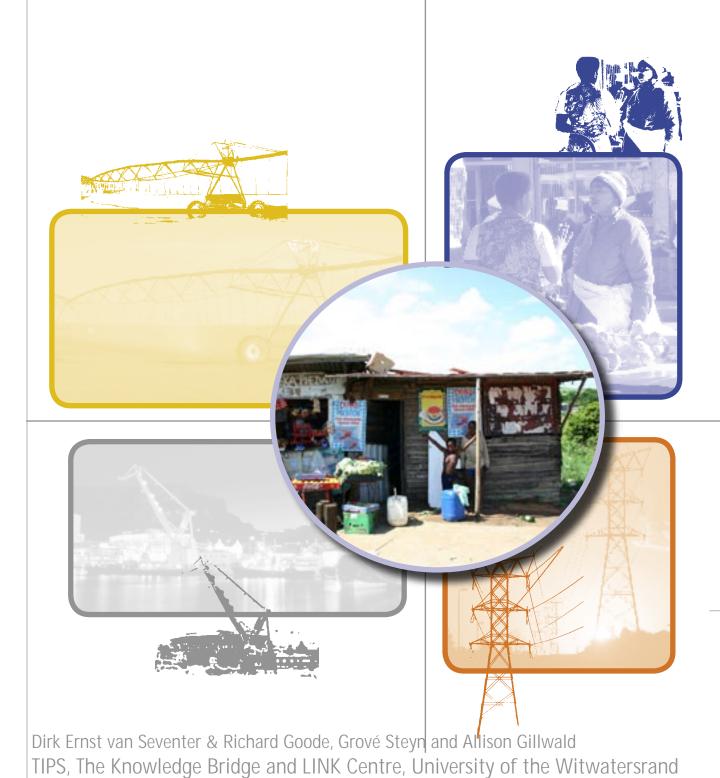# TIPS

WORKING PAPER 6 - 2005

Determining an Appropriate Methodology for an Economy-wide Study
of the Impact of Restructuring and Privatisation on the SA economy

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Determining an Appropriate Methodology for an Economy-Wide Study of the Impact of Restructuring and Privatisation on the SA Economy

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TIPS

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Acronyms

BEE	Black Economic Empowerment
CGE	Computable General Equilibrium (model)
CPI	Consumer Price Index
DCT	Durban Container Terminal (South Africa's port sector)
DME	Department of Minerals and Energy (South Africa)
DPE	Department of Public Enterprises (South Africa)
ESI	Electricity Supply Industry
FDI	Foreign Direct Investment
GATS	General Agreement on Trade in Services
GDP	Gross Domestic Product
IPO	Initial Public Offering
ISP	Internet Service Provider
MPT	Multipurpose Terminal (South Africa port sector)
NER	National Electricity Regulator
NFA	National Framework Agreement
NPA	National Ports Authority
NTB	Non-tariff Barrier
PPI	Producer Price Index
PSBR	Public Sector Borrowing Requirements
PTY LTD	Proprietary Limited
SA	South Africa
SAM	Social Accounting Matrix
SAPO	South African Port Operations
SAPP	Southern African Power Pool
SNO	Second Network Operator
SOE	State-owned Enterprise
SUT	Supply and Use Table
UN	United Nations
USAL	Under-serviced Area Licence
VANS	Value Added Network Services
VOIP	Voice Over Internet Protocol
WEPS	Whole Sale Electricity Pricing System

1.   Introduction

Since 1994, some restructuring of state-owned enterprises (SOEs) has taken place in South Africa (SA), which has included elements of corporatisation and commercialisation, as well as partial privatisation. The Government has committed itself to more reform. This is an ongoing process, and to inform this process an investigation into its economy-wide impacts in SA has been suggested.

Such an investigation would benefit from a two-stage approach, starting with a scoping exercise that aims at assessing relevant international experiences and the most appropriate methods to be adopted for the actual analysis, which is to take place in the second stage. In this report we undertake the following:

▪ A review of selected approaches adopted internationally towards modelling the macroeconomic impact of privatisation and restructuring.

▪ A review of existing and current work in SA that will be useful in determining the macroeconomic impact.

▪ A review of the data requirements of the various options, and the current availability of data in SA.

In spite of the main interest being an economy-wide impact analysis of restructuring and privatisation, the main drivers of any macroeconomic or economy-wide impact analysis of restructuring and privatisation are to be assessed at the micro level. Given bottom-up inputs from the micro scoping analyses, the challenge then is to consider appropriate ways of undertaking an economy-wide impact analysis.

Restructuring and privatisation is an ongoing process, with some milestones having been achieved while others are lagging behind the initial schedule. It is not easy to establish a definitive point at which, or period in time during which, a particular process of restructuring and privatisation was undertaken, sealed and closed off. In most cases, the reforms in SA focussed on corporatisation of the SOE, which was poorly sequenced with the introduction of new, more appropriate regulatory frameworks and regulatory institutions. Changes to the market structure, aimed at introducing competition, have not played a significant role in this process. The result has been ineffectually regulated public monopolies, which are detrimental to consumers and the economy at large.

Consequently, given the dearth of actual reforms, there is perhaps little that can be learnt from an economy-wide impact analysis of these rather convoluted and limited restructuring processes. Instead there may be greater interest in the economy-wide implications of more stylised type of processes. We think it is important to ask a number of 'what if' questions while keeping everything else constant. With this 'tool', the relevant stakeholders (policy-makers, union representatives and business) will perhaps find it easier to assess the likely impact of major policy choices with regard to key industries. In the past, these discussions were often based on rather dogmatic conjecture, with the direct impact of restructuring (such as employment losses in Telkom) the dominant concern, with little appreciation of the broader, economy-wide consequences.

Moreover, the stylised approach allows for comparative scenario analysis, which will provide valuable insights into the inevitable trade -offs in reform processes. It will, for instance, be possible to rank the scenarios with respect to certain critical variables, be these employment, prices or other policy variables, so that informed decisions can be made regarding the preferred road ahead. This approach will provide a 'menu of options' to form the basis of discussion between Government and other stakeholders, hopefully preventing a focus on direct employment effects unbalanced by the costs of inefficiency commonly associated with restructuring debates.

In addition, the economy-wide modelling framework proposed will allow for anomalous economic events to be excluded from the analysis so that the impact of reform can be discussed in the absence of events that may have exaggerated or mitigated SOE restructuring and may well have resulted in unexpected and unpredictable economic outcomes in the opposite direction of the intended reform.

If we were primarily concerned with stylised reform scenarios, a casual interpretation would imply that we take a forward-looking view (as it will be difficult to explain a 'clean' stylised scenario of reform that has taken place in the past) for which the modelling exercise produces an outcome that is radically different from what has been observed. Typically, exogenous economic events may have thrown a spanner in the works, and for the sake of comprehensive reporting, these other events also need to be taken into account in the analysis, both at the micro and the macro level. Although this is in itself an extremely important exercise and it was indeed one of the objectives of Chisari *et al* (1999) to show the interplay between major external shocks and reform in Argentina, the interpretation of the ex-post impacts of reform becomes considerably more complicated, as it will be difficult to separate out the impact of reform from the impact of exogenous shocks.

The above also suggests that as drivers of economy-wide policy options, the micro studies should stick to stylised representations of the reform that is still to take place. In the SA context the proposed sectors of relevance are electricity, transport (ports and rail) and telecommunication.

In terms of the organisation of this report, we start with a review of national and international analyses that offer accounts of economy-wide impact assessments of restructuring and reform. This is followed by the scoping of a number of micro-level case studies in the SA context. In section 4 we attempt to pull together the findings from the scoping of case studies at the economy-wide level by giving an indication as to what is possible with the current modelling frameworks available for SA in terms of an impact assessment of restructuring and reform of SOEs. We end with a conclusion.

2. Literature Review

Our literature review is by no means comprehensive, although we were somewhat surprised by the scarcity of analysis of restructuring and reform of SOEs, especially for lesser-developed economies. The applications that we did manage to scrutinise cover a wide variety of economies, including Argentina, Tunisia and a (stylised) transition economy. We also include some broad observations from Australia and sector-specific reforms in New Zealand and SA.

2.1. Argentina: Chisari *et al* (1999 and 2003)

Chisari *et al* (1999 and 2003) represent by far the most ambitious and comprehensive quantitative economy-wide applications of aspects of restructuring and reform in network industries. An attempt is made to isolate the restructuring and reform process from other major events that took place at the same time during the early and mid-1990s. However, some features of the analytical framework that allow for the main external shocks to be considered, such as the financial turmoil following the tequila crisis, were maintained, for example a rudimentary financial sector. This makes the analytical framework somewhat different from the standard neoclassical computable general equilibrium (CGE) modelling framework employed by the World Bank and associated institutions. Other features that make the Chisari *et al* (1999) framework look different are all related to the issues at hand – the assessment of the economic impact of restructuring. The most important ones for our purposes are listed below:

- The ability to handle mark-up pricing as well as flexible pricing rules.

- The distinction between private sector and public sector activities where necessary.

- Public expenditure on infrastructure is identified separately from private sector spending.

- The distinction between private sector and public sector labour supply, which is deemed to be useful for some scenarios if it is assumed that it is not easy to transform a public employee into a private worker instantaneously.

- Goods and services of privatised firms appear separately in household-demand functions and a quality index is assigned, which allows for the accounting of increases in service failures which may raise "costs for consumers of services because they need to buy a larger number of physical units to reach the desired flow of services which allows the costs of black-outs and brown-outs to be modelled as a share of unit costs".

- Holdings of private sector bonds allows for certain household groups to be modelled as net debtors in the benchmark simulation; in that case an increase in the price of bonds could result in an increase in the supply of labour and a reduction in the household expenditure of the relevant group. The converse would apply if (presumably high-income) households would be net creditors.

- Modelling of income transfers to privatised entities.

- Allowance for the improvement of quality of services rendered to other firms as intermediate inputs, by means of adjusting the technical input-output coefficient.

The following privatised sectors are considered:

- Electricity generation, which became competitive.

- Electricity distribution, which became regulated monopolies.

- Gas, which became regulated local distribution monopolies.

- Water, which introduced competition through a bidding process.

▪ Telecommunication, which became a regulated duopoly.

Gains from privatisation are modelled in the following way (Chisari *et al*, 1999: 370-371):

▪ Efficiency gains: reductions in intermediate inputs per unit of output of privatised sectors, which increase the capacity of the economy to generate a surplus. This is modelled as decreases in the technical (input-output) coefficients of the relevant sectors. Privatised sectors require fewer inputs from other sectors in the economy.

▪ Labour productivity: increases in labour productivity can be seen as efficiency gains in work so that less employment is needed to obtain a given level of service. This is modelled as a reduction in quantity of labour that feeds into a traditional Cobb-Douglas production function in which labour and capital are combined to produce value add.

▪ Quality improvements: increases are measured as a reduction of intermediate inputs supplied by the privatised sectors to all sectors in the economy (including what privatised sectors supply to each other, such as electricity to water) – the per unit of output.

▪ Tariffs: observed changes in the prices of privatised utilities.

The main purpose of the simulation is to track how these gains permeate through the economy along the following channels:

▪ Directly, through lower prices of the privatised services to final consumers.

▪ Indirectly, through lower input costs to industries using these services.

▪ Indirectly, through lower input prices for the privatised utilities themselves.

▪ Directly or indirectly through labour productivity gains and remuneration in factor markets.

The following simulations are undertaken:

▪ Privatisation with effective regulation: efficiency gains, productivity gains and quality improvement are modelled to be passed on to the consumer via price reductions. This is equivalent to flexible pricing, the standard set-up in a neoclassical CGE model in that prices adjust to assure benefits in the industry are equal to 0.

▪ Privatisation with ineffective regulation: rents are modelled to be appropriated by the owners/shareholders of the privatised entity in the form of a tax or a quota.

The difference between the two simulations is that with ineffective regulation, rents are generated as cost reduction, which leads to surpluses captured by the private operators. In an internally consistent framework these rents need to be redistributed somehow, with high-income households typically picking up the benefits. As will be seen below, this drives to a large degree the distributional impacts.

The results indicate the following:

▪ Privatisation has a positive impact on the gross domestic product (GDP) in all sectors and for both regulation options. The total impact is estimated to be 0.7% and 0.8% of GDP for the effective and ineffective regulation options.

▪ Employment effects are mixed. In total they are typically positive for the effective regulation option and negative for the ineffective regulation option. In the gas sector effective regulation is anticipated – "where dispersing the efficiency gains leads to a significant drop in labour productivity in the economy by shifting production to more labour-intensive sectors and reducing overall unemployment" (373). Presumably, labour-intensive sectors are more gas-intensive energy users and with sufficient supply and flexible pricing, costs will come down and production will go up.

▪ Exports are influenced by pricing rules and the effectiveness of regulation. If effective, exports increase and when rents are retained by private operators, as is the case with ineffective regulation, the relative price of tradeables increases by less.

▪ For the distributional effects, the report presents results for various measures such as household income, the Gini coefficient, an equivalent variation measure of household welfare in which prices, income and a quality/quantity measure feature. The results show that the last-mentioned will emphasise the positive impact of privatisation with or without effective regulation while the impact through prices will feature only in the case of effective regulation. Ineffective regulation appears to benefit high-income households relatively more than poor households due to the higher proportion of household income derived from unearned income. Poor households tend to benefit more from restructuring and reform in gas, water and electricity as these services represent a higher proportion of their income. Telecommunications reform has more of a positive impact on higher income households for the same reasons, i.e. the portion of household expenditure dedicated to these services is relatively high.

What can we learn from the above? Given the availability of a standard neoclassical CGE framework for SA (amongst others, Thurlow & Van Seventer, 2002; De Wet & Van Heerden J, 2003 and Kearney, 2003) a number of adjustments may need to be considered:

▪ Identifying privatised sectors: some sectors in the SA economy represent a combination of private and public enterprises. Some of the latter may or may not be privatised. The challenge is to disaggregate activities in the modelling framework and its underlying social accounting matrix (SAM) database by type of ownership, i.e. private or public.

▪ Mark-ups and price equations: currently the standard CGE framework for SA is set up with flexible pricing rules except for unskilled labour categories. The latter is assumed to be unemployment so that with a fixed price (wage) quantities adjust. Introducing mark-ups in a CGE framework can be done in several ways as will be discussed in section 4.

▪ Holdings of bonds have been used by Chisari *et al* (1999) as a way of modelling Argentina's financial sector and the various institutions' vulnerability to financial crises. The foreign sector may in some simulations be called on to finance domestic demand when it outstrips supply by buying up bonds issued by domestic agents. In times of an international financial crisis the interest rate has to go up in order to entice foreigners to buy local bonds. With an increase in the price of bonds, those households that are net debtors will suffer and cut back on other expenditures. The modelling of bonds is perhaps not all that relevant for the scenarios that we have in mind with the SA CGE in which usually fixed foreign savings are assumed and the exchange rate adjusts accordingly.

In a more recent paper, Chasari *et al* (2003) explore the economy-wide impact of differences in regulatory regime in a more stylised setting such as the Argentinean economy. Without the financial sector and a SAM with only four real sectors, of which one is the regulated service industry, the authors consider a price-cap regulation model versus a cost-plus regulated mark-up model in an economy that is characterised by a high degree of openness and foreign participation in the regulated industry.

The aim of the authors is to evaluate the relationship between the two regulation models especially focusing on their interdependence with the trade balance. Given that there will be a high degree of private foreign ownership in restructured infrastructure services, one would expect that the price-cap model, in which operators are encouraged to cut costs to maximise profits, may lead to considerable outflows when an exogenous efficiency gain by the operator is assumed. Assuming fixed foreign savings this means that exports will have to rise. Such adjustments through the trade balance may have profound implications for the rest of the economy in the case of countries like Argentina, depending on whether the exchange rate is allowed to adjust or not. If

the cost-plus regulated mark-up is chosen, the benefits of higher efficiency achieved by the regulated service operator is transferred to domestic consumers and place less of a burden on the trade balance.

One of the conclusions that the authors come to is that the capital account and the rate of exchange regime could be key elements to select the regulatory regime. The impact of the regulatory regimes may have an impact on the SA economy, although the trade balance channel is expected to be less powerful in SA than in Argentina, due to lower foreign participation expected in the restructuring of SOEs. The trade balance could, however, play an important role, and there is anecdotal evidence of that in SA, if the introduction of new technologies in, say, telecommunications results in a sudden rush of imports for intermediate inputs or investment.

2.2. Tunisia: Konan & Maskus (2002)

While the Argentina study has attempted to incorporate a number of structural features of the economy in the analytical framework, the study on Tunisia by Maskus & Konan (2002) is less concerned with that. The focus of the Tunisia study is less on restructuring and reform of state-owned enterprises and more on reform in the services sector in the context of GATS liberalisation of cross-border services trade (mode 1) and the establishment of domestic presence by foreign direct investment (mode 3). Moreover, services liberalisation is compared to liberalisation of goods.

The authors use a vanilla CGE model of the Tunisian economy. This is useful for our purposes as our starting point in SA is very much the same. How has their model been adapted? With regard to cross-border services (mode 1), an *ad valorem* equivalent NTB is assumed[1], while the authors deal with the direct investment issue (mode 3) as follows:

> Production decisions in the services sector are distorted by regulations
> that raise entry costs and limit the rights of foreign enterprises to
> establish facilities in Tunisia. In principle, this restriction distorts prices
> and quantities through two primary channels:

- *Cartel distortions*: ineffective regulation impedes competition and creates market power for local firms and the opportunity in a sector to charge price mark-ups over marginal cost. As in the case of the Argentinean study, some additional accounting is required to distribute the proceeds of the rent. This distortion is linked to the GATS mode 1 restraints on services trade, which involve restrictions on cross-border supply.

- *Inefficiency distortions*: domestic suppliers may be forced to absorb into their costs various regulations on provision and bureaucratic procedures. As in the Argentinean study, these activities do not contribute to output and generate pure economic waste. Resource-using service barriers raise marginal costs above 'best practice' marginal costs that would prevail in a liberalised environment. This distortion is linked to the GATS mode 3 issues as it is assumed to be a restriction on foreign ownership through foreign direct investment.

The implementation and quantification of these two distortions pose some data problems for the authors. Evidence of distortions at sectoral level is collected on an ad hoc basis using anecdotal evidence. Often, evidence can only be given for the sum of the two distortions, as this appears to be a measure that is more readily accepted. In that case the wedge is split between the two distortions. Another shortcoming is the way that the model handles foreign direct investment

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[1] *Ad valorem equivalent* NTB for analysing deregulation scenarios is difficult to estimate. Additional literature can be found in Hoekman and Primo Braga (1997); Hoekman (1995); Berlinski and Romero (2001); and Dee, Hardin and Holmes (1999).

(FDI). This is a shortcoming of a standard CGE modelling framework in which investment is typically treated as an exogenous variable and the comparative statistics do not incorporate the impact of investment on capital stock in the next period. According to the authors, omitting FDI, like they do, will underestimate the impact of services liberalisation.

In terms of sectors, the non-services industries (agriculture, mining, manufacturing) are not subjected to any distortions. The services industries comprise the following:

Table 1: Service sector distortions assumed in Tunisian study (% wedge price & marginal costs)

	Mode 1	Mode 3		Mode 1	Mode 3
	Cross-border trade	Foreign presence		Cross-border trade	Foreign presence
1. Construction	nt	3	8. Insurance	50	50
2. Distribution	nt	5	9. Bus, Insur & Leas	10	10
3. Transportation	50	3	10. Real estate	10	10
4. Communications	200	30	11. Repair	nt	3
5. Hotel	nt	3	12. Health & Educ	nt	nt
6. Restaurant	nt	3	13. Public Services	nt	nt
7. Finance	30	30	14. Other Services	nt	nt

[Source: Konan & Maskus (2002). Note: nt = non-traded modes of supply]

From these assumptions it is easy to see that this study is of a stylised nature. It can be seen from the table that the assumed distortions are highest on communications, transportation and insurance. As with the Argentinean study, communication liberalisation will presumably benefit high-income households more than low-income households, although at the same time rents will be lower.

The first set of results on which the authors report focuses on investment (mode 3). A distinction between efficiency and effective regulation is made which suggests that the abolition of rent-seeking distortion does not generate as high a positive impact on GDP as the inefficiency distortion. The reason is that while reduction of rent-seeking will hurt some groups, typically, high-income households lose out more when rents are squeezed, *all* households benefit from higher efficiency, although the degree to which this occurs depends on the elasticities of supply and demand. Therefore, the parameters used to calibrate the initial solution and to compute the simulations become critical for the distributional policy recommendations. In terms of the sectoral impact of liberalisation, the study indicates agriculture and services as the main beneficiaries and manufacturing and mining as relative losers. No explanation is given for these results, and one can only guess that service inputs result in lower costs for agriculture and services itself. These sectors will expand their output in a fully employed economy only at the cost of other sectors.

The authors continue their simulation by comparing the results of service trade liberalisation (mode 1, using the abolition of the ad valorem equivalent NTB mechanism) with that of the investment liberalisation (of mode 3), as described above. It appears that investment liberalisation (mode 3) can have a much higher impact than services trade liberalisation (mode 1). In both cases liberalisation appears to favour capital more than labour. Combining the two forces generates slight positive interaction terms, i.e. they reinforce each other. This, however, only applies to capital, as labour's interaction terms are negative. Again, this highlights that capital is to benefit more than labour from services liberalisation. Services trade liberalisation is expected to benefit manufacturing and mining more than agriculture and services, while the opposite is expected for investment liberalisation.

