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NIEP SOCIAL POLICY MODEL: policy tool for fighting poverty in South Africa

Draft Final Report

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Modelling is teamwork and the microsimulation model developed by NIEP and presented in this report is no exception. The construction of the NIEP Social Policy Model (NIEP-SPM) is the result of the contributions of a team of six researchers. The team members are Sam Bonti-Ankomah, Likezo Karn, Piason Mlambo, Matsuma Morunyane, Katerina Nicolaou and myself. Sam Bonti-Ankomah assisted in the development of the model's pension module. Likezo Karn reviewed government documents for the identification of eligibility and entitlement conditions of more than ten government anti-poverty programmes. Piason Mlambo prepared the survey data that was used for the development of the model database. He also assisted in writing of a number of social security modules. Matsuma Morunyane provided assistance in the ageing of the data. Finally, Katerina Nicolaou developed the tax, value added tax, and unemployment insurance modules with little extra help.

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Overview

The South African government is under enormous pressure to deliver on social programmes that will improve the standard of living of the majority of South Africans. In order for the government to do this effectively, its social programmes must be targeted to deliver a maximum benefit to the community and especially to its most disadvantaged members. To achieve this, policy makers need access to the kind of policy analysis that allows them to assess how policies impact on diverse groupings: for example, families headed by men or women in different racial groupings and falling into different income categories.

With the help of the UNDP and financial support from the Japanese government, the NIEP microsimulation model (that is, THE NIEP Social Policy Model (NIEP-SPM)) has been developed to assist government in meeting its anti-poverty challenge by creating a user-friendly simulation model that quantitatively assesses the impacts of anti-poverty policies on different categories of households and the economy. More specifically, policy makers are expected to use the model to simulate, prior to implementation, the impacts of major government social policy programmes and income tax on individuals, families and the economy and to test the likelihood of achieving targets. The model provides three types of analysis of both current and new policies: distributional (e.g. who is made better or worse off?), budgetary (what are the financial and/or feasibility implications for government departments?), and poverty effects (e.g. what are the impacts of policies on the head count poverty index and poverty gap?).

The NIEP-SPM is a static microsimulation model whose main components are its database and its tax and social policy modules. The model uses a micro-database of individuals and households using census and government surveys. A series of computer codes capture the rules of the government's anti-poverty programs. Simulations then trace the distributional, budgetary and poverty effects of possible changes in the rules governing social policies.

The NIEP Social Policy Model includes following modules:

- 1. NIEPSPM-Tax (Tax module)*
- 2. NIEPSPM-UIF (Unemployment Insurance Fund module)*

3. *NIEPSPM-PEN (Pension module)*
4. *NIEPSPM-DIS (Disability module)*
5. *NIEPSPM-CS (Child Support program module)*
6. *NIEPSPM-BI (Basic Income module)*
7. *NIEPSPM-CD (Care Dependency module)*
8. *NIEPSPM-House (Housing Subsidy module)*

The building and use of the model consisted of a eleven-part process, which are briefly summarized below:

1. *The preparation and construction of the appropriate microdata base;*
2. *The construction of policy modules;*
3. *The construction of distributional analysis module;*
4. *The construction of budgetary analysis module;*
5. *The construction of poverty analysis module;*
6. *The simulation of micromodel to produce base line results for each module;*
7. *The validation of base line results;*
8. *The simulation of the micromodel to produce results for alternative scenarios;*
9. *The evaluation of the results of the executed simulations;*
10. *The integration of all modules;*
11. *The construction of the user-friendly interface programme.*

1. INTRODUCTION¹

The South African government is under enormous pressure to deliver social programmes that will improve the standard of living of the majority of South Africans. In order for the government to do this effectively, its social programmes must be targeted to deliver maximum benefit to the community and especially to its most disadvantaged members. If poverty is to be eradicated in South Africa, social policies must positively and significantly improve the livelihoods of poor and vulnerable households and individuals.

This raises some important questions for researchers and policy makers. For example, who are the current beneficiaries of different government programmes? What room is there for improving the effectiveness of a given programme? What are the potential impacts of changes in policies on individuals, families, and households' income and poverty status? What impact will a change in a programme have on the cost of that programme?

The NIEP micro-simulation model has been developed to help provide answers to these and similar questions and to assist in designing a suitable policy mix to eradicate poverty in South Africa. The model consists of (i) a micro-database of individuals and male/female-headed families and households (containing demographic, labour market participation, incomes, housing and other important information); and (ii) a system of computer-coded modules that captures the various government anti-poverty programmes. By changing the parameters that reflect the eligibility and entitlement conditions of these programmes, we can quantitatively analyse the distributional, budgetary and poverty impacts of such changes. The results of the modelling exercise just described allow us to identify areas where the government can potentially improve the efficiency and effectiveness of a programme's impact on the livelihoods of poor households and individuals.

The rest of this report is organised as follows. Section 2 provides a short overview of poverty in South Africa. This is followed by Section 3, which presents a review of social policy programmes aimed at fighting poverty in South Africa. As part of this section, current government programmes related to social security and welfare services, housing, health, and labour are reviewed. Section 4 presents an overview of

¹ This section is based on the terms of reference of the project.

the development of the NIEP Social Policy Model, including sections on the selection and preparation of the database, the unit of analysis used and the ageing of the data. Section 5 offers an overview of the current NIEP-SPM modules, followed by detailed presentations of each module. Section 6 discusses the process of scenario development with the NIEP-SPM. Section 7 is allocated to the presentation and analysis of simulation results. The final part of the report is dedicated to concluding remarks.

2. POVERTY IN SOUTH AFRICA

Using average per capita income, South Africa is considered a middle-income country. It has, however, one of the worst records of poverty and inequality in the world.² The latest October Households Survey conducted in 1999 shows that:

- 12.3% of South Africans live in shacks.
- 9.4% of households have no toilet facilities.
- 10.6% of households still draw water from dams, rivers, streams, wells and springs.
- 31% of households have no access to electricity for lighting.
- 37.8% of households have to travel 5 kilometres or more to the nearest medical service.
- Poor and ultra-poor households depend on remittances from working family members and social pensions.
- African households are more vulnerable than the other race groups: over 50 percent of African households in the first quintile and almost 40 percent in the second have no income earners. Over 50 percent of African households in the third, fourth and fifth quintiles depend on one income earner, a figure that is higher than is the case for other race groups.

Given the extent and persistence of widespread poverty, government social policy programmes play an important role in fighting poverty. The next section reviews some of the main programmes introduced by government to combat poverty.

² In the latest Human Development Report (UNDP, 2001), South Africa ranks 93 (out of 133) in terms of Human Development Index (HDI).

3. REVIEW OF SOCIAL POLICY PROGRAMMES TO FIGHT POVERTY³

3.1 How It Began

The beginnings of modern social assistance in South Africa can be traced back to the period just after the Union in 1910 (Van der Berg: 1997, Liebenberg and Tilley: 1998). Between 1910 and 1933, many new though *ad hoc* schemes were introduced, mainly with the intention of protecting poor white people. When the apartheid system was formalized in 1948, the social welfare system became rigidly racialised. Benefit levels were set according to racial category, services were segregated and, with the introduction of the Bantustan policy, millions of African people were forced to look to new and uncertain sources of welfare.

It was this extremely complex, generally inefficient and often corrupt network of social welfare systems that had to be amalgamated in 1994, with a view to providing much needed social assistance and welfare services steered from a national centre through nine provinces.

3.2 The Current Situation

Currently, the social assistance and welfare services provided by the South African government constitute a significant poverty alleviation measure. Compared with other middle-income developing countries, South Africa is said to have a remarkably advanced social security system – both in terms of coverage against contingencies and spending ratios (Van der Berg: 1997). Despite this, South Africa has one of the worst records of poverty and inequality amongst its middle-income peers.⁴ Although the government has emphasised the role of the market in social security provisioning, the reality is that few South Africans are adequately equipped to participate effectively in the market to secure their social needs. In other words, until the structural causes of poverty and inequality in South Africa are addressed, social assistance remains a far more crucial mechanism for poverty alleviation than social insurance. Thus, as Van der Berg (1997) argues, the expansion and extension of South Africa's social security system (originally designed to protect a small number

³ This is a partial review of government programmes designed to fight poverty. The main focus is on programmes that have been partially or totally modelled as part of this project.

of poor whites) puts it in the unique position of being a semi-industrialised country with a modern welfare state.

3.3 Current Social Security and Welfare Services

Social security and welfare services offer a significant mechanism for poverty alleviation and income redistribution in South Africa. There are currently three main categories of state social security and welfare services: social and maintenance grants or social security; social services and development programmes and projects.

The main target groups of state social grants and welfare service are⁵: the aged, children, youth, poor families, disabled, drug and alcohol dependants/abusers, HIV/AIDS and other chronic illness sufferers, women, and people with special needs.

