Assessing the Economywide Effects of Development Interventions: An Analytical Framework Applied to the South African Child Support Grant

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Summary

South Africa has one of the largest cash transfer systems in Africa, which benefited about 31 percent of the population in 2012. More than half of the households benefit from some form of social assistance with 22 percent relying on it as a main source of income. Social grants have considerably expanded from 2.5 to 16.0 million beneficiaries in 1998 and 2012 respectively and are considered an important instrument to fight poverty in South Africa. The question still remains of the benefit to the society at large especially with the R158 billion invested in the program in 2012, representing 9% of the Government budget.

Although an increasing number of studies have shown interest in assessing the impact of social grants in South Africa, none of them has looked into the economywide implications and the impact on non-beneficiaries. Because of their important share in the Government budget and contribution to the lives of the poor, previous studies on the impact of social grants in South

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Africa made a strong assumption of the absence of a general equilibrium effect. This study develops a framework to capture the direct and indirect effects of large public interventions such as the South African Child Support Grant (CSG). Its novelty is in the methodology used to assess the overall impact of the program.

A recursive micro-macro model is built up and used to simulate a hypothetical South African economy without CSG beneficiaries. Thus, a matching technique identifies and replaces CSG beneficiaries by their matched non-beneficiaries in the survey (*Counterfactual Scenario Building*). Then, the induced changes in labor supplies and consumption expenditures are simulated at the macro level along with alternative government revenue adjustment. The induced prices, unemployment, and income effects estimated at the macro level are passed into the households' consumption modeling at the micro level (*Macro-Micro Modeling*). A Computable General Equilibrium (CGE) modeling is used to assess the impact of the CSG on the South African economy. The impact of the social grant shock on households' consumption, poverty and inequality measures is assessed by a nonparametric microsimulation modeling.

The results show direct differences between the beneficiaries and non-beneficiaries of the program in terms of their observed outcomes. Beneficiaries of the program increased there supply of labor for agricultural activities and reduced labor supply in the nonagricultural sector. There is also evidence that beneficiaries of the CSG spend more on clothes and footwear, energy and water, and municipal services relative to if they were not beneficiaries.

Looking at the macro results, we found a positive contribution of the grant program to the economic performance in South Africa as measured by the level of GDP. The program leads to a 0.5 percent increase in GDP. Poverty index and inequality are also shown to decline as a result of the program.

Our analysis leads to the recommendation that while fiscal prudence and consolidation are pursued in the medium term, social security spending should be preserve, especially in the wake of the prolonged aftermath of the global financial crisis which is still being felt today. This must be coupled with decisive responses to the crisis in the public education and health systems and effective job creation initiatives to ensure that growing social grants do not unnecessarily become a permanent feature of the South African landscape.

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1 INTRODUCTION

South Africa has one of the largest cash transfer systems in Africa, which benefited about 16 million people in 2012/13 according to the National Treasury (2013), i.e. 31 percent of the population. More than half of the households benefit from some form of social assistance with 22 percent relying on it as a main source of income. Social grants have significantly expanded from 2.5 million beneficiaries in 1998 and are considered an important instrument to fight poverty in South Africa.

Previous studies on the impact of social grants in South Africa made a strong assumption of the absence of a general equilibrium effect. The question still remains of the value/benefit to the society at large especially with the R158 billion invested in the program in 2012 (representing 9% of the budget in 2012). As a result, it remains uncertain whether the government is making the best use of its money according to a well-defined set of goals. Assessing the effectiveness of the South African social grants system is especially important given the various assistance programs and subsidies offered by the government in an economic situation where funding is becoming scarce and there is need to efficiently direct these scarce resources to alleviate poverty and aid economic growth.

The grants system is an important component of the South African's overall social security architecture. The social protection system as defined within the fiscal framework has two separate but interrelated entities, one that deals with social assistance and another with social insurance. Social assistance is represented by the grants system, through which the state provides basic minimum protection to relieve poverty. On the other hand, social insurance refers to mandatory employee contribution schemes. Government is responsible for three primary social insurance mechanisms: the Unemployment Insurance Fund, the Compensation Fund and the Road Accident Fund (National Treasury, 2010).

The particular area of interest for the purposes of this study is the Comprehensive Social Security Programme incorporates the two entities with both social assistance and social insurance components. The specific purpose of this programme is to alleviate and reduce poverty, vulnerability, social exclusion and inequality through a comprehensive social protection system. The system prevents vulnerability and destitution as a result of loss of income through offering social assistance. The social insurance component also contributes to poverty alleviation and helps mitigate the impact of vulnerability. The Comprehensive Social Security Programme strategically facilitates effective and efficient implementation of social policies and procedures and ensures compliance through regular appraisals and reviews of implementation options. This is often achieved through the payment of cash transfers in line with the Social Assistance Act. Social assistance is provided in the form of social grants (for adults who are 18 years and older), Children's Grants (for those younger than 18 years) and a special award or the social relief of distress grant. Social grants for adults are: old age grant, disability grant, war veterans' grant and grant-in aid. Social grants targeted to benefit children are: care-dependency grant, foster child grant and child support grant.

The Child Support Grant (CSG) is the largest cash transfer program and an important social protection instrument in South Africa. Rigorous impact assessment analyses have covered key aspects of recipient children and their respective household well-being. The successive expansion of the eligibility criteria -

increase in the age limit from 7 to 18 years old - and the adjustment in the income threshold and its scale - R100 in 1998 to R280 in 2012 - have significantly increased the program take-up. The program reached about 11 million children in 2012 receiving a monthly disbursement of R280 per child. The successive extension of the CSG program makes it more likely to have an economy-wide impact that can potentially affect both beneficiaries (direct effect) and non-beneficiaries (indirect effects). Attempts to quantify the overall - direct and indirect - effect of the CSG is the main contribution of this study. Although an increasing number of studies have shown interest in analyzing the impact assessment of the CSG, (see Agüero, Carter and Woolard, 2007; DSD, SASSA, UNICEF, 2012; Williams, 2007; Case, Hosegood and Lundi, 2005; Budlender and Woolard, 2006; Eyal and Woolard, 2011, and Chitiga et al 2012) none of them has looked into the economy-wide aspect and the potential impact on non-beneficiaries.

A state of the South African economy without beneficiaries of the CSG program is built to serve as a counterfactual simulation scenario. The latter provides useful insights on the biases introduced by the social grant into the South African economy and enables us to assess its overall impact. Results drawn from the counterfactual scenario are compared to those from the reference scenario, i.e. the actual performance of the economy with the social grant scheme. The main hypothesis of the study is that the child support grant has significant indirect effects through individuals' labor market participation and status, households' total consumption expenses and consumption budget shares.

A recursive micro-macro modeling is developed to quantify the impact of the CSG on the South African economy. The framework is used to simulate a hypothetical South African economy without child support grantees. Thus, a matching technique matches a CSG beneficiary with a non-beneficiary and the CSG beneficiaries are replaced by their matched non-beneficiaries in the survey. As sampling weights are readjusted across the survey, it is likely that the aggregate labor supply and consumption outcomes will change (*Counterfactual Scenario Building*). Therefore, the aggregate changes in labor supply and employment status, and total consumption expenditure and consumption by products are simulated at the macro level along with alternative government revenue adjustment (*Macro-Modeling*). Then, the induced prices, unemployment, income and output affect households' consumption patterns. At this stage, a sample reweighting technique (nonparametric) is used to assess the second order effects of the social grant shock (*Micro-Modeling*).[2]

The review of studies on South Africa and other countries in section 2 provides evidence of the impact of child support grants. The methodological framework is detailed in section 3. Results from the counterfactual scenario experiment are presented and discussed in section 4. The document concludes by summarizing the key findings, the limitation, and the future extension of the analysis in section 5.

[2] One can use a parametric micro-simulation modeling and estimate the income and prices elasticities, as well as the modeling of employment status and labor supply.

2 IMPACTS OF THE CHILD GRANTS: A REVIEW OF THE LITERATURE

The literature on impact assessment of social grants in South Africa and around the world is extensive. These studies have covered issues such as labor participation, poverty, inequality, education, health and nutrition. The impact of cash transfers (CTs) on welfare will depend on how the recipients use the cash. Since cash is fungible, there are concerns that the poor might be tempted to use the money on non-essential goods including alcohol and drugs. This argument has sometimes been used to advocate for in-kind transfers rather than CTs. Another question is on the sustainability of CT. As described by Devereux (2002), there is a difference between "livelihood protection" and "livelihood promotion" impacts of interventions meant to reduce poverty. Livelihood protection leads to maintenance of minimum living standards and allows for smoothing of consumption whereas livelihood promotion allows for a longer term and more sustainable improvement in living standards. In the past, CTs were seen as a livelihood protection measure especially when people faced crises. However, recent studies have begun to show that CTs can also lead to livelihood promotion (Devereux, 2002). Hence, it has become important to understand, via various methods, the impacts of various social grants on economies. The sections below give brief reviews of international evidence and South African evidence of the impact of social grants.

