CHE
COUNCIL ON HIGHER EDUCATION

Higher Education Monitor No. 18

Funding, Access and Success in Higher Education in South Africa: Impacts of the Policy Changes Announced in December 2017

Acknowledgements

The Higher Education Monitor number 18 is based on a report that was generated from a research project that the Council on Higher Education (CHE) commissioned the Ali Mazrui Centre for Higher Education Studies (AMCHES) at the University of Johannesburg, to undertake on its behalf. The CHE expresses its sincere appreciation to AMCHES for seeing through the project which was bedevilled by several challenges regarding availability of the required datasets. The CHE thanks, in particular, **Seán Muller**, the Principal Investigator, and his fellow researchers, **Nicola Branson** and **Andrew Kerr**, for their patience and dedication, which made it possible for the project to be completed, albeit with delays because of the data challenges encountered.

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Lastly, the CHE acknowledges that the commissioning of this project was part of the implementation activities of a partnership agreement between the CHE and AMCHES that was initiated by the late **Narend Baijnath** and **Michael Cross** who, at the time, were the Chief Executive Officer of the CHE, and the Director of AMCHES, respectively. May their souls rest in eternal peace.

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Foreword

Section 5(1)(d) of the Higher Education Act No. 101 of 1997, as amended, mandates the Council on Higher Education (CHE) to regularly publish information about developments in higher education, including regular reports on the state of higher education. The CHE fulfils this mandate by conducting research and monitoring developments on key issues within the higher education system in South Africa, and by disseminating the information and findings through reports and publications. One of such publications is the *Higher Education Monitor* series whose purpose is to present data and information from research undertaken or commissioned by the CHE on topical issues of interest to the broader higher education sector in South Africa. The first issue of the *Higher Education Monitor* series was published in 2003, and this publication on *Funding, Access and Success in Higher Education in South Africa: Impacts of the Policy Changes Announced in December 2017*, is the eighteenth in the series.

This volume of the *Higher Education Monitor* presents an analysis of the impacts of the changes in the National Student Financial Aid Scheme (NSFAS) student funding model that were announced in December 2017, to be effective from the 2018 academic year. There were four components to the changes. Firstly, the definition of 'students from poor and working class households' changed. Previously students from poor and working class households were defined as those from a household with income of up to R122 000 per annum. This then changed to students from households with a combined annual income of R350 000. Secondly, as from 2018, the first entering students eligible for funding would receive 100% bursaries or grants which would replace repayable loans. Thirdly, the bursaries or grants would be for full cost of attendance based on actual institutional costs. The previous funding cap for students would be removed. Fourthly, the new threshold of a household income of R350 000 would not apply to students who were already in the system. These are those who were in the second year, the third year, or the fourth year of their studies towards an undergraduate degree.

The stated purpose of the changes was to ensure equitable access to higher education for the poor and working class South Africans. The analysis reported in this volume of the *Higher Education Monitor* sought to assess the impact of these changes on equity, access to higher education, retention of students and/or drop out of students, performance and success of students. In addition, the analysis situates the changes within the broader history

and context of higher education funding, with a particular focus on public universities. Linked to this, the analysis also examines the possible role of the university funding formula in driving pre-existing trends in student performance, graduation and dropout.

The analysis utilises matched administrative data on higher education performance, student funding and school performance. The specific datasets include extracts of HEMIS data focusing on the NSFAS students for 2017, 2018 and 2019 cohorts; National Senior Certificate data for 2016, 2017 and 2018 cohorts; NSFAS applicants and recipients data for 2017, 2018 and 2019 cohorts; and General Household Survey data for the period 2013 to 2019.

The analysis has yielded a set of interesting findings. The first is that, according to the definition of Statistics South Africa, the new threshold of R350 000 annual household income goes beyond the upper boundary of poor and working class, and reaches the median of the annual household income of the middle class. This means that this intervention did not target specifically students from poor and working class households. It, inadvertently, also includes students from middle class households. In other words, the financial support is now being extended to those groups of students that it was not intended for. Therefore, it does not promote equity. The second interesting finding is that those students who entered the public universities in 2017 or before were not affected by the change in the threshold household income to R350 000 per annum. A sizeable proportion in the second year, third year and fourth year of studies in the universities were from households with incomes of more than R122 000 but less than R350 000 per annum. The change in policy still excluded them from benefitting from the NSFAS, while students who entered the university in 2018 and 2019 who were from households within the same income bracket, received NSFAS financial support. Therefore, students from households that fall within the same income bracket were not affected equally or in the same way, by the change in the funding model: some benefitted, while others did not. This is viewed as creating or exacerbating rather than reducing inequity.

Of great significance is the discovery that the implementation of the change in policy increased access to higher education, generally. However, a disproportionate share of the increase came from students who registered for Higher Certificate qualifications via distance learning at the University of South Africa (UNISA). Therefore, the change in funding policy seems to have had impact of increasing access, but not to diploma and degree programmes.

The analysis also found that the majority of students registered for the Higher Certificate qualifications at the University of South Africa were predominantly from Quintile 1, 2 and 3 schools (the no fee schools) in rural areas where most of the households are extremely poor. Therefore, in terms of access, the change in the policy seems to have expanded access for students from poor households, but as indicated above, this was predominantly to Higher Certificate programmes. It did not significantly expand access of students from poor and working class households to diploma and degree programmes in the universities.

The analysis further yielded results that showed that there were no significant changes in the course load and percentage of courses passed by the 2018 cohort of the NSFAS students compared to the course load and percentage of courses passed by the 2017 cohort of the NSFAS students. Similarly, there were no significant changes in the course load and percentage of courses passed by the 2019 cohort of the NSFAS students compared to the course load and percentage of courses passed by the 2018 cohort of the NSFAS students. This suggests that the implementation of the change in the student funding model did not result in the improvement of performance of students. It had not (yet) resulted in increased success of students.

Regarding impact on student retention, the analysis reveals that there was less dropout and more retention of students from the 2018 NSFAS student cohort, compared to the 2017 NSFAS student cohort. The decline in dropout increased more significantly with the 2019 NSFAS student cohort, compare to the 2018 NSFAS cohort. This suggests that generally the implementation of the change to the student funding model has had a positive impact of reducing student dropout and increasing student retention.

Disaggregating the results by gender showed larger decreases in dropout among female students relative to male students. The reasons for these trends need to be investigated. Further analysis of the dropout in relation to institution type produced results that showed that the decrease in dropout was higher in universities of technology compared to comprehensive and traditional research intensive universities. Again, the reasons need to be investigated. The decline in dropout was higher among students who had entered higher education from high schools in quintiles 1 to 3 (no fee schools), which are predominantly rural schools.

This volume of the *Higher Education Monitor* also explains in details the limitations pertaining

to the data used in the analysis. Therefore, the findings should be considered with those limitations in mind, although utmost due care was taken in processing and analysing the datasets to ensure that the limitations could not materially affect the validity and reliability of the findings.

For ease of reading, this volume of the *Higher Education Monitor* is divided into two parts. The first part is a high level synthesis of the methodology, the findings, recommendations and conclusions. This part is handy for readers who are interested in the methodology, the findings, recommendations and conclusions without the complex details of the quantitative analysis. The material is packed for easy and fast reading because it does not include the granular details. The second part provides step-by-step details of the data processing and analytical procedures followed leading to the generation of the findings, and the drawing up of the recommendations and conclusions. Taken together, the two parts of this volume constitute a rich knowledge resource which is useful for research, policy analysis, policy formulation, and policy implementation. Therefore, researchers, students, policy analysts, policy makers, and policy implementation managers are encouraged to make time to read this volume of the *Higher Education Monitor* as they are likely to find some findings, recommendations and conclusions that are of interest to them. Readers are encouraged to engage the contents of this publication carefully, and if they find that they have comments to make on any part of the publication, they should feel free to send those in writing to research@che.ac.za.

It took almost five years from the start of the research project to the publication of this volume of the *Higher Education Monitor*. The efforts and hard work of the researchers and analysts who generated the material published in this volume, the peer reviewers, the editors, and all who were involved in the research and publication value chain, are acknowledged with much gratitude. The support and guidance of the Research, Monitoring and Advice Committee (RMAC) of Council is also acknowledged with much appreciation.

Dr Whitfield J Green

Chief Executive Officer

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Acronyms and abbreviations

AF	Allocation Factor
AMCHES	Ali Mazrui Centre for Higher Education Studies
ANC	African National Congress
ASSAf	Academy of Sciences of South Africa
CACH	Central Application Clearing House
CAP	Central Application Process
CESM	Classification of Educational Subject Matter
CHE	Council on Higher Education
COVID	Coronavirus Disease
CPUT	Cape Peninsula University of Technology
CUT	Central University of Technology
DBE	Department of Basic Education
DHET	Department of Higher Education and Training
DSCI	Disadvantaged student cost index
DUT	Durban University of Technology
EFC	Expected family contribution
FCS	Full cost of study
FMF	Fees Must Fall
FTE	Full-time Equivalent
FTEN	First Time Entrant
GHS	General Household Survey
HEMIS	Higher Education Management and Information System
HH	Household
IEB	Independent Examination Board
IT	Information Technology
MTEF	Medium-Term Expenditure Framework
MUT	Mangosuthu University of Technology
NFF	New Funding Framework
NIDS	National Income Dynamics Study
NSC	National Senior Certificate
NSF	National Skills Fund
NSFAS	National Student Financial Aid Scheme

PMG	Parliamentary Monitoring Group
RDG	Research Development Grant
ROU	Research Output Unit
SA	South Africa
SAPSE	South African Post-Secondary Education
SARS	South African Revenue Service
SASSA	South African Social Security Agency
SETA	Sector Education and Training Authority
SIU	Special Investigating Unit
TDG	Teaching Development Grant
TEFSA	Tertiary Education Fund of South Africa
TIU	Teaching Input Unit
TOU	Teaching Output Unit
TUT	Tshwane University of Technology
TVET	Technical and Vocational Education and Training
UCDG	University Capacity Development Grant
UCT	University of Cape Town
UFS	University of the Free State
UG	Undergraduate
UNISA	University of South Africa
UP	University of Pretoria
US	University of Stellenbosch
USA	United States of America

Part 1: Synthesis

1. Introduction

Higher education is a fundamental part of modern societies. A higher education qualification materially affects the average economic prospects of graduates, in addition to the important personal development and societal benefits that such education may provide. However, financial requirements for obtaining higher education qualifications serve as an obstacle to those from lower income households and families, thereby compounding societal inequalities as well as limiting the fulfilment of personal, economic and societal development. Funding support for school-leavers who qualify for higher education is therefore an important public policy issue.

On the 16th of December 2017, former President Zuma announced the decision to dramatically change the student funding framework in South African higher education. The following excerpts reflect the key aspects of the announcement:

- *Noting our nation's staggering levels of income inequality and considering the definition of Poor and Working Class Students that has remained stagnant and outdated despite the escalating cost of living and studying, and in order to maximize the developmental impact of our pro-poor higher education policies, the definition of poor and working class students will now refer to "currently enrolled TVET Colleges or University students from South African households with a combined annual income of up to R350,000"*

- *Having amended the definition of Poor and Working class students, government will now introduce fully subsidised free higher education and training for poor and working class South African undergraduate students, starting in 2018 with students in their first year of study at our public universities. Students categorised as poor and working class, under the new definition, will be funded and supported through government grants not loans.*

- *NSFAS packages already allocated to existing NSFAS students in their further years of study*

will be converted from loans to 100% grants effective immediately.

- *This policy intervention will enable government to extend fully subsidized free higher education to youth from well over 90% of South African households.*

The decision was premised on political resolutions taken by the governing party, the African National Congress (ANC), which resolved to provide 'free higher education for poor and working class students'. It was prompted in part by student protests across the country from 2015 that had drawn attention to the pressures on less wealthy students from persistent above-inflation fee increases while, in parallel, neither the means test threshold for financial support nor the extent of support provided by the National Student Financial Aid Scheme (NSFAS) had increased with inflation.

The political commitment made by the ANC could, however, have been interpreted in a number of ways other than the policy that was ultimately adopted. And the policy response could have been different: as reflected in the submissions to, and conclusions of, the Commission of Inquiry into Higher Education which delivered its report in 2017. Nevertheless, the end result was that a dramatic change in the approach to this public policy issue took place in a very short period of time. The unexpected and sudden nature of the announcement may have been undesirable from a policy and planning perspective, but potentially makes the assessment of causal effects of the change somewhat easier – to the extent that it serves as what is now referred to in the social sciences as a 'natural experiment'.

The report on which this *Higher Education Monitor* is based on was one of three commissioned by the Council on Higher Education (CHE) to the Ali Mazrui Centre for Higher Education (AMCHES) at the University of Johannesburg. The project analysed a number of policy questions arising from the change in the NSFAS funding model consequent to the announcement of the former President in December 2017. The focus was on the university sector and not the important but very different, technical and vocational education and training (TVET) sector. The methodological approach adopted was primarily quantitative in nature, based on a combination of three administrative datasets on higher education, higher education student funding, and schooling. The two primary research questions related to the impact of the policy change on inequality (in the higher education system and nationally), as well as its impact on student performance and retention. In addition to those questions, the association between the university block grant

funding formula and trends in student performance and retention over time were examined. Aside from being an issue of interest in itself, and one that has received relatively little attention, the presence of pre-existing trends may confound impact analyses if not recognised and taken into account. Of particular interest was whether the funding formula may have created incentives for institutions that led to an increase in student academic results and graduation rates.

2. Higher education policy context and environment

The policy announcement in late 2017 took place in a context of significant change in the higher education sector and higher education funding in particular. The impetus behind the process that led to the announcement originated from the student protests that began in 2015, restarted in 2016, and whose demands were the subject of a commission of inquiry that concluded its work in 2017. Higher education enrolments had increased substantially but public funding had not entirely kept pace with that expansion, especially in relation to a proportionally larger increase in students from poor or less wealthy backgrounds entering the system. The administrative structure of student funding was also in the process of changing when the announcement was made. This section provides a detailed overview of university funding, student funding, and the new funding policy - as background for the analysis that follows.

2.1. Overview of university funding

South African universities are funded through a combination of government subsidy, fees paid by students, and 'third stream' income. The latter includes external research grants and donations. Below is an outline of the sources of university funding and how these have changed over time. The large increase in the NSFAS funding from the DHET is noted, a breakdown of the direct subsidies to universities into the different components is provided, and then more details on the block grant funding that comprises 82% of the direct subsidies paid by DHET to universities are provided.

There have been various funding mechanisms and formulae used for higher education institutions in South Africa since the early 20th century, but for the purposes of the analysis reported herein, the focus is on the New Funding Framework (NFF) that was introduced in 2004 and superseded the South African Post-Secondary Education ('SAPSE') formula that had been introduced in 1984 (Steyn and De Villiers, 2007).

Figure 1 uses data from Statistics South Africa (Stats SA) to show the relative changes over time in sources of funding for South African universities. The underlying figures are adjusted for inflation using the Consumer Price Index.

Real fee income and subsidy income have both increased - by nearly 100% and 80% respectively - whilst other income has remained constant.

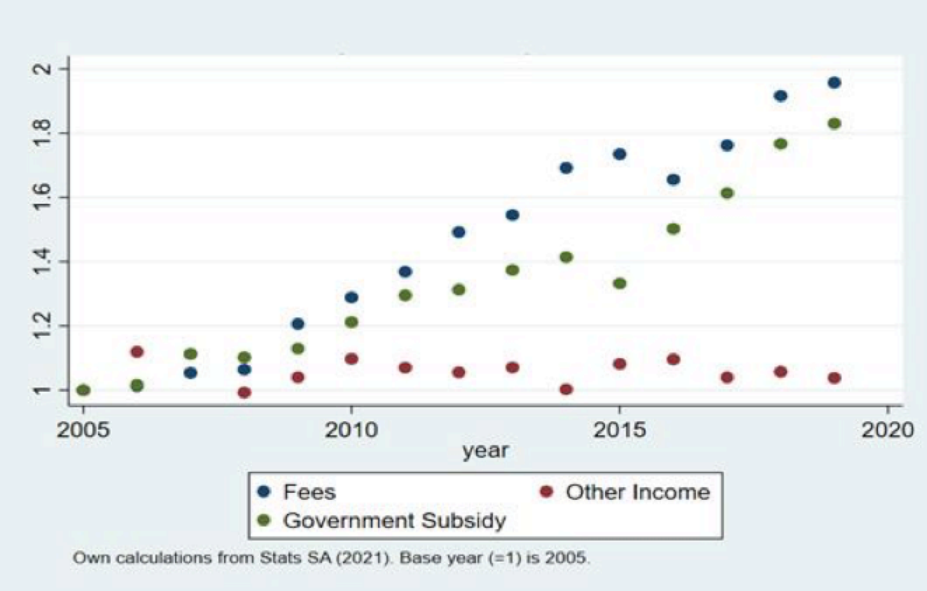


Figure 1: Relative changes in university sector income sources (2005-2019)

Figure 2 shows the proportions of the three sources of funding over time, showing that fees and grants made up an increasing share of total university income, whilst other income declined in importance - because of the changes shown in Figure 1.

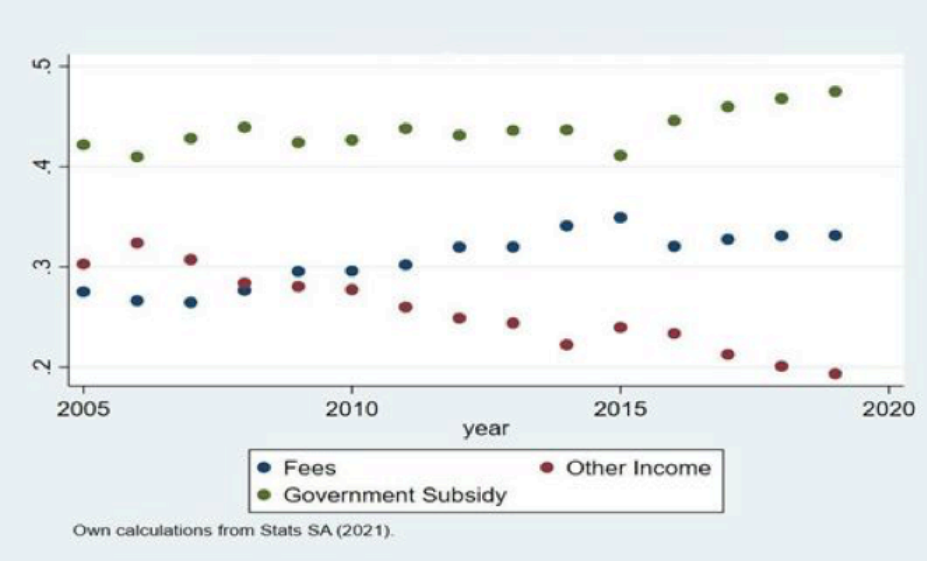


Figure 2: Changes in proportions of university income sources (2005-2019)

The trends are broadly similar for these three income sources across institutional types: historically disadvantaged universities (Fort Hare, Limpopo, Venda, Zululand and Walter Sisulu), universities of technology (Cape Peninsula, Central, Durban, Tshwane and Mangosuthu) and research-intensive universities (Pretoria, Cape Town, Witwatersrand and Stellenbosch). 'Other income' has grown slowest across all three university types, with similar growth in both fees and grant income. The exception is fees at historically disadvantaged universities, which have increased substantially more than at the other two university types, although from a lower base.

The broad picture from such data is one of increasing reliance on fees and government grants and a decline in a reliance on other income. Burger (2016) noted similar trends, linking them to rapidly increasing enrolments and a subsequent shift in orientation of universities towards teaching and thus more state subsidy for teaching.

2.2. DHET subsidies and block grants

The direct subsidies paid to universities by the South African state have two components: block grants and earmarked grants. For example, in the 2019/2020 financial year the block grant was

R35 billion, and the earmarked grant was approximately R7.5 billion. In recent years the earmarked grant has largely been for specific infrastructure and funding for the two new universities (University of Mpumalanga and Sol Plaatje University) - these account for around two thirds of the total earmarked grant, with the rest comprising of staff capacity development, specific funding for health and veterinary sciences, and a grant for historically disadvantaged universities (Sibusiso Bhengu Development Programme).

The block grants, which accounted for 82% of total direct DHET subsidy to universities in 2019/2020, have five components. These are the teaching input grant, the teaching output grant, the research output grant, the institutional factor grant, and the gap grant.

In 2019/2020 the teaching input grant accounted for 60% of block grant funding and around 50% of all direct DHET subsidy to universities. The teaching output grant was about 17% of block grant funding, the research output grant was about 13%, the institutional factor grant was 5% and the gap grant was around 5% of block grant funding. The gap grant has been phased out - the final year it was paid was the 2021/22 financial year (Department of Higher Education and Training 2020). All these grants appear as line items on the DHET budget.

The two block grants most relevant to this analysis are the teaching input and teaching output block grants.

Teaching input grant

As noted above, the teaching input subsidy is the largest part of the DHET subsidies to universities - about 60% of all block grant funding. Several factors are considered when calculating the allocation of the teaching input grant. Firstly, the DHET recognises Classification of Educational Subject Matter ('CESM') categories corresponding to different fields of study (there were 25 categories before 2010). For the purposes of the subsidy calculation these fields of study are collapsed into 4 'funding categories' and each funding category is allocated a weight. The weights range from 1 to 3.5 - so some fields of study attract 3.5 times as much funding as others.

Secondly, there are also different weightings for different levels of study. Undergraduate programmes typically have a weight of 1, whereas PhDs have a weight of 4. Contact programmes below Master's level are weighted twice as much as distance learning

programmes (mostly affecting UNISA) but the weights are the same at Master's and PhD for distance learning.

Thirdly, each university enters into an 'enrolment plan agreement' with the DHET for the number of students it plans to enrol in future years. This is undertaken every three years, corresponding to the state's Medium Term Expenditure Framework (MTEF) (Department of Higher Education and Training 2014:124). Enrolment plans include the number of students in different funding categories, at different levels (1st year, 2nd year, 3rd year, honours and so forth) and the number in contact and distance programmes. These planned student numbers are then converted into 'teaching input units' (TIUs), which are the basis of the subsidy calculation.

The number of TIUs is calculated by multiplying the number of full-time equivalent students by the CESM funding category, the level weight of each student and the contact or distance weight. These are then added to give the total university TIUs in the enrolment plan. To calculate each university's teaching input subsidy in a particular year the total amount in the teaching input line item in DHET's budget is divided by the total TIU in the enrolment plans across all universities from two years earlier. This results in a rand amount for that year that is paid per TIU. A university's total teaching input subsidy for a particular year is then the number of TIUs submitted in the enrolment plan two years prior multiplied by the rand amount per TIU in the current year.

From 2009 onwards the DHET discussed penalising universities for deviations below a certain percentage from the agreed enrolment plan, although these were only implemented from the 2015/16 financial year. Officially, the allowed deviation declined from 5% by 1 percentage point per year until 2019/2020. The penalty was a reduction in funding equal to one third of the value of the teaching input units represented by the under-enrolment (Department of Higher Education and Training 2020). Over-enrolment penalties were introduced in 2020 and were of the same value as under-enrolment penalties (Department of Higher Education and Training 2021). In practice, matters were more complicated with the DHET applying discretion to decide whether penalties that met the above criteria should actually be applied.

