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THE IMPACT OF THE CHILD SUPPORT GRANT ON GRADE REPETITION AND CHILD HUNGER: EVALUATING THE SOUTH AFRICAN EXPERIENCE USING PROPENSITY SCORE MATCHING

Mduduzi BIYASE[*]
University of Johannesburg, South Africa

Talent ZWANE
University of Johannesburg, South Africa

Abstract. This paper investigates the impact of the Child Support Grant (an unconditional transfer which provides cash to poverty-stricken households in order to alleviate poverty) on child hunger and grade repetition in South Africa. The study is based on the National Income Dynamics Study (NIDS) data set for South Africa for the year 2008. We account for the non-random selection of recipient households by using propensity score matching method. The results show that the Child Support Grant has a negative, although, limited effect on child hunger and grade repetition in South Africa.

JEL Classification: I38, I21, O15

Keywords: propensity score matching, Child Support Grant, child hunger, grade repetition

1. Introduction

Child Support Grant is increasingly becoming an important and promising tool for assisting the most vulnerable households in South Africa. This grant was introduced in 1998 with an explicit aim of reducing poverty and providing needed support to vulnerable households in South Africa. There is some encouraging empirical evidence to suggest that the Child Support Grant can help in the way of improving the well-being of the beneficiaries. In particular, various studies assessing the impact of the Child Support Grant have shown positive results on several dimensions of socioeconomic well-being, including, grade repetition, incidences of illness, and creche or daycare and attendance (see Budlender, Burns & Woolard 2007); school enrolment, attendance and learning (see Heinrich et al 2012 , Case et al 2005, Eyal et al 2013, Coetzee 2012); child hunger, weight and height z scores, and child labour (see Samson et al 2012 Samson et al 2008, Williams & Samson 2007, Aguero et al. 2009, Budlender & Woolard 2006, Boler 2007 and Samson et al. 2004). However less research has been undertaken to explore the impact of the Child Support Grant on grade repetition and child hunger.

[*] Corresponding author. Address: University of Johannesburg, Economics departament, South Africa, E-mail: mbiyase@uj.ac.za, Tel: 0115594482

Moreover, while evidence from the above studies is beginning to shed some light on the potential impact of the Child Support Grant on various socioeconomic indicators, the Child Support Grant has not been as broadly and rigorously studied as Conditional Cash Transfers (CCTs) programs in Latin America. These are similar schemes which provide cash support to certain households conditional on certain behaviours on the part of the household –conditions explicitly related to schooling, visit health clinics, school attendance, school enrolment, child vaccination, etc. Some of the well documented programe, include the Program Keluarga Harapan and Program Nasional Pemberdayaan Masyarakat-Generasi Sehat dan Cerdas in Indonesia, *Juntos* in Peru, Progresa or Oportunidades in Mexico, Education Sector Support Project in Cambodia, Bolsa Escola and Bolsa Familia in Brazil, *Familias en Acción* in Colomia, Red de Proteccion Social in Nicaragua, Programa de Asistencia Familiar in Honduras, Mi Familia Progresa in Guatemala, Program of Advancement through Health and Education in Jamaica, Food-for-Education in Bangladesh, and Program Minhet El-Osra in Egypt.

This paper attempts contributes to a small but growing literature on the effects of the Child Support Grant by addressing two main questions: First, we investigate whether receiving the Child Support Grant help to reduce grade repetition. Secondly, we examine the impact of the Child Support Grant on child hunger in South Africa. The article is structured as follows. Section 2 presents the literature survey, section 3 describes the data and variables used in the statistical analysis, Section 4 describe the method used, Section 5 discusses the results and Section 6 concludes.

2. Literature review

In this section we review studies on the impact of cash transfer on hunger and academic performance. A considerable body of evidence exists on the impact of cash transfers on children's schooling and hunger, for example Williams 2007 on South Africa, Cardoso 2004 on Brazil, Samson et al 2008 on South Africa, Skoufias and Parker 2001 on Mexico, Eyal and Woolard 2013 on South Africa, Kaziaga and de Walque 2013 on Burkina Faso, Bundlender and Woolard 2006 on South Africa, Heinrich et al 2012 on South Africa, Behrman and Parker 2010 on Latin America, Samson et al 2004 on South Africa, Glewwe and Kassouf 2010 on Brazil, Schady and Arajo 2006 on Ecuador, and Maluccio and Flores 2005 on Nicaragua.