The full liberalisation (trade plus investment) in financial and transportations sectors appear to be contributing most to the gains, other sectors play a much more modest role. This is partly the result of the high initial wedges that are assumed (see Table 1) but also because these services represent significant input costs. The authors also compare the results with that of tariff liberalisation. The last-mentioned is shown to be of lesser importance compared to services (model 1 plus mode 3) liberalisation. As expected from traditional trade theory, merchandise trade liberalisation is expected to benefit mainly labour as the abundant factor, while services liberalisation, as mentioned above, tends to advance capital relatively more. Manufacturing tends to benefit relatively more from merchandise liberalisation than services liberalisation.

The relevance of this study for SA purposes is that it has shown that even with relatively little data inputs, in terms of the assumed distortions in services trade, one can obtain an interesting and highly relevant story on the impact of deregulation. Another interesting aspect is that the deregulation scenarios are linked to GATS services liberalisation of cross-border supply (mode 1) and commercial presence (mode 3). While we are dealing with the commercial presence for our sectors of interest (electricity, transport and telecommunication) and the mode 1 issue of cross-border supply may be less relevant, it may be useful to consider deregulation scenarios of other services such as financial services by means of an *ad valorem* equivalent NTB.

2.3.   Eastern Europe: Roberts (1999)

This paper evaluates possible outcomes of privatisation in terms of macroeconomic performance. Alternative scenarios are put side by side within a consistent analytical framework of a CGE model. Illustrative simulations are performed for a representative economy of a country at the outset of transition. A reality test with what actually happened in Poland is also performed. In particular, the paper is interested in:

> ... how privatisation affects the functioning of the whole economy through its impact on output, employment, budget deficit and price level (p3).

At the outset it should be noted that the share of the economy that underwent restructuring in Eastern Europe is much larger than what is currently up for discussion in SA. This makes comparison difficult and the availability of relevant clues for our purposes limited. The other difference is that public enterprises were not only confined to network industries. In Eastern Europe, public enterprises were widespread in the manufacturing industry. Private enterprises were mainly confined to the trade sectors. Apart from efficiency, price and productivity issues, changing ownership from public to private in manufacturing therefore had significant consequences for macro variables such as the imports, exports and the balance of payment, as part of transition in Eastern Europe involved opening up the world and the import content of some sectors increased considerably.

Based on literature and stylised facts, the exogenous variables that are considered by the authors for purposes of approximating the privatisation process are:

1.   *Economic efficiency*: although not explained how this is modelled, it is in any case argued that the link between privatisation and efficiency may, in fact, be weak and this lever plays a relatively small role in the modelling exercise.

2.   *Taxation*: is expected to be different, lower in privatised firms. Presumably, as prices are deregulated, margins are squeezed and taxable income is reduced. Ineffective regulation, as it were, creates taxable surpluses.

3.   *Wages*: could be higher in the privatised sectors, especially where ownership is transferred to workers' councils.

4.   *Export competitiveness*: higher for privatised entities as modern technologies are introduced.

5.   *Imports*: import rationing, it is argued, would place the privatised firm at the back of the queue and the share of import in public enterprises is expected to be higher than in privatised enterprises.

The analytical framework is, however, highly aggregated with 3 sectors: public, transition and private. The transition sector has initially the same characteristics as the public sector and will be used to perform experiments. This framework displays typical characteristics of a stylised European economy at the outset of restructuring, such as:

- A public sector that dominates production except for trade and some other services and small-scale manufacturing;

- A public sector that is more export-oriented than the private sector;

- A public sector that offers the bulk of the tax income but also requires subsidies;

- A privatised transition sector, which displays higher factor productivity and therefore return.

A number of simulations are undertaken that form the elements of a comprehensive privatisation scenario. The following components are, amongst others, evaluated in isolation:

- Higher efficiency in privatised transition sector (20% of what used to be the public sector) will result in higher output and employment while prices are expected to come down. As a result real wages go up and the government deficit goes down and investment receives a boost, all as expected.

- Lower indirect taxes for privatised transition sector generates the same positive effects but government deficit is up.

- Higher nominal wages in the privatised transition sector, in addition to the increase in real wages mentioned under 1) above. Although there is a further increase in wages, employment will be lower.

- Increased import dependency by the private sector, now that that part of the public sector is privatised. If it is, then of course this will indeed have some negative effects.

- Higher exports by privatised transition sectors, compared to the public sector from which it has just been split off, will obviously counterbalance the negative impact of the higher imports. It makes sense to look at imports and exports together as a move to opening up the economy.

- Redistribution from government to households has a positive impact on household expenditure, but not on output, presumably because most of that additional demand is imported. Government's position deteriorates considerably.

A case study on the basis of a real SAM for Poland is undertaken to offer a reality check of the stylised scenarios described above. From the SAM it appears that enterprise aggregate data give a mixed picture of relative financial performance of the public and private sector in Poland. The ratio of costs to sales for private enterprises is higher than the relevant cost indicator for the public sector. However, at the beginning of the nineties the public sector received higher subsidies. A survey of Polish private and state-owned enterprises is also quoted as not providing clear evidence of better performance of the private sector either. With regard to trade, it would appear that public sector manufacturing firms are less reliant on imports than the newly privatised manufacturing firms and their export to output ratio is much higher although the privatised manufacturing firms did raise their ratio in later years.

Simulation with a CGE model for Poland should give us some idea about the magnitude of changes in macroeconomic performance that can be expected due to privatisation in a real rather than stylised economy. Again, the privatisation simulation is set up in such a way that 20% of the public sector becomes detached and its behaviour changes according to the scenario considered. A combined scenario is pursued instead of a series of individual changes. Importantly, increases in efficiency as part of the scenario are ignored, as the empirical evidence is thought to be not conclusive. Rather, privatisation is assumed to result in a reduction of subsidies, although taxes on profits paid by firms decrease as well as indirect taxes. Households are assumed to appropriate a larger share for value added in the privatised segment at the cost capital. Moreover, imports of intermediate goods increase, while exports by the sector in transition decrease. All changes that take place are assumed and are rather stylised 10% from the original values.

The results show that gross output declines by 2.2%, affecting all sectors, but the sector in transition in particular. Employment is also lower, by 7.6%, although prices decline and as a result real wages increase. Nevertheless, lower employment leads to lower household income and lower household consumption. In addition, the public sector's balances and with lower income of domestic institutions and, hence, lower savings, investment declines by 14%. According to the authors, "... this scenario exhibits many phenomena experienced by Poland and other countries in the first years of transition, such as a decline in output, an emergence of unemployment and severe government budget deficit."

The relevance of this study for our purposes is limited by the different structural features of the economies of Eastern Europe at the outset of restructuring, compared to the current situation in SA. Restructuring of SOEs in SA is considerably more modest and does not involve manufacturing to the same degree, although Denel can be considered for investigation in SA. Foreign accounts have played a much more important role in Eastern European investigations. Moreover, limited attention is paid to network industries such as those that are deemed to be important in SA.

2.4. SA: Hindson & Edwards (2003)

While the previous studies focused on packages of restructuring and reform measures, our next study offers an assessment of the economic impact of a single measure, in this case the restructuring of part of the port sector in SA. Although port activities are small in the macroeconomic context of SA, the impact of inefficient port operation can be substantial, as has been pointed out by Limao & Venables (1999). The central question for the Hindson & Edwards (2003) study is "What will be the economic impact of the concessioning of SA Port Authority (SAPA) terminals on the wider economy?" In particular the emphasis is on terminals only and not on the full range of port activities. Moreover, the focus is on concessioning of operations. As a result a 'tailor-made methodology' was considered for the study.

Considering the state of existing data sources, the difficulties in obtaining survey information and the time constraints, a case study approach was adopted. The Durban Container Terminal (DCT) and Richard's Bay Multipurpose Terminal (MPT) were selected to demonstrate the impact of concessioning of these entities on the wider economy.

With cargo statistics and information/estimates on changes in transportation costs associated with the concessioning of the two above-mentioned entities, a number of first-generation applications based on a SAM for SA is used to evaluate the direct and indirect impact on the economy. This approach can be compared to the single more complex second-generation model described in previous studies.

The authors evaluate the hypothetical economy-wide impact of reduced cargo costs following restructuring of the above-mentioned terminals. Cargo costs consist of a number of elements and a composite index is created. 10% and 50% reduction scenarios are then simulated.

A distinction is made between the impact on exports and imports. The modelling sequence of the economy-wide impacts of export growth and import penetration unfolds in a number of stages.

1. Using cost data and substitution elasticities, export growth and import penetration are estimated arising from a reduction in the costs associated with the relevant terminals.

2. To capture the indirect effects the authors use a conventional SAM-based multiplier model with which the impact of changes in final demand on the direct and indirect output of industries in the economy.

3. The study identifies the impact of further price effects on a household's purchasing power. With the import prices falling, local firms will be forced to drop their prices to maintain their competitiveness. Market share may be lost to imports, as mentioned above under 1) and 2) but lower prices will increase household expenditure and consequently output. This is modelled in two sub-stages:

    3a. The impact of lower prices is evaluated with a simple Leontief price model in which, as with the conventional multiplier model, inputs in the production process are used in fixed proportions and any cost reductions arising from cheaper inputs are transmitted fully to downstream industries. Eventually, these transmissions hit the factory gate of the final downstream industry before it is sold as final demand to institutions such as households and the rest of the world.

3b. Given assumed price elasticities for households and exports, the authors then estimate the impact on final demand, which is again evaluated in terms of sectoral value added with a conventional SAM input-output framework.

4. Investment outlays tied to the concessioning of the ports are evaluated by means of the conventional multiplier model.

The combination of an output and price multiplier model requires a number of restrictive assumptions to be made. In the output model, prices are assumed to be fixed, while in the price model output is assumed to be fixed. Moreover, both models assume fixed expenditure proportions, while the output model assumes constant returns to scale and excess capacity, and the price model assumes perfect competition in which prices are transferred forward and imperfect substitution between imported and domestic supply is not possible. Finally, the authors point to the apparent lack of national accounting consistency when using a combination of the two models, as well as the fact that the impact is modelled to affect SA as a whole, while it is more likely to be concentrated in certain provinces (KwaZulu-Natal and Gauteng).

Considerable effort is made to convert changes in port charges into initial price effects. Here, we use port cargo data and the weight of Durban harbour trade in SA's total trade basket. Changes in export prices are estimated as changes in port costs divided by the export price. The challenge for the authors was to get a quantitative handle on port costs and initial export prices. Without going into detail, it is clear that this required a considerable effort and a number of simplifying assumptions had to be made along the way. In the end, a 50% reduction in cargo charges appears to result in a reduction of the international price of exports and the domestic price of imports by about 1.5%. Given econometrically observed demand elasticities, exports are expected to increase by about 1.75%. On the import side, elasticities of substitution between local and domestic supply are employed to derive an increase in imports and a decline in local supply following a reduction in import charges. The responsiveness of household demand to lower domestic prices is derived by employing elasticities available from household expenditure survey analysis.

Using SA trade data obtained it is possible to estimate the contribution of trade through the two relevant harbours towards total SA trade. For example, at a broad sectoral level, products shipped through the DCT account for 20% and 27% of SA exports of agriculture and manufacturing

products respectively. Using the quantity input-output model it is possible to estimate the total (direct plus indirect) contribution towards the economy of export production that is transported through the harbours. Direct and indirect employment associated with this trade are based on average employment output ratios and ignores long-term employment elasticities that are typically lower than unity. With a gross value of output of R100-billion associated with the exports going through the harbour, the report estimates that employment of 435,000 workers is maintained in 2001. Through factor income and the income distribution mapping it is shown that there is a bias towards skilled labour and therefore high-income households.

After this scene setting, the report continues with an evaluation of the impact of lowering of port charges. As explained above, a number of effects are accounted for the net trade effect (comprising of an impact on exports, off-set by a negative impact through import replacement), an investment expenditure effect and a real household-income effect. The net trade effect of a 50% decline in Durban's port charges is positive but small, raising gross output by about 0.5% only. Real household-income effects are estimated to be about three times the net trade effect. The investment effect is about twice the household income effect, but this is typically only a one-off effect. In terms of a sectoral breakdown, the services and manufacturing sectors appear to benefit more than agriculture and mining. Employment impacts are also positive, although the bulk of the 36 000 additional workers is associated with the one-off investment programme. Only 10% of that can be associated with the cargo charge reduction. As was mentioned before, the employment impacts are determined by means of a unit employment output elasticity, while it makes more sense to consider econometrically estimated elasticities (Moolman, 2003). This would probably reduce the impact by half. A similar exercise was performed for the Richards Bay port where exports are more concentrated on basic metals and chemicals. The composition of the impact on sectors, factors and households should be different but turns out to be very similar to the Durban Harbour restructuring. However, the absolute values are much lower, because there is amongst others no capital expenditure requirement for restructuring.

The application reviewed here can be seen as a very important platform for modelling the economy-wide impact of SA port restructuring. Detailed groundwork, such as working out port charges as a percentage of exports, has now been undertaken. While the application is comprehensive in that it considers price and quantity effects, the interaction is limited to a single round as quantity effects following the initial price change would, typically, give rise to additional price effects. Additional price effects are ignored. The authors have also pointed out that fragmentation of the analytical framework in a price and quantity model does not allow for an entirely consistent macroeconomic story, notably regarding savings and investment, fiscal and trade balances. It therefore makes sense to consider a single framework that can handle price and quantity effects at the same time, while observing economy-wide consistency, such as those employed by the previously reviewed papers. Reductions in port charges could then be modelled in various ways, one of them being a cut in transport margins that reflects the initial reductions mentioned above. In this way, one would capture one issue that remains unresolved in the effort described above. A reduction in port charges inevitably means that those that were collecting the overcharge will now be faced with a reduction in their income. Typically, this would mean a reduction in revenues of the transport sector. In other words, reduction in port charges is not a dead weight loss – somebody will suffer from lower income and this may have economy-wide ramifications that are not considered by the reviewed report. Another approach would be to take the initial calculations undertaken by the authors and assume an equivalent drop in world import and export prices. A CGE model could then take these new prices and work out the impact. However, like with the approach taken by the authors the disadvantage is that it ignores income foregone by the transport sector.

2.5. Ivory Coast: Jones *et al* (2002)

While the reports reviewed above have a formal analytical framework in common to approach the economy-wide impact on restructuring and reform, the report on the impacts of these processes in the Ivory Coast focuses more on the microeconomic aspects, with a economy-wide consideration playing a secondary role. The report focuses four sectors, two of which involve network industries (electricity and telecommunication) and two are goods producing industries (rubber and palm oil). Reform of the goods producing industries in the Ivory Coast are less relevant for our current purposes as there is little equivalent production taking place in SA.

The general conclusion of restructuring goods producing sectors such as rubber and palm oil in a country such as the Ivory Coast is that the all important price impacts such as those recorded by the network industries can be ignored as these industries operate on a global market as price takers with little influence on output prices. Even if they don't export, goods-producing industries typically face import competition so that price manipulation is often limited. The impact of restructuring and reform in goods producing industries often has less downstream implications, although there may be some upstream issues. Typically, restructuring and reform impacts revolve around the distribution of surpluses and from that one can typically only expect some compositional changes (that is, some sectors may experience a slight benefit). More likely, the economy-wide results are driven mainly by the direct effects, and this is what may have prompted the Ivory Coast team to focus on the microeconomic issues. As a result, no formal economy-wide impact study of network industries is undertaken here.

The main emphasis of the study was to figure out whether privatisation that occurred during the early part of the 1990s had been a success or not. Aiming towards a broad value-based conclusion is not easy at the best of times and the authors are aware of this by spending considerable time on what determines successful privatisation. An overview of the privatisation process in the Ivory Coast reveals that state-owned enterprises were present throughout the economy – from agriculture to manufacturing, trading and even restaurants. In total more than 20 wholly owned public enterprises were privatised during the 1980s, leading up to the 1990s. A further 45 enterprises of mixed public-private ownership were divested from. Privatisation accelerated in the 1990s when a further 80 new private entities were created, of which almost 30 in agriculture and 16 in manufacturing. To summarise, their calculations show that when the public enterprise set includes all enterprises with any government equity, from 1990 through 1997 the Ivory Coast divested 29% without credit for partial divestiture and 57% when credit is given for partial divestiture through share weighting. Similarly, if we include only enterprises with a majority government equity, they divested 70% without share weighting and 72% with share weighting. With about 10% of the economy operated by public enterprises, these figures suggest that the Ivory Coast is in the big league of restructuring and reform with far-reaching implications for the whole economy. This is borne out by referring to international comparisons of other developing countries: the Ivory Coast has indeed been one of the forerunners and success stories in the game. There are a number of reasons for this – the dire crisis in which the economy found itself and other adverse initial conditions as well as the absence of a strong ideology of state capitalism and a large degree of mixed ownership.

Turning to the network sectors reflected on in the study, it is clear that considerable effort has been made to undertake a detailed microeconomic analysis of the restructuring processes in electricity and telecommunications. A number of economic variables are evaluated such as the return to capital and the distribution before and after privatisation. Prices and their cost-cutting incentives settings, collection incentives and a scale adjustment factor that works similarly to the usual CPI less productivity growth factor are also considered as well as quality of services rendered, employment and increases in capacity that may or may not have happened otherwise.

Projections are made for labour productivity and real wage and efficiency issues are dealt with as changes in intermediate demands. With all these variables some first-round effects are calculated in order to measure the successfulness of the electricity reform process.

A similar, but scaled-down exercise, is carried out for the telecommunications industry. An overview of the history of restructuring the industry highlights the price-cap formula that seems to employ a 7% productivity gain. This can be compared with the 1.5% productivity gain used for Telkom in SA. Relatively high levels of productivity gains are echoed by considerable gains in quality of services rendered, although the evidence is more anecdotal than based on hard numbers, and the counterfactual of what can and what cannot be attributed to restructuring is noted as a problem. Output in these sectors is therefore expected to increase considerably given that there is considered to be high excess demand. There is also believed to be ample room for improving efficiency gains in the sector.

Results for the full restructuring process are then summarised in terms of the usual variables – profitability of sectors involved, prices, output, labour productivity, efficiency, investment and other externalities. From this the authors argue one could infer some judgment on the success or failure of the process. However, they found this unsatisfactory and proceeded with a reality check on what the restructuring process means in the greater scheme of the entire sectors in which the privatisation takes place. The authors achieved this by combining information from case studies with knowledge of the particular industries to estimate the unknown variables. From this it would appear that some form of 'factoring up' was performed but the exact methodology is unclear.

The results suggest that the restructuring process is worth about 9% of GDP, which therefore doubles the contribution of the relevant enterprises to the Ivorian economy. These results include:

- Increased output from given capacity;

- Increased capacity due to increased investment;

- Increased labour productivity; and

- Increased intermediate input productivity.

The authors argued that the overall results of divestiture in the Ivory Coast parallel those in other well-run privatisation programmes. Finally, the authors performed some ad hoc sensitivity analyses and asked the question who benefited from the restructuring process.

From the above it would appear that the impact of restructuring is investigated without a formal economy-wide analytical framework. In its own right this is most likely sufficient as a micro-level assessment of the restructuring process and may well be sufficient for a team of analysts that intimately know the economy at hand. After all a formal analytical framework is not more than a structured approach to evaluating the adjustment of an economy to a particular shock, including that of restructuring. For less experienced analysts that have to deal with a much larger economy, it becomes too vast to pursue all possible interactions and permutations and a more rigid approach is often called for – even if this means that some heroic and arguably contestable assumptions have to be made along the way.

2.6. Australia: Various Publications

A number of efforts have been undertaken in Australia that focus on liberalisation of infrastructure services and telecommunications in particular. Dee & Nguyen-Hong (2002) note that a significant increase in productivity growth has occurred in Australia during the 1990s, the period in which reforms intensified throughout the economy and reforms have made a significant contribution to this economy-wide productivity improvement including improved technical efficiency and productivity, higher output and more technical innovation at the sectoral level.

Prices have become more reflective of costs, and improved productivity and lower prices have reduced the input and production costs of user industries. Lower prices and greater product choice have also benefited consumers.

The authors observed that barriers to trade in banking and telecommunications services have raised prices above costs in these sectors. With this evidence, services trade barriers were then modelled in an economy-wide analytical framework as *tax equivalents* while restrictions on establishments were introduced as *taxes on capital* and those on ongoing operations were considered to be *taxes on output*. A further detail involves foreign-owned firms, which were not only identified separately but also treated with differential rates to domestic entities. Interestingly, the model ensured that the revenues (or rents) from these 'taxes' were divided appropriately between the government and private agents.

Similar to Konan & Maskus (2002), cost-raising effects are also identified for treatment in an economy-wide analytical framework. A distinction is made between 'triangle gains' where barriers raise prices above costs but also create rents and distributional effects and 'rectangular gains' where barriers raise real resource costs of 'doing business' giving rise to dead weight losses.