The subsidy system has some strange characteristics. Whilst the enrolment plans agreed to between the DHET and each university describe in detail the number of planned enrolments by level and CESM, in assessing the difference between planned and actual enrolment the

DHET used to compare only the total TIUs, and not the level of students or the actual numbers of students by CESM category. Only fairly recently did DHET begin comparing actual and planned enrolment at levels below the total TIU amounts. Furthermore, at the graduate level the TIU calculation also includes a formula that takes into account past graduation rates. Since the focus in this report is on undergraduate performance the complexities of that and its implications, are not discussed any further.

The input subsidy per student is not based directly on the actual cost of enrolling a student. The total amount allocated to the teaching input line item is based on what DHET can afford (DHET, 2013: 121). However, the CESM weights are partly based on relative costs - in the sense that more expensive courses (for example, those requiring labs) attract more funding (DHET, 2013). And whilst the different CESM weightings reflect relative costs, they also reflect the DHET priorities: those with higher priorities are given higher CESM weights.

Teaching output grant

A concern with the teaching input grant is that universities get funding for enrolment regardless of the education they provide. The teaching output grant, which is the focus of Section 5.1, is intended to account for actual educational 'output' not just enrolments. It nevertheless remains a small proportion of the block grant relative to the input grant. The Ministerial Committee on the Review of the Funding Framework concluded that: 'in principle it would be ideal if funding could be equally distributed between teaching input and teaching output grants, much more equity in the system needs to be achieved before a significantly increased percentage of the funding could be channelled towards teaching outputs' (Department of Higher Education and Training 2013, 31).

The teaching output grant is calculated using the actual number of graduates from two years previously. As with the input subsidy, different levels of graduates attract different weights: undergraduate diplomas have a weight of 0.5, a 3-year bachelor's degree or diploma has a weight of 1. The total teaching output subsidy is then divided by the total teaching output units from two years previously, to give a rand value per teaching output unit. Universities are then allocated a subsidy equal to their teaching output units multiplied by the rand value per unit. Master's and PhD graduates are excluded from these teaching output calculations, and are instead subsidised through the research grant, discussed below.

In addition to the above, where an institution fell short of a 'norm' agreed with the DHET, it became eligible for a teaching development grant (Walwyn 2008). In other words, if an institution agreed a norm of 500 TOUs based on its past performance and it only achieved 450, it would only receive the teaching output subsidy for 450 students but would be eligible for a teaching development grant based on the shortfall of 50. This created concerns about the unintended effect of 'rewarding' institutions for notionally poor performance (Walwyn 2008; Department of Higher Education and Training 2013). For those and other reasons, a new approach was introduced via a University Capacity Development Grant (UCDG) which was intended to "[consolidate] the purposes of the Teaching Development Grant (TDG) and the Research Development Grant (RDG) in a more streamlined and systematic fashion" (Department of Higher Education and Training 2018, 3).

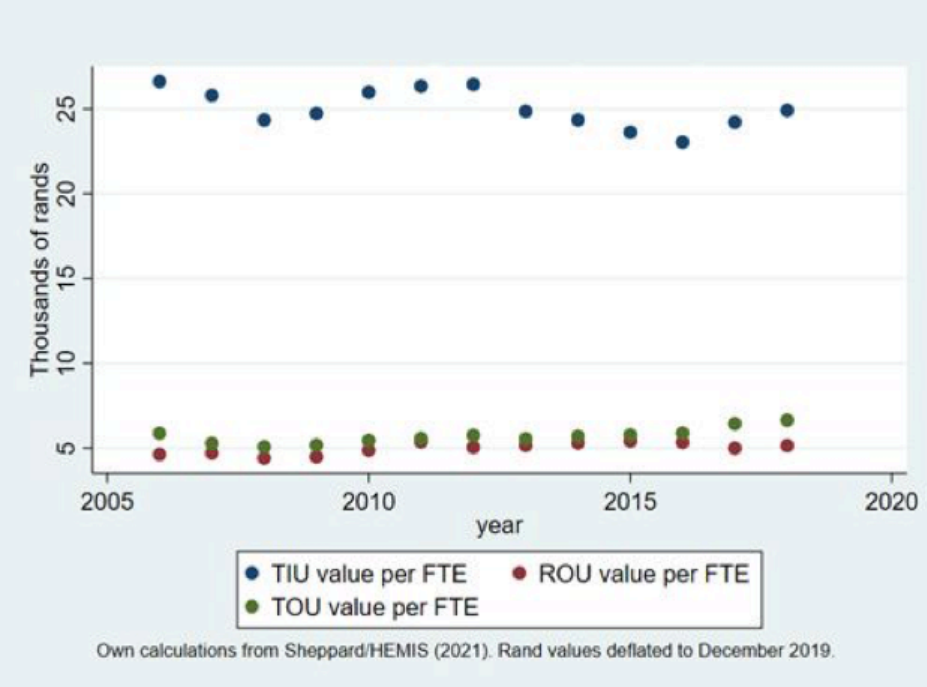
Optimising Behaviour

For the purposes of the present report, the primary interest in relation to the funding formula is its effect on the behaviour of institutions in relation to undergraduate performance and throughput. The analysis considers how individual universities might modify their behaviour to increase the income they receive from different block grants. In doing so it is assumed that the overall DHET subsidy budget, and total of each line item within that, is fixed and outside the control of universities. Optimising behaviour is possible for the teaching input, teaching output and research grants despite the fixed subsidy budget. This is because of the way the budget for these line items is allocated to different universities. There is a fixed amount of subsidy to be allocated and the more teaching inputs, teaching outputs and research outputs a university produces, the larger its share of each of these three budget components.

The enrolment planning process and the penalty system imposed by the DHET limit the extent to which universities can expand their enrolment to gain teaching input subsidy. However, there is greater scope for obtaining a larger share of the teaching output subsidy. The same is true for the research output subsidy and various studies (Pouris 2012; ASSAf 2019) have shown a large increase in the amount of research outputs produced since its introduction. Separate analyses have argued that the increase is partly driven by a rent-seeking dynamic (Muller 2017) and raised concerns, along with other scholars (Mouton and Valentine 2017), that a significant proportion of the increase in research output has been due to publications with predatory publishers (Kerr and de Jager 2021). While a great deal has now been written on such concerns in relation to the

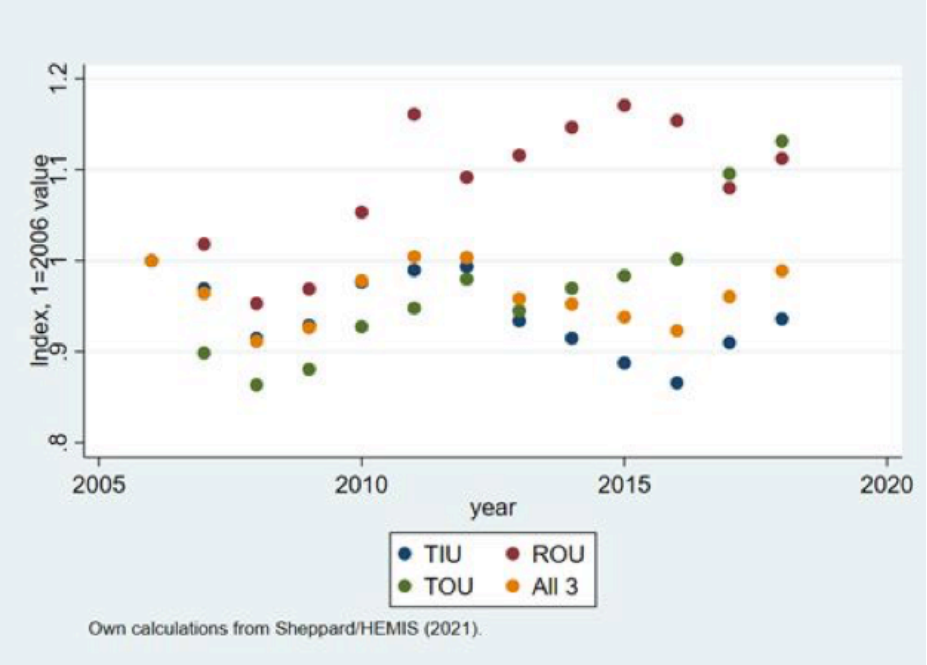
current subsidy system, going back to at least 2008 (Walwyn 2008; Vaughan 2008), very little has been written on corresponding concerns relating to the teaching output subsidy.

Figures 3 and 4 show that while the teaching output grant value was substantially less than the TIU value, it was more than the research output unit (ROU) value and grew substantially over time.



Notes: TIU denotes Teaching Input Units. ROU denotes Research Output Units. TOU denotes Teaching Output Units.

Figure 3: Grant per Full Time Equivalent (FTE) student



Notes: TIU denotes Teaching Input Units. ROU denotes Research Output Units. TOU denotes Teaching Output Units.

Figure 4: Grant per Full Time Equivalent (FTE) student index

This provides some basis for believing that the teaching output grant would have functioned as a material incentive for university managers to reorient institutional decisions - the potential consequences of which are examined in Section 4.1.

2.3. Overview of the National Student Financial Aid Scheme

The National Student Financial Aid Scheme (NSFAS)[1] was established to increase access to tertiary education for academically eligible, low-income South African students who are registered or intend registering for their first undergraduate qualification. It does so by funding their tuition and living expenses. This funding provides income to universities through fee income as well as through students using NSFAS funding to pay for university accommodation and other sundry costs.

1 NSFAS funding covers students enrolled in universities as well as Technical and Vocational Education Training (TVET) colleges.

Tuition fees paid by the NSFAS are included as fee income in university financial statements and are therefore not visible in Figure 1[2]. The amount paid out by the NSFAS increased from R733 million in 2002 to R6.97 billion in 2014. The number of students supported by the NSFAS grew from 86,147 in 2002 to 186,150 in 2014, representing about one quarter of all undergraduate university enrolments.

The NSFAS was established by statute in 1999 (Republic of South Africa 1999), superseding the Tertiary Education Fund of South Africa. In fiscal terms, the NSFAS originally formed part of earmarked grants from the DHET (Ministry of Education 2004). The funds were allocated to individual institutions, which made eligibility and allocation decisions. The distribution of funds across institutions was based on a formula in which the two main components were an estimate of the full cost of study (FCS), and a measure of the number of (historically) disadvantaged students weighted according to race category.

The advisory committee appointed in 2009 to advise the Minister on NSFAS argued that both aspects of the formula were 'inappropriate' (Department of Higher Education and Training 2010). For that and other reasons it recommended a centralised application and disbursement process.

Since the former President Jacob Zuma's surprise announcement of 'free' higher education at the end of 2017, the DHET funding of students through NSFAS has increased substantially to R45.43 billion for approximately 428,000 students in 2022/23 (National Treasury 2023) - a function of a higher income threshold and a move to bursaries rather than an income contingent loan scheme.

There are three periods in the NSFAS's existence that correspond to distinct features of its implementation. Before 2017 the NSFAS application process was decentralised, and funding decisions were made by institutions. From 2017 onwards, administration was centralised and the NSFAS disbursed funding itself. In 2018, the scope and nature of the awards changed from income-contingent loans to bursaries, with the income eligibility threshold increasing to R350,000 per annum. That policy change is the focus of this report and further details are provided below on the implementation of the new policy for 2018 and 2019. Since the quantitative analysis in this report does not go beyond 2019 - due to the confounding fac-

2 While the focus of the analysis on optimising behaviour is on direct subsidies for teaching outputs to universities, the large increase in DHET spending on NSFAS, some of which flows to universities as fee income, is an important trend to be aware of.

tor of the Covid-19 pandemic - the discussion of the subsequent years is fairly brief. [3]

The initial era of NSFAS (1999-2013)

The Tertiary Education Fund of South Africa (TEFSA) was established as a public entity under the Department of Education in 1991 and was formally replaced by the NSFAS in 1999 with the gazetting of the NSFAS Act of 1999. Prior to 2017, the NSFAS operated in a decentralised manner, and NSFAS funds were allocated to institutions based on an allocation factor (AF). The AF was determined by multiplying the institution's disadvantaged student index – the weighted sum of the number of Black, Coloured and Indian students[4] enrolled – with an institution specific calculation of the full cost of study (FCS)[5], to get what was known as the disadvantaged student cost index (DSCI)[6]. The DSCI was then divided by the sum of all institution's DSCI's to get the AF percentage. The intention was for institutions to rank their students based on socioeconomic need and academic merit and allocate an amount equal to the FCS less an expected family contribution (EFC)[7].

Institutions used a means test to calculate a student's EFC, which accounted for family income[8], the number of dependents in the household, and the family's cost of living. For dependent students the family was defined as:

> *The parents (where the parents are married and living together), Unmarried siblings under the age of 21 and their children; The applicant and his/her children; Any "dependent" siblings at tertiary education institutions; The spouse of the applicant (if he/she is living in the family home or being supported by the family); The spouse of any sibling at a tertiary education institution (if he/she is living in the family home or being supported by the family). (NSFAS, n.d.).*

3 At the outset of the project there was no expectation that the 2020 HEMIS data would be obtained, but after various delays briefly described at the beginning of this publication, the 2020 HEMIS data was obtained. The decision to exclude post-2019 years from the analysis was largely based on the dramatic and complex effects of the Covid-19 pandemic and associated policy responses, which would confound most attempts at comparisons of other trends across time.

4 Black students were given a weight of 3, Coloured students 2, and Indian students 1.

5 Full cost of study being tuition fees, accommodation, meals, books, and travel, as provided by the institution.

6 The enrolment statistics appear to be taken from two years prior (t-2) and the estimated cost of study from one year prior (t-1), however official documents that state this explicitly cannot be found.

7 EFC was calculated as a third of household disposable income for households supporting one student, and a fifth for households with more than one student. Disposable income was determined as net annual income less a number of allowances determined based on area specific tables (Bhorat *et al*. 2017).

8 The definition of 'family income' and its implementation in practice is discussed in later sections and in more detail in the Technical Analysis part of this publication.

This family concept does not include all individuals living under the same roof, which is what would be used in a household survey to define household income.

From 2014, the NSFAS began using means test waivers for students who attended quintile 1-3 schools ('no fee' schools) or who received social grants. These students were also automatically given a zero expected family contribution. Despite there being no official household income threshold for eligibility during this time, R122,000 is typically referred to as the income threshold prior to 2018 (Department of Higher Education and Training 2010).

The Commission of Inquiry into Higher Education and Training (2017) noted that the R122,000 threshold was premised on the assumption that it represented the upper limit on the lowest band of the personal income tax table. However, it was not revised for a number of years, nor was it an official NSFAS policy guideline. This meant that in practice, institutions could adopt different approaches to allocating and disbursing NSFAS funds.

For example, the University of Cape Town (UCT) had its own policy to fund students with household income up to R230 000 per annum, using a combination of the NSFAS and UCT funds[9]. Other institutions, in distributing the NSFAS funds, may have allocated funds on a first-come first-served basis (Jansen 2015; Commission of Inquiry into Higher Education and Training 2017). That meant that some qualifying students did not get funded at all and funding amounts may have had no relation to need (within those who qualified). Other institutions engaged in a practice known as 'top-slicing' – a distributive process whereby in response to receiving insufficient funding from the NSFAS, institutions shared loan amounts equally among all students who qualified[10] for NSFAS. This necessarily left many students underfunded (Department of Higher Education and Training 2010).

Another concern was that funding was capped at a maximum level per student by the NSFAS and this cap was less than the rising full cost of study at some institutions. That was particularly a problem at traditional universities, largely due to escalating fees[11]. Additionally, the FCS

9 Together with fairly good fee payment rates on high student fees from the student body that could afford to pay, this financial aid structure allowed UCT to cross-subsidise students who would otherwise not have been able to afford to study at UCT.

10 Here, although R122,000 was not an official threshold, it appears that some institutions used it as such, dispersing funds equally across all students with family incomes below this amount.

11 Although increases in the cap occurred at rates higher than inflation, universities blamed government underfunding for resultant hikes in fees. Similarly, they argued that a weakening currency pushed up the cost of books and equipment, and increasing utility costs and academic salaries (to retain high performing academic staff) further lead to the higher education inflation rate [HEPI] growing faster than CPI (Universities South Africa 2016).

of certain programmes may have been above the cap, even where the institutional average FCS fell below the cap (NSFAS 2016b). While some institutions (such as UCT) contributed fundingto top up the shortfall, students at other institutions remained with funding that was insufficient to cover their costs (Cornerstone 2016b), and students were still expected to make a family contribution (EFC). This led to the NSFAS students accumulating what is commonly referred to as 'historic debt' — monies owed to institutions by students who could either not cover the shortfall (between the NSFAS allocation and actual FCS) or their EFC, or both.

During this time, the NSFAS existed primarily as an income-contingent loan-scheme[12], with up to 40% of the loan for a given year eligible to be converted to a bursary annually, depending on students' academic success[13]. From 2011 — following a Ministerial review of NSFAS (Department of Higher Education and Training 2010) — qualifying students in the final year of their programmes were eligible to have the full loan amount of that year converted into a bursary. Together, these conversions were intended to function as incentives for students to pass and graduate timeously.

The NSFAS funding was only available for the prescribed length of a student's qualification plus two additional years (colloquially referred to as the 'N+2 rule'). Students who failed to complete their degrees within this timeframe were ineligible for continued funding. This timeframe included any time spent previously registered at any post-school institution[14]. Students also became ineligible for continued NSFAS funding if they did not pass fifty percent (50%) of their modules in a given year (the 'fifty-percent rule')[15]. The stated aim of this

12 Loan repayments began once a student had found employment and earned at least R30 000 per annum. Interest was charged at 80% of the repo rate (interest rate charged by the South African Reserve Bank on loans to banks) on the capital amount of the loan and would only accrue to a maximum of the initial capital amount. In other words, the most a student could owe was double the amount of their initial loan. The repayment amount was calculated starting at 3% of a student's annual salary and increasing to a maximum of 8% when the salary reached R63 100 or more per year (SALDRU 2017). Interest did not accrue while the student studied, nor for up to 12 months after the student left the institution. This provision came into effect at the same time as the final year full bursary mentioned above, following Ministerial review of NSFAS in 2010 (Department of Higher Education and Training 2010).

13 For example, if a student passes all their courses, they will have 40% of their loan converted to a bursary. If they pass 50% of their courses, 20% would be converted to a bursary (Cornerstone Economic Research 2016b). To be eligible for the final year bursary, a student must pass all subjects in their final year, else the 40:60 conversion rate will apply (NSFAS 2017b).

14 In other words, the N+2 rule is not based on the number of years that a student has been funded, but on the number of years that the student has been registered for tertiary study in South Africa (NSFAS 2016a).

15 The extent to which this rule was enforced by institutions is not clear. For example, UCT only began enforcing this rule in 2015 in anticipation of moving to the NSAS centralised application system in 2016 (see Section 1.2). Moreover, NSFAS (2016b) recognises that this rule alone is not sufficient to ensure students graduate in N+2. They recommended using a progressive courses-passed rate that is more forgiving in first year when institutions are making decisions about academic eligibility for continued funding when the allocation is not sufficient to fund all eligible applicants.

rule was to improve targeting of funds to students with academic potential in a context of escalating budgetary pressures.

The 'student-centred' model (2014-2017)

In 2014, the NSFAS began piloting a new administrative model to manage loans and bursaries. Under this model, applications for funding became centralised, and administration was removed from university financial aid offices. This new model, called the Central Application Process (CAP) model, or sometimes the student-centred model, aimed at streamlining administration and improving accountability and consistency across institutions. Institutions no longer received an annual NSFAS allocation upfront, and funding then followed the student – where the student registered, funding followed. That is, tuition and residence costs (where relevant) were paid directly from the NSFAS to the institution. This administrative model was fully operational from 2017 onward, with pilots having been in place at some institutions between 2014 and 2016.

Before 2017, the decision about which students would be eligible for funding had been dealt with by the institutions. From 2017, the NSFAS therefore needed to make this decision centrally. Students who were personally in receipt of the South African Social Security Agency (SASSA) child support or disability grants were automatically eligible (NSFAS 2017b; DHET 2018a). But there is some ambiguity about the income threshold adopted. One NSFAS document (NSFAS 2017b) states that no income threshold was used but another, NSFAS (2017b), suggests that there was an income threshold, and that this was R120 000 per annum, very close to the previous unofficial threshold of R122,000[16].

As discussed above, prior to 2017, the family concept was used in calculating income available to the applicant. The 2017 NSFAS Handbook (NSFAS 2017b, 33) defined the household as:

> *members of the students' immediate and/or extended family that are living under the same roof, living off the wages/salary/grants earned by those contributing to the same household income. For the purposes of assessing household income, this may include a guardian so appointed by the State who is not living with the family but contributing to the household income. This may also include grandparents receiving a grant to support children whose parents are absent. Caregivers*

16 It is shown in the empirical work below that the actual income threshold adopted in 2017 seems to have been R122,000.

informally supporting a student are not obliged to provide their financial information, but all attempts to determine the extent of this support on the expected contribution of the students' family to his/her study costs should be undertaken.

However, the income information required by the NSFAS includes only the applicant, their spouse and parents or guardians. This means that the household income used to calculate the funding amount was for a narrower set of people compared to the pre-2017 era. It also means that this concept of household income is less comparable to household income obtained from a household survey, including that used in the analysis for this report. This issue is discussed further in later.

Before 2017, all continuing students (who were 'renewing' their funding) had to re-apply and were re-assessed based on financial eligibility, academic eligibility, and available funding. The CAP model uses only the latter two as the basis for decisions on which students are funded (NSFAS 2017). Therefore, since the introduction of the CAP model, the financial need of the student is assessed at the point of first application, and continuing students do not need to re-apply annually. However, from 2021, the NSFAS (2021: 8) explicitly states that it "may re-assess the eligibility of any student at any point whilst funded by NSFAS and reserves the right to withdraw funding if the student no longer meets the eligibility criteria".

Under the CAP model, the NSFAS Handbook (NSFAS 2017b) suggests that allocations remained ring-fenced for institutions, using the same principles and baseline as the allocation formula. Based on financial need (according to the EFC calculation and ranked from most negative to most positive) and academic potential (students most likely to complete the qualification within the minimum time), the NSFAS then determined which students were to receive funding. The 2017 guidelines stressed that, "if there are insufficient funds to assist all financially needy applicants at an institution, preference should be given to those applicants whose financial need and potential to succeed is greatest." (NSFAS 2017b, 33). The NSFAS also administers bursaries on behalf of a number of partners, such as the National Skills Fund (NSF) and Sector Education and Training Authorities (SETAs) which target funds toward students enrolled for scarce skill qualifications.

The 'free higher education' era (2018-)

By late 2015, the discourse on the student-led Fees Must Fall (FMF) protests stressed that

government funding was failing to match increasing enrolments causing roughly a third of eligible candidates to be denied funding (Cornerstone Economic Research 2016b); and, the funding allocated to students was often inadequate. Students argued these issues were contributing to academically eligible students dropping out, experiencing hardship or facing financial exclusion due to inability to pay, and the subsequent accumulation of historic debt[17].

