DISABILITY GRANT
FORCE PARTICIPATION:
THE CASE OF SOUTH AFRICA

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ABSTRACT

Despite the explosive growth in the number of people receiving disability benefits in South Africa, very little is known about the labour supply effects of the disability grant (DG). This study investigates the impact of disability grant receipt on labour force participation. Consideration is given to potential bias that may arise from unobserved confounding factors. The study utilises data drawn from the 2007 wave of the General Household Survey (GHS) and implements a three-step methodology in a comparative perspective. Firstly, a standard probit regression of labour force participation is applied, followed by an instrumental variable regression to correct for possible endogeneity of DG take up. Finally, the sensitivity and robustness of the results is checked by implementing a variety of propensity score matching techniques. The results overall suggest that the DG receipt has substantial work disincentive effects, but the magnitude of the effect differs between parametric and non-parametric estimators.

JEL Codes: H53, J21, J64, J22, J68

Keywords: Disability Grant, Labour Force participation, Propensity score

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CONTENTS

1. INTRODUCTION

Globally, governments and development agencies tentatively recognise cash transfer programmes as an important instrument to counter insecurity and vulnerability associated with extended durations of absolute poverty among the underprivileged. The popularity of such programmes stems from their inherent flexibility in targeting specific individual and households' varied needs. In line with that recognition, South Africa, for a developing country, has one of the most substantive social protection systems (Seekings, 2007). Disadvantaged children and their families can benefit from the Child Support Grant (CSG), Care Dependency Grant (CDG) and Foster Care Grant (FCG). Elderly people, war veterans and people with disabilities can benefit from the Old Age Pension (OAP), War Veterans Grant (WVG) and the Disability Grant (DG) respectively. All social grants in South Africa are administered by the South African Social Security Agency (SASSA).

The coverage and uptake of social grants in South Africa has grown tremendously in the past decade. In particular, between 2001 and 2007, the number of people receiving disability benefits more than doubled. A total of 0.6 million individuals received the DG in 2001, increasing to an unprecedented level of 1.4 million beneficiaries by 2007. This represents an average annual growth rate of 15.2 percent, five times more than the 3.1 percent average annual growth rate observed for the OAP over the same period. Similarly, the FCG increased at an average annual growth rate of 26.2 percent, although, in comparison to the the OAP, DGP and CSG, it has a low coverage. The CSG had the highest increase in coverage, growing at an average annual rate of 138.3 percent (SASSA, 2007). In view of these trends, it is unsurprising that almost a third (29.2 percent) of the South African population (50.6 million) benefit from social grants. Relatedly, 52.3 percent of the country's households have at least one person receiving a social grant (SASSA, 2010).

A growing body of evidence has demonstrated the positive contribution of social grants to poverty alleviation (Leibbrandt, Woolard, Finn and Argent, 2010; Booysen and van der Berg, 2005; Case and Deaton, 1998). In particular, a number of studies have found that the OAP is an important source of income for the poor and elderly, and in some instances is linked to increased school attendance, and reduction in child labour (Case and Ardington, 2006; Edmonds, Mammen and Miller, 2005; Hamoudi and Thomas, 2005). Yet another strand of literature has identified positive effects of social grants on health outcomes of beneficiaries and other household members (Aguero, Carter and Woolard, 2007; Case, 2004; Duflo, 2000). These studies clearly support the case that access to social grants (OAP and CSG) alleviates household poverty, improves health status of household members by improving nutrition access and health care of household members, and improves human capital outcomes of children in recipient households.

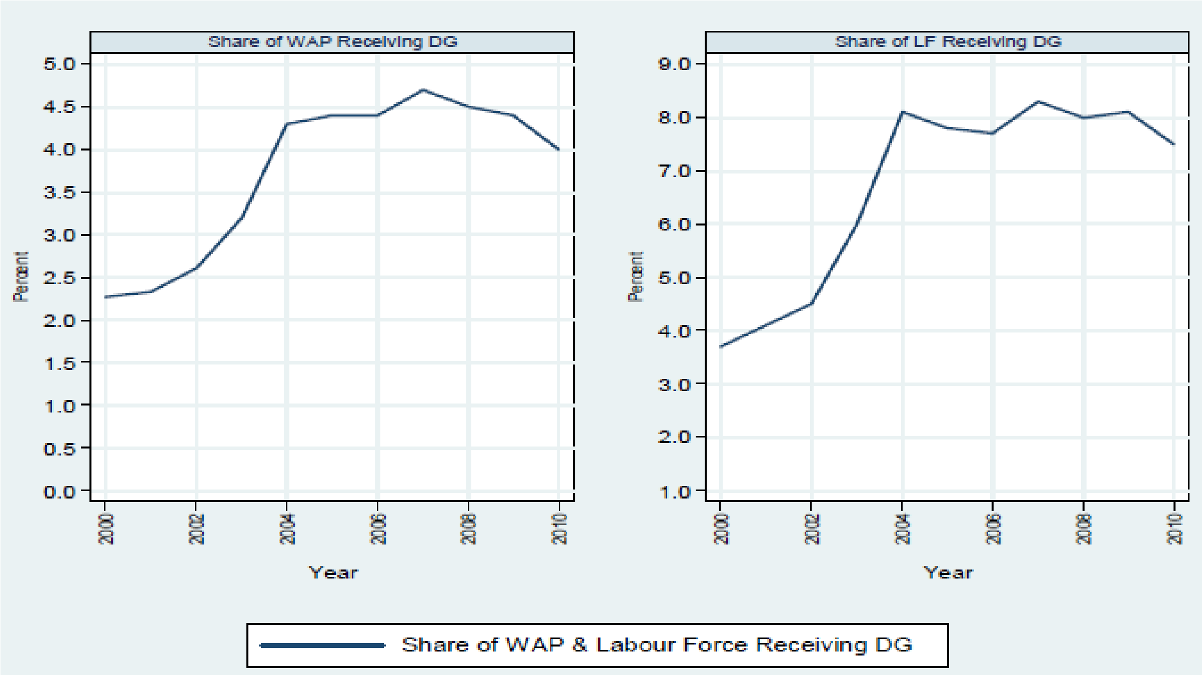
Nonetheless, social grants do not always have the intended positive effects; diverse behavioural effects have been associated with South Africa's generous social security system (Swartz and Schneider, 2006). Accordingly, policy-makers face a critical challenge of designing social security policies that achieve poverty alleviation with limited collateral costs. However, on a practical level, programmes that usually have positive outcomes on one dimension, often have impairing effects on the other. For example, other than the positive effects of the social grants identified above, concerns have been raised about possible promotion of a welfare dependency syndrome – a state where beneficiaries become permanently dependent on 'handouts' and lose any inclination to improve their circumstances and come out of poverty through their own efforts (Devereux, 2010; Thornton, 2008). The role of social grants on labour force participation (LFP) has thus attracted wide interest both locally and internationally.

Two competing perspectives have emerged regarding the role of social grants on labour supply. On the one hand, a number of studies have demonstrated that social security transfers have substantial work disincentive effects (Ranchhod, 2009; Mitra, 2009; Booysen and van der Berg, 2005; Dinkelman, 2004; Bertrand, Mullainathan and Miller, 2003). It is proposed that cash transfers constitute an injection of non-labour income into the household, and as such have an income effect on both direct and indirect beneficiaries in the household, which may reduce work incentives (Woolard and Leibbrandt, 2010). This has led some to argue that the 'state needs to carefully consider the incentives it provides under its various welfare programmes' (Ranchhod, 2006a). An alternative view regards social grants as having positive employment effects (Ardington, Case and Hosegood, 2009; Posel, Fairburn and Lund, 2006; Klasen and Woolard, 2009). In particular, evidence on the CSG has shown that cash transfers provide money that can be used to pay for transport costs when searching for jobs, and thus may result in increased labour force participation (Eyal and Woolard, 2010).

In continental Europe and the United States, the declining labour force participation rates (LFPRs) observed among the elderly has attracted a substantial amount of research attempting to investigate the interaction between social insurance programmes and LFP (Chen and van der Klaauw, 2008; Campolieti, 2004; Gruber, 2000; Bound and Burkhauser, 1999). One body of literature identified generous and long lasting unemployment benefits as factors that potentially explain the low LFPRs (Blanchard and Wolfers, 2000). Disability insurance (DI) programmes have been suggested as potential vehicles altering labour market behaviour (Staubli, 2009; Autor and Duggan, 2006; Haveman and Wolfe, 1984b).

In South Africa, unlike the OAP and CSG whose reach and impact has been the subject of a growing body of literature (Ranchhod, 2009; Ardington et al., 2009; Aguero et al., 2007; Lund, 2007; Case and Ardington, 2006; Ranchhod, 2006b; Booysen and van der Berg, 2005; Case, 2004; Duflo, 2000), very little is known about the labour supply effect of the DGP which specifically targets working age persons with disabilities. This is in part because of a paucity of disability related data, but most importantly the disincentive effect of disability cash transfers has long been assumed to be economically insignificant because of low take-up rates and high unemployment in the country (Case and Deaton, 1998). Indeed, in some countries take-up rates of disability cash transfer programmes is very low (O.Keefe, 2007). However, in the last decade, the take-up rate of the DG in South Africa has grown substantially and 4.5 percent of the working age population (8.3 percent of the labour force) were receiving the DG by 2007 as shown in Figure 1 (National Treasury, 2007).

Figure 1: Proportion of the working population and labour force receiving the disability grant



Source: Author's calculations based on the GHS, 2002-2010.

If screening of applicants to the disability grant programme (DGP) was consistently in line with legislation, receipt of disability benefits would not affect the decision to participate in the labour market, as only those who are unable to work due to disabilities would receive the DG benefits. Nonetheless, because the selection process is imperfect and developing countries generally lack the administrative capacity required to run social programmes, moral hazard reporting is expected to take place (Parsons, 1996). As a result, disability assessment is inherently prone to classification errors (Mitra, 2009) with some individuals receiving disability benefits even though they are not disabled (inclusion error), while others may be rejected although they have disabilities (exclusion error) (Benitez-Silva, Buchinsky and Rust, 2004; Nagi, 1969).

Due to errors in disability screening, it is not unusual that in developing countries with high under-employment and unemployment, disability targeted programmes might induce efficiency losses through reductions in labour supply. In light of the generosity of potential benefits under the DGP and concurrent low levels of LFP observed among people with disabilities, the DG provides a potentially interesting explanation of the low LFPRs among people with disabilities in South Africa.

This paper aims to investigate the effect of the DGP on labour supply decisions among South Africans receiving DGs. The impact of the DG on LFP is estimated using a three-step methodological technique. Firstly, a standard probit is implemented to control for observables. Secondly, a probit instrumental variable (IV) regression is applied to address potential endogeneity of DG take-up. Finally, as the instrument might be weak, an attempt is made to control for the endogeneity of participation in the DGP with a propensity score matching (PSM) method to check the robustness of probit and probit IV results.

The rest of the paper is organised as follows follows. Section 2 discusses trends in LFP in South Africa, and how these trends differ according to disability and DG status. Section 3 reviews previous evidence on the effect of disability benefits and LFP, while Section 4 describes the data used for empirical analyses. The modelling strategies will be considered in Section 5. Section 6 presents the results of implementing probit and probit IV regression techniques, while Section 7 tests the robustness of the results using a propensity score matching methodology. Lastly, Section 8 concludes with a discussion of the policy implications of the findings.

2. LABOUR MARKET OVERVIEW

Over the past decade, more men and women have been entering the labour market, thereby increasing the share of the economically active population (Casale and Posel, 2002). In particular, the increasing number of women entering the labour market has attracted a considerable amount of literature on the feminisation of the labour market (Klasen and Woolard, 1999; Standing, Sender and Weeks, 1996). Despite the documented increase in labour force participation among South Africans, the labour force participation rates (LFPRs) of people with disabilities have remained substantially lower than the national average. This is particularly true of those receiving disability benefits.