Many of the studies found a positive impact of social grants on various socio-economic outcomes. With respect to the empirical evidence, DFID (2011) notes that cash transfers are one of the more thoroughly researched forms of development intervention. Furthermore, over the past 15 years, a 'quiet revolution' has seen governments in the developing world invest in increasingly large-scale cash transfer programs. Their findings indicate that while the evidence base for cash transfers is better than for many other policy areas, it is also uneven. Less is known about some instruments (public works) and outcomes in certain regions (sub-Saharan Africa). However, they acknowledge that there is convincing evidence from a number of countries that cash transfers can reduce inequality and the depth or severity of poverty. Furthermore, there is an increasing volume of research into how cash transfers might support 'graduation' from poverty for those of working age.

There has been mixed evidence of the effects of cash transfers on health and nutrition. Brazil's health and nutrition CCT, Bolsa Alimentação, 2001, was aimed at providing eligible households with a monthly cash transfer on condition that they complied with a range of compulsory programme activities. The programme was targeted at pregnant women, breast feeding mothers with children 0-6 months and children from 6 months to 7 years of age (Bassett, 2008). Morris et al. (2004) conducted a study that assessed the impact of Bolsa Alimentação on anthropometric status in 4 municipalities in northeast Brazil. The study used a random effects regression model to compare programme beneficiaries with matched individuals from households that were originally selected to receive the benefit but were later excluded due to quasi-random administrative errors. A total of 472 beneficiary and 158 excluded children under 3 years of age were included in the analysis. The results showed that for each additional month of exposure to the programme the weight of beneficiary children was 31 grams lower than that observed in excluded children of the same age. These results were relatively startling and Morris et al.

(2004) attributed the failure to respond to the programme to the possible perception that benefits would be discontinued if the child's health and nutrition status improved.

Agüero et al. (2007) observed that the child height-for-age data indicates that the child support grant payments, which are assigned to women, boost early childhood development. The study uses the 1998 KwaZulu-Natal Income Dynamics Study (KIDS) data to measure the nutritional impact of the child support grant received in the first three years of a child's life. A continuous treatment method was used to estimate how child nutrition, as measured by height-for-age is affected by receipt of the CSG. Similar to these findings, DSD et al. (2012) observe that receipt of the child support grant in early life improves height-for-age scores for children whose mothers attained schooling beyond grade eight. Yamauchi (2005) used several rounds of the KwaZulu-Natal Income Dynamics Study (KIDS) to show that grant financed nutritional improvements induced positive educational outcomes for children, for example reducing repetition in school and allowing for early schooling. Williams' (2007) noticed that the probability that any child goes hungry falls by 8-14%, for each child support grant a household receives.

While there is conflicting evidence on health and nutrition, there seems to be more agreement in the literature on the effects on education. Williams (2007) used data from the GHS; Labour Force Survey (LFS) and the National Treasury to investigate impacts of the child support grant. The results indicate that receipt of the child support grant is associated with positive impacts on school attendance, availability of food and broad labour force participation. Consistent with the literature which provides evidence that the child support grant increases school attendance; Williams (2007) reports that receipt of the child support grant appears to decrease the probability of a school-age child not attending school by over half. The effect on school attendance is observed almost entirely on the child who receives the child support grant which suggests that child support grant income is not pooled with other income sources in the household and is thus not being spread equally among all children in a household. However, Williams (2007) observes that when a child is not living with his or her mother, the effect of the child support grant on school attendance is much smaller. No differential impact is observed between girls and boys.

Case et al. (2005) studied the reach and impact of the child support grant in Umkhanyakude, a largely rural district of KwaZulu-Natal. The study uses longitudinal data that was collected through the Africa Centre for Health and Population Studies. Results from the study shows a significant increase in enrolment rates for 6 and 7 year old grant recipients. Using older siblings of grant recipients as the control group, Case et al. (2005) observed the control group at younger ages and found that they were less likely to be enrolled in school than other children. This is believed to reflect the greater poverty in grant-receiving households and indicates the importance of the grant in helping to overcome the impact of poverty on school enrolment. It was found that the parents of child support grant recipients were less well educated, and less likely to be employed. Despite this finding, only 50 per cent of the poorest children in the district were reported to be receiving the grant (Case et al, 2005 p. 480).

Receipt of the child support grant, according to DSD et al. (2012), significantly improves completion of grades of schooling and scores on a math test for children who were enrolled in the grant at birth as compared to children enrolled at the age of six. The positive impacts of grant receipt is said to be

significant particularly for girls. Compared to receipt at the age of 6, early receipt increased girls' grade attainment by 25% of a grade, improved scores on math and reading tests and reduced delays in entering school by 27%; for those with mothers who had more than eight grades of schooling (DSD et al., 2012). The results indicate that CSG has no impact on children whose mothers have eight or more grades of schooling but has a positive impact on children whose mothers have less than eight grades of schooling. Early enrolment in CSG was observed to raise grade attainment of children with mothers who had less than grade 8 of schooling by 0.38 grades, a 10.2% increase (DSD et al., 2012 p. 55).

It can thus be concluded from the literature that the majority of the studies in South Africa concur that CSG promotes school attendance among beneficiary children (Case et al, 2005; Budlender and Woolard, 2006; Leibbrandt et al, 2010) with the only exception being the Community Agency for Social Enquiry (CASE) (2008) which reported that there was no major difference on children (between the ages of seven and 13 years) receiving the grant and those not receiving the grant. However it is important to qualify these results by pointing out that, even in the absence of grants, there are already high enrolment and attendance rates in South Africa. Therefore, the evidence suggests that receiving grants is very important for reducing school non-attendance, (Budlender and Woolard, 2006).

Eyal and Woolard (2011) observed, on average, a 15% increase in employment probability and a 9% increase in labour force participation of mothers, in their twenties, who became recipients (on their children's behalf). Broad labour force participation of mothers who had a child that receives a CSG was associated with an increase of 7-14% (Williams 2007). This impact was found to be most positive among mothers and household heads who did not complete their matric and among mothers who lived in informal residences. The study indicated that provision of the CSG did not have any identifiable negative impact on labour supply but Williams (2007) suggested that the complex dynamics between social grants, poverty, and reproductive and remunerated labour needed to be further researched.

Haarmann (2000) investigated the potential effects of social assistance (CSG and Old Age Grant (OAG)) on poverty alleviation in South Africa using a micro-simulation model. Using the SALDRU data, updated to 1996 with 1996 census data, the study observed that the CSG has the potential to effectively alleviate extreme poverty as it reaches some of the poorest households. However, Haarmann (2000) commented that "the current support, both in terms of coverage and quality, is far from being able to break the poverty cycle effectively", (p. 190). On average, only 36.8% of the poverty gap in the first two (quintiles will be closed by transfers if the system is to work with 100% efficiency (Haarmann, 2000). The possibility of an introduction of other forms of social assistance namely a Basic Income Grant, an Unemployment Benefit, and a Household Grant, in addition to the OAG and the CSG, was analysed and Haarmann (2000) found that the Basic Income Grant would effectively reduce poverty across the various household types.

Samson et al. (2004) carried out a study, commissioned by the Department of Social Development (DSD), on the social and economic impacts of South Africa's social security system. Micro-simulation modelling was used to assess the impact of social grants on poverty alleviation. The analysis focused on the CSG as well as the OAG and the Disability Grant (DG). The measures of poverty lines used in the analysis are the poverty headcount, the average poverty gap, the poverty gap ratio and the rand poverty

gap. The results indicate that extending the eligibility age of CSG receipt has the greatest potential of reducing poverty. However, the measurement of the quantitative impact was found to be greatly affected by the choice of the poverty line. Samson et al. (2004) observed that the measured impact is consistently greatest when employing the total rand poverty gap and consistently smallest when the poverty headcount measure is used as an indicator.

Focusing on the Child Support Grant (CSG) Chitiga et al. (2012) analysed the impact of changes in the CSG value and number of recipients. Using a top-down/bottom-up modeling approach three simulations were investigated. An increase in the value of the CSG (by 20% for people already benefiting from the transfer); an increase, by two million, of the number of beneficiaries among the eligible children and a combination of simulation 1 and 2. The results showed that in comparison to the 2008 CSG programme that cost 0.93% of GDP, all three simulations impose a significant cost on government with simulation 1 costing 1.11% of GDP (in 2008 terms), while simulation 2 and 3 would cost 1.15% and 1.38% of GDP respectively. With the CSG being the largest of all the grants these results also echo issues of sustainability of South Africa's social assistance more so in light of the global downturn.

In summary, previous studies generally indicate that social grants; and the CSG in particular have, had positive impacts on recipients and households. In the short run the CSG leads to improvements in beneficiary children's health and nutrition (Agüero et al, 2007; DSD et al., 2012) as well as in their educational outcomes in form of reducing repetition in school, allowing for early schooling and reducing the probability of a school-age children not attending school (Case et al., 2005; Yamauchi, 2005 and Williams, 2007).

