract

South Africa's high unemployment and small informal economy has been attributed to barriers to entry in informal labour markets. We develop a general equilibrium model based on a typology of informal activities that captures formal/informal linkages in product and labour markets. Simulations reveal that trade liberalisation increases formal employment, hurts informal producers, and favours informal traders and may explain the dominance of traders instead of producers. Wage subsidies also raise employment but further heighten competition for informal producers. Cash transfers favour informal employment, albeit with a fiscal burden. Results confirm the role of formal/informal linkages and product markets in explaining policy outcomes.

JEL Classification: D58, D5, D, J21, J2, J, O21, O2, O, O55, O5, O

Keywords: Informal sector, unemployment, CGE model, South Africa

1. INTRODUCTION

Unemployment is one of South Africa's most pressing socio-economic challenges, affecting a quarter of the workforce. Rodrik (2008) identifies manufacturing's poor performance relative to skill-intensive services as the main cause behind rising unemployment among lower-skilled job seekers. Moreover, most of manufacturing's decline since the end of apartheid is attributed to low profitability caused by rising import competition. As a result, formal sector job creation has failed to keep pace with expanding labour force participation (Hodge, 2009). It is expected then that the unemployed would turn to the informal sector. Indeed, informal employment has accounted for most of the job creation over the last decade (Casale *et al.*, 2004; Altman, 2008). However, despite this expansion, South Africa has a small informal sector compared with other countries at similar income levels (Maloney, 2004; Schneider, 2002). Supporting this observation, Kingdon and Knight (2004) and Heinz and Posel (2008) show that unemployment in South Africa is involuntary and that informal work is preferred. This suggests that there exist significant barriers to entry in the informal sector, such as poor access to credit, high levels of crime and a reservation wage inflated by social transfers (Ranchhod, 2006).

* Corresponding author: Research Fellow, United Nations University's World Institute for Development Economics Research, and International Food Policy Research Institute, Katajanokanlaituri 6 B, Helsinki, Finland. E-mail: thurlow@wider.unu.edu

† Research Associate, Human Sciences Research Council, 134 Pretorius Street, Pretoria, South Africa. E-mail: rdavies@hsrc.ac.za

High unemployment in South Africa is thus attributed to an underperforming formal sector and to the inability of the unemployed to enter informal labour markets. However, few studies have examined the linkages between South Africa's formal and informal sectors. In other words, how has the structure and size of the formal sector influenced employment incentives and opportunities in the informal sector? Moreover, studies that do consider formal–informal sector linkages typically focus on tax policies, such as expanding the tax base, or on labour market interactions, such as trade unions' protection of formal employment (see, for example, Schultz and Mwabu, 1998; Lucas and Hofmeyr, 2001). Such studies do not address formal–informal sector competition in product markets, which may also influence the size and composition of the informal sector, and hence indirectly the high level of unemployment.

In this paper we examine how South Africa's formal sector affects informal production and employment. Given the diversity of the informal sector, Section 2 uses recent household and labour force surveys to develop a typology of informal activities or occupations based on their different interactions with the formal sector. Drawing on this typology, Section 3 constructs an empirically calibrated economy-wide model that captures formal–informal sector linkages in both product and labour markets. This model is used in Section 4 to examine three policies that feature prominently in South Africa's current unemployment debate: trade liberalisation, formal sector wage subsidies and unconditional cash transfers. Model results indicate that policies can produce diverging outcomes for formal and informal economies. More specifically, policies favouring formal sector job creation may in fact lower informal employment while also having differential impacts on different kinds of informal jobs. This suggests that formal/informal linkages can explain some of the small size of South Africa's informal sector, as well as its concentration among traders rather than producers. These results also caution against adopting formal sector policies without considering informal sector impacts. The final section discusses these findings and their implications for future research.

2. A TYPOLOGY OF INFORMAL ACTIVITIES AND EMPLOYMENT

2.1 Contrasting Views of the Informal Economy

In contrast to typical dual economy models, the informal economy is quite diverse and has complex interactions with the formal sector. To begin with, there are conflicting views over the role of informal activities in stimulating broader economic development (Devey *et al.*, 2003). For some, the informal sector is viewed as a dynamic sector with the ability to create jobs and actively contribute to economy-wide growth. Informal activities are viewed as "small enterprises" which may eventually generate tax revenues through a gradual process of formalisation. By contrast, others view informal activities as low-productivity employment or as "survivalist" strategies for poor households. From this perspective, the informal sector plays a passive role in development and acts as a temporary substitute for social protection during the formal sector-led growth process. Evidence from recent surveys in South Africa reveal the heterogeneity of informal activities and suggest that there is room for both perspectives (Berry *et al.*, 2002; Heinz and Posel, 2008). Indeed, the informal economy comprises a continuum of survivalist and enterprise activities. This more nuanced view of the role of informal activities highlights the complexity of designing policies that account for differential impacts on formal and informal economies.

There are also differences in the definition of the "informal" sector (Devey *et al.*, 2003). Here we draw the distinction between "informal activities" and "informal employment."[1] Some view informal workers as those who own or are employed by informal or unregistered firms. Indeed, this is the view held by official statistics in South Africa. By contrast, others take a broader view and include workers *informally employed* within the formal sector (Hussmanns, 2001). For example, the former (narrower) definition includes informal producers and traders, while the latter (broader) definition includes day labourers and seasonal farm workers working for formal firms/farms but without contracts or benefits. This distinction is important. For example, under the narrower definition, South Africa has a disproportionately small informal sector (*i.e.* 2.35 million informal workers or one-fifth of total employment). Under the broader definition, an additional 1.45 million workers are classified as informally employed (excluding domestic workers and subsistence agriculturalists).[2] This raises the share of broadly defined informal employment to more than one-third of total employment. While this redefined informal sector measurement is not directly comparable across countries, it is more consistent with other countries at similar income levels (Schneider, 2002; Maloney, 2004). Thus, a broader view of informal employment is preferred to conventional distinctions between formal and informal sectors. It also highlights the complex linkages between formal and informal economies.

2.2 A Typology of Formal–Informal Activities

We develop a typology based on the nature of informal activities' interactions with the formal sector. Table 1 lists the four types of informal activities that we identify: *(i)* informal producers who compete with formal producers in product markets; *(ii)* informal traders who sell formal sector products and charge a fixed transaction cost margin; *(iii)* workers who are informally employed in producing formal sector products; and *(iv)* informally employed workers producing goods and services that are not produced by the formal sector (*i.e.* non-competitive producers).

The first category, "informal producers," includes small enterprises producing goods and services that compete with formal sector firms producing similar products. Examples include processed foods, textiles and clothing. Informal producers generate employment

Table 1. Four types of informal employment

	Are distinct formal and informal goods produced?	Is there price competition between formal and informal goods?	Is there wage competition between formal and informal workers?
Informal producers (*e.g.* food, clothing, transport)	Yes	Yes	No
Informal traders (*e.g.* street vendors)	No	No (fixed margin)	No
Informally employed in formal sector (*e.g.* construction day labourers)	No	No	Yes
Non-competitive informal activities (*e.g.* domestic workers)	No	No (sold to formal sector)	No

[1] CGE models typically distinguish between activities (*i.e.* sectors) and labour (*i.e.* the workers employed in different kinds of occupations within a sector). For convenience, we will use the term "activities" in this section to mean the combination of occupation and sector of employment, but we will retain the CGE distinction in later sections.

[2] Calculations based on the 2004 Labor Force Survey (September).