For the purposes of this paper, LFPR is defined as the percentage of the working-age population reporting to be either working or actively looking for work. The numerator thus consists of the economically active population employed or unemployed and looking for work, whilst the denominator consists of the total population within the working age category. The minimum working-age limit differs from country to country and is usually guided by legislation that regulates for example, the compulsory schooling age, minimum age for admission to employment, and extent of child labour (Hussmanns, 2007). In most countries, including South Africa, the 15-65 age group constitutes the working age population.

The working age population increased steadily during the years 2002 through 2007 (Table 1). By 2007, the country had a total of 30.4 million individuals within the working ages of 15 to 64 years. Similarly, employment steadily increased over the same period to reach 13.3 million, representing an absorption rate of 43.7 percent. The trends in unemployment appear to reflect the general patterns observed in employment. Narrow unemployment declined moderately to reach 3.9 million individuals by 2007, representing an unemployment rate of 22.7 percent. For the greater part of the period, the LFPR has remained unchanged averaging 56 percent and 67 percent, according to narrow and broad definitions respectively.

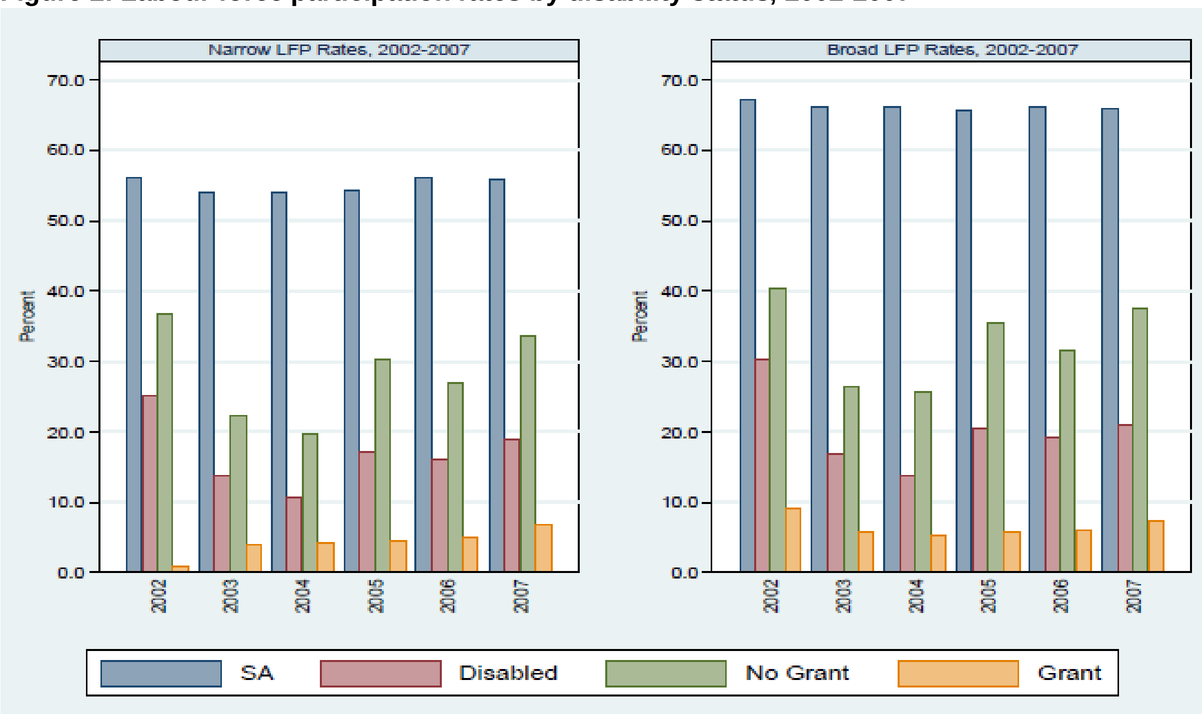
Table 1: Labour market overview, 2002-2007

	2002	2003	2004	2005	2006	2007
Labour Market Aggregates (Millions)						
Working Age Population	28.5	28.9	29.3	29.7	30	30.4
Employed	11.3	11.4	11.6	12.3	12.8	13.3
Narrow Unemployed	4.9	4.4	4.1	4.5	4.4	3.9
Narrow Labour Force	16.2	15.9	15.8	16.8	17.2	17.2
Broad Unemployed	8	8.2	8	7.8	7.6	7.3
Broad Labour Force	19.3	19.6	19.6	20.1	20.4	20.6
Discouraged Workseekers	3.1	3.8	3.9	3.3	3.2	3.4
LFP Rate (Percent)						
Narrow LFPR	56.9	54.8	53.8	56.5	57.3	56.6
Broad LFPR	67.7	67.8	66.9	67.7	68.8	67.8
Unemployment Rate (Percent)						
Narrow Unemployment	30.4	28	26.2	26.7	25.5	22.7
Broad Unemployment	41.5	41.8	40.8	38.8	37.3	35.4

Source: Author's calculations based on GHS, 2002-2007.

Figure 2 shows the LFPRs among South Africans in general, people with disabilities, DG recipients and non-recipients. The LFPRs con.rm the presence of substantial differences between the general working age population and people with disabilities.

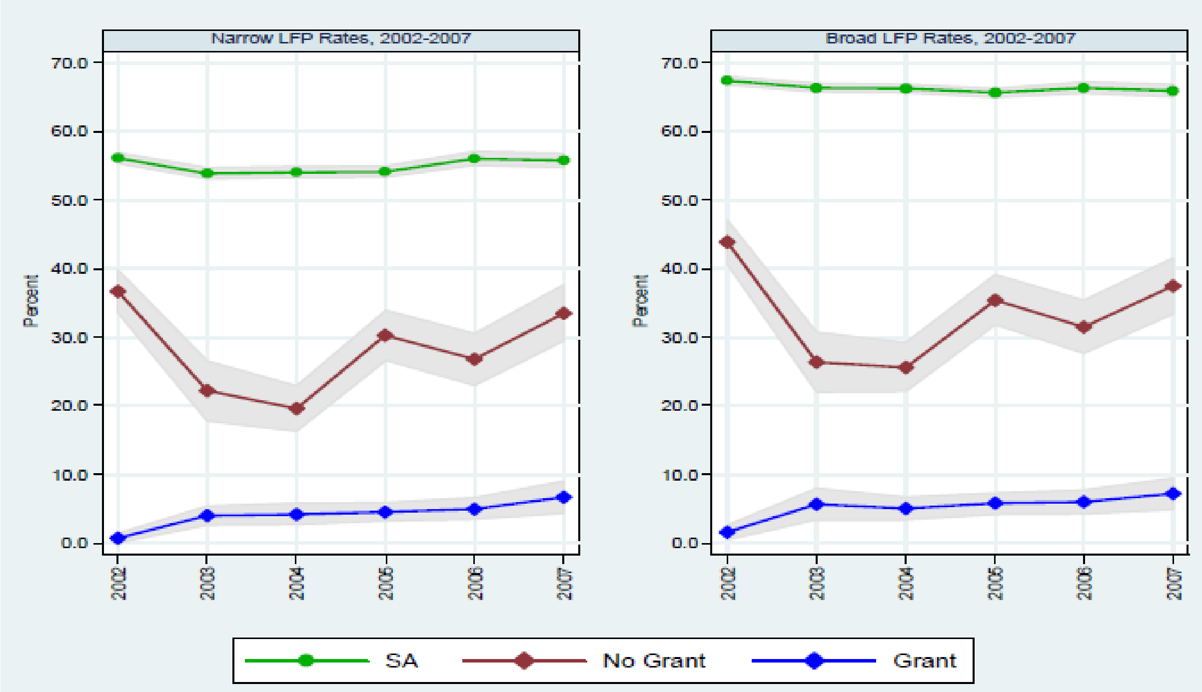
Figure 2: Labour force participation rates by disability status, 2002-2007



Source: Author's calculations based on GHS, 2002-2007.

It appears the general working age population have substantially higher LFPRs compared to people with disabilities. While 56 percent of the general population participate in the labour market, only one in four (25 percent) of people with disabilities do so. Additionally, there is striking variation in LFPRs among people with disabilities: DG recipients have lower LFPRs compared to non-recipients. The differences are statistically significant as shown in Figure 3.

Figure 3: Trends in labour force participation rates by disability status, 2002-2007



Source: Author's calculations based on GHS, 2002-2007.

2.1 Prevalence of Inclusion and Exclusion Errors in DG Targeting

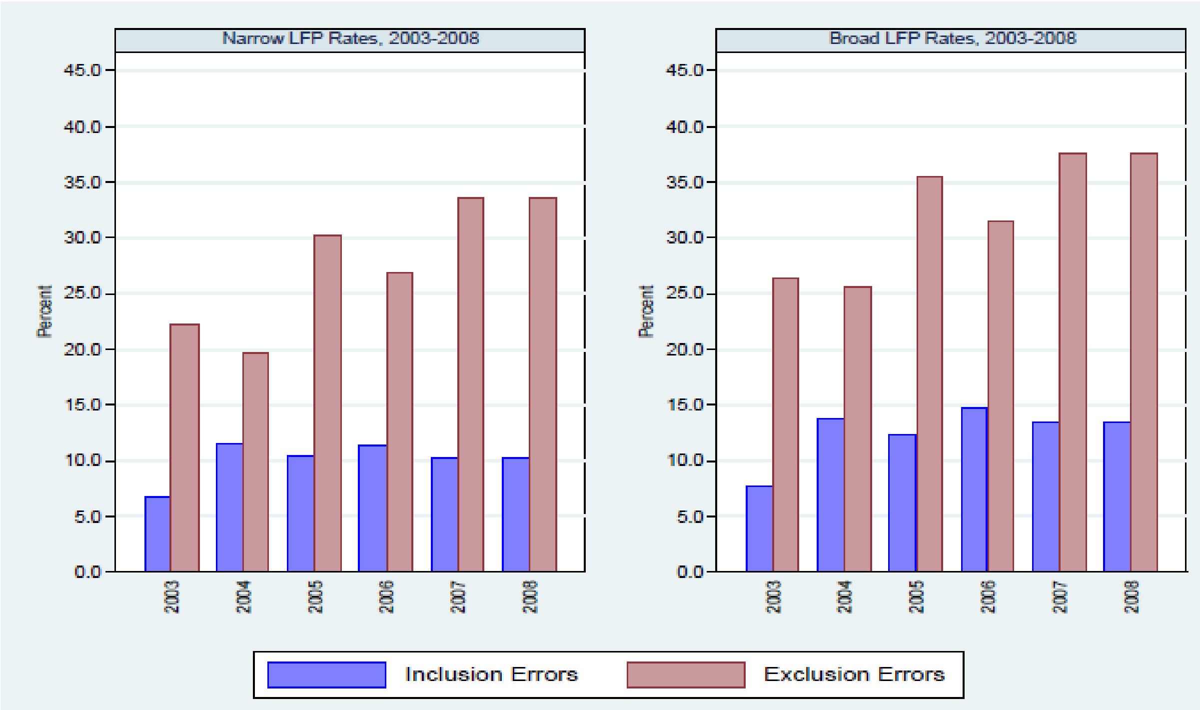
The key question is whether the low LFPRs observed among recipients of disability benefits primarily reflect health status; that is, the tendency for people with disabilities to withdraw from the labour market due to physical impairments, or a longer lasting structural influence emanating from altered work seeking behaviour due to increased reservation wages. The answer to this question draws on the LFPRs of individuals incorrectly receiving disability benefits and those erroneously excluded from the DGP. If the low LFPR among people with disabilities is driven by health reasons, individuals erroneously excluded from the DGP should exhibit similar LFPRs as recipients of the DG. Similarly, individuals incorrectly included in the DGP should have similar LFPRs as the rest of the general working age population. If, instead, the opposite is true for either case, the DG may be a significant influence on the withdrawal of people with disabilities from the labour market.

The DG explicitly targets people whose disability severely prevents them from being gainfully employed. The grant is, therefore, an explicitly targeted cash transfer, as opposed to a universal transfer where everyone within a category – such as children or the elderly – is eligible. The main benefit of targeting the beneficiaries is that it potentially saves money by reducing the "inclusion error" of universal programmes – the distribution of transfers to people who are not eligible, and eliminating "exclusion errors". The later have an effect of depriving severely disabled people of a source of social investment that can trap generations in poverty, with a social cost many times the unutilised fiscal expenditure.