The protest action led to a nation-wide implemented 0% fee increase for the 2016 academic year for all students, and a significant increase in funding for NSFAS-funded students. In January 2016, the DHET, through the NSFAS, made additional funds available to cover NSFAS students' historic debt (debt-relief) at institutions as a result of the NSFAS cap or EFC from the period 2013-2015, in an attempt to circumvent disruptions from occurring at the beginning of 2016 (Commission of Inquiry into Higher Education and Training (2017)). In 2017, an 8% fee increase was covered by government through a grant (DHET Fee Grant) allocated to universities for all NSFAS students and those in the 'missing middle' [18] category.

Nonetheless, protests continued because of ongoing concerns about underfunding and exclusion of less wealthy students. Ultimately, these dynamics culminated in a large increase in, and restructuring of, the NSFAS funding when former president Jacob Zuma announced a 'free' higher education policy on 16 December 2017.

For first-time entering new students (FTENS) from 2018 onwards, the new policy extended the eligibility for the NSFAS funding to students with household income levels below R350,000 per annum (increased from the previous R122,000). Household income was defined as, "the direct family income (namely parents, legal guardians or spouse) of the prospective student. It does not include the income of extended family members (for example, brothers, sisters, aunts and uncles, grandparents), if these are not their legal guardians" (DHET 2018a, 5). This means the income concept was the same as in 2017 and narrower than the pre-2017 era. The income concept was also narrower than the typical definition of 'household income' from a household survey.

17 This being particularly because institutions do not allow students who owe money to register or collect graduation certificates.

18 This term typically refers to students not financially eligible for the NSFAS and whose household income is less than R600 000 per annum. The Commission of Inquiry into Higher Education and Training (2017) notes that the focus on R600 000 as the upper limit for the missing middle is thought to be premised on this announcement made by the Minister of Higher Education and Training during 2016.

A substantive change was that all NSFAS funding would take the form of a bursary (known as 'NSFAS-DHET Bursary'), essentially abolishing the loan-bursary combination of the previous scheme. The new scheme covers the (institution-specific) full cost of tuition and campus accommodation with nationally standardised limits on transport, books, food and off-campus accommodation (DHET 2018a).

Under the new NSFAS Bursary scheme, the NSFAS now only funds N+1 years of study (previously N+2), and a community service component has been introduced for all students from their second year of study onwards - although the details of this remain unclear and the requirement has not yet been strictly enforced. According to the 2020 DHET Guidelines, consideration will be given to the practicality of implementing this as a compulsory obligation linked to the bursary in the future.

From 2020, the fifty percent rule no longer applied to students on the NSFAS-DHET Bursary - if the university allowed students to re-register, they would be funded. This was effectively an easing of progression requirements because passing 50% of modules taken is typically a stricter requirement than institutions' academic eligibility requirements for re-enrolment/progression. However, this change had not yet occurred in the time period covered by data analysed for this report (up to 2020). It was later stated that a more stringent requirement would be introduced for the 2023 academic year (NSFAS 2022a). At the time of finalisation of this report in 2024, the official requirement for continued funding was that a student has passed 50% of their course credits by 2024 and in that year should achieve a pass rate of 60% of course credits (NSFAS 2024). The higher requirement is likely to reflect a desire to reduce the substantial fiscal cost of the new policy.

The NSFAS-funded students who first registered at a higher education institution prior to 2018 continued on the capped amount of the previous scheme, but with their full loan amount converted to a bursary (known as a NSFAS-DHET Grant). For those students, both the N+2 rule and fifty-percent rule continued to apply. The threshold on household income for continuing students remained at R122,000 per annum. Notably, students who had entered the system prior to 2018 with a household income of more than R122,000 but below the new threshold of R350,000 remained ineligible for the NSFAS funding. In 2019, NSFAS undertook to write off further debt owed to institutions by continuing NSFAS-funded students who had been funded under the pre-2018 funding policy (DHET 2019c). However, any loan amounts

accumulated before the introduction of the new scheme remain repayable. These nuances have some implications for the empirical analysis, which is discussed in later sections.

Under the new schemes (NSFAS-DHET Grant and NSFAS-DHET Bursary) the stated intention is that the NSFAS funds are allocated to all financially eligible students who successfully register at a public institution. Following registration, the NSFAS releases funds to institutions based on the registration records it receives. Institutions remain responsible for administering direct payment of allowances to students from their advances received from NSFAS. The NSFAS (2019) states that, "Universities are required to transfer funds to ensure that students are able to access funds for living expenses (accommodation, food, transport and other expenses) and learning materials; and then secondly apply funding towards paying the first instalment of the tuition fee." Since all eligible students are funded, budgetary pressures can increase dramatically, especially if institutions do not stick to their approved enrolment plans. The COVID-19 pandemic exacerbated these pressures due to falling household incomes, but that period is outside the sample for the analysis in this report.

Between 2017 and 2019 the number of new NSFAS applicants who had not previously attended university and who were funded by NSFAS increased by more than 40%. Around 77 000 new applicants who had not previously attended university were funded in 2017, versus 113 000 in 2018 and around 107 000 in 2019.

The 2018 policy change in practice

Policy implementation often differs from official positions in documentation. Such differences can be important for empirical analysis, so it is worth examining whether and how this might have been the case for the 'free higher education' policy.

The announcement of the policy came after the NSFAS and university applications for the 2018 academic year had already closed (Pather 2017; Tshangela 2021). While an announcement may have been anticipated in November of 2017 (Munusamy ***et al***. 2017), the details of such a plan were unclear. Notably, the policy that was ultimately announced differed in key respects from the recommendations of the Commission of Inquiry into Higher Education.

As already noted, these characteristics mean the policy can potentially be treated as a 'natural experiment' in which the composition of the student body entering in 2018 did not change, but

the funding package they received did. Moreover, for pre-2018 cohorts the funding change was only from a loan to bursary, without an increase to FCS or an increase in the income eligibility threshold. The implication being that one can use these cohorts to try and identify the impact on student outcomes of different funding mechanisms, such as receiving a bursary versus receiving a loan with bursary conversion component (see also section 4.3).

The extent to which the policy change can be treated as a genuinely exogenous event - not anticipated by relevant actors within these systems — depends on how it was implemented. The new policy would have made university attractive to some students who did not apply, or perhaps changed the preferred university of some who had already applied and been accepted at another university. So it is important to document how universities and the state attempted to implement the policy in 2018.

Various sources suggest that the NSFAS, together with universities, put a process in place to ensure that students who already had firm offers from universities, but who had not applied to the NSFAS, could identify themselves as students from families earning a gross household income of up to R350,000 per annum (DHET 2018a; University of Pretoria 2018). Universities were responsible for verifying that the students were first time entrants along with collecting income and other information relevant to eligibility. The NSFAS was subsequently responsible for verifying the income data and making the final funding decisions.

Some possible reasons why the policy change may still have influenced the applicant and enrolment pool, are considered. First, one official suggested that some continuing students may have been able to make a late application for funding in 2018 and may have been erroneously funded using the new R350,000 threshold. Second, a statement was issued by Universities South Africa (USAf) that universities would allow new students to apply and register if institutions had unfilled places, and that universities that did not have places would help individuals find places at other institutions using the DHET's Central Application Clearing House (CACH) system (Universities South Africa 2018). Third, some universities themselves indicated that they would accept late applications (Mahlokwane 2018, Macupe and Richie 2018, DUT 2018, UFS 2018). Finally, UNISA allowed undergraduate students to submit late applications until 19 January 2018 (UNISA 2018b) and UNISA FTENS who thought they qualified for NSFAS funding could apply for the extended 2018 NSFAS funding from 3 January to 20 February 2018 as part of the registration process (UNISA 2018a).

As regards the last of these concerns, official statistics show that the number of FTEN students increased by 8% (15 379 students) and the major contributor to this increase was that UNISA enrolled 13 050 more students in 2018 than 2017 (DHET 2020). This also exceeded the institution's enrolment target for 2018, which the DHET flagged as an ongoing problem (Magubane 2021). The analysis of the policy change largely focuses on traditional, contact undergraduate degree programmes so it would not be affected by changes to the composition of the UNISA first years. However, as discussed in Section 5.2, this possibility does have implications for some of the inequality (welfare) impacts of the new policy.

In relation to the other concerns, it is concluded that only a few thousand individuals at most would have been able to apply late through CACH and ultimately be enrolled, and only a small portion of those could then have also been successful, late NSFAS applicants.

Overall, therefore, treating the policy change as exogenous in the analysis when it comes to the composition of the 2018 first year cohort (not in distance learning) appears plausible.

Means test waivers

In 2017, the NSFAS applicants were not required to report household income if they attended quintile 1, 2 or 3 schools (no fee schools) or if they were personally in receipt of South African Social Security Agency (SASSA) child support or disability grants (NSFAS 2017b; DHET 2018a; PMG 2017). The SASSA waiver was enabled by an agreement between NSFAS and the Department of Social Development that clears all social grants beneficiaries from submitting any proof of income when they apply for student funding (SAnews 2018). These students were also automatically given a zero EFC (expected family contribution).

The logic of this is that the means test requirements to qualify for these social grants are more stringent than the income test for NSFAS eligibility, so if an individual or household meets the SASSA requirements they will also meet the NSFAS requirements. NSFAS and DHET policy documentation from 2018 and 2019 suggests that only SASSA recipients were exempt from providing income information and school quintile was no longer considered (DHET 2018a; 2019a).

For the years applicable to the analysis (2017-2019), it appears that the way validation checks

against SASSA data were conducted could have changed over time. In 2017, it appears that the NSFAS began running some checks against SASSA data — or at least planned to (NSFAS 2017a, 11). In 2018, the NSFAS validated applicants' SASSA status against the 2017 SASSA database. In 2019, applicants were verified as SASSA recipients if they had received a social grant in the previous two years.

Although beyond the timeframe of the analysis, in 2020 the approach had again changed: the verification period for SASSA receipt extended to five years prior and included whether or not an applicant's parents were social grant recipients. This latter criterion was removed in 2021, and as of 2022 the verification period had been shortened to three years prior. One would expect that broadening the criterion to count family member grant receipt and considering a longer period over which grant receipt was observed would substantially increase the number of students recorded as 'SASSA recipients.' Statements made in Parliament by the NSFAS and the DHET suggest that, this may have been the case. In February 2021 it was reported that 62% of the NSFAS applicants were SASSA beneficiaries (PMG 2021). Unofficial data suggested that the proportion of NSFAS recipients who were also classified as having been SASSA recipients increased from 8.7% in 2017 to 13.95% and 16.11% in 2018 and 2019, respectively, then jumped to 46.3% in 2020. This has not been corroborated with the time and data available for this report.

Approved qualifications

The 2017 NSFAS Handbook (NSFAS, 2017: 32) states that only the first higher education qualification would be funded by the NSFAS. From 2018 onwards the NSFAS still only funded the first qualification but there was an exception for the one-year higher certificate programmes if students then proceeded to a degree or diploma (DHET, 2019). Higher certificate programmes have lower entry requirements than diplomas and degrees, and since socioeconomic status and high school performance are positively correlated, this aspect of the change in the policy is likely to have benefitted students from relatively low socio-economic backgrounds.

Institutional problems and challenges

The work presented in this report began late 2020 and was subject to a variety of delays. In the course of the delays, several issues were reported in the public domain regarding institutional problems and challenges at the NSFAS. Those followed a period in which the NSFAS had been

placed under administration (2018-2020). These institutional issues may explain some of the data challenges alluded to above, as well as lack of clarity on how certain policies or positions were implemented in practice.

The most notable information in this regard for the purposes of the analysis emerged in 2023 in public reports and statements by the Special Investigating Unit (SIU). In 2022 the SIU was mandated by the President to investigate a range of issues at the NSFAS (Republic of South Africa 2022). In 2023 the SIU stated in Parliament that it was investigating 'undue funding' of over 40,000 students over the period 2018 to 2022, at an approximate total cost of R5.1 billion (PMG 2023). Although most public statements conflate them, there are two separable issues here: funding of students who should not have received NSFAS funds, and overpayment to institutions of amounts that were never subsequently paid to students. Particularly notable for the purposes of the analysis in later sections is the statement by the SIU that these "are students whose household income is above R350,000 and therefore would not qualify for NSFAS funding based on the funding rules" (SIU 2023).

Those findings may suggest that the problems at the NSFAS were a consequence of the very late announcement of the new funding policy at the end of 2017. However, as already noted, there was already a substantial amount of missing household income for applicants in the 2017 NSFAS data, which points to pre-existing internal problems. That is consistent with the fact that the SIU investigation also found 'weak internal controls', 'weaknesses and flaws in IT systems', and misalignment between institutional and NSFAS lists of funded students. And the NSFAS itself has noted a range of such problems (NSFAS 2021).

Since the purpose of this report is an empirical analysis of questions of policy interest, rather than a forensic investigation, the available data is taken at face value. In the concluding sections some possible implications of the SIU findings for the findings of analyses, are briefly considered.

3. Data

The analysis presented in this report utilises administrative data from three distinct datasets: the Higher Education Management Information System (HEMIS) held by the DHET, the National Student Financial Aid Scheme (NSFAS) dataset, and the National Senior Certificate (NSC) dataset held by the Department of Basic Education (DBE).

The initial project proposal envisaged only access to two of these: HEMIS and NSFAS. Access to the third would have improved the quality of the analysis but was not essential for the methods and models originally envisaged. However, due to data challenges linked to the NSFAS dataset the use of the NSC dataset became crucial in partially addressing the limitations that arose from the incomplete NSFAS datasets.

The report provides a brief discussion of some of the challenges that arose during the analysis process, how these placed limitations on the analysis, and how the originally envisaged process of analysis was modified to address those. In addition, it is important to note that different components of the analysis used different subsets of the administrative data, while one component also utilised household survey data acquired from Stats SA. For reasons of brevity, full details of those differences are not provided here: the definitive explanations of data used for each component can be found in the relevant sections of the Technical Report.

Table 1 shows the data requirements envisaged in the original research proposal, where 'X' means that a particular data requirement was 'essential' to implement the research, and 'XX' means that it was 'desirable but not essential'.

In the course of obtaining the necessary data, it became apparent that a large portion of data from the NSFAS database on family income was missing values. As reflected in the table, this was the most important variable for the envisaged analysis because it would have shown which income category an NSFAS recipient was in. Knowing the income categories of the NSFAS recipients would have made it possible to distinguish between those who benefitted from the new funding threshold and those who benefitted under the previous threshold.

Table 1. Overview of data requirements

	'Inequality'	'Impact'	'Formula'
Family income	X	X	
Pass rates by programme and institution		X	X
Individual performance		XX	XX
Individual characteristics	XX	XX	XX
Institutional funding allocations			X
Cohort 2016 and 2017	X	X	X
Cohorts before 2016	XX	XX	X
Cohorts after 2017	XX	XX	

The absence of data on the household (family) incomes of NSFAS applicants and recipients is an important finding of this project. One implication is that any research that seeks to examine the impact of the new policy will have to address this very serious constraint. Another is that it confirms the difficulty in assessing whether public funds were properly allocated. Recent reports by the Auditor General and the Special Investigating Unit have drawn attention to related concerns.

The NSFAS officials contacted explained that the missing data problem may partly have arisen from decentralised allocation decisions taken by staff on their own devices (computers) that were never subsequently aggregated. That in turn may have been a partial consequence of the administrative instability at NSFAS before (2017) and after the adoption of the new funding model (2018 and 2019).[19]

The result was that, for the purposes of the study, two components of the intended analysis could not proceed by using a household (family) income variable.

As a second-best approach, it was decided to utilise information from the NSC database. The database contains information on school quintile, which has been used for NSFAS allocation

19 The research team was also informed that allocation decisions utilised information from credit bureaus — though it was unclear how that was implemented in practice.

decisions — as discussed further below. Once the NSC dataset was obtained, it was possible to use schooling information as an indication of likely household income status. In addition, school characteristics and schooling results serve as useful additional 'control' variables when examining individual performance and outcomes in higher education.[20]

In the process of linking the NSC and HEMIS datasets it was discovered that the matches were particularly poor for certain years and after some investigation, it was established that the relevant identifiers were incomplete. While resolving this was ultimately fairly simple, the process of establishing where the problem was, obtaining a new set of identifiers and merging the datasets again, took almost a year. The final data necessary for remedying this problem was only received shortly before submitting the report and as a result the third component of the analysis only utilises a restricted sample.[21]

There are inherent limitations that cannot be remedied — such as the missing information on the family/household income of NSFAS applicants and recipients. And more extensive data cleaning and checking would be valuable. In both respects, the initiatives by DHET and DBE to formalise and systematise the linking of basic education, higher education and higher education funding data for the purposes of future research and policy analysis, are endorsed.

NSFAS data

Applicant level dataset from the NSFAS for the period from 2014 to 2019 was obtained. For 2014-2016 only data on successful applicants was obtained, whereas for 2017-2019 data on both successful and unsuccessful applicants, was obtained. Anonymised identifiers made it possible to link applicants to HEMIS (for those who entered higher education) and to DBE NSC results for 2017-2019.[22] The NSFAS data used in the analyses includes information on whether the applicants were successful, whether they reported being SASSA beneficiaries, household income (although in practice this data was often missing), and the amount of funding received.

A brief description of the number of individuals funded by the NSFAS for period 2014 to 2019, the total funding provided to these individuals and the number of all applicants (successful and

20 The project also experienced a range of challenges in obtaining the NSC data in appropriate scope and format, and matching it to the other datasets, which delayed the overall analysis further.

21 There is an intention to update this to the full NSC-HEMIS samples in subsequent analysis of this nature.

22 A person should only appear in the HEMIS data if at some point they enrolled in a higher education institution.

unsuccessful) for 2017-2019, are provided. These numbers broadly match those reported in official NSFAS documents, although there are some differences. The data obtained contain several other variables that are used in later sections of this volume where they are described fully.

Table 2 below shows the number of funded individuals from 2014-2019, the total funding disbursed to these individuals and the total number of applicants (successful and unsuccessful) in 2017-2019.

The number of funded students more than doubled, with large increases between 2016 and 2017 and after the new policy was implemented. The figures differ from the official ones presented in NSFAS Annual Reports (row 2): the figures for 2016 and 2019 are somewhat lower than official figures, while the 2017 and 2018 figures are higher. Given the various concerns about NSFAS records no attempt was made to reconcile the figures or to explain the differences.

Administrative data on unsuccessful applicants was only available for 2017 to 2019. The number of applicants increased by nearly 50% over this period, whereas the number of funded students increased by around 30%. Row 4 shows the total funding disbursed to the funded students adjusted for inflation, which rose from R10.5 billion in 2014 to R27.6 billion in 2019 — a 170% increase. Mean funding per student rose from R57,000 to R71,000, a 25% increase.

Table 2. Descriptive Statistics from NSFAS Administrative Data: 2014-2019

	YEAR					
	2014	**2015**	**2016**	**2017**	**2018**	**2019**
Total Funded Students	183208	176866	214734	296464	364745	388590
(official figures)	186150	178961	225950	260002	346966	393767
Total Applicants				469818	577499	692219
Total Applicants/ Total Funded	0.00	0.00	0.00	1.58	1.58	1.78
Total funding (Billions)	10.49	10.38	13.13	18.47	23.97	27.63
Mean funding per student	57240	58668	61132	62317	65711	71103

Note: Own calculations from NSFAS, except official figures which are taken from NSFAS Annual Reports. Rand values deflated to Nov 2023 rands

Missing income data

In the NSFAS data, there is household income data for only around 26% of new applicants in 2017, none in 2018, and 44% in 2019. The percentages for funded applicants are 18%, 0% and 44% respectively. The extent of this missing data initially delayed the project as it was sought to establish whether it was an error or if information had been withheld. It was then also necessary, having confirmed that the data was indeed missing, to substantially reorient the planned analysis.

According to current and former NSFAS officials who were interviewed, the lack of 2018 household income data is because the NSFAS application system was not able to process all the data. In response, decisions were made 'off-system' by NSFAS employees and the data for those decisions was not subsequently collated into the main database. So, for instance, some applicants in 2018 may have provided income data that is not in the centralised database. Such income data was therefore not part of the data obtained for the analysis for this report.

If similar issues were present in 2017 and 2019, this would explain why the percentage of applicants with income data was so low. An alternative explanation is that some of these applicants obtained a means test waiver because of attending no fee schools or being SASSA beneficiaries. The Revised NSFAS Strategic Plan for the fiscal years 2020/21–2024/25 states that, "from the 760 000 applications received in 2021 academic year, it is believed that over 460 000 (61%) applicants are SASSA beneficiaries" (NSFAS 2022b, 27). This, however, is substantially higher than the reported proportion of those who applied for the NSFAS funding between 2017 and 2019 who were SASSA recipients.

When applicants are required to report household income there are also strong incentives to under-report household income. During the period of interest, applicants were required to provide affidavits if their families received little to no income (DHET 2019a), but the legitimacy of these cannot be easily determined. After the period covered in the analysis (from 2020 onward), the NSFAS instituted a data sharing agreement with South African Revenue Authority (SARS) through which NSFAS can check on the incomes of the parents and guardians of applicants (NSFAS 2020b).

In conclusion, it was not possible to obtain income data for those with missing incomes or a definitive explanation for why the data is missing for these individuals — especially in

2017 and 2019. Similarly, it was not possible to establish with confidence how the NSFAS made funding decisions for individuals who were not means test exempt, and who did not provide income, or for whom there is no income information in the data accessed. Corroborating the explanations provided and further establishing the details of the process was outside the scope of the present report.

HEMIS administrative data

Individual level HEMIS data from DHET for the period from 2012 to 2020, was obtained. As noted above, the data could be linked to NSFAS applicant data for the period 2017 to 2019 as well as the NSC data from DBE, which is described below.

Among the variables used in the analyses were information on the type of qualification and university an individual attended, age, whether a student was in residence, the individual's reported race, sex, whether they were studying a contact or distance programme, and whether they were postgraduate or undergraduate. The focus of this report is on undergraduates, since NSFAS only funds undergraduate qualifications (including four-year degrees). Crucially, the HEMIS data provides information that can be used to determine when an individual first entered the university system. Those who started in 2018 or 2019 qualified for the new 2018 bursary conditions, whereas those who had entered in 2017 or earlier did not.

For outcome variables, individual-level performance measures are constructed from the course-level data. That data allows identification of student course load and share of courses passed. Enrolment across years is examined to define a dropout variable and thereby also construct dropout rates over time.

Dropout is defined as students who exit without completing their qualification.[23] The HEMIS data captures enrolment at a mid-year point, therefore students who initially enrol and subsequently drop out before the HEMIS census date are classified as dropouts. The measure of dropout therefore includes both those students who did not enrol at the start of the year and those who dropped out by the HEMIS census date. Given this, dropout can only be defined from year 2 onward as students who initially enrol in year 1, but dropout in the first half of the year do not

23 Students may, however, return in subsequent years or may enrol at a different institution.

feature in the HEMIS data. For this reason, the estimated dropout rates are expected to be lower than those calculated in DHET cohort studies (DHET 2022) — to the extent that those studies have more comprehensive data.

National Senior Certificate (NSC) data

Individual level NSC data was obtained from the DBE for the years 2011-2020.[24] Having been provided with the appropriate identifiers it was possible to match the same individuals to their NSFAS and HEMIS records. The data also contains a school identifier and, in some years, the school quintile and whether the school was an independent school. (Some independent schools write the state NSC examinations and so are present in the data and identified as such).