The impact of cash transfer on hunger and education indicators

Although cash transfers in general have the potential to increase education, the impact of cash transfer seems to be influenced by the type of cash transfer used – conditional or unconditional transfer. For instance CCTs, where transfers are normally conditional on children enrolling in school and attendance rate generally show a strong impacts on schooling compared to unconditional transfers.

For instance, de Brauw et al 2014 examined the impact of Bolas Familia on school enrolment and other educational indicators such as dropout rates, grade progression, and grade repetition in Brazil. Using a longitudinal household data and treatment effect method (propensity score), they find that Bolas Familia causes an 8 percentage points increase in school participation and 10 percentage points increase

in grade progression, “with large, significant effects across both younger and older girls in rural areas but concentrated among girls aged 15–17 years in urban areas” (de Brauw et al 2014: 1). Similarly, Cardoso and Souza (2003) studied the impact of Bolsa on child labour and school attendance among ten to fifteen year-old poor children in Brazil. They found that these programs have a significant impact on increasing school attendance. Specifically, they found that the average treatment effect causes an increase of 3 percentage point in school attendance among boys (similar findings were also obtained for boys). Bourguignon et al. (2002) confirm these findings based on 2009 Pesquisa Nacional por Amostra de Domicílios (PNAD) data in Brazil. Specifically they find that the scheme had significant and positive effect on the enrolment rates and in child labour. These results are echoed by Soares et al. (2010) in their paper, “Evaluating the Impact of Brazil’s Bolsa Famila”

Similar evidence is available from other countries. For example, Maluccio and Flores (2005) found that the *Red de la Proteccion Social* in Nicaragua induced a 17.7 percentage point increase in school enrolment and school attendance (20 percent) for the targeted group. Moreover, the program also induced an average net increase of 7.3 percentage points for the students in grade 1 to 4. In Honduras, Glewwe and Olinto (2004) found that the *Programa de Asignacion Familiar (PRAF)* was responsible for a 1 to 2 percentage point increase in school enrolment, and a 2 to 3 percentage point reduction in school dropout rate. Schady and Araujo (2006) in Ecuador using a randomised experiment showed that the CCT had a bigger impact of approximately 10 percentage point increase in school enrolment.

As for unconditional cash transfers such as the Child Support Grant in South Africa – transfers not conditional on children enrolling in school and attendances rate, the impact is rather marginal. For instance, Coetzee (2011) examined the impact of the Child Support Grant on child health, nutrition and education in South Africa. Using the propensity score matching on the National Income Dynamics Study, the author find that the unconditional grant had a surprisingly modest impact on the wellbeing of the beneficiary children. In her view this might be explained by the fact that the transfers are unconditional and is likely to be used for other purposes other than child health, nutrition and education.

Similarly, Budlender and Woolard (2006) assessed the impact of the Child Support Grant and old age grants on children’s schooling and work in South African. Using, Project for Statistics on Living Standards and Development (PSLSD) survey conducted by the Southern African Labour & Development Research Unit (SALDRU) of the University of Cape Town and the World Bank in 1993, they find that while the Child Support Grant has a statistically significant impact on school enrolment, the magnitude is very small.

Samson and Heinrich (2009) applied the propensity score matching method to examine the impact of CSG in South Africa. After adjusting for the differences between the treatment and the control groups, the authors concluded that the impact on the beneficiaries of the Child Support Grant on reducing hunger was 2 to 3 times higher than the unmatched differences of 0.024. In addition, Samson and Heinrich (2009) noted that the beneficiaries of Child Support Grant had a positive and statistical significant impact on school enrolment. There is not much written on the impact of the Child Support Grant on child hunger (with William (2007) and Samson et al (2008) being an exception)) and grade repetition for the Africa which makes it difficult to compare it to other schemes elsewhere.

Although evidence seem to suggest that unconditional cash transfer appear to have a smaller impact compared to CCT, it is difficult to generalise — there are variations in the findings. For example, Case et al. (2005) find that the beneficiaries of the Child Support Grant in KwaZulu Natal was associated with an 8.1 percentage point increase in school enrolment among the 6 year olds, and a corresponding 1.8 points for 7 year olds. A study by Akresh et al. (2013) which attempted to compare a UCT to a CCT conditional on enrolment in Burkina Faso, found no significant difference between the UCT and the CCT. Interestingly enough, a paper entitled " Turning a Shove into a Nudge?" by Benhassine et al (2014) found that adding formal conditions on attendance in Morocco tended to decrease the overall impact on participation and learning.