Special case studies have been devoted to the impact of the reform process in the telecommunications sector of Australia. Albon (1998) focuses on productivity growth only. Measurements of productivity growth following restructuring of the telecommunications sector are reviewed. Interestingly, productivity growth feeds into the price-capping model in the same way as in SA. The difference is that the productivity growth rate employed in SA is set at 1.5% while Australia uses 7.5%. The authors noted that evidence suggests that the productivity growth rate employed by the regulator in Australia should be revised upwards from 7.5%.

The authors will continue with a discussion on how productivity improvements through the lowering in overall cost structuring of producing telecommunications services can be passed on as price reductions to business and residential users. The overall impact of that can be evaluated with a computational general equilibrium (CGE) model. In comparison with studies reviewed earlier the authors focused on the economy-wide impact productivity improvements only. Distributional issues, efficiency and pricing are ignored at this stage.

The paper notes a number of drawbacks. First, it is argued that CGE models are generally not sufficiently disaggregated to evaluate the impact of a non-uniform price change. There are ways of getting around that as has been pointed out by Francois (1998) – mark-ups can be defined at a commodity level, while the feed-through to downstream industries will vary according to the commodity's proportion in the input basket. It would therefore seem to be possible to allow for the differences in impact on sectoral costs according to the pattern of actual price reductions and the pattern of use of telecommunications services. Secondly, although CGE models are also usually based on a Leontief fixed-coefficient production technology it is possible to capture efficiency gains from reducing distortions of input choice by changing input coefficients.

Finally, the authors noted that CGE models can be disaggregated while additional behavioural equations are introduced so as to provide a more complete representation of potential market interventions. However, data limitation in SA currently prevents an ideal configuration in which public and private activities are distinctly identified. Nevertheless, we would agree that applied CGE models are often used to indicate not more than broad direction of change from restructuring and reform and the orders of magnitude of effects. Reference is then made to a modelling exercise in which an increase in labour productivity of 30% and capital productivity of 10% in the main telecoms provider of Australia was evaluated. This translates in a general price reduction in the price of telecommunications services of about 12% after general equilibrium adjustments. Through increases in real wages, the basic result of the modelling exercise suggests a rise of about

$1.7 billion in annual real consumption. The biggest sectoral gains are expected in communications, accommodation, and personal services.

A similar study was conducted by Access Economics (2002) in which the impact of telecommunications reform on economic activity was estimated by tracing the change in the prices of telecommunications services as a direct reduction in their cost in the production of other goods and services, and in final consumption as well as an increase in real incomes. Moreover, lower production costs increase the profitability of other industries and/or reduce the prices of their outputs with further positive impacts downstream on incomes and costs of production. Similar to Albon above, the authors pointed to inflexibility of CGE models to adequately capture the factor substitution effects of lowered input prices, which may underestimate the long-term benefits of reform. However, as was pointed out earlier, more flexible specifications of production functions may get around these limitations. As an alternative, without formal CGE modelling, it may be sufficient instead to go the first-generation price or quantity input-output SAM-based model in which the first-round impact of lower telecommunications services prices on other industries' costs and profitability is assumed to translate into short-run economy-wide increases in national income:

> For instance, input-output data from the Australian Bureau of Statistics suggest that telecommunications services represent about 3.4% of the cost of inputs to Australian production. If telecommunications services prices fell by 10% as a consequence of regulatory reform, costs would then fall (in the first instance) by around 0.34%.

It is recommended that an economy-wide second-generation application with a CGE is preceded by an analysis of this kind

An interesting and highly relevant study on the electricity sector concludes this literature review. Whiteman (1998) examines the economy-wide impact of x-inefficiencies in the electricity industry on the Australian economy. X-inefficiency is defined as inefficiency in supply that cannot be explained from the traditional allocative efficiency point of view. From our methodological perspectives there are two issues of interest. The first is how to measure x-inefficiency in the electricity sector and the second how to model the economy-wide impact of reducing x-inefficiency in the electricity sector on an economy. The authors identified two methods to measure x-inefficiency – one based on the estimation of a stochastic production function model while the other involves the piecewise construction of a surface as an estimate of best practice production frontier using non-parametric mathematical programming. In the case of the latter, the challenge is to find the most efficient supplier in a sample of electricity producers as a benchmark and to determine the reduction in inputs that can be achieved against this benchmark (Whiteman 1998: 4).

The alternative method, explored by the authors, suggest separating the error of the stochastic component of an estimated production function in a random factor and a one-sided systematic component. The last-mentioned could then be interpreted as a measure of x-inefficiency. Data for a large number of electricity suppliers were evaluated, including a number of Australian but also SA suppliers. The results show that Australian producers are about 20% x-inefficient. Using the same measures it is suggested that there is very little x-inefficiency in the supply of electricity in SA (grouped together with Israel) but the mathematical programming method suggests that a 20% gain in efficiency can be achieved.

While the authors, focusing on Australian suppliers, decided to stick with the highest estimate of x-inefficiency, we left the most appropriate estimate for the SA supplier for a more up-to-date estimate. More importantly, we contemplated how the economy-wide impact of reducing x-inefficiency was evaluated. For this, the authors made use of the well-known Orani CGE modelling framework for Australia in which the reduction of x-inefficiency was introduced as a Hicksian

neutral factor augmenting technical change. As a result, the efficiency of all factors of production in the electricity sector is raised equally so as to reduce the costs of electricity in all downstream electricity-using industries. That GDP will increase is no surprise but the extent of this positive impact will depend on the fiscal and labour market policy stances that are selected. In the comparative static world of this model, the 20% increase in x-efficiency results in a 0.6% increase in GDP, even though some workers in the electricity sector will be displaced.

2.7. Conclusion

In conclusion it would therefore seem that although economy-wide applications of restructuring and reform of public enterprises have not taken place as frequent as trade, fiscal and distributional policies, a growing body of work is emerging. From this some guidelines as to how to proceed in SA appear. Firstly, a distinction needs to be made between modelling macroeconomic impacts and economy-wide impacts. From a simplistic perspective, the former is a subset of the latter in that an economy-wide framework includes a (sometimes very simple) macroeconomic story, but also offers some detail in terms of production structure, labour market, income distribution, fiscal and trade policy. Given the additional flexibility in terms of institutional and other structural detail and the expected sectorally differential impacts of SOE restructuring, it then makes sense to consider an economy-wide framework. Some studies have also shown that it is not always necessary to construct a formal economy-wide modelling framework. The analysis in the Ivory Coast for example has been conducted without a formal model. What the studies have in common though is that they all rely on extensive microeconomic analysis. Micro-level analysis can take many forms. In the SA port restructuring case study, harbour-specific trade data were utilised, while inefficiencies in electricity supply were obtained using cross-country estimation techniques. In general, it will involve case studies. In the next section we will review what it may take in SA to collect the necessary information at the micro level.

The economy-wide impact analysis of restructuring undertaken for Argentina, Australia and Tunisia, appears to have created the benchmark against which SA efforts may be measured. The Argentinean study seems to lead the way in that a dedicated analytical framework was created to deal specifically with the structural features of the economy at hand and what is of particular relevance is the issue of competition and regulation. The Argentinean application is also the most comprehensive in that it attempts to deal with a broad range of restructuring issues. The Tunisian and Australian applications tend to use a more standard off-the-shelf framework, which allows the analysis to consider certain aspects of restructuring only. This may in the short run also be the route to follow in SA, in that it allows a gradual process to be established with intermediate success criteria to be achieved as bite-size chunks.

The SA port application is a good example of the start of such a process. It uses a much simpler approach than in applications for the countries mentioned above.

From the point of view of regulation issues, the most important distinction is between efficiency gains, which are dead weight losses, and rent-seeking activities, which have more distributional implications. The overall impact of the latter on key economic ratios such as GDP is usually lower as some groups in society will lose and some will win. More recently, research has started to make a further distinction between various approaches to regulation such as the price cap approach versus the cost plus regulated mark-up approach. The former creates larger surpluses when efficiency gains are achieved and they are typically appropriated by the shareholders of the relevant operators. If there is considerable foreign ownership of such operators, this may lead to an outflow of funds, which may or may not require adjustments to the trade balance and possibly the exchange rate. In the cost plus regulated mark-up approach the benefits of efficiency gains are collected by domestic consumers, which may lead to a different economy-wide outcome.

3. Scoping of Case Studies

3.1. Background

Given the literature review offered in the previous section we can now identify a number of economic variables that need to be considered at the micro level for our focus sectors (electricity, transport and telecommunication) when measuring the economy-wide impact of reform. They include:

1. Employment of factors of production and their returns

2. Factor productivity

3. Efficiency

4. Quality improvement of services delivered

5. Pricing/Tariffs

6. Fiscal implications (sales/new sources of taxation and privatisation proceeds)

7. Attracting additional investment at the micro/meso (sector) level

We will discuss how each may be measured at the micro level in turn below. The discussion is not necessarily comprehensive and may in some cases even be duplicated. The challenge is to ascertain if this is a reasonable starting point for scoping at the micro level.

3.1.1. Employment of Factors of Production

The first and most visible association that any policy maker and politician will make when the concepts privatisation and deregulation are discussed is the loss of direct employment in the, usually narrowly defined, sector. An additional feature of this discussion is the distribution of this burden across skill or occupation groups, across race groups and consequently across household income groups, which are perceived to be affected in a different way.

On the other hand, however, proponents of reform are quick to point out that a large proportion of the employment directly lost during the process is (sometimes) rehired as part of an outsourcing programme elsewhere, either in the same industry or in another sector. Moreover, the indirect employment effects, such as job creation in newly established competitors (e.g. MTN, Cell C in telecoms) or in downstream industries (e.g. aluminium smelting in electricity or call centres in telecoms) due to improved efficiency; more competitive pricing; and/or improved service delivery, could outweigh the direct negative employment impact on the SOE. Restructuring can also lead to increased employment in other sectors, which are sometimes harder to identify and associate with the primary sector. (For example, the introduction of cellular telephony has led to significant new employment in the retail services industry but this is firstly hard to quantify and secondly often not directly associated with the telecommunications industry). It is therefore of critical importance that the static costs are weighed against the dynamic gains of the restructuring.

While micro-level analysis may point out that employment conditions and employment security for workers in 'outsourced' industries are not of the same standard as the previous public sector employment, at the economy-wide level this level of detail may be lost. Nevertheless, a scoping of a detailed accounting of changes in employment patterns in the relevant sectors and the possibility of shifting demand for labour to other industries need to be pointed out, in particular with regard to which other industries would be involved. In short, we need to know if it is possible to get some quantitative measure of employment changes and shifts that may take place and what information has been collected so far in SA even if this is rather stylised.

An important consideration that was pointed out by similar kind of work for transition economies suggests that the relative wage rate may well be changing in the relevant sectors. Can we expect real wages of unskilled labour to fall and those of skilled labour to rise in the privatised units? If so, by how much?

With the loss of employment, there is the likelihood that labour productivity will improve, while quality of services delivered may change. Scoping of these changes will be discussed in the next subsections.

In terms of the production factor capital we need to know the value of capital installed in the benchmark and the stylised reform scenarios. Alternatively, an indication whether a simple percentage change from the current situation is available or not may also be sufficient. Similar to the wage rate mentioned above, information on the return to factor capital is required.

3.1.2. Factor Productivity

One of the objectives of reform of SOEs is to increase the productivity of the production factors, labour and capital. The most obvious way to measure this is to take the ratio of gross sales in physical terms over the number of workers and units of capital (in Rand terms) employed. As with the measurement of employment, for labour productivity this can be deceptive as redundant workers may be re-employed in other sectors while basically doing the same kind of work as part of an outsourcing strategy and the outsourced service now shows up as an intermediate input. For each relevant sector, the ratio can easily be calculated given total sales of physical units if employment is available as per (1) above. The challenge then is scoping the availability of total sales of physical units (lines installed, tons transported, gigawatt hours [GWh] delivered, etc.) or changes off some base year for a reform scenario versus a non-reform or status quo scenario.

Another way of measuring labour productivity is by taking the ratio of net value of production or value added to labour employed. For economy-wide modelling purposes, value add is defined as gross value of production less intermediate inputs, but before direct taxes. In other words, it is the value that is added by the relevant sector to the intermediate inputs, i.e. the sum of the (gross) returns to labour and capital or the wage bill plus gross returns to capital (including depreciation, interest payments on working capital, dividends, etc.). Again, the micro scoping exercises should give an indication as to how feasible it is to determine to what degree value added will change in the stylised reform scenarios and what is required to obtain such information.

Capital productivity can be derived from the ratio of total sales of physical units and the value of capital stock employed. The latter was discussed in (1) above.

3.1.3. Efficiency Gains

Efficiency gains can, according to Chisari *et al* (1999) be measured as reductions in intermediate inputs purchased as a share of total inputs. In other words: has the relevant privatised operator been able to produce more given the same value of intermediate inputs. Although they can be dependent on each other, efficiency gains are to be interpreted differently from labour productivity gains. While the former focuses on the capacity to generate more value added in a reform scenario, the latter can be seen as efficiency gains in work so that less labour is needed to obtain the same level of physical production by the reformed unit.

Measuring efficiency gains directly as part of a micro study will undoubtedly be a tall order. Considering the costings of intermediate inputs in a benchmark and a reform scenario are probably beyond the scoping exercise. However, a more manageable but perhaps cavalier approach, would be to ascertain whether the reform processes in the various sectors are expected to yield 'cost cuttings' usually expressed as a proportion or percentage cost reduction (excluding

labour costs). This can be used as a proxy to adapt the relevant per unit intermediate inputs in an economy-wide set up.

At another level, Konan & Maskus (2002) talk about an inefficiency effect, "when domestic suppliers may be forced to absorb into their costs various regulations on provision and bureaucratic procedures. These activities do not contribute to output and generate pure economic waste". Thus, inefficiencies due to lack of regulatory reform inflate marginal costs above 'best practice' marginal costs that would prevail in a reformed environment.

The challenge for the scoping of the micro studies is to ascertain whether information on inefficiency and economic waste exists for the relevant sectors and, if not, how this information should be obtained or how these measures may be estimated indirectly from available literature in SA and elsewhere.

3.1.4. Quality of Services Delivered

Improvement in the quality of services rendered by the to be reformed sectors has an impact on the users of these services. Changes in the quality of services can according to Chisari *et al* (1999) be measured as reductions in outages, delays in harbours or en route on rail, or telephone lines in repair. Scoping for the micro studies should give an indication if such information has been obtained in the past and whether a noticeable change is perceived. A broad percentage change is probably sufficient at this stage as the economy-wide modelling framework can employ this to reduce the intermediate input costs of the user of these services.

3.1.5. Pricing/Tariffs

A crucial variable to track is what is happening with prices and tariffs charged by the relevant entities. Have they come down in a privatised/commercialised environment compared to a full state-owned benchmark environment? In order to establish this, it is important to determine for the state-owned benchmark (that is, the full monopoly scenario) the degree to which costs are marked up in the first place. Assuming that in a perfectly competitive environment prices would be equal to marginal costs, a partially commercialised environment is expected to show mark-ups in between a perfect monopoly situation and a perfectly competitive situation. It is important to distinguish between market structure and ownership, as (in)efficiencies will arise due to the market structure regardless of ownership. Determining what these costs are will be a challenge in itself since they are dependent on the state of reform, as was argued above, with efficiency gains presumably contributing towards lower costs and therefore lower prices.

It may also be that partial reform will *increase* the mark-up. This can occur where a state-owned entity is fully or partially privatised or restructured without the introduction of additional entrants in the market. In these cases the pricing rules change from a publicly owned monopoly exercising some form of 'social pricing' to a private monopoly exercising profit maximisation. Generally speaking economic regulation is either non-existent or lax in the integrated monopoly stage, and regulation should be introduced with restructuring.

The micro-level scoping exercises need to consider the above-mentioned in such a way that they point towards a quantitative measure of mark-up over costs. This quantitative measure can be based on actual cost and price measures or some broad anecdotal notion of excessive pricing compared to an international benchmark. Using the last-mentioned a micro analysis may conclude that SA's pricing of telephone services should be x% lower than it is now, given comparable cost structures.

3.1.6. Fiscal Implications (sales/new sources of taxation and privatisation proceeds)

An important economy-wide consideration is whether there will be fiscal implications of planned reforms in SA. Fiscal implications will be felt directly through the privatisation proceeds as well as indirectly through the collection of tax revenues from those enterprises that were previously state owned and generally enjoyed a tax-exempt status.

On the other hand, we need to establish whether the relevant SOEs are actually generating an income for the government. If so, from a national income perspective, government income from property (dividends) is replaced by increased tax revenues and the net effect may well be negligible.

The capital layout for the sales may be financed locally, in which case there is a diversion from private to public savings with some limited economy-wide implications. On the other hand, sales may be financed by means of foreign capital inflow in case of a foreign buyer, in which case an increase in public savings is matched by an increase in foreign savings. Again there is an economy-wide story, now also involving the exchange rate more directly.

The micro-level scoping exercise should indicate whether such information is available from the past and what the broad numbers involved are for sales, who will make the capital layout and how has it or will it be financed. In addition future expected additional annual tax and loss of government revenue from property income need to be ascertained.

3.1.7. Attracting Additional Investment at the Micro/Meso (Sector) Level

Reform may attract additional investment in the sector that may not have taken place otherwise. This investment should not be confused with the initial purchase of assets involved in privatisation and should also be considered to be additional to the normal capital expenditure programmes that would have taken place without reform. As before, the additional capital required may be financed locally or through foreign capital inflows, the economy-wide story line will be similar as above. The micro-level scoping exercise should examine whether additional investment as described above may be attracted in the future and what the source of the capital flows could be.

3.1.8. Summary

Although the above discussion is not necessarily comprehensive, it has covered a wide range of potential measures. Not all measures can possibly be covered by the micro scoping exercise, but it was necessary to put them on the table for consideration.

A summary checklist for micro-level scoping of the direct impact of potential future reform can now be drawn up.

Table 2: Check-list of variables and measures for micro scoping

	Variables	Direct measures
	Employment of production factors and their returns	o Shifts in the demand for labour • Within the relevant sector (telecommunication broadly defined: Telkom & MTN, Sentech, etc.) • Across relevant sectors (outsourcing and new sectors e.g. retail sales sector in telecommunication) • Of skill or occupation group patterns o Shifts in capital stock installed (Rand values) o Changes in the rate of return for the production factor capital and the wage rate for three broadly defined skill classes
	Factor productivity	Changes in o Physical volumes of sales as a ratio of employment (see 1.) above o Value added [sum of the wage bill and gross (including depreciation) return to capital] o Proportion of value added accruing to wages compared to that accruing to capital
	Efficiency gains	Changes in o Intermediate inputs, or o Broadly defined cost cuttings as a percentage in the reform scenario compared to the current situation
	Improvement in services rendered	Reductions in outages, delays in the harbours or en route on rail, or telephone lines in repair expressed as broad percentages compared to the current situation
	Changes in prices and tariffs	Quantitative measure of mark-up over costs of the reform scenario compared to the current situation: o Actual cost and price measures or o Some broad anecdotal notion of excessive pricing
	Fiscal implications	o Revenue from sales of (part of) SOEs o Additional annual tax revenues of privatised entities o Additional annual tax revenues from new entrants in the sector (SNO or Cell C, etc.) o Loss in government income from property o Capital layout sourced • Domestically • Abroad if both, then in what proportions?
	o Additional investment	o Quantify what is crowded-in over and above current capital expenditure o Capital layout sourced • Domestically • Abroad if both, then in what proportions?

3.2. Case Studies

Given the above background notes we can now turn to the scoping of each of the sectors. These sectors are: electricity, transport (ports/rail) and telecommunication.

3.2.1. Electricity

Background

At the simplest level, the electricity sector can be viewed as consisting of three sub-sectors: generation, transmission and distribution. In SA, Eskom undertakes generation and transmission activities almost exclusively by means of its Generation and Transmission Divisions. Municipal distributors as well as Eskom Distribution distribute electricity in SA. While reform and privatisation policies have at times involved the privatisation of distribution activities, this is not being contemplated for SA at present. Instead government has adopted a policy to rationalise Eskom and municipal distribution activities into a small number of regional distributors. This policy exists independently from whether competition will be introduced and whether aspects of the Electricity Supply Industry (ESI) will be privatised.

Essentially distribution restructuring amounts to a reorganisation of the public sector without introducing competition or privatisation. Policies being considered for conventional restructuring and privatisation will primarily affect Eskom, and the few large municipalities who own power stations. Competition will affect distributors in the way in which they purchase their power.

Sector variables

This section reviews the relevant variables that should be measured to assess the impact of alternative polices.

a) Employment of factors of production

As outlined in the project briefing document changes in the employment of factors of production constitute an important impact associated with reform and privatisation. Like with other network industries, such as telecommunications, restructuring and reform in the electricity sector is likely to result in lower direct levels of employment in power firms themselves, and a greater role for outsourcing and sub-contracting. Eskom has already implemented substantial strategies to outsource a myriad of services, including cleaning, IT services, engineering services at its power stations, water treatment, ash removal and processing, maintenance and overhauls, etc. Despite producing substantially more power than in the middle 1980s and servicing many more customers, employment levels have practically halved to around 30,000 at present. Increased outsourcing and subcontracting played an important part in this strategy. It is possible that overall, employment levels will not decrease as reforms progress, particularly in the context of increasing investment in generation and other electricity infrastructure.