School quintile and whether the student attended an independent school are key variables from this dataset because they provide a source of information on the socioeconomic status of the student. In addition, and as discussed above, in 2017 the NSFAS applicants reportedly qualified for a "means test waiver" (they did not need to show proof of income) if they attended a quintile 1, 2 or 3 school (and/or if they were a SASSA grant recipient). If information about school quintile or whether the school was independent or not was missing in some years, this was imputed from later or earlier year information on the same school, where this was available.

Around 0.7% of the new NSFAS-funded students in 2017-2019 were merged into the NSC data but their schools were missing school quintile information, and were also missing information on whether the schools were independent. It is unclear why this occurs. Another 8% were missing information on school quintile because they were not merged into the NSC data available. There are two main reasons this can occur. The first is that individuals wrote NSC before 2011, and so are not in the NSC data used, and therefore their school or school quintile are not known. The second is that some students would have written non-NSC matric examinations, such as the Independent Examination Board (IEB). It is assumed that students who applied and entered in 2017 and who were 25 years or older in 2017 have missing school data because they wrote NSC in 2010 or earlier. It is assumed that students younger than 25 years wrote a non-NSC examination. The same is assumed for 2018 and 2019, but add one year and two years of age for 2018 and 2019 respectively.

24 Attempts to obtain data from DBE for earlier years were unsuccessful.

Household survey data

The official policy and its practical implementation need not be the same for a variety of reasons. To examine the impact of the free higher education policy on inequality empirically, several sources of microdata are used in the analysis.

The General Household Survey (GHS) is conducted annually by Statistics South Africa. It provides data that can be used to describe household income, as well as the incomes of student and non-student households, and relate these incomes to the family income thresholds (R122,000 and R350,000) used by NSFAS. It allows identification of where the likely beneficiaries were in the national income distribution, thereby providing insight into the inequality implications.

The GHS asks questions about several sources of household income. These include all social grants, earnings from work, private pension income and remittances from family members in other households. Social grants and employment income are asked for each person, and pension income and remittance income are asked about for the household. The income sources are not as comprehensive as Stats SA's Income and Expenditure surveys, but they cover the key sources of income.

The GHS asks questions about all household members, including whether they are students and the institutions at which they study. One can use these questions to identify university students, whether these students attend public or private universities, whether they are undergraduate or postgraduate (based on whether they say they have already completed a degree or diploma) and whether they are contact or distance students. Comparable questions have been asked about students and household income since 2013 and the 2013-2019 years are used.

One weakness of the GHS for the current analysis is that by design the GHS does not survey individuals in university residences. This means that only university students living in private accommodation could potentially be surveyed. It is shown in the Technical Report that estimating the number of university students from GHS data produces numbers that are too low; that is probably a result of residence students being excluded.

The main conclusion from the comparisons of GHS and HEMIS is that whilst there is an underestimate of public university students in the GHS, it nevertheless looks very sensible when examining proportions by race, gender, postgraduate versus undergraduate, contact versus distance and captures some of the trends over time. It is concluded that using the GHS to examine the potential impact of the free higher education policy is sensible.[25]

Section 4 of the Technical Report contains a detailed, extensive analysis and discussion of the appropriateness of the GHS data for our research on the likely inequality effects of the free higher education policy change: the interested reader is referred to that Report for further information.[26]

4. Methods

The analysis is composed of three components that utilise different methods. The first component examines the potential effect of the university funding formula on student 'output' by looking at in-year performance, graduation rates and dropout rates. It does so in two parts: firstly, by concretising the specific hypotheses in formal specifications of university incentives, and secondly, by examining trends in descriptive statistics over time.

The second component examines the inequality implications of the 'free higher education' policy by using a combination of partial NSFAS data, NSC data and household survey data to estimate where the beneficiaries were likely to fall in the national income distribution. It then conducts some simple, counterfactual calculations of how alternative policies utilising the same budget could have led to a more equitable distribution of resources (within higher education and nationally).

Finally, the third component implements econometric analysis in an attempt to estimate the effect of the policy change, and components thereof, on student outcomes — specifically in-year performance and dropout.

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25 Prior research (Moses, van der Berg, and Rich 2017; Inchauste *et al*. 2017) has used the Income and Expenditure Surveys (IES) to undertake analysis of university students, despite residence students also being excluded from the sampling frames of these surveys. There is thus precedent for using surveys like the GHSs to examine who was likely to benefit from increased spending on higher education spending. The IES was not used because the most recent survey with publicly available data was undertaken in 2010/11.

26 See in particular sections 4.4, 4.5 and 4.6.

The following subsections briefly elaborate on the approach taken, while more detail is provided in the Technical Report.

4.1. The university funding formula and student 'output'

The creation and design of the teaching output grant is intended to encourage universities to maintain or improve the quality of the education they provide to students, which in turn is presumed to correspond to a higher pass rate. The notion that better quality education necessarily implies a higher pass rate could be questioned, but this report does not dwell on that. The focus is on the fact that this funding mechanism creates a financial incentive to increase student graduation.

A model of university optimising behaviour

The first part of this analysis utilises formal (mathematical) expressions to capture a partial representation of university behaviour in response to the teaching output component of the block grant funding formula. These formulae are premised on the kinds of representations used in neoclassical economics to describe the behaviour of individuals or organisations. The purpose is not to endorse that manner of thinking about higher education institutions, but rather to capture the underlying rationale of the funding formula and provide a framework within which to better analyse its potential consequences.

Empirical analysis

The empirical analysis of the possible effect of the funding formula on student 'output' proceeds in two parts. Aggregated funding data across institutions and years are examined, focusing on the final units utilised by the DHET to calculate the block grant for teaching output. Using only descriptive statistics, changes in this over time are examined, with reference to earlier enrolment numbers. If institutions are seeking to maximise funding by increasing the student completion rate, this would have to reflect in the institution's teaching output unit numbers in order to be effective.

The second part of the analysis uses HEMIS data to look at aggregate student performance over time. Teaching output units are based on verified student completion, so it follows that – all else

being equal – an increase in the output grant requires an increase in student completion rates. The overall completion rate will be a function not just of the probability of graduation from the third year onwards, but also dropout and progression rates from first year. Thus, it provides an overview of these different performance measures over the period of time for which data prior to the implementation of the new funding policy (2012 to 2017) was available and subsequently.

One complication in looking at student performance in higher education is that it is likely to be affected by the quality and effectiveness of students' school background. High quality school background could lead to improved performance at university, while a low quality school background may similarly be mirrored in poor university performance. Using matched data from National Senior Certificate results, changes in the prior schooling performance of students admitted to higher education institutions are also examined.

4.2. An inequality analysis of the new funding policy

The second component of the analysis examines the inequality implications of the new funding policy and contrasts those with the stated commitment to address difficulties faced by 'poor and working class' students. It uses a combination of theoretical analysis, descriptive statistics and triangulation of evidence. This triangulation is necessitated in large part by the absence of household/family income data in the NSFAS database, as described above.

The theoretical analysis, including graphical and mathematical representations, is used to examine the inequality implications of the adopted policy relative to potential alternative policies.

The empirical analysis examines a range of additional questions, looking at descriptive statistics. Household survey data is used to locate the expected beneficiaries of the new policy within the national household income distribution.[27] Merged NSFAS-HEMIS-NSC data is used to examine the socioeconomic characteristics of the NSFAS beneficiaries and how those change after the implementation of the new policy. The limited household income information that is available for the NSFAS recipients is used to ascertain whether the new policy was implemented in the manner

27 This cannot be done directly because the household survey does not ask specifically about NSFAS receipt and the proportion of all students receiving NSFAS funding was relatively low.

stated in official documents. That analysis uses the existing income data to impute income where it is missing. That and other information are then used to estimate the proportion of the new NSFAS recipients above the original household income threshold of R122,000.

Finally, the analysis examines descriptive statistics on the actual amount of funding awarded to students, across the three main years of interest (2017 to 2019) and the available data on family income.

4.3. Impact of the new funding policy

The third component of the analysis uses econometric methods to estimate the possible impact of the new funding policy on student achievement. Due partly to the design of the policy and partly to data limitations, it narrows this down to the following questions:

a) Has student performance and retention changed after the implementation of the policy?

b) Has the extension of funding to the higher income band resulted in improved outcomes for students in that band?

c) Have the new conditions of the bursary scheme impacted student outcomes for those in the <R122K income band?

Differential exposure to components of the policy change across cohorts and years of study, is used to examine how student performance changed with the introduction of the new NSFAS policy. Specifically, the first year outcomes for cohorts entering in 2018 are compared to the outcomes of cohorts entering prior to 2018. This allows for the comparison of the group exposed to the new policy *versus* the old.

For second year outcomes, two comparisons are made. First, 2018 outcomes are compared to pre-2017 cohort outcomes, which amounts to a comparison of students in year 2 who either experienced the new or old policy (but not both). Second, comparing second year outcomes for the 2018 cohort to the 2017 cohort represents comparison between a group eligible for a full cost bursary under the R350,000 income threshold, to a group — the 2017 cohort — eligible

for a capped bursary under the R122,000 income threshold. Building on the analysis described in subsection 4.1, cohort-year of study specific estimates for cohorts from 2013 to 2019 are made, to enable an examination of trends in performance over time.

To measure the overall impact of the policy change on student outcomes (research question 1), trends in cohort-year of study performance measures are examined, recognising the differential exposure of cohorts to the policy as described above.

The analysis was also interested in the impact of the policy change for students newly eligible for funding and previously eligible for funding who experienced a change in the funding conditions (research questions 2 and 3 respectively).

Two empirical challenges were encountered in attempting to answer these questions. First, in the period of the new NSFAS policy, the only information available is about who is funded via NSFAS versus not funded. Thus it is not possible to identify who from this group was induced to take up funding due to the policy change *versus* those that would have been eligible for (and would have taken) funding under the old policy rules. If the 'treatment' population in the experiment is defined as those students who became eligible for NSFAS under the new policy — in other words, those entering from households with incomes between R122-350K — this treatment status is not observed in the pre-policy period. For cohorts which first enrolled prior to 2018, only students funded via the NSFAS under the old rules (and only for those entering in 2017 given the restricted NSFAS dataset available for the analysis) can be identified. In the 2017 data, students in the R122-350K band should not be funded, and are therefore indistinguishable from students in the R350k+ income band.

The problems are tackled by using school quintile information as a proxy for eligibility. Students in quintile 1-3 schools are more likely to be eligible for funding under the old policy than students in other quintile schools. Similarly, students in quintile 4 schools are more likely to have become eligible for funding under the new policy than students from quintile 5 schools.

Cohort-year of study specific coefficients are compared to obtain estimates of how performance changed with the introduction of the new NSFAS policy, but the addition is that the comparison is done within school quintile groupings. Thus, while all student incomes are not directly observed, and therefore cannot identify eligibility for funding

under the old versus new policy, by observing trends in performance within school quintiles, trends across groupings where students have differential eligibility under the old and new policy, are identified. This indirect examination of changes in performance of students from different school quintiles provides suggestive evidence for research questions two and three.

All these approaches are implemented using appropriate econometric models that allow the estimation of the magnitude of any effects and their statistical significance — the specification of those models and other details are provided in the relevant section of the Technical Report.

5. Analysis and findings

This section presents the results of the analysis using the methods and data described above. Given the differences between them, the three components of the analysis are presented and discussed separately.

5.1. The university funding formula and student outcomes

In seeking to empirically examine the potential impact of a new policy on an outcome or outcomes of interest, as is explained in subsection 5.3, a general concern is the possibility of pre-existing trends in the variables of interest. One specific hypothesis as to why such trends may exist in the South African case is the incentive structure of higher education funding — an issue of interest in its own right.

As already noted, the 'teaching output' component of the block grant system determines a significant proportion of public funding for higher education institutions. While intended to 'reward' actual delivery of education, this potentially creates an incentive for these institutions to increase graduation rates independently of that. If this occurred, through whatever means, it would create a pre-existing trend in that variable — and associated variables — which could generate misleading results in the empirical analysis on the impact of the policy.

The basic motivation for this aspect of the research, then, is two-fold. The first is an interest in possible university optimising behaviour in response to incentives in the funding model, of

which 'teaching output' is an important component. The second is a desire to check, *ex ante*, the robustness of any before-and-after econometric analysis of 'free higher education' by examining whether there may have been a pre-existing trend in the outcome measures used.

The specific hypothesis is that there may be a pre-existing trend of increased student throughput as a result of university optimising behaviour: universities may have increased student throughput in order to benefit from teaching output funding.

The issue of performance funding linked to student outcomes has received some attention internationally (Rutherford and Rabovsky 2014; Hillman, Tandberg, and Gross 2014), but there has been no such work in South Africa. In contrast, the impact of research funding incentives in South Africa has been the subject of a number of studies and publications. That is despite the fact that the teaching output grant has ranged between 13.9% and 17.1% of the block grant total over the period 2008 and 2017, versus 12,3% and 13.5% for the research output grant over the same period. As shown in Figures 5 and 6, the teaching output component of block grant funding can be substantially more than the research output component in many institutions.

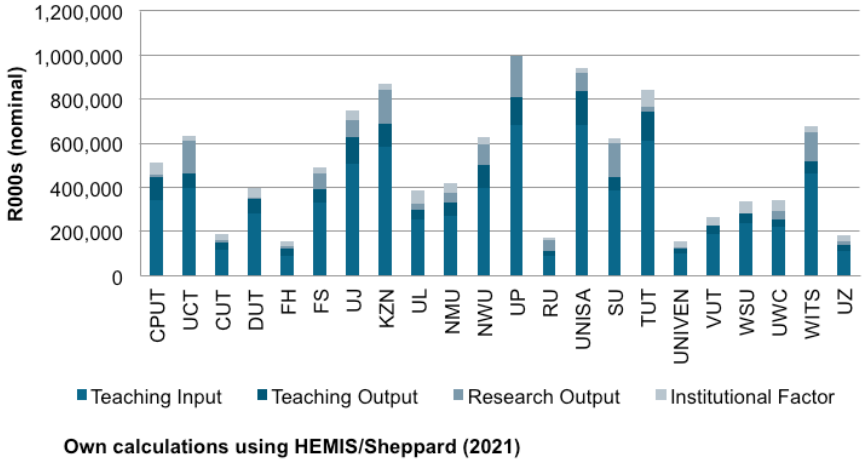


Figure 5: Components of block grant funding by institution (2008)

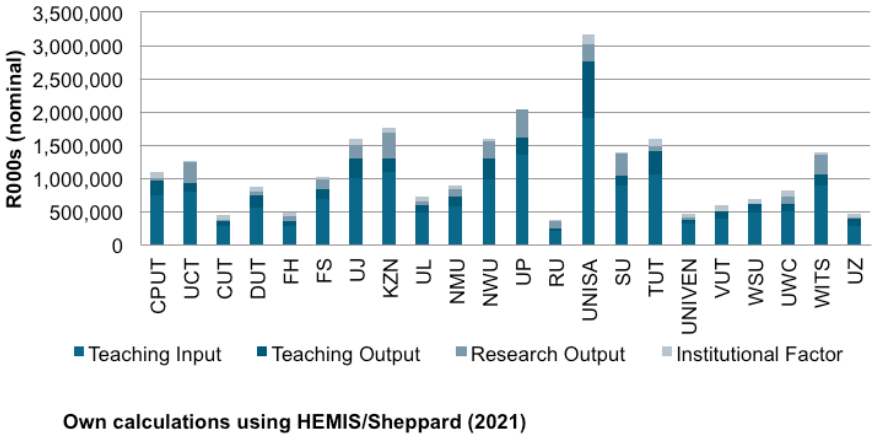


Figure 6: Components of block grant funding by institution (2017)

A model of university optimising behaviour

Actual allocations of the teaching output block grant are a function of the behaviour of all institutions: the allocation is a function of the proportion of output units a particular institution contributes to the national total. This provides an incentive for institutions to alter student 'output' through the means at their disposal.

One may wonder whether the percentages shown above are large enough for the teaching output component of funding to affect university behaviour to a significant degree. However, it is suggested that the logic of optimisation as working on *marginal* effects means that the implicit, but deliberate, incentives arising from this component of funding are pertinent to the analysis of institutional behaviour. Existing evidence on the research output component provides support for that argument, showing that it has had a dramatic effect on the quantity of research output despite such funding ranging from a minimum of 0.64% to a maximum of 27.86% of universities' government block grant funding across institutions.

It is important to restate that adopting and developing this conceptual framework does not necessarily mean endorsing such an approach to higher education management. Indeed, if

anything, the analysis is premised on a concern that institutions may react to incentive mechanisms in a manner that is contrary to the intentions of policy and the public interest (Muller 2022). The framework should rather be considered a hypothesis as to how institutions may respond to such incentives, and through which the empirical evidence is examined.

The university optimisation problem can be structured by first specifying a revenue equation and then considering which dimensions of this are subject to influence by actions by or within individual institutions. One can then incorporate the cost of admitting, and continuing to enrol, particular 'types' or categories of students — where 'type' includes probability of progression and graduation. Moreover, one should consider that different groups of students have varying capacities to pay fees. Putting all this together, one can specify the expected net revenue stream an institution will obtain from enrolling a particular type of student and/or, by changing the probability of that student progressing and graduating (conditional on them not dropping out). The formal details can be found in the Technical Report.

Assuming the quality of applicants to be exogenous, there are two main instruments available to universities to increase student throughput. These are (a) improving the quality of support and instruction, and (b) mechanically increasing pass rates (or lowering quality thresholds).

It may not be possible to definitively distinguish between these in the current analysis, but the difference is clearly crucial for policy and public interest purposes. Under the reasonable assumption that increasing educational quality and support is more expensive and hard to achieve than simply adjusting pass rates, a university that only seeks to maximise short-term net revenue will respond to the output incentive by passing and graduating more students.

Descriptive analysis over time: institutions

Given the preceding analysis and the intuitive concern that institutions may take actions to increase revenue from student 'output', first the evidence is examined at the level of institutional aggregates using official information on university funding allocations (HEMIS/ Sheppard, 2021).

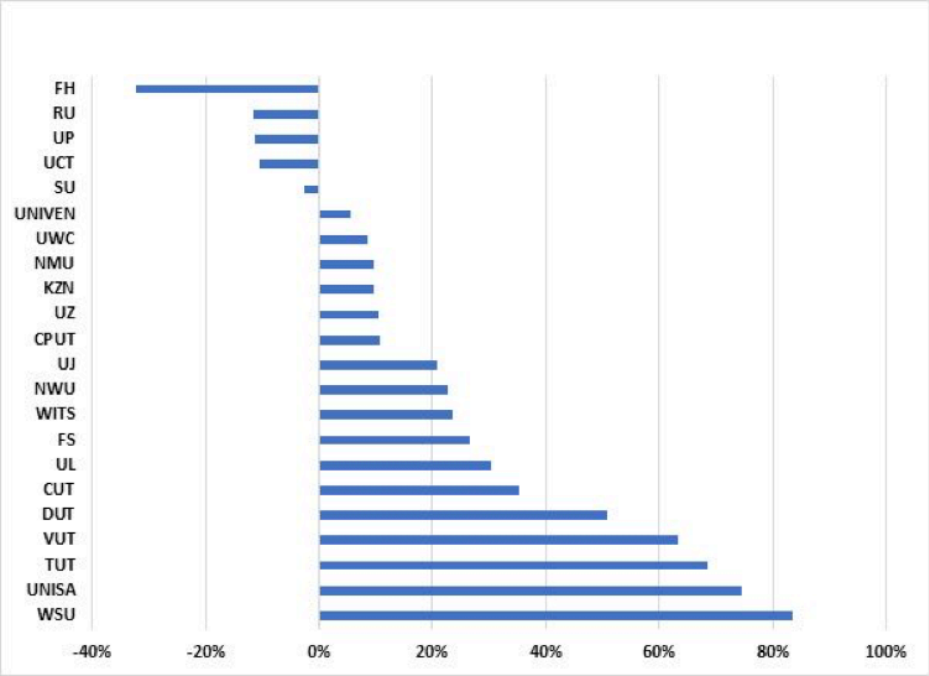
As already discussed in subsection 2.2, universities are funded, in the main, via block grants, one of which is the teaching output grant. To calculate the appropriate allocations to institutions, the

DHET utilises a formula that aggregates teaching output units. Different degree types receive different weightings.[28] University funding in year *t* reflects teaching and research outputs from year t-2 and the data is adjusted accordingly to reflect year in which the 'outputs' occurred. At the aggregate level it is not possible to link 'inputs' (the students entering) and 'outputs' (students graduating) directly. This presents a challenge since only looking at graduation numbers could generate a misleading trend when overall enrolments are increasing or decreasing.

To address this, a rough proxy of the actual ratio of graduates to enrolments is used, by dividing the teaching output units for year t by the teaching input units for year t-3. Then the change in that ratio over time is calculated and expressed in percentage terms. The intuition here is that if universities are increasing the rate of student output (the probability of graduating), then the constructed ratio should also increase.

Figure 7 shows this calculated using all teaching inputs and outputs, for 2017 compared to 2006. The results suggest a substantial increase over time for most institutions.

28 This may create incentives for institutional revenue maximisation behaviour across degree types, for present purposes — and as in the formal model above — this is not examined any further as it has no direct bearing on student throughput per se.

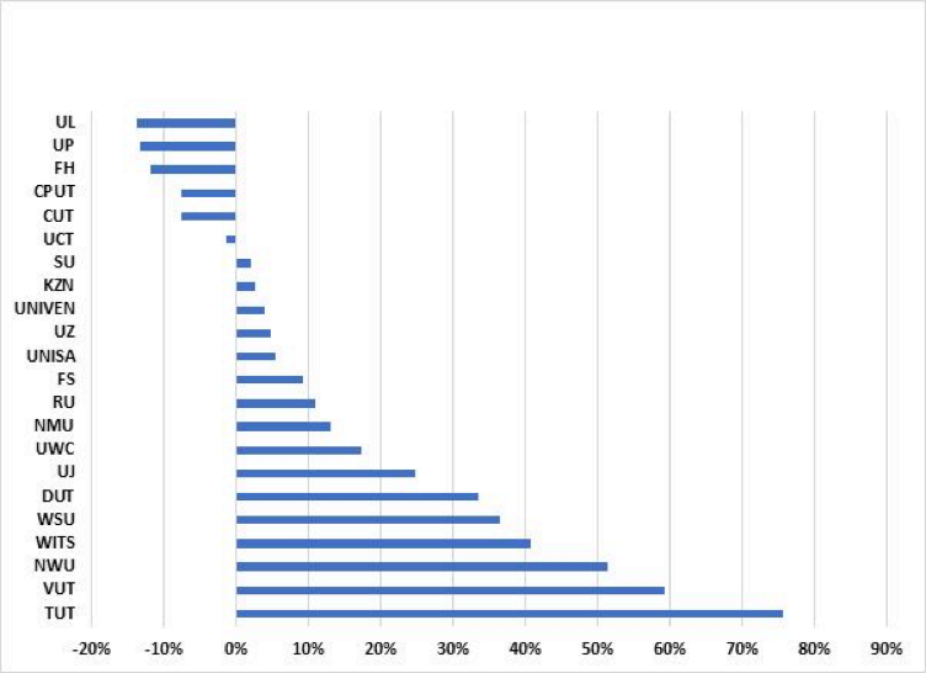


Note: The horizontal axis is the percentage change in the ratio of teaching output units in year 't' to teaching input units in year 't-3', from the earliest year in the data (2006) to the latest year before the new funding policy (2017).