Table 2. Employment profile, 2004

	All workers	Formal sector workers	Informally employed workers	Informal sector workers	Skilled workers	Semi-skilled workers	Unskilled workers
Total employment (1,000s)	10,556	6,754	1,451	2,351	2,048	4,826	3,682
Employment share (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture	10.3	6.9	9.8	20.3	2.0	3.9	23.3
Manufacturing	14.7	18.9	5.4	8.3	11.2	21.2	8.1
Food and beverages	2.5	3.4	1.1	0.7	1.5	3.3	2.0
Textiles and clothing	2.9	3.0	1.2	3.6	0.6	5.3	1.0
Other manufactures	9.3	12.4	3.1	4.0	9.1	12.6	5.0
Construction	7.3	4.7	8.9	13.6	2.5	11.0	5.1
Mining and utilities	4.4	6.9	0.0	0.0	2.5	7.4	1.6
Services	63.3	62.6	75.9	57.7	81.8	56.5	62.0
Retail trade	17.7	14.1	7.3	34.3	10.3	20.4	18.2
Restaurants	3.3	3.6	2.5	3.0	3.0	5.0	1.3
Transport	4.8	5.0	3.2	5.1	5.6	6.4	2.2
Business	9.1	13.3	1.0	2.0	16.1	10.5	3.4
Government	10.4	16.2	0.0	0.0	29.2	7.7	3.5
Other services	18.1	10.3	61.9	13.4	17.5	6.6	33.4
Average wage (R per worker)	19,662	26,175	10,015	8,032	38,609	19,198	9,792

Note: "Skilled" workers are professionals and managers, "semi-skilled" are sales and technicians, and "unskilled" are all others.
Source: Own calculations using the 2004 Labor Force Survey (September).

for other informal workers, and they compete in product markets based on the price at which they can supply their goods. Thus, the main linkages between informal producers and the formal sector are through the purchasing of formal sector intermediates and through the selling of commodities under price competition to formal consumers. This employment type closely corresponds to the official definition of the informal sector (*i.e.* workers in unregistered or untaxed businesses). According to the September 2004 Labor Force Survey (LFS2004) (StatsSA, 2004), about 1.55 million workers fell into this category out of a total employed workforce of 10.6 million (see fourth column in Table 2). Note that this is total informal sector employment less informal traders, who form the second category in the typology.

"Informal traders" differ from informal producers in that they do not produce a product but rather provide a service to consumers. Accordingly, they do not compete directly with formal producers over price. Rather, as a generalisation, they purchase formal sector goods, which they sell on to consumers with a fixed mark-up or margin. This means that informally traded goods will often have a higher price than those that are formally traded. This higher price is possible because informal traders often trade formally purchased goods in smaller volumes than formal retailers (*i.e.* "regrating" or price discrimination), or they trade in closer proximity to final consumers (*e.g.* at taxi ranks or along the road). According to the LFS2004, about 805,000 workers are engaged in informal trade, thus forming a large part of South Africa's overall informal sector (see fourth column in Table 2).

"Informally employed" workers work in the formal sector on a somewhat "casual" basis. In other words, they do not have contracts, are not unionised and do not receive benefits. Examples include day labourers in the construction sector or seasonal agricultural workers working on commercial farms. These workers compete with formal sector workers through their wage rates. In many developing countries, the textiles sector provides a good example to distinguish informal producers from informally employed workers. To begin with, informal producers may produce textiles that compete in local

markets against formally produced and imported goods. At the same time, other workers may be casually employed in formal textile factories alongside contracted labour, producing goods that are sold in both local and foreign markets. While the first type of formal–informal interactions is through price competition in product markets, the second type of interaction is through wage competition in labour markets.

Finally, we include a fourth type of informal activity: workers who produce goods that are not produced by the formal sector. These types of workers are a subset of workers informally employed in the formal sector. For example, domestic workers might be considered "casually" employed in the formal sector (despite recent regulations), but they do not face competition from formal sector workers (since no formal sector firms produce domestic services). However, while there is no competition to produce these services, they are sold entirely in the formal sector and are thus dependent on demand from formal sector consumers (in this case, private households receiving most of their incomes from the formal sector). Thus, there are still important formal sector linkages for this type of informal activity.

While any typology is an abstraction of a more complex reality, the above classification of informal activities and employment has the advantage of providing a clear framework for understanding how alternative policies may have differential effects on specific actors within the formal and informal economies. Our typology is less concerned with grouping workers based on differences in their specific jobs (for example, taxi drivers vs. domestic workers). Rather, it identifies the various transmission channels linking formal and informal activities, such as product market prices, labour market wages, and informal trader margins. In the next section, we implement this typology within a broader economy-wide context and develop an integrated multi-sector model of South Africa's formal and informal economies.

3. MEASURING AND MODELLING FORMAL–INFORMAL LINKAGES

In this paper, we develop a multiregional computable general equilibrium (CGE) model that captures the observed structure of South Africa's formal and informal economies as well as the various linkages or transmission channels connecting their different economic actors (*e.g.* firms, traders, government and investors). A CGE model is a system of equations that describes the functioning or behaviour of an entire real economy (*i.e.* it covers all sectors, institutions and markets). The parameters of the CGE equations are calibrated to observed data from a social accounting matrix (SAM). A SAM is an economy-wide database that accounts for all monetary flows in an economy within a specific year. It reconciles a wide range of data sources, including national accounts, household income and expenditure surveys, and labour force surveys. Our analysis therefore required the construction of both a specialised South African formal–informal model (SAFIM) and an accompanying SAM. The mathematical specification of SAFIM is included in the appendix. This section presents a conceptual framework of the model and discusses its structure and core assumptions.

3.1 Conceptual Framework of Formal/Informal Sector Linkages
Fig. 1 provides a conceptual framework of the formal/informal sector linkages in SAFIM. The model identifies two regions, representing the formal and informal economies. Each region produces and consumes commodities. The formal region produces a wide range of
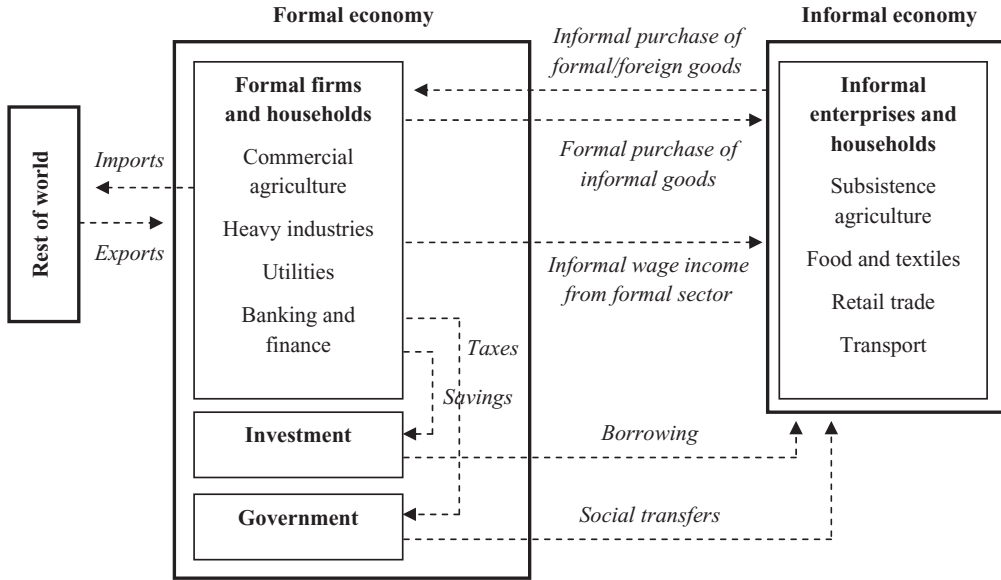
Figure 1. Conceptual format for the formal–informal economy model

products and is fairly autonomous because it produces most of the goods that it consumes and trades directly with the rest of the world. Formal sector firms and households[3] pay taxes to the government and invest their savings in formal financial institutions. By contrast, the informal region is far from autonomous because it produces a narrower range of products and does not trade directly with the rest of the world.[4] Informal enterprises and households demand products that they do not produce themselves, and so they must purchase ("import") goods from the formal region (*i.e.* the top interregional arrow in the figure). But this implies that informal region households are spending more money than they earn, which is not sustainable in the long run (*i.e.* does not describe an equilibrium situation). As shown in the figure, four linkages generate the earnings needed to finance the informal region's trade deficit with the formal region.

Firstly, the informal region generates external earnings by selling ("exporting") products to the formal region. According to the 2000 Income and Expenditure Survey (IES2000) (StatsSA, 2000), about 5% of formal households' food purchases (in value terms) and 3% of their non-food purchases were made in informal markets (see Table 3).

---

[3] We define "informal households" as those earning any income from the informal sector, including incomes from workers who are informally employed in the formal sector (see Section 2). We also include households that contain only unemployed adult members. All other household are deemed "formal."

[4] The informal sector in South Africa does engage in international trade. For example, informal traders may travel to neighbouring countries, such as Zimbabwe and Mozambique, in order to sell their products in these markets. However, this trade is likely to be heavily concentrated along the border and is a very small share of the informal trade with the formal economy and of South Africa's total trade with the rest of the world. For modelling convenience and because of a lack of data on informal cross-border trade, it is excluded from our conceptual framework and empirical analysis.