3. Data and variables used

To investigate the impact of the Child Support Grant on grade repetition and child hunger in South Africa, we employ the National Income Dynamics Study (NIDS). The NIDS is an ongoing longitudinal panel survey with representative data for the South African population. During the first wave, 7683 households were interviewed, generating a sample of over 28,000 persons. NIDS has been conducted since 2008, and covers a wide range of topics, including household's positive or negative shocks (a death in the family or an unemployed relative obtaining a job). It also provides useful information on issues related to poverty and well-being; household composition and structure; fertility and mortality; migration; labour market participation and economic activity; human capital formation, health and education; vulnerability and social capital. Detailed description of the dataset is available at *www.nids.uct.ac.za*. We limit our analysis to the first wave (2008) of the NIDS since the information related to child hunger is only available for wave 1. In the NIDS data the questions related to child hunger incidence and grade repetition were asked as follows:

"In the past 12 months, how often did any child in this household go to bed hungry because there wasn't enough food?"

"Has this child ever repeated a grade?"

In this paper we used two dependent variables: child hunger and grade repetition. The relevant regressors are drawn from the existing empirical literature in this field. The following table provides a brief description of the variables used in the study.

Table 1: explanatory variables used in the empirical analysis

Explanatory variables	**Description**
Household size	total number of members in the household
Age	age of household head (in years).
Employed	employment status of the household head(empl = 1 and unempl= 0)
Married	marital status of the household head (marr = 1 and not mar = 0)
Female	gender of the household head (male = 1 and female = 0)
Coloured	Race of the household head (Coloured = 1 and 0 otherwise)

Indian	Race of the household head (Indian = 1 and 0 otherwise)
White	Race of the household head (White = 1 and 0 otherwise)
Urban	household in Urban area (1/0)
Farms	household in farming areas (1/0)
Eastern Cape	household in Eastern cape (1/0)
Northern Cape	household in Northern Cape (1/0)
Free State	household in Free State (1/0)
KwaZulu-Natal	household in KwaZulu-Natal (1/0)
North West	household in North West (1/0)
Gauteng	household in Gauteng (1/0)
Mpumalanga	household in Mpumalanga (1/0)
Limpopo	household in Limpopo (1/0)
Primary	Head of household with Matric (1/0)
Secondary	Head of household with secondary education(1/0)
Tertiary	Head of household with tertiary education(1/0)

4. Methodology

This section describes the method used to evaluate the effect of the Child Support Grant on child hunger and grade repetition in South Africa. Evaluating the impact of a program like the Child Support Grant can be extremely challenging if there is no good comparison group. When programs have experimental designs in which treatment (children receiving the Child Support grant in this case) and control groups (children not receiving the Child Support Grant in this case) are randomly assigned, we can safely assume that the main difference between the treatment group and the control group is due to the program. However, such evaluations are difficult to undertake which force researchers to use the propensity score method, defined as the conditional probability of being treated given the covariates. This method accounts for non-random selection and match each treated observation (children receiving the Child Support grant) with a similar control observation (children not receiving the Child Support grant) on the basis of their propensity scores. This in turn enables the researcher to interpret the outcome of the control observation as the counterfactual outcome of the treated observation in the absence of treatment

We adopt a three-step estimation procedure to investigate the effect of the Child Support Grant on child hunger and grade repetition. In the first step, we estimate a logit model. Drawing on previous literature, we carefully select sociodemographic determinants of child hunger and child repetition. These include age of the head of household, household income and household size, gender of the household head. The results based on the logit model are presented in appendix (Table A.1). In the second step, the estimates of the logit model are used to compute the propensity score, based on the probability of receiving the Child Support Grant. In the third step, the propensity score derived from the logit model is used to match the receiving households with non-receiving households.

Table A.2 (see appendix) presents the results of the t-test for differences between the receiving households and non-receiving households within the common support region. It is clear from the table that the common support assumption was fulfilled because observations in both groups (the receiving households with non-receiving households) are very similar and no systematic differences is observed.

According to the tests, it can be reasonably argued that the balancing property was achieved and that potential selection bias has been systematically reduced. A look at the difference in means suggest that the socio-economic characteristics are most statistically insignificant.

The propensity score index is defined as the probability of receiving treatment conditional on observed covariates X:

$$\mathbf{P(X) = Pr(D = 1 \mid X)} \quad \textbf{(1)}$$

Where P(X) is the abbreviation for propensity score
Pr is a probability,
D=1 indicates exposure to the treatment,
the "|" symbol stands for conditional on,
and X is a set of observed covariates.