Figure 7: Change in teaching unit output-input ratio over time (2006 to 2017)

A limitation of that approach is that, as already noted, teaching output units are weighted combinations of degree programmes of different lengths. Figure 7 therefore examines these trends only for the sub-sample of three-year qualifications.

While the specific institutional values and positions change, the broad pattern remains the same, namely an apparent general — and sizeable — increase in student output relative to input.



Note: The horizontal axis is the percentage change in the ratio of teaching output units in year 't' to teaching input units in year 't-3', from the earliest year in the data (2006) to the latest year before the new funding policy (2017).

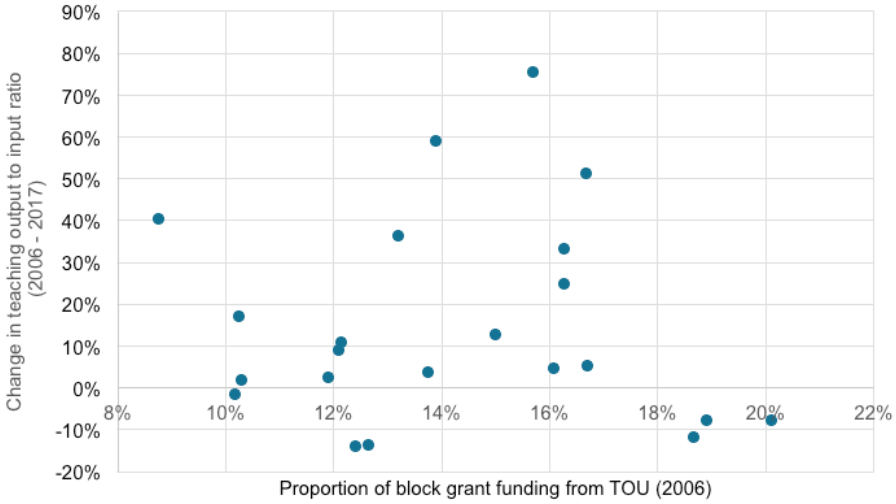
Figure 8: Change in teaching unit output-input ratio over time: 3-year qualifications (2006 to 2017)

This pattern is consistent with the hypothesis that the funding formula incentivises institutions to increase student output/throughput.

However, these changes are also consistent with other explanations — such as more selective admissions, better teaching and/or better support for undergraduates. More selective admission appears unlikely given the dramatic increase in enrolments over time and, as discussed below, an aggregate decline in school-leaving results or qualifications. Given institutional concerns about inadequacy of resources relative to growing intake, it also seems unlikely that better teaching and support could explain such large improvements, but it is not possible to rule those explanations out entirely within the scope of the present study.

Figure 9 presents a visual comparison of the share of institution block grant coming from teaching output units (in 2006) and the subsequent change in the proxy used for conversion of teaching

input units to teaching output units. It shows no clear relationship between the two. On the one hand, one might intuitively expect that institutions more reliant on the teaching output grant would be more likely to increase teaching outputs if engaging in optimising behaviour. However, as already noted, optimisation is driven by *marginal* gains. A more comprehensive analysis of this relationship is warranted but was not possible within the time available for the present analysis and is left for subsequent work.



Note: The vertical axis shows the percentage change in the ratio of teaching output units in year 't' to teaching input units in year 't-3', from the earliest year in the data (2006) to the latest year before the new funding policy (2017). The horizontal axis shows the proportion of the institution's block grant funding that came from the teaching output grant in 2006.

Figure 9: Comparison of teaching output conversion ratio with TOU block grant share

Descriptive analysis over time: students

As a second form of analysis, individual-level data from HEMIS is examined, but initially aggregating this over time. In principle that provides a more direct resolution to the problem above, where using the ratio of teaching 'outputs' to teaching 'inputs' is only a rough proxy for the actual outcome of interest: individual performance and graduation rates.

For this project only *individual*-level HEMIS data from 2012 onwards was available, with the

result that the individual-level results are not directly comparable to the institution-level results. However, the findings are supplemented with discussion of those from the latest cohort study provided by DHET which utilises data back to 2000 (DHET 2022).

As a first attempt to examine whether there has been a significant change in student completion rates over time, the focus is on comparison of aggregate changes for 2012 against those of 2017. The reason for using these two years is that 2012 is the earliest year in the HEMIS dataset available for this study, while 2017 was the last year before the implementation of the new student funding policy.[29]

Aside from time period, another key difference from the preceding, institution-level analysis is that with individual-level data it is possible to distinguish between types of study. This is also important to the extent that the focus in this report is on a particular subset of undergraduate students in traditional research incentive and comprehensive universities studying for full-time, 'traditional' undergraduate degrees. Therefore, these changes are examined for different subsamples of the HEMIS data.

The first subsample is limited to contact, full-time students. Along with removing duplicates and other data cleaning, this reduces the dataset to 4,527,578 observations from an initial 8,777,572.

The first variable examined is the average percentage of qualification credits completed by year of study and calendar year. It should be recalled that the focus is on the period 2012 to 2017, prior to the policy change, so the report does not cover later years. From 2012 there is an increase in the proportion of qualification course credits completed in the first year of study, but a decline in the second and third years.[30] The trend is suggestive but mixed and no strong conclusion can be drawn. This is further corroborated by the results for the proportion of total courses passed over time by year of study. The pattern there is broadly one of increases over the period, but only after an initial decline from 2012 to 2013. Tables presenting these datasets are provided in the Technical Report.

29 The tables in the Technical Analysis part of the publication provide these results for the full sample (up to 2020).

30 The same pattern is also visible for the subsequent period with the exception of 2020, where the patterns for 2nd, 4th and 5th years change. As already noted, 2020 is likely to be an outlier due to Covid-19.

The preceding variables represent in-year performance, which must contribute to successful degree completion, but ultimately is a proxy for that. To examine completion more directly the proportion of students from a given cohort graduating in minimum time is calculated. Minimum time is relative to the degree type and so should also provide a more accurate picture of any aggregated trends over time. These results, shown in Table 3, are more consistent with the findings from the aggregated institution-level changes from the funding data: they show a sizeable increase of five percentage points from 2012 to 2017, which equates to an increase of approximately 17%.

Table 3. Proportion of cohort graduating in minimum time

First year of study	Graduated within the min. time specified?		
	No	Yes	Total
2011	202,639 71.23	81,841 28.77	284,480 100.00
2012	323,517 70.75	133,732 29.25	457,249 100.00
2013	313,543 69.82	135,512 30.18	449,055 100.00
2014	322,871 68.15	150,882 31.85	473,753 100.00
2015	348,095 66.60	174,538 33.40	522,633 100.00
2016	348,443 67.73	166,053 32.27	514,496 100.00
2017	333,357 66.48	168,051 33.52	501,408 100.00
Total	2,192,465 68.45	1,010,609 31.55	3,203,074 100.00

Finally, dropout rate over time is examined. The implication of 'profit' maximisation by institutions for dropout is less clear than for completion or progression rates. In theory, a student dropping out simply creates a space, within an institution's enrolment plan, for admitting an additional student. In that sense it is 'profit neutral'. However, for two students with identical ex ante graduation probabilities, the dropout of the first reduces the expected graduation year (and therefore teaching output subsidy received) by a year. On the other hand, as a student stays in the system beyond the minimum graduation time, the student's conditional probability of graduating falls and it could be 'optimal' for institutional revenue to get the student to drop out and be replaced by one with higher probability of graduation.

Table 4 shows a declining dropout rate over time for the first four years of study and increasing rate for the fifth year. Note that dropout information from 2013 onwards has been used (rather than 2012) because information on dropouts as derived from HEMIS is only available from the year after the first year of study.

Table 4. Proportion of students dropping out

Year	Year since started qualification					
	1	2	3	4	5	Total
2013	0.103 165,935	0.067 109,944	0.062 87,977	0.069 53,159	0.076 22,959	0.08 439,974
2014	0.102 175,764	0.071 109,651	0.057 91,123	0.066 54,301	0.09 22,674	0.08 453,513
2015	0.101 189,759	0.065 110,968	0.063 83,508	0.06 54,041	0.086 21,438	0.08 459,714
2016	0.093 191,176	0.05 128,760	0.046 91,612	0.052 53,167	0.07 20,065	0.067 484,780
2017	0.093 195565	0.059 127,194	0.041 102,767	0.058 57,368	0.086 22,269	0.07 505,163

The second subsample reduces the dataset to only traditional undergraduate degrees (three or four year) and traditional universities (as opposed to universities of technology). This reduces the sample to 2,079,781 observations.

While the levels of the various outcomes differ, the findings are broadly the same. For example, for this sample the proportion of students graduating in minimum time is higher to begin with (in the 2011 cohort): 36.24% *versus* 28.77% in the larger sample. However, the trend is approximately the same: an increase of 15% in the proportion graduating in minimum time between the 2011 and 2017 cohorts.

One factor that could affect performance in higher education is the quality of prior schooling and school-level achievement. A good, consistent proxy for achievement should be results of school-leaving examinations. All else being equal, it should be expected that an upward trend in schooling achievement would be associated with a subsequent upward trend in higher education outcomes. Alternatively, if a downward trend in schooling achievement of those entering higher education is accompanied by an upward trend in higher education performance then that is more likely to reflect a change occurring within the higher education system.

To examine this, the HEMIS data discussed above is linked with data on National Senior Certificate (NSC) schooling results, in order to examine trends in the schooling performance of students who enter the higher education system. Note that students who sat for non-NSC examinations, such as the Independent Examination Board (IEB) examinations, are excluded from the resultant sample. Furthermore, entrants to the higher education system who completed the NSC prior to 2011 are also not be in the resultant sub-sample.

Table 5 suggests a downward trend in the average subject mark of students in higher education, from 66.52% for first years in 2012 to 63.82% in 2017 (the period of focus in this analysis) and down to 60.79% in 2020. The lower sample sizes in earlier years reflect the fact that some NSC students do not enter higher education immediately after schooling and therefore because the NSC sample starts in 2011 the match rate grows over time.

As above, the sample is reduced further to a sub-sample of students who were registered for traditional undergraduate degrees at traditional universities. Unsurprisingly, given the higher entrance requirements, these students have higher averages overall but a similar trend is present

across years. For first years the subject average declines from 70.29% to 67.98% in 2017 and 64.19% in 2020. For third years, the subject average declines from 72.15% to 69.66% and 68.72% respectively. These findings do not support the notion that downward trends in dropout and upward trends in graduation in minimum time are explained by improving preparedness or calibre of students entering the higher education system.

Table 5. Subject average from NSC exam: undergraduates in full-time, contact study

Year	Year since started qualification					
	1	2	3	4	5	Total
2012	66.52 54014					66.52 54023
2013	64.33 90732	67.43 109,651				65.46 133734
2014	64.12 120165	65.06 110,968	68.34 37839			65.20 226419
2015	63.52 137980	65.48 128,760	65.59 54252	68.88 24083		64.91 299944
2016	63.90 150903	64.38 127,194	65.63 71410	65.94 35696	68.13 8509	64.66 367032
2017	63.82 168083	64.25 105254	64.69 83236	65.46 45405	65.78 14954	64.36 409801
2018	63.62 168083	64.14 112204	64.43 88810	64.70 52293	65.14 18768	64.11 440158
2019	63.51 173215	63.81 120157	64.26 93789	64.49 56891	64.24 21489	63.89 465541
2020	60.79 104042	63.72 124534	63.98 102162	64.19 61480	64.04 24630	63.14 416848
Total	63.64 1160086	64.47 753260	64.95 533347	65.26 277515	65.14 89292	64.32 2813500

5.2. An inequality analysis of the new funding policy

The extent to which tertiary education spending in South Africa is targeted at high- or low-income individuals is an important question and has been addressed in several papers (van der Berg 2005 and 2009, World Bank 2014, Inchauste *et al*. 2017). These studies used household surveys to examine where students who reported studying at public higher education institutions fell in the income distribution. The conclusion from these papers is that higher education spending is not pro-poor, in the sense that enrolment rates are higher at higher household per capita income levels. The World Bank (2014) estimated that half of the benefits of tertiary education spending for students go to students from households in the top decile (top 10%) of the per capita income distribution, and two thirds of the benefit go to those in the top quintile (top 25%).

These studies make the simplifying assumption that the amount of tertiary education subsidy per student is the same for all students. But in Germany (Barbaro 2002) and the United States of America (Choy and Berker 2003), the finding is that the poor obtained larger amounts of state subsidies than the rich, which renders such expenditure more progressive. The analysis below addresses both these aspects, for the old (in 2017) and new (in 2019) NSFAS funding policies.

The South African papers cited above focus on public spending on tertiary education in general, whereas the focus in this report is on the NSFAS that is explicitly targeted at higher education students from relatively low-income families. A key tension which will be explored is between the rhetorical case that expanding the NSFAS funding would benefit 'poor and working class students', whereas the evidence suggests that by expanding the income eligibility threshold to R350,000 in family income, the funding would benefit households much higher in the income distribution.

In the analysis below, survey data is used to examine where in the household income distribution these thresholds were in practice, basing the analysis on the previous South African studies mentioned above but using newer data from the General Household Survey. The results are not directly comparable to the older studies, however, because in this analysis household

income is used, and not household income per capita.[31] In the Technical Report a range of other issues that could affect the results, such as the exclusion of students in residence from household surveys and the difficulty in assessing family income if a students are not resident at home, have been discussed. Finally, it should be noted that the analysis does not consider the origins of the funds used for higher education and the fiscal incidence of those decisions, but the policy relevance of this is discussed in section 6.

Was the design of the new funding policy equality promoting?

The stated intention of the 'free higher education' policy was improving access for poor, working class and missing middle students. Official statements emphasised the first two groups: the original announcement by former President Zuma used the phrase 'poor and working class' fourteen times.

This presents an apparent contradiction (Muller 2018) when considering available evidence on the likely beneficiaries of the new threshold. While the real value of the preceding (R122,000) threshold had eroded over time due to rising inflation and fees, only a smaller adjustment was needed to remedy that. The policy went further by substantially expanding the eligible group to cover up to 90% of South African households.

While neither the term 'poor' nor the term 'working class' can be defined in an entirely objective way, some empirical and conceptual definitions are more consistent with typical usage and actual data than others.

Official poverty lines published by Statistics South Africa (Stats SA) for 2018 utilise different definitions of poverty to estimate poverty lines that ranged from R547 to R1,183 per person per month, implying household poverty lines of R2,735 to R5,915 per month for a household of five persons.[32] That translates to a household income definition of poverty of R32,820 to R70,980 per year for a household of five. Budlender, Leibbrandt, and Woolard (2015) previously proposed

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31 The reason for this is because the NSFAS income thresholds are expressed in terms of total family or household income. Using household income will make larger families seem better off than they would be if per capita income was used, and since, on average, larger families have lower income per capita, this means that we will overestimate the benefits accruing to students at the bottom of the household per capita income distribution.

32 Reference to a household of five here is made because that is approximately the average size of a poor or 'chronically poor' household (Budlender, Leibbrandt, and Woolard 2015; Schotte, Zizzamia, and Leibbrandt 2018).

using an upper bound household income line to define poverty, which amounts to approximately R120,000 in household income for a household of 5 at the end of 2023.

The definition of 'working class' may be even more open to interpretation and contestation than that of 'poor'. Nevertheless, there is much literature on approaches to defining class categories. One reasonably consistent aspect of this literature consists of distinguishing the working class from the 'middle class' and the 'upper class' or elite. None of the extant scholarly analyses of class in South Africa would classify the top decile as 'poor' or 'working class' (Muller 2006; Nattrass and Seekings 2008). A study using data from the South African National Income Dynamics Study (NIDS) sought to define class categories with reference to the probability of transitioning into poverty (Schotte, Zizzamia, and Leibbrandt 2018). The median expenditure per person per month for those defined as 'middle class' was equivalent to approximately 5,393 in 2023 Rands, which is approximately R240,000 in household expenditure in 2018 Rands.[33]

These studies suggest that before the policy was implemented the empirical evidence showed that (a) the existing threshold of R122,000 covered all those households categorised as 'poor' even using higher ('upper bound') poverty lines, and (b) the new threshold of R350,000 would go substantially beyond the median household income (expenditure) of the 'middle class'.

Increased access to higher education can be seen as a good in-and-of itself. However, since reducing inequality was one of the primary stated motives for the policy it seems appropriate to examine in what sense, if any, the policy was indeed inequality reducing. To do so available data is used to empirically answer the question: how were the benefits of the policy distributed across household income categories?

Prior to the empirical analysis that examines the actual distribution of benefits in practice, it is useful to examine whether the policy was optimal from a theoretical perspective. In other words was the policy adopted the most inequality reducing option available given the resources provided? To address this, firstly, it is assumed that there is a fixed resource envelope. Secondly, a question is asked whether those resources could have been allocated to actual or potential students in a way that would have been more progressive, where progressiveness is defined as allocating a greater

33 This is likely an overestimate since such households have lower average household size than five. The reason for converting to 2018 Rands is that this corresponds to when the policy was implemented.

proportion of funds to students from lower income households. Greater progressiveness would imply a less unequal distribution of resources and therefore better serve the stated objective of the policy. In doing so the policy is assessed by the criteria that were presented as justification for it.

There are two main apparent contradictions between the policy objectives and its design. The first contradiction is that prior to 2020 the vast majority of young adults received very little social or economic support from public funds, while those in higher education received substantial fiscal resources – directly and indirectly (Inchauste *et al*. 2017). Increasing the resources allocated to individuals within the higher education system would therefore increase the gap between those receiving resources and the majority who did not. The second contradiction is that, the decision to stagger the introduction of the policy — including only first years in 2018, for instance — effectively disregarded the challenges faced by inadequately resourced students who were already in the higher education system.

The effect of increasing inequality among the youth was, therefore, essentially inevitable given the decision to allocate limited fiscal resources to higher education while largely keeping the number of students constant. However, there was still scope to allocate those resources in a manner that was more or less progressive within the population of students in higher education. To see why the approach taken was sub-optimal from an inequality perspective, it is informative to compare it to a counterfactual alternative: implementing a lower threshold across the first three or four years of study. Figure 10 illustrates the simple intuition.

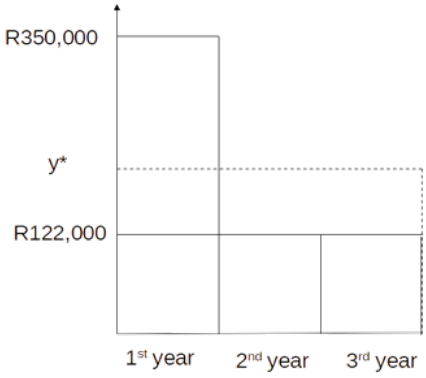


Figure 10: Optimal and sub-optimal thresholds

For the first year it was implemented, the new policy allocated all additional resources to first year students from households with income between R122,000 and R350,000. It retained the existing threshold for students in the system from 2nd year onwards, which meant that students with household income only slightly above R122,000 from those years continued to receive no support. Figure 10 illustrates the more equitable or progressive alternative of raising the threshold to a lower value (y*) but for all students in the system in 2018 within the prescribed period of study for their degree.

The allocation of an identical quantum of resources within qualifying household income categories is also sub-optimal. An optimal policy would allocate funds according to the gap between available household resources and the quantum required for enrolment and participation in higher education. Indeed, this logic was recognised in the earlier logic of NSFAS which specified an 'expected family contribution' (EFC) for some qualifying students.

The intuition for the basic policy problem is captured in Figure 11.

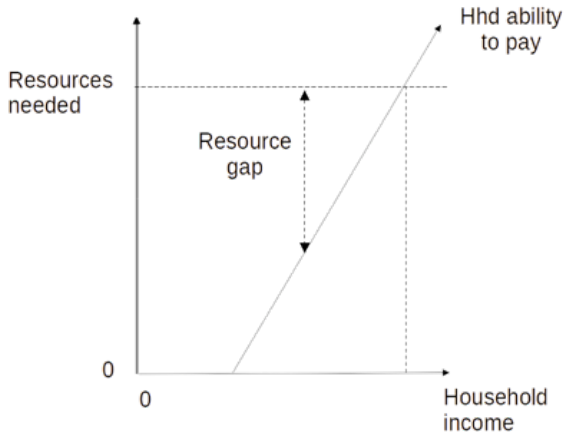


Figure 11: Policy problem

Figure 12 attempts to visualise the policy that was actually implemented. The solid grey areas represent resource needs that were funded under the new policy. Hashed area A represents the non-funding of the needs of cohorts prior to 2018. This can be contrasted with the hashed area B which represents the 'over-funding' of cohorts from 2018 onwards.[34] Under an optimal policy, B would not be funded and A would be.

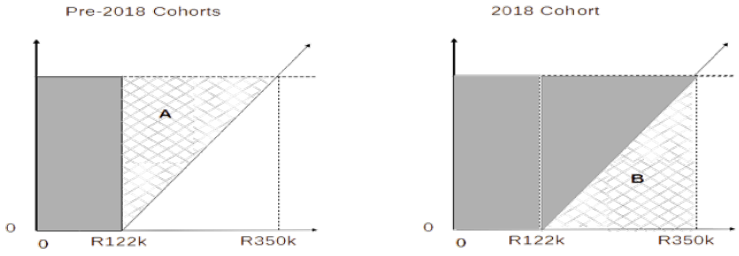


Figure 12: Visualisation of new (2018) funding policy

34 The notion of overfunding is more controversial than underfunding. The latter can be proven from household disposable income (if any) after meeting basic needs, whereas the former may depend on more subjective notions of what constitute household priorities.

It is important to emphasise that these diagrams are for illustrative purposes only. To assess the actual (absolute) and relative sizes of areas A and B would require detailed knowledge of the household income distributions within and across cohorts, as well as how resource availability varies with household income.[35] In practice, it appears — as discussed below — that the NSFAS only had partial information on the income distributions. Moreover, there has been no known detailed assessment of how households' ability to pay varies with income. A first-best policy of this kind would therefore not have been possible in practice without more comprehensive information on household income and ability to pay.

Nevertheless, there is still a second best that would have been more progressive (less unequal) than the policy that was implemented. That second-best policy would have been to set a lower threshold and apply that across all cohorts that could still complete within the minimum time of three years, or a prescribed period such as the 'N+2' utilised at the time. Intuitively, one can think of this as taking funding from first years higher up the household income distribution (but below R350,000) and transferring it to second and third years lower down the income distribution (but above R122,000).

Fiscal incidence of state spending on higher education students

In this subsection the General Household Survey (GHS) data is used to describe the overall household income distribution, and the position of households with higher education students in that distribution. This gives a sense of where potential beneficiaries of the free higher education policy would fall in the national income distribution. The Technical Report provides detailed analysis to assess the appropriateness of the GHS data for answering this question and conclude that it does appear to be a valid source of information for this purpose.

The GHS data is used to estimate the proportion of households with public university students and where those students are located in the income distribution. This addresses the possible impacts of government spending on higher education in general.