Table 3. Informal market expenditure shares, 2000

| | Share of purchases (value) in informal markets (%) | | | |
| | Food products | | Non-food products | |
	Formal households	Informal households	Formal households	Informal households
All expenditure deciles	5.1	10.1	3.2	6.6
Deciles 1-5	13.4	13.5	9.8	9.7
Deciles 6-8	9.2	11.3	6.8	7.1
Deciles 9	5.1	5.4	4.6	5.5
Deciles 10	1.9	3.1	1.6	4.0

Note: "Informal households" include all households reporting earnings from informal employment as well as households with all members that are unemployed.
Source: Own calculations using the 2000 Income and Expenditure Survey.

In fact, formal and informal households reported similar informal market expenditure shares, thus highlighting the importance of bidirectional formal/informal trade. While lower-income households spend a greater share of their income in informal markets, households in the top expenditure deciles still purchase informally produced and traded products. Overall, the 2002 SAM, which is based on the IES2000, estimates that informal sector exports to the formal region cover 77.5% of the informal economy's trade deficit with the formal sector (and, indirectly, with the rest of the world). This underlines the importance of product markets for understanding formal/informal linkages.

The second source of external earnings for the informal economy is wages earned by workers who are informally employed in the formal sector. Following our two-region conceptual framework, these workers effectively "migrate" to the formal region on a daily basis and remit their wages back to households in the informal region (*e.g.* domestic workers working for formal households). These remitted incomes can then be used to cover the cost of imports from the formal sector. According to the 2002 SAM, the remitted earnings from informally employed workers covered 15.1% of the informal sector's trade deficit.

The remaining two sources of external earnings for the informal sector lie outside of the product and labour markets. To begin with, the informal region is able to borrow externally in order to cover its formal sector purchases. This flow is reversed if informal households as a group are able to save some of their incomes. Secondly, and more importantly, informal households are net recipients of social transfers from the government, such as through public pensions or child support grants. Even though informal activities and households are exempt from direct (income and corporate) taxes, the social transfers from the government are still offset by indirect (sales and import) taxes that informal households effectively pay on their formal sector purchases (*i.e.* on final and intermediate demand). Netting out these indirect tax payments, the 2002 SAM estimates that government inward transfers account for 7.4% of the informal sectors' trade deficit with the formal sector.

The conceptual framework is a simple representation of the major linkages that need to be captured in any comprehensive model of the formal and informal economies. It therefore provides a foundation for understanding the workings of the more detailed economy-wide model.

3.2 The Formal–Informal Economy-Wide Model
SAFIM is a CGE model in which formal and informal economies are represented in much the same way as regions in a multiregional model of South Africa would be. As seen

in Table 2, the formal economy contains most of South Africa's heavier industries (*e.g.* mining and metals) as well as commercial agriculture and financial services. By contrast, the informal sector covers subsistence agriculture, some lighter manufacturing sub-sectors such as food and clothing, and a significant share of trade and transport services. To capture this heterogeneity, SAFIM contains detailed information on demand and supply for 26 economic sectors/commodities in each of formal and informal regions. Producers in each sector and region employ labour and capital under the assumption of constant returns to scale and profit maximisation. For this we use a nested production system, with a constant elasticity of substitution (CES) function determining factor demand and a Leontief function combining value added and intermediates.

SAFIM separates formal and informal workers into skilled, semi-skilled, and unskilled groups, which are used with differing intensity in each sector and region. Skilled labour is assumed to be fully employed earning a flexible real wage. By contrast, the supply of semi-skilled and unskilled workers is perfectly elastic at a fixed real wage, reflecting the high levels of unemployment observed for these skill groups in South Africa. Based on prevailing wages, all workers from the informal region can seek employment from both informal producers and formal sector firms.[5] This specification of labour markets, together with the separation of formal/informal regions, allows SAFIM to capture the three types of informal employment identified in Section 2: informal producers, workers informally employed in the formal sector and non-competitive informal jobs (see Table 1). Finally, capital stocks are immobile across sectors and earn sector-specific returns. The model therefore reflects the complex labour market linkages between formal/informal sectors.

The second formal/informal economy linkage is trade. The model explicitly allows for both interregional and international trade (*i.e.* trade between the formal and informal regions, and between South Africa and the rest of the world). Import competition and export opportunities are captured by allowing producers and consumers in the formal region to shift between "regional" and foreign markets depending on the relative prices of imports, exports, and locally produced goods. Informal producers and consumers can only substitute between informal and formal goods. More specifically, the decision of producers to supply local, regional or foreign markets is governed by a non-nested constant elasticity of transformation function, while substitution possibilities between local and (regionally) imported goods are captured by a CES Armington function. This specification permits two-way trade between the formal and informal regions, which, as shown in Table 3, is an important characteristic of formal/informal interactions.[6] This means that if the informal region is initially a net importer of a particular product, then it can still become a net exporter if policies, prices and/or productivity improve. Finally, the model also captures the

---

[5] We assume there are no barriers to entry for informal/casual employment in the formal sector, implying that informal workers are fully mobile between regions. However, informal workers cannot work formally in the formal sector. This assumption may be justified by union power, which limits entry into formal employment.

[6] Initial trade flows between the formal/informal economies was estimated using the informal market expenditure shares shown in Table 3, but for a more detailed range of products. Total demand is then compared with production, which was itself estimated using national accounts and labour income data from the 2004 Labor Force Survey. The CGE model is therefore calibrated to observed formal/informal production structures and consumer behaviour.

transaction costs that are generated by all goods entering or leaving the informal economy. The transaction costs are paid to the informal retail trade sector. SAFIM therefore captures how changes in trade patterns between the formal and informal sectors generate incomes for informal traders. This is the fourth and final kind of informal employment identified in the typology (see Table 1).

Household income and expenditure patterns vary considerably across households living in the formal and informal economies. These differences are important because the incomes earned by workers in different sectors benefit households differently according to their initial factor endowments. To capture these differences, the model further separates households in the formal and informal economies into four income subgroups (*i.e.* national expenditure deciles 1-5, 6-8, 9 and 10). These representative households receive factor incomes and social transfers from the formal sector government. This is the third linkage between the formal and informal sectors (see Fig. 1). Despite these social transfers, informal households receive most of their income from lower-skilled workers, while formal households receive a greater share from capital and higher-skilled workers. All households save some of their income (based on fixed marginal propensities to save), but only formal households pay direct taxes (based on fixed tax rates). Tax rates are highest on higher-income formal households. All households use their remaining income to consume commodities under a Cobb–Douglas demand function.[7]

Macroeconomic balance is maintained through three "closure" rules. First, for the government account, all tax rates are fixed and direct and indirect tax revenues are pooled at the national level. These are used to pay for social transfers to households, which are per capita based, and to cover public investment/savings, which are a fixed share of total revenues. The remaining revenues are used for public consumption spending, which generate demand for formal sector products only. Second, for the foreign account, a flexible national exchange rate adjusts to maintain a fixed current account balance measured in foreign currency. As the domestic price index is the model's numéraire, the exchange is the ratio of the price of tradables to non-tradables (*i.e.* the real exchange rate). Finally, for the savings-investment account, all savings rates are fixed and the supply of loanable funds is pooled at the national level. This is used to finance investment spending, which generates demand for imported and formal sector commodities. As the model is comparative static, there is no second period effect on productive capital stocks from changes in investment.

3.3 Calibration of the Model

SAFIM is calibrated to the 2002 South African Formal–Informal Sector SAM. Gross domestic product (GDP) in the 2002 national SAM (Thurlow, 2005) was disaggregated across formal and informal sectors using labour income shares from the LFS2004. This assumes that the broad production technologies of the formal and informal sectors are the same, and that intermediate demand patterns can be allocated in proportion to workers'

---

[7] We experimented with the more flexible linear expenditure system (LES) of demand, but this produced similar model results. Given our lack of econometrically estimated income elasticities, the LES system reduces to the Cobb–Douglas functional form, which thus assumes that marginal and average budget shares are the same. The static nature of our model lessens the consequences of this assumption because household incomes do not change dramatically.

incomes.[8] All government, investment and foreign export demand is allocated to formal sector products. Household consumption demand was separated into demand for formal and informal products using detailed informal market consumption shares from the IES2000 (see Table 3). Together, this provides an estimate of total demand in the formal and informal economies. Finally, in estimating the SAM we assumed that the foreign import penetration is the same for formal and informal sectors, but then adjusted the database such that all imported goods are purchased via the formal sector.[9] Thus, at this stage, the difference between total demand and supply is the value of regional imports (*i.e.* a residual approach to estimating trade between two regions). Remaining household incomes and expenditures are based on government accounts and on reported non-factor incomes in the IES2000. The final SAM represents the structural characteristics of the formal and informal economies, including production, trade, and incomes. The initial or "base" structure of SAFIM is shown in Table 4.