One of the important caveats for using the PSM is that it relies on rather restrictive assumption. More specifically, it assumes that the outcomes are independent of program participation conditional on a particular set of observable characteristics – after controlling for X, the treatment assignment is "as good as random". This is commonly referred to as the conditional independence assumption or the assumption of selection on observables (Rosenbaum and Rubin (1983); Heckman and Robb (1985)).

$$\mathbf{Y^0, Y^1 \perp D \mid X} \quad \textbf{(2)}$$

Where: the symbol ⊥ denotes independence and
D=1 indicates exposure to the treatment,
the "|" symbol stands for conditional on,
X is a set of observed covariates and $Y^0 \; and \; Y^1$ are potential outcomes

Since estimates are sometimes sensitive to the choice of matching technique, we implement two frequently used approaches. We consider nearest neighbour matching (NNM) and kernel-based matching (KBM). With nearest neighbour matching, each member of the treatment group is matched to a non-treated unit using the closest propensity score. Whilst the kernel-based matching the propensity score of each treated unit is matched with the kernel weighted average outcome of all non-treated units. Some researchers (see Ravallion (2005)) insist that the property of balancing distribution of observable covariates between the treated and control groups should be fulfilled. This is important, particularly if the assignment of treatment is not randomized. We use the pstest command for this. The results in Table A2 show that the balancing requirements were satisfied.

5. Results

Before we proceed to presenting empirical results, we provide a descriptive analysis indicating how child hunger and grade repetition is distributed across South Africa by race. Table 1 shows child hunger by race in 2008. Perhaps unsurprisingly, African children are over-represented among those affected by hunger. The incidence of hunger experienced by African children is reported as roughly more than two times as large as that for Coloured group and exceeds that of whites by several times.

Table 2: Child hunger by race in South Africa, 2008

Race	Child hunger
African	31.26
Coloured	13.71
Asian/Indian	16.47
White	2.90

Source: Own calculations using NIDS data

A similar pattern is observed with grade repetition by race. In 2008, African learners were more vulnerable to grade repetition (43 percent), a higher percentage than the percentages for White, Coloured, or Indian learners. The percentages of Coloured learners (22 percent) who had been retained in a grade were higher than the percentages of White (7 percent) and Asian (3 percent) students who had been retained.

Table 3: grade repetition by race in South Africa, 2008

Race	Grade repetition
African	43.42
Coloured	22.58
Asian/Ind	3.14
White	7.36

Source: Own calculations using NIDS data

Table 4 and 5 present the matching estimates of the impact of the child Support Grant on child hunger in South Africa for the nearest neighbour matching and kernel-based matching estimators described above. Although the effect of the Child Support Grant is negative across estimators (nearest neighbour matching and kernel-based matching estimators), it is statistically insignificant. The estimate of the difference in reduction in hunger between those who are receiving and the non-recipients is fairly consistent across the matching methods, ranging from 1.1 to 2.4 percentage points. This finding is similar to what has been documented in previous South African studies (see Samson et al 2008).

Table 4: Average treatment effect of the Child Support Grant on child hunger in SA, 2008

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Nearest neighbour matching						
Child hunger	Unmatched	0.37557	0.28235	0.09321	0.01708948	5.45
	ATT	0.37557	0.38688	-0.0113	0.030894017	-0.37

Table 5: Average treatment effect of the Child Support Grant on child hunger in SA, 2008

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Kernel-based matching						
Child hunger	Unmatched	0.37557	0.28235	0.09321	0.01709	5.45
	ATT	0.37557	0.39985	-0.0243	0.02331	-1.04

Table 6 and 7 present the estimate of the impacts of the Child Support Grant on the academic performance – measured by grade repetition, using the estimated propensity score and the two matching methods (nearest neighbour matching and kernel-based) described above . Using the nearest neighbour method, the results in Table 6 show no statistically significant impact of the Child Support Grant on grade repetition. For the robustness check of this result, we used the kernel-based matching method. Consistent with the nearest neighbour matching method estimate, the impact of the Child Support Grant estimates in Table 7 yield no statistically significant impact of the Child Support Grant on grade repetition. Our results are inconsistent with the results of existing studies (see Heinrich (2005) and Behrman, Sengupta and Todd (2005)) that find that Conditional cash transfers significantly reduce grade repetition. As noted in the previous section, it is possible that Conditional cash transfers have a bigger impact simply because of their design features (monitored and enforced).