CSG receipt also has long term impacts on households and on the economy. The CSG reduces poverty according to Haarmann (2000) and Samson et al. (2004). The reduction in poverty is expected to improve the levels of income, welfare and consumption levels of households. The labour force participation of recipient mothers improves due to the CGS (Williams, 2007; Eyal and Woolard, 2011). Chitiga et al (2012) raise a concern regarding the sustainability of the system of social assistance. Being the largest of all the grants, an expansion in size and/or value of the CSG could strain government spending in the long run unless other (including non- traditional) revenue raising options are also considered.

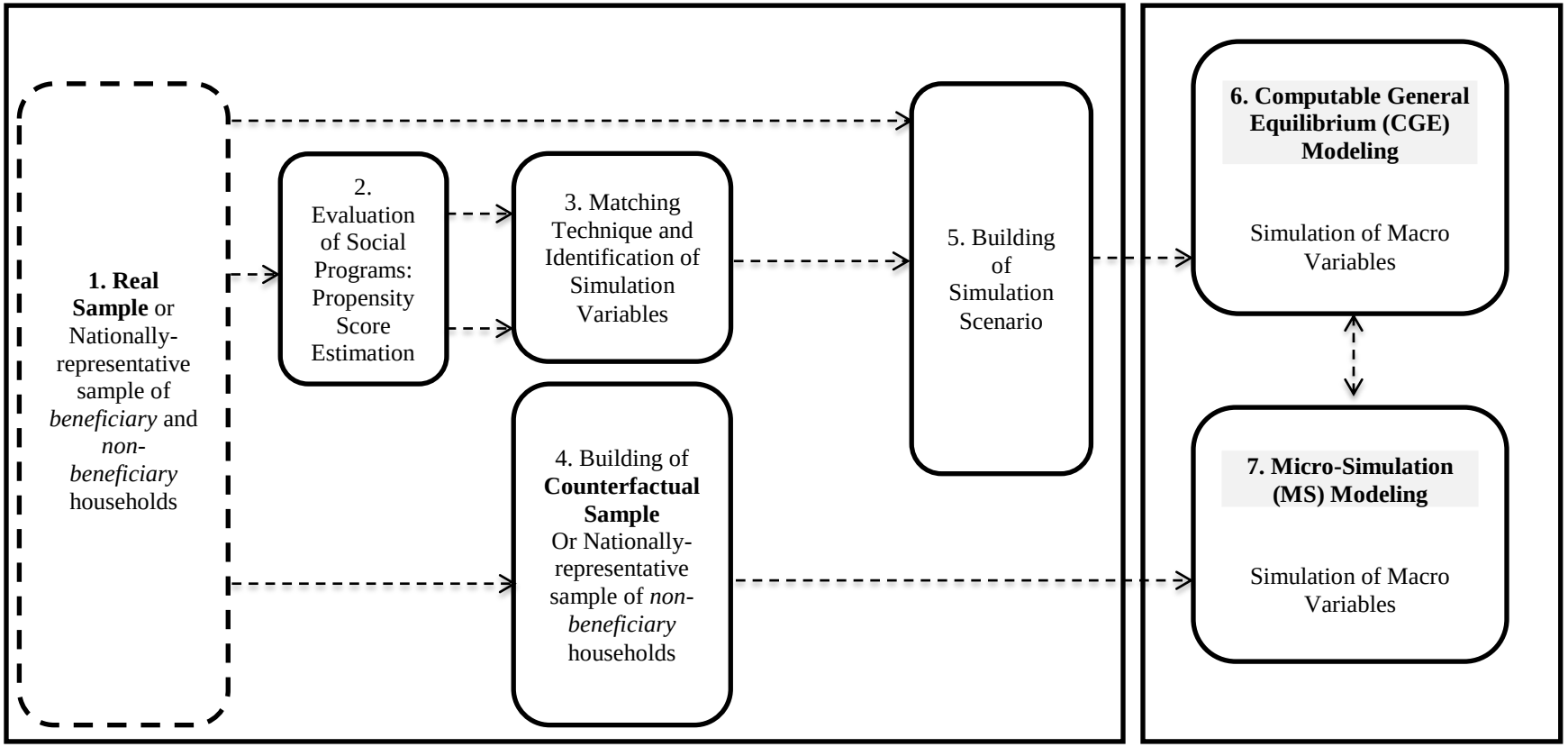
3 THE ANALYTICAL FRAMEWORK

The analytical framework integrates three methodological approaches: the Propensity Score Matching (PSM) Technique, the Computable General Equilibrium (CGE) Modeling, and the Micro-Simulation (MS) Modeling. The process and steps are developed in six steps and presented in Figure 1. The first step is to get a sample that is representative of the population of South Africa. This will be a nationally representative sample of *beneficiary* and *non-beneficiary* households. Given the data in Step 1, we apply the propensity score matching technique that requires no modeling of expectations involving the outcome of interest of the treated and counterfactual group (Step 2). The impact of the program can be estimated by modeling the probability of been in the program given the characteristics of the

household. This probability, called *propensity score* in the evaluation literature, will in turn be used in Step 3 to match households to a counterfactual and at the same time identify simulation variables.

However, building the simulation scenario in step 5 requires a selection of the simulation variables in Step 3 using the available matching techniques and the building of a counterfactual sample that is a nationally-representative sample of non-beneficiary households in Step 4. The matching techniques and the counterfactual sample building use the results of the propensity score estimation in Step 2. This estimation requires the availability of a nationally-representative sample of beneficiary and non-beneficiary households or real sample. The simulation scenario compares the outcomes of the simulation variables from the real and the counterfactual samples. In Step 5, a simulation scenario is built and used as input in the CGE model. The macro results generated by the CGE simulation in Step 6 are used in the MS model (Step 7) which, in turn, produces the micro results for poverty and inequality analyses. The methodological aspects are discussed in detail in next sections.

Figure 1: Simplified Presentation of the Analytical Framework



3.1 Building of the Simulation Scenario

The analytical framework includes a building of a simulation scenario which compares the outcomes of the simulation variables from the real and the counterfactual samples. The changes in the values of the simulation variables are interpreted as the DIRECT impact of the grant program which then serves as simulation shocks in the CGE model. The analysis of the real and the counterfactual samples enables to compare between what actually happened and what would have happened to the economy without the CSG, respectively. The counterfactual sample built CSG beneficiaries. This is equivalent to building a *representative household*s *sample* which does not show any beneficiary of the CSG. While the change in Government grant expenses are modelled at the macro- level, a suited technique is required to build the counterfactual scenario at the household- level.

First, a propensity score is estimated for the beneficiaries and the non-beneficiaries of the CSG. *Second*, the matching techniques are used to estimate the direct impact of the program on key variables of interest and to identify the simulation variables. *Third*, the matching method is used to find, for each beneficiary household, a matched non-beneficiary household; then the sample representativeness (weight) of the beneficiaries and their matched non-beneficiaries are adjusted to reflect their new proportions in the counterfactual sample. *Fourth*, the changes in the values of the simulation variables are computed by comparing the real and the counterfactual samples; these changes are used as the CGE simulation shocks (bottom-up).

3.1.1 Application and Data Description

We apply our framework to data from the National Income Dynamic Survey (NIDS) covering questions related to access of eligible children and their caregiver to the CSG. The NIDS is used for the analysis of the general equilibrium impact of the CSG program. The NIDS project is implemented by the Southern Africa Labor and Development Research Unit (SALDRU) based at the University of Cape Town's School of Economics. The first NIDS survey was carried out across the country in 2008 with a nationally representative sample of over 28,000 individuals in 7,300 households. NIDS examines the livelihoods of individuals and households over time. It also provides information about how households cope with positive or negative shocks, such as a death in the family or an unemployed relative obtaining a job. Other themes include changes in poverty and well-being; household composition and structure; fertility and mortality; migration; labor market participation and economic activity; human capital formation, health and education; vulnerability and social capital. The survey captures the dimensions of the well-being of South Africans which includes access to cash transfers and social services, wealth creation in terms of income and expenditure dynamics and asset endowments; dynamics in relation to household composition and migration; social heritage which includes education and employment dynamics, social capital and intergenerational developments. The NIDS frame included private households in all nine provinces of South Africa and residents in workers' hostels, convents and monasteries but excluded such collective living quarters as student hostels, old age homes, hospitals, prisons and military barracks.

The next section discusses the access of eligible children and their caregiver to the CSG.[3] The main criteria of eligibility to the CSG are the age of the beneficiary, the income of the applicant or caregiver, of the spouse or partner, and of the beneficiary, and the citizenship or the residency status of the applicant. Successive increases in the age threshold for CSG eligibility occurred over the 14 years of implementation of the program. An active campaign of communication was organized to inform on the changes in the age threshold through letters, pamphlets, and road shows. This criterion considers the income of the applicant or caregiver, the spouse of partner, and the beneficiary. The annual income threshold in 2012 was established to R32, 700 for a single caregiver and R70, 000 for a married caregiver and spouse. The employment status, in particular government employment, has been an important element of application because of misperception of the eligibility criteria. South African citizenship or permanent resident status of the applicant or caregiver is the third criterion. The status of the beneficiary does not determine the eligibility.