Direct employment data with detailed profile information will be available from Eskom. However, it will be a greater challenge to gather the data from other parts of the industry, and specifically from the services sectors supplying into the ESI. Here national statistics will have to be used, but these are notoriously unreliable. Two recent attempts include Steyn & Daniels (2004) and Bhorat (1999).

As far as the employment of the production factor capital is concerned it is important to consider that the ESI is highly capital intensive. This creates particularly acute investment decision-making problems, as most of the resources required for production are committed upfront, mostly in the form of an irreversible investment. Monopoly public utilities are known to practice gold plating and be biased toward the most capital intensive plant and technology options, based on static

engineering economic calculation which value economy of scale factors and undervalue the inter-temporal cost factors associated with risk, uncertainty and even total ignorance about future contingencies. This is particularly pertinent in the power sector as projects are discounted over periods of between 15 to 25 years.

Hence, capital cannot be viewed as homogeneous as is implied in the project briefing document. On the contrary, one of the most important benefits that can arise from competition is improved investment decision-making in the face of uncertainty and ignorance. The outcomes only materialise over the 15- to 25-year periods, when the benefits of more flexible, less capital intensive (but perhaps with lower economies of scale) options are realised. Outcomes can thus not be measured before this period has lapsed, but the flexibility, phasing, scaling and technologies of investment choices can be.

b) Factor productivity

Eskom productivity measures are available (although not always easy to obtain). Output measures in the form of GWh delivered, GW of installed available capacity, availability levels, km of transmission lines, etc. are all available and is likely to be available in future. As stated above, capital productivity levels are expected to rise as surplus capacity is used up, purely as a result of increased demand, not because of improved management or as the result of reform policies. Productivity measures will thus have to be normalised to exclude this effect if the effect of reform is to be measured. At present value-added figures are calculated by Eskom, and can also be derived from its financial statements. The problem with this approach is that it combines price effects with true productivity effects, which means lower wages will show up as a productivity increase when in fact it is not.

c) Efficiency gains

The differences between factor productivity and efficiency gains as explained in the project briefing document is not clear. Efficiency gains seem to refer to total factor productivity, while factor productivity seems to refer mostly to single factor labour productivity. We would argue that total factor productivity measures should be employed. Eskom has a long history of doing productivity accounting (at least 15 years), and in principle these figures exist, but are closely guarded by the utility.

d) Quality of services delivered

Many quality-of-service measures are currently in place in Eskom, which could provide a basis for comparison. However, most customers are serviced by municipalities and here service levels vary enormously, and are mostly not measured. At the most basic level, reliability and power outage indicators can be used.

e) Prices and tariffs

For the purposes of this analysis price measures should focus on Eskom's tariffs, including the Whole Sale Electricity Pricing System (WEPS), and on its average selling price. The picture here is complicated by the fact that SA is emerging from an over-capacity situation where most of the debt associated with the investment had been amortised by the middle 1990s, while equity returns have been non-existent until recently. This allowed prices to fall in real terms during the 1990s. Prices will increase under all scenarios as surplus capacity decreases and new plants have to be built. This situation makes it important to develop appropriate counterfactuals. Specifying the Status Quo scenario appropriately here will be critical. Clear measures exist for calculating average and marginal costs on a normative basis and they can be used to compare actual prices against. These are based on the average cost of installed capacity at US$1,000 per MW, the cost of fuel (coal), the cost of finance, depreciation, labour, etc.

f) Fiscal implications

International experience suggests that a number of significant fiscal implications can be expected to occur, depending on the nature of the reforms implemented. Privatisation proceeds and increased tax revenues from the currently non-existent levels will be significant. Privatisation is highly likely to result in foreign investment into the power sector, and will thus have balance of payments and exchange rate implications. Information from experience in countries such as Chile, Argentina, Brazil, the UK, Australia, etc. is available here for comparison.

g) Additional investment

International experience suggests that, depending on the nature of reforms (particularly whether they are credible, reduce regulatory and political risk and allow for real competition) addition investment is likely to occur. This does, however, depend on key functions being established in either the market mechanisms, or the hierarchy (monopoly) system that is employed. Key aspects include solving the information problems associated with the exposure to medium- to long-term power scarcity risk and uncertainty. This is best achieved by effectively internalising the risk by removing it from the commons of the network and allocating it to individual procurers in order to create incentives to contract for further capacity. It should secondly, be possible for potential suppliers and procurers to have direct access to each other in contractual terms.

h) Economic rent

While key aspects have been touched on above, it will be useful to develop an overall picture of how the total economic rent created by the industry is distributed in each case. The primary receivers of rent include:

- Various consumer groups, differentially
- Labour and managerial groups, differentially (in terms of wage and employment levels)
- Providers of capital, equity and debt
- The providers of fuel and water, particularly coal
- The Receiver of Revenue

Counterfactuals would have to be established for the price of these factors in order to calculate the rent allocation, for example, the market-based marginal cost of labour, coal, water, electricity and finance. The allocation of rent will raise important distributional issues and is likely to reveal, perhaps surprisingly, that the greatest beneficiaries of the ESI in SA, is not the poor who have been benefiting from electrification over recent years, but large capital in the form of heavy industry and mines. It could possibly even be argued that moving to a more market-based system will result in a progressive readjustment of economic rent in the ESI. At the very least this analysis is likely to demonstrate that, in the case of electricity, competition and privatisation are not likely to be as regressive as might have been thought.

i) Other economic benefits

Other economic impacts should also be measured. The primary effect here being the possibility of greater regional power trade through the Southern African Power Pool (SAPP). Although the SAPP already exists, it will only come to real fruition when SA opens its electricity market. The benefits to SA of increased development, greater stability and increased industrial demand from the southern African region should be reflected.

Scenarios

While it is suggested to consider two forward-looking scenarios for the micro-level methodologies, a 'positive scenario' and a 'realistic scenario', in practice the study will, implicitly or explicitly, inevitably rely on another scenario, the 'status quo scenario'.

Specifying the status quo scenario is important for both policy relevance and research design reasons. As has become clear over the past two years, living with some form of status quo for a specific sector over a considerable period of time is indeed a possible policy outcome. It is thus important to address this scenario, particularly if highlighting questions about the appropriate balance between efficiency and other objectives discussed in the briefing document is to be achieved.

In terms of the research design, the status quo scenario will serve as the primary counterfactual for the other two scenarios. For this purpose the status quo scenario should also be specified as a forward-looking scenario as the other two will be. 'Status quo' should be understood as 'not fundamentally and proactively changing the policy framework for the sector'. This does not mean, however, that in this scenario the sector will not change incrementally over time, or that at times the government will not be forced by circumstances to come up with selected policy responses.

a) The status quo scenario

In the status quo scenario, policy measures are taken as given without any new polices being put in place. A distinction is made between policies that have been in place for a while, but for which the assessment is that little political will exists to implement them, and those for which indications suggest that the policy is likely to be implemented on the basis of current commitments.

Credible policy commitments include:

▪ Eskom's share of existing electricity generation reducing progressively but Eskom retaining no less than 70%.

▪ The introduction of private sector participation of up to 30% in existing electricity generation.

▪ Involvement of Black Economic Empowerment (BEE) within the generation sector of about 10% of existing electricity generation capacity.

Eskom has recently been corporatised and now operates as a Limited Liability Company in terms of the Companies Act. Eskom has always been, and continues to be, subject to weak external governance. Government and regulators have little capacity and information on which to base critical assessment of its activities and plans, which creates perverse managerial incentives and moral problems. These relate to ongoing expenses, but specifically also to incentives for investment decision-making, in terms of the levels of risk and uncertainty to which technology choice, investment phasing and configuration decisions expose the utility.

In this scenario Eskom will not be 'allowed' to build new plants. New capacity will be constructed in response to the Department of Minerals and Energy's (DME's) call for proposals. At present it is unclear who the purchasing party would be, and substantial doubt exists whether this process will indeed lead to new capacity being constructed. Delays in this process could very likely lead to a situation where concerns about power shortages lead to Eskom being asked to provide the required capacity. Eskom is in any case in the meantime preparing plans to construct another pump storage scheme at Braamhoek in the Drakensberg, and with plans to recommission its 'mothballed' power stations.

Capacity utilisation will increase as demand increases (true for all scenarios). Labour productivity levels are expected to remain relatively static and are expected to compare poorly with international best practice. Investment decisions are expected to be substantially different than

what could be expected to occur in a competitive environment. International and past experience in SA, suggest that Eskom could be expected to choose larger, more capital-intensive solutions, than what would occur otherwise. Hence more nuclear, hydro and large coal and less natural gas and green (renewable) energy sources will be used.

b) A Realistic Scenario

In a realistic scenario the current policy framework is complemented by the following components:

Eskom transmission is separated from the Eskom group, creating an independent state-owned company. This has the important benefit of creating an independent force with similar information and intellectual capacity as the Eskom group, but which has no stake in generation plant, and which will thus be able to provide alternative independent views.

Government takes steps to guarantee that the SA market is open to any supplier, either inside the country or from other parts of Africa. Eskom is not allowed to build any further plants beyond refurbishing its existing 'mothballed' stations. Government actively commits to promoting the independence and adequate capabilities of the National Electricity Regulator (NER), enabling it to take a tough stance with respect to regulating the monopoly and competitive parts of the industry. Energy policy emphasises the value of increasing diversity in the energy supply system and encourages smaller, independent and green power producers.

In this scenario increased regulatory pressure contributes to modest improvements in labour productivity in Eskom, while new capacity is constructed on a competitive basis, resulting in substantial gains in productivity for new plants. Investment efficiencies are also improved as a greater pool of options is available and decisions are based on commercial incentives in the context of greater exposure to risk and uncertainty.

c) A Positive Scenario

In a positive scenario the reforms pursued in the realistic scenario are followed up by 2007 with restructuring of the remainder of Eskom Generation into four or five competing subsidiaries which are then sold on the basis of competitive bids with the state retaining a direct minority shareholding in each. An independent system operator, a balancing market, a power exchange, and vesting contracts between generators and distributors are established. SA will now have a fully competitive electricity market.

Substantial direct improvements in labour productivity are expected as surplus labour is retrenched. As this scenario provides the best opportunity for retaining SA electricity prices at low levels industrial investment relying on cheap power are expected to continue at moderate levels. However, new large energy-intensive projects relying on short-run marginal cost pricing are unlikely to emerge.

The establishment of an open competitive electricity market in southern Africa at a time when new investment in infrastructure at generation, transmission and distribution levels is required will create major opportunities for contracting and engineering services, and the provision of capital equipment. An unequivocal commitment to a competitive market will decrease regulatory and political risk and is likely to see substantial direct foreign investment in the power sector and associated activities in SA.

3.2.2.   Transport

Introduction

The challenge of estimating the impact of restructuring and privatisation within the transport sector on the SA economy is twofold. Firstly, there is a profound lack of accessible data on the

performance of state-owned entities responsible for rail transport and port operations. Secondly, difficulties exist in evaluating the impact of restructuring in the context of erratic implementation of declared government policy.

To proceed to the second stage of modelling the macroeconomic impact of restructuring, primary data sources will need to be evaluated and data sets of required economic variables will have to be constructed. In short, government as owner of transport infrastructure enterprise will be required to set terms for these enterprises to report on their activities in a form of disclosure that makes a sensible economic assessment of their performance possible.

We start with some background notes, followed by an overview of how the port and rail businesses operate. We subsequently evaluate trends in economic variables to assess the impact of restructuring in both rail and port and conclude with a discussion of an optimistic and realistic scenario.

Background

The objects of this section are freight rail services undertaken by Spoornet and cargo-handling operations performed by SA Port Operations (SAPO), both divisions of Transnet Pty Ltd. Herein lies the crux of the data problem. Transnet's rail and port operations businesses are run as divisions with a limited breakdown of financial and operational performance reported. Transnet groups its two divisions of Spoornet and Metrorail (commuter rail service operator) together in its segment report for its annual financial statements. Limited details are provided in divisional reviews. Segment reporting for the marine sector combines the National Port Authority and SAPO, activities that are quite distinct and have different operating economics – the former a property business responsible for the port estate and the latter a cargo handling service. A result of reporting provided by Transnet is to reduce publicly available data on the financial and economic performance of key transport infrastructure service providers.

a) Institutional structure precludes effective economic monitoring

The legal framework within which Spoornet and SAPO operates is devoid of regulation or monitoring of economic performance. There are neither on a sector nor on a broader level regulatory instruments for monitoring or influencing pricing, access or service levels. The reasons for this can be found in the institutional form that Transnet and its predecessors took as a state-owned entity providing railway and harbour infrastructure and services. Crucial milestones have been the commercialisation of SA Transport Services in the early 1980s and its subsequent corporatisation as Transnet in 1991. These successive steps have produced the current situation – a state-owned commercially run vertically integrated transport business governed by a board appointed by the shareholder (SA Government through the Minister of Public Enterprises) that is responsible to the board for performance against commercial targets as well as non-commercial targets. Sidestepping the debate on the merits and costs of regulatory institutions, the absence of a transport regulator means there are no bodies over Spoornet and SAPO to obtain data on performance, price setting and service levels.

Consistent with its status as a commercial enterprise, Transnet's board has a tariff and marketing committee, tasked with developing an overarching tariff policy for the Group, to oversee the Groups pricing and tariff strategy and to ensure that "the Group tariff policies comply with the relevant legislation, ethical standards and are effectively communicated to all stakeholders" (2003 Annual Report).

Spoornet's overall price adjustments on freight categories are communicated to government annually, but save for a limited number of items with regulated prices (liquid fuels), rates are set through commercial negotiations. It has been Spoornet's practice to brief officials in the economic ministries on its overall freight rate tariff structure and proposed changes. Such briefings are not a formal pricing approval process; however, Spoornet claims that it considers the presentation of

tariffs to an inter-governmental meeting as a type of approval process (Teljeur 2003: 50). 70% of Spoornet's freight is on contracts set with its customers via commercial negotiations. It therefore maintains such information is commercially confidential. Spoornet has consistently taken up this stance. A survey of rail investigations over the last six years indicates that cost data have been developed on a piecemeal basis in relation to particular transport routes only, such as Durban-Gauteng.

In contrast to Spoornet, SAPO operates on the basis of a published tariff book for its services, as does the NPA. Thus there is complete transparency about the charges set. Price adjustments are made after negotiations with customer groupings. Regulation over tariff setting for port service is not undertaken. Draft legislation to establish an independent Port Authority does provide for a port regulator. This role is described in the National Commercial Ports Policy White Paper of 2002 as serving to protect abuse of power by the holding company Transnet, owning both the port authority and port operator divisions during a period of restructuring while new private sector operators are introduced and would cease to operate after the separation of the Port Authority.

Tariffs collected by the NPA for infrastructure (previously wharfage which became cargo dues from 2002) and services are not applied directly to port infrastructure. Historically such revenue has been able to support other activities in Transnet. A financial dependency has been created from a tariff system that is able to tax trade and made Portnet and the NPA Transnet's cash cows. The persistence of the structural imbalance between the source and application of finances within Transnet is a major obstacle to reforming the group and achieving cost reflective prices in port and rail services.

Rail operations overview

Spoornet operates a 22,817 km national railway system, of which about 6,000 km consists of main lines for general freight and long-distance passenger train services. Spoornet's freight business transported 164 million tons in 2003 in three main divisions. General Freight Business operates on the core network as well on several secondary routes and branch lines totalling over 12,000 km. In 2003 it handled 85.4-million tons earning R6.9bn.

CoalLink hauled 49-million tons on a dedicated 580 km line from the Mpumalanga coal fields to Richards Bay. Orex operates an 861 km dedicated heavy haul line from the iron ore mine rail head at Sishen to Saldanha. Passenger transport is undertaken by Shosholoza Meyl, which transports 3.5-million passengers long distance and the Blue Train premium service, neither of which are discussed further in this section. In 2003 Spoornet's turnover was R11.831bn with net assets of R9.383bn. It employed 34,662 people.

Commuter rail services are administered by the SA Rail Commuter Services who control over 2,500 km of suburban lines and have appointed Metro Rail, a division of Transnet, to operate these services. Commuter services are not part of this survey.

a) Restructuring SA rail 1998 to 2003

Restructuring, defined by the government to "refer to the matrix of options that include the redesign of business management principles within enterprises, the attraction of strategic equity partnerships, the divestment of equity either in whole or in part where appropriate, and the employment of various immediate, turnaround initiatives" (DPE, 2000) has been a stop-start affair at best, limited to the last-mentioned turnaround initiatives.

Prior to government unveiling plans for restructuring Spoornet, the Mercer consulting group was commissioned to advise Spoornet management on a strategy to turn the entity into a profitable class 1 railway business. In 1998 the results were presented to the Transnet board in what, arguably remains the most thorough assessment of Spoornet's business from the perspective of maximising the profitability of rail activities. Recommendations were made to reduce the

workforce from 34,000 to 10,500 and operate only on the core transport routes. Disagreements within Spoornet on the strategic direction for the business were thrown into sharp relief by these recommendations and precipitated the Minister of Public Enterprises to intervene and declare government would not sanction such job losses. Government through the DPE then commenced on a process to develop a restructuring plan for Spoornet. In parallel Spoornet enlisted the assistance of the Halcrow consulting group to advise on implementing efficiency improvement projects that were consistent with retaining the prevailing structure of continued services on high-, light- and low-density lines.

In 2000 government outlined its plans for restructuring Spoornet into separate entities and concessioning the bulk of these to the private sector. The social costs of such large job losses necessary for a turn-around of the business were some of the factors that prompted government to devise its restructuring plan based on concessioning with the objective of mobilising private sector funds for reinvestment and raising the level of efficiency of the rail services. Trade union opposition to government's restructuring plans succeeded in overturning them via an 18-month engagement (Von Holdt, 2003). Eventually an agreement between government and labour was reached under the National Framework Agreement (NFA) and recommended to government. In terms of these recommendations the restructuring of Spoornet was directed at maintaining the business as a state-owned enterprise with a mandate to run an extended network and for management to use cross-subsidisation from the profitable ore export lines to recapitalise the loss-making General Freight Business most affected by the capital investment holiday of the previous decade. Partial corporatisation of Spoornet was to improve transparency over monitoring financial flows. However, this was intended to stop short of full corporatisation that would have made it a tax-paying entity for the sake of Transnet cash management requirements. Other important aspects of the agreement provided for up to 8000 forced retrenchments to deal with employees' surplus to requirements. A review of the low- and light-density network was to be undertaken to investigate what could be done to revive them, or failing which nominate them for closure. Proper restructuring was to be applied to concession the Blue Train. Measures mostly the responsibility of government were to be taken to encourage the shift of appropriate traffic from road back onto rail.

Government's plan for Spoornet followed the recommendations from the NFA with the exception of leaving the option to bring in private sector operators into the Orex operations. The plan was adopted at the end of 2001.

At the end of 2003, two years after agreement was reached between government and organised labour, none of the major aspects of the agreement had been implemented. Spoornet planned to embark on a fleet renewal programme in 2002 to increase service reliability, particularly by raising locomotive availability. A capital programme of R45bn rand to be spent over 15 years was announced (later reduced to R42.5bn) Tenders for new traction equipment were issued in 2002, but not awarded. Spoornet has been unable to proceed with this fleet renewal programme owing to its inability to finance capital expenditure either from its own resources or from its parent company, Transnet. Lately, Spoornet has announced plans to defer the acquisition of new equipment in favour of refurbishing existing plants.

Rail reform experiences in other countries show improvements in operational performance resulting from privatisation. In England, between 1992/93 and 1999/00, passenger miles and freight ton-miles grew by 21% and 19% respectively while total industry costs fell by nearly 6% (Pollitt & Smith, 2001). An assessment of New Zealand's 1993 rail privatisation found that by 1997 productivity had risen significantly and welfare increased, the largest gainers being taxpayers. The study found, however, that despite improvements, with capital valued at its replacement value, the rail business was not able to generate a positive economic surplus (NZ Institute for the Study of Competition and Regulation Inc, 1999). In June 2004 the New Zealand

Government will reacquire the rail business and run it as a commercialised state-owned enterprise. In Australia the effects of privatisation measured between 1990 and 1998 showed productivity rose significantly in both freight and passenger services. Real freight rates fell by 30% over this period (Productivity Commission, 1999).