Inclusion error in the DG case is, thus, the mistake of providing the social transfer to someone who either doesn't have a disability or has a disability that is not severe enough to prevent the person from being gainfully employed. Exclusion error, on the other hand, is the failure to provide a transfer to a targeted individual that has work limiting disability. The reduction of inclusion error is the potential benefit of targeting; exclusion error is part of the cost. For the purposes of this thesis, inclusion and exclusion errors have been limited to the GHS question that explores if a respondent has a disability. Therefore, the estimates of inclusion and exclusion based on this judgement at the minimum may overstate the prevalence of exclusion errors as only a proper medical assessment can potentially determine one's work capabilities. However, we would expect inclusion errors determined using the GHS method to be fairly close to the ideal estimates.

Figure 4 presents the LFPRs for individuals who are incorrectly benefiting from the DGP and those erroneously excluded from the programme. The estimates, indeed, confirm the influence of the DG on LFP as the incorrectly included recipients have similar LFPRs to people with work disabilities (legitimate beneficiaries), whilst the exclusion errors have higher LFPRs than DG recipients. However, this evidence is only tentative; an empirical analysis is required to confirm or refute this supposition.

Figure 4: Labour force participation rates of individuals incorrectly on DGP and erroneously off DGP, 2003-2007



Source: Author's calculations based on GHS, 2002-2007.

3. RELATED LITERATURE

3.1 Theory

The link between the DG and LFP is complex. Any analysis of the two should investigate whether or not receipt of the DG by individuals acts as a disincentive to seeking or keeping employment. The means test that determines eligibility to the DGP seems to penalise and de-motivate people with private savings, or those who want to take-up employment. People with disabilities are more likely to rely on the DG because of their exclusion from employment opportunities (Boardman, Grove, Perkins and Shepherd, 2003; Manning and White, 1995). Those who are employed are likely to be so on a temporary basis and are less well paid than able bodied individuals (DeLeire, 2000; Burkhauser and Daly, 1996). As a result, they often weigh the risk of losing their jobs against an otherwise guaranteed source of income through the DG (Tschopp, Perkins, Hart-Katuin, Born and Holt, 2007; McLaren, Philpott, Mdunyelwa and Peter, 2003). They argue that in the event that they are laid off from their jobs, they risk facing long delays before they start receiving government benefits again (Mitra, 2005).

3.1.1 Potential Causal Mechanisms

Reservation Wage: In the standard labour-leisure choice model, the reservation wage is a fundamental aspect of the decision on whether to work or not. The reservation wage is the amount an individual would need to earn at work in order to accept a job. For a DG beneficiary to return to work, the market wage would need to exceed the reservation wage. If leisure is assumed to be a normal good in the labour leisure choice model, the reservation wage increases as non-labour income increases (Borjas, 2000). As the disability benefits increase, non-labour income also increases, and ultimately workers want to consume more leisure and therefore a larger wage is required to induce the person to work (Bloemen and Stancanelli, 2001; Gorter and Gorter, 1993; Jones, 1988; Feldstein and Poterba, 1984).

Health Effect: The decision not to work by DG beneficiaries may not be completely explained by the reservation wage effect. Even in the presence of classification errors, the likelihood of receiving disability benefits is high among individuals with severe disabilities (diminished health stocks). At the same time, individuals with severe disabilities have a higher probability of not engaging in market activities. Therefore, the decision not to work in such circumstances may be a result of poor health rather than a preference for leisure (Kreider and Pepper, 2007; O.Donnell, 1998; Barnes, 1992).

3.2 International Evidence

While the OAP and CSG have been carefully researched, very little evidence is available on the DGP (Mitra, 2005; Mitra, 2009). Most of the research on disability benefits and labour market outcomes relates to the industrialised world where poverty and unemployment are more limited and the social security system more expansive than in South Africa (Surender, Noble, Wright and Ntshongwana, 2010). This section presents international evidence on the effect of disability benefits and labour supply. The generalisability of the findings to the South African case is however still to be determined.

Since the 1960s, the LFPRs of the elderly males in OECD countries has declined from 80 to 65 percent despite improvements in aggregate health (Staubli, 2009). This created an interest from researchers seeking to explain what seemed like an appalling phenomenon. For this reason, currently there is a substantial amount of literature focusing on the behavioural effects of disability insurance programmes as a possible explanation of the declining LFPRs (Gruber, 2000; Bound, 1989; Haveman andWolfe, 1984a; Parsons, 1980). Although there is ample literature on social security programmes and labour supply in the developed world, particularly the US and Canada[1], there still remains substantial uncertainty on the impact of the programmes.

Studies on behavioural effects of disability programmes may be categorised into two groups. On the one hand, there are studies that rely on time series variations in the legislation to identify the effect of changes in benefits or other parameters of the social security programmes. Alternatively, studies rely on cross sectional variations (e.g. across families) in benefits to identify the effect of social security benefits. Further, there are studies that utilize panel data potentially drawing on both time series and cross-sectional variation in benefits.

Behavioural cross sectional analyses suffer from the likely correlation of factors that determine benefits (e.g. previous earnings) with labour force attachment and thus confound the estimated effects of the disability insurance programme. On the other hand, studies which utilize time series analyses encounter a situation where LFP trends downward when social security benefits trend up. The causal pathway is thus affected by whether the negative relationship between benefits and labour supply is causal or is just a reflection of other variables that have also trended over time such as income or pension wealth (Krueger and Pischke, 1991).

Cross-sectional studies generally proceed by modeling LFP as a function of potential disability benefits receipt. The pioneering study in this block was by Parsons (1980) who estimated an elasticity of labour force non-participation with respect to disability benefits. With a coeffcient range of 0:4 to 0.93, his upper bound estimate implied that increases in disability benefits over the 1960s and 1970s could explain the entire trend of non-participation.

However, Bound (1989) argued that this type of strategy is likely to yield misleading inferences of the effect of DI generosity on LFP. Since DI benefits are a redistributive function of past earnings common to all workers, variation in potential benefits arises primarily from differences in earnings history across workers. This leads to a fundamental identification problem in modeling the effect of potential DI benefits on work decisions; a finding that workers with higher potential DI replacement rates are more likely to leave their jobs may simply refiect the fact that low earning workers have less desire to continue working. What is clearly needed is to identify the behavioural impact of DI benefits variation on programme generosity, which is independent of underlying tastes for work. Haveman and Wolfe (1984b) attempted to address this identification problem by replacing the actual replacement rate with a predicted value obtained from a first stage regression of the replacement rate on a set of exogenous variables. In contrast to the earlier studies, they found much lower elasticity estimates of

[1] Bound and Burkhauser (1999) provide a comprehensive review up to the year 1999.

between 0 and 0.03. To identify the replacement rate effect (or the separate wage and disability benefit effects) some exogenous variables that determine wages or (and) disability benefits must be excluded from the LFP equation. However, without a convincing justiication for their exclusion restrictions, their estimates may not be credible.

While these earlier cross-sectional studies based on US data either ignored the potential endogeneity of the replacement rate or relied on arbitrary exclusion restrictions for identification, two recent studies explore alternative identification approaches for dealing with the endogeneity of disability benefit receipt (Autor and Duggan, 2003; Gruber, 2000). Gruber (2000) employed a difference-in-difference methodology to exploit an exogenous policy change conducted in Canada in 1987, where the benefit levels of the rest of the country were adjusted upwards to meet those of the Quebec Province. Using data from 1985-1989 period, he estimated the elasticity of labour force non-participation with respect to DI benefit levels to be between 0.28 and 0.36. The identification approach and the credibility of his estimate depend on the validity of the assumption that any changes in the relative labour market conditions in Quebec as compared to the rest of the country during this period, were uncorrelated with the differential change in DI benefits.

Autor and Duggan (2003) also use differential time variation in average benefits across geographical regions to identify the impact of DI on the LFP of low skilled workers in the US. Using state level data from the Current Population Survey (CPS) and the Social Security Administration (SSA), they exploited the variation in the replacement rate due to differences across states and over time in the wage distribution, to identify the effect on low-income workers. They maintained that the widening dispersion of earnings in the US, combined with the progressivity of the disability benefits formula and the fact that DI benefits are set nationally and do not adjust for variation in regional wage levels, provide an exogenous measure of programme generosity independent of workers' underlying taste for work. They concluded that the DI system provided many low-skilled workers with a viable alternative to unemployment. They estimated that the overall unemployment rate in 1998 would have been one half a percentage point higher in the absence of the DI programme. Unfortunately, their reported estimates do not allow calculation of an elasticity that can be compared to those in other studies. The identification strategy relies on the absence of other differences across states in both the changes in labour market conditions over time as well as the impact of such changes on labour supply, which seems problematic since variation in the wage distribution over time across states can itself be expected to directly affect labour supply.

While most literature has focused on the effect of potential benefits on labour supply, there are a number of other tools available to the DI policy maker who is trying to mitigate moral hazard. Marvel (1982), Halpern and Hausman (1986), Parsons (1991) and Gruber and Kubik (1997) examined the effect of the DI denial rate on applications to DI on labour force participation. Halpern and Hausman (1986), and Parsons (1991) found a strong association between denial rates and LFP. Gruber and Kubik also found a strong association between denial rates and the labour force participation of older workers; they estimated that each 10 percentage rise in denial rates led to a statistically significant 2.8 percent fall in LFP among 45-64 year old males.

De Jong, Lindeboom and van der Klaauw (2006) investigated the effects of intensified screening of disability insurance benefit applications. A large-scale experiment was set up where in two of the 26 Dutch regions, workers of the disability insurance administration were instructed to intensely screen applications. The empirical results showed that intense screening reduces long-term absenteeism as a result of ill health and disability insurance applications. This provides evidence both for direct effects of the more intensive screening on work resumption during sickness absenteeism and for self-screening by potential disability insurance applicants.

Staubli (2009) explored the labour supply effects of a large-scale policy change in the Austrian disability insurance programme, which tightened eligibility criteria for older men. Using administrative data on Austrian private-sector employees, the results of a difference- in-difference empirical strategy suggested a substantial and statistically significant decline in disability enrolment of between 11.6 and 14.3 percentage points and a modest increase in employment of 3.2 to 4 percentage points.

4. DATA AND DESCRIPTIVE STATISTICS

The data used in this thesis comes from the GHS, conducted by Statistics South Africa - the official statistical agency in South Africa. The GHS is a nationally representative large-scale cross-sectional survey. For each round, the survey samples 10 households from each of the 3000 Enumerating Areas (EAs), giving an average sample size of 30 000 South African households across all nine provinces of the country. The first GHS was released in 2002, and subsequent surveys have been conducted annually. The survey provides a comprehensive picture of social grants coverage, labour market and general living conditions in the country.

The 2007 wave of the GHS is used to draw empirical estimates of the labour supply impact of DG receipt.

4.1 Variables

As this paper aims to assess the labour supply impact of receiving the DG, the dependent variable is a dummy variable on LFP. The dummy is coded 1 if an individual participates in the labour market and 0 if otherwise. Given the dichotomous nature of the variable, it is assumed that an individual faces the choice between participating in the labour market or not.

The key regressor is receipt of DG benefits. In order to construct this variable, a dummy variable for disability is created first. An individual is coded as having a disability if the response to the question, “Do you have a limitation in daily activities, at home, at work or at school, because of a long term physical, sensory, hearing, intellectual, or psychological condition, lasting six months or more?” is affirmative. This self-reported measure, though widely used, is likely to suffr from endogeneity (arising from measurement error), especially when used to model the effect of own disability on labour supply (Bound, 1991). Of the individuals who report having disabilities, another dummy variable is further created with code 1 if the individual receives the DG and 0 if otherwise. This becomes our treatment variable in subsequent analyses.