The state social security system includes the following programmes: old age pensions, disability grants, child support grants and care dependency grants. Welfare services available in South Africa include government residential care services, government-subsidised residential care services (such as places of safety and children's homes, old age homes, rehabilitation centres and homes for the disabled and rehabilitation centres for alcohol and drug users) and non-residential care service centres (such as therapy/counselling, service centres for the aged, protective workshops and crèches). Some of these programmes are briefly described below:

TREATMENT CENTRES FOR DRUG DEPENDANTS

State institutions established under the Prevention and Treatment of Drug Dependency Act, 192 (Act 20 of 192) are centres for the treatment and detention of persons dependent on drugs. Some privately established and run facilities are subsidised by the state in return for services rendered.

CHILDREN'S HOMES

These are facilities established in terms of the Child Care Act, 1983 (Act 74 of 1983) and maintained for the admission, protection, care and education of children over six years' of age not living with their parents. Most such homes in South Africa have been established by private initiative (although some are state homes) and most

⁴ According to the latest Human Development Report (2001), South Africa ranks 93 using UNDP Human Development Index.

⁵ The poorest households are targeted through means testing.

are subsidised by the State.

CRECHES

Places where children over six years of age, who are not living with their parents, are cared for during the day. Like children's homes, most of these have been established and are run privately. Crèches provide for the stimulation of pre-school children, especially in disadvantaged communities.

PLACES OF SAFETY

Residential facilities established under the Child Care Act, 1983 (Act of 1983) or other suitable places providing for temporary admission, care and treatment of children or other persons involved in court proceedings pending a final ruling. Most have been established and are run by the State. Private homes and/or children's homes are also used for these purposes, particularly in rural areas. In such cases, the rendering of such services is fully financed by the state.

HOMES FOR PEOPLE WITH DISABILITIES

Homes for people with disabilities provide housing and care. A disabled person is described as a "person with a hampering physical or mental handicap, whether congenital or acquired".

PROTECTIVE WORKSHOPS FOR PEOPLE WITH DISABILITIES

Workplaces operated by welfare organisations and funded on specific conditions by the state. Work is done for a consideration under protective circumstances. Such workshops are provided for people with disabilities who already receive pensions or social grants because the nature of their disability disqualifies them for the open labour market and sheltered employment.

HOMES FOR THE AGED

Facilities where old people are housed and/or receive care. These have tended to accommodate more white than African residents. The present policy is that all such facilities be available for all groups. However, waiting lists are long and facilities are costly. The current policy is that such facilities should be available only to frail

elderly people who cannot be cared for by their families and/or by means of other community facilities. It is preferred that elderly persons who are not frail and cannot stay with their families be accommodated in less costly housing schemes, supported by services rendered by the community.

HOUSING SCHEMES FOR THE AGED

Privately established facilities for the care in residence of aged persons. They may be established with private funds or with financial assistance by the State where there are a sufficient number of eligible aged persons to warrant the establishment of such a facility.

SERVICE CENTRES FOR THE AGED

A service centre is described as a non-residential facility that renders services to aged persons and provides opportunities for social intercourse and participation in recreational, educational and cultural programmes. In some cases, people with disabilities make use of these facilities. As with housing schemes and old age residences, these service centres tend to be used more by whites.

In addition to the above welfare services, there are other welfare development programmes and projects, which include:

THE FLAGSHIP PROGRAMME FOR UNEMPLOYED WOMEN WITH CHILDREN UNDER FIVE

In recent years, a variety of developmental projects have been funded. These include initiatives such as farming, garment-making and home building. These programmes are designed to create profits that will be reinvested in the community and build up the economy in a particular region. A number of government departments may be involved in these projects. For example, the Department of Labour funds training for women, the Department of Housing provides capital subsidies and the Department of Health is engaged in nutrition programmes. The Flagship Programme is part of a new thrust towards developmental social welfare. The Babinachuene Women's Multipurpose Project, for example, which involves women in vegetable farming, was launched in collaboration with the Northern Province Department of Health and Welfare.

OTHER PROGRAMMES

Other programmes include HIV/AIDS awareness and violence against women campaigns; community projects such as drug and alcohol abuse prevention programmes; life skills development programmes; youth at risk programmes, income-generating projects; HIV/AIDS prevention programmes; housing, feeding and clothing schemes; services for battered women and services for street children.

3.4 Housing Programmes

While housing is an issue in both urban and rural areas in South Africa, the bulk of housing policy has tended to focus on the former. Urban poverty – particularly urban housing poverty in South Africa – is largely a consequence of the fact that the apartheid government refused to acknowledge the permanence of Africans in urban areas. The paucity of services and infrastructure for Africans in urban areas was justified on the grounds of the ‘transient’ status of African people in ‘white’ areas, even as the apartheid government attempted (and failed) to stem the tide of African urbanization through influx-control laws.

The result was the creation of distorted cities, characterized by structural inequality in respect of access to housing, services, jobs and infrastructure for blacks. It is no exaggeration to say that forced removals have always been a feature of South African life. Sophisticated by apartheid, the practice impoverished black urbanites, removed workers from convenient inner city residential areas and disrupted established economic enterprises and community structures. Removals to new settlements on the periphery of cities also created high costs of household expenditure and time. These costs included items such as transportation to job opportunities in the centre (SANGOCO Occasional Publications No. 5, April 1998:3-5). Moreover, the quality of housing stock and associated infrastructure for blacks in these new settlements was appalling.

In 1994, the new government of national unity prioritised the housing needs of the poor. It promised South Africans that it would clear housing backlogs and deliver 1 million new houses to the poor within the first five years. This target has not quite been met. As of October 1999, the government is said to have delivered or been in the process of constructing 920 891 housing units. The current housing backlog is

estimated to be about 3.7 million (Development Action Group, 1999).

The Housing Act of 1997 commits the South African government to: the establishment and maintenance of habitable, stable and sustainable public and private residential environments to ensure viable households and communities in areas allowing convenient access to economic opportunities, and to health, educational and social amenities in which all citizens and permanent residents on a progressive basis have access to permanent [homes] with secure tenure, ensuring internal and external privacy and providing adequate protection against the elements [and] potable water, adequate sanitary facilities and domestic energy supply.

The main component of the government's housing policy is the capital subsidy scheme. This provides grants to low-income beneficiaries of up to R18 400 for internal infrastructure and top-structures. Currently, the government provides six types of housing subsidies: three direct and three indirect.

3.4.1 Direct housing subsidies

The three programmes that provide direct housing subsidies are:

PROJECT-LINKED SUBSIDIES

This subsidy gives people a chance to own houses in projects approved by provincial housing boards. Potential beneficiaries must sign a contract with a builder who is building houses as part of a housing project approved by the Provincial Housing Board. The builder must be registered with the National Home Builders Registration Council. Once the contract is signed, the builder applies for the subsidy on the applicant's behalf.

INDIVIDUAL SUBSIDIES

This gives people access to housing subsidies so that they may acquire ownership for the first time. A person can apply for this subsidy in order to buy an existing property or build his or her own home.

CONSOLIDATION SUBSIDIES

Through this subsidy, people who received housing assistance from the state

in the form of ownership of serviced sites before the inception of the Housing Subsidy Scheme can apply for a further benefit from the State to improve their housing circumstances provided the beneficiary household income is less than R1 500 per month. The consolidation subsidy is granted for the provision or upgrading of a top-structure on such a site.

3.4.2 Indirect housing subsidies

In addition to programmes that provide direct housing subsidies, three indirect housing subsidies are also available:

INSTITUTIONAL SUBSIDIES

These are available to institutions that aim to create affordable housing stock to allow eligible people to live in subsidised residential properties with secure tenure. Properties are often rented. However, tenure forms based on share blocks, deeds of sale or full ownership are not excluded. In an approved project, an institution is entitled to receive up to R18 400 for each residential property to be occupied by qualifying beneficiaries.

RELOCATION ASSISTANCE

This is an initiative aimed at stabilizing the housing environment by providing an alternative to borrowers whose mortgage has become unaffordable and who have defaulted by three months on their mortgage payments. It provides for the conclusion of a rental agreement for a defined period so that they can remain on the property pending relocation to another. The government provides a grant equal to that for which a person would normally qualify and banks provide a mortgage loan that the individual can afford.

DISCOUNT BENEFIT SCHEME

This scheme promotes home ownership among tenants of State-financed rental stock, including formal housing and serviced sites. Tenants get a maximum discount of up to R7 500 on the selling price of a property.

3.4.3 Other Housing Subsidies

Other subsidies for housing come from central government departments and statutory bodies, local government and the non-profit sector. They include:

- Department of Housing – Provincial Housing Development Board (PHDB) facilitation grant for project packaging, People’s Housing Process (PHP) support grant of R520 per unit for PHP projects. And People’s Housing Partnership Trust (PHPT) capacitation grants.
- Department of Land Affairs (rural areas) – provides a settlement grant of R16 000 for purchase of land, infrastructure, top structure and/or on-farm capital items, as well as a planning grant of R1440 and land acquisition grant of R1560.
- Department of Constitutional Development – has a Consolidated Municipal Infrastructure Programme, which provides grants of R3000 for bulk infrastructure.
- National Energy Regulator – provides a subsidy of about R2000 per connection.
- Local authorities – because the value of housing subsidies is low and is constantly being eroded by inflation, some local authorities provide additional subsidies in order to meet adequate housing standards.