The informal economy (narrowly defined) contributes 7.1% to South Africa's total GDP but generates 22.3% of total employment (see columns 4 and 5 in Table 4). This reflects the low wage rates and high labour intensity of the informal sector. The largest informal sectors are retail trade (41.5%), transport (18.5%), construction (10.0%) and subsistence agriculture (9.3%) (see column 2 in Table 4). Key informal manufacturing sectors include food processing and textiles. Food processing is an important traded product between the formal and informal sectors. Formal products supply almost all informal food consumption demand, while 90% of informal food production is supplied to the formal sector (see columns 8 and 9 in Table 4). Overall, the high import and export intensities reflect the considerable bidirectional trade that exists between the formal and informal economies. The higher import intensity is consistent with the trade deficit that the informal sector runs with the formal sector. Earlier in this section it was said that interregional trade covers around three quarters of the deficit. This means that around half of the overall deficit is covered by informal "exports" of retail trade, transport and construction. This underlines the importance of informal services over informal agricultural and manufacturing producers.

"Informal households" are those earning income from the informal sector, as well as from workers informally employed in the formal sector. We also include households with all members unemployed because their non-zero consumption levels cannot be excluded from the economy-wide model and because their demand patterns are closer to those of informal households. Based on this definition and according to the IES2000, around two-thirds of South Africa's population is part of the informal economy (see Table 5). Informal households are typically poorer than formal households, with 66.6% of the informal population in the lowest five expenditure deciles compared with 24.9% of the formal population. By contrast, only 7.8% of the informal population is in the highest two expenditure deciles.

---

[8] The assumption of similar formal/informal production technologies is a limitation of the study because capital–labour ratios undoubtedly vary across the two sectors. However, the assumption was necessary because nationally representative firm-level data were not available. Survey data were used, however, to capture the higher (low-skilled) labor intensity of production in the informal sector. As such, labor productivity does vary across formal/informal sectors.

[9] The macro SAM underlying SAFIM is presented in Table A3 in the appendix.

Table 4. Economic structure of South Africa's informal economy, 2002

	Share of total GDP (%)			Informal sectors' share of national total (%)		Informal trade shares and intensities (%)			
	Formal sector	Informal sector	National	GDP	Employment	Total exports	Total imports	Exports/output	Imports/demand
All sectors	100.0	100.0	100.0	7.1	22.3	100.0	100.0	66.6	73.7
Agriculture	3.9	9.3	4.3	15.2	43.9	8.6	6.2	82.5	82.6
Manufacturing	20.7	9.1	19.9	3.3	12.6	12.0	53.8	56.4	89.1
Food and beverages	3.2	0.6	3.0	1.5	6.4	1.8	18.5	90.0	99.2
Textiles and clothing	0.9	1.7	0.9	12.9	27.5	2.8	5.0	64.2	81.5
Other manufactures	16.6	6.8	16.0	3.0	9.7	7.3	30.3	49.5	85.1
Construction	1.7	10.0	2.3	31.2	41.7	19.3	0.0	73.6	0.0
Mining and utilities	12.1	0.0	11.2	0.0	0.0	0.0	5.6	0.0	100.0
Services	61.6	71.6	62.3	8.2	20.3	60.1	34.4	65.2	60.1
Retail trade	10.2	41.5	12.4	23.7	43.1	30.0	1.0	61.2	6.7
Restaurants	0.9	1.6	1.0	11.3	20.1	1.5	1.0	60.7	60.5
Transport	8.8	18.5	9.5	13.9	23.7	18.8	8.1	72.0	60.9
Business	19.9	3.1	18.7	1.2	4.9	0.9	16.5	22.2	87.8
Government	16.0	0.0	14.9	0.0	0.0	0.0	0.2	0.0	100.0
Other services	5.8	7.0	5.9	8.5	16.5	8.9	7.6	85.1	87.2

Note: The "informal sector" in this table excludes the contribution of informally employed labour working in the formal sector (see Table 1).
Source: Own calculations using the 2002 South African Formal–Informal Social Accounting Matrix.
GDP: gross domestic product.

Table 5. Household population patterns, 2000

	Formal households	Informal households	All households
Population (1,000s)	17,404	26,291	43,694
All expenditure deciles (%)	100.0	100.0	100.0
Deciles 1-5	24.9	66.6	50.0
Deciles 6-8	34.6	26.9	30.0
Deciles 9	17.6	5.0	10.0
Deciles 10	20.9	2.8	10.0

Note: "Informal households" include all households reporting earnings from informal employment as well as households with all members that are unemployed.
Source: Own calculations using 2000 Income and Expenditure Survey.

In summary, SAFIM captures the initial economic structure of South Africa at a detailed sector level and across both factor and product markets. SAFIM's multiregional specification also allows it to capture the various formal/informal linkages depicted in the conceptual framework in Fig. 1 (*i.e.* interregional trade, intersectoral labour migration and social transfers). Finally, the model captures the four kinds of informal activities/employment identified in the typology in Table 1, including producers, traders and workers employed without contracts or benefits. SAFIM's detailed structural and behavioural characteristics, and its calibration to observed South African data, make it an ideal tool for examining socio-economic policies.

4. THREE POLICY SIMLATIONS

SAFIM is used to assess the effectiveness of three different policies in generating employment and raising household incomes. These policies include trade liberalisation, wage subsidies and unconditional cash transfers. We also consider how previous national-level assessments of these policies may have concealed differential outcomes for formal and informal economies.

4.1 Trade Liberalisation
South Africa underwent rapid trade liberalisation during the 1990s. At the same time, both unemployment and poverty worsened. Further relaxation of trade restrictions has therefore been the subject of much debate. A number of sector studies find that liberalisation reduced industrial employment, albeit only slightly (see, for example, Bhorat and Hodge, 1999; Edwards, 2001). Economy-wide studies find divergent outcomes for industry and services but also indicate a net decline in national employment as a result of liberalisation during the 1990s (Thurlow, 2007).[10] Within this context, we use SAFIM to simulate the impact of eliminating all remaining import tariffs in 2002. Table 6 shows the initial rates and tariff collections. We replace lost government revenues by raising direct tax rates in order to maintain public recurrent consumption spending at its initial level. Tax rate increases include both corporate and personal income tax rates and are proportional to initial rates (*i.e.* increasing tax rates is regressive).

[10] Fofana *et al.* (2007) find that liberalisation favoured employment, except for high-skilled workers. Although the reported effects are small, they are inconsistent with other empirical studies mentioned earlier. However, the study did not model South Africa's actual liberalisation episode and so is not directly comparable (see Mabugu and Chitiga, 2009). Their finding may also result from their assumed wage-employment elasticities, which are not reported in their study.

Table 6. Initial tariff rates and collections, 2002

	Tariff collection share (%)	Foreign import value share (%)	Tariff collection rate (%)
Total gross domestic product	100.0	100.0	2.8
Agriculture	2.9	2.2	3.7
Manufacturing	95.9	70.2	3.9
Food and beverages	5.0	2.5	5.6
Textiles and clothing	21.0	3.2	18.5
Other manufactures	69.9	64.5	3.1
Construction	0.0	0.1	0.0
Mining and utilities	0.0	11.2	0.0
Services	1.2	16.2	0.2
Retail trade	0.0	0.3	0.0
Restaurants	0.0	2.8	0.0
Transport	0.0	3.9	0.0
Business	1.1	2.5	1.3
Government	0.0	1.2	0.0
Other services	0.0	6.7	0.0

Source: Own calculations using the 2002 South African Formal–Informal Social Accounting Matrix.

Table 7 shows the changes in production under the three policy simulations. Trade liberalisation reduces tariffs on South Africa's foreign imports, which reduces import prices and raises demand for imported products. The highest tariffs in 2002 were on textiles and clothing. Therefore, it is these sectors which face the largest increase in import competition when tariffs are eliminated, with the production of textiles and clothing declining by 4.7% (see column 3 in Table 7). Moreover, textile producers in both the formal and informal sectors are adversely affected by cheaper imported products. The overall increase in imports has macroeconomic implications because it places pressure on the current account balance, which is assumed to be fixed in foreign currency. The real exchange rate therefore depreciates by 2% in order to offset some of the increase in foreign import demand and encourage foreign exports. This depreciation causes a slight increase in production among non-textile manufacturing sectors such as processed foods, metals and wood products. However, because it is the formal sector that engages in foreign exports and not informal producers, it is formal producers of processed foods and other manufactured goods that benefit the most from the real depreciation. Hence, while formal production in these sectors increases and generates some demand for informal inputs, it still declines overall for informal producers, who face higher import competition without any improved access to foreign export markets.