The potential labour market participants are assumed to make decisions based on their individual characteristics. Thus, other explanatory variables such as race, age, educational attainment, marital status and type of disability is included at the individual level. Household characteristics are controlled for in the LFP equation by variables such as the presence of infants, children aged 1-7 years, and children aged 8-15 years in the household. Similarly, the presence of a pensioner in the household is also controlled for as part of household effects. Community variations in employment opportunities are proxied by provincial dummies, district narrow unemployment and LFPRs.

Table 2 provides the characteristics of the ultimate sample presented according to the treatment status. A total of 3 293 individuals reported to have disabilities, of which 1 675 individuals (42,7 percent) receive disability benefits. The racial structure of people with disabilities is moderately similar between the treated and control cases. Both are dominated by Africans with a share of over 77 percent. The major difference within the race category occurs among Coloureds. It appears individuals within this racial group are more represented in treated cases than in the control group.

Table 2: Descriptive statistics of selected variables used in estimations

	Treated N=1675		Control N=2248		Difference	
Variable	**Mean**	**(SD)**	**Mean**	**(SD)**	**(T-C)**	**p-value**
LFP Status						
Employed	0.04	(0.20)	0.13	(0.33)	-0.08	0.000
Narrow unemployed	0.01	(0.12)	0.04	(0.20)	-0.03	0.000
Broad unemployed	0.02	(0.13)	0.06	(0.24)	-0.03	0.000
Narrow labour force	0.06	(0.23)	0.17	(0.37)	-0.11	0.000
Broad labour force	0.06	(0.24)	0.19	(0.39)	-0.13	0.000
Race						
African	0.77	(0.42)	0.79	(0.40)	-0.02	0.039
Coloured	0.18	(0.39)	0.13	(0.34)	0.05	0.000
Asian	0.02	(0.12)	0.02	(0.13)	0.00	0.659
White	0.03	(0.18)	0.05	(0.23)	-0.02	0.001
Age groups						
Age	42.08	(27.50)	49.87	(55.01)	-7.79	0.000
85-24 years	0.10	(0.29)	0.17	(0.37)	-0.07	0.000
25-34 years	0.18	(0.38)	0.19	(0.40)	0.01	0.247
35-44 years	0.25	(0.44)	0.23	(0.42)	0.02	0.212
45-54 years	0.31	(0.46)	0.25	(0.43)	0.06	0.001
55-60 years	0.17	(0.37)	0.16	(0.36)	0.01	0.600
Marital status						
Single	0.57	(0.49)	0.46	(0.50)	0.11	0.000
Married	0.23	(0.42)	0.26	(0.44)	-0.03	0.053
Cohabit	0.07	(0.26)	0.06	(0.23)	0.01	0.038
Widowed	0.08	(0.28)	0.19	(0.39)	-0.11	0.000
Divorced	0.04	(0.20)	0.04	(0.19)	0.00	0.560
Educational Attainment						
Years of Education	4.78	(4.17)	4.72	(4.31)	0.06	0.630
No Education	0.30	(0.46)	0.31	(0.46)	-0.01	0.657
Primary	0.47	(0.50)	0.47	(0.50)	0.00	0.862
Secondary	0.16	(0.37)	0.13	(0.34)	0.03	0.004
Matric	0.05	(0.23)	0.06	(0.23)	-0.01	0.942
Diploma	0.01	(0.07)	0.02	(0.15)	-0.01	0.000
Degree	0.00	(0.05)	0.01	(0.09)	-0.01	0.021
Literacy						
Can read	0.60	(0.49)	0.56	(0.50)	0.04	0.021
Can write	0.59	(0.49)	0.56	(0.50)	0.03	0.043
Province						
Gauteng	0.04	(0.21)	0.08	(0.27)	-0.04	0.000
Eastern Cape	0.18	(0.38)	0.13	(0.34)	0.05	0.000
Northern Cape	0.07	(0.26)	0.09	(0.28)	-0.02	0.172
Free State	0.09	(0.28)	0.09	(0.29)	0.00	0.466
KwaZulu Natal	0.26	(0.44)	0.25	(0.43)	0.01	0.655
North West	0.09	(0.29)	0.12	(0.33)	-0.03	0.006
Western Cape	0.12	(0.32)	0.08	(0.27)	0.04	0.000
Mpumalanga	0.07	(0.26)	0.10	(0.30)	-0.03	0.005
Limpopo	0.08	(0.27)	0.07	(0.25)	0.01	0.103
Child Status						
No children	0.33	(0.47)	0.34	(0.47)	-0.01	0.732
Infants present	0.08	(0.28)	0.08	(0.27)	0.00	0.806
Children 1-8 yrs present	0.38	(0.49)	0.39	(0.49)	-0.01	0.628
Children 8-15 yrs present	0.20	(0.40)	0.19	(0.39)	0.01	0.406
Old Aged Adults						
Over 60 year old present	0.34	(0.47)	0.51	(0.50)	-0.17	0.000
Local labour market conditions						
District unemployment rate	0.25	(0.09)	0.25	(0.08)	0.00	0.216
District narrow LFP	0.52	(0.11)	0.52	(0.11)	0.00	0.382
Impairment						
Physical	0.49	(0.50)	0.39	(0.49)	0.10	0.000
Sight	0.07	(0.26)	0.22	(0.42)	-0.15	0.000
Hearing	0.05	(0.22)	0.17	(0.38)	-0.12	0.000
Speech	0.04	(0.20)	0.03	(0.16)	0.01	0.005
Mental	0.21	(0.41)	0.12	(0.32)	0.09	0.000
Emotional	0.13	(0.34)	0.07	(0.26)	0.06	0.000
Distance to welfare office						
Less than 30 min	0.89	(0.45)	0.89	(0.47)	0.00	0.775
More than 30 min	0.11	(0.39)	0.11	(0.40)	0.00	0.875

Source: Author's calculations based on GHS, 2007.

Note: Standard deviations (SD) are shown in paranthesis.

On average individuals in the treatment group are 42 years old with 4.8 years of schooling, whilst individuals in the control group are 50 years old with 4.7 years of schooling. The key difference within the age structure occurs among individuals aged between 18 and 24 years: treated individuals are less likely to be in this age group compared with individuals in the control group. Pensioners are more represented in control households than in treated households, whilst individuals with physical disability are more prevalent in the treated group compared with the control group. There are no substantial differences between the treated and control groups with regards to educational attainment, provincial dummies, presence of children, local labour market conditions, and distance to the nearest welfare office. The table thus highlights the role of randomization: it appears the distribution of covariates between treated and control groups is overall not significantly different.

5. MODELLING STRATEGY

5.1 Theoretical Model: Static Model of Labour Supply

The labour supply effect of DG receipts can be modelled through a static model. Following the works of Cahuc and Zylberberg (2004), Kaufman and Hotchkiss (2000) , Ehrenberg and Smith (2000) and Killingsworth (1983), consideration is given to a representative individual between the working ages of 18-60 years who reports having a disability. The individual is faced with a choice to allocate time between market and non-market activities. Each choice stems from the inherent intention of the individual to maximise an independent utility function composed of consumption and leisure. The utility is maximised subject to a budget constraint (Blundell and Macurdy, 1999; Leuthold, 1968). Therefore, let h and C denote the individual's hours of work and private consumption respectively. The price of the consumption is considered to be a numaraire. The individual's utility is thus

$$U = f\,(1 - h, C) \qquad (1)$$

where U is strongly quasi-concave, strictly monotone (increasing) and twice continuously differentiable. Also, let w and y be the individual's wage income and non-labour income respectively. In seeking to maximise utility, the individual is constrained by an income level required to purchase consumption and by implication leisure time, thus:

$$C = wh + y \qquad (2)$$

The individual choice problem is thus:

$$\max_{h,C} U\,(1 - h, C) \qquad (3)$$

subject to

$$wh + y = C \qquad (4)$$

5.1.1 Including the Disability Grant

The above framework models an individual's LFP and hours of work, h, as a function of individual preferences, unearned income y and potential wage w. Labour force participation depends on whether the potential wage exceeds the individual's reservation wage (Kaufman and Hotchkiss, 2000). The potential wage is a function of human capital, and traits such as age, race, education and local labour market conditions. On the other hand, the reservation wage reflects the valuation of an individual's non-market time, and depends on factors such as individual's disability (health) status D, taste for leisure and unearned income y. Unearned income is composed of the individual's income net of any earnings w. Thus, an individual's LFP, h, is ultimately a function of unearned income y, disability status H, and other socio-economic characteristics that affect the reservation wage and potential age w:

$$h = f\,(y, D, w) \qquad (5)$$

The individual disability status (D) has two implications; the health effect (H) discussed earlier and potential transfer payment component (DG). Therefore unearned income y, is a function of the DG and other socio-economic factors x:

$$y = g\ (DG,\ x) \tag{6}$$

Thus:

$$h = f\ (g\ (DG, x)\ ,H\ ,w) \tag{7}$$

Substituting (7) in (3) gives

$$\max U\ [(1 - f\ (g\ (DG, x)\ ,H\ ,w)\ )\ ,C] \tag{8}$$

subject to:

$$w\ [f\ (g\ (DG, x)\ ,H\ ,w] + g\ (DG, x) = C \tag{9}$$

The solution to the above model clearly suggests that the DGP affects labour participation through the health effect (*H*) and pure-income effect (*DG*). However, it is impossible to adequately separate the two effects into standalone components in an empirical framework. The various types of disability are included in the empirical analyses to control for the health effect. It is assumed that each type of disability represents a different individual health state. For example, an individual with a physical disability is accordingly expected to have a different probability of performing market activities compared with an individual with a hearing disability.

5.2 Empirical Models

5.3 The Probit Common Effect Model

Until recently, the standard way to estimate the effect of treatment on labour market outcomes with cross sectional data was to control for observable differences between treated and non-treated individuals using ordinary least squares (OLS) linear regression (Vandenberghe and Robin, 2004). The standard probit model is similar to OLS regression except that it is applied to a categorical dependent variable as opposed to a continuous variable. Consistent with this approach, let Y_i be the probability of LFP (outcome measure), and D_i be the treatment indicator, where $D_i = 1$ if an individual with a disability receives the DG and $D_i = 0$ if an individual with a disability does not receive the DG. The observed LFP outcome is, therefore, estimated using the following standard probit regression:

$$Y_i = \alpha + \beta X_i + \delta D_i + \varepsilon_i \tag{10}$$

Where Y_i is the probability of LFP (= 1 if an individual participates in the labour market and 0 if not), X_i is a vector of control variables at the individual, household and community levels and ε_i is the error term proxying unobservables that affect LFP.

The variable X_i is a vector of demographic and socio-economic covariates that affect the likelihood of participating in the labour market. It therefore includes variables such as age, race, educational attainment, household composition, marital status, gender, and local labour market conditions. In this base model or the "benchmark" case, the treatment dummy gives the coefficient δ for the average effect of DG on the probability of LFP of the recipients (*ATT*). If the regressors included in the vector X_i perfectly control for the determinants of participating in the labour market (individual characteristics and other factors), the probit estimate, $\hat{\delta}$ yields an unbiased estimate of *ATT*. This approach assumes that there is no correlation between the DG take-up and unobservable factors that affect LFP.

5.4 Instrumental Variable (IV) Two-Stage Least Squares Regression

The assumption of no correlation between DG take-up and unobservable factors is unfortunately too strong, especially in relation to issues of disability as the possibility of of endogenous participation in the DGP is of concern. There may be systematic differences between DG recipients and non-recipients. Such a possibility yields a biased probit coefficient of the *ATT*. Specifically, enrolment is likely to be higher among individuals with severe disabilities, a possibility that simultaneously deters their participation in the labour market. Therefore, the coefficient associated with DG dummy may be confounded with the effect of the unobserved (selection) variables. Controlling for the type of disability in (10) may potentially reduce the bias, but not completely remove the confounding effect. It is, therefore, important to control for the adverse selection problem, thus reducing the distortion on the labour supply impact of the DGP.

