The paper studies the impact of non-personnel funding on school outcomes in South Africa. The results show a small but positive effect of resources on student throughput during the last years of high school, and on the number of students writing the matriculation exam. However, additional resources do not translate into a higher number of successful exams, leading to an overall negative effect on pass rates. It is suggested that these findings may have to do with schools reacting to the per-pupil nature of funding.
INTRODUCTION

Student learning is the outcome of a variety of factors/inputs. The framework of the so-called “educational production function” is used in much of the applied literature that examines the impact of additional resources on educational outcomes (Hanushek, 2006; Gibbons and McNally, 2013). Little credible evidence exists on the effect of non-personnel school expenditures on educational outcomes in developing countries.

South Africa represents an interesting case to study with regards to school resources and performance - inequalities in both are huge, due to the historical legacy of apartheid. The present study exploits the peculiar way in which these resources are allocated in South Africa. Government funding follows quintiles constructed on the basis of school poverty scores (see Figure 1). This creates discrete jumps in the allocation of funding, which can be used to analyze its effect on school outcomes at the end of high school, using a regression discontinuity (RD) approach. In South Africa, almost all outcome variables (notably pass rates) increase by quintile, suggesting that poverty scores reflect factors harmful for school progress and learning. The study adds causal evidence on the impact of non-personnel spending on school outcomes in developing countries by examining actual policy for allocating these resources.

Figure 1. Per pupil funding by quintile from 2007-2012

The main results of the analysis concern the change in school outcomes upon crossing the threshold from poverty score quintile four to three, using a regression discontinuity approach. That is, calculating the effect on school outcomes of a substantial increase in non-personnel school resources provided by government on a per pupil basis. The main results are as follows.

Firstly, the increase of about 200 Rands in funding (~ 20 USD) has a relatively small impact on student outcomes. No regression coefficient is larger than 0.025.

EVIDENCE AND ANALYSIS

The main results of the analysis concern the change in school outcomes upon crossing the threshold from poverty score quintile four to three, using a regression discontinuity approach. That is, calculating the effect on school outcomes of a substantial increase in non-personnel school resources provided by government on a per pupil basis. The main results are as follows.

Firstly, the increase of about 200 Rands in funding (~ 20 USD) has a relatively small impact on student outcomes. No regression coefficient is larger than 0.025.
Secondly, additional non-personnel funding increases student throughput from grade 10 to 12, but has no impact on grade 10 enrollment.

Thirdly, there is no evidence that non-personnel school resources increase final-year exam pass rates. Note that exam pass rates are a widely used measure of student learning. If anything, the effects on pass rates are somewhat negative.

Thus, the increase in student throughput does not translate into higher pass rates. This suggests that additional resources may have the effect that weaker students are more likely to remain enrolled in school. This is speculated to be a result of the per-pupil nature of funding, which creates the incentive to keep student enrollment high, but which is not dependent on student learning (measured by final exam pass rates).

**POLICY IMPLICATIONS**

Understanding the effect of resources on school outcomes will help to assess the impact of progressive funding allocations on existing educational performance gaps, such as those found in South Africa. The main research conclusions are that additional funding leads to a small but significant increase in student throughput, but this does not translate into higher student learning (as measured by final-year exam pass rates).

An interpretation of these research results as a misuse of funds would be at odds with the observation that higher non-personnel funding increases student throughput but has no effect on grade 10 enrollment. That is, one would expect that changes in funds would affect both outcomes in the same direction. Similarly, the analysis does not suggest that the results are due to a migration of students in response to a change in the perceived quality of education (due to the increased available resources at schools that receive higher government funding). Further, non-personnel resources do not appear to alter hiring incentives, since there is no indication of an increase/decrease in the number of staff in schools receiving greater non-personnel funding.

The research results raise doubts on the effectiveness of non-personnel funding in improving student learning in South Africa. Although additional years of schooling are generally considered beneficial for youth, irrespective of final graduation, the South African literature on returns to education reports virtually no earnings returns to completing grades 10 and 11 (Keswell and Poswell, 2004). This implies that there is little or no positive effect of the funding policy on student outcomes through additional years of education. Moreover, the students on the margin who do benefit from more years at school may be significantly different from the others, leading to the possibility of unintended negative consequences of higher funding, from changes in class size and peer composition.