Row 1 of Table 6 shows the proportion of households with public university students. That

35 See the Technical Analysis part of this publication for a mathematical representation of these issues.

is estimated to be about 3-5% in each year: in other words, only a very small fraction of households have public university students in them. However, the GHS only finds around 60% of the student numbers in HEMIS between 2013 and 2018, and around 80% in 2019. Row 2 of Table 6 adjusts for the undercounts in each year, by multiplying by the ratio of HEMIS to GHS in each year. This suggests that the true proportion of households with public university students is estimated to be between 5 and 6 percent.

In general, then, the first conclusion is that any government spending on public university students (of all types, not just through NSFAS) is going to be a very small fraction of all households, even after undercounts in the GHS is corrected for.

State spending on university students is unlikely to be randomly distributed across all households. Students from higher income households are more likely to complete matric and attain the grades required to enter university (van der Berg 2016). Adjusting for potential undercount, Rows 3-7 of Table 6 show that the estimated proportion of quintile 1 households with public university students in them is between 2% and 5%, whilst for the top quintile this is between 9% and 12%. The bottom or 1st income quintile means the 20% of households with the lowest household income, the top quintile is the 20% of households with the highest household income. The share of households with students in the top quintile is between 3 and 6 times that of the same share of the lowest quintile households.

Table 6. Proportion of HH with public university students (GHS)

	2013	2014	2015	2016	2017	2018	2019
Prop. Student HH	0.03	0.04	0.03	0.03	0.03	0.03	0.05
Prop. Student HH, adj	0.05	0.05	0.05	0.05	0.05	0.05	0.06
Prop. Student HH, adj. Quint 1	0.05	0.02	0.02	0.03	0.03	0.03	0.02
Prop. Student HH, adj. Quint 2	0.02	0.03	0.02	0.03	0.03	0.03	0.03
Prop. Student HH, adj. Quint 3	0.02	0.04	0.04	0.04	0.04	0.04	0.04
Prop. Student HH, adj. Quint 4	0.05	0.07	0.05	0.07	0.07	0.05	0.06
Prop. Student HH, adj. Quint 5	0.12	0.11	0.12	0.09	0.11	0.11	0.11

Note: Own calculations from GHS 2013-2019. Adj means household income adjusted for earnings under-reporting.

These findings confirm previous research which showed that households with public university students are substantially overrepresented in the top income quintile of households, so any policy aimed at public university students in general is likely to benefit higher income households. To put this into perspective, a policy that was perfectly targeted at university students with household incomes in the bottom quintile would have no impact on the 95-98% of the households in the bottom quintile that do not have any public university students in them.[36]

The household income distribution and the free higher education policy

To understand who might benefit (or have benefitted) from the new funding policy, Table 7 shows several percentiles and the mean of monthly household income from all sources included in the GHS in 2016 and 2017.[37] The first four rows use the household income data without any adjustments.

Row 1 gives the income distribution for all households and shows that in 2016/17 the median household in South Africa had total household income of R4,000 a month, the 25th percentile roughly R2,000 a month and the 75th percentile R10,000. This means that both the old and new family income NSFAS eligibility thresholds were high up the household income distribution: R122,000 is at roughly the 75th percentile, while the new threshold of R350,000 is the 93rd percentile of household income.

36 Limiting this to only households with at least one member aged between 18-35 inclusive genrates very similar percentages.

37 The two years are combined because 2017 was the final year of the old policy and because also using 2016 helps to increase the sample size and decreases sampling error. Incomes from 2016 are adjusted for inflation to 2017 rands

Table 7. Monthly Household Income Distributions in 2016/2017

	P25	P50	P75	P90	Mean
All Households	2,150	4,000	10,000	22,000	9,497
Public university student HH	3,750	8,220	15,798	39,757	16,420
Public university student HH, excluding students only HH	5,525	15,000	23,000	47,393	19,983
Non-student HH	2,150	3,949	9,497	20,800	9,170
Adjusted HH Income					
All Households	2,317	5,661	15,000	35,104	14,066
Public university student HH	3,949	12,166	24,573	66,259	24,431
Public university student HH, excluding students only HH	7,500	15,00	37,665	78,985	30,289
Non-student HH	2,264	5,431	14,833	33,332	13,556

Note: Own calculations from GHS 2016-2017.

Adjusted HH income means all earnings inflated by 66% but other incomes not adjusted.

The unadjusted GHS household income distribution suggests that the new 'free higher education' policy enabled students in households between the 75th and 93rd percentile of the household income distribution to access free higher education. This contrasts sharply with the framing of the new policy as extending free education to "poor and working-class students".

To show more clearly the differences between the incomes of student and non-student households, and focusing on public university undergraduate students (the beneficiaries of the free higher education policy), row 2 of Table 7 shows that public university undergraduate students come from households that have much higher incomes than all other households. The median income of households with university students is double that of all households, while the 75th and 90th percentiles are more than double those percentiles for all households.

To address possible concerns about such estimates being distorted by counting income of households where students are resident away from their families, row 3 shows student households excluding those where all household members are between 18 and 30 years old. Row 4 excludes all households with public university students. The conclusions remain

broadly the same. Finally, to account for possible underreporting, the second set of four rows in Table 7 shows the same set of distributions as the first four rows but using adjusted household income.[38]

Using adjusted income, the old and new NSFAS thresholds would be at the 66th and 88th percentiles of the household income distribution respectively. In which case, the NSFAS eligibility threshold meant that students living in households between the 66th and 88th percentiles would be able to obtain free higher education.

These estimates are broadly corroborated by the NSFAS and HEMIS data — see the Technical Report for further details.

Due to the fact that there are no questions in the GHS about NSFAS receipt, and that the proportion of students receiving NSFAS would have been relatively small in 2017, the GHS itself cannot be used to directly estimate the likely effect of the policy. The above results nevertheless give an indication of what could reasonably have been expected.

Changes in characteristics of the NSFAS recipients

To investigate how the new policy changed the socioeconomic status of NSFAS beneficiaries, available data on family income and school quintile (as a proxy for socioeconomic status), is examined. The analysis also investigates whether the new policy resulted in changes to the relationship between socioeconomic status and the amount of funding received, conditional on receiving funding.

The partially missing income data in 2017 and 2019 means that the above questions can only be addressed by making some additional assumptions about the (missing and present) NSFAS income data and use additional data.

The data from the 2011-2019 NSC results about the type of school each individual attended and data from HEMIS with the available NSFAS data were merged. The information used from

38 These increase incomes by 66%: the percentage increase required for the GHS total earnings to match earnings in the National Accounts

NSFAS is family income, where available, and whether the student reported being a SASSA beneficiary. From the NSC data, the information about the school quintile of the school each student attended when they sat for their senior certificate examinations is used, as well as information on whether the school was an independent school. To examine possible changes after the policy was introduced, the new applicants funded in 2017 who had not previously registered at a university are compared with new applicants funded in 2018 and 2019 who had not previously registered at a university.[39]

Table 8 below shows the number of the newly funded NSFAS beneficiaries in 2017, 2018 and 2019, by the type of university that they enrolled in. The number of new students funded increased by around 48% between 2017 and 2018, then declined slightly: so the increase between 2017 and 2019 was 40%. The largest change relates to UNISA students funded in 2018 and 2019 compared to 2017: 2019 was triple the 2017 number. The increase for other institutions was only 20% between 2017 and 2019.

Table 8. Newly funded NSFAS students by Institution Type

Institution Type	2017		2018		2019	
	Num	%	Num	%	Num	%
Traditional University	28,209	36.6	34,325	30.31	34,938	32.46
Comprehensive University	17,716	22.98	20,975	18.52	22,604	21
University of Technology	23,592	30.61	27,198	24.01	26,787	24.89
UNISA	7,563	9.81	30,762	27,16	23,308	21.65
Total	77,080	100	113,260	100	107,637	100

Note: Own calculations from HEMIS

Table 9 shows the qualification types of the newly funded students in 2017-2019. The two most clear changes are the large increases in the number and share of students registered for one-year higher certificate programmes and the absolute number of students registered for bachelor's degrees.

39 For brevity, this section refers to new funded applicants who had not previously registered at a university as "new funded applicants".

Further examination of the data revealed that from 2017 to 2019 the proportion of students studying for higher certificates at UNISA increased from 58% to 77%. For non-UNISA universities the largest absolute increase came from bachelor's degrees, and this plus higher certificates had the highest percentage increases, around 50%. As shown above, the overall increase in funded students was around 20%. These numbers imply that nearly half of the increase in newly funded students between 2017 and 2019 came from UNISA students studying either higher certificates or bachelor's degrees.

Table 9. Qualification Type for Newly Funded NSFAS students

Institution Type	2017		2018		2019	
	Num	%	Num	%	Num	%
Higher certificate	6,570	8.52	21,220	18.74	17,671	16.42
Diploma	26,282	34.1	32,242	28.47	30,668	28.49
Bachelor's degree	26,503	34.38	36,419	32.16	42,282	39.28
Bachelor's Professional	17,033	22.1	22,150	19.56	16,297	15.14
Other	692	0.9	1,229	1.09	719	0.67
Total	77,080	100.00	113,260	100.00	107,637	100.00

Note: Own calculations from HEMIS and NSFAS

Higher certificate programmes have lower entry requirements than those for diplomas and degrees and thus those who enrol for higher certificate programme are likely to have lower grades at the high school level. The NSC data merged into the HEMIS and NSFAS records shows this is true: the median of the NSC subject average for higher certificate students was 52% and 50% in 2017 and 2019 respectively, whereas it was 62% and 61% for other qualification types in these two years. Since high school performance and socioeconomic status are positively correlated, the large increase between 2017 and 2019 in the number of NSFAS funded students studying for higher certificates is likely to have benefitted students from relatively low socio-economic backgrounds. The reason that this led to large increases at UNISA and not at other institutions, is not clear.

The results suggest that the new 2018 NSFAS funding policy seems to have had an important effect on enrolment that was not obvious from how the policy was framed by the DHET. The changes in the socioeconomic status of the newly funded students are described below, and an assessment of how this varied by university and qualification type is provided.

As already noted, there was a substantial amount of missing income information in the NSFAS dataset. In 2017 this was approximately 85% for those who should have provided income and in 2019 it was 57%. Thus, the missing income rate is much higher in 2017, even after accounting for the fact that a larger share of individuals were exempt from the means test.

Table 10 shows the share of new funded applicants in five different categories in 2017 and 2019. In 2017 those who attended quintile 1-3 schools or who were SASSA beneficiaries reportedly did not need to provide income information. These funded students are in the first three rows of the table and were about 61% of all newly funded applicants in 2017. Row 4 includes those who did not provide income (or did but the analysis team had not been able to access it) when the NSFAS rules suggested they should. This was around 33% of all successful new applicants in 2017. The final row is those who were required to provide income and did, around 6% in 2017. Thus, the missing income rate for those who should have provided income is around 33% of 39%, or around 85% in 2017.

Table 10. Socioeconomic Status of Newly Funded Students

	2017		2019	
Student Category	**Num**	**%**	**Num**	**%**
Quintile 1-3, not SASSA	42,489	55.12	49,773	46.24
SASSA, not Quintile 1-3	1,912	2.48	6,961	6.47
Quintile 1-3 and SASSA	2,557	3.32	13,144	12.21
Other missing income	25,486	33.06	19,709	18.31
Non-missing inc & not Cat 1-3	4,636	6.01	18,050	16.77
	77,080	100	107,637	100

Note: Own calculations from HEMIS, NSFAS and NSC

Table 11 shows relatively stable shares of Quintile 1-5 schools between 2017 and 2019. As shown above and in Table 11, the total number of newly funded students increased from 77,000 to 107,000: a nearly 40% increase. The increase in the number of students from Quintile 1-3 schools was around 18,000 individuals: 60% of the total increase. The increase in the number of students from Quintile 4 or 5 schools, or independent NSC writing schools, between 2017 and 2019 was around 9,000: about 29% of the total increase.

Table 11. School type for newly funded students

School Type	2017		2018		2019	
	Num	%	Num	%	Num	%
Quintile 1	15,670	20.33	21,899	19.34	23,067	21.43
Quintile 2	11,702	15.18	17,081	15.08	16,249	15.1
Quintile 3	17,674	22.93	24,533	21.66	23,601	21.93
Quintile 4	11,254	14.6	16,512	14.58	15,713	14.6
Quintile 5	9,532	12.37	14,924	13.18	13,950	12.96
Indep NSC writing school	2,228	2.89	2,770	2.45	3,178	2.95
NSC writing school but Missing quintile	3,044	3.95	4,310	3.81	4,312	4.01
Missing quintile: likely IEB/ non-NSC	2,366	3.07	3,722	3.29	2,791	2.59
Missing quintile: likely pre-2011 NSC	3,610	4.68	7,509	6.63	4,776	4.44
Total	77,080	100	113,260	100	107637	100

Note: Own calculations from HEMIS and NSC

On the face of it, the increase in the number of beneficiaries from lower quintile schools after the policy was implemented is puzzling. As already noted, the NSFAS reportedly gave means test waivers to individuals in Quintile 1 to 3 schools in 2017: so even those with high household incomes should have qualified. Further analysis of the data (not shown here) shows that was the case for some: 13.89% of beneficiaries in low quintile schools who reported household income in 2017 were above the R122,000 threshold and that increased to 22.72% in 2019.

It is not possible to determine with confidence the cause of this oddity. Among the possible explanations, one reason could be that the prospect of a full bursary led to more applications from poorer students. In other words, some NSFAS-eligible individuals from low quintile schools did not apply previously, under the income contingent loan policy, because they did not want to be indebted; and the change to a bursary policy led such individuals to apply. However, an alternative explanation linked to the large proportion of newly funded students who enrolled at UNISA, is considered below.

Share of new NSFAS recipients with household income above the previous threshold

The main method of estimating the difference in socioeconomic status of the NSFAS beneficiaries after the policy change is to estimate the changes in the share and number of the new NSFAS beneficiaries with incomes above R122,000 between 2017 and 2019. In principle this should have been straightforward, but as already noted, income data is missing for a very large share of those who received funding in 2017 and a smaller but still large share in 2019.

To address that limitation, the available income data, plus other datasets that were merged in, were used in a simple imputation method. In other words, the missing data values were 'filled in' using information from individuals whose data did not have gaps (missing values) but had similar characteristics. To have confidence in the results of this (imputation) process, one must believe that the distribution of incomes of those who provided income information was similar to the distribution of incomes in the same categories who did not provide the same. This is a strong assumption, but without it no analysis of this question is possible because of the missing data.[40]

Using this approach, it is found that the number of newly-funded students with family incomes above R122,000 increased by almost 18,000 students from 9% to 23% between 2017 and 2019. That was about 58% of the total increase. So, as expected, a large share of the increase in beneficiaries from the new policy appear to be those with household incomes above R122,000.

In the discussion of the household income distribution above it was found that, adjusting for under-reporting of earnings, R122,000 was at the 66th percentile of the household income distribution. Putting these two findings together means that 58% of the increase in NSFAS beneficiaries between 2017 and 2019 came from individuals in households in the top third of the South African household income distribution.

One important question is why an estimated 42% of the increase in new funded students came from individuals with family income below R122,000, when such individuals would have qualified under the old NSFAS policy? As showed above, newly-funded students from UNISA undertaking higher certificates and bachelor's degrees made up half of the

40 One alternative would be to collect this data retrospectively by surveying the students with missing data: that is likely to be a difficult and costly exercise and it is not envisaged that this will ever occur.

increase in the number of newly funded students between 2017 and 2019. To investigate the possibility of a connection between these observations, the previous analysis estimating the number of beneficiaries with family income above R122,000 separately for UNISA and non-UNISA, is repeated. This reveals that almost all of the total increase in funded students at universities other than UNISA was estimated to be students with family incomes above R122,000. On the other hand, only 17% of the increase in NSFAS-funded students at UNISA from 2017 to 2019 are estimated to have had family incomes above the old R122,000 threshold.

Funding amount and socioeconomic status

So far the focus has been on the characteristics of individuals who received the NSFAS funding and the implications of the policy change in 2018 relative to the national income distribution. To get a more comprehensive sense of the distributional implications it is necessary, as mentioned in the theoretical analysis above, to also consider the actual amount of funding provided to individual students.

In 2017 the NSFAS used applicants' family income to determine their expected family contribution (EFC) — the amount that the student and their family should have to contribute to their studies. The smaller the family income, the smaller the EFC and, one would expect, the larger the funding received from NSFAS. There was also a cap on total funding received, which was R76,000 per student, in 2017 (NSFAS 2017b).

In 2018 and 2019 the new policy meant that the funding for contact students included the full cost of tuition and accommodation (if in a university residence), or funding for private accommodation with a cap at the maximum cost of equivalent university accommodation (DHET 2018a). There were also standardised amounts for books, food for those in self-catering residences or private accommodation, and transport for those living at home more than 30km from the university. Distance students received funding for tuition and a learning materials allowance only.

Given the different funding regimes, it might be expected that funding amounts were negatively correlated with family income in 2017 and perhaps uncorrelated with family income in 2019, which would mean that the new policy was less progressive than the old one.

Table 12 shows descriptive statistics on the funding amounts received by the NSFAS beneficiaries. The amounts are adjusted for inflation and shown in rands. The total NSFAS funding to students increased by 49% in real terms between 2017 and 2019, whilst funding to the new first year students increased by 69%.

It is the changes for the new first year students that reflect the new policy, since by 2019 only around 42% of all the NSFAS-funded students were funded under the new conditions. The mean, real funding for the new first year students increased from R50,000 to R60,000 per annum, or by 20%, between 2017 and 2019. Excluding UNISA, the increase was from R54,000 to R73,000, an increase of 35%. The increase for UNISA students was from R11,000 to R13,500, a 23% increase.[41]

Table 12. NFSAS Funding Amounts

	2017	2018	2019
Total Funding (billions)	14.93	19.33	22.33
Total Funding: new students (billions)	3.84	5.83	6.50
Mean funding amount: all students	50,281	52,680	56,820
Mean funding amount: new 2017 students	49,756		
Mean funding amount: new 2018+ students		51,459	60,351
Mean funding amount: new 2017 students, excluding UNISA	53,962		
Mean funding amount: new 2018+ students, excluding UNISA		64,850	73,294

Note: Own calculations from HEMIS and NSFAS. Amounts expressed in Dec 2019 rands

There has been no definitive study of the full costs of attending higher education institutions. Nevertheless, to put the figures above in context, it is useful to consider some rough approximations used in other studies. The estimates range between R90,000 (2018 Rands) in a study by the World Bank (Dessus, Hanusch, and Nagashima 2019), R100,000 (Branson, Hendry, and Ranchhod 2020) and R135,000 in one of the submissions to the Commission on Free Higher Education (Commission of Inquiry into Higher Education and Training 2017, 488). On the basis of those and the above evidence, one could call into question the claim that the new NSFAS policy really did fund 'full cost of study'.

41 The overall increase was smaller than both UNISA and non-UNISA increases because of the composition effect of a large increase in the share of all newly funded students that were at UNISA.

The analysis now examines how the funding amounts for those who were funded by the NSFAS were distributed across socioeconomic status. As above, information about incomes was available for a small proportion of newly funded students in 2017 and a higher, but not very large, proportion in 2019.

Figure 13 shows the total funding received by family income levels in 2017. Each bubble represents an income range and the position of the bubble on the y-axis is the average funding amount received for all funded individuals in that family income range. The size of the bubbles indicates the number of students with family incomes in that family income range.

The funding amount appears to be first increasing with family income and then perhaps decreasing around R100 000. This is surprising because, as noted above, the policy in 2017 implied that students with lower family incomes would receive more funding.

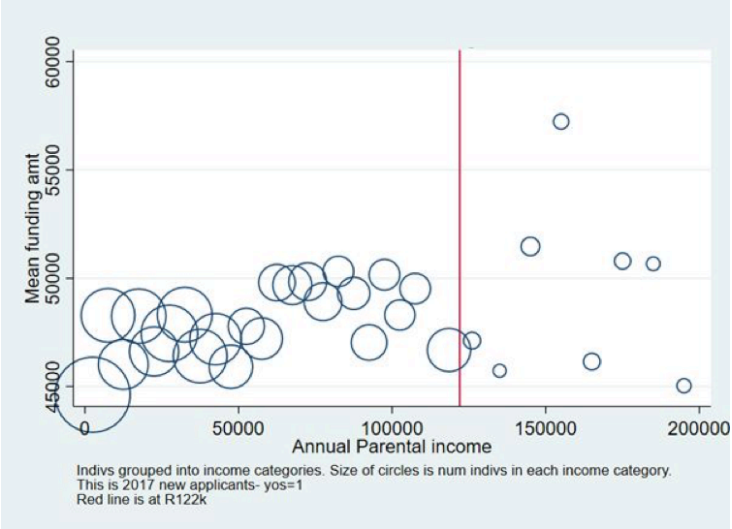


Figure 13: Funding amounts and annual family income for new 2017 funded students

Figure 14 shows the same relationship for 2019 but including only contact students, since distance students (90% of whom attend UNISA) received less funding than other students under the new policy. In these results, students with the highest family incomes received funding that was 35% higher on average than those with the lowest incomes. The pattern including non-contact students was even stronger.

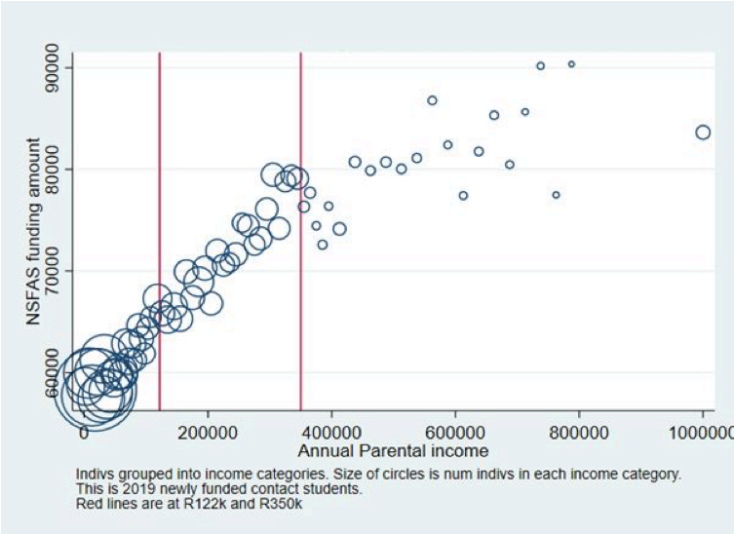


Figure 14: Funding amounts and annual family income for new 2019 funded students, Contact Only

Similar conclusions are reached when looking at the share of funding going to individuals with income above the R122,000 family income threshold. In 2017, about 9% of funding went to these individuals who comprised about 9% of those funded. In 2019, 29% went to such individuals who were 23% of those funded. The difference is because family income is positively correlated with the amount of funding in 2019, as showed above.

In the theoretical section in this analysis, it was assumed that the cost of attending university, and thus the state funding of that cost, was constant across family incomes. The empirical analysis shows otherwise. Hence the policy change resulted in a funding allocation that was even more regressive.

5.3. Impact of the new funding policy

The new 'free higher education' policy introduced from early 2018 led to three primary changes for the 2018 entering cohort:

- the family income eligibility threshold of R122,000 applied in 2017 was increased to R350,000 per annum

- financing was via a full bursary, rather than the previous combination of a loan with a performance-based bursary conversion component

- financing was for full cost of attendance based on actual institutional costs, with the previous funding cap removed.