To fix this problem an instrument for DG receipt is required. To this end, an instrumental variable (*IV*) estimation strategy is implemented. Theoretically, this strategy consists of estimating a two-stage regression model. In the first stage, the treatment outcome (probability of receiving disability benefits) is estimated against all the exogenous variables, X_i and the instrument Z. The instrument introduces an element of randomness into assignment to treatment and ultimately:

$$D_i = \alpha + \lambda X_i + {}_{\tau}Z + \eta_i \quad (11)$$

The predicted cDi from (11) is added to the regression of

$$Y_i = \alpha + \beta X_i \mathrm{i} + \widehat{\delta D_i} + \varepsilon_i \quad (12)$$

in the second stage. If a suitable instrument exists, (11) and (12) will give an unbiased estimate of *ATT*. Failure to find a good instrument has often been the major drawback affecting reliability of *IV* estimates. Z qualifies to be a valid instrument if it affects the probability of receiving the DG, without itself being affected by any confounding factors that influence probability of participating in the labour market-outcome variable (Wooldridge, 2002). Therefore,

$$E\,(D_i \mid Z) \neq 0 \quad (13)$$

but:

$$E\,(Z \mid \varepsilon_i) = 0 \quad (14)$$

A categorical variable, *DIST*, distance to the welfare office is used to instrument receipt of the DG. The dummy is coded 1 if an individual resides less than 30 minutes from public transport and 0 if otherwise. Table 5.4 presents the results (marginal effects) of a first stage probit regression of DG receipt on distance to welfare office (instrument) and other various controls. The full set of first stage *IV* probit results are shown in Table 9 (see appendix). The results confirm that the instrument fulfils the first condition necessary to be a valid instrument: the marginal effect of being located closer to public transport significantly increases the likelihood of receiving the disability grant.

Table 3: Sensitivity of disability grant take-up to distance to the nearest welfare office

Variable	**Full sample with disabilities (1)**	**Males with disabilities (2)**	**Females with disabilities (3)**
≤30 min to welfare office	0.085**	0.078**	0.091*
	(0.033)	(0.046)	(0.050)
Other controls			
Individual	Yes	Yes	Yes
Household	Yes	Yes	Yes
Spatial	Yes	Yes	Yes
Observations	2,398	1,254	1,144

Source: Author's calculations based on GHS, 2007.
Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

However, the second condition (non-correlation with the residuals of the LFP equation) cannot be tested empirically, thus the choice of a valid instrument largely depends on intuition and economic theory. There are intuitive arguments making distance to nearest welfare office an important predictor of receiving disability benefits.

As Mitra (2005) notes, people with disabilities may not have access to disability programmes because of limited geographical access to welfare offices that provide information on eligibility, application procedures and the actual receipt of benefits and services. Physical accessibility is determined by the distance to the nearest welfare office as well as access to public transport.

Similarly, van der Westhuizen and van Zyll (2002) identified accessibility of services, especially in rural areas as the major problem hindering the uptake of social programmes. Sparsely populated interior regions and bad roads were observed to be major obstacles to delivery of services. Transport costs are a major obstacle that deter poor people from travelling to departmental offices to apply for grants or to pay-points to collect grants. Provinces with sparsely populated areas struggle to reach grant recipients. It is against this background that DG take-up is instrumented with 'distance to the nearest welfare office' a categorical variable equal to 1 if an individual resides less than 30 minutes drive to the welfare office and 0 if otherwise. Distance to welfare office is expected to have an influence on LFP only via its effect on DG take-up.

5.5 Results for Probit and Probit IV Regressions

Table 5.5 reports extracts of probit and probit IV regressions results respectively. The full results for both specifications are reported in Tables 8 and 10 (see appendix). In both specifications, estimation is initially done for the full sample and then separately for males and females. The average effect of receiving disability benefits on LFP (ATT) was captured by DG dummy in a standard probit, whilst in probit IV, ATT was estimated using a two stage least squares regression.

Using probit regressions, it is found that receipt of disability benefits reduces the probability of participating in the labour force by 22.3 percent for the full sample regression. When the sample is restricted to males only, the disincentive effect marginally declines to 21.6 percent, whilst restricting the sample to females yields a marginal effect slightly higher (23.3 percent) than in the other two cases.

Table 4: Probit and Probit IV estimation results (marginal effects) of labour force participation, 2007

		Probit			**Probit IV**	
Variable	**All (1)**	**Males (2)**	**Females (3)**	**All (4)**	**Males (5)**	**Females (6)**
Disability Grant (ATT)	-0.223***	-0.216***	-0.233***	-0.265***	-0.276**	-0.298*
	(0.023)	(0.033)	(0.031)	(0.254)	(0.327)	(0.397)
Other controls						
Individual	Yes	Yes	Yes	Yes	Yes	Yes
Household	Yes	Yes	Yes	Yes	Yes	Yes
Spatial	Yes	Yes	Yes	Yes	Yes	Yes
Disability severity	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,398	1,254	1,141	2,398	1,254	1,141

Source: Author's calculations based on GHS, 2007.
Notes: Robust standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

When DGP participation is instrumented with distance to nearest welfare office , the findings suggest that enrolled individuals are more likely to withdraw from the labour force than was reported in probit regressions. Specifically, the marginal effect of receiving disability benefits on the probability of withdrawing from the labour market is 26.5 percent for the full sample, more than four percent higher than reported in the standard probit regression. The effect is similarly higher for both males and females, although with reduced statistical significance for females. While our instrument passed the under-identification tests, the discrepancy in probit and probit IV results, although marginal, suggest that our instrument may have been weak. In particular we might be concerned that without adequate controls for urban/rural residence of DG applicants, distance to the welfare office may just be picking effects that otherwise would be picked by the urban/rural variable. Further, because employment opportunities are limited in rural areas, distance to welfare office may not only ifluence LFP via DG take-up, but may proxy the direct rural/urban effect on LFP. This adds credence to the idea that our instrument may be weak. The following section, thus, implements yet another estimation technique to check the robustness of the above results.

5.6 Robustness Check: The Evaluation Problem

The standard *probit* and *probit IV* techniques assume that DG effect is uniform across the distribution of covariates and is adequately captured by the coefficient of the DG dummy. Nonetheless, economic theory provides no justification for such a linear restriction which poses a major drawback. Therefore, the probit and IV analyses are complemented with a non-parametric propensity score matching approach following the works of Caliendo and Kopeinig (2008); Dehejia (2005); Dehejia and Wahba (2002); Smith and E Todd (2005); Heckman, Ichimura and Todd (1997); Rosenbaum and Rubin (1983); and Rosenbaum and Rubin (1983).

Propensity score matching is implemented in two steps. Firstly, a probability model is estimated to calculate the probability (or propensity score) of receiving disability benefits for each observation. In the second step, each recipient is matched to a non-recipient with similar propensity score values, in order to estimate the average treatment effect for the treated (ATT). Various matching methods have been developed to match recipients with non-recipients of similar propensity scores. Asymptotically, all matching methods should yield similar results. However, in practice, there are trade-offs in terms of bias and efficiency with each method (Caliendo and Kopeinig, 2008). This study implements the nearest neighbour, radius, local linear regression, kernel, and stratification based matching algorithms.

Following Rosenbaum and Rubin (1983), the PSM approach considers a random sample n of 18 - 60 year old individuals with disabilities drawn from a sample of size N where $n_i < N$. N is, thus, the size of the admissible population. Each person within the sample is exposed to a binary treatment $D_i \in \{1, 0\}$; $D_i = 1$, if the person is enrolled in the DGP (treated), and $D_i = 0$ if the person does not receive disability benefits (control). Each participant in both the control and treated groups has a vector of pre-treatment characteristics:

$$X_i = [X_{i,1}, X_{i,2}; \ldots X_{i,k}] \qquad (15)$$

with $k > 1$ and $i \in \{1, 2, ..., n\}$. The pre-treatment characteristics include vocational factors such as age, gender, marital status, household composition, provincial dummies as well as educational attainment levels. Let $\phi_{X|D=1}$ and $\phi_{X|D=2}$ represent the densities of these covariates in the treatment and control population respectively. Y_i (W_i) is assumed to denote the pair of potential labour market participation outcomes that individual i attains if they are exposed to the treatment and vice-versa. The LFP status of each individual is thus:

$$Y_i = LFP_i = Y_i\,(1)\,D_i + (1 - D_i)\,Y_i\,(0) \qquad (16)$$

From (16) it is apparent that an individual cannot be observed in both states at the same time: that is both participating and not participating in the labour market.[2] However, for each individual one can simultaneously observe D, Y_i and X_i . For each unit, the unobserved treatment effect Θ is defined as:

$$\Theta_i = Y_i(1) - Y_i(0) \qquad (17)$$

5.6.1 Identification

For the purposes of this study, the interest is in measuring the probability of LFP for people who have been treated. This has traditionally been de.ned as the Average Treatment Effect on the Treated (*ATT*):

$$\Theta = \underbrace{E\,[Y\,(1)\,|\,D = 1]}_{identified} - \underbrace{E\,[Y\,(0)\,|\,D = 1]}_{counterfactual} \qquad (18)$$

first part of (18) can be easily estimated fromthe data. The second part $E\,[Y\,(0)\,|\,D = 1]$ is, however, not identified, as it is not possible to observe an individual receiving and not receiving the DG simultaneously. The only information available about Y (0) is in the admissible population not exposed to the treatment. Identification of this part entails using propensity score matching. The closer the propensity score, the better the match. It is crucial to ensure that the people who are selected into the control group are not sys- tematically different from the treated individuals, otherwise the identification process will be exposed to selection bias. Therefore, four crucial assumptions are required to ensure identification.

[2] It is possible to observe an individual in either state if one is using longitudinal data and the treatment is only administered some time after observation of the sample had started.

5.6.2 Assumptions

5.6.3 Conditional Independence Assumption

The conditional independence assumption,

$$Y(0) \perp D \mid X \tag{19}$$

requires that conditioning on treatment, the potential outcomes of the treated and control groups are similar. This assumption is valid insofar as the unobservables are unrelated to the probability of receiving the DG once one has conditioned on the relevant observable individual attributes. That is, the set of *X'*s should contain all the variables that jointly influence LFP with no-treatment as well as the selection into treatment. Selection on unobservables is thus ignorable.

5.6.4 Stable Unit Treatment Value Assumption

It is further required that potential labour market participation outcome of an individual be unaffected by the particular assignment of treatment to other persons. This excludes interference of outcomes among individuals and non-identical versions of treatment.

5.6.5 Exogeneity

$$X = X(1) = X(0) \tag{20}$$

Treatment should not have a causal impact on X, otherwise conditioning is partly on the effect. If violated, the average treatment effect Θ is still identified but can not be considered as causal.

5.6.6 Common Support Condition

$$0 < p(x) < 1, \forall x \in X \tag{21}$$

Expression (21) is the propensity score denoted:

$$P(\text{Disability Grant} \mid X) \equiv p(x) \tag{22}$$

which is the probability that an individual with disabilities receives the DG conditional on the corresponding vector of covariates (X).[3]

The propensity score provides a way of comparing those who are treated against those who are not treated in the sample. It is a measure of proximity between sample units that summarises all the information on the covariates set X into a single dimension vector so that comparison between units can be conducted on a probability level. When the propensity score is similar between a DG recipient and a non-recipient, the outcome of interest from the non-recipient individual can serve as the 'counterfactual' outcome that the recipient would have had in the event of not receiving the disability grant. Once each recipient is matched to a non-recipient, the matching procedure goes on to compare average outcomes between recipients and non-recipients.

5.7 Empirical Strategy

5.8 Estimating Propensity Scores

The empirical strategy to evaluate the effect of the disability benefits on LFP on matching methods. The key issue upon which validity of results rests is the choice of comparison units. The propensity scores are estimated first using a probit model. The dependent variable is the DG dummy. Table 5 presents the results (marginal effects) of implementing a probit model on the determinants of

[3] These are not the same Xs as would be selected when running a standard instrumental variables (IV) regression; in that case one would want Xs correlated with receipt of disability grant but not related with labour market status.

receiving the DG. The estimates show that several variables are significantly associated with receipt of DG. Relative to Africans, Coloureds have a higher likelihood of receiving the DG, whilst Asians and Whites are less likely to receive the DG. Restricting the sample to males and females yields a statistically insignificant race effect on receipt of the DG. Age is positively related with DG receipt for both males and females: older individuals have a higher likelihood of receiving the DG than younger individuals (18-24 years).