A closer examination of the 2008 NIDS data highlighted the main reasons cited by poor caregivers for not having applied for the CSG (DSD et al., 2012): the lack of documents (parent identification document, child's birth certificate, child's clinic card, marriage certificate, proof of address), the lack of time, and the income being too high. "Refusals of fathers to support the mothers' applications for the grant on behalf of the child" (marital status) have been cited as one barrier to the grant access according to the report. Misunderstanding of the application process such as the caregiver not being the child's mother (relationship between the child and the caregiver), process being too time-consuming or costly, past experience with social grant applications are all cited as important barriers to applying for the program (DSD et al., 2012). There is a high correlation between the CSG and other grants received as "Households receiving the Child Support Grant are more likely to receive another grant than households who receive no CSG." (DSD et al., 2012)." High transport costs reduce the likelihood of applying by rural caregivers from applying (urban and rural location, and access to road).

Being African and a female headed household increase the likelihood of receiving social grants as compared to other population group and male headed households (Geldenhuys, 2008). The author finds that households that receive grants tend to be larger than non-grant receiving households. Most of the indicators were also found to be higher in grant recipient households than in non-grant recipient households. These include the mean total dependency ratio, child dependency ratios and aged dependency ratios. This was also the case for both the unemployed and not employed ratios. The results show that school attendance ratios (ages 5–24) were significantly higher in the grant recipient population than amongst households not receiving grants.

3.1.2 Evaluation of Social Programs: Propensity Score Estimation

Evaluation of the impacts of social programs, predicting their effects in a different state of the world, and predicting the effects of policies never tried are important tasks to economists and of use to policy

[3] We refer readers to DSD et al., 2012 for a more elaborate review of the access to CSG - the report provides a good understanding of the eligibility criteria to the CSG and its evolvement since its implementation in 1998.

makers. One of the most popular methods of tackling this task is the treatment effect literature. The term 'treatment effect' refers to the causal effect of a binary (0–1) variable on an outcome variable of scientific or policy interest. According to Heckman and Vytlacil (2005), the treatment effect literature as currently developed focuses on the first task — evaluating the impact of a policy in place — in the special case where there is a "treatment group" and a "comparison group," i.e., a group of nonparticipants. For the purpose of our study it will be the effect of participating (treated) or not participating in the CSG on certain economic outcomes such as labor force participation and consumption patterns of household.

The estimation of the impact of these programs (treatment effects) is complicated for economists because of the problem of selection bias.[4] Previous section provided some reasons why a number of people do not apply for the CSG even though they are eligible for it. These highlight some of the differences between participants and nonparticipants that can bias the estimation of the impact. The most common methods of estimating these effects are typically using social experiments, regression models, matching estimators, and instrumental variables. Although social experiments are gaining popularity especially because of the low cost of carrying them out in developing countries, most economic research still uses secondary data relying on a variety of statistical control strategies and/or natural experiments to reduce the selection bias. The most commonly used statistical techniques in this context are regression, matching, and instrumental variables. All the three methods are relatively linked in practice. For example, regression estimates can be understood as a type of weighted matching estimator. Matching estimator is similar to regression in that it argues that the source of selection bias can be traced to the set of observed covariates of the representative agents.

In this study, we will focus primarily on the matching estimators for two reasons. First, because treatment effects are constructed by matching individuals with the same covariates instead of through a linear model for the effect of covariates, it fits in very well with our framework. Secondly, given our vast understanding of the process determining the eligibility of the CSG, it makes the assumption of conditional independence valid and amenable to the use of the matching estimator.[5]

Given that it becomes computationally difficult if we have to match the treated and the control when the covariates take on many values and dimensions, a propensity score was proposed that gives the conditional probability of treatment given covariates. "Propensity score matching (PSM) constructs a statistical comparison group that is based on a model of the probability of participating in the treatment using observed characteristics" (Khandker, Koolwal, & Samad, 2009). The key conditions of applying a PSM method are the conditional independence, and the sizable common support. Omitting key variables that determine participation leads to biased estimation of the propensity score. The selection of relevant variables is context-specific and driven by available data; limited guidance is provided by statistical tests (Khandker et al., 2009).

[4] Selection bias arises from the fact that treated individuals differ from the non-treated for reasons other than treatment status per se

[5] The conditional independence implies the selection of key variables that are more likely to affect participation but not the outcomes.

The propensity score estimation is based on a model of probability of being a beneficiary of the CSG (T) conditional on household's observed covariates (X).

$$P(X) = \Pr(T = 1 | X)$$

The model is specified over twenty-four (24) variables that respect the conditional independence and the sizable common support conditions (Table 8 – Annex 1).

3.1.3 Identification of Simulation Variables

Matching techniques are used to assess the direct impact of the social grant and to select relevant variables to be considered in the simulation experiment. First, a set of outcomes are pre-selected from an exhaustive review of the literature. Only outcomes that are likely to be affected in the short run by the CSG program are considered.

Labor Supply

Previous studies have highlighted important labor market implications with access to the CSG. The ratio of the number of employed household members to household size was substantially higher in non-grant receiving households than in households that receive some form of social grants (Geldenhuys, 2008). Furthermore, the ratio of the number of those unemployed to household size was found to be lowest for non-granted households according to the author. Altman & Boyce (2008) pointed out significant changes in the number of households engaged in personal subsistence agriculture activities – such as keeping chickens, growing vegetables, raising livestock - increase among the grant recipients.

Consumption Expenses

According to Altman and Boyce (2008), grant recipients spend most of their expenditure on food with over half of the grant being spent on this commodity item. Both food items acquired through market transactions and own production increases with household access to grant. Grant recipients payments for municipal services account for the second-largest grant expenditure item. It appears that grant recipients might have low levels of indebtedness with the common creditors being schools (17%) and the local authorities (13%) according to Altman and Boyce (2008). However debt related to the purchase of essentials stood at 40%. In addition Geldenhuys (2008) found that households that receive grants have lower welfare levels (based on spending and asset index scores).

3.1.3.1 Matching Techniques

The available matching techniques[6] – Nearest Neighbor, Stratification, Radius, and Kernel – are used to assess the direct impact of the social grant on the identified outcomes of interest. We consider the impact of the CSG scheme on nine (9) categories of consumption by purpose - food, personal, transport, energy and water, household, clothes and footwear, health, education, and miscellaneous. The analysis

[6] Refer to Khandker, Koolwal, & Samad (2009) for further discussion on the matching techniques.

of labor participation and time allocation includes six (6) type of work: agricultural wage, nonagricultural wage, self-employed, personal subsistence agriculture activities, casual, and business.

3.1.4 Generating the Simulation Scenario

The analysis uses the common support blocks as clusters to generate the counterfactual sample.[7] A binary variable (α) is generated to highlight the grant recipients (modality 0) and the non-recipients (modality 1) over the common support. Also, households outside the common support zone are covered by the counterfactual sample (modality 1). Then, the sample weights are uniformly adjusted within each common support blocks through the following equation:

$$wgt^{adj} = \frac{\sum_{h=1}^{n} wgt_h^i}{\sum_{h=1}^{n} \alpha_h \cdot wgt_h^i} \quad \text{with} \quad \alpha \in \{0,1\}$$

Where wgt^{adj} is equal to one when outside the common support area. Within each block of the common support, counterfactual sample weights are calculated by the equation:

$$wgt_h^f = wgt^{adj} \cdot \left(\alpha_{\mathrm{h}} \cdot wgt_h^i\right)$$

Outside the common support block wgt^{adj} and α_{h} are both equal to one; then wgt_h^f is equal to wgt_h^i. In the counterfactual sample, beneficiary households are substituted with their matched non-beneficiary households within each block. Thus, recipients' weights are adjusted to zero while non-recipients weights are (uniformly) adjusted upward to account for the replacement. The changes in the values of the simulation variables "*simvar*" (labor supply and consumption spending) are computed using the real and counterfactual samples of households:

$$\Delta sim\,\mathrm{var}_k = \frac{\sum_{h=1}^{m} wgt_h^f \cdot sim\,\mathrm{var}_{h,k}}{\sum_{h=1}^{m} wgt_h^i \cdot sim\,\mathrm{var}_k}$$

The above equation is used to compute the aggregate labor supply – total hours allocated – to the agricultural and the nonagricultural sectors, and the aggregate consumption spending on food;

[7] Alternatively, one can generate a cluster variable that couples the beneficiary and their matched non-beneficiary households over the common support using the nearest-neighborhood method without replacement and compute a single weight for a beneficiary and its matched non-beneficiary.

transport; energy and water; clothes and footwear; and health identified as the set of simulation variables *k* (*simvar*). These simulation variables are used in the CGE model described in the next section.

3.2 Modeling the Macro and Micro Effects

The scenario with an absence of CSG beneficiaries (Counterfactual Scenario) is simulated using a combined Computable General Equilibrium (CGE) model and a Micro-Simulation (MS) model linked in a top-down fashion. The changes in income by sources (agricultural work, nonagricultural work, and capital), the unemployment rate, and the changes in real consumption expenses are assessed by the CGE model and used as input in the MS model. Aggregate income and consumption results are distributed among surveyed households using the MS model. In turn, results on micro variables are used to compute the poverty and inequality indicators.