3.5. Health Programmes

Under apartheid, the South African health system was fragmented, with overlapping administrative systems. Each of the four racial groups had their own national department of health, as did each homeland and provincial administration. In addition, each of well over 400 local authorities had its own department of health.

South African health services were biased towards urban areas, curative in focus, hospital-based and specialised. Since financial resources are finite, this approach to health care was expensive and inefficient. In 1992/93, it was estimated that 76 percent of total recurrent public health expenditure was on acute hospital care and only eleven percent of funds went to primary health care outside of the hospital

setting.⁶

Moreover, the apartheid government's policies encouraged the growth of privatised health care, serving the needs of a minority of South Africans. In 1992/93, almost 61 percent of total health care expenditure derived from private financial sources and the majority of health personnel worked in the private sector. Yet only 23 percent of South Africans had any regular access to private health care. While private medical aid members visited a general practitioner five to six times per year on average, residents of the poorest districts in South Africa, by comparison, used outpatient services about once a year. At the same time, the private health care system is said to have benefited from hidden and unhidden public health care subsidies, which are detailed elsewhere.⁷

A further problem with the apartheid health system was the unequal distribution of health care resources between geographic areas. In 1992/93, *per capita* health expenditure varied between R137 in what is today the province of Mpumalanga and R491 in the Western Cape. In KwaZulu-Natal and Northern Cape, the population per clinic was 23 000 and 6 000 respectively.

These structural features gave rise to huge disparities in health care provisioning. Needless to say the 'haves' and 'have-nots' of health services in South Africa correlated strongly with race, household income, employment, education, insurance status and so on, rather than with health status (Gilson et al: 1999, 20).

3.5.1. Health Challenges Facing the Government Since 1994

In April 1994, the new government of national unity took over enormous challenges in health care, many of which persist to this day. The main ones include:

- Historical disparities in health resource allocation between geographic areas (provinces).
- Fragmentation and duplication in health administration authorities.
- Expensive and inefficient bias towards urban areas, curative, hospital-based and specialised health care, serving the needs of a small elite and neglecting those of the majority of South Africans.

⁶ Gilson et al, 1999:19, May et al:1998:105.

⁷ *Ibid.*

- The HIV/AIDS epidemic, with an estimated one in eight adults infected in 1998.

After 1994, the public health sector was reorganised to constitute a national Department of Health, with responsibility for national policy making and the development of standards to ensure equitable and affordable health provisioning across the provinces. Nine new provincial departments of health were set up and are responsible for operational decision-making, including determining subsidies to local authorities, provision of hospital services and curative primary health care.

In 1997, the White Paper for the Transformation of the Health System in South Africa was published. It put forward a national vision and strategy for the public health system, which envisioned a single, unified health system with coordination among the public and private systems and NGOs. It stipulated delivery of health care through the primary health care (PHC) approach and emphasised the role of the district health system as a vehicle.

The main health policy reforms are summarised in Table 1 below.

Table 1: Health policy reforms 1994-1999

Reform	Description
Immunisation	National polio campaign in 1995 and Hepatitis B vaccine included in range of vaccines for public. Immunisation campaign in 1996 and 1997 focusing on polio and measles.
Nutrition	1994 – Primary School Nutrition Programme and Integrated Nutrition Strategy.
Reproductive Health Care	Reproductive health services expanded after guarantees made in the constitution and abortion legalised in 1996.
HIV/AIDS	Programme focusing on behavioural change launched in 1998.
Tuberculosis	New treatment course and monitoring system launched.
Affordable, accessible and safe drugs	National Drug Policy in 1996 and Essential Drugs List were published.
Termination of Pregnancy	Legalised in 1996
Clinic building programme	Between Oct 1995 and mid-1998, 400 new clinics were built and 152 extended
Community service for medical graduates	Compulsory community service introduced for all newly qualified doctors.

Source: Adapted from Gilson et al, 1999:37

3.5.2. Programmes with a direct impact on vulnerable households and individuals

The main goal in health care provisioning as set out by the 1997 White Paper for Health is to achieve universal access to an essential package of primary health care services. This approach is considered progressive, sensible and, most importantly, pro-poor people. The primary health care (PHC) approach focuses on prevention rather than cure and prioritises the health needs of vulnerable groups such as women and children, rural and peri-urban dwellers and the urban poor.

The main policies and programmes catering to the health needs of the poor include:

FREE HEALTH CARE POLICY

This is the most direct policy in terms of poor households and individuals. It evolved in two stages. In June 1994, free care for pregnant mothers and children under six years of age was introduced. This was followed in April 1996 by the introduction of a package of free primary health care (PHC) services for all South African citizens and permanent residents. The policy serves to improve financial accessibility to health care, although it does not address aspects such as geography and quality of care.

MATERNAL AND CHILD HEALTH

Programmes include the free health care policy mentioned above, a national cervical screening programme, primary school nutrition programme (which is described below) and abortions.

NATIONAL DRUGS PROGRAMME

A list of essential drugs for PHC services was introduced in March 1996. The list contains medicines considered essential for most common conditions (and which should be routinely available at PHC clinics) and government hospitals.

PRIMARY SCHOOL NUTRITION PROGRAMME

This was implemented in September 1994 as a Presidential Project. It was implemented in the context of the need to improve the health status, including

nutrition, of vulnerable sectors of the population and the quality of education. Studies had shown considerable evidence of malnutrition, temporary hunger and related conditions amongst South African pre-school and school children, especially in rural and peri-urban areas. Hunger and malnutrition, aside from adversely affecting children's health, also inhibit their ability to learn and concentrate. The programme also includes de-worming where the need is established.

The programme is integrated with wider community development initiatives such as nutrition education. In short, the programme provides snacks, nutrition education, micronutrient supplementation and parasite eradication. Schools and communities may apply for the programme.

The principles of the programme are that:

- It must be implemented in primary schools where the need has been established, especially in rural and peri-urban areas, including schools serving informal settlements. The programme targets schools rather than individual children. Within such targeted schools, all children receive food.
- The programme focuses on addressing temporary hunger resulting from poverty. It is, therefore, targeted at geographic areas where the incidence of poverty is highest.
- The majority of schools targeted should be in rural and peri-urban areas since these areas experience the highest levels of poverty.
- Consideration should be given to the percentage and distribution of households with incomes below the Minimum Living Level.
- Consideration should be given to teachers' perceptions of the community's circumstances.

3.6. Labour Market Programmes

Within the Department of Labour, there are two poverty alleviation programmes that involve direct payments to beneficiaries. These are the Unemployment Insurance Fund (UIF) and the Workers' Compensation Fund (or simply the Compensation Fund).

3.6.1. The Unemployment Insurance Fund

According to the UIF Act, the Fund endeavours to insure contributors against the risk of loss of income resulting from unemployment, illness, pregnancy or the adoption of children and to provide for lump-sum payments to the dependants of deceased contributors.

MATERNITY BENEFITS

Maternity benefits are paid to an unemployed female contributor for a periods not exceeding 26 weeks from the date she becomes unemployed as a result of her pregnancy or who, although her services have not been terminated, receives less than one-third of her normal earnings from her employer during pregnancy. The benefits are payable if the employee has accumulated the necessary credits. In addition, the applicant must have been employed as a contributor or have otherwise been in employment for not less than 13 weeks during the 52 weeks preceding the expected date of confinement or, where application is made, on or after the date of birth, as the case may be. Special provisions are made in cases where an applicant has been employed in work connected to ionising radiation.

ILLNESS BENEFITS

Provided the necessary credits have been accumulated, illness benefits in respect of any illness may be paid for a maximum period of 26 weeks to a contributor who is unemployed or who, although not unemployed, receives less than one third of his/her normal earnings from his/her employer. To qualify for this benefit, the applicant must have been employed as a contributor or have been otherwise in employment for at least 13 weeks during the 52 weeks immediately preceding the date on which he/she became incapacitated because of illness. Contributors' applications for illness benefits are considered only in respect of the specific contributions and the contributor's date of becoming ill up to a maximum period of 12 months before the date of application.

ADOPTION BENEFITS

This benefit is paid to an unemployed female contributor for a period not exceeding 26 weeks commencing not earlier than the date on which she applies to a

Children's Court for the adoption of a child. At the time of the application, the child must be under two years of age. The contributor is eligible whether or not she is capable of and available for work. The applicant for adoption benefits qualifies only if:

- She was in employment as a contributor or had been otherwise in employment for at least 13 weeks during the period of 52 weeks immediately preceding the date of adoption.
- She has accumulated the required credits.
- Adoption benefits applied for within a period of 52 weeks from the date of the adoption concerned.
- Certified copies of birth certificate and order of adoption in respect of the child are submitted.

PAYMENTS TO DEPENDANTS OF DECEASED CONTRIBUTORS

Upon the death of a contributor, an amount not exceeding the equivalent of 26 weeks of benefits may be paid to the widow or widower of a contributor, provided the deceased contributor has accumulated the necessary credits. If no such dependants exist, payment may be made to the deceased children who, upon the contributor's death, were under 17 years of age and who, in the opinion of the Board, were wholly or mainly dependant upon the deceased for their necessities of life. In order to qualify for this payment, an applicant must apply within three years of the date of death of the deceased and the deceased must have been in employment for at least 13 weeks during five years immediately preceding his/her death.