Port operations overview

SA Port Operations division of Transnet has a monopoly on the handling of containers, vehicles and operates the majority of bulk terminals, break-bulk and multi-purpose terminals. Private sector cargo operators handle liquid fuels, share the market in multipurpose terminals, fruit terminals and operate some bulk terminals. Break-bulk and multipurpose terminals operated by SAPO are declining cargo-handling markets, mainly due to the shift to containerisation. In 2002/03 these terminals handled 11.2-million tons. SAPO's bulk terminals handled 29.6-milllion tons. Total container handling at three terminals for 2002/03 was over two million TEUs (twenty-foot equivalent containers which come in three standard sizes), 65% of which are being handled by the DCT. SAPO achieved a turnover of R2,344m in 2003 and recorded a pre-tax loss of R86m. Net asset value was reported at R1 697 m. SAPO employed 5 645 people in 2003. (2003 Annual Report)

The discussion on port services concentrates on reform scenarios in container handling, as these are the most important cargo category by value. Container terminals are operated in Cape Town, Port Elizabeth and Durban, the last-mentioned handling 65% of the 2.2-million TEU shipped through SA ports in 2003. Operating performance of the other terminals is strictly linked to the cargo flows they handle and this differs enormously. The iron ore terminal at Saldanha is highly efficient and profitable with tariffs linked to the international price of iron ore. At the other end of the spectrum the multipurpose terminal in Durban is making a loss, is overstaffed and in a declining cargo market.

a) Restructuring port operations 1999 to 2003

Government's restructuring policy for SA's ports in 1999 anticipated separating port operations from landlord functions, establishing a new policy framework for the sector and privatising the former. Divisionalisation of Transnet's erstwhile Portnet port business into National Port Authority and SA Port Operations took place in 2000. Functional separation, but not full separation, was affected to operations, as neither entity was corporatised. A new National Commercial Ports Policy was adopted in 2002, which provided for a landlord port authority under public ownership to be eventually separated from Transnet and the transfer of cargo operations to the private sector via concessions. Enabling legislation to establish the National Port Authority and create a port regulator was processed through parliament during 2003 but was withdrawn at the insistence of Transnet. Government preparations for concessioning port operations involved public declarations at intervals so that the private sector would be brought in to operate the DCT (DPE 2002). This remains a stated intention.

Poor performance of SAPO has acted as a fillip for restructuring. The reliance on the port of Durban for transporting 60% and upwards of the high-value merchandise trade for SA and SADC countries ties port performance directly to trade competitiveness. Durban Port, and the Durban Container Terminal in particular, influence macroeconomic performance in the foreign trade sector with respect to the cost competitiveness of exports (directly via aggregate port charges and indirectly via delays and reliability factors). On the import side direct gains from trade are diminished via higher aggregate handling charges, although this provides some protection to domestic producers.

The DCT is performing below par. Whether measured by handing rates with comparable ports, ship turnaround time or total transit time of containers through the port, the DCT is a lagging not leading performer. Importantly, however, while this performance has triggered reactions from

shipping lines to impose congestion surcharges, the port has not collapsed. It represents thus a burden on performance rather than a crisis, which in part explains why it persists rather than being dealt with decisively. Due to the significant impact that the performance of the DCT has on the country's trade it was earmarked as the first facility for private sector participation.

Trends in economic variables to assess impact of restructuring: rail

At the outset of any discussion about rail restructuring is a requirement to define the criteria for judging the performance of the rail entity. Simply put, rail operations include the network infrastructure costs as well as the operating costs of the transport services they provide in their total costs (even quantification of costs is poor or inaccurate where full cost accounting is absent or the business failing to replace its capital stock by deferring maintenance). In contrast competing transport modes, mainly road freight and coastal shipping infrequently factor infrastructure costs in their total costs. Ignoring factors such as road congestion and travel time costs, road network infrastructure costs are not fully incorporated in road freight costs. As a result, road freight operators are subsidised by the fiscus and by light-vehicle users, since network charges are not incorporated by road fright operators. Prominent examples of public sector acknowledgment of the economic, environmental and social value of a rail network are found in the state support given to the French national railways and the backing European Union transport planners have given to increasing the rail sectors' share of the freight market. Hong Kong's Special Administrative Region Government regards improved rail services as critical to retaining their status as the world's most productive container port. Assessing a railway's performance needs to take into account the competitive environment in which it operates. Firstly, in Spoornet's case high gross vehicle mass axel limits of 56 tons permitted in SA and the partial inclusion of infrastructure costs in road freight charges make road freight a highly competitive mode and this explains why road freight has won market share away from rail on price. Secondly, Spoornet has scaled back its operations on secondary lines. However, it has been prevented from closing lines despite the losses it incurs and it is consequently not maximising its rate of return.

Rail companies are not particularly good investments, even in markets where they are fully privately owned. In the US since the re-regulation in 1980, an assessment found that by 1990 despite both the number of class 1 operators and employment halving, and the route kilometres falling by a third, not a single railway was earning its cost of capital, despite return increasing dramatically (NZ Institute for the Study of Competition and Regulation Inc, 1999).

a) Employment of factors of production and their returns

Gross employment data are available from Spoornet. Data assembled for the TWG report in 2001[2] included broad skills distribution and an age profile for the workforce.

An assessment of employment levels in Spoornet is directly related to the size and chosen operational method of the rail network. The demand for labour would alter significantly in a restructuring scenario which redesigned the operating method and service levels to raise the productivity and profitability of Spoornet. Typically, under such a scenario the total network size would be reduced to operate only the main trunk lines, branch lines would be transferred to other operators or closed down and total employment will be cut by 70%, as was recommended by Mercer in 1998.

Direct employment in Spoornet was judged to be 25% higher than would be necessary for the current size of the network and operational methods in 2001. Significantly, this figure was agreed

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[2] Technical Working Group comprising of government officials, trade union officials and Spoornet management to supply information. Includes appendices on labour skills profile. Final report 14 September 2001.

by the trade unions representing rail workers. Therefore it represents a low estimate against a full cost-cutting estimate of reducing direct employment by 70%.

Outsourcing of functions has not occurred in Spoornet since this has been vigorously and successfully resisted by organised labour. Only three concession-type contracts with private operators started to run services on lines that had been retired from service. Therefore the extent to which outsourcing would absorb displaced labour or generate new employment has not been explored.

Skills shortages exist in the technical fields and for middle management within the railways. Employees classified as surplus to requirements are concentrated in the manual labour categories.

Assessing Spoornet's capital stock requires disclosure from Spoornet (and Transnet) of the entities' financial results on a corporatised basis. There is no dispute over the fact that Spoornet has experienced an investment holiday, which has resulted in it running down its capital stock. There is no consensus, however, over the investment requirements for Spoornet as those generated by Spoornet are suspect, being generated within an engineering paradigm and not subject to competitive influence.

Data on capital productivity require financial disclosure from Spoornet. However, an inescapable point is that Spoornet does not generate sufficient returns to cover its cost of capital and for this reason has been unable to fund its fleet replacement programme.

b) Factor productivity

Aggregate labour productivity data would have to be obtained from Spoornet from each of its major divisions. A productivity measure that would allow comparisons with other modes requires an index to measure net ton kilometres per employee per division to be constructed.

c) Efficiency gains

Key railway efficiency measures are related to rolling stock utilisation rates. Improved wagon turnaround rates were the central recommendations made by efficiency advisors Halcrow brought in by Spoornet in 2000. These measures are available from divisions and would need to be obtained from Spoornet.

d) Improvements in services rendered

Expected improvements in the service would increase service predictability. Current service levels are poor in two respects. Firstly, the non-availability of wagons and traction to match customer demands. Secondly, low service predictability and the lack of reliability in scheduling collection and delivery for customers. A reformed rail service would make adherence to a service schedule a high priority.

e) Prices

Spoornet has introduced a pricing strategy with three tiers of service. Long-term contract carriage, scheduled services between major centres and a carriage-on-demand, the last being at the highest rate and dependent upon the availability of resources needed. This pricing strategy rations the available services in favour of major customers and has loaded large increases on certain small-volume customers. In a reform scenario, price hikes by Spoornet would be contained by competitive pressures.

f) Fiscal implications

Rail reform options do not provide for significant foreign private sector involvement that would contribute to foreign direct investment. Private sector participation in the freight business via concessions would not offer opportunities for large once-off payments to the fiscus. Instead the

fiscal impact would mainly be expressed through reducing the fiscal burden of underwriting debt in Transnet or directly in Spoornet.

Trends in economic variables to assess impact of restructuring: ports

To build a base case to judge the impacts of reform on SAPO's operations and what the economy-wide impact could be, financial disclosures from the company would be required beyond the level currently available from Transnet.

a) Employment of factors of production and their returns

The demand for labour in SAPO's container terminals is underpinned by the growth in container cargo generated by merchandise trade augmented by containerisation of commodities previously handled as break-bulk goods.

Estimates of manning levels at the DCT against comparable terminals suggest that absolute employment numbers are 15% to 20% higher than a more streamlined operation. More importantly, alternative work organisation methods would change the deployment of workers and assign them different and flexible roles not necessarily reduce absolute employment. Greater efficiency in SA ports would generate traffic volumes and stimulate port logistics in related sectors with an associated growth in employment in the transport services sector.

Skills levels in container terminals handling cellular vessels are high, with only a small proportion of the work involving manual lashing and unlashing of containers. More direct labour is required for non-cellular vessels which do call at SA ports. Skills demanded are in the higher categories of operators. Restructuring will accelerate the demand for higher skills to raise efficiency levels.

Capital investment paradoxically may be lower under a positive scenario of full privatisation due to improved management of operations and higher levels of system efficiency.

b) Factor productivity

SAPO's labour productivity is rising due to the better management and a focus on reducing bottlenecks. SAPO has been under intense scrutiny as an obstacle in SA's logistics system. Capital productivity data would require disclosures from SAPO on its asset cost base.

c) Efficiency gains

A reform scenario could produce efficiencies from tight cost control over labour costs, better deployment of staff and management of overtime labour costs. However, quantification of these will be difficult.

A notable area of improved efficiency and lower costs under a reform scenario is in terms of speed, cost and flexibility of procurement. State enterprise procurement under Industrial Participation rules adds to costs. An equivalent equipment purchase for SAPO would have been 40% cheaper without the industrial participation restrictions.

d) Improvements in services rendered

Of the many measurements for monitoring port productivity that relate to efficiency of equipment use, crane moves per hours, cargo movement per meter of berth, yard density, the most important to port users is the total time to complete operations or ship turnaround time from entering the harbour to exit. This measure takes account of all the port services necessary for the safe movement of goods from entering the port boundaries such as vessel traffic management, pilotage, towage, mooring, health, safety and customs inspection. Responsibility for such services rests with other authorities. Nevertheless, these have a major influence on port productivity.

Port productivity measures are straightforward and comparable since all container ports use basically the same equipment. Efficiency improvements from reform would be capable of lifting crane moves per hour from the current 16 to 20 per hour to 25 to 30 per hour.

The most important improvement in service expected from reform would be a reduction in port dwell time by 80% from an average of 110 hours to 60 hours.

Hindson & Edwards (2003) modelled the effects of improved performance by estimating the total costs of port tariffs, interest charges on containers in transit through the port and ship delay charges. The last-mentioned two costs arise from delays, which can comprise up to half the total costs of shipping goods through a port. Higher operational efficiency could half the transit time through the port and halve total costs that include the effects of delays.

e) Prices

SAPO container handling rates are low in comparison with other ports. Thus any reform scenario that does not include tariff rebalancing from the over-recovery of cargo dues by the NPA will not support lower transport costs. All reform scenarios will require changes to the conduct of the NPA to ensure that income earned by the NPA is applied to port infrastructure applications.

Influences over prices in a reform scenario depend on the contractual arrangements used for private sector participation. Three main influences are through competition in the market from competing terminals, through the mechanism of the concession contract that includes a slate of prices and price adjustments or via a government agency that approves tariffs.

Reform experiences in other ports around the world show dramatic improvements after privatisation. Between 1991 and 1995 Argentina recorded the following performance improvements for the port of Buenos Aires: container dwell time dropped 67%, per capita productivity rose 73%, port export tariffs declined 40% and import tariffs declined 120% (Estache & Carbajo, 1996). A recent comparison between two ports of similar scope and scale serving comparable markets in central America, the one efficient and operating at global standards and the other inefficient, showed that the latter incurred an additional 49% cost 'penalty' due to delays (Londoño-Kent & Kent, 2003).

f) Fiscal implications

All reform scenarios will involve transferring investment risk to new private sector operators who would be tax-paying entities and raise proceeds from concession contracts. However, the last-mentioned will be attributable to the NPA. Private sector participation will result in foreign investment, as the only entities that are capable of competing to take over and operate container terminals are foreign operators. Domestic firms will participate in business setup to run terminals along with foreign-based terminal operator companies so likely funding for acquisition of a concession and funding of expansion will involve domestically raised debt finance.

g) Additional investment

Both reform scenarios will improve the efficiency of existing facilities to handle increased cargo volume and postpone the construction of new capacity. A positive scenario involving terminals competing for traffic is likely to draw additional trans-shipment traffic to SA ports. In contrast to traffic originating and terminating domestically, trans-shipment traffic is influenced by port efficiency, costs and frequency of vessel callings. SA's east coast ports compete for trans-shipment traffic with Port Louis in Mauritius and the Port of Mozambique. Under a positive scenario higher traffic supporting increased trade is further expanded by increased trans-shipment traffic, which would create the conditions necessary for building a new container terminal.

The reform scenario counterfactual of continued poor port performance will encourage traffic to shift to Maputo and to a lesser extent Walvis Bay which would stimulate the Namibian and Mozambican ports industry.

Restructuring Scenarios

a) Rail

Government's restructuring intentions for Spoornet are not clear. Little has been achieved as far as implementing the reform plan for Spoornet, adopted at the end of 2001. Four factors need to be considered:

1. There is, as yet, no formal replacement policy for the rail model. At its core stood the assumption that Spoornet would be able to replace its ageing infrastructure via cross-subsidisation of the loss-making general freight business from the profitable export divisions. Spoornet's inability to raise the capital it requires through a funding plan drawing on its own resources or from Transnet demonstrates that the assumption does not hold. Thus, the internally driven turnaround model has failed.

2. Although effort has been made to deal with passenger rail services in search of a structure that will sustain subsidised transport to low income commuters, a workable model has yet to emerge.

3. The desire by the state to stimulate fixed investment through the levers of SOE infrastructure investment programmes for growth, employment and ancillary objectives of promoting Black Economic Empowerment.

4. The deteriorating level of service provided by Spoornet and consequential negative impact on trade together with its inability to win back market share lost to road freight haulers.

No substantial reform assumes that the current structure of Spoornet as a division of Transnet is retained, corporatisation is not undertaken and the managerial resources of Spoornet are not strengthened by responding to competitive pressure on services or through the injection of new private sector skills. Retention of the restrictive labour practices puts labour in the position of opposing any alterations to the status quo while overall employment declines.

Both a realistic scenario and a positive scenario involve a break from the restrictive conditions which hamper Spoornet, namely restrictions on outsourcing functions, shedding services and transferring operations to third-party operators. Corporatisation of Spoornet is necessary in the realistic scenario to put the entity in a position to be monitored and be accountable to a regulatory authority and provide the transparency necessary for public sector oversight. This is necessary so as to be confident that reliable information on performance is being provided.

A realistic scenario to freight rail could involve the following elements:

1. Establishing an economic regulator for the rail sector.

2. Retaining Spoornet as a state-owned rail entity.

3. Imposing a horizontal separation of the track (under state ownership) and train operations.

4. Allowing regulated access to third-party operators on the rail network.

5. Making extensive use of public-private partnerships to improve services to major customers via joint financing of rolling stock, construction and operation of rail handling equipment on agency basis, etc.

6. Falling real freight costs.

A positive scenario would involve introducing rail on rail competition via the separation of the general freight rail business into three regionally demarcated businesses – Southern, Eastern and East and Northern. Each region would be centred on a core route: Cape Town -Gauteng, Durban-Gauteng, and Richards Bay and Maputo-Gauteng respectively. Such a model would give a fully competitive rail service.

b) Ports

Government restructuring intentions for ports appears to have capsized, or at the very least become anchored. This poses a problem to define the status quo, for at least from a policy perspective. There is a stated intention for public ownership of cargo handling to be phased out over time with the result that the state would exit from operations and public ownership and overseeing be exercised through the Port Authority alone.

A non-reform scenario could emerge as a reversal of policy in favour of a continued role for the public sector in the expanding container handling market. Such a scenario would imply that Government favours the retention of the Transnet group as a holding company in the belief that it will be able to provide superior performance from an integrated logistics business. Such a position would provide SAPO and Transnet with an upside and continued involvement in cash generative business to offset its losses in the declining break-bulk sectors where restrictive labour practices have limited retrenchments and restructuring. Factors driving such a scenario are found first, in the tenor of the exchanges between Government and labour within the NFA channels that contemplated retaining publicly owned operations and finding a continued role for SAPO. Secondly, some improvements in the performance of the DCT avert the pressure for change and strengthen the argument advanced by SOE management, that given the capital they need, they will be able to perform on a par with other private sector terminal operators. Employment levels are maintained through a moratorium on forced retrenchments. Port congestion and suboptimal performance continue to hamper growth. Some traffic is lost to competing ports but competition is limited by Spoornet's pricing policy on its concession to run the railway line to Maputo.

A realistic reform scenario retains adherence to the policy framework and allows for private sector participation through concessioning existing facilities to international terminal operating companies. In the port of Durban the configuration of the container terminal includes the existing facilities operating on pier 2. Construction is underway to convert the adjacent pier 1 from multipurpose cargo to a container terminal with the intention of port planners that SAPO run both pier 2 and 1 as a single operation. These facilities are unbundled and pier 2 is offered as a concession while SAPO is retained to operate pier 1. Competition for the market takes place through a competitive process to award the concession and there is intense interest from bidders for control of the dominant share of the SA container market. The Durban Container Terminal (pier 2) is concessioned to a leading international container terminal operating company in partnership with SA investors and BEE companies. Prohibitions on retrenching surplus labour maintain employment at constant levels. Productivity rises slowly and the operator makes investment in handling equipment to increase the capacity of the terminal. Concessioning of the container terminals in Cape Town and Port Elizabeth is postponed as government seeks to increase the flow of traffic to the new port of Coega. A port regulator, created to act against abuse by the holding company Transnet and it's authority and operations divisions, exercises some economic regulation over port charges set by the new operator by requiring adherence to published tariffs. No separation of the Port Authority from the Transnet group occurs. As a result, infrastructure charges remain higher than required for port infrastructure, owing to the diversion of funds to Transnet.

Comprehensive port reform would be expressed in a positive scenario and framed within the existing policy prescripts, with the addition of a strategy to encourage a competition to the greatest extent possible. For the Durban Container Terminal two short-term concessions are

granted for operations on pier 2 as new operators are acquiring assets that are have medium-term economic lives. A longer-term concession is granted for pier 1, including rights to extend the terminal, which would require large investments from the concessionaire. In quick succession two concessions are offered for Cape Town. In Port Elizabeth a concession bundled with development rights at Coega is offered. In order to maximise competition between terminals for traffic, private sector terminal operators who succeed in becoming the concessionaires on existing facilities are prevented from bidding for other existing terminals, but are permitted to bid for new development rights. Port productivity rises steadily in every port as new operational practices and skills are brought to bare. Inter- and intra-port competition occurs as terminal operators seek to win additional traffic which keeps handling charges at constant real rates. A separation of the NPA from Transnet takes place and results in a reduction in cargo dues which in turn lowers the overall port costs. Employment is maintained and starts to grow after three years as new skilled workers are recruited to handle increased volumes. Higher volumes of cargo are handled through SA ports as a result of the competitive status of port services. Back-of-port operations in logistics services are stimulated by more productive ports, which raise employment in transport distribution services.

3.2.3. Telecommunication

Backgound

- As far back at the late 1980s the technological and economic drivers of digitisation and liberalisation compelled the state to acknowledge that the monopoly telecom utility Telkom was not meeting the needs of a modern economy.

- In line with global trends at the time aimed at shifting the financial demands on the state for the provision of telecommunications onto the private sector, SA began to prize open the market in the early 1990s. In the dying days of the apartheid regime the Nationalist Government pushed through two mobile GSM licences, which provided the first facilities-based competition.

- Following the first democratic elections and the coming to power of the African National Congress, SA began to pursue a more aggressive reform agenda in two phases. First, a regulator was established through the passing of the Telecommunications Act in 1996. In 1997 the Government partially privatised Telkom through the sale of a 30% stake to foreign investors from the US and Malaysia with a five-year exclusivity attached.

- Building on the facilities-based competition resulting from the licensing of two mobile licences in 1993, the first phase of reform proposed that further competition be introduced in this market segment. Following a highly contested process a third licence was granted in 2001.

- Phase one also allowed for the opening up Value Added Network Services (VANS) market segment, which subsequently included Internet Service Providers but they were required to acquire their facilities from the partially privatised incumbent against which they compete. This has had a chilling effect on the growth of this market segment and Telkom's monopolistic behaviour was contested. In 2003 Telkom was listed.

- The second phase of reform meant a fixed-line competitor to Telkom in the form of a second network operator (SNO) by 2002. However, the SNO process has been so protracted that the licence was only expected to become operational in the second half of 2004. The licensing of the proposed 10 under-serviced area operators has also been delayed for more than 18 months, seriously undermining their already tenuous business cases. In the second phase of reform, the state also secured for the publicly owned signal distributor an international gateway and multimedia licence. However, competing state interests, particularly that of

protecting Telkom's revenues at the time of its listing, saw the stripping away of several critical proposed rights of the Sentech licences.

Introduction of a fourth cellular licence was expected by 2005. With some luck this process will take place under the new proposed convergence legislation, which goes some way to ameliorate current inhibiting arrangements for new entrants and which is aimed, amongst other objectives, at stimulating the rather poor investment record in SA's telecom sector.