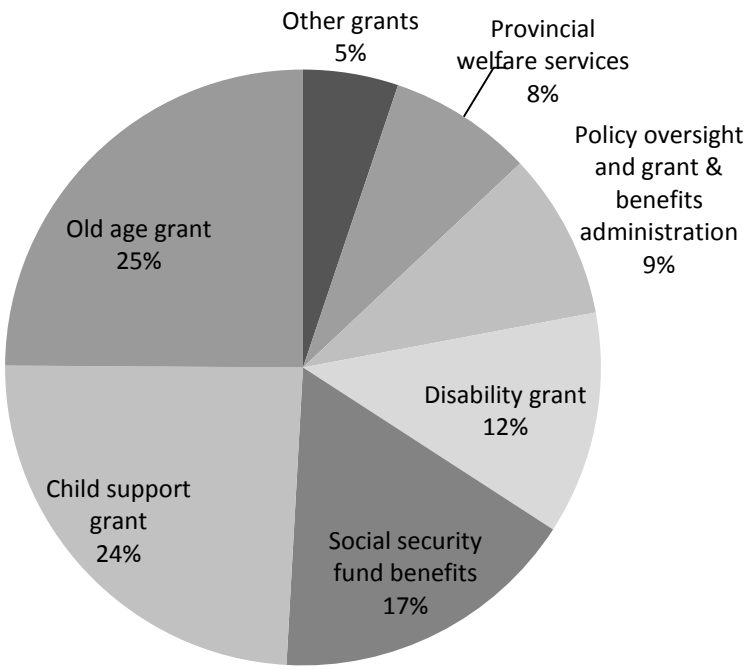
- *The CGE Model*

A static-comparative CGE model is built with exogenous labor supply and a linear expenditure system specifying households' consumption of goods and services. Household's total consumption is initially equalized to its minimum consumption. The counterfactual scenario simulation is performed through exogenous shocks on the labor supply and the minimum consumption variables. The marginal income gain or loss (net of taxes, transfers, and saving) is allocated to consumption items given the income elasticities of consumption. A neutrality of Government budget is assumed, and its income and expenses are balanced through a uniform compensatory tax on household gross income. The model is investment driven, that is, households' aggregate saving is adjusted to an exogenous investment volume level. The direct impact of the CSG is simulated by cancelling out the changes in labor supply to the agricultural and nonagricultural sectors, on the one hand, and the changes in consumption expenses on food; transport; energy and water; and clothes and footwear (direct impact), on the other (Table 4).

The above mentioned changes in labor supply (to agricultural and nonagricultural sectors) and consumption expenses on food, transport, energy and water and municipal services, and clothes and footwear, on the other (Table 4) are imposed to the CGE model. This shock is the direct impact of the CSG program and is interpreted as what would have happened without the CSG program.

A state of the South African economy without the CSG program means less transfers income to households from the Government and more income to the Government. The CSG program covers 10.8 million children receiving R280 every month as of April 2012 (DSD, SASSA & UNICEF, 2012). The Government spending on the CSG program was estimated at R35.6 billion in 2011 representing 24% of the total social protection spending (Figure 2). We assume that the extra income of the Government is used to reimburse its domestic debt (best spending opportunity). Figure 3 shows a positive relation between government deficit and debt reduction.

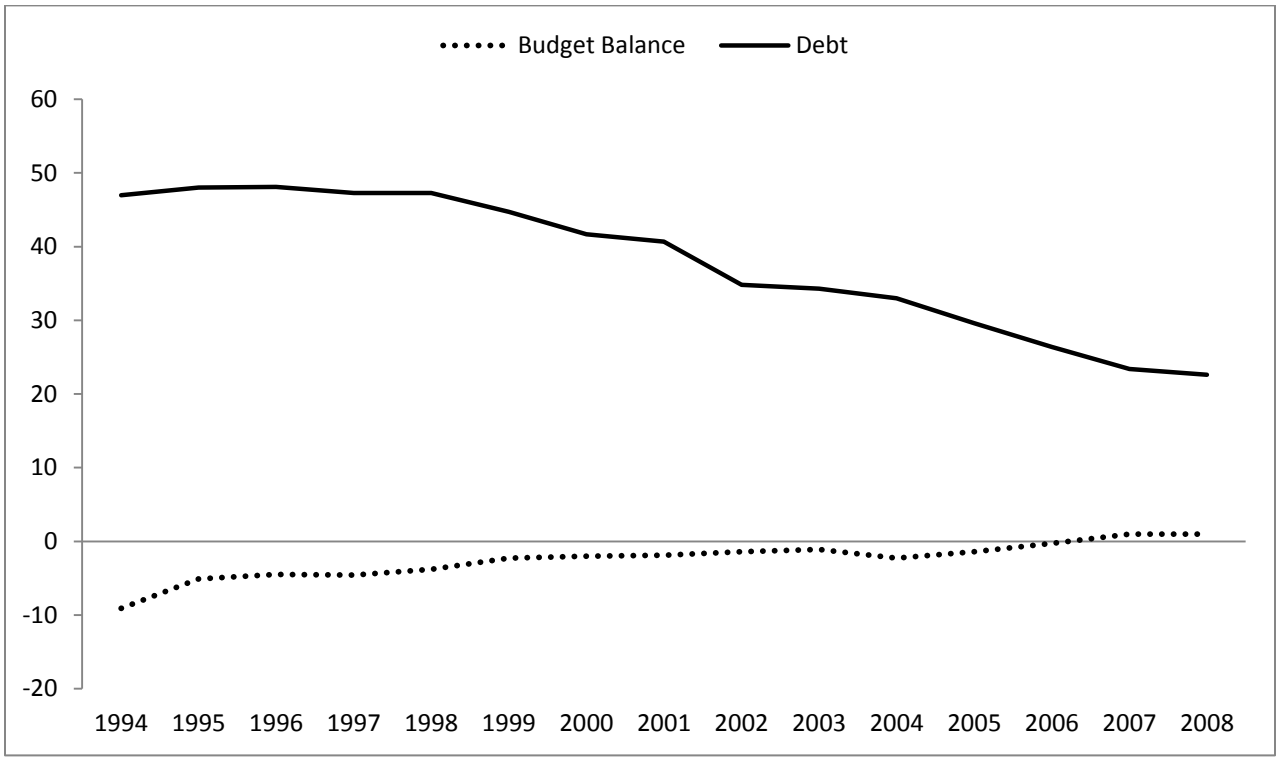
Figure 2: Share of CSG in the Social Protection Spending for 2011



***Source**: National Treasury (2011)*[8]

[8] National Treasury. 2011. Budget Review. Republic of South Africa. RP: 05/2011. ISBN: 978-0-621-39858-8. www.treasury.gov.za

Figure 3: Government budget balance and debt (Percent of GDP)



Source: The Presidency (2009)[9]

- *The Micro-Simulation Model*

A Micro-Simulation (MS) model is developed to assess the distributional impact among individuals and households of the social grant shock. The adopted method builds upon the non-behavioral micro-simulation approach which consists of adjusting the survey household's weights to create consistency between the macro and the micro outputs. Therefore, the method does not allow individuals and households to adjust their behavior in response to the shock.

Under additional information provided by the macro model, household weights in the survey are readjusted using the cross-entropy estimation procedure (Golan, Judge, and Miller, 1996). The approach minimizes the Kullback-Leibler cross-entropy measure of the distance between the sets of initial (*x*) and final (*y*) surveyed-household weights transformed into probability measures:

$$Min\ \Omega = \sum_{h=1}^{n} y_h \ln \cdot \frac{y_h}{x_h}$$

[9] The Presidency. 2009. Development Indicators. Republic of South Africa. ISBN 978-0-621-38904-3. www.thepresidency.gov.za

subject to a consistency with the additional information

$$A_j = \sum_{h=1}^{n} y_h \cdot a_{h,j}$$

The constraint equations (*j*) include - in addition to the adding-up normalization constraint - unemployment rate, agricultural labor earning, nonagricultural labor earning, capital earning, government transfer revenue, private transfer revenue, and total consumption spending (or macro variables). A_j are simulated macro data (averages) that are consistent with the set of final weights. The counterfactual sample of households is used in the MS model. This sample does not show any CSG beneficiary and requires prior upward adjustments of the weights.[10]

The cross-entropy method calculates new weights for the counterfactual sample of households which are consistent with the changes in the macro variables. The unemployment rate (30.5%)[11] computed in the MS model is imposed to the CGE model for consistency. The changes in values are used for the labor supply and the consumption variables and do not require a reconciliation procedure between the CGE and the MS models.

The changes in aggregate earnings and real consumption income, and the new employment rate are generated from the CGE model and constitute the new constraint for the MS model. The latter is run and the new weights that satisfy the constraints on these aggregate outputs are collected for the poverty and inequality analysis.