3.6.2. Compensation Fund

The Compensation for Occupational Injuries and Diseases Amendment Act of 1993 replaced the Workmen's Compensation Act of 1941. The purpose of the Act is to provide a mechanism for financing compensation of injured employees or their dependants in the event of death, and to pay reasonable medical expenses incurred as a result of the accident or an occupational disease. All persons who employ one or more employees in connection with their business or farming activities are required to register and to pay annual assessments to the Compensation Fund.

4 DEVELOPMENT OF NIEP-SPM

The NIEP Social Policy Model (NIEP-SPM) has been developed to assist government in meeting its anti-poverty challenges by creating a user-friendly simulation model that quantitatively assesses the impact of anti-poverty policies on different categories of families, households, and individuals. More specifically, policy makers can use the model to simulate, prior to implementation, the impact of government's income tax and social policy programmes and test the likelihood of their achieving their targets.

The model provides three types of analysis of current and new policies: distributional (that is, who is made better or worse off), budgetary (what are the financial and/or feasibility implications for government departments?) and poverty effects (what are the impacts of policies on the head count poverty and poverty gap?).

Microsimulation is a method of modelling socio-economic systems by simulating individual units within the system, thus enabling its users to analyse the impacts of socio-economic policies at the individual level.⁸ A major advantage of this modelling technique is that it allows for analysis of the distributional impact of a policy measure across categories of families. A 1991 review of microsimulation in the United States concluded, "... that no other type of model can match microsimulation in its potential for flexible, fine-grained analysis of proposed policy changes..." (Citro and Hanushek, 1991, p.115).⁹

Microsimulation models can be static or dynamic. Static models usually take a cross-section of the population at a specified point in time and apply programme rules to the individual units to measure the instantaneous or 'morning after' effects of policy changes. The main feature of dynamic models is that the ageing of the original unit records on the basis of probabilities of different real life events occurring. This allows the original population to be projected forward in time, while maintaining detailed information on the individuals within the simulation.

The modelling principle employed by NIEP is static microsimulation

⁸ Some microsimulation models focus on the firm (van Tongeren, 1993; Eliasson, 1985).

⁹ For a good review of microsimulation technique and its applications see ... H. Sutherland (1994) also presents an excellent survey of static microsimulation models in Europe.

modelling, whose application to socio-economic modelling was pioneered by Guy Orcutt in the United States in the late 50's and early 60's (Orcutt, 1957; Orcutt *et al.*, 1961). During the last two decades, static microsimulation models have become an important tool in the development of tax and transfer policy in most industrialised countries.¹⁰

The NIEP-SPM is a static microsimulation model whose main components are its database and its tax and social policy modules. The model uses a micro-database of individuals and households using census and government survey data. A series of computer codes capture the rules of the government's anti-poverty programmes. Simulations then trace the effects of possible changes in the rules governing social policies on the income distribution and poverty status of individuals, families and households. Simulations also provide estimates of the cost of a programme or change in a programme.

At the beginning stage of developing the NIEP-SPM, the focus of the research team was on the construction of the database and the compilation of government documents pertaining to the government's anti-poverty programmes. At a later stage, a third dimension was added to the work. This involved the writing of computer codes to capture the eligibility and entitlement rules of a number of government programmes. The outcome of this process was the construction of different modules of the NIEP-SPM. Next, before allowing interactions between different modules, each programme was individually run against the database to obtain, evaluate and fine-tune first hand results of programmes. In the next stage, necessary changes were made in each module in order to link them together properly, allowing for interaction among the modules. The resulted linked programme was run against the database to produce results that took into consideration the comprehensive way government programmes interact with individuals and families and with each other.

Using administrative data on government programmes, the model results were subjected to a rigorous process of validation before the work on the project was considered satisfactory. In the final stage of the project, the NIEP hired an information technology company to help it transform the model to a menu-driven user-friendly programme that can be used by policymakers and researchers who, though potential users of the model, are not necessarily economic modellers.

¹⁰ See Harding (1993, p. 381) for comprehensive list of references.

The next two sections of this report provide more detailed explanations about how each of the above components of the model has been constructed.

4.1 Selection of a Suitable Data Source

Microdata is fundamental to microsimulation models. The annual October Household Survey (1995 to 1999), the Income Expenditure Survey (1995), the Census (1996) and the recently released Labour Force Survey of 2000 are the only practical sources of countrywide economic and demographic microdata. The annual October Household Survey contains detailed demographic, labour force, education, housing and (broad) income information. The five-yearly Income and Expenditure Survey (the last available was in 1995) captures detailed information about individual income sources and household income and expenditure. Each of these surveys provides records on 30 000 households representing more than 120 000 individuals. The unit records, both at household and individual levels, are linked to the population through household or individual weights. For the NIEP-SPM, the October Household Survey of 1995 (OHS-95) and the Income Expenditure Survey of 1995 (IES-95) were chosen and merged to produce the base microdata set.

4.2. Unit of Analysis

The impact of government programmes can be assessed in terms of the individual, the income unit, the family and the household. The choice of unit of analysis determines the perspective from which simulation outcomes are viewed. In the NIEP-SPM, the rules of government programmes are applied to individuals. The impact effects can, however, be calculated to provide the outcome for families or households.

The choice of unit of analysis in NIEP-SPM depends on the purpose of the analysis and assumptions about financial relationships within units (for example, pooling of income, sharing of expenditure). For example, while family unit structure has been used to establish eligibility of family members for a given financial grant and the amount of the grant, household structure has been used for the assessment of impact of transfers on poverty.

NIEP-SPM database is prepared in terms of *family units*, because it relates closely to the definition of the financial unit used by many of the government tax and transfer programmes. The members of a family unit live in the same household and are assumed to share income. There are four types of family unit: single person, couple without dependants, couple with dependants and single parent. Dependents are defined as those aged under 15 and those aged 15 to 24 who are full time students living with their parent(s). Special provisions have been made for disabled children.

Since the South African national surveys use 'households', the construction of the unit record of the NIEP-SPM on the basis of family unit required a substantial amount of programming.

The relational codes in the October Household Survey were used to break households into the appropriate number of families. As a result, the 29 800 *households* in the OHS-95 were broken down into 61 684 *families* to be used as unit records for the operation of the NIEP-SPM. New weights were constructed to link each family unit in the sample to the population. At the same time, each family unit record brings together all available information about a family (e.g. demographic, income, expenditure, labour force participation, housing, education, health, etc.) into a single record and systematically preserves all available information regarding all individuals within a family unit. The family unit also preserves its household origin.

4.3. Reweighting the OHS Survey

The main objective of NIEP-SPM is to estimate the immediate distributional effect of policy changes. Therefore, the microdata on which it is based need to be 'aged' so that key aggregates of the information it contains is consistent with what is known about the current South African population. Since October 1995, for example, there has been a decline in mining and agricultural employment. Changes such as these impact on policy considerations, including taxation receipts and expenditure levels and should therefore be accounted for in the updated dataset.

The data ageing is obtained by 'reweighting' and 'uprating' each record. Reweighting is used to modify the demographic, family and labour force characteristics of the model's population. Uprating, on the other hand, is used to alter the value of incomes and expenditures.

The base population of NIEP-SPM was reweighted and updated from 1995 to 1999. Each individual or household record in the OHS-IES-95 file has a weight attached to it, representing the number of persons or households in the South African population with a similar set of characteristics. CALMAR (*caliberation of margins*) is a reweighting algorithm that has been used to alter weights in a sample dataset to reflect a new population of reference. It applies given marginal totals to a set of initial weights on a survey record file.

CALMAR has been used to reweight the OHS-95 to Census 96 and then to OHS-99, using information on the demographic changes in the South Africa population during the period. CALMAR allows for marginal totals to be applied to the weights in succession rather than simultaneously. For this, the individuals in the OHS and Census are broken up into nine categories – gender, race, age, province, education, occupation, sector, family status and labour force status – and the marginal totals for each category have been calculated by using the most recent population estimate. For example, the gender variable requires only population totals for males and females for all of South Africa in 1999.

In order to ensure that the reweighting procedure takes into account the cross-classified distributional information as much as possible, each of the nine categories of marginals has been broken down further by gender. For example, instead of identifying four marginal totals for the race categories (Blacks, Coloureds, Whites and Indians), we have used eight marginal totals for this category by further subdividing each of the race categories by gender, thus producing marginal total for, for example, Black Male, Black Female, White Male, White Female, etc.

In order to implement the CALMAR algorithm, two sets of information are needed. The first includes the original weights associated with the data that are being re-weighted. The second includes the marginal totals for all of the category variables in the new population. CALMAR calculates a new set of weights that meet the marginal population constraint, while minimising the aggregate ‘distance’ between old and new weights with individual distance measured by their ratios.