Falling informal production reduces employment among informal producers (see column 2 in Table 8). This is especially pronounced for semi-skilled informal producers and workers, who are more intensively engaged in manufacturing. However, the increase in production within the formal sector (driven by expanding exports) generates additional jobs for formal workers, primarily for high-skilled and unskilled workers in the service sectors. There is also increased demand for informally employed workers in the formal sector, although this benefits mainly lower-skilled workers. Finally, the decline in informal production and foreign import prices encourages informal consumers to become more reliant on foreign imported goods. This shift in consumer preferences increases the amount trade between the informal and formal sectors, thus benefiting informal traders, who collect fixed transaction margins based on the volume of trade. Thus, while employment for informal producers falls under trade liberalisation, there is a slight increase in employment among lower-skilled informal traders.

Table 7. Changes in production under alternative policy simulations

| | Change in gross domestic product from base value (%) | | | | | | | | |
| | Trade liberalisation | | | Wage subsidy | | | Unconditional cash transfer | | |
	Formal sector	Informal sector	National	Formal sector	Informal sector	National	Formal sector	Informal sector	National
Total gross domestic product	0.32	−1.13	0.21	1.47	−0.07	1.36	0.01	2.01	0.15
Agriculture	0.25	−0.17	0.19	0.41	−0.27	0.31	0.79	2.30	1.02
Manufacturing	0.17	−7.87	−0.09	1.94	−7.25	1.64	0.13	1.69	0.18
Food and beverages	0.06	−1.12	0.05	1.97	−9.95	1.80	1.18	1.62	1.18
Textiles and clothing	−4.57	−5.33	−4.67	5.36	−5.80	3.92	1.45	5.21	1.94
Other manufactures	0.44	−9.13	0.15	1.76	−7.36	1.48	−0.15	0.82	−0.12
Construction	−0.20	−3.51	−1.23	3.02	−1.17	1.71	−0.57	−1.05	−0.72
Mining and utilities	1.34	0.00	1.34	1.99	0.00	1.99	0.20	0.00	0.20
Services	0.18	−0.06	0.16	1.24	1.02	1.22	−0.11	2.45	0.10
Retail trade	−0.24	0.00	−0.19	2.47	1.24	2.18	0.28	2.45	0.79
Restaurants	0.57	−0.41	0.46	6.42	0.77	5.78	0.38	5.17	0.92
Transport	0.33	−0.02	0.28	1.59	0.85	1.49	0.46	2.57	0.76
Business	−0.14	−0.61	−0.15	1.39	−0.01	1.37	0.01	2.16	0.03
Government	0.74	0.00	0.74	−0.58	0.00	−0.58	−0.95	0.00	−0.95
Other services	0.23	−0.23	0.19	2.18	0.74	2.06	0.22	1.65	0.34

Note: The "informal sector" in this table excludes the contribution of informally employed labour working in the formal sector (see Table 1).
Source: Results from the South African Formal–Informal Model.

Table 8. Changes in employment under alternative policy simulations

	Base employment (1,000s)	Change in employment from base (%)		
		Trade liberalisation	Wage subsidy	Unconditional cash transfer
Total employment	10,556	−0.13	3.60	1.58
Skilled	2,048	0.00	0.00	0.00
Semi-skilled	4,826	−0.42	6.03	1.28
Unskilled	3,682	0.17	2.42	2.83
Formal workers	6,754	0.42	5.63	0.49
Skilled	1,898	0.14	−0.03	−0.33
Semi-skilled	3,524	0.52	8.77	0.63
Unskilled	1,332	0.57	5.41	1.26
Informally employed	1,451	0.43	0.53	0.82
Skilled	0	0.00	0.00	0.00
Semi-skilled	357	0.05	−0.08	0.79
Unskilled	1,095	0.55	0.73	0.83
Informal traders	805	0.01	2.61	5.29
Skilled	18	−0.45	2.23	4.72
Semi-skilled	265	0.02	2.61	5.31
Unskilled	522	0.02	2.61	5.31
Informal producers	1,545	−3.16	−1.86	5.11
Skilled	132	−1.94	0.17	4.09
Semi-skilled	681	−5.73	−3.59	3.34
Unskilled	733	−0.99	−0.61	6.94

Note: "Formal workers" is formally employed workers in the formal sector; "informally employed" is informally employed workers in the formal sector (see Table 1).
Source: Results from South African Formal-Informal Model (SAFIM).

Overall, trade liberalisation causes employment to fall slightly despite an overall increase in national GDP. This is consistent with the findings of previous studies (see, for example, Thurlow, 2007). However, national results hide divergent outcomes for formal and informal sectors. Total informal production declines significantly, leading to a similar decline in informal employment. By contrast, formal sector producers and their workers, especially in the service sectors, benefit from improved access to foreign export markets, which more than offset the losses caused by increased import competition. Total formal GDP therefore rises and creates new formal sector employment opportunities. The opening of South Africa's economy since the early 1990s may therefore have contributed to a small size of South Africa's informal sector relative to the formal economy. Moreover, model results indicate that trade liberalisation alters the composition of the informal economy. There is a shift in employment away from informal producers towards informal traders and workers informally employed in the formal sector. This is consistent with the observation that South Africa has a small informal producer sector and a disproportionately large informal trader sector (Blaauw, 2005).[11]

Table 9 shows changes in household incomes following trade liberalisation. These income changes include a 6% increase in direct taxes that is needed to offset lost revenue from eliminating import tariffs, which amounts to 9.6 billion rand (*i.e.* about 1% of national GDP in 2002). This tax increase only affects formal households and is based on tax *collection* rates. Overall, there is a slight decline in real household disposable incomes

---

[11] An anonymous reviewer was concerned that the simulation results show declining informal employment while survey data report rising informal employment. However, while trade liberalisation has been a major policy change for South Africa, empirical evidence suggests that its effect on net employment has been small and has been dwarfed by other changes taking place during this time, such as increased labour force participation rates.

Table 9. Changes in incomes under alternative policy simulations

| | Change in income from base (%) | | |
	Trade liberalisation	**Wage subsidy**	**Unconditional cash transfer**
All households	−0.29	1.51	1.39
Deciles 1-5	−0.09	2.13	24.13
Deciles 6-8	0.09	2.68	5.29
Deciles 9	0.15	2.44	1.14
Deciles 10	−0.53	0.89	−1.81
Formal households	−0.31	1.59	−0.80
Deciles 1-5	0.24	3.23	6.47
Deciles 6-8	0.30	3.49	2.44
Deciles 9	0.17	2.68	0.34
Deciles 10	−0.56	0.88	−2.08
Informal households	−0.21	0.99	16.15
Deciles 1-5	−0.46	0.84	44.85
Deciles 6-8	−0.39	0.84	11.76
Deciles 9	0.02	1.14	5.52
Deciles 10	0.15	1.25	4.04

Note: "Incomes" are post-tax (*i.e.* disposable); "informal households" include all households reporting earnings from informal employment as well as households with all members that are unemployed.
Source: Results from the South African Formal–Informal Model.

because of falling employment. This offsets lower consumer prices and slightly higher national GDP. However, impacts across household groups differ significantly. Previous studies find that trade liberalisation benefited households in the middle of the income distribution (Thurlow, 2007). Our results are consistent because incomes rise for national deciles 5-9 but fall for other household groups. Disposable incomes for the highest expenditure decile fall substantially because most households in this group are in the formal sector and face the highest marginal tax rates. They therefore bear the brunt of the required revenue-replacing tax increase. However, there are different distributional implications from trade liberalisation for formal and informal households. It is informal households at the top of the income distribution that benefit the most from trade liberalisation. This is because these informal households have fewer unemployed members compared with lower-income informal households. They are also not subject to the increase in direct taxes and are less affected by the drop in employment for semi-skilled workers. Thus, while the bottom nine deciles for formal households experience rising incomes, the bottom eight informal deciles experience declining incomes. Thus, the decline in incomes among poorer households observed at the national level is driven by falling informal household incomes.