Poverty and Inequality Analysis

The poverty impact is assessed using the Foster, Greer, and Thorbecke (1984)[12] measure of poverty or FGT; where: *n* is the number of individuals in the population, y_p is the per capita consumption expenditure of the person *p*, z is the per capita consumption threshold; α is the weight of the individuals with consumption expenditure below the threshold *z*:

$$FGT = \frac{1}{n} \cdot \sum_{p=1}^{n} \left(\frac{z - y_p}{z} \right)^{\alpha}$$

[10] Robillard and Robinson (1999) discuss the cross-entropy method and its use to balanced macro and survey data.
[11] This rate is lower than the official (narrow) rate of 23.5% but closer to the unofficial (broad) rate of 31.5% in March 2008 (Presidency, 2009).
[12] Foster, J., J.Greer and E.Thorbecke, 1984, "A Class of Decomposable Poverty Measures", *Econometrica* 52: 761-5.

The measure of the inequality indicators uses the Theil index (Theil, 1967)[13]; *n* and y_p keep their above definitions, μ is the population average per capital consumption expenditure:

$$THEIL = \frac{1}{n} \cdot \sum_{p=1}^{n} \frac{y_p}{\mu} \cdot \log \frac{y_p}{\mu}$$

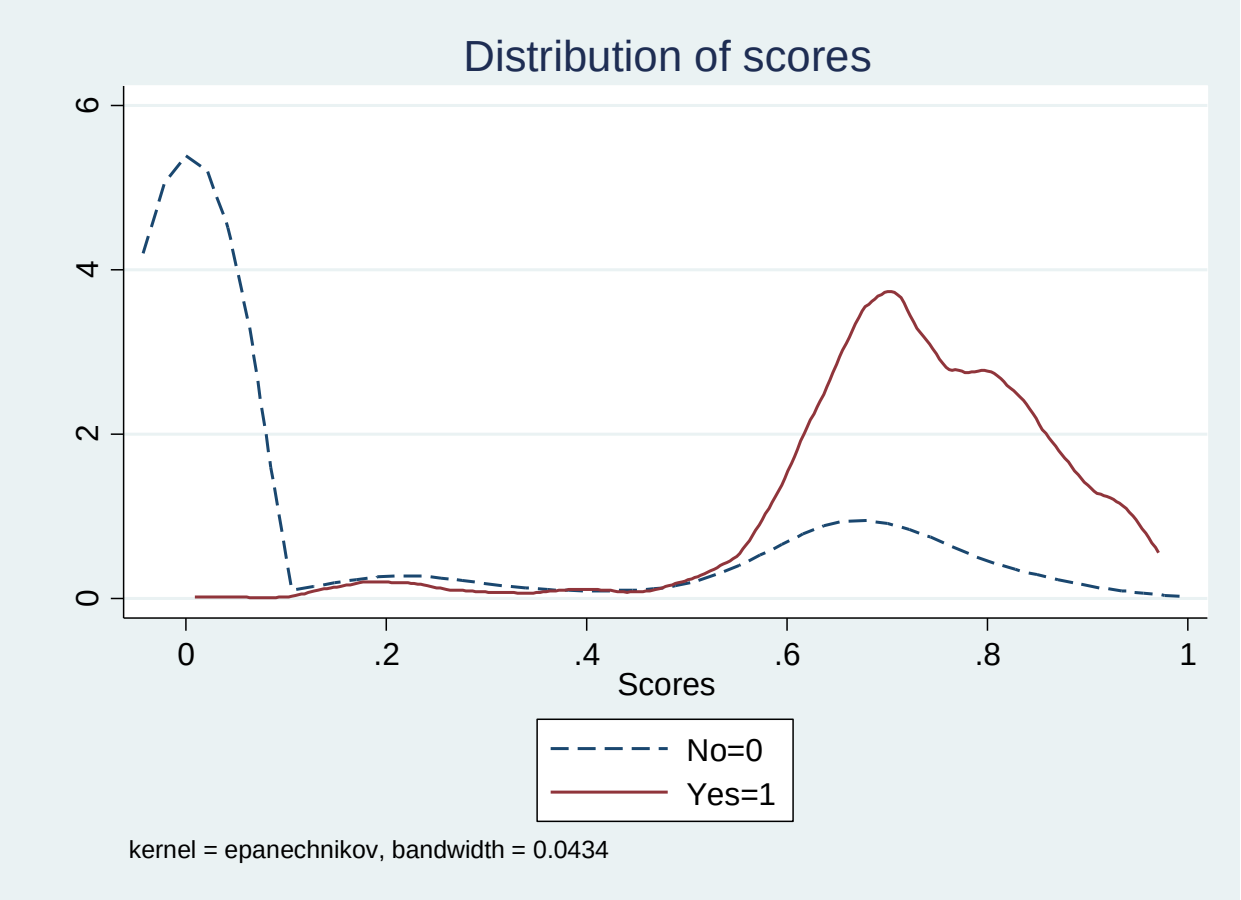
Three datasets are used for the poverty and inequality analysis: the 2008 NIDS survey including 7301 households (Real Sample); a sample composed by the original 7301 households less the 2795 beneficiaries of the CSG with adjusted weights (Counterfactual Sample); and a reweighted counterfactual sample (Reweighted Sample) consistent with the new macro outputs. FGT indexes (headcount, gap, and severity) are computed for each of the three samples given a poverty line of $2/Day or R260 /Month (Leibbrandt et al., 2010; p.17). Theil inequality measures are also calculated using the average per capita consumption expenses in each sample.

4 SIMULATION RESULTS AND DISCUSSION

To assess the general equilibrium effect of the Child Support Grant (CSG) program in South Africa, we first estimate the Propensity Score (PS) over a series of observed variables. Figure 4 presents the Kernel density distribution function of the CSG beneficiary and non-beneficiary groups resulting from the PS estimation. It identifies a large common support (0.009 to 0.98) and eight blocks that satisfy the balancing property. Table 1 show for each block, the inferior score and the number of beneficiary and non-beneficiary groups.

[13] Theil, H., 1967, *Economics and Information Theory*, North Holland, Amsterdam.

Figure 4: Kernel density function of the PSM



Source: Authors from the estimation results.

Note: No = Not a recipient of CSG; Yes= Recipient of CSG

Table 1: Common support block

Inferior Score	Non-beneficiary	Beneficiary	All
0.009	96	35	131
0.200	175	64	239
0.400	186	264	450
0.600	501	851	1352
0.700	220	477	697
0.750	121	352	473
0.800	139	566	705
0.900	20	186	206
Total	**1458**	**2795**	**4253**

Source: Authors from the estimation results.

After the propensity scores are estimated, we turn to comparing the outcomes of the beneficiary group with these of the matched non-beneficiary group for our pre-selected[14] variables of interest (Tables 2 and 3). The matching methods aim at providing evidences that the CSG program affect the variables of interest. However, only variables that show a statistically significant effect are selected as **simulation variables**.

The results from the available matching methods – nearest neighborhood, stratification, radius, and kernel – show statistically significant differences in per capita spending on "energy, water, and municipal services", and "clothes and footwear" (Table 2). On the other hand, per capita spending of food, transport, and health are also different between the beneficiary and the non-beneficiary groups although the evidence is weak.

Table 3 shows differences in the labor supply outcomes between the two groups. Recipients of the CSG increase their participation to the labor market as well as the average number of hours worked in the agricultural sector, especially for the personal subsistence agriculture activities. However, non-agricultural wage work is observed to be negatively affected by the CSG both in terms of labor force participation and average hours worked. This implies that CSG beneficiaries reduce their labor hours but

[14] The variables are pre-selected according to the objective of the analysis. We have selected the labor supply and consumption variables as we are interested in the short run impact of the CGS program.

tend to spend more time on agricultural activities. One explanation for this can be because most of the agricultural activities at that level of income will be at the subsistence level; income from those activities may not necessarily count towards CSG eligibility. This provides extra income for the household without being disqualified for the CSG.

Table 2: Effect on Consumption Spending

Consumption Item	**Average monthly per capita consumption(in Rand)**
Food products	17.9
Transport services	-23.7
Energy and water	**11.0**
Clothes and footwear	**12.0**
Health services	8.5

Source: Authors from the simulation results.

Estimates in bold are significant at 1%.

Table 3: Effect on Labor Supply

Type	Participation	Annual Hour worked
	Average number of individual	Average annual hour worked
All nonagricultural work	**-0.083**	**-126**
Nonagricultural wage work	**-0.056**	**-101**
Agricultural wage work	-	30
Self-employment	-0.021	-
Casual work	-0.016	-19
Help in others' business	-	2
All agricultural work	**0.052**	**36**
Agricultural wage work	-	30
Personal subsistence agriculture	**0.048**	**6**

Source: Authors from the simulation results.

Estimates in Bold are statistically significant at less than or equal to 10% for all variables.

The estimation of the participation effects to the CSG program using the matching methods in the previous step identifies seven simulation variables (Table 4). The **simulation scenario** is built around the simulation variables and the changes in the outputs between the real and the counterfactual samples of households.