Table 6: Average treatment effect of Child Support Grant on grade repetition in SA, 2008

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Nearest neighbour matching						
Grade repetition	Unmatched	0.54478	0.51789	0.02689	0.04788	0.56
	ATT	0.54478	0.5597	-0.0149	0.09225	-0.16

Table 7: Average treatment effect of the Child Support Grant on grade repetition in SA, 2008

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Kernel-based matching						
Grade repetition	Unmatched	0.54478	0.51789	0.02689	0.04788	0.56
	ATT	0.54478	0.58327	-0.0385	0.07316	-0.53

6. Conclusions

Child Support Grant (an unconditional transfer which provides cash to poverty-stricken households in order to alleviate poverty) remains an important instrument of social protection in South Africa, reaching millions of South African children every month. It is a good example of firming government's capacity to redistribute resources to those who are most in need. There is also growing evidence suggesting that there are many poor households who benefit from it, and that it substantially covers basic needs that otherwise would go unmet.

While various studies assessing the impact of the Child Support Grant have shown positive results on several dimensions of socioeconomic well-being, their effects on grade repetition and child hunger has not been as extensively examined in South Africa. This paper contributed to the body of work on the impact of Child Support Grant by using the South Africa National Income Dynamics Study (NIDS) data set for the 2008 wave and by focusing on the effect of the Child Support Grant on child hunger and grade repetition in South Africa.

We adopt the propensity score matching method to address the problems of selectivity. The results do not suggest any impacts: Child Support Grant estimates yield no statistically significant impact on grade repetition and child hunger. This result is important as it suggest that Child Support Grant are only a small part of necessary changes to improve social protection programs in South Africa which are aimed at eradicating extreme poverty and other related challenges. Thus there is need for the Child Support Grant to be interrelated with other reforms if governments really want to address other socio-economic challenges (child hunger and grade repetition).

A P P E N D I X

Table A1: Estimation of the propensity scores, logit model estimating the probability of receiving Child Support Grant in South Africa, 2008

CSG	Coefficient	SE
Urban	-0.31302***	0.128353
Farms	-0.06316	0.185679
Primary	0.20504	0.129131
Secondary	0.28115	0.15222
Matric	-0.09567	0.208194
Tertiary	-0.37892	0.3183
HHHgender	3.497936***	0.176054
HHHage	-0.0505***	0.003891
Eastern Cape	0.735253***	0.230653
Northern Cape	0.140836	0.235449
Free State	0.423383	0.262333
KwaZulu-Natal	0.532154***	0.230785
North West	0.524002	0.2737

Gauteng	0.54161**	0.252569
Mpumalanga	0.594578**	0.264891
Limpopo	0.249654	0.258743
hhsizer	0.030226	0.018728
HHHunempl	0.478649***	0.132587
HHHmarried	-0.01599	0.116548
IncomePC	-0.00074***	0.000107
Coloured	-0.06708	0.196595
Asian/Indian	-0.76174	0.848505

Notes: Standard Errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table A2: Covariate balance check and absolute bias reduction

Mean	t-test		V(T)/			
Variable	Treated	Control	%bias	t	p>t	V(C)
Urban	.41968	.44616	-5.3	-1.12	0.261	.
Farms	.07579	.07958	-1.3	-0.30	0.766	.
Primary	.35633	.35114	1.1	0.23	0.819	.
Secondary	.34502	.34705	-0.4	-0.09	0.929	.
Matric	.09729	.10901	-3.8	-0.81	0.418	.
Tertiary	.02262	.02391	-0.6	-0.18	0.858	.
HHgender	.95475	.94625	2.2	0.82	0.410	.
HHage	43.734	42.992	5	1.09	0.274	0.83*
Eastern Cape	.1776	.19548	-4.9	-0.96	0.335	.
Northern Cape	.06335	.05921	1.6	0.36	0.717	.
Free State	.06674	.06179	2	0.42	0.671	.
KwaZulu-Natal	.28733	.26145	5.9	1.22	0.223	.
North West	.06787	.06657	0.5	0.11	0.913	.
Gauteng	.08484	.09147	-2.3	-0.49	0.623	.
Mpumalanga	.07692	.0701	2.6	0.55	0.583	.
Limpopo	.10747	.11133	-1.3	-0.26	0.795	.
HHsizer	4.7896	4.6524	5.4	1.11	0.266	0.87*
HHunempl	.21946	.2057	3.9	0.71	0.480	.
HHmarried	.20362	.21542	-2.6	-0.61	0.542	.
IncomePC	448.99	476.86	-1.5	-0.87	0.383	0.36*
Coloured	.0905	.0933	-0.8	-0.20	0.838	.
Asian/Indian	.00226	.00214	0.1	0.06	0.955	.

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