Different solutions for the new weights will be obtained depending on the choice of aggregate distance function. The choice of function will be determined by the amount of movement in the weights required to recalibrate the dataset. For most

ordinary applications, the linear distance function is adequate. For a detailed account of the CALMAR reweighting approach, see Deville, Sarndal and Sautory (1993) and Deville and Sarndal (1992).

4.4. Uprating the 1995 Income Expenditure Survey

The second component of ageing the microdata relates to ‘uprating’ the value of income and expenditures so as to make the base population more representative of the current situation in terms of income and expenditure. This process entails ‘uprating’ the different categories of income and expenditure so as to account for changes that have occurred in the income and expenditure of individuals, households and families since the 1995 survey. The inflators that are used to uprate the IES-95 incomes and expenditure are selected from available indicators (e.g., Consumer Price Index) and a number of deflators generated by NIEP to uprate particular categories of income or expenditures.

The 1995 IES contains detailed information on income sources and amounts for persons surveyed. On the expenditure side, the IES-95 also contains detailed information on household expenditures. Before these income and expenditures can be used, they were uprated to 1999 levels to account for changes in income levels and costs of expenditure on goods and services that have occurred since the survey was undertaken in 1995.¹¹

4.5. The Base Population Database

As a result of the above work, the NIEP-SPM population database includes 125 830 individuals, making up 61 684 families or 29 800 households. The database includes weights for individuals, families and households, which are used to translate each of the three samples to their corresponding populations for 1995, 1996 and 1999. Each unit record includes more than 400 columns of information for each individual in the family – including demographic, labour force, marital status, housing, income and expenditure information.

¹¹ In the final version of our report, more details will be provided regarding the reweighting and uprating methods used.

5 CURRENT NIEP SOCIAL POLICY MODULES

Taxes, pensions and social security benefits are important both in determining the income, consumption and welfare of individuals and families and in determining governmental income and expenses. Because they affect inequality within and between groups – at a given point in time and over individual life cycles – taxes and benefits are important policy instruments.

The NIEP Social Policy Model (NIEP-SPM) has been developed with a view to analysing the impact of these and other government policies and programmes on individuals and families, the government budget and the economy. The policies and programmes modelled include government's taxation policy and eight social programmes. These include six programmes associated with the government's social security programmes and two housing programmes. This report elaborates and explains the structure of each of the modules of the NIEP-SPM.

The NIEPSPM-TAX (Tax Module) is developed using the current government income tax framework. It is used to simulate income tax revenues and distributional implications of current and alternative income tax policies.

The NIEPSPM-CONSUM (NIEPSPM - Consumption) simulates the effects of both direct and indirect taxes and government transfers on families' consumption of durable, semi-durable, non-durable, and services.

The NIEPSPM-UIF (NIEPSPM-Unemployment Insurance Fund) simulates the number of individuals eligible for unemployment insurance benefits under different conditions, determines the welfare implications of these transfers for individuals and their families and households and estimates the budgetary implications for the state providing this benefit.

Six modules attempt to model government's main social security programmes. These are the NIEPSPM-PEN (pension module), the NIEPSPM-DIS (disability module), the NIEPSPM-CS (child support module), the NIEPSPM-CD (care dependency module), the NIEPSPM-GIA (grant-in-aid module) and the NIEPSPM-WV (war veterans' module). Each module simulates the impacts of possible policy changes on (a) the number of individuals eligible for each grant, (b) the number of individuals and households below poverty line and (c) the cost of the programme.

The NIEPSM-CHS (consolidated housing subsidy module) and NIEPSM-PLS (project-linked subsidy module) are two housing modules that simulate the effect of possible policy changes on either of the programmes on the number of individuals eligible, poverty and budget of each programme.

5.1. NIEP-SPM-TAX: Model of Income Tax

The role of taxation in economic policy is diverse. Income tax is one of the primary sources of government revenue, affecting the disposable income of individuals and influencing their welfare status. Estimating the impact of taxation policies on the welfare status of individuals and on state revenue provides a wealth of information to policy makers. Micro-simulation techniques are often used to estimate the impact of taxation. The NIEP-SPM has been built to assess the impact of income tax policies on individuals and on the state's revenue in South Africa. The same techniques are used to estimate the impact of value-added tax.

Because the overall emphasis of the study is to assess the impact of policies on welfare, it was decided to model income tax and value-added tax only as it pertains to individuals. Company taxation, for example, is not relevant to the scope of the study. The taxation module can, however, be expanded to include other forms of taxation such as property taxes, excise taxes and the like. Moreover, although the study assesses taxation at the national level, it is possible to analyse taxes at the provincial level as well; one could, for example, model property tax.

OBJECTIVES AND METHODOLOGY ISSUES

The primary aim of the taxation module of the NIEP-SPM is to simulate the number of individuals who are liable to pay taxes and to simulate the amount of tax (income and value-added) that is expected to be paid to the state by individuals. It also provides detailed information about the distributional effects of current and alternative taxation policies in terms of their impact on the disposable (net) income of different categories of families, racial groups, provinces and so on. Finally, the model simulates the impact of changes in current tax policies on poverty in the country.

DATA ISSUES AND ASSUMPTIONS

Currently, the South African tax system is source-based. In other words, tax is applied to incomes generated within the country. However, in his 2000 Budget speech, the Minister of Finance announced that the tax system is moving from a source-based system to a resident-based tax regime. This means that tax will henceforth be applied to South African residents and citizens and will include all income generated outside the Republic. Thus, although for the tax year 1999/2000 the source-based tax method is applied to the model, the tax module will have to be partially revised in the near future. This revision will make it possible to examine the welfare and revenue impacts of moving from a source-based tax system towards a resident-based system.

In calculating the tax for the 1999/2000 tax year, it is necessary to develop the computation of normal tax that is used in the tax module. Normal tax is calculated using taxable income, which in turn is calculated as follows:

$$\text{Income} = \text{Gross Income} - \text{Exempt Income}$$

$$\text{Taxable Income} = \text{Income} - \text{Deductions}$$

$$\text{Normal Tax} = (\text{Taxable Income})(\text{Applicable Tax Rate})$$

The first step in calculating normal tax is to establish which components of a taxpayer's income constitute gross income in terms of the definition in section 1 of the Income Tax Act.

Gross income, in relation to any year or period of assessment, means, in the case of any person, the total amount, in cash or otherwise, received by or accrued to or in favour of such person during such year or period of assessment from a source within or deemed to be within the Republic, excluding receipts or accruals of a capital nature ...¹²

All these criteria must be present before an amount can be treated as gross income. Income is defined as the "the amount remaining of the gross income of any person for any year of period of assessment after deducting therefrom any amounts exempt from normal tax under Part 1 of Chapter II".¹³ Taxable income is defined as "the amount remaining after deducting from the income of any person all the amounts allowed under Part 1 of Chapter II to be deducted from or set off against such

¹² Income Tax Act No 58 of 1962 (as amended).

income”.¹⁴ In the case of salaried individuals, the deductions are somewhat limited, consisting mainly of pension and retirement annuity fund contributions and possibly medical expenses. Persons conducting their own businesses can, on the other hand, include many deductions into their tax computations.

From the above, it is clear that a rather complex set of requirements exists when calculating taxable income and the taxpayer's tax liability.

STRUCTURE OF TAX MODULE

Several assumptions have been made in order to model income tax and VAT for individuals. The first assumption is that all individuals working in the formal (or informal) sector pay tax and are not involved in tax avoidance schemes. Moreover, since it is not possible to determine whether or not individuals are married in community of property, an assumption was made that all working individuals (married or not) would be liable to pay tax in their individual or personal capacity. From a tax point of view, where a couple is married in community of property the income, exemptions and deductions are combined before the relevant tax rate is applied to the couple's taxable income.¹⁵

The income information in the model database is derived from the Income Expenditure Survey (which is quoted annually). The tax liability is also based on an annual assessment, despite the fact that the tax payment streams might be paid monthly, bi-annually or even, in some circumstances, annually. Hence, all the calculations were done on an annual basis and all information that was not in the desired format was converted into yearly rates.

Gross income was estimated for several types of individuals:

- (i) Full-time employees that work for someone else only;
- (ii) Part-time employees that work for someone else only;
- (iii) Self-employed individuals;
- (iv) Self-employed individuals who work for someone else part-time;

¹³ Income Tax Act No 58 of 1962 (as amended).

¹⁴ Income Tax Act No 58 of 1962 (as amended).

¹⁵ Since a distinction is no longer made between married persons, married women and single persons, it was feasible to make this assumption, although it means that the tax liability will be slightly underestimated.

- (v) Self-employed individuals who work for someone else full-time;
- (vi) Individuals that are not employed but still earn an income.

All types of income were included in the gross income calculation for these different categories of individuals, except income of a capital nature. Individuals working in the formal or informal sector were assumed to pay tax. For self-employed individuals, profits were included in the gross income calculation, while their business expenses were deducted from their gross earnings. Profits were also included for taxpayers working for someone else on the premise that the value should technically be zero.