Table 5: Sensitivity of disability grant receipt to vocational factors (marginal effects of a probit model)

Variable	All individuals with disabilities (1)	Males with disabilities (2)	Females with disabilities (3)
Coloured	0.065*	0.059	0.070
	(0.040)	(0.054)	(0.061)
Asian	-0.032	0.023	-0.078
	(0.091)	(0.132)	(0.127)
White	-0.059	-0.068	-0.052
	(0.062)	(0.083)	(0.097)
Male	0.019		
	(0.022)		
25-34 years	0.127***	0.132***	0.130**
	(0.036)	(0.046)	(0.057)
35-44 years	0.202***	0.222***	0.192***
	(0.034)	(0.043)	(0.055)
45- 54 years	0.253***	0.239***	0.277***
	(0.035)	(0.046)	(0.055)
55-60 years	0.198***	0.201***	0.210***
	(0.038)	(0.050)	(0.059)
Married	-0.053*	-0.048	-0.060
	(0.030)	(0.044)	(0.044)
Cohabit	-0.044	-0.020	-0.072
	(0.041)	(0.057)	(0.061)
Widowed	-0.010	-0.050	-0.004
	(0.046)	(0.088)	(0.056)
Divorced	-0.042	-0.089	0.000
	(0.055)	(0.082)	(0.075)
Primary	-0.085***	-0.087**	-0.079**
	(0.025)	(0.035)	(0.036)
Secondary	-0.070**	-0.068	-0.065
	(0.032)	(0.045)	(0.047)
Diploma	-0.436***	-0.302***	-0.565***
	(0.060)	(0.107)	(0.034)
Degree	-0.270*	-0.320*	-0.207
	(0.150)	(0.179)	(0.291)
Eastern Cape	0.222***	0.161**	0.285***
	(0.043)	(0.066)	(0.056)
Northern Cape	0.129**	0.091	0.171**
	(0.056)	(0.081)	(0.080)
Free State	0.173***	0.154**	0.190***
	(0.048)	(0.071)	(0.067)
KwaZulu-Natal	0.130***	0.068	0.194***
	(0.048)	(0.072)	(0.065)
North West	0.068	0.062	0.078
	(0.052)	(0.076)	(0.074)
Western Cape	0.223***	0.202***	0.243***
	(0.050)	(0.072)	(0.072)
Mpumalanga	0.113**	0.001	0.221***
	(0.052)	(0.083)	(0.063)
Limpopo	0.183***	0.162**	0.192***
	(0.049)	(0.071)	(0.070)
Means-test	-0.354***	-0.361***	-0.354***
	(0.034)	(0.052)	(0.046)
Sight	-0.215***	-0.219***	-0.218***
	(0.035)	(0.049)	(0.050)
Hearing	-0.234***	-0.281***	-0.200***
	(0.039)	(0.060)	(0.053)
Speech	0.057	0.044	0.060
	(0.057)	(0.078)	(0.086)
Mental	0.044	0.017	0.084*
	(0.031)	(0.040)	(0.049)
Emotional	0.080**	0.075	0.087*
	(0.034)	(0.048)	(0.051)
Household size	0.002	0.006	-0.003
	(0.004)	(0.005)	(0.006)
District unemployment rate	-0.008	0.056	-0.041
	(0.149)	(0.211)	(0.217)
30 min to welfare office	0.023**	0.013*	0.023
	(0.024)	(0.033)	(0.035)
30 min to public transport	0.062***	0.052**	0.077*
	(0.035)	(0.048)	(0.053)
Observations	2,398	1,254	1,144

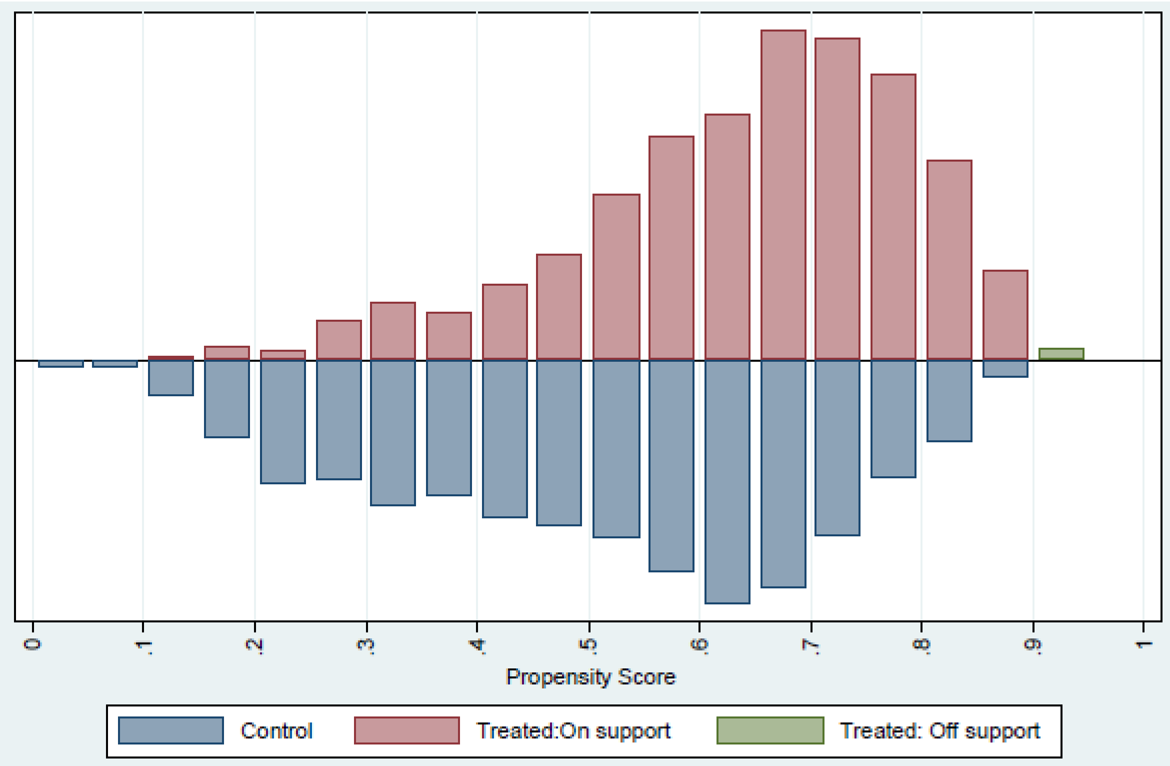
Source: Author's calculations based on GHS, 2007.
Notes: Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Marital status and household size are not significant predictors of DG receipt for both males and females, whilst, as expected, there is an inverse association between educational attainment and receipt of DG. Relative to individuals with no formal education, individuals with post-primary education are less likely to receive the DG. The effect appears to increase with each successive educational cohort for both males and females. Barring the North West province, all other provinces have a higher probability of having DG recipients compared to Gauteng. Individuals with emotional disabilities are more likely to receive the DG relative to individuals with physical disabilities, whereas individuals with sight and hearing disabilities are less likely to receive the DG compared with individuals with physical disabilities. Finally, the closer an individual resides to the welfare office, and public transport, the higher the probability of receiving disability benefits.

5.9 Common Support Check

Before estimating the causal effects of the DG on labour supply, it is essential to check the region of common support and determine if there is enough overlap between the treated and control cases. Figure 5, a histogram of the estimated propensity scores, provides a simple diagnostic on the data. A visual inspection of the density of distributions of the estimated propensity scores of recipients and non- recipients shows that the common support condition is satisfied.

Figure 5: Histogram of estimated propensity scores



Note: 'Treated: on support' indicates the observations in the treated group that have a suitable comparison, while 'Treated: off support' indicates the observations in the treated group that do not have a suitable comparison.

The upper half (in red) shows the treated cases, while the control cases in blue are graphed in the lower half. Treated cases are restricted within propensity scores of 0.1 and 0.9 whilst control cases span the whole range of the propensity score, but above 0.9. Both treated and control cases are concentrated above propensity scores of 0.5. It thus appears there is no common support problem.

5.10 Covariate Balance Checking

Propensity score methodology relies on balancing the observed distribution of covariates across DG recipients and non-recipients (Lee, 2006). The balancing test is implemented after matching to check if differences in the covariates observed between DG recipients and non-recipients before matching were eliminated by matching. If no differences are observed after matching, the DG non-recipients are considered a plausible counterfactual. Of the several balancing tests explored in the literature, the mean absolute standardized bias (MASB) is the most widely used (Rosenbaum and Rubin, 1985). A standardized difference of greater than 20 per cent should be considered too large and an indicator that the matching process has failed (Rosenbaum and Rubin, 1983). If an affirmative result is achieved, the propensity score method becomes a reliable alternative to randomized clinical trials in terms of the bias introduced by using non-experimental data.

Table 6 presents balance check results before and after matching. Each row shows the mean of a variable for both treated and control groups. Further, the percentage bias (standardised difference between the mean of treated and control groups for the same variable) is also shown. An additional column for the percentage reduction in bias (how much of the bias was eliminated by matching), is included for the matched cases. Balance is achieved if the p-value for the difference in treated and control means is not statistically significant for all variables. The results show that a number of variables failed the balance test pre-matching, though all the bias was eliminated through matching.

Table 6: Balancing tests on all covariates before and after matching with propensity scores