In summary, trade liberalisation has different implications for South Africa's formal and informal sectors. It reduces informal employment by raising import competition without providing many additional opportunities for informal producers to access foreign export markets. By contrast, formal producers are better able to take advantage of these new foreign market opportunities, and their production expands as a result. Trade liberalisation also alters the composition of the informal sector by reducing product market space for informal producers, increasing opportunities for informal traders and encouraging informal workers to seek "casual" employment in the formal sector. Ultimately, it is the adverse effect that trade liberalisation has on the informal sector that reduces total employment in spite of new employment opportunities in the formal sector. This highlights the need for policies to support further employment creation and raise incomes among poor households.

4.2 Wage Subsidy

There is ongoing debate in South Africa regarding the effectiveness of a wage subsidy to reduce unemployment. Two studies have examined this policy option using national CGE models (Pauw and Edwards, 2006; Go *et al.*, 2009). These studies find that a wage subsidy targeted towards lower-skilled workers raises the overall level of employment despite the need for compensating tax increases and possible inflexibilities in the labour market. In this section we provide a 7% wage subsidy to all semi-skilled and unskilled workers in the formal sector, which is only slightly below the 10% wage subsidy simulated in previous studies. The wage subsidy is a fixed proportion of formal labor wages paid for by the government.[12] We target a lower wage subsidy so that the required increase in direct taxes to maintain a balanced fiscal budget is the same as under the previous trade liberalisation scenario.[13]

The wage subsidy reduces the cost of workers for firms and increases demand for labour. There is consequently a substantial increase in employment for semi-skilled and unskilled labour in the formal sector (see column 3 in Table 8). There is also a modest shift in demand away from skilled workers and capital.[14] The largest increases in employment are within the more labour-intensive sectors, which benefit the most from the subsidy. These sectors include textiles and clothing and construction, whose formal sector production expands significantly under this policy simulation (see column 4 in Table 7). Overall, national employment rises by 3.6% as a result of the wage subsidy.

Again the national results hide differential outcomes for the formal and informal sectors. This is because the wage subsidy reduces the cost of production in the formal sector but does not benefit informal producers. As a result, the price of formal products decline relative to informal products. This causes consumers to shift demand towards formal products at the expense of informal producers, whose production declines significantly (see column 5 in Table 8). It also encourages greater export growth, which only benefits formal sector firms. Informal workers therefore migrate towards those sectors that face a smaller penetration of formal sector products and fewer opportunities for export displacement. This includes much of the service sector, where trade intensities are lowest (see the final two columns of Table 4). Despite this migration to services, there is still a sharp overall decline in employment among informal producers. Falling formal sector prices and increased trade with the formal sector does, however, benefit informal traders. Increased formal sector production also benefits workers who are informally employed in the formal sector despite the substantial overall shift in labour demand towards formally employed workers (*i.e.* who are eligible to receive the subsidy).

Even though informal production declines slightly, informal households' disposable real incomes still rise as a result of the wage subsidy. This is partly because of the offsetting increase in employment for traders and informally employed workers in the formal sector. However, the main driver behind rising informal incomes is the sharp decline in

---

[12] See the exogenous parameter *ws* in Equation 12 in Table A2 in the appendix.

[13] The overriding goal of this paper is to compare our formal/informal sector CGE model with those from previous studies that use national models. However, the interested reader may wish to contrast our three policy scenarios, and so we attempt to make the first two scenarios comparable.

[14] Our simulation is broadly equivalent to that of Pauw and Edwards (2006) and to the "medium" case simulation presented in Go *et al.* (2009).

Table 10.   Unemployment rates for formal/informal households

	Households		
	Formal	**Informal**	**All**
Total employed (1,000s)	7,355	3,201	10,556
Formal	6,754	0	6,754
Informal	601	3,201	3,802
Unemployed	1,333	2,505	3,839
Total active population	8,688	5,707	14,395
Unemployment rate (%)	15.3	43.9	26.7

Note: "Formal households" are those that have any family working in the formal sector.
Source: Own calculations using the 2004 Labor Force Survey (September).

consumer prices caused by the lower cost of production. This result suggests that if producers pass the cost reduction onto consumers, then real incomes will rise even among non-recipient households in the informal sector. Again, it is informal households towards the higher end of the income distribution that benefit more than lower-income informal households. This is because semi-skilled workers in the informal sector are more heavily concentrated among higher-income informal households. By contrast, higher-income formal sector households are more reliant on high-skilled workers, who did not receive the wage subsidy in our simulation. Moreover, these higher-income households experience the largest increases in direct taxes in order to cover the cost of the subsidy. Consequently, it is lower-income formal sector households that benefit the most from the targeted wage subsidy.

One limitation of SAFIM regarding the simulation of wage subsidies is that it assumes that because it is workers in the formal sector who receive the wage subsidy, it is also formal households that benefit from new formal sector jobs. This is because, by our definition, all households with formally employed members reside in the formal "region." In effect, we assume that all new jobs created by the wage subsidy are filled by unemployed members of households with at least one formal sector worker. This is possible because 15.3% of economically active formal household members are unemployed (see Table 10). It could also be justified by network effects, in which it is easier for workers to find formal jobs if a family member already has one. However, we would expect that at least some of the new jobs will be filled by unemployed members of informal households, especially because their unemployment rate is 43.9%. To capture this within a CGE model, it would be necessary to make the classification of formal/informal households endogenous, which would require an integrated occupational choice model that tracks workers and the households they belong to. Although we do not think this would significantly alter our conclusions, it is an area that requires further work.

In summary and acknowledging the above limitation, our results suggest that a targeted wage subsidy greatly expands employment and real incomes but favours households towards the middle of the national income distribution. This is because informal producers face increased competition from subsidised formal sector producers. This encourages a shift in the composition of informal employment towards traders and casual employment. Thus, while our results are consistent with previous national-level studies, they again highlight the importance of taking formal–informal linkages into account, as well as considering the effects of employment policies on both labour and product markets.

4.3 Unconditional Cash Transfers

An alternative policy to the wage subsidy that received considerable attention in the past in South Africa was an unconditional cash transfer or a "basic income grant." Such transfers would be paid to all South Africans irrespective of age, work status or income level. Proposals at the time suggested that the transfer should be financed via increased taxes. Numerous studies examined the impact of the cash transfer on household welfare. Thurlow (2002) used a CGE model to estimate the economy-wide impact of providing a R100 per month transfer to all South Africans. In this section we simulate a R60 per month transfer because this would already involve a direct tax rate increase twice the size of the previous simulations (*i.e.* 13% instead of 6%). More recent proposals have focused on targeted or means-tested transfers, partly because of the prohibitive cost of universal transfers.

Our results are consistent with those from previous studies. The cash transfer increases disposable incomes for all households, except for formal sector households in the highest expenditure decile (see the final column of Table 9). These households experience the largest increases in tax rates in order to maintain a balanced fiscal budget. Given their importance in determining the absolute level of formal sector consumption spending, the required increase in taxes more than offsets the additional income from the cash transfer, causing real formal sector incomes to fall. The transfer also has different implications for households within the informal economy. More specifically, the value of the grant as a percentage of current incomes is much larger for lower-income households. Real per capita incomes therefore increase by 44.9% for the bottom five informal deciles compared with only 4.0% for the highest informal decile.

Large increases in informal household incomes generate additional demand for informally produced products, especially for processed foods, informal restaurants and transport services (see column 8 in Table 7). This increase in demand generates additional employment and marketing opportunities for informal producers, whose employment rises substantially. The increase in income also generates additional demand for imported and formal sector products, which benefits informal traders. Overall, the unconditional cash transfer raises national production and employment despite some slight adverse implications for formal sector production. However, the fiscal burden of the cash transfer is significant, representing more than 2% of national GDP in the current simulation and almost 5% for the R120 per capita grant that is currently being debated. Our analysis indicates that there would have to be a substantial increase in direct taxes, with severe implications for higher-income households. We do not consider the effects of the grant on capital flight, declining foreign investment, and tax evasion, any of which would increase the necessary tax increases and could possibly undermine long-term economic growth. However, despite its relatively small and possibly overestimated impact on national production, the results from our analysis do confirm the strongly pro-poor outcomes of an unconditional cash transfer.