The implication of understatement or overstatement of income and expenses for the calculation of gross income is assumed to be negligible. The model, therefore, calculates the tax that individuals are liable to pay according to their stated income and expenditure.¹⁶

Certain income categories were not included in the gross income calculation, either because individuals were less likely to declare them or because it was not possible to calculate the deduction for a particular type of income. Examples of these include income from stokvels¹⁷, cash benefits, non-refundable claims, food benefits, housing benefits, clothing benefits, other gifts, income from lobola¹⁸ payments and other income. Since the definition of gross income excludes income of a capital nature, income from the sale of vehicles, property and used items was also excluded.

Where applicable, specific exemptions were applied to individuals. These include: pension exemptions; interest exemptions; dividend exemptions; Unemployment Insurance Fund (UIF) benefit exemptions and alimony exemptions (to the spouse). Regarding alimony payments, it was assumed that where the individual has received alimony or a maintenance payment from a spouse, the tax on the amount is paid by the payer of the alimony, hence it is deemed to be an exemption. In addition, war veteran, disability and compensation paid out of the Workman's Compensation Act or the Compensation for Occupational Injuries and Diseases Act

¹⁶ The Income data is renowned for being less accurately recorded. Many missing values exist, where individuals refuse to declare their income or declare an unspecified income value (coded 9999 in the questions).

¹⁷ Informal financial collectives with a closed membership offering a variety of informal saving and collective assistance schemes.

¹⁸ Bride price

are all tax exemptions.

Since UIF is generally paid to individuals who are formally employed and working for someone else, it was assumed that self-employed individuals do not have access to UIF Benefits. This is also a statutory norm.

Some of the other exemptions could not be included due to the lack of information available in the surveys. Examples are: copyrights, national service, uniform allowance, ship crews, bursaries and scholarships, and lump sums on retirement.

In respect of tax deductions, it was necessary to include self-employed individuals who incur business expenses that represent taxable deductions. Hence it was assumed that all recorded business expenses represent tax deductions, although this is not necessarily the case. Since there is no detailed breakdown of the expenses, the entire amount was included.

Due to shortcomings in the information available, it was only possible to estimate the pension fund contribution deduction. It was impossible to estimate the retirement annuity deductions since the information for pension, provident and retirement annuity contributions is combined. Hence it was assumed that each individual makes a pension contribution. This assumption will probably result in an underestimation of these tax deductions.¹⁹

It was, in addition, not possible to estimate donations to universities and colleges since information about donations does not specify recipients. Furthermore, entertainment allowances could not be estimated since the information does not specify whether the entertainment expenses incurred are associated with trade and the earning of an income or whether they are of a personal nature. Also, since it was not possible to establish whether a working individual worked from home or not, tax exemptions related to the existence of 'a study' at a private residence and other related write-offs (e.g. computer) could not be estimated.

There was very little information available regarding travelling expenses. It was, however, possible to arrive at a rough estimate of the deduction. The estimated value of private use of a company or similar vehicle was deducted from the travel

deduction declared in the income expenditure survey. This method only partially captures the relevant rules regarding deductions associated with travelling expenses. In particular, as there is no information in the survey data about the number of kilometres travelled, it was not possible to deduct the 14000kms that the state deems to be private.

It was possible to estimate dental, medical and disability expenses in great detail. These are allowable tax deductions. It was necessary to make assumptions regarding couples and their expenses. Where a couple has only one working member, the entire medical expenses of both parties are included in the deduction of the working taxpayer. Where there are children and only one member of the couple works, the same principle was applied – all the deductions were allocated to the working taxpayer. The deduction is limited to the greater of (a) R1000 or (b) 5 percent of taxable income before this deduction for taxpayers under the age of 65 and where there is no handicapped family member. Where there is a handicapped family member (under the age of 65), the taxpayer may deduct all expenses that exceed R500 for the year. There is no limit to the deduction for individuals over the age of 65.

Where both members of the couple work, there was no problem in allocating the expenses. However, where there are children, the medical expenses of the children are cumulated and allocated proportionately according to the income of each spouse²⁰.

For individuals, the tax deductions estimated are fairly comprehensive. However, it was not possible to estimate several of the deductions due to the lack of information. These include taxable benefits derived by reason of employment. This is a very broad category and comprises the acquisition of an asset, the right to use an asset such as a vehicle or accommodation, the right to use other assets, meal and refreshment vouchers, free or cheap services, low interest loans, housing subsidies or housing subsidy schemes and the payment of an employee debt. Other deductions (or exemptions) not estimated include transfer costs, occasional educational grants, share incentive schemes and study loans and bursaries (although this is being phased out).

¹⁹ Since retirement annuity deductions are based on the greater of: (i) R1 750; (ii) R3 500 less any amount allowed in terms of s 11(k) (pension contributions); (iii) 5% of income from non-retirement funding employment sources after deducting admissible deductions and allowances.

²⁰ This is based on the proportion of the one spouse's income relative to the total income of both spouses.

Having applied the exemptions and deductions, it is possible to estimate the taxable income. The rebates and tax rates are then applied to the taxable income in order to calculate the taxpayer's tax liability.

5.2. NIEP-SPM-VAT: Modelling Value-Added Taxation

In the first version of the VAT module, VAT was applied to all expenditures at a rate of 14 percent. The results provided the necessary information to assess the distributional and budgetary impacts of current zero-rating of some expenditure items on households. In the second version of the VAT module, parameters were included for zero-rated foods: cereals, meat, fish, oils, milk, vegetables and fruit. Since not all the products in these categories are zero-rated, a set of parameters was defined to capture the relevant proportion of each food category that is zero-rated. The parameters range from 0.1 to 0.3.

5.3. NIEPSPM-UIF: Model of Unemployment Insurance Fund

The Unemployment Insurance Fund (UIF) is one of the South African government's social security programmes. It is also an income support programme that endeavours to promote equality and the redistribution of resources. The UIF comprises several types of insurance benefits: unemployment, maternity, illness, adoption and benefits that accrue to the dependants of deceased contributors. Modelling these benefits facilitates an analysis of the welfare implications of these government programmes.²¹ The primary objectives of the UIF module of the NIEPSPM are:

1. To identify the number of individuals eligible for UIF;
2. To determine the welfare implications of these transfers for individuals and their households;
3. To identify the budgetary implications for the state providing this benefit; and
4. To assess distribution and budgetary impacts of introducing changes in the UIF programme.

²¹ For the purpose of this project, only the unemployment insurance benefit of the UIF programme has been modelled. The remainder of the benefit programmes are difficult to model due to the lack of information in the OHS survey.

ASSUMPTIONS AND MODELLING METHODOLOGY

The UIF module estimates the number of eligible unemployed individuals and the benefits that accrue to them. Two separate programmes are also used to assess the impacts of the programme on the budget, the poverty gap and the distribution of poverty across race, gender, province, family type and quintiles.

The first step to model the unemployment benefits of the UIF is to identify the unemployed according to the criteria that the individual is unemployed but still looking for work. This was tested using relevant information in the OHS.

The next step was to calculate for how long the individual had been unemployed and to establish for how long the person had contributed to UIF. Again, a combination of information in the OHS enabled us to establish reliable answers to these questions.²²

The third step was to calculate the period of contribution in order to apply the UIF benefit rate of one week's benefit for every six weeks worked. Individuals who worked for three years or more received the maximum 26 week benefit. Moreover, the benefit is 45 percent of income earned while the individual was employed. It is important to note that the benefit period is rounded downwards. In other words, if a person contributed for 14 weeks, the benefit period would be $14/6$, which is equivalent to 2.3 weeks of contribution. The Fund only pays a benefit of two weeks in this case.

The next step was to estimate the individual's last earned salary. The income information in the Survey was converted to a weekly income rate, using the pay type

²² In the OHS Survey, Question 3.2 (code = 2), the individual stated that s/he was unemployed for: less than one month (code = 3); one month to less than 6 months (code = 4); and 6 months to one year (code = 5). Using this information and the recoded information from Question 3.12 highlighting when the person started to work for his/her last employer, it was possible to highlight for how long the person had contributed to UIF. In determining the period of contribution to UIF through the period of employment, the minimum 13-week (or 3 month) requirement was included. In other words, an individual unemployed for less than one month became unemployed in October. In order to include the minimum contribution of 13 weeks, the module sets the minimum starting period of employment at July. In other words, this person must have worked during at least July, August and September. These criteria have been applied to every month of unemployment up to a maximum of one year's unemployment.

of the individual from the same question.²³

The final step was to calculate the UIF benefit paid to eligible unemployed individuals and index them accordingly. Indexing allows us to estimate the number of individuals who receive UIF. An individual eligible for UIF was given a code of 1, while all other individuals were given a code of zero. The UIF Benefit was calculated as:

$$\text{UIF Benefit} = (\text{BENRATE}) * (Y)_w * (\text{CP})_w$$

Where BENRATE is the benefit rate set at 45 percent of income by the government; Y_w is the weekly income rate; while CP_w is the UIF contribution period that has been rounded downwards. The individual weight is then applied to the Rand value of the UIF benefit as well as to the individual who receives the benefit (index code = 1). This estimates the proportion of individuals in the population that the individual in the sample represents. The module then sums up the UIF Benefit paid to the population as well as the number of individuals in the population who receive the benefit.²⁴

5.4. NIEP-SPM Social Security modules

NIEP-SPM simulates the social security system and makes it possible to analyse the effects of changes in the rules for the old age pensions and four other social benefit rules. The aims of these modules of the model are:

1. To identify the number people eligible for a given social grant;
2. To identify the cost to the state of providing such a grant to all those eligible;
3. To determine the effect of these transfers on the income and poverty status of individuals, families and households; and
4. To allow quantitative analysis of the impacts of possible changes in the programme.