The matching technique and the sample comparison show inconsistent results (opposite sign) with regard to the health spending.[15] At this stage, the health expenses variable is dropped from the simulation variables.[16]

Table 4: Changes in Simulation Variables

Variable of interest	**Change (in percent)**
Labor Supply	
- Nonagricultural labor supply	-5.1
- Agricultural labor supply	12.3
Consumption Spending	
- Food expenses	5.6
- Transport expenses	-5.2
- Energy and Water expenses	10.2
- Clothes and Footwear expenses	34.4
- Health expenses	-20.3

***Source**: Authors from the simulation results.*

Figure 5 presents the FGT poverty indexes and the Theil inequality indexes for the Reference and the Simulations Scenarios. The latter represent the elimination of the CSG program in South Africa and is divided into the Direct and the Indirect Impacts.

In the reference scenario, the values of the indexes are computed using the nationally representative sample of households (NIDS 2008), hereon the real sample. We use a per capita monthly consumption

[15] The stratification matching method shows a negative sign (although not statistically significant) as well as the comparison of the real and the counterfactual samples, while the nearest-neighborhood (also not significant) and the Radius matching (significant at 20%) methods show positive results.

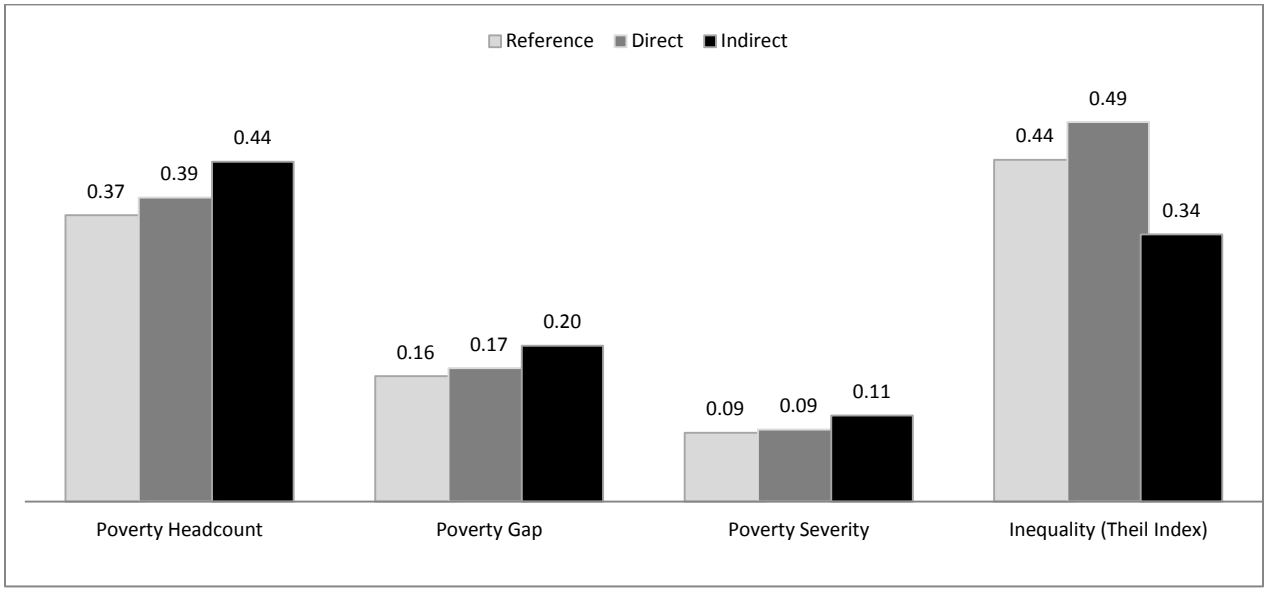
[16] Tables 2 and 3 are expressed in average hour worked per household and per capita consumption spending; table 5 is expressed in percentage change of the aggregation hour worked and per capita consumption spending; only the direction of the changes for the variables of interest are meaningful for analysis.

spending of R260 as the poverty line[17] and compute the FGT poverty indexes (headcount, gap, and severity).

The counterfactual sample of households replaces the CSG beneficiaries with their matched non-beneficiaries resulting in a hypothetical representative sample of households with no CSG beneficiaries. The counterfactual sample is used to estimate the direct impact of the CSG program. The child support grant program has contributed to reducing poverty. Poverty indexes are lower in the real sample (including beneficiary and non-beneficiary households) compared to the counterfactual sample (including only non-beneficiary households). The headcount ratio and the poverty gap are 2 and 1 percent point lower, respectively. Theil index is lower in the real sample compared to the counterfactual sample. Inequality is however slightly higher under the CSG program.

The simulated aggregate results are distributed among the categories of households using a reweighted technique. Comparison of results from the reweighted and the original counterfactual samples gives the indirect impact of the CSG program. Poverty indexes are lower for the direct impact compared to the indirect impact with differences of 5, 3, and 2 percent for the headcount, gap, and severity respectively. *Thus, the results show a positive indirect impact of the CSG program as poverty indexes decline further compared to the direct impact. The overall inequality is also declining under the grant program*. Theil index declines without the program compared to the reference of actual situation.

Figure 5: Poverty and Inequality Indexes



Source: Authors from the simulation results.

[17] The value is equivalent to the international poverty line of US $2 per day (Leibbrandt et al., 2010; p.17).

The analysis shows a positive contribution of the grant program to the economic performance as measured by the level of GDP. Indeed, South African GDP is lower (-0.5 percent) under the counterfactual scenario, i.e. absence of the CSG program, compared to the reference scenario (Table 5). This result is driven by less private final consumption (-0.7 percent). Government earns slightly less (-0.3 percent) and the cost of its consumption increases slightly (0.3 percent) under the counterfactual scenario. Considering the static comparative and short run nature of the analysis and, consequently, the neutrality of the Government revenue by assumption (fixed Government saving), the loss of revenue and the extra cost of its expenses are covered by households and reflected in their well-being. However, the extra revenue collected from households' gross income represents a small proportion (0.01 percent in average) of their initial tax rate. Next paragraphs provide further details on the positive indirect effects on poverty and inequality as well as the GDP and fiscal effects of the CSG program.

Table 5: Changes in Macro Variables (Percent)

	GDP	Public Final Consumption	Private Final Consumption	Fixed Capital Formation	Change in Inventories	Exports	Imports
Share	100.0	19.5	64.6	16.8	1.2	24.5	26.4
Change	-0.5	0.0	-0.7	0.0	0.0	-1.0	-0.9

Source: Authors from the simulation results.

Table 6 shows that the declining households' consumption is driven by an income reduction (-0.5 percent) induced by less transfers from Government (-0.8 percent) and less remuneration of nonagricultural labor (-1.4 percent). Under the counterfactual scenario, increasing nonagricultural wage labor supply puts downward pressure on the nonagricultural wage rate. Table 7 show higher unemployment rate (3.6 percentage point) and lower nonagricultural wage rate (-1.1 percent). Although agriculture employment earning increases as agricultural employment falls and its wage rate increases, its contribution to the overall households' income is less important (1.0 percent) than the nonagricultural employment earning (42.0 percent) and the transfer income (25.4 percent).

Table 6: Household Income and Consumption Effects (Percent)

	Public Employment Earning	Agricultural Employment Earning	Nonagricultural Employment Earning	Capital Earning	Transfer Income	All Income
Share	15.1	1.0	42.0	1.6	25.4	100
Change	0.1	37.2	-1.4	0.0	-0.8	-0.5

Source: Authors from the simulation results.

Table 7: Labor Supply, Unemployment, and Factor Prices (Percent)

							Value Added	
	Labor Supply	**Unemployment**	**Wage Rates**	**Labor Demand**	**Capital Demand**	**Return to Capital**	**Change**	**Share**
Agriculture	-12.3	-	56.4	-12.3	0.0	-16.1	-4.9	2.7
Non agriculture	5.1	3.6*	-1.1	-0.3	0.0	-0.3	-0.2	82.3
Public	0.1	-	0.0	0.1	0.1	0.1	0.1	15.0
All Sectors	**3.9**	**-**	**0.2**	**-0.4**	**0.0**	**-0.8**	**-0.3**	**100.0**