	Unmatched				Matched				
	Mean		% bias	p value	Mean		% bias	% red bias	p value
Variable	**Treated**	**Control**			**Treated**	**Control**			
Race									
African	0.766	0.794	-6.6	0.039	0.77	0.79	-3.9	40.8	0.139
Coloured	0.185	0.134	13.9	0.000	0.186	0.188	-0.4	97.2	0.923
Asian	0.016	0.017	-1.4	0.659	0.013	0.021	-6.7	-366.9	0.081
White	0.033	0.054	-10.5	0.001	0.030	0.029	0.3	96.7	0.911
Gender									
Male	0.555	0.465	18.1	0.000	0.534	0.515	3.8	78.8	0.309
Female	0.445	0.535	-18.1	0.000	0.465	0.484	-3.8	78.8	0.309
Age groups									
18-24 years	0.095	0.167	-21.3	0.000	0.092	0.076	4.8	77.3	0.119
25-34 years	0.176	0.194	-4.7	0.247	0.174	0.171	0.7	84.5	0.842
35-44 years	0.255	0.233	5.1	0.212	0.254	0.251	0.8	83.9	0.829
45-54 years	0.308	0.248	13.4	0.001	0.311	0.302	2.1	84.6	0.596
55-60 years	0.166	0.158	2.1	0.600	0.169	0.179	-2.7	-25.3	0.487
Marital Status									
Single	0.572	0.455	23.5	0.000	0.556	0.530	5.3	77.5	0.163
Married	0.230	0.256	-6.3	0.053	0.230	0.235	-1.2	81.6	0.755
Cohabit	0.073	0.057	6.7	0.038	0.079	0.069	3.7	43.8	0.350
Widowed	0.083	0.193	-32.2	0.000	0.088	0.091	-1.0	96.8	0.742
Divorced	0.042	0.039	1.9	0.560	0.047	0.053	-2.9	-53.1	0.491
Educational Attainment									
No education	0.302	0.309	-1.4	0.657	0.277	0.311	-7.4	-409.4	0.148
Primary	0.471	0.474	-0.6	0.862	0.474	0.464	2.0	-250.4	0.598
Secondary	0.164	0.131	9.3	0.004	0.179	0.186	-2.0	78.4	0.626
Matric	0.055	0.055	-0.2	0.942	0.062	0.054	3.4	-1333.5	0.375
Diploma	0.005	0.023	-14.5	0.000	0.006	0.006	0.6	95.8	0.808
Degree	0.002	0.008	-7.8	0.021	0.003	0.005	-2.9	62.5	0.365
Literacy									
Can read	0.600	0.563	7.5	0.021	0.627	0.612	3.0	59.6	0.416
Can write	0.593	0.561	6.5	0.043	0.621	0.608	2.6	60.6	0.487
Province									
Gauteng	0.044	0.079	-14.6	0.000	0.096	0.038	0.6	96.0	0.846
Eastern Cape	0.179	0.131	13.2	0.000	0.180	0.168	3.3	74.8	0.399
Northern Cape	0.073	0.085	-4.4	0.172	0.076	0.071	1.8	58.6	0.613
Free State	0.085	0.092	-2.4	0.466	0.089	0.077	4.0	-69.0	0.275
KwaZulu Natal	0.257	0.250	1.4	0.655	0.247	0.259	-2.9	-103.4	0.436
North West	0.093	0.120	-9.0	0.006	0.096	0.111	-4.6	48.6	0.217
Western Cape	0.117	0.078	13.2	0.000	0.117	0.123	-1.9	85.5	0.643
Mpumalanga	0.072	0.098	-9.2	0.005	0.078	0.073	1.8	80.6	0.618
Limpopo	0.079	0.066	5.2	0.103	0.078	0.084	-2.5	53.0	0.535
Child status									
No children	0.333	0.338	-1.1	0.731	0.351	0.385	-7.3	-561.8	0.113
Infants present	0.084	0.081	0.8	0.806	0.082	0.101	-7.0	-779.2	0.078
Children 1-7 years present	0.380	0.388	-1.6	0.628	0.369	0.335	7.0	-347.5	0.059
Children 8-15 years present	0.202	0.192	2.7	0.406	0.198	0.199	-0.4	86.7	0.925
Pensioner									
Over 60 year old present	0.338	0.512	-35.7	0.000	0.291	0.285	1.2	96.7	0.740
Local Labour mkt conditions									
District unemployment rate	0.250	0.247	4.0	0.216	0.249	0.247	2.5	38.1	0.528
District narrow LFP	0.519	0.522	-2.8	0.382	0.517	0.517	0.6	80.3	0.881
Disability									
Physical	0.485	0.389	19.5	0.000	0.500	0.533	-6.7	65.6	0.107
Sight	0.075	0.223	-42.6	0.000	0.076	0.068	2.2	94.7	0.423
Hearing	0.053	0.173	-38.5	0.000	0.052	0.050	0.7	98.2	0.798
Speech	0.042	0.025	9.1	0.005	0.038	0.040	-0.8	91.3	0.846
Mental	0.214	0.118	26.2	0.000	0.200	0.172	7.7	70.6	0.053
Emotional	0.130	0.072	19.6	0.000	0.133	0.144	-3.8	80.7	0.383
Distance to welfare office									
Less than 30 min	0.896	0.869	8.4	0.110	0.896	0.869	8.2	-7.5	0.110
More than 30 min	0.104	0.104	8.3	0.112	0.104	0.104	8.3	-7.3	0.112

Source: Author's calculations based on GHS, 2007

5.11 Results from Matching

Table 7 reports the estimates of the average labour supply effects of DG receipt estimated by nearest neighbour, radius, local linear regression, kernel and stratification matching algorithms. As a sensitivity analysis, the radius matching is implemented at three caliper sizes of 0.01, 0.02, and 0.05.

All the analyses were based on implementation of common support, so that the distribution of DG recipients and non-recipients were located in the same domain. Bootstrap standard errors based on 400 replications are also reported.

Table 7: Average Treatment Effects Results

Matching Method	Bandwidth	Caliper	ATT	Standard Error	Observations	
					Treated	**Controls**
Nearest Neighbour			-0.213***	(0.026)	1418	563
Radius Matching		r=0.05	-0.200***	(0.018)	1418	965
		r=0.02	-0.197***	(0.018)	1415	965
		r=0.01	-0.197***	(0.020)	1414	963
Local Linear Regression	b=0:18		-0.194***	(0.015)	1411	965
Kernel	b=0:14		-0.197***	(0.016)	1418	965
Stratification			-0.192***	(0.017)	1418	965
Nearest Neighbour			-0.184***	(0.038)	759	292
		Males				
Radius Matching		r=0.05	-0.196***	(0.028)	753	477
		r=0.02	-0.194***	(0.027)	759	483
		r=0.01	-0.198***	(0.028)	759	483
Local Linear Regression	b=0:18		-0.196***	(0.020)	757	483
Kernel	b=0:14		-0.197***	(0.026)	759	483
Stratification			-0.193***	(0.025)	759	483
		Females				
Nearest Neighbour			-0.176***	(0.037)	659	263
Radius Matching		r=0.05	-0.199***	(0.028)	655	467
		r=0.02	-0.195***	(0.027)	658	473
		r=0.01	-0.192***	(0.027)	659	474
Local Linear Regression	b=0:18		-0.193***	(0.022)	656	474
Kernel	b=0:14		-0.187***	(0.029)	659	474
Stratification			-0.190***	(0.026)	659	474

Source: Author's calculations based on GHS, 2007
Notes: Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

The outcome variable is narrow LFP. In order to further understand the labour supply impact of DG receipt on different recipients, the differential impact is examined by dividing the sample into males and females. In each subset of the sample, the first row shows the results from nearest neighbour matching algorithm. The next three rows report the results from radius matching, with radii of 0.01, 0.02 and 0.05. Local linear regression and kernel based matching results are shown in the last two rows.

In all cases the results indicate that receipt of DG has a negative and significant effect on the probability of participating in the labour market. The decline in probability of LFP ranges from 19.2 to 21.3 percent for the full sample, 18.4 to 19.8 percent for males, and 17.6 to 19.9 percent for females. This is the average difference in probabilities of participating in the labour force for similar individuals that belong to different DG status (i.e. recipients and non-recipients). These results are consistent with the probit results discussed in section 5.5.

6. CONCLUSION

This paper investigated the impact of disability receipts on LFP in South Africa. The study utilised data from the 2007 wave of the GHS. The effect of disability benefits on LFP was estimated using a standard probit and probit IV regressions to control for observable variables and possible endogeneity of DGP participation. A variety of propensity score matching techniques were implemented to assess the robustness of the results. This helped in estimating the true effect of labour supply effect of disability benefits by controlling for the role of selection on enrolment to the DGP. Individuals with disabilities who receive disability benefits served as the treated group, while individuals with disabilities but not receiving disability benefits were the control cases.

Two main conclusions can be drawn from these results. Firstly, all of the results suggest that the DGP appears to have altered the labour market behaviour of working age individuals. The standard probit and PSM results suggest that individuals receiving disability benefits would have their probability of participating in the labour force increase by between 19.2 and 22.3 percent had they not been receiving the grant, whilst the effect is larger for the IV regression. These results confirm a commonly held view among observers that the DGP promotes dependency by reducing labour supply.

However, one cannot completely ascertain the true labour supply effect of the DGP. A major concern arises from the inadequacy of the available data to control for the severity of disability of beneficiaries. Should there be differences in disability severity (health effect) between DG recipients and non-recipients, the effect of the DG on labour supply would be contaminated. Thus in as much as it is undisputable that the DGP does have some work disincentive effect, it is impossible to differentiate the reservation wage effect and the health effect from the observed overall effect.

Nonetheless, since inclusion and exclusion errors in disability tagging equally affect both the treated and control groups, it may not be entirely incorrect to assume that eligibility to the DGP satis.es the principles of randomisation. In this case the estimated coefficients in the paper will represent the true labour supply effects of the DGP. This may prove useful given some of the concerns among policy makers especially with regards to ensuring that people with disabilities are rehabilitated and eventually return to useful employment. Specifically, efforts to administer the DGP efficiently and effectively should focus on inventing a more systematic evaluation of potential DGP applicants, which would reduce the possibility of inclusion and exclusion errors.

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APPENDIX

Table 8: Probit estimates (marginal e¤ects) of labour force participation, 2007

	All observations with disabilities			Males with disabilities			Females with disabilities		
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Disability grant	-0.311***	-0.294***	-0.223***	-0.263***	-0.248***	-0.216***	-0.338***	-0.316***	-0.233***
	(0.010)	(0.022)	(0.022)	(0.014)	(0.022)	(0.021)	(0.013)	(0.029)	(0.028)
Coloured		0.028	0.017		0.010	0.006		0.008	0.006
		(0.029)	(0.029)		(0.022)	(0.021)		(0.043)	(0.045)
Asian		0.049	0.059		0.010	0.020		0.088***	0.076***
		(0.046)	(0.042)		(0.040)	(0.034)		(0.016)	(0.018)
White		0.022	0.005		0.002	0.009		0.049	0.041
		(0.035)	(0.040)		(0.030)	(0.034)		(0.031)	(0.033)
25-34 years		0.020	0.026		-0.010	-0.011		0.081	0.103*
		(0.030)	(0.031)		(0.020)	(0.018)		(0.054)	(0.058)
35-44 years		-0.030	-0.026		-0.021	-0.021		0.002	0.013
		(0.026)	(0.026)		(0.018)	(0.017)		(0.042)	(0.042)
45-54 years		-0.056**	-0.045*		-0.025	-0.020		-0.049	-0.026
		(0.027)	(0.027)		(0.020)	(0.019)		(0.039)	(0.040)
55-60 years		-0.063**	-0.064**		-0.038**	-0.040***		-0.018	-0.004
		(0.027)	(0.025)		(0.017)	(0.014)		(0.046)	(0.047)
Married		0.109***	0.079***		0.075**	0.049*		0.103**	0.080**
		(0.031)	(0.029)		(0.030)	(0.027)		(0.042)	(0.039)
Cohabit		0.075*	0.048		0.061	0.038		0.029	0.014
		(0.041)	(0.038)		(0.041)	(0.034)		(0.049)	(0.043)
Widowed		0.051	0.029		0.071	0.047		0.027	0.022
		(0.052)	(0.048)		(0.069)	(0.059)		(0.057)	(0.055)
Divorced		0.105*	0.095		0.126	0.111		0.029	0.021
		(0.062)	(0.060)		(0.077)	(0.072)		(0.065)	(0.060)
Primary		0.071***	0.065**		0.037*	0.031		0.063	0.064*
		(0.027)	(0.027)		(0.020)	(0.019)		(0.039)	(0.038)
Secondary		0.134***	0.107***		0.044	0.027		0.196***	0.191***
		(0.042)	(0.041)		(0.031)	(0.027)		(0.070)	(0.074)
Matric		0.308***	0.272***		0.134**	0.105*		0.375***	0.370***
		(0.067)	(0.068)		(0.061)	(0.056)		(0.112)	(0.120)
Diploma		0.528***	0.490***		0.403***	0.318**		0.644***	0.668***
		(0.094)	(0.102)		(0.135)	(0.135)		(0.132)	(0.135)
Degree		0.516***	0.395**		0.409*	0.309		0.648**	
		(0.163)	(0.183)		(0.214)	(0.202)		(0.275)	
Eastern Cape		-0.047	-0.039		-0.036*	-0.027		-0.054	-0.054*
		(0.033)	(0.034)		(0.022)	(0.023)		(0.036)	(0.032)
Northern Cape		0.048	0.021		0.036	0.018		-0.025	-0.037
		(0.055)	(0.049)		(0.050)	(0.042)		(0.050)	(0.040)
Free State		-0.031	-0.025		-0.054***	-0.047***		0.045	0.044
		(0.035)	(0.036)		(0.012)	(0.012)		(0.061)	(0.061)
KwaZulu-Natal		-0.003	-0.003		-0.010	-0.009		-0.021	-0.022
		(0.039)	(0.039)		(0.031)	(0.029)		(0.045)	(0.042)
North West		-0.036	-0.035		-0.024	-0.020		-0.034	-0.034
		(0.033)	(0.033)		(0.024)	(0.023)		(0.038)	(0.035)
Western Cape		-0.036	-0.032		-0.013	-0.009		-0.054	-0.048
		(0.038)	(0.038)		(0.033)	(0.033)		(0.035)	(0.033)
Mpumalanga		-0.035	-0.031		-0.009	-0.004		-0.064**	-0.059**
		(0.033)	(0.033)		(0.029)	(0.030)		(0.027)	(0.025)
Limpopo		-0.076**	-0.081***		-0.040**	-0.038**		-0.074**	-0.076***
		(0.030)	(0.026)		(0.020)	(0.017)		(0.029)	(0.022)
Means-test		0.942***	0.946***					0.960***	0.968***
		(0.008)	(0.008)					(0.010)	(0.009)
Infants present		-0.029	-0.021		-0.020	-0.006		-0.004	0.006
		(0.028)	(0.029)		(0.022)	(0.025)		(0.040)	(0.042)
Children 1-7 present		-0.004	0.002		-0.003	0.000		0.006	0.021
		(0.020)	(0.020)		(0.015)	(0.015)		(0.029)	(0.029)
Children 8-15present		0.021	0.026		0.017	0.021		0.019	0.027
		(0.026)	(0.026)		(0.021)	(0.021)		(0.036)	(0.037)
Pensioner present		0.008	0.013		0.012	0.016		0.003	0.010
		(0.021)	(0.020)		(0.017)	(0.017)		(0.026)	(0.026)
Local unemployment rate		0.099	0.095		0.207**	0.177**		-0.171	-0.122
		(0.113)	(0.111)		(0.088)	(0.084)		(0.149)	(0.141)
Local LFPR		0.179*	0.121		0.079	0.052		0.123	0.045
		(0.106)	(0.105)		(0.080)	(0.075)		(0.144)	(0.138)