²³ The pay type from Question 3.16 was: daily (code = 1), weekly (code = 2), monthly (code = 3), and yearly (code = 4).

²⁴ Several assumptions were made in order to model the unemployment benefits as accurately possible. This is fully explained in Adelzadeh, A. and K. Nicolaou (2001).

5.4.1. NIEPSM-PEN: Pension Module

As in many other countries, the South African old age pension provides income security for older people and is one of the three main categories of social grants in the country.²⁵ In the developed countries, income support programmes have been modelled, using microsimulation techniques, to determine their budgetary and welfare impacts.²⁶ A similar approach has been used to model old age pensions in South Africa.

Old age pensions are paid to the aged in society. Beyond this, several other criteria are applied to identify those who are eligible for old age pensions. These criteria are:

- An individual qualifying for an old age pension must be a South African citizen and resident in South Africa at the time of application.
- A male applicant must be aged 65 years or more and a woman must be 60 years or more.
- Applicants may be married or single. Single applicants must have a total net income of less than or equal to R13 244/year. In the case of married applicants, both spouses must have a combined net income of less than or equal to R24 884 per year.
- Applicants must not be maintained in nor cared for in a state institution and must not be in receipt of another social grant.

Anyone who satisfies all the above conditions qualifies for the old age pension grant. However, the amount received by any one applicant depends on a means test. The means test is used to determine the maximum amount for any eligible application out of a possible maximum of R540 a month.

In modelling the old age pension programme, the model database provided satisfactory information to implement almost all the eligibility criteria for the old age pension. Exceptions were: (a) the surveys used did not specifically ask individuals whether they were permanent residents of South Africa; (b) information about whether or not applicants were maintained in or cared for by a state institution was

²⁵ For more information see section 3.3.

²⁶ Merz (1991) provides a good survey of applications of microsimulation modelling for distribution and budgetary analyses.

not available for the OHS and was not, therefore, considered in the analysis; (c) although the War Veterans Grant is another social grant, information was not gathered for this in the OHS or IES. People who received war veteran grants are not, therefore, included in the eligibility criteria. The number of people in receipt of War Veterans Grant is only a small proportion of the population.

5.4.2. NIEPSM-DIS: Disability Grant Module

An individual qualifying for a disability grant must be a South African citizen, resident in South Africa at the time of application. In addition:

- S/he must be a disabled person of 18 years and older who, owing to his or her disability, is unable to obtain employment or does not have any other resources to support him or herself.
- The period of disability for all work must be either permanent or for a continuous period of 6 months or 1 year.
- S/he must not refuse to undergo the necessary medical treatment unless the treatment may be life-threatening.
- S/he (and his or her spouse) must comply with the means test. Those who are eligible are single persons with a net income of less than R13 320 per year or R1 110 per month or married persons with a combined net income of less than R24 888 per year or combined net income of R2 074 per month.
- S/he must not be maintained or cared for in a state institution.
- S/he must not be in receipt of another social grant in respect of her or himself.

The eligible applicant is expected to receive a maximum amount of R540 per month until a permanently disabled person dies or until a period of temporary disability lapses. The grant will also lapse if a person is admitted to and maintained in a state institution such as a psychiatric hospital. Where the disability is permanent and the beneficiary has no means, no further means assessment is required.

In modelling the eligibility criteria, it was not feasible to apply all the eligibility criteria to determine the number of eligible persons for this welfare grant because of shortcomings in the data. The following information could not be

established from the main database used for modelling this welfare programme.

- Permanent residence status: we could not determine permanent residential status and only South African citizens could be considered.
- Medical treatment: we could not infer whether individuals were willing to undergo medical treatment in connection with the reported disabilities or handicap from the survey data.
- Receipt of other state grants: it was not possible to separate those who were receiving only disability grants from those who were receiving other grants such as old age pensions. Our assumption was, therefore, that any person who reported that s/he was too handicapped to work was eligible for the disability grant, provided the other eligibility conditions were satisfied.²⁷

5.4.3. NIEP-SPM-CS: Child Support Grant Module

As of April 1, 1998, a new Child Support Grant (CSG) was introduced in place of the State Maintenance Grant (SMG). The government claims that the CSG will reach ten times as many children as the SMG. There was a great deal of debate about the CSG leading to its approval by Cabinet. The new CSG is an attempt to reach larger numbers of poor South African children while at the same time containing the potentially astronomical costs such an expansion would have posed under the old SMG.

The grant level was reduced from a maximum of R700 (this includes both child and parent components) to R75 per child which, after much public protest, was raised to R100 per child. The previous grant (SMG) was limited to a maximum of two children. The CSG lifts this limit to a maximum of 6 non-biological children and places no limit on the number of biological children. The eligible age group under the SMG was 0-18 years while, under the new CSG, the eligible age group has been reduced to 0-6 years. Also, under the new CSG, there is no longer any allowance for parents. The grant of R100 per month is payable to a primary caregiver in respect of a child or children under the age of seven. A primary caregiver is any person who takes

²⁷ In the integrated version of the model, simulated information regarding the eligibility of a person for a particular grant was saved and used, where applicable, to assess the eligibility of the same person for any other grant.

primary responsibility for the daily care needs of the child or children and is not necessarily related to the children.

The eligibility criteria for the child support grant are as follows:

- The children and primary caregivers must be South African citizens and must be resident in South Africa at the time of application.
- The applicant must be the primary caregiver of the children concerned.
- The child or children must be under the age of seven.
- The grant is payable in respect of a maximum of six non-biological children and there is no limit for biological children.
- The primary caregiver must comply with the financial criteria in the means test. The net household income of which the primary care-giver is a member must be below R9600 per annum, or must be below R13 200 per annum and the child and primary care-giver either live in a rural area, or live in an informal dwelling (without brick, concrete or asbestos walls).
- The primary caregiver must not be in receipt of remuneration for taking care of the child or children concerned.
- An institution must not receive an award for taking care of the child.
- The primary caregiver or any other person must not be in receipt of a grant on behalf of the child.

Other conditions are that the child must be immunised if the service is available. The caregiver may not, without good reason, refuse to assume employment or participate in a development programme; and must make some effort to secure maintenance from the parents of the child.

The grant lapses on the child's seventh birthday or upon the death of the child or primary caregiver or if the child is no longer in the custody of the primary caregiver. An annual assessment is made by the Director-General who must review the case file. Beneficiaries are required to be prepared to appear before the Director-General and provide acceptable proof of circumstances although, in practice, this is often not done.

In building this module, limitations of the survey data prevented the

application of all the eligibility criteria. As a matter of fact, the following conditions could not be applied. Proxies were used in their stead wherever possible.

- It could not be established whether the person to whom the child was assigned was the primary caregiver.
- It could not be established whether the parent or person to whom the child was assigned was receiving any remuneration for taking care of the children.
- It could not be established whether there was an institution or any other person who was receiving a grant in respect of the child in question.
- It could not be established whether the person taking care of the child would agree to immunise the child if requested to do so by the authorities.
- It could not be established whether the person taking care of the child would accept employment or agree to participate in a development project if so asked to do so by the authorities.
- It could not be established whether the person taking care of the child, in the event that they were not the biological parent(s), would make effort to get maintenance grants from the biological parent(s) of the child.

5.4.4. NIEP-SPM-CD: Care Dependency Grant Module

A care dependency grant is a grant payable to the parents or foster parents in respect of a care-dependent child between the ages 1 and 18 years who, due to severe mental and/or physical disability, needs full time care. The amount of this grant is R540 per month per child. The grant lapses when the child attains 18 years (and can then apply for a disability grant); when parent or child dies, or when the child is admitted to a state institution for care.

To be eligible for this grant following criteria apply:

- The parent/s and care-dependent children must be South African citizens and the applicant and care-dependent children must be residents of South Africa at the time of the application.
- The care-dependent children must be between the ages 1 and 18 years.
- A medical report and functional assessment of the child must be submitted.

- The child must be evaluated as to his or her educability and trainability at the age of six years.
- The care dependent child must be legally in the care of parent or foster parent and must not be permanently cared for in a state institution.
- The combined annual net income of the family (after permissible deductions) may not exceed R48 000 (the income of the foster parent/s of a care dependent child is not taken into consideration).

The extent or severity of disability could not be determined from the survey data. Thus any disabled person, whether the disability is minor or not, was included as a potential beneficiary of the care dependency grant provided, of course, that they satisfied other criteria.