The SA telecommunications market – some numbers[3]

In the 10-year period between 1992 and 2001, the revenue generated by this sector grew from R7bn to R56bn [ITU (2002); BMI-T (2002)]. These figures are often used to demonstrate the success of telecom reform in SA. Even international comparisons suggest that this growth is significant. However, disaggregation of the data may paint a different picture, for example that some of the increased contribution to GDP may reflect the high cost of telecommunications. That there has been increased activity and expansion in the sector is nevertheless obvious.

The partially privatised public switched telecommunications network incumbent, Telkom, has made impressive gains during the period of its extended monopoly from 1997 to 2002, growing its activities from R7bn in 1992 to R43bn in 2001 and retaining a significant 43% of total market share in the face of aggressive mobile growth. With over 30% of the total market share by 2001, and more than three times the number of subscribers than the fixed network, the mobile cellular market has grown beyond all expectations.

The composition of the sector continues to change, as a third operator entered the market in late 2001, and will change further, when the SNO becomes operational in the final quarter of 2004.

Data services, which include leased lines, Internet, corporate networks and virtual private networks, continue to grow and now represent 12% of the sector. The VANS market segment was worth almost R3bn in 2001, not including Telkom, according to market research firm BMI-TechKnowledge. Telkom's 2002 Annual Report states that its data business revenues were R4bn, putting the total value of the data services market at a little under R7bn, the size of the total market in 1992 when the process of liberalisation began.

Revenues and investment

While by comparison with other countries in the Southern African region, SA's telecom revenues per capita are relatively high, as a middle-income country by United Nation (UN) classification, SA's comparative telecom spend per capita has been low.

The rise and fall of the SA level of investment in the telecommunications sector reflects the capital expenses associated with the 2.8 million lines that Telkom was required to rollout during its exclusivity. This totalled nearly R50 billion over the exclusivity period. The decline in these figures in recent years reflects the completion of this exercise and Telkom's stated intentions in its 2002 Annual Report to rather focus on shareholder value.

In line with its larger economy and higher GDP, current levels of investment indicate that SA is investing significantly more in its telecommunications infrastructure than other SADC countries for which data are available. In terms of middle-income countries, however, SA invests less than Poland, Mexico, and South Korea but more than Morocco and Turkey, both of which have lower GDPs.

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[3] This section is largely drawn from Gillwald, A. and Kane, S. (2003)

Network coverage and subscriber numbers

In terms of fixed line growth in SADC and other middle-income comparison countries only Morocco, Zambia and the war-torn Democratic Republic of Congo have had worse performance in terms of annual growth than SA over the past six years.

> "Therefore, policy-makers and regulators must overcome their fixation
> with fixed lines and look to mobile as a way of achieving social policy
> goals." (ITU 2002: 8)

Nevertheless, despite the achievements of mobile it is also clear that fixed lines will continue to be an important developmental measure.

SA's growth rate in mobile subscribers is impressive given the relatively large initial base of 2.35-million subscribers off which it was achieved, attracting 17-million subscribers by 2003 and using its profit base in SA to secure operational rights throughout the continent. Compared to middle-income countries, the country performs well, having slightly fewer subscribers per capita than Poland, slightly more than Mexico, and significantly more than Morocco and Turkey.

While SA's growth rate is also in line with other middle-income countries, its current growth trajectory would not seem to allow it to narrow the teledensity gap between it and the best performing middle-income countries of South Korea, Turkey, and Poland.

One of the reasons is that in SA attempts to innovatively allocate scarce resources and rights in order to stimulate investment and encourage new entrants have largely been undermined by overriding policy or licensing processes as the policy-makers struggle with the balance of stimulating timely and efficient investment both in incumbents and new entrants and securing social returns on investment.

As a result of disconnections due to customer non-payments and customer migration to mobile services and the line roll-out targets contained in the licence, Telkom has considerable excess capacity on its fixed-line network. Telkom indicated in its Initial Public Offering (IPO) Prospectus that it plans to use this capacity to expand prepaid services.

The high retail prices that have resulted in at least a significant portion of the two million-odd disconnection, together with the high wholesale pricing, which has seen Telkom brought before the regulator, suggest that Telkom's monopoly behaviour is resulting in inefficient use of the network.

Impact of telecommunications restructuring around privatisation

- SA, like other governments in both the developed and developing world, has tended to focus on initial upfront payments from sales or new licences rather than longer-term contributions to the economy and the treasury, such as focussing on longer-term tax revenues. The fiscal impact of licences already granted is sizeable, with taxes paid to the Treasury in the 2003 financial year amounting to almost R2bn[4]. Taxes paid by the R5bn VANS industry will add significantly to this effect.

- This focus on the maximisation of state assets has compelled the state to pursue a policy of "managed liberalisation". In the first phase it focused on securing the optimal price in partial privatisation in exchange for rights and exclusivities that allowed the strategic equity partner to milk its investment. In the second phase of managed liberalisation, the state's

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[4] Vodacom's SA taxes (2003): R1.231 billion – Vodacom Annual Report 2003 pp. 84

MTN's SA taxes (2003): R691million – MTN Annual Report 2003 pp. 84

preoccupation with Telkom shifted to the initial private offering (IPO Telkom) and the creation of conditions that would maximise its share price.

The IPO also represented SA's biggest attempt to spread share ownership among the black majority in an economy still dominated by whites nine years after *apartheid* has ended.

However, the offer was rejected by SA's biggest trade union coalition, Cosatu[5], which contended:

> "... commercialisation and privatisation have greatly increased the cost of living for working people. In telecommunications, in particular, the commercialisation of Telkom has led to soaring costs for low-income households, although rich consumers enjoy better services and lower tariffs." (Cosatu Press Release 2003)

▪ However, the VANS providers, including Internet Service Providers (ISPs), have not been fortunate either. Required by law to obtain all their facilities from the fixed-line incumbent, who competes with them in this competitive segment of the market, the VANS market excluding Telkom's share has shrunk during the period of the exclusivity, with the period characterised by a litany of complaints to the regulator and the Competition Commission charging Telkom with anti-competitive behaviour.

▪ The three-pronged reform model – privatisation, liberalisation and regulation – is underpinned by the assumption that regulatory interventions will ensure the efficiency and extension of the network roll-out under imperfect market conditions. Historically, investment in the network was secured through rate-of-return regulatory mechanisms that guaranteed a return on investment, which reduced the risk for the investor, sometimes entirely. Information asymmetries generally made the application of mechanisms to ensure efficiency gains impossible as network operators sought to extend the terms of their guarantees with past expenditures.

▪ The trend away from rate of return regulation to price capping on wholesale and retail tariffs reflects the desire to shift the investment risk from the state to the private sector through privatisation and liberalisation strategies.

▪ While the various institutional arrangements were made to comply with WTO commitments, including the establishment of a regulator for telecommunications in the 1996, the capacity of the regulator to effectively regulate the incumbent, Telkom, in order to ensure the benefits of privatisation, by acting as a proxy for competition, has been lacking.

▪ The outcome of ineffectively regulated privatisation in SA has been a loss of 2 million fixed-line subscribers, a loss of 30 000 jobs, 160% increase in local tariffs and a chilling effect on the openly competitive sectors of the market, specifically VANS and ISPs. The section below will attempt to examine some of the implications of this for the sector and the national economy.

a) Employment

The standard used by Telkom and other operators around the world for judging labour productivity is the number of main-line subscribers per employee. Due to major reductions in its workforce in recent years, Telkom's main-lines-per-employee productivity has improved dramatically, increasing by 50% since 1998. This has resulted in the shedding of 30 000 jobs in Telkom. Over this five-year period Telkom's fixed line employee productivity has been growing by 11% on an annual basis – significantly higher than its productivity adjustment factor of 1.5%. Moreover, this trend has

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[5] Congress of SA Trade Unions

continued with Telkom's IPO prospectus reporting that the employees per line metric had reached 129 by September 2002. International best practice also indicates that there is further room for improvement as many of Telkom's international peers have achieved productivity levels of 200 lines per employee.

While privatisation invariably involves a reduction in the number of workers, the terms under which labour is employed may improve. Generally, there is an increase in wages, training and often the introduction of share schemes to incentivise production or to diffuse political concerns.

As mobile has proved to be a much more efficient technology for providing access to telecommunications services, with about 1,600 connections per employee with a constantly improving metric, than has fixed line, few of these 30,000 workers have been absorbed into the mobile sector, which has generated far fewer jobs over the last 10 years. Where they have absorbed workers from Telkom they tended to be more skilled workers.

However, the delays in the licensing and operationalising of the SNO and even the 10 proposed under-serviced area licensees, which have the potential as new network operators to mop up some excess labour, have undermined this potential.

The deregulation of customers' premises equipment in SA was one of the first areas of liberalisation and requires nothing other than type approval from the Regulator. The introduction of competitive networks and services especially in mobile has boosted the equipment supply side of the industry. However, this is largely a foreign import business in SA with little significant opportunities for employment creation, as has been evidenced in some other emerging markets such as China and Korea.

b) Factor productivity

Productivity improvements are determined in the telecommunications sector primarily by investments in improved technologies and the more productive use of labour.

While calculating technology improvements is complex, calculating labour productivity is straightforward. In telecom the standard measure for fixed-line operations is the number of lines provided per employee as was mentioned above.

With labour productivity at 10%-11% per annum, and new technologies adding significant additional benefits, the productivity figure used by Telkom in the price-cap formula, 1.5%, is remarkably low. This is especially so when compared to the numbers used for incumbent telecom operators in other countries, especially at a similar stage in their telecom reform process, where there are major opportunities to improve productivity. International benchmarks would suggest a number between 5% and 10%.[6] Although the efficiency gains from technology improvements are notoriously difficult to quantify it is evident that Telkom has dramatically improved the technology of its network in recent years.

Although there are also no numerical calculations available of Telkom's capital productivity, Melody (2003: 18) argues that the available evidence clearly demonstrates that it is high, and will continue to be high for the foreseeable future. "This suggests that for the immediate future (2003-04) Telkom's capital productivity growth must be at the upper bound of the international benchmark range for total company productivity, 10%, or even higher."(Melody 2003:18). Telkom plans another 60% labour productivity improvement within the next year or two. This evidence suggests a labour productivity number for the price-cap formula in the order of 25% or more per annum for the next two years.

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[6] See Intven, H. ed. (2000) *Telecommunications Regulation Handbook*, Module 4, Washington, World Bank.

Melody argues, however, that Telkom's plans seem unrealistic and a more realistic figure might be a slight improvement on the level achieved over the five years of exclusivity, 12% to 15%. If Telkom actually achieves its plans, the productivity improvement in excess of 12% to 15% would provide Telkom with extra profit. Melody contends that the combination of capital productivity of 10% or more and labour productivity of 12 – 15% or more, yields a total productivity estimate for Telkom of 11% to 13% or more. Still, this should be seen in the light of a 1.5% productivity improvement, granted to Telkom for the price increase capping.

c) Pricing/tariffs

As a monopoly, Telkom is required to file its annual price increases with the telecommunications regulator in SA according to a rate regime that is currently determined by the regulator but approved by the Minister. As in several other areas where the Ministry has been compromised by a conflict of interests, under pressure from Telkom and the impending IPO, the efficiency factor proposed by the regulator was halved in 2002 allowing Telkom to increase its tariffs significantly.

In SA the mechanism that is used by the regulator to evaluate Telkom's proposed pricing increases is the price-cap model. According to this model, for a specified future period, the telecom operator may adjust prices on the basis of estimates of probable inflation in the operator's costs (often measured by the CPI) and achievable improvements in its productivity. Inflation increases costs. Productivity improvements decrease costs. Thus the difference between the two allows the operator to raise their prices by the inflation rate adjusted downwards for its productivity increases (Gillwald and Kane 2003: 21).

In most countries the costs and prices of providing telecom services have been declining significantly for several years as a result of new technologies, services, competition and efficiencies in network management. In contrast, Telkom has been increasing prices annually by substantial margins. Between 1997 and 2002, residential connection charges were increased by 56%, monthly subscriptions by 53%, and peak rate local calls by more than 3.5 times. The 2003 price increase was 9.5% overall and 12.5% for residential services. At the same time disconnection of more than 2 million subscriber fixed lines has taken place.

"Telkom has announced outstanding financial results for the 6 months to September 2003. Net profit increased 158% and earnings per share 171%. While the Government may be happy with high profitability it must realise that these results are those of an ineffectively regulated monopolist exploiting its power in providing an essential public service. This is both inefficient and inequitable. As a government-sanctioned practice, this is mercantilism, not economic development." (Melody 2003)

Another factor in the price-cap formula as it is currently applied is the undermining of efficient pricing of telecommunications services which relates to the calculation of inflation. Telkom is experiencing rapidly declining unit costs in its major purchases of the latest technology equipment in international markets following the appreciation of the Rand.

In addition, the productivity factor is set at 1.5% which would seem to be extremely low given international practice and Telkom's productivity improvements in recent years. For example, the productivity factor for British Telecom was set at 7.5% during the 1990s, and is currently set at 6.5% in the US, 7.5% in Australia, and 3.0% in Mexico (Intven 2000: 4-26).

The rapid growth in Telkom's productivity as compared to the figure that is used in SA's price-cap regulations means that Telkom is able to increase its rates at a significantly greater rate than a competitive market would allow. The central premise of the price-cap formula is to mimic a competitive market, to ensure that gains from productivity increases are distributed to both consumers (in the form of lower prices) and the monopoly operator (in the form of profits).

The net effect is that over two million subscribers have come off the network, negating the central public policy purpose of the privatisation – securing private investment in network expansion to unserviced SAs and integrating them into the network economy and information society. It is possible that there are now fewer residential subscriber fixed lines than there were in 1997 when Telkom was privatised. With 56% of total main lines being residential, SA has an unusually low percentage or conversely an unusually high proportion of business and Government users, especially compared with other lower middle-income countries where about 75% of lines are residential.

Melody (2002) argues that overall an empirically based application of the price-cap formula would call for minimum price reductions in the order of 15% or more per annum.

d) Universal access obligations and service quality

Telkom's focus on the more lucrative market segments has been highly successful and responsible for the significant profit accrued. Concomitantly, there has been an emphasis on improved quality of service, as highlighted, especially in the business segment of the market. Waiting pipelines have largely been cleared but with increasing credit-checking, customers that cannot afford services are simply being excluded from service. Only in the area of residential fault clearances did Telkom not fulfil or exceed its licence targets, which again reinforces their focus on the lucrative business end of the market, and the delivery of profits that continue to bolster the share price.

As indicated in the IPO prospectus in the period ahead Telkom will be shifting its "focus from fulfilling licence obligations to strategic and operational initiatives based on margin improvement and earnings growth".

e) Fiscal implications

As mentioned earlier, SA like other Governments, both in the developed and developing world, has also tended to focus on initial upfront payments rather than longer term contributions to the economy and treasury such as focusing on longer term tax revenues.

The 30% partial privatisation of Telkom in 1997 brought in R5.6bn. However, the relatively high price received for the 25-year licence, and particularly the five-year exclusivity, came at some cost to the sector and the economy, as argued above. In addition, short-term gains have not been offset against potential longer-term tax revenues. Even at current levels, in a restricted market, the fiscal impact of licences granted already is sizeable, with taxes paid to the Treasury in the 2003 financial year amounting to almost R2bn. Added to this were taxes paid by the R5bn VANS industry.

f) Attracting additional investment

With the end of the exclusivity for Telkom, additional investment opportunities were sought through the creation of several new licences. It granted an uncompetitive international gateway and a multimedia licence to publicly owned signal distributor, Sentech. However, investment implications of this preferential licence relate more to stimulating internal investment at this stage than securing foreign investment. The purpose of granting the licence uncompetitively was to increase the value of this rather neglected state asset for privatisation at some point.

The two pending major investment opportunities in the sector (the mobile operator and the SNO) were severely impacted not only by the downturn in the global economy and the sector, but by the negative perceptions of political and regulatory risk arising from the third cellular licensing process. Moreover, the focus on the SNO licensing process by the regulator happened at the expense of the initial 10 under-serviced area licences (USALs), which are intended to provide services to areas with less than 5% teledensity. It has been suggested that without regulatory intervention to ensure that the cost of terminating calls on high-cost rural networks are at least

50% higher than the cost of terminating calls on established networks, and the ability to share facilities, licences will not be viable and therefore be unlikely to attract sufficient investment.[7]

The ability to attract investment outside of Telkom following the privatisation and subsequently the IPO, was severely hampered by the monopolistic behaviour of the incumbent and the inability of the regulator to curb it effectively. In this regard the short-term gains for the national treasury have to be off-set against the negative impact on the growth of the sector as a whole, and in light of the significance of this sector as a service sector to other sectors, this might have caused a drag to the economy as a whole. Unfortunately, there are not much data available in this regard. What is possible, as was mentioned earlier, is to highlight the impact on the growth of those sectors, dependent by law on Telkom for facilities. In particular, the VANS sector, which globally has been the driver of innovation in the network economy, actually shrunk during the exclusivity, if one excludes Telkom's share of the market. The growth rate of Internet services has also declined during this period, largely due to the high cost of the Telkom components of the service to the service providers and customer. This has occurred at a time that Telkom has been digitising and modernising its network and creating excess capacity. The inability of service providers to acquire bandwidth and other facilities at all or sometimes not at cost-based prices raises serious questions around the underutilisation of the network and inefficient capital investment.

The restructuring of the sector and granting of effectively three public fixed-line network licences will result in competition between three state-owned entities with different conditions on the terms of trade. While the ownership of some of these has been diluted with strategic equity and public ownership, historical legacies in some cases, and policy and regulatory constraints in others, this means that we are unlikely to see the relatively high-risk investment and market responsiveness witnessed in the mobile sector.

Analysing privatisation and restructuring of the telecommunications sector

The anticipated benefits of network expansion, improved efficiency and cost-based prices are not evident in SA. As these processes have played out in licence negotiations they have tended to focus on the optimisation of the value of the state asset in exchange for increased rights and opportunities to generate revenues by the privatised entity, rather than on broader policy objectives of affordable access and sector development.

The anti-competitive incentives that arise in a market structured around a vertically integrated national company, with a monopoly on its upstream activities but which competes downstream against rival firms are impossible to counter without constant checking and adjusting of the integrated entity's behaviour by the regulator. This problem is compounded where rival firms are required to acquire their non-competitive facilities from it in order to operate as required in many developing countries.

Similar structural forces come into play for other networks having to interconnect in order for their customers to access the historically larger number of subscribers on the incumbent's network. This creates anti-competitive incentives for the incumbent to deny access to its network to rival firms, whether through delays or pricing strategies. While largely anecdotal, stories abound of the direct investment in the competitive segments of the market that has been driven away by the unrestrained anti-competitive behaviour of the incumbent that has received so much publicity, despite an official interconnection framework. Investment in certain other high communication usage sectors, location of regional offices and call centre development have been identified as having been negatively impacted by the high cost of communication.

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[7] See African Ventures Financial Assessment of USAL

The second phase of privatisation, focusing on the IPO has exacerbated this situation, with little consideration of how longer-term policy and regulatory vision might improve the state's budget balance and compensate for any immediate impact on sale proceeds from privatisation.

Scenarios

All the evidence suggests that adopting a more open market structure that exposes Telkom to competition with the associated efficiency gains, and with an effective competition regulation regime, would have yielded a net benefit to this critical sector of the network economy and better fulfilled national policy objectives of accelerated network development and affordable access. There is little doubt that this would have resulted in significant short-term cost to government, both with regard to the initial privatisation value, premised on an extension of the monopoly, and possibly the share price of the IPO. But even this is an assumption.

What is clear from international and local evidence is that determining policy and regulatory frameworks on the basis of immediate benefits for the treasury will not serve the more strategic national interests of the country in the global economy (Access Economics, 2002). However, it would appear that the short-term interests of the state will prevail over the longer-term interests of the sector and the economy.

Based on the observations made above, which can be interpreted as a status quo scenario, the following two scenarios can be drawn up.

a) Optimistic scenario

There is significant evidence that the demand for communication services can be innovatively met through market forces and gaps in market cost which will be effectively filled by enabling alternative operators to come into areas regarded as unprofitable by incumbents. However, their success in every instance in developing countries is dependent on strategic policy and effective regulation of the market, which includes reduced regulatory risk to induce local and foreign investment.

The SNO will start operating, which will create sufficient competition to bring down costs of telecommunication to private enterprises but as a duopoly with little access to residential customers other than through the incumbent probably not for residential users. A new third network operator, or extending Sentech's right to direct connectivity, would create even further downward pressure on telecommunication costs. Under effective regulation, telecommunication prices will come down by 10% per annum over the next five years.

Labour shedding in Telkom could be absorbed by the other operators. Effective retraining mechanisms will be put in place to upgrade low-skilled labour. Expanded activities will create additional demand for labour by fixed and mobile operators.

New fixed-line operators will undertake capital expenditure to ensure roll-out, but Telkom's spare capacity will be better utilised with associated efficiencies. Telkom's headline earnings and share price will fall.

The 10 USALs, which are intended to provide services to areas with less than 5% teledensity, will become economically viable by allowing a termination rate of other network traffic as high as 50% to 70% on their high-cost networks and the ability to share facilities amongst themselves. The Universal Service Agency introduces a reverse bid to allocate competitively the optimal amount required to build out the USAL networks and to award initial grants to further licences from the Universal Service Fund.