Students from previous entry cohorts retained the prior funding threshold and caps, but also moved to a full bursary rather than the loan-bursary combination.

Utilising university and schooling data from 2013 to 2019, the study employs econometric analysis to assess the impact of the policy shift on re-enrolment and performance across student cohorts. Specifically, the investigation covers the following questions:

a) has student performance and retention changed for cohorts of students (NSFAS funded or not) entering after the implementation of the new funding policy?

b) has the extension of funding to the R122-350K income band resulted in improved outcomes for students in this income band?

c) have the new conditions of the bursary scheme impacted student outcomes for those in the <R122K income band?

These questions are considered through a gender lens.

While the primary objective of the increase in student funding related to equity in accessing higher education, intuitively one may expect or hope that funding support also leads to improved outcomes. For example, one may hypothesise that financial stress negatively affects student performance or that variability in households' economic circumstances could cause student dropout. If such negative relationships exist, access to funding, or increased funding, could improve student performance and completion rates.[42]

42 Note that such effects on measured outcomes would not occur under all circumstances were learning substantively improved. For example, in higher education systems where it is common to 'mark to a curve' an aggregate improvement in learning may not be observable from student grades.

The aim is to contribute to scholarship in the field of higher education financing in two key ways. First, in analysing the effects of the policy change on student outcomes, this work contributes to a better understanding of the role of student financial aid in the process of creating graduates in South Africa. This is important in understanding how accessing higher education opportunities is converted into outcomes such as graduation (Cardak and Vecci 2016), as well as understanding how efficiently student financial aid policy is achieving some of its aims.

Second, it is becoming increasingly important to understand the effects and benefits of state expenditure. The Department of Higher education and Training (2019), following the National Development Plan (Republic of South Africa 2012), aims to increase the number of university enrolments to 1.62 million by 2030, up from 1.036 million enrolments in 2017. That now occurs in a context of a weaker fiscal and economic position. In 2023 the Minister of Finance and the National Treasury signalled their intentions to substantially cut back on a wide range of public expenditure areas in order to achieve macro-fiscal objectives such as 'fiscal consolidation' (National Treasury 2023). Moreover, as already mentioned, the absence of broader funding and social welfare support for working age South Africans creates a chasm between those who enter the higher education system and those who do not. In this context it is particularly important to regularly assess how equitable and effective the distribution of funding is. The previous subsection considered equity issues, whereas in this section, the focus is on outcomes.

The findings of the analysis are somewhat mixed. Regarding *in-year student performance*, it is found that the 2018 cohort - the first cohort entering university in the new policy environment - did not exhibit significant improvements in first-year performance compared to the 2017 cohort. On the other hand, the 2018 group did show a substantial decline in dropout rates. Gender differences were evident on all measures examined, with performance and dropout of female students seemingly being more sensitive to the policy changes. Changes in dropout rates are most pronounced among students from lower school quintiles and university of technology students. A larger share of students in these groups are eligible for funding, which provides support for the observed changes across cohorts being attributable to the policy.

Related literature

The relationship between financial aid, enrolment, persistence, and completion has been

extensively explored internationally, particularly in studies focused on the United States of America (USA) and other 'developed' countries. Recent comprehensive summaries, such as that prepared by Dynarski, Page, and Scott-Clayton (2022), provide an overview of this rich literature. Financial aid is typically found to increase the probability of post-secondary student persistence and degree completion. The size of the estimated effect varies by category of aid (need-based versus merit-based), the amount of aid given, and the design of the aid programme or intervention. Loan aid also functions as a price subsidy and encourages college enrolment (Dynarski and Scott-Clayton 2013; Van der Klaauw 2002). However, loans are found to be less favourable compared to other forms of aid (Long 2010; Herzog 2018; Dowd and Coury 2006). This is due to long term impacts associated with repayment and debt accumulation which can affect students' decisions both during their studies and long after completion.

While there is South African literature on the causal link between outcomes and financial aid — Gurgand, Lorenceau, and Mélonio (2023), de Villiers,Van Wyk and Van Der Berg (2013), Lam, Ardington, Branson and Leibbrandt (2013), Wildschut, Megbowon and Miselo (2020) — it is quite limited. The extension of the income threshold for cohorts entering from 2018 onwards and the shift from loan to bursary support for all students present an opportunity to assess the impact of credit rationing on student persistence and performance in the South African context for a national sample.

Data and method

The analysis in this section draws on three sources of institutional data and small area level information from the Census 2011. The sample is restricted to students in full-time contact diploma, bachelor, or professional degree programmes.[43] The sample is further restricted to South African students, those who are over the age of 18 at the point of first enrolment and those with linked NSC-HEMIS data and subsequently to those 19 or older.[44]

Student outcomes for the university system are analysed as a whole and grouped into Traditional Universities (TUs), Comprehensive Universities (CUs) and Universities of

43 This restriction removes most UNISA students and therefore UNISA is excluded from the analysis

44 The age restriction is to avoid selection in the 2018 cohort. Students from the 2017 NSC cohort born in year 2000+ were not matched to HEMIS data. These students would be 18 or younger if they enrolled in the year after completing their National Senior Certificate (NSC). This problem was remedied in the preceding analysis but not in the current component due to time limitations.

Technology (UoTs). The 2020 data was excluded from the analysis as the effect of the Covid-19 pandemic and policy responses could generate misleading conclusions. This unfortunately means that the effect of the new policy on graduation in minimum time, cannot be examined. Hence, only performance in years 1 and 2 only up to and including 2019 are examined.[45]

To address the problem of missing family income information, the school quintile is utilised as a proxy for eligibility (as in the preceding component of the analysis). In addition, average characteristics from the census are used, and these are mapped to students via their home postal code (Culligan, 2022). This allows the identification of the socioeconomic circumstances of the postal code (as measured by the Census 2011) in which the students' homes are located.

It is important for identification of any causal relationship between the policy change and outcomes that the characteristics of the cohort first enrolling in 2017 are similar to those in 2018. The analysis finds that this is the case, consistent with hypothesis that the late and sudden announcement of the new policy prevented any substantial change in the characteristics of those applying for funding and enrolling.

Descriptive analysis

As a first step to examining whether there are differences in performance across cohorts and years, Table 13 presents these outcomes by year of study (year since first enrolment) for cohorts 2013-2019 in the research (analysis) population. Cells representing outcomes in the new policy environment are highlighted in grey; those values should be compared to the ones to their left in the table.

45 Even if graduation data was available for later years (2021 and onwards) there would still be a concern that graduation rates could not be compared to pre-Covid-19 outcomes under the older NSFAS policy. If educational achievement, enrolment and dropout are cumulative, then 'exposure' to the effects of the Covid-19 pandemic period will still confound comparisons to try and identify the effects of the policy change.

Table 13. Performance outcomes by cohort and year of study

	Year	2013	2014	2015	2016	2017	2018	2019
All								
sharepass	1	.785	.794	.808	.815	.812	.81	.817
	2	.78	.791	.794	.79	.789	.79	
pass50	1	.851	.857	.868	.877	.873	.873	.882
	2	.838	.847	.848	.845	.846	.851	
dropout	2	.115	.122	.104	.107	.094	.082	
Number of student (entry cohort)		100,332	101,072	95,160	100,967	97,511	98,667	96,751

The results show no evident difference in the share of courses passed, or the likelihood of passing more than fifty percent of courses, between pre- and post-policy cohorts. However, the dropout rate seems substantially lower in the cohorts affected by the policy change (8.2% dropout in the 2018 cohort versus 10.7% in the 2016 cohort). In the same results across school quintiles it is found that the lower dropout rate occurs across all quintiles except quintile 5 schools (the wealthiest quintile of public schools).

As already mentioned, school quintiles are used as a proxy for eligibility in the pre- and post-implementation periods. However, it is important to note that these are imperfect proxies: as shown in the preceding subsection, in both periods there are higher education students who attended schools in the lowest quintiles that did not receive funding while some students from schools in the highest quintiles did. Table 14 summarises this information for the core sample of this analysis.

Table 14. Share and number NSFAS funded by school quintile: 2017-2019 FTEN UG

School quintile	2017	n	2018	n	2019	n
1	.833	10,833	.865	12,634	.856	11,864
2	.827	10,734	.86	11,692	.859	9,889
3	.752	12,298	.812	13,937	.828	12,600
4	.521	3,521	.681	4,562	.717	5,615
5	.26	4,558	.381	6,449	.375	6,930
DK	.451	9,048	.575	11,227	.686	8,761
All	.589	51,042	.684	60,501	.699	55,659

Sample: South African students in degree and diploma qualifications, 19 years or older who wrote NSC

As expected, the proportion of those from higher quintile schools who receive NSFAS funding increases after the introduction of the new policy. For instance, the percentage funded from Quintile 4 schools increases from 52.1% in 2017 to 71.7% in 2019.

A key point for the econometric analysis is that in examining change in performance within quintile groups, changes are being identified within groups that have all been impacted by the policy change but to different degrees, and by different aspects of the policy change. It is anticipated that the quintile 4 (and 5) groups will be most impacted by the extension of the income threshold, but the increase in the share funded across all groups suggests that students attending all types of schools may have become newly eligible.

Econometric analysis

In an attempt to identify the causal impact of the policy an econometric analysis of the available data was undertaken. If information was available on student household income before and after the policy change, the econometric analysis would be relatively straightforward. However, there was no income information for non-NSFAS students in higher income bands before the policy change and limited income information for NSFAS recipients after the policy change due to missing data.

Differences in outcomes according to cohort and year are examined with a focus on dropouts given the preceding descriptive statistics. To examine the effect on average dropout of the full set of policy changes, dropout rates (measured in second year of study) of the 2016 and 2018 cohorts were compared. The results across a range of other variables, from gender to institution type and school quintile, are examined.

Overall, the results substantiate the observation above that the policy appears to have caused, or been associated with, a substantial decline in dropout rates. Dropout among female students decreased from 8% in the 2016 cohort to 6% in the 2018 cohort, a decline of a third. For males, the decline is similarly large: from 12.9% to 10.5%, a 23% decline.

Comparing the 2018 and 2017 cohorts, on the other hand, provides an estimate for the impact of the extension of the income threshold and funding amount (FCS) — since the 2018 cohort benefitted from both while the 2017 did not. In that case, the decrease in dropout is somewhat smaller: 20% for females and 11% for males.

The third comparison is of the 2017 and 2016 cohorts which should capture the effect of receiving bursary rather than loan funding. Dropout decreases by 11% and 9% for females and males, respectively. The largest impact is therefore when a cohort benefitted from the full policy change, but the separate components appear to have an additive impact in reducing dropout.

Each of these three analyses was repeated across institution types and school quintiles. The decrease in the dropout rate is most evident — in size and statistical significance — for students who attended lower quintile schools. In the case of females, the extent of the estimated reduction from the full policy change is such that it appears to equalise dropout rates across students from different school quintiles, but that is not the case for males. The switch to a bursary from a loan continues to have a positive effect but, as above, is smaller. Across institution types, the largest reduction in dropout appeared to be for universities of technology, followed by 'comprehensive universities' and traditional universities.

As discussed in subsection 5.1, there is some evidence of a pre-existing downward trend in dropouts and upward trend in graduation rates. Taking that pre-existing trend into account would mean that the estimates of the policy effects would be lower. On the other hand, there

are also considerations that suggest the policy effects may be underestimated. One of these is the problem that has already been mentioned, namely that policy beneficiaries (or those who were in the same income bands in previous periods) cannot be directly identified. Since not all students in the cohorts examined benefitted from NSFAS funding, the true average causal effect would be higher than the estimates in this report.

Another reason the approach could underestimate the policy effect is that some institutions already provided financial support for students with household income above the original NSFAS threshold. For example, Branson, Hendry, and Ranchhod (2020) note that the University of Cape Town (UCT) used its own additional resources to provide financial support over-and-above NSFAS. It covered shortfalls between the NSFAS allocated amount and the estimated full cost of study; and, it covered students whose family income was above the NSFAS threshold of R122,000. So in the case of UCT, it would be expected that whatever effect the new policy had would be substantially smaller when conducting the kinds of comparisons used in this analysis.

6. Policy and other implications

The findings from the analyses, including observations and discoveries made during the research process, have a number of potential implications.

Unintended consequences of the teaching output block grant

The analysis has provided suggestive evidence that the teaching output block grant may be associated with increased throughput (graduation) rates because the grant creates a financial incentive to raise these rates. It is important to establish whether such increases are due to genuine educational improvements or, as suggested by the model used in the analysis, institutional behaviour that seeks to maximise public subsidies. Such unintended consequences may vary across institutions, depending on institutional cultures, financial constraints, capacity to improve student support and pedagogy, and so forth.

Missing NSFAS data

The analysis found that there were substantial amounts of missing data on the crucial household (family) income of the NSFAS applicants and recipients. This substantially constrains research

that can be done on the transition to the new funding policy, while also raising serious concerns about monitoring and effectiveness of these allocations of public funds.

Sub-optimal policy design

The theoretical and empirical analysis corroborate the criticism that the 'free higher education' policy was sub-optimal from an inequality perspective. An alternative design in which a lower threshold was used and all undergraduate students eligible to apply — not just first years — would have been more progressive.

National inequality

Households with students in higher education are a small proportion of the population and on average, have substantially higher annual incomes. The vast majority of young people do not benefit from higher education. Therefore, all else equal, large social transfers to higher education students actually increase inequality.

Poverty, inequality and policy design

While the stated aim of the 'free higher education' policy was to address the funding needs of 'poor and working class' students, few of the beneficiaries of the new policy fall in those categories. The DHET itself appears to have been aware how large a share of the population might be eligible: a statement in January 2018 noted that the policy entailed, "Extending the provision of free higher education and training to the children of the bottom 90% of South African households…" (DHET 2018b).

The allocation of funds also does not reflect household income: students from higher income households get higher allocations, on average. As with the design of the roll-out, this aspect of the policy is unnecessarily regressive.

Implementation and uptake of the new funding policy in practice

Where family income information is available, the NSFAS appears to have implemented the

policy in accordance with the official thresholds. As a result, the majority of beneficiaries from the new policy were likely in households between the 66th and 88th percentiles (in the top third) of the income distribution.

The implementation and uptake of the new funding policy was not simply according to the pre-existing structure of enrolments. In particular, enrolments for higher certificates at UNISA increased disproportionately. One positive aspect of that was that such students were more likely to come from lower income households. From a policy perspective this draws attention to the need to connect funding support with institutional enrolment plans.

With the exception of UNISA, the policy implementation in 2018 does not appear to have affected the characteristics of enrolled and funded students, which means that for 2018 the policy change can be treated as a 'natural experiment'.

Impact of the new policy on student outcomes

The analysis does not find any effect of the new funding policy on in-year student outcomes and was unable to assess the effect on graduation. However, it found sizeable and significant reductions in dropout rates, which are larger for females and students from lower quintile schools. These findings draw attention to the inadequate policy consideration given to objectives of student funding policies besides the direct issues of equity and access.

While the policy change is often referred to as one change, it in fact had multiple components: increasing the amount of funding, changing from a bursary-loan scheme to a full bursary, and broadening eligibility to higher income households. The findings suggest differential effects of those sub-components, which has implications both for analysis of the new policy but also any future changes made to the funding system.

7. Recommendations

Recommendations that can be derived from this research and its findings include:

- There should be greater attention to, and further investigation of, the potential effects

of the teaching output block grant on institutional behaviour in relation to student throughput (graduation).

- Data on the household (family) incomes of all NSFAS applicants and beneficiaries should be collected and centrally preserved in order to facilitate monitoring of equity, effectiveness, and proper implementation of student funding policies.

- When considering further changes to student funding policies, more attention should be paid to the design of such policies in terms of their implications for funding incidence, inequality and progressiveness — nationally and within the higher education system.

- Consideration should be given to how the existing student funding policy could be more equitable by linking actual funding amounts to students' household or family incomes — as was the case with the previous policy.

- Analysis of, or changes to, the existing policy should explicitly address the fact that it has three conceptually separable components (an increase in funding, bursaries rather than loans, and a wider eligibility that includes higher income households). Each of these has different implication for equity and other outcomes.

8. Further research

The analysis suggests a range of issues that could be the subject of further research. These include:

- Further, more fine-grained quantitative analysis of upward trends in student throughput (graduation) rates across institutions, faculties and degrees

- Survey-based analysis of management and staff responses regarding increases in student throughput rates and the role of the teaching output grant

- Analysis of the effects of different continuation criteria on student outcomes and equity

- Analysis of the consequences of differential treatment and definition of social grant recipient status as a basis for the NSFAS funding eligibility

- Disaggregated analysis of the effects of the new policy by individual institutions — differentiating those that had additional funding support mechanisms prior to the policy change from those that did not

- Analysis of how the policy affected enrolment in higher education in later years and what such changes tell us about which potential students face funding constraints

- Estimation of reliable measures of the cost of study and family ability to pay in order to potentially inform a more sophisticated and more equitable funding scheme that varies support with household income.

Part 2: Technical Analysis

9. *Introduction*

Higher education is a fundamental part of modern societies. A higher education qualification materially affects the average economic prospects of graduates, in addition to the important personal development and societal benefits that such education may provide. Financial requirements for obtaining higher education qualifications serve as an obstacle to those from lower income households and families, thereby compounding societal inequalities as well as limiting the fulfilment of personal, economic and societal development. Funding support for school-leavers who qualify for higher education is therefore an important public policy issue.

On 16 December 2017, former President Zuma announced the decision to dramatically change the student funding framework in South African higher education. Under the new framework, eligible students would receive full bursary funding for their studies at public higher education institutions. Moreover, the household income threshold would be raised from R122,000 a year to R350,000: greatly expanding the pool of eligible students. The decision was premised on political resolutions taken by the then governing party, the African National Congress (ANC), which resolved to provide 'free higher education for poor and working class students'. That political commitment could, however, have been interpreted in several ways other than the policy that was ultimately adopted – as for example, was the case with a number of the submissions to, and conclusions of, the Commission of Inquiry into Higher Education which delivered its report in 2017. Nevertheless, the result was that a dramatic change in the approach to this public policy issue took place in a very short period of time. The unexpected and sudden nature of the announcement may have been undesirable from a policy and planning perspective, but potentially makes the assessment of causal effects of the change somewhat easier – to the extent that it serves as a 'natural experiment'.

This report, commissioned as part of a broader set of research projects overseen by the Ali

Mazrui Centre for Higher Education (AMCHES) at the University of Johannesburg on behalf of the Council on Higher Education (CHE), analyses a number of policy questions arising from this change. The focus is on the public university sector and not the, important but very different, technical and vocational education and training (TVET) sector. The methodological approach adopted is quantitative in nature, based on a combination of three administrative datasets on higher education, schooling and higher education student funding. The two primary research questions relate to the impact of the policy change on inequality (in the higher education system and nationally) and its impact on student performance. In addition to that, the association between the university block grant funding formula and trends in student performance over time, is examined. Aside from being an issue of interest in itself, and one that has received relatively little attention, the presence of pre-existing trends may confound impact analyses if not recognised and taken into account.

A number of obstacles were encountered in compiling the datasets needed for these analyses and the report begins with a brief description of those. Section 10 then provides an overview of university funding in South Africa from the apartheid era to the present. Section 11 provides a more detailed overview and analysis of the National Student Financial Aid Scheme (NSFAS), which has been the conduit for most direct public financial support to higher education students for the last 25 years. Section 12 analyses the university funding formula and its potential effect on teaching 'output'. Section 13 presents an inequality analysis of the new funding policy, examining both the design of the policy and empirical evidence of its likely effects on inequality using not just higher education and NSFAS data but also the General Household Survey. Section 14 examines the impact of the new policy on student performance measures, such as credits completed and dropout rates, and disaggregates these by gender, school quintile (as a proxy for socioeconomic status) and type of higher education institutions. It also examines pre-existing trends in relevant variables and account for those in the econometric analysis, which also incorporates data from the Census. Section 15 presents concluding remarks.

10. Datasets and challenges

The analysis that follows utilises administrative data from three distinct datasets. The are the Higher Education Management Information System (HEMIS) from DHET, the National Student Financial Aid Scheme (NSFAS), and National Senior Certificate (NSC) from the Department of Basic Education (DBE). The initial project proposal envisaged only access to two of the first two:

HEMIS and NSFAS. Access to the third would have improved the quality of the analysis but was not essential. However, due to data challenges linked to the NSFAS dataset, the use of the third, NSC dataset, became crucial in partially remedying the limitations.

The table below shows the data requirements envisaged in the original research proposal, where 'X' means that a particular data requirement is essential to undertake the research and 'XX' means that it is desirable but not essential.

While making efforts to obtain the necessary data, it became apparent - after fairly lengthy interactions with relevant officials - that a large portion of the data from the NSFAS database containing information on family income, was missing. As indicated in the table, this was the most important variable for the envisaged analysis because it would show which income category an NSFAS recipient fall in. In turn, this would have allowed distinguish between those who benefitted from the new funding threshold and those who benefitted under the previous threshold.

Table 15: Overview of data requirements

	'Inequality'	'Impact'	'Formula'
Family income	X	X	
Pass rates by programme and institution		X	X
Individual performance		XX	XX
Individual characteristics	XX	XX	XX
Institutional funding allocations			X
Cohort 2016 and 2017	X	X	X
Cohorts before 2016	XX	XX	X
Cohorts after 2017	XX	XX	

The significance of this missing data goes beyond the analysis presented in this report, because it has implications for the ability to assess whether public funds were properly allocated. Recent reports by the Auditor General and the Special Investigating Unit have drawn attention to related concerns.

Officials indicated that the missing data problem may partly have arisen from decentralised allocation decisions taken by NSFAS staff on their own devices (computers). The data were never subsequently aggregated. That in turn may have been a partial consequence of the administrative instability at NSFAS before and after the adoption of the new funding model. The officials said that, in addition to this, some allocation decisions were based on information from credit bureau data - though it was unclear how that was implemented in practice.

The end result of the missing data problem was that two components of the intended analysis could not proceed using a household/family income variable.

As a second best approach, it was decided to utilise information from the National Senior Certificate (NSC) database. The database contains information on school quintile, which has been used for the NSFAS allocation decisions, as discussed further below. Having obtained the NSC dataset, it was then possible to link schooling outcomes with NSFAS allocation decisions as one way of obtaining information on likely household income status. In addition, school characteristics and schooling results serve as useful additional 'control' variables when examining individual performance and outcomes in higher education.[46]

In the process of linking the NSC and HEMIS datasets it was discovered that the matches were particularly poor for certain years and after some investigation, it was established that the relevant identifiers were incomplete. While resolving this was ultimately fairly straightforward in practice, the process of establishing where the problem was, obtaining a new set of identifiers and merging the datasets again took almost a year. The final data necessary for remedying this problem was only received shortly before submitting the report and as a result the analysis of Section 14 only utilises a restricted sample for the impact analysis.

46 The project also experienced a range of challenges in obtaining the NSC data in appropriate scope and format, and matching it to the other datasets, which delayed the overall analysis further.

Ultimately, a series of datasets that combine HEMIS, NSC and NSFAS data, was created, and this was valuable for addressing the questions that concern this report.