Nonetheless, it would be inappropriate to conclude from the results that allocating resources to relatively poor schools, in contexts such as South Africa, cannot and generally does not improve learning. In particular, the results can only speak to the effects of a roughly 20 USD increase in per-pupil resources for secondary schools around the quintile 3-4 threshold in the distribution of poverty scores. There are three main reasons why resources in similar contexts could have a positive effect on learning. First, there may be a higher impact in the bottom quintile where the lack of resources is more severe and baseline learning is lower. Second, results could be different for primary schools, since younger students may be more able to acquire additional cognitive skills (Heckman, 2000). Third, larger increases in resources may have a proportionally higher impact than smaller increases, since different material inputs may complement each other in the classroom. Thus, while the research results do not conclusively show that “non-personnel resources do not matter” they do provide cautionary evidence regarding the potential for this type of funding to close educational attainment gaps. Evaluations based on existing government programs may offer a more realistic setting than some controlled experimental interventions.
The study uses a regression discontinuity approach to estimate the effect of non-personnel school resources on educational outcomes. School-level data was obtained for five out of South Africa’s nine provinces: Western Cape, Gauteng, Northern Cape, Eastern Cape and Kwazulu-Natal (where the authors were able to obtain school poverty scores). The administrative data includes information on poverty scores, quintiles, enrollment by grade, and final-year attendance and exam results. Data was collected both before and after the current funding system (established in 2006/2007). Information before the policy change is used to verify the identification strategy and control for pre-policy educational outcomes at the school level.

In the South African allocation of funding, schools are assigned a poverty score that depends on the socioeconomic characteristics of the surrounding community and divided into quintiles on the basis of this score. Non-personnel funding is then determined by the school’s poverty quintile. Schools in the poorest quintile receive around 800 Rands (about 80 USD) per pupil, while schools in the remaining quintiles obtain progressively less funding (down to 150 Rands in the top quintile schools). Funding is discontinuous in the poverty score at the thresholds determining the quintiles, which allows for a regression discontinuity (RD) approach to estimate the effects of non-personnel resources on educational outcomes. The main outcome variables are attendance and success in the national exam that students take at the end of high school (matric). There are between 500 to 700 high schools per quintile.

Descriptive analysis shows that differences in government funding across the bottom three quintiles of the poverty score distribution is small so these cannot be exploited using the regression discontinuity approach. Fees in quintile five schools are high enough to make changes in government funding irrelevant for these schools. These findings justify the reliance on the cut-off from quintile 3 to 4 for identifying the effect of non-personnel resources. Two-stage least squares estimation is used. The instrument is poverty score assignments to schools and government funding is treated as the endogenous variable. There is no clear indication of manipulation of poverty scores to the advantage of schools on one side of the threshold i.e. no asymmetric bunching in the data. Reassuringly for the empirical validity, the current quintile thresholds are shown to be meaningless in terms of predicting funding before 2007 when they were first used for allocation. The number of teachers and staff is balanced on either side of the threshold, which suggests resources are indeed being used for non-personnel expenditures as intended. The validity of the RD approach is verified in the analysis. The results are robust across specifications regardless of the polynomial order and window size used for the RD estimation.

A limitation is that the present study results apply to a specific type of schools, namely secondary schools just above the median of the school poverty distribution. It is plausible that resources might have a different (and positive) effect in other contexts. Resources might be more productive in poorer schools (if there are diminishing benefits from additional funding) and/or primary schools, where students are younger.


NOPOOR – Enhancing Knowledge for Renewed Policies against Poverty

Institut de Recherche pour le Développement, Paris, France

CDD The Ghana Center for Democratic Development – Accra, Ghana
CDE Centre for Development Economics – Delhi, India
CNRS (India Unit) Centre de Sciences Humaines – New Delhi, India
CRES Consortium pour la Recherche Economique et Sociale – Dakar, Senegal
GIGA German Institute of Global and Area Studies – Hamburg, Germany
GRADE Grupo de Análisis para el Desarrollo – Lima, Peru
IFW Kiel Institute for the World Economy – Kiel, Germany
IRD Institut de Recherche pour le Développement – Paris, France
ITESM Instituto Tecnológico y de Estudios Superiores de Monterrey – Monterrey, Mexico
LISER Luxembourg Institute of Socio-Economic Research – Esch-sur-Alzette, Luxembourg
OIKODROM - The Vienna Institute for Urban Sustainability – Vienna, Austria
UA-CEE Université d’Antananarivo – Antananarivo, Madagascar
UAM Universidad Autónoma de Madrid – Madrid, Spain
UCHILE Universidad de Chile – Santiago de Chile, Chile
UCT–SALDRU University of Cape Town – Cape Town, South Africa
UFRJ Universidade Federal do Rio de Janeiro – Rio de Janeiro, Brazil
UNAMUR Université de Namur – Namur, Belgium
UOXF-CSAE University of Oxford, Centre for the Study of African Economies – Oxford, United Kingdom
VASS Vietnamese Academy of Social Sciences – Hanoi, Vietnam


April 2012 – September 2017 (66 months)

EU contribution: 8 000 000 €

http://www.nopoor.eu/

Xavier Oudin, Scientific coordinator, IRD-DIAL, Paris, France, oudin@dial.prd.fr
Delia Visan, Manager, IRD-DIAL, Paris, France delia.visan@ird.fr
Tel: +33 1 53 24 14 66 Contact email address: info@nopoor.eu

Edgar Aragon, Laura Valadez (ITESM)
Heidi Dumreicher (OIKODROM)
Anne-Sophie Robilliard (IRD), Hélène Lenoble (DIAL)

The views expressed in this paper are those of the authors and do not necessarily represent the views of the European Commission.