A fourth mobile telephone operator will start operation, initially as a roamer, but later on, after considerable capital outlay, using its own network. No impact on employment is expected, as the new participant will absorb loss of market share by existing operators.

Capital outlays associated with the above will reach such proportions that local manufacturing become viable in comparison with imports. Export markets for equipment and services to the rest of Africa are penetrated more than before.

Service-based competition is ultimately introduced that allows for resale and potentially the unbundling of the local loop, that drives down residential prices and packages services creatively, flexibly and affordably.

The removal of policy constraints on value-added network services and Internet services, particularly those on the offering of integrated voice services, and Voice over Internet Protocol (VoIP), and the self-provision of telecommunication facilities, unleashes this sector for e-commerce, e-government and e-services.

Collectively, this will increase the range of services, drive down prices, reduce the cost of business in high-communication usage businesses and stimulate investment and contribute to broader economic growth.

b) Realistic scenario

The SNO will start operating with some delay. Although this will create some competition, costs of telecommunication to private enterprises will only be brought down to half of the optimistic scenario. A third operator is not expected in the medium term. Under somewhat effective regulation, telecommunication prices will come down by 5% per annum over the next five years.

Labour shedding in Telkom will only to some degree be absorbed by the SNO, effective retraining mechanisms will be put in place to upgrade low-skilled labour. Little additional demand for labour is expected to be created by a new SNO.

New fixed-line operators will undertake some capital expenditure to ensure roll-out but usage of Telkom's spare capacity will increase. Telkom's headline earnings and share price will fall somewhat, but its continued dominance within the market should bolster them.

The 10 USALs will not be economically viable, and the liquidity will be drained from them through high regulatory transaction costs and delays, and little state or regulatory support.

A fourth mobile telephone operator will start operation, initially as a roamer but later on after considerable capital outlay, using its own network. No impact on employment is expected, as the new participant will absorb loss of market share by existing operators.

Capital outlays associated with the above will be limited to such an extent that most equipment will be imported. Export markets for services to the rest of Africa will be penetrated more than before.

Cost of services will remain relatively high, retarding penetration and usage of services, particularly those required in a network economy such as the Internet, which will remain at 5% saturation levels. This will have a negative impact on investment decisions within the sector and across the economy in general.

3.2.4. Summary of Case Studies

We can now summarise the suggestions made in the above case studies. We simplify, perhaps to the extreme, and report changes in major variables that can be considered in an economy-wide impact application as discussed in the next section. More detail is available on request.

In terms of electricity it has been suggested that at the economy-wide level, efficiency and quality of services rendered will probably not change much. These observations apply to both scenarios. With regard to electricity prices, a small decline can perhaps be expected in the optimistic scenario, while pricing in the realistic scenario will most likely stay the same as the benchmark.

The productivity of labour and capital in the sector is expected to rise as gross value of production will increase more than the employment of factor services. There are indications at this stage that some proceeds may follow from sales of parts of Eskom. The numbers involved are, however, not yet known. This will, it is expected, not have much impact on tax revenues. Higher tax revenues are, however, expected from new market entrants. It is unclear whether additional investment will be attracted to the sector, following successful deregulation. There is a tentative indication that in the context of the Southern African region, the greatest successful investment will be taken up first by the most economic options to supply the market. Regardless of restructuring and reform, investment will be made in order to keep up with demand.

More action can be expected in terms of telecommunication. A positive scenario assumes effective regulation and the variable that is expected to be most sensitive is price. A more likely scenario foresees a reduction in the price of 5%. Other variables that are expected to be influenced positively is factor productivity, especially labour productivity and quality of services. The last-mentioned suggests that the costs of telecommunication services as downstream input will decline. Proceeds of further sales of assets are likely to be less in the optimistic scenario, as the focus will be more on long-term benefits rather than short maximisation of returns to assets and share price. Tax revenues of new entrants under the optimistic scenario are expected to be higher than under the more likely scenario, while addition investment in the industry as well as in upstream supplying industry can be expected in the optimistic scenario.

Table 3: Summary of micro scoping findings

		Electricity		Telecommunication		Rail transport		Harbours	
		Most likely	Optimistic	Most likely	Optimistic	Most likely	Optimistic	Most likely	Optimistic
Efficiency	Change in intermediate inputs per unit of output purchased by SOEs	Lower	Even lower	No change	No change	Some gains	Costs reduced + efficiency gains from third-party operators	No change	75% gain from tighter management and cost control
Productivity	Labour productivity: change in physical units produced per worker	No change	Up	12% - 15%	25%	No change	Up	Low positive change	High positive changes
	Capital productivity: change in physical units produced per unit of capital	No change	Up	10%	10%	No change	Up	Low positive change	High positive changes
Quality of services	Change in services per unit of output in downstream industries	No change	No change	-10%	-10%	Deterioration arrested service level improves	Higher service level demonstration effect restores customer trust	No change	Improvement
Tariffs	Change in price charged to downstream users	No change	No change	-10%	-20%	+10% for next 3 years	Up with CPIX, i.e. no real change	Higher user costs	Lower user costs
Fiscal implications	Proceeds of asset sale	Up	Even higher	Some	Low	Low	Small	No	Concession fees
	New tax revenue	Up	Even higher	Medium	High	No change	Positive but unknown	Some due to limited concessions	Higher due to more concessions and higher volumes
	Loss of government property income	No change	No change	0	0	No change	Lower burden of loss-making entities	No change	No change
Further investment	Crowding of further private sector investment in sector	Yes	Yes	Some	High	Minimal	Some	No change	New container terminal US$300m
	Investment in upstream/downstream	Unclear	Unclear	No	Some	Minimal	Some	No change	

Note: More detail is available in Appendix A

Rail and port restructuring is expected to make a difference mainly in terms of the quality in services rendered. Another important expected effect is the degree to which labour productivity can rise concurrent with reduction in the labour force. In the positive scenario this is expected to make a significant difference in terms of reducing user costs and make a considerable contribution to trade competitiveness across the board, especially of manufacturing exports. Minerals exports are strongly affected by rail restructuring. The discussion on port restructuring focused on container terminals. However, to support mineral exports follow-through to bulk terminals would be required. Although the fiscal burden of loss-making entities will be lower, no major sales revenues are expected. Limited factor productivity and limited changes in the tariffs or costs to users are expected. Some significant private sector investments can be expected in a positive port restructuring scenario.

4. Scoping of the economy-wide impact analysis of restructuring and reform

After the above expositions as to international experience as well as what is available at the sectoral level in SA, we can now proceed with recommendations as to how to model the economy-wide impact of restructuring and reform in SA. Economy-wide impact analysis of restructuring and reform can be undertaken in two broad ways:

- First-generation applications with extensions of simple price and quantity input-output models based on a combination of fixed quantity/fixed price assumptions

- Second-generation applications with computable general equilibrium (CGE) models that allow for richer representation of economy-wide adjustments.

In this section we expand on the basic modelling framework that is necessary to evaluate the economy-wide impacts starting with adaptations to the underlying database, followed by a discussion of the two modelling approaches.

4.1. Underlying Database Adaptation

Both applications have in common that they require the Social Accounting Matrix (SAM) as the underlying database. A SAM is a snapshot picture of an economy in which a number of variables or accounts are identified (activities, commodities, factors of production, institutions) and represented in an internally consistent way, using traditional accounting techniques in the format of an oversized chessboard. Consistency is preserved by means of enforcing income and expenditure of each account to be equal. In terms of the oversized chessboard, row and column totals for each account need to be the same. The disaggregation of the variables depends on the focus of the analysis at hand. A SAM represents the income and expenditure flows that are typical of an economy in which goods producing activities generate factor incomes that are distributed to households through a household-income distribution mapping. Households buy goods, some of which are imported, pay taxes and save. Other institutions that save are government, enterprises and the rest of the world. The pool of savings matches the investment demand that takes place over the period that is represented by the SAM.

Since the late 1980s, SA has a rich history of SAMs (see for example Thurlow & Van Seventer 2002). For our purposes the standard SAM for SA needs to be adapted in order to be able to evaluate the economy-wide impacts of SOE restructuring.

At the macroeconomic and main industry level a reasonable amount of data are available splitting business enterprises between the public and private ownership for each level of information. This information is generally available for GDP, remuneration, gross operating surplus, depreciation, output (sales), capital formation and the national financial account. The availability of this data should afford analysis at an economy-wide or macro level comparing privately and publicly owned business enterprises in the electricity, transport and telecommunications sectors. With this data it is then possible to compile an estimated customised SAM that will split out non-financial publicly owned enterprises from the relevant industries.

An important constraint on the quality of the resultant database will be that researchers will only have access to publicly available data and any unpublished data that can be readily procured from the relevant official sources and individual SOEs. The resultant Supply and Use Table (SUT) and SAM tables should, however, be suited for analysis purposes as a reasonable amount of information at both the enterprise and industry level is currently available for the estimation process. In addition the framework can serve as a conceptual show case for pointing out the usefulness of economy-wide analysis of SOE restructuring.

The basis for disaggregating the industries will be the SAM described by Thurlow & Van Seventer (2002), comprising 43 industries and 43 commodities. Further disaggregating the transport industry can be achieved by using sector surveys recently published by Stats SA. It may make sense to split out some of the larger enterprises such as Eskom, SA Airways, Spoornet, the Post Office, Telkom, etc. as industries in their own right and show the remainder of public enterprise ownership for each industry as 'other' public enterprises.

4.2.   First-generation Economy-wide Applications to Evaluate Economy-wide Impacts or Restructuring SOEs

Following on the work by Hindson & Edwards (2003) that was described earlier it is possible to undertake a first-cut evaluation of the impact of restructuring of SOEs. For example, if we know that in an optimistic scenario of telecommunications restructuring the price of telecommunications services will drop by 10% it is possible to trace-through the impact of downstream users of the services under the assumption that:

- Perfect competition allows for the full transfer of input cost reductions to output price reductions

- Production is characterised by fixed-input coefficients and constant returns to scale;

- There is no cross-price elasticity of substitution. Firms do not shift towards substitutes in response to relative price shocks.

These assumptions are potentially severe, particularly for large shocks in the economy. An important assumption of SAM-based modelling is that the production structure remains constant. Thus, this analysis is comparatively static by nature and ignores any dynamic effects, such as substitution between labour and capital and between domestic and imported intermediates. Nevertheless, with telecommunication prices falling, local firms will be forced to drop their prices to maintain their competitiveness. This will at the same time increase household expenditure and consequently output. These effects can be modelled in two stages by evaluating the impact of lower prices with a simple Leontief price model in which, as with the conventional multiplier model, inputs in the production process are used in fixed proportions and any cost reductions arising from cheaper inputs are fully transmitted to downstream industries. These transmissions will eventually arrive at the factory gate of the final downstream industry before it is sold as final products to institutions such as government, households, the market for investment goods and the rest of the world.

Given these restrictive assumptions it will then be possible calculate a weighted average impact on intermediate, household and export prices as a proxy for the impact on the producer price index (PPI), CPI and export price index. Using the full household income and expenditure detail it is also possible to evaluate how various household income classes may be affected in terms of their purchasing power.

Given estimated or assumed price elasticities for households and other final-demand sectors the impact on final demand can be estimated. This can then be evaluated in terms of industry output, GDP, employment, investment and the balance of payments within the conventional demand-driven SAM input-output framework.

4.3.   Second-generation Economy-wide Applications to Evaluate Economy-wide Impacts or Restructuring SOEs

Typically, the real world economy does not adjust to shocks such as lower telecommunication prices in a linear fashion such as described in the previous sections. An increase in intermediate

input costs may (or may not) lead to a substitution at the aggregate industry level between intermediate and primary inputs. The latter includes labour as well as capital and depends entirely on the substitutability that is assumed or estimated from external sources. Firms may decide to absorb the increase in costs to some degree by laying off workers or reducing operating surplus. Similar arguments can be thought of in the case of a decrease in intermediate costs. Operating surplus may just increase, instead of lower costs being passed on to the 'client'. Apart from what will happen in the telecommunications industry itself, lower costs and higher surpluses could eventually lead to higher household income as dividends will rise. Which households will benefit depend on the income distribution of capital income. If the demand for labour increases, the benefits will reach different types of households, each with their own household-income expenditure characteristics.

Demand expansions may lead to adjustments in household savings and possibly economy-wide investment, while changes in the trade balance could lead to exchange rate correction, however small they may be. Changes in the foreign price have further repercussions. The picture gets more complicated if we consider various fiscal stances that could be adopted. Is, in the case of a demand expansion, the additional tax revenue, which was ignored above, going to be taken out of the demand system or do we assume a fixed Public Sector Borrowing Requirements (PSBR) to GDP ratio? The latter has been the policy in the recent past although a shift in thinking appears to have taken place recently. The fixed ratio may in an expansionary phase well lead to further expansion. Finally, demand expansion, could well lead to higher prices, thereby reversing to a more or lesser degree the process that we started with in the first place.

The models described in the previous section cannot deal with these more subtle nuances and a different modelling environment is required, although some of these additional economy-wide considerations could be dealt with in a partial equilibrium way. Nevertheless, what is clear is that a more comprehensive analytical framework is required to sort out the net effect of all these possible permutations. Such a framework is a computable general equilibrium (CGE) model and has been described for SA amongst others by Thurlow & Van Seventer (2002), De Wet & Van Heerden (2003) and Kearney (2003), which in turn was taken from the neoclassical modelling tradition that was originally presented, amongst others, in Dervis *et al* (1982).

A CGE model is an attempt to express the flows represented in the SA SAM as a set of simultaneous linear and non-linear equations. As such the model follows the SAM disaggregation of factors, activities, commodities and institutions. The equations describe the behaviour and interactions of these actors using rules captured by both fixed coefficients and non-linear first-order optimal conditions. Furthermore, the equations ensure that a set of both micro- and macroeconomic constraints are satisfied, so that factor and commodity market, savings and investment, and government and current account balance requirements are all met simultaneously.

The model equations are used to define the interrelationships of the macro-economy. The data in the SAM provides actual values for the coefficients in these equations through a process known as 'calibration'. The model is initially solved for equilibrium to ensure that the base-year dataset is reproduced. It is then possible to 'shock' the model with a change in the value of one of the exogenous variables. The model is resolved for equilibrium and the changes in the values of the endogenous variables are compared to those of the base-year equilibrium to determine the modelled impact of the exogenous shock.

An important feature of this standard model is that it is a static rather than dynamic CGE model. Accordingly, it does not take into account the second-period effects of changes in investment spending. Neither is the model specific about the time horizon of the adjustment or even how the adjustment takes place. In other words, the model cannot determine whether adjustment from the base to a new equilibrium occurs over any particular length of time, or whether a large part of the

adjustment takes place in a particular year. This standard framework can be adapted in various ways in order to evaluate issues around restructuring and reform of SOEs, some of which are discussed below.

4.3.1. Prices

Currently, the standard CGE framework for SA, such as the one described by Thurlow & Van Seventer (2002) is set up with flexible pricing rules except for the unskilled labour categories. The latter is assumed to be unemployment so that with a fixed-price (wage) quantities adjust. It is, however, possible to consider a range of other configurations. Gibson & Van Seventer (1997) take into account a combination of fixed and flexible mark-ups, with the latter typically the case in the construction sector linked to capacity utilisation in the sector and in the financial services sector linked to the spread in borrowing and lending rates which is assumed to rise with the interest rate. These levels of the (fixed and flexible) mark-ups were calibrated from the SAM. However, a more appropriate approach would be to estimate mark-ups from long-term trends that are currently available for about 46 industries in the SA economy. A first, as yet unpublished, attempt has recently been presented (Fedderke *et al*, 2003) but requires updating. If there is sufficient econometric evidence of mark-ups at the activity level, this should, in an effort to replicate as close as data allow the structure of the SA economy, be made the default pricing rule in the standard analytical framework.

A number of additional considerations have to be made. In the first place one has to worry about who gets the mark-up. In national accounting practice the mark-ups should be allocated to the enterprises, after which it is distributed to households. Some of the surplus also finds its way to the government and to the rest of the world, the latter as repatriated surpluses.

A further detail that requires attention is what is included in the costs. Gibson & Van Seventer allocate all surpluses that are generated on top of intermediate and labour costs to firm income. Given the standard CGE for SA that is most likely to be employed as a starting point for our purposes here. The alternative is to introduce 'super' mark-ups over and above intermediate, labour *and* capital costs. The last-mentioned requires a benchmark estimate of costs of capital, which may vary from sector to sector. The costs of capital can be considered as the 'normal' return to capital and feeds into the production function, while the 'super' mark-ups can flow directly to enterprises after which they are distributed amongst the above-mentioned institutions.

A simplification has been suggested by Francois & Roland Holst (1997) in which a price wedge or mark-up between the producer price and the consumer price is introduced on top of a relevant commodity. The mark-up would typically be zero in the case of perfect competition with many firms supplying a market and take a larger positive value with less suppliers. Introduction of mark-up pricing can now proceed on a commodity by commodity basis or for groups of commodities. Introducing a mark-up for one particular commodity, say telecommunications, while keeping all other commodity markets in their initial position, would then allow for an evaluation of uncompetitive behaviour in this market.

There are several issues that still need to be considered here too. The first is the question of what is the benchmark. Anecdotal evidence suggests that there are a number of markets in the SA economy where mark-up pricing occurs and surely this should be incorporated in a counterfactual against which the introduction (or removal) of mark-ups is measured in the relevant market. A different counterfactual may influence the impact. For reasons of convenience and short of considering which markets in the SA economy in fact do qualify for mark-up treatment, we may for example assume that all other markets are subject to perfect competition.

Another issue is what is going to happen with the rents that are earned when a mark-up is introduced (or reduced). Several assumptions can be made depending on the circumstances. If we

are dealing with a state monopoly, the rents are collected by the government. This would not be much different from raising commodity taxes in that market and in that case it should be modelled that way. If the rents are collected by a particular group of households a distribution pattern will have to be assumed. As a starting point, one can assume the distribution patterns that are incorporated in the underlying database of the SAM. These patterns typically show that a high proportion of income distributed by enterprises is collected by high-income households, and a small proportion by low-income households. Alternatively, if there is particular evidence, it is possible to make ad hoc distribution patterns up, for example one in which all rents are collected only by the top 10% of the income-earning households. A special case could be to have part of the rents distributed abroad, depending on the particular circumstance.

4.3.2. Bond Holdings and other Financial Interactions

Holdings of bonds have been used by Chisari *et al* (1999) as a way of modelling Argentina's financial sector and the various institutions' vulnerability to financial crises. In Argentina's case, the foreign sector may in some simulations be called on to finance domestic demand when it outstrips supply, by buying up bonds issued by domestic agents. In times of international financial crisis the interest rate has to go up in order to entice foreigners to buy local bonds. With an increase in the price of bonds, those households that are net debtors will suffer and cut back on other expenditures.

While important in Argentina, the modelling of bonds is perhaps not all that relevant for the scenarios that we have in mind with the SA CGE in which usually fixed foreign savings are assumed and the exchange rate adjusts accordingly. Introducing a financial sector in the SA circumstances may involve more than just introducing bonds. Gibson & Van Seventer (1997) have experimented with a financial stock-flow SAM which, apart from bonds, also identifies private sector equity and domestic and foreign bank loans. This is certainly something that can be considered in the long run but for purposes of our exercise may not be necessary at this stage.

4.3.3. Other Adaptations

Finally, the Argentinean and Tunisian studies reviewed in this report have indicated where a standard CGE can be adjusted in order to simulate restructuring and reform. An important distinction that is necessary to be made at this point is those reforms and restructuring that contribute to the reduction in dead weight losses and those that contribute to the reduction of rent-seeking. In the case of the former, everybody is a winner, while reduction of rent-seeking takes income away from some and redistributes it to others. The impact of reducing rent-seeking is on balance typically not as large as the impact of reducing inefficiencies.

- Efficiency gains: reductions in intermediate inputs per unit of output of privatised entities which are modelled as decreases in the technical (input-output) coefficients of the relevant SOE sectors. Consequently, value add per unit of output will increase.

- Labour productivity: a reduction in quantity of labour per unit of output that feeds into a traditional Cobb-Douglas production function in which labour and capital are combined to generate value add.

- Quality improvements: increases are measured as a reduction of intermediate inputs of sectors in the economy – the per unit of output supplied by the SOEs. For example, the usage of electricity per unit of output will drop in downstream electricity-using activities. As a result of the lower usage of electricity, these industries will generate higher value add.

- Tariffs: observed changes in the prices of privatised utilities can be modelled by changing the pricing rules as discussed above.

4.3.4. An Example of an Economy-wide Application: A Reduction in the Price of Telecommunication

To give the reader an idea of what to expect from an economy-wide application of successful deregulation in one of the sectors discussed in the sections above, we evaluate a 10%-decline in the price of the communication sector in a static computable general equilibrium model of the SA economy for the year 2000. The first issue to note here is that the communication sector includes not only the telecommunications sector (fixed line as well as mobile) but also postal and other courier services. A more careful simulation would first determine what the share of fixed-line telecommunication is of the larger communication sector. We assume here that given that share the communication sector's price will decline by 10%, so that the decline in the price of fixed-line telecommunications is 10% divided by the share of fixed-line telecommunication in the communication sector.