5. CONCLUSION

Unemployment is one of South Africa's most pressing social challenges. Existing studies identify the underperformance of the formal sector and the existence of barriers to entry

in the informal sector as the primary explanations for high unemployment. Our study has extended this literature by considering the linkages between the formal and informal economies. We adopted a broader view of informal employment by including workers who are informally employed in the formal sector. We found that this explains some of South Africa's disproportionately small informal sector. However, even under this broader view, our results indicated that most of the interactions between the formal and informal sectors occur within product markets. We therefore adopted an economy-wide perspective and accounted for formal–informal interactions in both factor and product markets. Finally, we considered differences in behaviour among informal activities. Drawing on a typology of informal employment, we developed a multi-region CGE model that is empirically calibrated to the structure and behaviour of South Africa's formal and informal economies. We used the model to examine three policies designed to expand production and employment.

Model results indicated that while trade liberalisation reduces national employment, it has sharply different implications for formal and informal sectors. Formal sector production and employment expands in part because of enhanced production efficiency and improved export opportunities. By contrast, increased import competition undermines informal producers and encourages informal workers to move into trading and "casual" employment in the formal sector. This result suggests that past trade liberalisation may explain some of the small size of South Africa's informal sector, as well as its concentration within trading rather than production. While formal sector households are the main beneficiaries of trade liberalisation, lower import prices also benefit higher-income informal households. The overall effect of liberalisation is, however, a widening of the income gap between rich and poor households, and between formal and informal sectors. Further trade liberalisation is therefore unlikely to generate the employment and income opportunities needed to significantly reduce unemployment in South Africa.

We also examined the impact of introducing a wage subsidy to stimulate labour demand, and an unconditional cash transfer to directly raise incomes. A wage subsidy raises employment substantially at the national level. However, it also favours formal sector producers, whose lower cost of production allows them to reduce their market prices. This heightens competition between formal and informal producers in domestic product markets and causes a substantial decline in informal employment. Increased trade with the formal sector does, however, benefit informal traders. A wage subsidy would therefore further narrow South Africa's informal sector towards the greater trading of formal/imported products. By contrast, an unconditional cash transfer stimulates demand for informally produced products and causes a substantial increase in informal producer employment, while also benefiting informal traders. The cash transfer also has the largest positive impact on lower-income households' incomes and helps narrow the income gap between formal/informal households. However, the large size of the cash transfer requires substantial increases in tax rates, which adversely affect formal sector households, especially at the higher end of the income distribution. Moreover, the cash transfer is less effective at stimulating national production than a wage subsidy.

Beyond their policy implications, our findings confirm the need to assess the differential implications of policies on formal and informal economies. This is because the results of previous studies have hidden sharply divergent outcomes for

formal/informal enterprises and households, which should ideally be considered when assessing alternative socio-economic policies. Finally, our results highlight the importance of capturing differences in behaviour across the full spectrum of informal activities, as well as the need to consider both labour and production market conditions when designing policies to address South Africa's unemployment challenge.

REFERENCES

ALTMAN, M. (2008). Revisiting South Africa's employment trends in the 1990s. *South African Journal of Economics*, 76(S2): S126-S147.

BERRY, A., VON BLOTTNITZ, M., CASSIM, R., KESPER, A., RAJARATNAM, B. and VAN SEVENTER, D. E. N. (2002). The economics of SMMEs in South Africa. Trade and Industrial Policy Strategies, Pretoria. Available at: http://www.tips.org.za/files/506.pdf [Accessed 13 October 2010].

BHORAT, H. and HODGE, J. (1999). Decomposing shifts in labour Demand in South Africa. *South African Journal of Economics*, 67(3): 155-168.

BLAAUW, P. F. (2005). *The Dynamics of the Informal Sector in South Africa – A Case Study of Day Laborers in Pretoria*. Paper presented at the biennial conference of the Economic Society of South Africa, 7-9 September 2005, Durban, South Africa.

CASALE, D., MULLER, C. and POSEL, D. (2004). Two million net new jobs: A reconsideration of the rise in employment in South Africa, 1995-2003. *South African Journal of Economics*, 72(5): 978-1002.

DEVEY, R., SKINNER, C. and VALODIA, I. (2003). *Informal Economy Employment Data in South Africa: A Critical Analysis*. Paper presented at the Development Policy Research Unit's Forum 2003, 8-10 September 2003, Johannesburg, South Africa.

EDWARDS, L. (2001). Globalisation and the occupational structure of employment in South Africa. *South African Journal of Economics*, 69(1): 40-71.

FOFANA, I., COCKBURN, J., DECALUWÉ, B., MABUGU, R. and CHITIGA, M. (2007). A gender-focused macro-micro analysis of the poverty impacts of trade liberalisation in South Africa. *Research on Economic Inequality*, 15: 269-305.

GO, D., KEARNEY, M., KORMAN, V., ROBINSON, S. and Thierfelder, K. (2009). *Wage Subsidy and Labor Market Flexibility in South Africa*. Policy Research Working Paper 4871, Africa Region, World Bank, Washington, DC.

HEINZ, J. and POSEL, D. (2008). Revisiting informal employment and segmentation in the South African labor market. *South African Journal of Economics*, 76(1): 26-44.

HODGE, D. (2009). Growth, employment and unemployment in South Africa. *South African Journal of Economics*, 77(4): 488-504.

HUSSMANNS, R. (2001). *Informal Sector and Informal Employment: Elements of a Conceptual Framework*. Paper presented at the Fifth Meeting of the Expert Group on Informal Sector Statistics, 19-21 September 2001, New Delhi, India.

KINGDON, G. G. and KNIGHT, J. (2004). Unemployment in South Africa: The nature of the beast. *World Development*, 32(3): 391-408.

LUCAS, R. E. B. and Hofmeyr, J. F. (2001). The rise in union wage premiums in South Africa. *Labour*, 15(4): 685-719.

MABUGU, R. and CHITIGA, M. (2009). Liberalizing trade in South Africa: A survey of computable general equilibrium studies. *South African Journal of Economics*, 77(3): 445-464.

MALONEY, W. F. (2004). Informality revisited. *World Development*, 32(7): 1159-1178.

PAUW, K. and EDWARDS, L. (2006). Evaluating the general equilibrium effects of a wage subsidy for South Africa. *South African Journal of Economics*, 74(3): 442-462.

RANCHHOD, V. (2006). *Household Responses to Adverse Income Shocks: Pensioner Out-Migration and Mortality in South Africa*. Paper presented at the Economic Research Southern Africa's Labor Markets Workshop, September 2006, Cape Town, South Africa.

RODRIK, D. (2008). Understanding South Africa's economic puzzles. *Economics of Transition*, 16(4): 769-797.

SCHULTZ, T. P. and MWABU, G. (1998). Labor unions and the distribution of wages and employment in South Africa. *Industrial and Labor Relations Review*, 41(4): 680-703.

SCHNEIDER, F. (2002). *Size and Measurement of the Informal Economy in 110 Countries around the World*. Paper presented at a workshop at the Australian National Tax Centre, 17 July, Canberra, Australia.

STATSSA. (2000). 2000 Income and Expenditure Survey: Electronic Data, Statistics South Africa, Pretoria, South Africa.

———. (2004). 2004 (September) Labour Force Survey: Electronic Data, Statistics South Africa, Pretoria, South Africa.

Thurlow, J. (2002). *Can South Africa Afford to become Africa's First Welfare State?* Trade and Macroeconomics Discussion Paper 101, International Food Policy Research Institute, Washington, DC.

———. (2005). *A Dynamic Computable General Equilibrium (CGE) Model for South Africa: Extending the Static IFPRI Model*. Trade and Industrial Policy Strategies, Pretoria, South Africa.

———. (2007). Trade liberalization and pro-poor growth in South Africa. *Journal for Studies in Economics and Econometrics*, 3(2): 161-179.