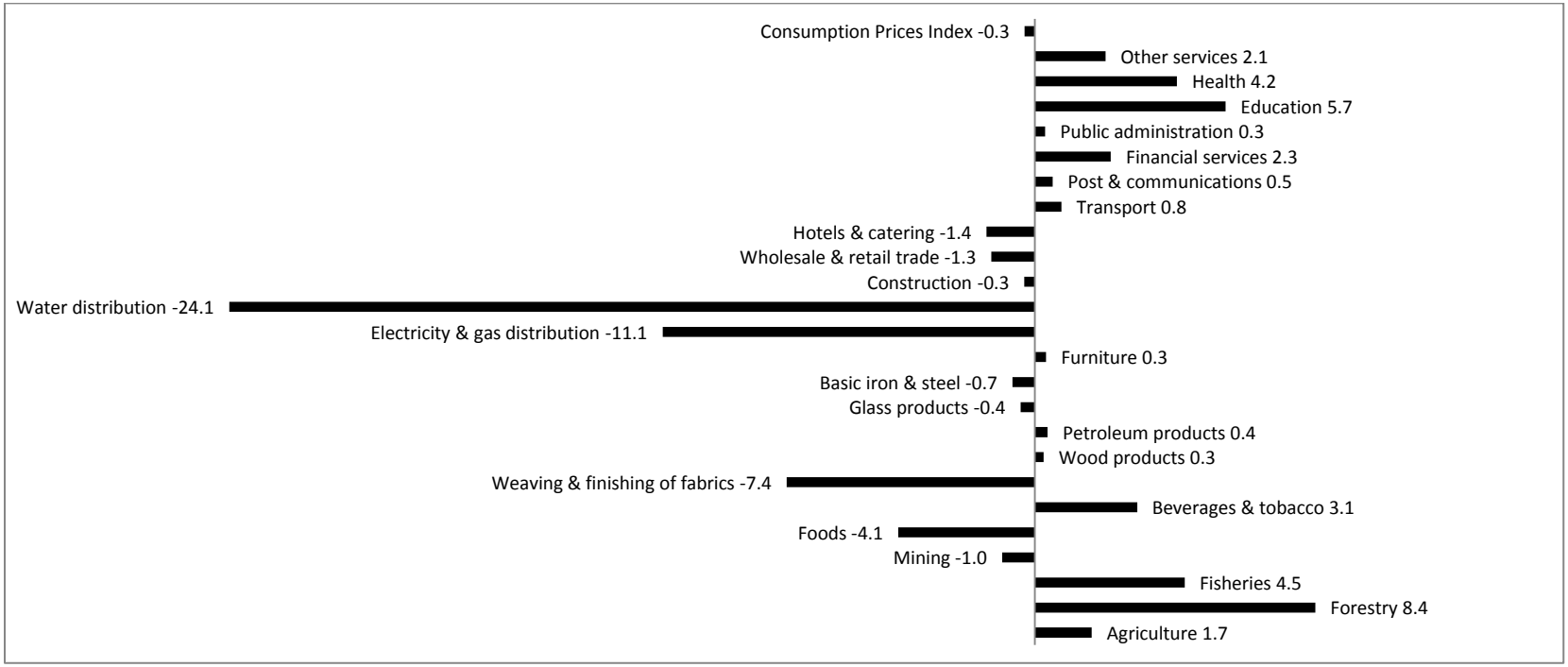
Source: Authors from the simulation results.

The fall in agriculture employment and value added does not have a considerable impact on the overall GDP as reflected by its small contribution to the GDP (Table 7). On the other hand, the impact of the nonagricultural sector which represent 82.3% determine largely the economy-wide effect of the shock. Thus, the increase of nonagricultural employment is favorable to the supply of nonagricultural products. On the other hand, the fall in households' income reduces the demand for nonagricultural products. The negative demand impact overcomes the supply impact as the demand for nonagricultural labor and value added falls (Table 7).

The simulated reduction of food consumption leads to a fall in demand for food and agricultural products (Figure 6). The reduction in demand for food products lead to fall in prices for food products, and hotel and catering. On the other hand, the prices of agriculture, forestry, and fishery products increase as agricultural labor and, consequently, supply for the these products also fall. An increasing demand for transport services is performed under the counterfactual scenario. Thus, the price of transport services and petroleum products increases. On the other hand, the prices of electricity and water, and textile products, and wholesale and retail trade (including reparation) declined as declining demands are simulated for energy and water, and clothes and footwear.

The simulation results show increasing prices for services as demand is more important under the counterfactual scenario (absence of CSG beneficiaries) compared to the reference scenario (Figure 6). The consumer prices index stagnates (-0.3%) as the reduction in prices for energy and water, and textiles, and food products are almost compensated by the increases of prices for services; beverage and tobacco; and agriculture, forestry, and fishery products.

Figure 6: Effects on Consumption Prices (Percent)



Source: Authors from the simulation results.

5 CONCLUSION

Comprehensive social security programmes such as the Child Support Grants are introduced to serve as safety nets to the poor in South Africa. While a number of studies have looked at the impact the program has on the beneficiaries, no research has been done on the impact of the program on the society at large, particularly on non-beneficiaries. This becomes important as the size of the program continues to increase in South Africa. Social grant increased in size and reach in 2012 with a growth rate of 9.1 % from the previous year and R157.9 billion invested, amounting to more than what was spent on basic education in the same year (R152.1 bn). The amount invested in the Child support grant alone is equivalent to about 32 % of the total budget for the health sector.

This study is a first attempt to study the general equilibrium effect of social grants in South Africa by using an analytical framework that combines state of the art techniques on evaluation of social programs including matching techniques. The framework builds counterfactuals which are fed in to a combined CGE and micro simulation model to calculate the impact of the program on outcomes of interest such as poverty and inequality in the country, in the absence of the program. The changes in income by sources, unemployment rate, and the changes in real consumption expenses are evaluated through the CGE model and used as an input in the micro simulation model.

The results show direct differences between the beneficiaries and non-beneficiaries of the program in terms of their observed outcomes. Beneficiaries of the program increased there supply of labor for agricultural activities and reduced labor supply in the nonagricultural sector. There is also strong evidence that beneficiaries of the CSG consume more clothes and footwear; energy and water services relative to if they were not a beneficiary.

Looking at the general equilibrium results, we found a positive contribution of the grant program to the economic performance in South Africa as measured by the level of GDP. The absence of the program in a counterfactual setting leads to a 5% decline in GDP. Poverty index and inequality are also shown to decline as a result of the program.

We also found a decline in private final consumption which was attributed to reduction in income as a result of less transfers from government and loss of income from nonagricultural activities. However, we do not find the fall in agricultural employment and value added to have a considerable impact on the overall GDP. We also simulated the impact on prices showing a stagnation of the Consumer price index as the reduction in prices for energy and water, textiles, and food products are almost compensated by the increases of prices for services, beverage and tobacco, agriculture, forestry and fishery products. Our analysis leads to the recommendation that while fiscal prudence and consolidation are pursued in the medium term, social security spending should not be cut, especially in the wake of the prolonged aftermath of the global financial crisis which is still being felt today. This must be coupled with decisive responses to the crisis in the public education and health systems and effective job creation initiatives to ensure that growing social grants do not unnecessarily become a permanent feature of the South African landscape.

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Annex 1: Other tables and Figures

Table 8: Variables used in the Propensity Score Estimation

Variables	Observation	Modalities
1. Recipient of CSG	7301	No (0) Yes (1)
2. Presence of children less than 14 years old	7301	No (0) Yes (1)
3. Child has birthday certificate	7301	No (0) Yes (1)
4. Clinic card	7301	No (0) Yes (1)
5. Source of information for the child's date of birth	7301	Not applicable (0) Card (1) Recall (2)
6. Child living with a parent	7301	No (0) Yes (1)
7. Caregiver	7301	Others (0) Parent (1) Great, Grand Parent (2) Step, Adoptive, Foster (3) Brother, Sister, Cousin (4) Uncle, Aunt (5)
8. Mother completed higher education	7301	No (0) Yes (1)
9. Mother's occupation	7301	No (0) High (1)* Medium (2)** Low (3)***
10. Father completed higher education	7301	No (0) Yes (1)
11. Father's occupation	7301	No (0) High (1)* Medium (2)** Low (3)***
12. Recipient of grant (excluding CSG)	7301	No (0) Yes (1)
13. Household size	7301	1-26
14. Number of children less than 14 years old	7301	0-14
15. Population group	7301	Others (0) African (1) Colored (2) Asian (3) White (4)
16. Gender of household head	7301	Female (0) Male (1)

17. Number of year of education of household head	7301	0-25
18. Age of household head, number of year	7301	14-99
19. Marital status of household head	7301	Never Married (0) Married (1) Living with partner (2) Widow/Widower (3) Divorced/Separated (4)
20. Type of dwelling	7301	1-10 (see questionnaire for details)
21. Number of room	7301	1-35
22. Distance of water source	7301	Not applicable/Water on site (0) Less than 100m (1) 100m - less than 200m (2) 200m - less than 500m (3) 500m - less than 1km (4) 1km and more (5)
23. Access to electricity	7301	No (0) Yes (1)
24. Time to reach the public transport services	7301	0-300

Source: Authors from the PSM estimation.

Note: * legislators, senior officials, managers, and professionals, technicians and associate professionals; ** clerks, service workers, skilled agriculture workers, craft and trade workers, and plant and machinery workers, *** elementary occupations.

Table 9: Products-to-Consumption Mapping (Percent)

Industry	Food	Personal	Transport	Energy & water	Household	Clothes & Shoes	Health	Education	Miscellaneous
Agriculture	18								
Forestry	1								
Fisheries	0								
Mining									
Foods	74								
Beverages & tobacco		50							
Weaving & finishing of fabrics					10	86			
Wood products		1						29	
Petroleum products			62	37					
Glass products		1							1
Basic iron & steel					53				19
Furniture					9				3
Electricity & gas distribution				39					
Water distribution				22					
Construction					2				
Wholesale & retail trade					8	14			3
Hotels & catering	6	11							
Transport			38						
Post & communications		24							
Financial services									68
Public administration				2			1	16	
Education								56	
Health							99		
Other services		14			17		0		6
All Industry	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Authors from the simulation results.