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	All observations with disabilities			Males with disabilities			Females with disabilities		
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Sight			0.128***			0.073**			0.125**
			(0.036)			(0.033)			(0.053)
Hearing			0.108***			0.035			0.161***
			(0.039)			(0.032)			(0.059)
Speech			0.130**			0.058			0.180*
			(0.065)			(0.052)			(0.106)
Mental			-0.068***			-0.037***			-0.054*
			(0.020)			(0.013)			(0.028)
Emotional			-0.018			-0.024			0.042
			(0.028)			(0.016)			(0.047)
Observations	3,923	2,435	2,398	1,975	1,167	1,147	1,947	1,161	1,141

Source: Author's calculations based on GHS, 2007.
Note: Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 9: First stage - Distance to the nearest welfare office as a predictor of disability grant receipt (marginal effects of probit estimates)

Variables	Full sample with disabilities (1)	Males with disabilities (2)	Females with disabilities (3)
Coloured	0.075*	0.072	0.073
	(0.039)	(0.053)	(0.060)
Asian	-0.031	0.058	-0.085
	(0.091)	(0.130)	(0.123)
White	0.011	0.029	-0.025
	(0.062)	(0.081)	(0.098)
25-34 years	0.107***	0.110**	0.112*
	(0.037)	(0.048)	(0.058)
35-44 years	0.169***	0.193***	0.153***
	(0.035)	(0.045)	(0.057)
45-54 years	0.216***	0.220***	0.215***
	(0.036)	(0.047)	(0.058)
55-60 years	0.172***	0.193***	0.163***
	(0.040)	(0.051)	(0.063)
Married	-0.048	-0.053	-0.047
	(0.031)	(0.045)	(0.043)
Cohabit	-0.037	-0.028	-0.056
	(0.041)	(0.057)	(0.061)
Widowed	-0.006	-0.042	0.022
	(0.045)	(0.088)	(0.055)
Divorced	-0.058	-0.110	-0.000
	(0.054)	(0.080)	(0.074)
Primary	-0.115***	-0.128***	-0.103***
	(0.027)	(0.038)	(0.039)
Secondary	-0.105***	-0.107**	-0.100**
	(0.035)	(0.049)	(0.051)
Matric	-0.136***	-0.162**	-0.119
	(0.048)	(0.065)	(0.074)
Diploma	-0.436***	-0.307***	-0.566***
	(0.061)	(0.110)	(0.035)
Degree	-0.292**	-0.354**	-0.194
	(0.142)	(0.165)	(0.287)
Eastern Cape	0.232***	0.168**	0.291***
	(0.046)	(0.072)	(0.060)
Northern Cape	0.119**	0.078	0.159*
	(0.057)	(0.084)	(0.082)
Free State	0.174***	0.158**	0.185***
	(0.049)	(0.071)	(0.069)
KwaZulu-Natal	0.139***	0.084	0.187***
	(0.052)	(0.078)	(0.072)
North West	0.085	0.081	0.090
	(0.056)	(0.081)	(0.080)
Western Cape	0.232***	0.204***	0.256***
	(0.048)	(0.071)	(0.069)
Mpumalanga	0.104**	-0.007	0.212***
	(0.053)	(0.084)	(0.065)
Limpopo	0.205***	0.189**	0.204***
	(0.053)	(0.076)	(0.079)
Infants present	-0.029	-0.010	-0.060
	(0.041)	(0.062)	(0.057)
Children 1-7 years present	-0.009	0.043	-0.075*
	(0.026)	(0.034)	(0.040)
Children 8-15 years present	0.025	0.032	-0.001
	(0.031)	(0.042)	(0.047)
Pensioner present	0.080***	0.097***	0.073**
	(0.024)	(0.035)	(0.036)
Local unemployment rate	0.078	0.140	0.081
	(0.148)	(0.211)	(0.214)
Local LFPR	0.072	0.027	0.102
	(0.132)	(0.181)	(0.198)
Sight	-0.250***	-0.260***	-0.255***
	(0.033)	(0.047)	(0.047)
Hearing	-0.256***	-0.333***	-0.192***
	(0.038)	(0.055)	(0.053)
Speech	0.041	0.021	0.044
	(0.057)	(0.079)	(0.087)
Mental	0.046	0.012	0.080*
	(0.030)	(0.040)	(0.049)
Emotional	0.073**	0.060	0.091*
	(0.034)	(0.048)	(0.050)
30 min to p/transport	0.085**	0.078*	0.091*
	(0.033)	(0.046)	(0.050)
Observations	2,398	1,254	1,144

Source: Author's calculations based on GHS, 2007.

Notes: Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Table 10: Second-stage probit IV estimates (marginal effects) of labour force participation, 2007

	All observations with disabilities			Males with disabilities			Females with disabilities		
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Disability Grant	-0.394***	-0.303***	-0.265***	-0.314***	-0.292***	-0.276***	-0.338***	-0.313***	0.298***
	(0.041)	(0.062)	(0.254)	(0.056)	(0.087)	(0.327)	(0.060)	(0.089)	(0.397)
Coloured		0.010	0.037		0.005	0.011		0.019	0.056
		(0.029)	(0.029)		(0.040)	(0.042)		(0.043)	(0.041)
Asian		0.067	0.055		0.074	0.066		0.079	0.063
		(0.044)	(0.047)		(0.054)	(0.056)		(0.055)	(0.063)
White		0.070**	0.064**		0.055	0.047		0.102***	0.096***
		(0.028)	(0.029)		(0.041)	(0.042)		(0.032)	(0.033)
25-34 years		0.122***	0.058		0.082*	0.034		0.189***	0.101
		(0.037)	(0.045)		(0.046)	(0.054)		(0.066)	(0.078)
35-44 years		0.117***	0.027		0.086*	0.022		0.175***	0.047
		(0.037)	(0.052)		(0.046)	(0.066)		(0.064)	(0.087)
45-54 years		0.119***	0.005		0.076	-0.006		0.197***	0.036
		(0.039)	(0.061)		(0.050)	(0.077)		(0.065)	(0.101)
55-60 years		0.041	-0.044		-0.011	-0.065		0.125*	-0.005
		(0.039)	(0.046)		(0.045)	(0.052)		(0.071)	(0.084)
Married		0.071***	0.085***		0.119***	0.125***		0.035	0.061
		(0.024)	(0.028)		(0.039)	(0.043)		(0.031)	(0.038)
Cohabit		0.041	0.051		0.093*	0.095*		-0.012	0.007
		(0.031)	(0.034)		(0.049)	(0.051)		(0.038)	(0.044)
Widowed		0.032	0.030		0.082	0.071		-0.001	0.003
		(0.037)	(0.036)		(0.081)	(0.077)		(0.040)	(0.041)
Divorced		0.102**	0.130**		0.185**	0.204**		0.045	0.089
		(0.047)	(0.053)		(0.080)	(0.086)		(0.057)	(0.069)
Primary		-0.012	0.033		-0.016	0.014		-0.006	0.057
		(0.022)	(0.034)		(0.031)	(0.045)		(0.032)	(0.051)
Secondary		0.005	0.046		-0.039	-0.016		0.063	0.131**
		(0.027)	(0.039)		(0.032)	(0.044)		(0.043)	(0.067)
Matric		0.094**	0.162**		0.025	0.059		0.186**	0.300***
		(0.043)	(0.066)		(0.049)	(0.072)		(0.073)	(0.111)
Diploma		-0.010	0.230		-0.076*	0.019		0.097	0.534*
		(0.056)	(0.199)		(0.045)	(0.165)		(0.116)	(0.301)
Degree		0.058	0.212		0.038	0.130			
		(0.116)	(0.183)		(0.127)	(0.198)			
Eastern Cape		0.082	-0.030		0.133*	0.036		-0.006	-0.111*
		(0.052)	(0.064)		(0.079)	(0.107)		(0.061)	(0.061)
Northern Cape		0.112**	0.040		0.137*	0.072		0.052	-0.020
		(0.056)	(0.057)		(0.082)	(0.085)		(0.075)	(0.070)
Free state		0.099*	0.002		0.014	-0.040		0.159**	0.019
		(0.053)	(0.059)		(0.063)	(0.067)		(0.079)	(0.092)
KwaZulu-Natal		0.066	-0.001		0.069	0.017		0.047	-0.030
		(0.043)	(0.050)		(0.063)	(0.072)		(0.059)	(0.067)
North West		-0.002	-0.036		-0.018	-0.046		-0.007	-0.041
		(0.039)	(0.037)		(0.053)	(0.048)		(0.053)	(0.051)
Western Cape		0.093	-0.030		0.153	0.037		0.028	-0.087
		(0.059)	(0.065)		(0.093)	(0.112)		(0.072)	(0.069)
Mpumalanga		0.041	-0.008		0.081	0.034		-0.004	-0.053
		(0.043)	(0.043)		(0.069)	(0.071)		(0.052)	(0.051)
Limpopo		0.003	-0.080*		0.005	-0.062		-0.001	-0.098*
		(0.052)	(0.045)		(0.073)	(0.067)		(0.072)	(0.058)
Infants present		-0.075***	-0.066***		-0.043	-0.036		-0.093***	-0.083***
		(0.021)	(0.022)		(0.036)	(0.037)		(0.027)	(0.029)
Children 1-7 years		-0.035**	-0.030*		-0.050**	-0.048**		-0.025	-0.017
		(0.017)	(0.017)		(0.023)	(0.022)		(0.026)	(0.027)
Children 8-15 years		-0.004	-0.013		-0.006	-0.012		-0.002	-0.016
		(0.021)	(0.022)		(0.030)	(0.029)		(0.031)	(0.032)
Pensioner present		-0.003	-0.034		0.000	-0.021		0.003	-0.042
		(0.020)	(0.024)		(0.029)	(0.035)		(0.028)	(0.036)
Local unemployment		-0.082	-0.119		0.153	0.111		-0.338**	-0.365**
		(0.106)	(0.105)		(0.145)	(0.143)		(0.156)	(0.156)
Local LFPR		0.201**	0.141		0.261**	0.198		0.104	0.044
		(0.096)	(0.098)		(0.130)	(0.132)		(0.143)	(0.146)
Sight			0.159*			0.096			0.250
			(0.092)			(0.110)			(0.157)
Hearing			0.109			0.086			0.155
			(0.091)			(0.118)			(0.150)
Speech			0.108**			0.110			0.099
			(0.054)			(0.075)			(0.080)
Mental			-0.085***			-0.087***			-0.070**
			(0.020)			(0.026)			(0.033)
Emotional			-0.003			0.021			-0.028
			(0.030)			(0.044)			(0.042)
Observations	2,398	2,398	2,398	1,254	1,254	1,254	1,144	1,141	1,141

Source: Author's calculations based on GHS, 2007.
Notes: Standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1

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