For purposes of modelling convenience, we present the results of the introduction of imperfect competition in the market communication services. For a full description of the model we refer to Thurlow & Van Seventer (2002). We manipulate the number of firms in the market for communication services so that the mark-up is just about 10%. A number of assumptions are made about the macroeconomic adjustment process:

- **Foreign savings are assumed fixed:** Any changes in either imports or exports will have to be counterbalanced by changes in exports and imports respectively, by means of exchange rate adjustments.

- **The public sector budget deficit is assumed fixed:** Any changes in revenue consequent upon changes in income are assumed to be off-set changes in the tax rate.

- **Investment is assumed fixed:** Any changes in the amount of savings due to changes in income will be matched by countervailing changes in the savings rate. For example, with lower income, the savings rate will undergo upward adjustment in order to maintain a constant level of total savings as this has to be equal to investment.

- **Wage rates for each type of labour are assumed fixed:** This implies that the supply of labour adjusts to meet any changes in demand.

Different assumptions could have been made. However, the above set limits effects arising from changes in aggregate demand, allowing attention to be focused on the efficiency aspects of the imperfect competition. Results for macro variables are shown in the following table:

Table 4: Macroeconomic results of introducing imperfect competition in communication, (2000 Rbn)

		Initial	New	% Change
	Private consumption expenditure	557	556	-0.12
	Fixed investment	132	132	
	Inventory changes	9	9	
	Public expenditure	166	166	
	Exports	249	249	-0.04
	Imports	225	224	-0.04
	GDP at market prices	888	887	-0.08
	Net indirect taxes	100	100	-0.07
	GDP at factor costs	788	787	-0.08

Source: Model calculations

It can be seen that a small decline of 0.08% of GDP is expected as a result of the introduction of imperfect competition by means of a 10% mark-up in communications. As we assume government consumption and gross domestic investment to remain constant, the adjustment burden falls on private consumption expenditure and trade, with the former taking the biggest knock. The balance on trade is achieved by means of a number of adjustments. On the one hand higher prices reduce exports, while lower GDP requires less imports. The negative impact on exports is initially larger but a slight depreciation (0.2% not shown) ameliorates the decline and also reduces imports further so as to keep foreign savings constant by assumption.

Why does GDP decline in the first place? In principle, imperfect competition reduces GDP, since producers cut back on production in order to push their profits up. They thus reduce employment and the total wage bill falls.[8] Although it may appear that this fall should be offset by higher profits, most of the profits are simply rents (payments to producers that do not reflect higher production).

In order to trace through these general principles in the model, we show detailed impacts on activities and commodities in Table 5. In the first column we report on the prices of commodities produced and sold locally. It comes as no surprise that the highest increase is recorded by communications with 7%. Costs of trade services (wholesale, retail) also rise as they rely on communications.

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Note that we assume fixed wages and the possibility of unemployment. If we had assumed on the other hand that there is always full employment, the GDP-reducing effects of anti-competitive behaviour will be ameliorated (since total employment cannot fall, so workers displaced from the oligopolistic industry find work – and production – in other sectors). Anti-competitive behaviour seems to have more serious consequences in a high-employment economy.

**Table 5: Sectoral impacts, reported as % change from the base,
following a 10% mark-up (2000 pr) in communications**

	1	2	3	4	5
	PDDXP	QAXP	GDPTAB2P	QFXP LABLS	QEXP
	demand price for com'y produced & sold dom'ly (%ch)	level of dom activity (%ch)	real GDP at f.c. by activity (%ch)	qnty of unskilled labour (%ch)	qnty of exports (%ch)
Communication	6.994	-1.931	-7.429	-4.720	4.236
Wholesale and retail trade	0.204	-0.201	-0.536	-0.369	-1.449
Prof & scientific equip	0.067	-0.449	-0.806	-0.627	-0.783
Other producers	0.063	-0.297	-0.407	-0.352	-1.049
Wearing apparel	0.052	-0.488	-0.635	-0.561	-1.373
Gen govt serv	0.045	-0.006	-0.007	-0.007	-0.791
Building constr & civil eng	-0.008	-0.014	-0.032	-0.023	-0.643
Other manufacturing	-0.046	-0.299	-0.823	-0.561	-0.518
Plastic prods	-0.073	-0.214	-0.269	-0.239	-0.608
Other chems & man-made fib	-0.077	-0.270	-0.540	-0.405	-0.581
Other transport equip	-0.078	-0.784	-1.057	-0.847	-0.878
Furniture	-0.085	-0.311	-0.888	-0.432	-0.463
Med, vet & oth serv	-0.090	-0.262	-0.767	-0.515	-0.633
Glass & glass prods	-0.091	-0.249	-0.539	-0.351	-0.545
Business services	-0.099	-0.096	-0.523	-0.310	-0.455
Rubber prods	-0.104	-0.243	-0.475	-0.345	-0.472
Mach & equip	-0.105	-0.185	-0.619	-0.228	-0.284
Metal prods excl mach	-0.119	-0.144	-0.395	-0.268	-0.347
Electrical mach & apparatus	-0.119	-0.140	-0.288	-0.216	-0.387
Non-metallic minerals	-0.135	-0.063	-0.256	-0.181	-0.280
Printing, publ & record media	-0.138	-0.279	-0.536	-0.367	-0.453
TV, radio & comm equip	-0.140	-0.454	-0.791	-0.623	-0.517
Footwear	-0.141	-0.224	-0.965	-0.440	-0.110
Motor vehicles, parts & acc	-0.162	-0.093	-0.478	-0.166	-0.171
Textiles	-0.169	-0.226	-0.830	-0.287	-0.209
Paper & paper prods	-0.174	-0.196	-0.594	-0.435	-0.254
Gold & uranium ore min	-0.181	-0.097	-0.363	-0.137	-0.109
Transport & storage	-0.192	-0.184	-0.642	-0.414	-0.250
Finance & insurance	-0.196	-0.108	-0.442	-0.275	-0.170
Coke & refined petrol prods	-0.208	-0.038	-0.554	-0.266	0.178
Leather & leather prods	-0.209	-0.200	-0.546	-0.373	-0.204
Oth min	-0.215	-0.024	-0.333	-0.070	-0.023
Food	-0.221	-0.109	-0.958	-0.194	0.088
Basic chems	-0.225	-0.136	-0.574	-0.355	-0.100
Wood & wood prods	-0.228	-0.118	-0.486	-0.170	-0.048
Beverages & Tobacco	-0.231	-0.060	-0.699	-0.207	0.280
Coal min	-0.238	-0.045	-0.398	-0.098	0.000
Agriculture, for & fish	-0.241	-0.095	-0.465	-0.281	0.016
Basic iron & steel	-0.245	-0.047	-0.587	-0.096	0.038
Catering & accomm serv	-0.257	-0.038	-0.286	-0.162	0.041
Basic non-ferrous metals	-0.267	-0.006	-0.317	-0.034	0.089
Electricity, gas & steam	-0.329	-0.113	-0.535	-0.324	0.209
Water supply	-0.348	-0.147	-0.745	-0.447	0.243
Average	0.157%	-0.181%	-0.686%	-0.298%	-0.074%

Source: Model Calculations, Note: weighed by the base quantity of domestic sales*

From row 7 onwards we note that the prices of commodities have dropped. The reason is that output as a whole has declined, as can be seen in the last entries of columns 2 and 3 and that drags down demand and therefore prices for a large number of commodities as these are all flexible. The last entry of the first column suggests that the overall price level is still 0.16% higher than before the introduction of imperfect competition.

Output and value added by activity are reported on in columns 2 and 3. Communications is expected to record a slight decline. The reason is that the introduction of the mark-up in this activity gives rise to lower domestic sales and a slight switch to the export market, as can be seen in column 4. Although mark-ups lead to rents and rents lead to higher income and expenditure for some households, this does not outweigh the negative impact of higher communication costs. The net effect is that output of all industries is expected to decline. No particular sectoral pattern emerges from this part of the story and the same applies for the demand for unskilled labour as is reported in column 4. The total impact on the demand for unskilled labour is -0.3%. With costs increasing, exports of most industries are expected to drop as can be seen in the last column. However, towards the bottom of this column a number of industries see their exports increase. This is because their local price drops as a result of the general decline in local economic activity and they see their global market share increase somewhat. The overall impact is, however, a small decline in exports.

The impact on demand for labour is shown in the next table. It can be seen that the impact is negative across all skills, with a slight bias towards low-skilled labour. The total number of person-year equivalents in the formal sector is shown in the last column and is about 22 000.

Table 6: Impacts on the demand for labour following the introduction of 10% mark-up in communication

	Initial level ('000)	Impact (% ch)	Impact ('000)
Low-skilled & unskilled labour	3,596	-0.30	-11
Medium-skilled labour	2,718	-0.32	-9
High-skilled labour	1,118	-0.21	-2
Total	7,432	-0.29%	-22

Source: Model Calculations

Finally, we report on household income and show results for a limited number of household income classes in the next table. In the last row it can be seen that total household income increases. This would seem to be inconsistent with the earlier result that total household expenditure has declined. In the table below it can easily be seen that the impact, however small, is not uniformly distributed across income classes, with high-income households benefiting, while low- and medium-income households are losing out.

Table 7: Impacts on household income and equivalent variation following the introduction of 10% mark-up in communication.

	Household income group (% of income-earning households)	Description Household income group	Household income Initial level (2000 Rn)	Impact on household income (%ch)
1	<40	Low income	55	-0.121
2	40-80	Middle income	191	-0.077
3	>80	High income	410	0.109
4	Total		657	0.035

Source: Model Calculations

High-income households are the winners of the introduction of a mark-up rent because they are assumed to be those receiving the lion share of this rent. This assumption can easily be adapted if better information becomes available. Given the current distribution of rents, and the underlying household expenditure patterns for the income groups identified in the SAM, the net effect of the reduction in household expenditure by poor households and increase in household expenditure of high-income households is negative, hence the decline in overall household expenditure.

4.3.5. Summary: Potential Policy Levers and Reporting Variables of an Economy-wide Application of Deregulation

From the above example it would appear that some broad direction of the economy-wide impact of aspects of deregulation can be achieved with a CGE model. Note that in our example we only 'pulled' a single policy lever, which was the price or the tariff of the telecommunications service. This is meant to reflect the effectiveness of regulation in the industry. Based on our earlier discussions, a number of policy levers should be considered. They are:

- *Tariff and pricing policy*: what pricing rules will be followed in the sector, is it a price-cap approach or a 'cost-plus' model?

- *Effectiveness of regulation policy*: to what degree will operators resist exogenous productivity increases set by regulators?

- *Investment policy*: apart from the demand effects of critical investments this lever may lead to higher efficiency of the relevant sector and higher quality of services offered to other sectors in the economy.

- *Labour market policy*: streamlining the labour force in a deregulated sector may lead to direct job losses but could lead to lower prices if regulation is effective. If micro-level evidence permits, new job opportunities through outsourcing can also be considered as part of this policy lever.

- *Financing options*: if a financial SAM is available and linked to the real SAM one can investigate various ways of financing infrastructure investment programmes. One can for example think of foreign equity owners who provide a one-off foreign capital injection but who need to be rewarded which may lead to capital outflows in the form of foreign dividend payments as opposed to a domestic financing option. The latter could create some pressure on interest rates if they indeed feature in the CGE.

- *Fiscal policy options:* Will the fiscal burden of loss-making public entities be lessened and can the deregulated entity be taxed? How will, following the successful sale of part of a to-be-deregulated entity, the sudden inflow of public resources (if any) be employed? What is the fiscal stance? Is debt going to be retired or will these resources be employed to finance infrastructure development elsewhere?

These policy levers can be considered one by one for individual sectors or all together for individual sectors or for a number of sectors. A CGE framework will in principal be able to evaluate each policy lever for each sector separately, but it is clear from the above that some of the levers cannot realistically be considered independently from one another. The amount of output data also makes it more practical to contemplate a reform package rather than individual elements. CGE models have the advantage of being able to handle a range of policy levers that may push economic adjustment processes in the same or in opposite directions or both, and in the end present a net outcome for the economy as a whole.

5. Conclusions

Restructuring of SOEs has taken place in SA since 1994. This has included elements of corporatisation and commercialisation, as well as partial privatisation. The government has committed itself to more reform. This process is ongoing and to inform this process an investigation into its economy-wide impacts in SA has been suggested.

Such an investigation would benefit from a two-stage approach starting with a scoping exercise that aims at assessing relevant international experiences and most appropriate methods to be adopted for the actual analysis, which is to take place in the second stage. In this report we undertook a review of:

- Selected approaches adopted internationally towards modelling the macroeconomic impact of privatisation and restructuring.

- Existing and current work in SA that will be useful in determining the macroeconomic impact.

- Data and model requirements of the various options, and the current availability of data in SA.

It is our view that the main drivers of any macroeconomic or economy-wide impact analysis of restructuring and privatisation are to be assessed at the micro level. Therefore a considerable part of the scoping exercise undertaken in this report was by means of an investigation of the microeconomic foundations of restructuring and privatisation for the relevant sectors, for a select number of economic variables. Given bottom-up inputs from the micro scoping analyses, the challenge then was to consider appropriate ways of undertaking economy-wide impact analyses.

From the literature review it would seem that although economy-wide applications of restructuring and reform of public enterprises have not taken place as frequent as trade, fiscal and distributional policies, a growing body of work is now emerging. From this some guidelines as to how to proceed in SA are now appearing. Firstly, a distinction needs to be made between modelling macroeconomic impacts and economy-wide impacts. From a simplistic perspective, the former is a subset of the latter in that an economy-wide framework includes a (sometimes very simple) macroeconomic story but also offers some detail in terms of production structure, labour market, income distribution, fiscal and trade policy. Given the additional flexibility in terms of institutional and other structural detail and the expected sectorally differential impacts of SOE restructuring, it makes sense to consider an economy-wide framework. Some studies have also shown that it is not always necessary to construct a formal economy-wide modelling framework. Analysis in the Ivory Coast for example has been conducted without a formal model. What the studies reviewed in this report have in common though, is that they all rely on extensive microeconomic analysis. Micro-level analysis can take many forms. In the SA port restructuring case study, harbour-specific trade data were utilised, while inefficiencies in electricity supply were obtained using cross-country estimation techniques. In general, it will involve case studies.

The economy-wide impact analysis of restructuring undertaken for Argentina, Australia and Tunisia, appears to have created the benchmark against which SA efforts may be measured in the future. The Argentinean study seems to lead the way in that a dedicated analytical framework was created to deal specifically with the structural features of the economy at hand and of particular relevance the issue of competition and regulation. The Argentinean application is also the most comprehensive in that it attempts to deal with a large range of restructuring issues. The Tunisian and Australian applications tend to use a more standard off-the-shelf framework, which allows the analysis to only consider certain aspects of restructuring. This may in the short-run perhaps also be the route to follow in SA, in that it allows a gradual process to be established with intermediate success criteria to be achieved as bit-size chunks.

The SA port application is a good example of the start of such a process. It uses a much simpler approach than in applications for the countries mentioned above. It only applies to some aspects of restructuring in the harbour transport sector but it creates a platform for further analysis.

From the point of view of regulation issues, the most important distinction that appears to be made is between efficiency gains, which are dead weight losses, and rent-seeking activities, which have more distributional implications. The overall impact of the latter on key economic ratios such as GDP is usually lower as some groups in society will lose and some will win. More recently, research has started to make a further distinction between various approaches to regulation such as the price-cap approach versus the cost-plus regulated mark-up approach. The former creates larger surpluses when efficiency gains are achieved, and they are typically appropriated by the shareholders of the relevant operators. If there is considerable foreign ownership of such operators, this may lead to an outflow of funds, which may or may not require adjustments to the trade balance and possibly the exchange rate. In the cost-plus regulated mark-up approach the benefits of efficiency gains are collected by domestic consumers, which may lead to a different economy-wide outcome.

While the international studies reviewed in this report focused on a packages of restructuring and reform measures, the SA study offers an assessment of the economic impact of a single measure – in this case the restructuring of the part of the port sector in SA. Although port activities are small in the macroeconomic context of SA, the impact of inefficient port operation can be substantial. The SA study should be 'What will be the economic impact of the concessioning of the SA Port Authority (SAPO) terminals on the wider economy?' In particular the emphasis is just on terminals and not on the full range of port activities. Moreover, the focus is on concessioning of operations. As a result a 'tailor-made methodology' was considered for the study.

Consideration the state of the existing data sources, the difficulties of obtaining survey information, and the time constraints available for the study led to a case study approach being adopted. The DCT and the Richards Bay MPT were selected to demonstrate the impact of concessioning of such entities on the wider economy.

The SA application reviewed here can be seen as a very important platform for modelling the economy-wide impact of SA port restructuring. Some of the detailed groundwork, such as working out port charges as a percentage of exports has been undertaken. While the application is comprehensive in that it considers price and quantity effects, the interaction is limited to a single round as quantity effects following the initial price change, would typically give rise to additional price effects. The last-mentioned is ignored.

The review of data requirements of the various restructuring options and the availability of this data in SA have been approached in the report from two angles. Considerable attention is paid to micro-level evaluation of the three sectors that are of particular interest to policy-makers in SA. A summary of the scoping of potential micro studies is repeated here. We simplify, perhaps to the extreme, and report changes in major variables that can be considered in an economy-wide impact application.

In terms of **electricity** it has been suggested that at the economy-wide level, efficiency and quality of services rendered probably will not change much. These observations apply to both scenarios. With regard to electricity prices, a small decline can perhaps be expected in the optimistic scenario, while pricing in the realistic scenario will most likely stay the same as the benchmark. The productivity of labour and capital in the sector is expected to rise as gross value of production will increase more than the employment of factor services. There are indications at this stage that some proceeds may follow from sales of parts of Eskom. The numbers involved are, however, not yet known. This will, it is expected, not make much change to tax revenues, as Eskom is already doing so at this stage. Higher tax revenues are, however, expected from new market entrants. It is unclear whether additional investment will be attracted to the sector, following successful

deregulation. There is a tentative indication that in the context of the Southern African region, the greatest successful investment will be taken up first by the most economic options to supply the market. Regardless of restructuring and reform, investment will be made in order to keep up with demand.

More action can be expected in terms of **telecommunication**. A positive scenario assumes effective regulation and the variable that is expected to be most sensitive is price. A more likely scenario foresees a reduction in the price of 5%. Other variables that are expected to be influenced positively are factor productivity, especially labour productivity and quality of services. The last-mentioned suggests that the costs of telecommunication services as downstream input will decline. Proceeds of further sales of assets are likely to be less in the optimistic scenario, as the focus will be more on long-term benefits rather than short maximisation of returns to assets and share price. Tax revenues of new entrants under the optimistic scenario are expected to be higher than under the more likely scenario, while addition investment in the industry as well as in upstream supplying industry can be expected in the optimistic scenario.

Rail and port restructuring is expected to mainly make a difference in terms of the quality in services rendered. Another important expected effect is the degree to which labour productivity can rise concurrent with reduction in the labour force. In the positive scenario this is expected to make a significant difference in terms of reducing user costs and make a considerable contribution to trade competitiveness across the board, especially in manufacturing exports. Minerals exports are strongly affected by rail restructuring. The discussion on port restructuring focused on container terminals. However, to support mineral exports follow-through to bulk terminals would be required. Although the fiscal burden of loss-making entities will be lower, no major sales revenues are expected. Limited factor productivity and limited changes in the tariffs or costs to users are expected. Some significant private sector investments can be expected in a positive port restructuring scenario.

The main challenge of data collection at the micro level is obtaining data from the relevant operators and service providers. As was pointed out in the case studies, such reporting is not always easily available for various reasons. At the macro level, it has been indicated that a breakdown of public and private sector entities for the relevant sectors in a social accounting matrix (SAM) framework and data sources are essential.

The methodology for investigating economy-wide impacts of restructuring SOEs that is suggested in this report is one in which a second-generation economy-wide policy modelling framework is used. This framework will require extensive inputs from micro-level analysis for the sectors deemed important by policy-makers, as has been highlighted by the micro-level scoping in this report.

The review of economy-wide modelling techniques elsewhere, suggests that more details specific to the SOE restructuring process is desirable. The Argentinean study for example is richer in analysis than the Tunisian study, which in turn is richer than the sample application for SA. There is of course a point were marginal costs of adding additional features become less than the marginal benefits in terms of policy-relevant insight. It will be difficult to ascertain *a priori* where this point lies in terms of the modelling. It is therefore suggested to start simple, produce initial results and then consider further modifications.

The report has indicated several features of SOE restructuring that should be considered as a minimum. They include:

▪ Efficiency gains: reductions in intermediate inputs per unit of output of privatised entities.

▪ Labour productivity: a reduction in quantity of labour per unit of output.

- Quality improvements: increases are measured as a reduction of intermediate inputs of sectors in the economy – the per unit of output supplied by the SOEs.

- Tariffs: observed changes in the prices of privatised utilities can be modelled by changing the pricing rules as discussed above.

Given that the modelling of the economy-wide impact of restructuring SOEs in SA has not been undertaken previously, a tentative project plan to get an idea of what is involved makes sense. On the other hand, given the lack of local experience, a project plan would have to be viewed in a very flexible way. It is, however, clear that the two main components will be micro case studies and economy-wide policy modelling.

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