Furthermore, it could not be established whether the child was legally in the care of the person heading the income unit or family to which s/he had been assigned or whether s/he was in a state institution. This information was, therefore, simply not incorporated in the modelling.

5.5. NIEP-SPM Housing Modules

For the purpose of this study, we also modelled two government programmes designed to provide housing support to the poor. These are the Consolidated Housing programme and the Project Linked Housing programme.

5.5.1. NIEP-SPM-CH: Consolidated Housing Module

Through this subsidy, people who received housing assistance from the state in the form of ownership of serviced sites before the inception of the Housing Subsidy Scheme may apply for a further benefit from the State to improve their housing circumstances. The consolidation subsidy is granted for the provision or upgrading of a top structure on such a site and the beneficiary household income must be less than R1 500 per month.

To be eligible for this housing subsidy, the following criteria must be met. The applicant:

- Must be a South African citizen or permanent resident.
- Must be married or if single, over 21 with dependants or cohabiting with a long-term partner.
- Must be unemployed or living in a household whose income is less than R1 500 per month.
- Must not have received a government housing subsidy before.
- Must be a first time homebuyer.

In modelling this government programme, it could not be established from the database:

- Whether a person had received a government housing subsidy before.
- Whether a person was a first time homebuyer.
- Whether person received housing assistance in the form of ownership of a serviced site.

5.5.2. NIEP-SPM-PLH: Project-Linked and Individual Housing Subsidies Module

The project linked housing subsidy gives people the opportunity to own houses in projects approved by provincial housing boards. Beneficiaries are asked to sign a contract with a builder who is building houses as part of a housing project approved by a Provincial Housing Board. The builder applies for the subsidy and, if the beneficiary signs a contract with the builder, he/she receives the subsidy. The builder must be registered with the National Home Builders Registration Council.

To be eligible for the project-linked and individual housing subsidies, the following criteria must be met. The applicant:

- Must be South African citizen or permanent resident.
- Must be married or, if single, over 21 with dependants or cohabiting with a long-term partner.

- Must be unemployed or earning less than R3 500 per household.
- Must not have received a government housing subsidy before.
- Must be a first time homebuyer.
- Must understand what a contract means and the responsibility that goes with it.

In building the module, it could not be established from the modelling database:

- Whether a person had received a government housing subsidy before.
- Whether a person was a first time homebuyer.
- Whether a person received a housing assistance in the form of ownership of a serviced site.
- Whether a person understood what a contract was and the responsibilities that go with it.

6. SCENARIO DEVELOPMENT WITH NIEP-SPM

The combination of the model's micro-database of individuals and families and the above policy modules that capture the rules of the government's anti-poverty programmes constitute the main structure of the model. Using the model, we are able to simulate both current policies and alternative policies where the eligibility and/or entitlement conditions of a programme are changed. By comparing the results of the two simulations, we are then able to identify the budgetary effects and distributional and poverty impacts of changes in a programme.

For example, policymakers may be interested in knowing the impacts of changing the male age requirement for eligibility for the old age pension grant from 65 years to 60 years. To find the answer, the model is first run and results are saved using the current policy parameters (which includes a minimum age requirement of 65 years for males). The model is then run for the second time after changing the minimum age requirement for males from 65 to 60 years. Using separate programmes that have been written as part of the model, the results of the simulations are compared in terms of budgetary, distributional and poverty effects of changing male-age requirement for pension grants. The results of this exercise show that:

- The number of eligibles for pensions increases from 2,067,721 to 2,327,566, an increase of
- The main beneficiaries in terms of family type are couples with children whose eligible numbers increase from 530 208 to 693 803. Their share in total number of eligible persons for pensions increases from 26 percent to 30 percent.
- Of the 300 000 new additions, about 200 000 are black.
- Budget has to increase by R1 521 013 000 to accommodate the new eligibles.
- Head count poverty declines by 112 093.
- Poverty gap declines by an additional 1.31%.
- The main province benefiting from the extension of the old age pension is KwaZulu Natal.

In order to facilitate easy use of the NIEPSM by policymakers and researchers, a user-friendly interface has been developed with the help of an IT company. By following the steps outlined below, any person, located in his/her office/home anywhere in world, can run the above scenario and receive detailed results. The only prerequisite is access to the Internet.

- The user needs to go to the NIEP web site
- Choose the option to run the NIEP Social Policy Model
- Chose the module s/he wants to run, e.g., old age pension
- Make changes in the policy parameters, e.g., change minimum age requirement for male from 65 to 60
- Choose the type of analysis, e.g., budgetary, eligibility, poverty analysis
- Choose the result type, e.g., level, level difference, growth rates.
- Choose the type of tables for the presentation of results, e.g., race-gender; race-family type; family type-quintile, etc.

- Run the model.

After making the selection, the NIEP-SPM can be run using the web-server and the requested results will be e-mailed to the user.

7. RESULTS

In this part of the document, we will briefly present some of the simulation results.²⁸ The intention is to offer a sense of the type of outputs one can expect from the model. The results are organised in terms of (a) distribution of eligible individuals for social grants; (b) distribution of cost associated with a policy; and (c) the poverty effects of a policy.

7.1. Distribution of Eligible Individuals: Simulation Results

As an example of this category of results, our simulation of the current government child support programme indicates that 3,356,546 children in the country are eligible for this grant. Eligible African children make up 94.1 percent of the total eligible. Alternatively, if the child support programme is extended to children under 19, with all other conditions applied, the number of eligible children increases to 8,207,770. Tables 2 and 3 highlight the distribution of eligible children across race and gender for both scenarios. Similar tables can be generated to indicate the distribution of eligible children across provinces, race, gender and family type.

7.2. Distribution of Cost: Simulation Results

If all eligible children under current government programmes for child support receive the grant, the programme costs 4.4 billion rands. The distribution of this fund among the caregivers of the eligible children and in term of race and gender of the children is presented in Table 4. The expansion of child support to include children under 19 will require a simultaneous increase in the budget from 4.4 billion rands to 10.8 billion rands. This increase in the budget is needed to accommodate the more than doubling of the number of eligible children for this programme.

²⁸ The final document will include a more detailed presentation of simulation results.

7.3. Poverty in South Africa: Simulation Results

One important area for which the NIEP-SPM can be effectively utilised is to estimate the extent and distribution of poverty in South Africa and to simulate the impacts of policy scenarios on head count poverty and poverty gap. Depending on the choice of poverty line and assumptions about intra-household allocation of resources, estimates of the number of people in poverty will vary. We have used adult equivalent scales and a poverty line of R533 per month per adult equivalent (US\$65). When a household's net income falls below the poverty line, the household and all its members were classified as poor. The NIEP-SPM was used to simulate the number and distribution of poor people by gender, race, family type and province classifications. The following Tables provide some of the results of the simulations. Some of the findings are:

- There are 24,493,369 poor persons in South Africa, of which 11,398,176 are male and the remaining 13,095,193 are women (e.g., 46.5 percent of poor are male while 53.5 percent are female).
- 91 percent of the poor are black compared to whites that make up 0.56 percent of the poor in the country.
- Families with children and single parent families have the largest number of poor (34.3 percent and 31.8 percent, respectively). At the same time, 28.8 percent of the poor are single, while only 5.1 percent of the poor are part of families with no children.
- Provinces with largest number of poor are Eastern Cape and KwaZulu-Natal, followed by Northern Cape.

Furthermore, the NIEP-SPM can be used to estimate the poverty gap in South Africa and to simulate the impacts of policy scenarios on poverty gap. Our simulation results show that the current poverty gap in South Africa amounts to R113,870,920,000 (\$13,886,697,000) using the poverty line of R533 (\$65) per adult equivalent per month. The NIEP-SPM is able to estimate the impact of any policy change on the head count poverty and poverty gap. For example, our simulations show that if the minimum male-age requirement for the old age pension declines from 65 to 60 years, the national poverty gap declines by 1.49 billion rands and the number

of poor persons in the country declines by an additional 112,093 persons.

The results also enables the policy makers to be more specific regarding who will move out of poverty as a result of a policy change; that is, which family type or which race or gender group or province will be better off after a policy change.

8 OVERVIEW AND CONCLUDING REMARKS

The delivery of this project has contributed to policy making in South Africa. It has also resulted in an enhanced capacity at the NIEP, thus contributing to the long-term sustainability of the Institute. The development of the above model and the output derived from it constitute a unique policy tool for policy makers. As a result of this project, policy makers in South Africa have started to use NIEP-SPM to test their identified policy goals prior to implementation to ensure that they will have the desired effect.

During the course of this year, the Committee of Inquiry into a Comprehensive System of Social Security, which has been appointed by the Cabinet to review government's social policy programmes and make recommendations to the Cabinet, has used the NIEP-Social Policy Model extensively in its examination of the effectiveness of the current policies to reduce poverty, and to evaluate the financial implications and poverty effects of possible changes in some of the policies.

The NIEP-SPM is designed to enhance anti-poverty policymaking in South Africa. Its diverse and at the same time linked modules allows for interactions among different government departments and different anti-poverty programmes. Finally, its user-friendly interface allows technical and non-technical individuals to use utilise it for policymaking and research.