APPENDIX: MATHEMATICAL SPECIFICATION OF THE MODEL

Table A1. Model sets, parameters and variables

Sets or indices		Sets or indices	
a	Activities	t	All regions (domestic and foreign)
c	Commodities	r	Domestic regions (formal and informal)
f	Factor (labor and capital)	w	Foreign region (rest of world)
h	Households		

Parameters or exogenous variables		Parameters or exogenous variables	
α^q	Import substitution shift parameter	gb	Per capita transfer from government
α^t	Export transformation shift parameter	icr	Transaction cost margin (from t to t')
α^v	Production function shift parameter	pop	Household population
β^h	Average household budget share	pwe	World export price
δ^q	Import substitution share parameter	pwm	World import price
δ^t	Export transformation share parameter	$qgov$	Base government demand quantity
δ^v	Production function share parameter	$qinv$	Base investment demand quantity
θ^{hf}	Household factor income share	sg	Government savings rate
θ^n	Intermediate input technology coefficient	sh	Household savings rate
θ^v	Value-added technology coefficient	tf	Factor tax rate
ρ^q	Import substitution elasticity	th	Household direct tax rate
ρ^t	Export transformation elasticity	tm	Import tariff rate
ρ^v	Factor substitution elasticity	tq	Sales tax rate
$cwts$	Consumer price index weight	ws	Wage subsidy value
$dwts$	Domestic price index weight		

Endogenous variables		Endogenous variables	
CPI	Consumer price index	QG	Government demand quantity
DPI	Domestic price index	QH	Household consumption demand quantity
EXR	Exchange rate	QI	Investment demand quantity
$GADJ$	Government demand adjustment factor	QN	Intermediate input quantity
$FSAV$	Foreign savings	QQ	Composite quantity
$IADJ$	Investment demand adjustment factor	QR	Domestic supply quantity
PA	Activity price	QT	Transaction margin quantity
PQ	Composite price	QV	Value-added quantity
PR	Domestic supply price (without margin)	WD	Sector and region wage distortion
PRM	Domestic supply price (with margin)	WF	Economywide average wage rate
PV	Value-added price	YF	Total factor income
QA	Activity quantity	YG	Total government income
QF	Factor demand quantity	YH	Total household income

Table A2. Model equations

Prices		
Import price	$PR_{wrc} = pwm_{rc} \cdot (1 + tm_{rc}) \cdot EXR$	1
Export price	$PR_{ruc} = pwe_{rc} \cdot EXR$	2
Domestic sales price	$PQ_{rc} \cdot (1 - tq_{rc}) \cdot QQ_{rc} = \sum_t PRM_{trc} \cdot QR_{trc}$	3
Activity price	$\sum_{a=c} PA_{ra} \cdot QA_{ra} = \sum_t PR_{rtc} \cdot QR_{rtc}$	4
Value-added price	$PA_{ra} \cdot QA_{ra} = PV_{ra} \cdot QV_{ra} + \sum_c PQ_{rc} \cdot QN_{rca}$	5
Price margin	$PRM'_{tt}c = PR'_{tt}c + \sum{}' icr'_{tt}cc' \cdot PR'_{tt}c$	6
Consumer price index	$CPI = \sum_c cwts_{rc} \cdot PQ_{rc}$	7
Domestic price index	$DPI = \sum_{rc} dwts_{rc} \cdot PR_{rrc}$	8

Production and trade		
Intermediate demand	$QN_{rca} = \theta^n_{rca} \cdot QA_{ra}$	9
Gross output	$QV_{ra} = \theta^v_{ra} \cdot QA_{ra}$	10
Production function	$QV_{ra} = a^v_{ra} \cdot \sum_f \left(\delta^v_{rfa} - QF^{-\rho^v_{ra}}_{rfa} \right)^{-1/\rho^v_{ra}}$	11
Production function first order condition	$WF_{rf} \cdot WD_{rfa} - ws_{rfa} = PV_{ra} \cdot QV_{ra} \cdot \sum_f{}' \left(\delta'_{rf} \alpha^v \cdot QF'_{rf} \alpha^{-\rho^v_{ra}} \right)^{-1} \cdot \delta^v_{rfa} \cdot QF^{-\rho^v_{ra}-1}_{rfa}$	12
Export transformation function	$\sum_{a=c} QA_{ra} = a^t_{rc} \cdot \sum_t \left(\delta^t_{rtc} \cdot QR^{\rho^t_{rc}}_{rtc} \right)^{1/\rho^t_{rc}}$	13

© 2010 The Authors.
Journal compilation © Economic Society of South Africa 2010.

Table A2. Continued

Production and trade

Export transformation first order condition	$PR_{rtc} = \sum_{a=c} PA_{ra} \cdot QA_{ra} \cdot \sum_t' \left(\delta'_{rt}c^t \cdot QR'_{rt}c^{\rho^c_{rc}} \right)^{-1} \cdot \delta'_{rtc} \cdot QR^{\rho^c_{rc}-1}_{rtc}$	14
Non-export/domestic commodities	$\sum_{a=c} QA_{ra} = \sum_t QR_{rc}$	15
Import substitution function	$QQ_{rc} = \alpha^q_{rc} \cdot \sum_t \left(\delta^q_{trc} \cdot QR^{-\rho^q_{rc}}_{rtc} \right)^{-1/\rho^q_{rc}}$	16
Import substitution first order condition	$PRM_{trc} = PQ_{rc} \cdot (1 - tq_{rc}) \cdot QQ_{rc} \cdot \sum_t' \left(\delta'_t rc^Q \cdot QR'_t rc^{-\rho^q_{rc}} \right)^{-1} \cdot \delta^q_{trc} \cdot QR^{-\rho^q_{rc}-1}_{rtc}$	17
Non-import or domestic commodities	$QQ_{rc} = \sum_t QR_{trc}$	18
Transaction costs	$QT_{rc} = \sum_{tc}' icr'_{trc}c \cdot QR'_{trc}$	19

Factors and institutions

Factor incomes	$YF_f = \sum_{ra} WF_{rf} \cdot WD_{rfa} \cdot QF_{rfa}$	20
Household incomes	$YH_{rh} = \sum_f \theta^{hf}_{rhf} \cdot (1 - tf_{rf}) \cdot YF_{rf} + g b_{rh} \cdot pop_{rh} \cdot CPI$	21
Consumption demand	$FQ_{rc} \cdot \theta H_{rch} = \beta^h_{rch} \cdot (1 - sh_{rh}) \cdot (1 - th_{rh}) \cdot YH_{rh}$	22
Government revenues	$YG = \sum_{rh} th_{rh} \cdot YH_{rh} + \sum_{rf} tf_{rf} \cdot YF_{rf} + \sum_{rc} tq_{rc} \cdot PQ_{rc} \cdot QQ_{rc} + \sum_{rwc} tm_{rc} \cdot pwm_{rc} \cdot QR_{wrc} \cdot EXR$	23
Investment demand	$QI_{rc} = qinv_{rc} \cdot IADJ$	24
Government demand	$QG_{rc} = qgov_{rc} \cdot GADJ$	25

System constraints

Product market equilibrium	$QQ_{rc} = \sum QN_{rca} + \sum_h QH_{rch} + QG_{rc} + QI_{rc} + QT_{rc}$	26
Factor market equilibrium	$QFS_f = \sum_{r}^{a} QF_{rfa}$	27
Government balance	$\sum_{rc} PQ_{rc} \cdot QG_{rc} + \sum_{rh} g b_{rh} \cdot pop_{rh} \cdot CPI + \sum_{rfa} ws_{rfa} \cdot QF_{rfa} = (1 - sg) \cdot YG$	28
Savings-investment balance	$\sum_{rc} PQ_{rc} \cdot QI_{rc} = \sum_{rh} s_{rh} \cdot (1 - th_{rh}) \cdot YH_{rh} + FSAV \cdot EXR + sg \cdot YG$	29
Current account balance	$FSAV = \sum (pwm_{rc} \cdot QR_{wrc} - pwe_{rc} \cdot QR_{rw})$	30
Regional balance	$RSAV_r \sum_{rwc}^{wc} c = (PR'_r \cdot QR'_r rc - PR'_{rr}c \cdot QR'_{rr}c)$	31

Table A3. Macro Social Accounting Matrix, 2002 (Billions of Rands)

	ACT-F	ACT-I	COM-F	COM-I	LAB-F	LAB-I	CAP-F	CAP-I	HHD-F	HHD-I	GOV	TAX	S-I	ROW	TOTAL
ACT-F			2,643												2,643
ACT-I				191											191
COM-F	1,574	88							572	86	215		189	382	3,106
COM-I	101	29	6	21					37	28					221
LAB-F	458														458
LAB-I	28	35													63
CAP-F	483														483
CAP-I		39													39
HHD-F					458		483				71				1,011
HHD-I						63		39			24				125
GOV												291			291
TAX			117	9					165						291
S-I									238	11	−18			−43	189
ROW			340												340
TOTAL	2,643	191	3,106	221	458	63	483	39	1,011	125	291	291	189	340	

Source: South Africa Formal-Informal social accounting matrix.
Note: ACT: activities; COM: Commodities; LAB: labour; CAP: capital; HHD: households; GOV: government; TAX: direct and indirect taxes; S-I: savings and investment; ROW: rest of world. "F" and "I" denote formal and informal sectors, respectively.