There are inherent limitations that cannot be remedied, such as the missing information on the family/household income of NSFAS applicants and recipients. Therefore, more extensive data cleaning and checking would be valuable. In both respects, the initiatives by the Department of Higher Education and Training (DHET) and Department of Basic Education (DBE) to formalise and systematise the linking of basic education, higher education and higher education funding data for the purposes of future research and policy analysis, are endorsed.

11. An overview of the public university funding model

South African public universities are funded through a combination of government subsidy, fees paid by students and 'third stream' income, that includes external research grants and donations. This section of the report outlines the sources of university funding and how these have changed over time. It notes the large increase in NSFAS funding, breaks down the direct subsidies to universities and then focuses on the block grant, which comprises 82% of the direct subsidies paid by DHET to universities.

11.1 A short history of university funding in South Africa

The South African state has funded public universities for over 100 years. The funding mechanisms used to allocate the subsidy amongst different public universities have changed over time, and a brief overview of the relevant details is provided. For the entire period there has been an expectation from the state that universities would also source private funding, mainly through charging fees to students (Trotter 1988). Prior to 1994, funding was very heavily skewed towards what were designated as White universities.

The initial funding mechanism was one in which specific expenses were budgeted for and paid by the state (Cilliers 1945; Trotter 1988). This changed in the mid-1920s to a block grant system in which universities were allocated amounts of funding but had discretion on how it was allocated. These grants were initially based on the expenses of the universities, but were changed to matching grants based on revenues, sometimes with maxima above which no extra funding would be allocated (Cilliers 1945).

Even in these initial years there was recognition that the funding mechanisms created incentives for universities that were not necessarily in the public interest. Trotter (1988, 95) attributes to EG Malherbe (without any citation) in 1945 the statement that the funding mechanism "accentuates the undignified scramble for students, resulting in the acceptance for subsidy purposes of students who really should not be at the Universities".

Partly because of these concerns, the "Holloway formula" was introduced in 1953 (Steyn and De Villers 2007) and comprised a block grant with three components: one component which was a function of the number of students in an institution, and two components which were not a function of the number of students in an institution. The next mechanism was the Van Wyk De Vries formula, introduced in 1977, which was a more sophisticated version of the Holloway formula, distinguishing both between different levels of study and mode of instruction (Steyn and De Villers 2007).

The South African Post-Secondary Education ('SAPSE') funding formula was introduced in 1984 and was the first funding mechanism in which part of the subsidy was based on output rather than solely on inputs — both for student graduation numbers and research output (Steyn and De Villers 2007). The SAPSE funding formula was replaced by the New Funding Framework (NFF) in 2004, which is still in operation today. The NFF continues to use both input- and output-based measures to determine how the subsidy is distributed amongst the universities. In this report the focus is on the incentives that the NFF creates for universities and the ways in which universities might respond to those incentives.

11.2 Recent university sources of funding

Since 2005, Statistics South Africa (Stats SA) has produced figures on university income and expenditure, called statistical release P9103.1 (Statistics South Africa 2021). These data are collected from university income and expenditure statements, mostly released in university annual reports. The underlying data is not available directly on the Stats SA website, but was obtained by requesting it directly from Stats SA. The data can be used to describe how the various sources of income have changed over time and how they vary by university. They are an alternative to the data used by the DHET, the "Audited financial statements of the universities", which comes from the same source, but which is not publicly available, although there are many reports which do refer to the data, for example the CHE's annual VitalStats publication (Council on Higher Education 2018).

Figure 15 uses the Stats SA data to show the relative changes over time in sources of funding for South African universities. The underlying figures are first adjusted for inflation using the Consumer Price Index. Real fee income and subsidy income have both increased - by nearly 100% and 80% respectively- whilst other income has remained constant.

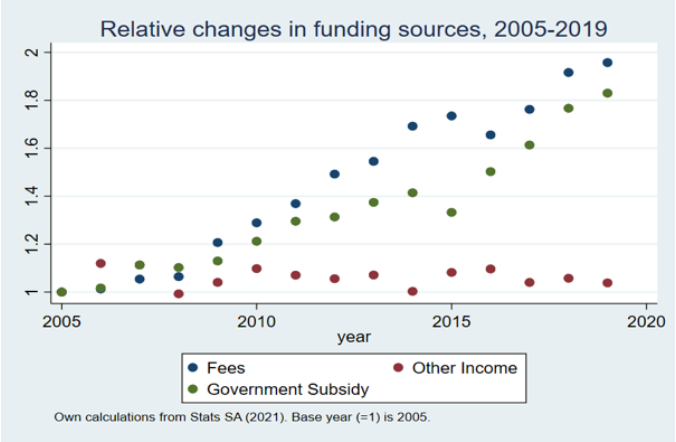


Figure 15: Relative changes in university sector income sources: 2005-2019

Figure 16 shows the proportions of the 3 sources of funding over time, showing that fees and grants made up an increasing share of total university income, whilst other income declined in importance – because of the changes shown in Figure 1.

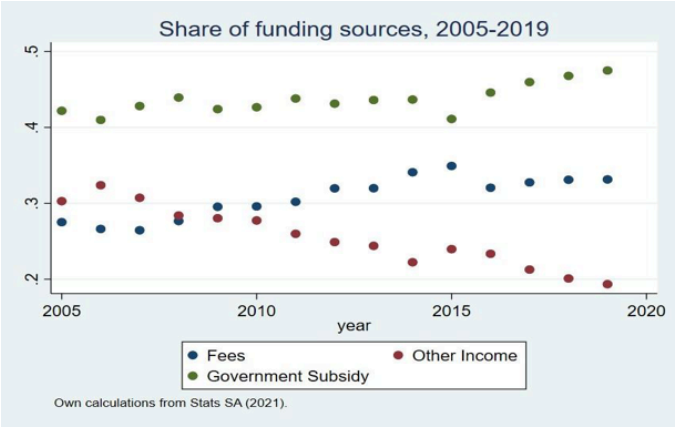
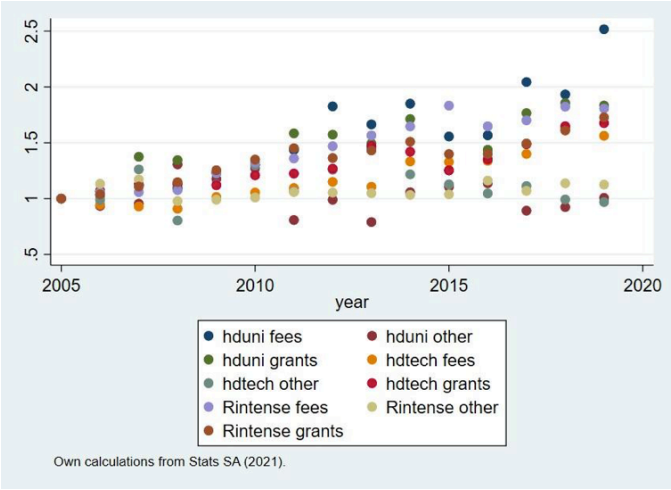


Figure 16: Changes in proportions of university income sources: 2005-2019

The aggregate figures in Figures 15 and 16 may mask differences in both the levels and trends across different universities. Figures 17 and 18 show the changes across the same three income sources for selected universities from three different groups: historically disadvantaged universities (Fort Hare, Limpopo, Venda, Zululand and Walter Sisulu), Universities of Technology (Cape Peninsula, Central, Durban, Tshwane and Mangosuthu) and research-intensive universities (Pretoria, Cape Town, Witwatersrand and Stellenbosch). As in Figure 15, other income has grown slowest across all three university types, with similar growth in both fees and grant income across all three types. The exception is fees at historically disadvantaged universities, which have increased substantially more than at the other two university types, although from a lower base.

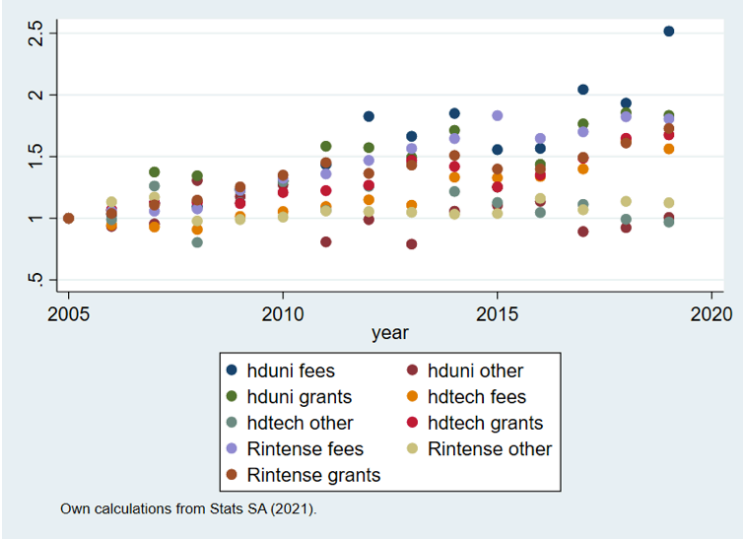


Notes: hduni denotes historically disadvantaged university and for this report we have included only Fort Hare, Limpopo, Venda, Zululand and Walter Sisulu. Hdtech denotes former Technikons and includes CPUT, CUT, DUT, TUT and MUT. Rintense denotes research intensive universities and includes UP, UCT, Wits and Stellenbosch.

Figure 17: Changes in university income sources by university type

Figure 18 shows strong differences in reliance on the three sources of income across the three different university types. Government subsidy accounted for more than 50% of income at historically disadvantaged universities and universities of technology over the period, whilst it was around 36% for research intensive universities (this increased by a few percentage points over the period). By 2019 fees accounted for 40% of total income for historically disadvantaged

universities, 35% at historically disadvantaged universities of technology and 30% at research universities. This percentage was lower at the start of the period in historically disadvantaged universities and research-intensive universities. Other income was a small and declining share at historically disadvantaged universities of technology and historically disadvantaged universities but a much larger share at research intensive universities, although that share declined from 44% in 2005 to 33% in 2019.



Notes: hduni denotes historically disadvantaged university and for this publication only Fort Hare, Limpopo, Venda, Zululand and Walter Sisulu have been included. Hdtech denotes former Technikons and includes CPUT, CUT, DUT, TUT and MUT. Rintense denotes research intensive universities and includes UP, UCT, Wits and Stellenbosch.

Figure 18: Changes in university income sources proportions by university type: 2005-2019

The broad picture from these datasets is one of increasing reliance on fees and government grants and a decline in a reliance on other income. The same trend can be seen in the Department of Higher Education and Training (DHET) version of this data, although the levels are sometimes slightly different. The CHE's VitalStats publications for the 2013 and 2016 financial years (Council on Higher Education 2015; 2018) show that the proportion of university income from 3rd stream declined from around 32% in 2008/9 to 27% in 2016/17. Burger (2016) noted similar trends, linking them to rapidly increasing enrolments and a subsequent shift in orientation of universities towards teaching, and thus state subsidy for teaching.

11.3 The NSFAS funding from the DHET

The National Student Financial Aid Scheme (NSFAS) was established as a statutory body in 1999 (Republic of South Africa 1999), superseding the Tertiary Education Fund of South Africa that had been established in the 1990s.

In fiscal terms, NSFAS originally formed part of earmarked grants from the DHET (Ministry of Education 2004). The funds were allocated to individual institutions which made eligibility and allocation decisions. As discussed below, the distribution of funds across institutions was based on a formula in which the two main components were (a) an estimate of the full cost of study (FCS) and (b) a measure of the number of (historically) disadvantaged students weighted according to race category. The advisory committee appointed in 2009 to advise the Minister on the NSFAS argued that both aspects of the formula were 'inappropriate' (Department of Higher Education and Training 2010). For that and other reasons it recommended a centralised application process.

Tuition fees paid by the NSFAS are included as fee income in university financial statements and therefore not visible in Figure 15. The focus in the ensuing subsections of this section is on direct subsidies for teaching outputs to universities, one of the components of the direct subsidies that the DHET pays to universities. However, the big increase in the DHET spending is on the NSFAS, some of which flows to universities as student fees income. This is an important trend to note.

The amount paid out by the NSFAS to the beneficiaries increased from R733 million in 2002 to R6.97 billion in 2014. The number of students supported by the NSFAS grew from 86,147 in 2002 to 186,150 in 2014, representing about one quarter of all undergraduate university enrolments. Since former President Jacob Zuma's surprise announcement of 'free' higher education at the end of 2017, the DHET funding of students through the NSFAS increased substantially to R45.43 billion for approximately 428,000 students in 2022/23 (National Treasury 2023) — a function of a higher income threshold and a move to bursaries rather than an income contingent loan scheme.

Prior to 2014, before the NSFAS system was centralised, the NSFAS funds were divided across institutions based on the allocation factor (AF). The AF was determined by multiplying the institution's disadvantaged students index - the weighted sum of the number of black, coloured and Indian students enrolled in year t-3 - with an institution specific calculation of the full cost

of study (FCS) from year t-1, to get what was known as the disadvantaged student cost index (DSCI). This was then divided by the sum of all institution's DSCI's to get the AF percentage. Black students were assigned a weight 3, coloured students 2 and Indian students 1. FCS included average tuition, levies, residence accommodation, and meal costs. Once apportioned, institutional funding officers were in charge of allocating funds to students within their institutions. While the guidelines were to rank students based on expected family contribution (EFC)[47] and allocate an award (equal to full cost of study less any bursaries and EFC) from those most in need until the funds were depleted[48], universities had some autonomy and instances of 'top-slicing' - where the full fund amount is divided by all students requesting funding - resulted in many students receiving funding below FCS.

In 2014, due to the recommendation of the ministerial advisory committee (Department of Higher Education and Training 2010), the NSFAS began piloting a new administrative model to manage the NSFAS loans, grants and bursaries. In this model, funding applications are centralised in NSFAS, removing the administration from the university and TVET financial aid offices. The model was piloted in a subset of universities and TVET colleges in 2014-2016 and all institutions were participating from 2018.

The design of the new model aimed to streamline administration and improve accountability and consistency across institutions. Under this model, students apply directly to NSFAS, removing the institution's financial aid office from the equation. Students are ranked nationally on a composite score that, reportedly, accounted for financial need, academic merit and a scares skills factor. Tuition and residence costs are paid directly from NSFAS to the institution.

11.4 The DHET subsidy overview

The direct subsidies paid to universities by the South African state have two components: block grants and earmarked grants. In the 2019/2020 financial year the block grant value was

47 EFC was calculated as a third of household disposable income for households supporting one student, and a fifteen for households with more than one student. Disposable income was determined as net annual income less a number of allowances determined based on area specific tables.

48 The R122,000 value that often appears as the earlier threshold was set as the upper limit on family income. This number represented the lowest band in the SARS tax tables at the time. Although this was not an official threshold, some institutions used it as such, dispersing funds across all students with family incomes below this amount.

R35 billion, and the earmarked grant value was approximately R7.5 billion. The earmarked grant component is currently largely for specific infrastructure and funding for the two new universities - these account for around two thirds of the total earmarked grant, with the rest comprising of staff capacity development, specific funding for health and veterinary sciences and a grant for historically disadvantaged universities (Sibusiso Bhengu Development Programme).

In 2019/2020 financial year, the teaching input grant accounted for 60% of block grant funding and around 50% of all direct DHET subsidy to universities. The teaching output grant was about 17% of block grant funding, the research output grant was about 13%, the institutional factor grant was 5% and the gap grant was around 5% of block grant funding. The gap grant has been phased out — the final year it was paid was the 2021/22 financial year (Department of Higher Education and Training 2020). All these grants appear as line items in the DHET budget.

This section of the report discusses the block grants, which accounted for 82% of total direct DHET subsidy to universities in 2019/2020. The block grants have five components, namely teaching input grant, the teaching output grant, the research output grant, the institutional factor grant and the gap grant. After discussing each of these components, some descriptive statistics on the evolution of the three major components of the block grant- the teaching input, teaching output and research output grants- since 2006, are provided.

Teaching input

As noted above, the teaching input subsidy is the largest part of the DHET subsidies to universities - about 60% of all block grant funding. It is important to explain how the subsidy to each university is calculated. The DHET recognises 23 Classification of Educational Subject Matter (CESM) categories corresponding to different fields of study (there were 25 pre-2010). For the purposes of the subsidy calculation these fields of study are collapsed into four "funding categories" and each funding category is allocated a weight. The weights range from 1 to 3.5 - so some fields of study attract 3.5 times as much funding as others. There are also different weightings for different levels of study. Low level undergraduate courses have a weight of 1, whereas PhDs have a weight of 4. Contact programmes below master's level are weighted twice as much as distance learning programmes (mostly affecting UNISA) but the weights are the same at master's and PhD for distance learning.

Each university comes to an agreement with DHET on an "enrolment plan" for the number of students it plans to enrol in future years. This is undertaken every three years, corresponding to the state's Medium Term Expenditure Framework (MTEF) (Department of Higher Education and Training 2014, 124). Enrolment plans include the number of students in different funding categories, at different levels (1st year, 3rd year, honours and so forth) and the number in contact and distance programmes. These planned student numbers are then converted into "teaching input units" (TIUs), which are the basis of the subsidy calculation.

The number of "teaching input units" (TIUs) is calculated by multiplying the number of full-time equivalent students by the CESM funding category, the level weight of each student and the contact or distance weight. These are then added to give the total university TIU in the enrolment plan. To calculate each university's teaching input subsidy in a particular year the total amount in the teaching input line item in DHET's budget is divided by the total TIU in the enrolment plans across all universities from two years earlier. This results in a rand amount for that year that is paid per TIU. A university's total teaching input subsidy for a particular year is then the number of TIUs submitted in the enrolment plan two years prior multiplied by the rand amount per TIU in the current year.

From 2009 onwards the DHET discussed penalising universities for deviations below a certain percentage from the agreed enrolment plan, although this was only implemented from the 2015/16 financial year. Officially, the allowed deviation declined from 5% by 1 percentage point per year until 2019/2020. The penalty was a reduction in funding equal to one third of the value of the teaching input units represented by the under-enrolment (Department of Higher Education and Training 2020). Over-enrolment penalties were introduced in 2020 and were of the same value as under-enrolment penalties (Department of Higher Education and Training 2021). In practice, matters were more complicated with the DHET applying discretion to decide whether penalties against over- and/or under-enrolment should actually be applied.[49]

The subsidy system has some strange characteristics. Whilst the enrolment plans agreed to between the DHET and each university describe in detail the number of planned enrolments

49 Personal communication with Charles Sheppard, 17 August 2021.

by level and CESM, in assessing the difference between planned and actual enrolment, for many years the DHET only compared the total TIUs, and not the level of students or the actual numbers of students by CESM category. Only fairly recently did the DHET begin comparing actual and planned enrolment at levels below the total TIU amounts. Furthermore, at the graduate level, the TIU calculation also includes a formula that takes into account past graduation rates. Since the focus in this report is on undergraduate performance. the complexities of that and the implications thereof, are not discussed any further.

It is also noted that the input subsidy per student is not based directly on the actual cost of enrolling a student. The total amount allocated to the teaching input line item is based on what the DHET can afford (DHET, 2013: 121). However, the CESM weights are partly based on relative costs — in the sense that more expensive courses (for example, those requiring labs) attract more funding (DHET, 2013). And whilst the different CESM weightings reflect relative costs, they also reflect DHET priorities: those with higher priorities are given higher CESM weights.

Teaching output grant

The teaching output grant is a much smaller component than the teaching input grant. The Ministerial Committee on the Review of the Funding Framework concluded that: "in principle it would be ideal if funding could be equally distributed between teaching input and teaching output grants, much more equity in the system needs to be achieved before a significantly increased percentage of the funding could be channelled towards teaching outputs" (Department of Higher Education and Training 2013, 31).

The teaching output grant is based on the actual number of graduates from two prior years. Similar to the input subsidy, different levels of graduates attract different weights: undergraduate diplomas have a weight of 0.5, a 3-year bachelor's degree or diploma has a weight of 1. The total teaching output subsidy is then divided by the total teaching output units from two years previously, to give a rand value per teaching output unit. Universities are then allocated a subsidy equal to their teaching output units multiplied by the rand value per unit. Masters and PhD graduates are excluded from these teaching output calculations, and are instead subsidised through the research grant, discussed below.

In addition to the above, where an institution fell short of a 'norm' agreed with DHET, it became eligible for a teaching development grant (Walwyn 2008). In other words, if an institution agreed a norm of 500 TOUs based on its past performance and it only achieved 450, it would only receive the teaching output subsidy for 450 students but would be eligible for a teaching development grant based on the shortfall of 50. This created concerns about the unintended effect of 'rewarding' institutions for notionally poor performance (Walwyn 2008; Department of Higher Education and Training 2013). For those and other reasons, a new approach was introduced via a University Capacity Development Grant (UCDG) which was intended to "[consolidate] the purposes of the Teaching Development Grant (TDG) and the Research Development Grant (RDG) in a more streamlined and systematic fashion" (Department of Higher Education and Training 2018, 3).

Research output grant

The total amount to be paid each year is fixed by the budget, like the other elements of the block grant subsidy. Similar to the other elements of the block grant, different research outputs are weighted and then all outputs are added together to get total weighted output. The line item in the DHET budget for research output is then divided by the total weighted number of outputs, from which a per unit subsidy is calculated. Each university is then allocated a subsidy amount that is the per unit subsidy multiplied by the number of units produced by the university. For example, journal articles, published conference proceedings and book chapters all have a weight of 1, while books, patents and other research output can have a weight of up to 10. For outputs with more than one author the subsidy is divided proportionately by the number of authors. Masters and doctoral graduates are counted as part of the research output grant, rather than in teaching outputs. Masters graduates have a weight of 1 and doctorates have a weight of 3.[50] The amount of subsidy paid in year t is based on outputs in year t-2 and the budget line item in year t. As with the Teaching Output Grant, it used to be the case that institutions falling short of the target agreed with DHET would be given an additional 'research development grant'. And due to similar concerns with the potential implications of that approach, in 2018 this was replaced by the UCDG as described above.

50 Some universities maintain internal weighting schemes for allocating the subsidy received from DHET to faculties, departments and individual academics that differ from those DHET's.

Institutional factor grant

There are two factors that influence the size of the institutional factor grant. The first is the share of African and coloured students at each university. Universities with less than 40% shares are given a factor of 0. The factor increases linearly by 0.025 for each 10 percentage point increase in the share of African and coloured students up to a maximum of 0.1 in the case of universities with shares of 80% or more. This factor is multiplied by the number of approved teaching input units and these additional units are then funded as regular teaching input units.

The second part of the institutional grant is an adjustment for economies of scale. Universities with less than 4000 FTE students are given a factor of 0.15, and this decreases by .00714286 per 1000 students. Universities with more than 25000 FTE students get a factor of zero. Again, this factor is multiplied by the number of approved teaching input units and these additional units are then funded as regular teaching input units.

Gap grant

The gap grant was introduced to cover the fee increases of students beginning in the 2017/18 financial year (DHET, 2017). This covered all students with family incomes up to R600 000 per annum. It was initially an earmarked grant but is now a subcomponent of the block grant (DHET, 2020). It is being phased out and the final year it will be paid is the 2021/22 financial year. This is not discussed further in this publication.

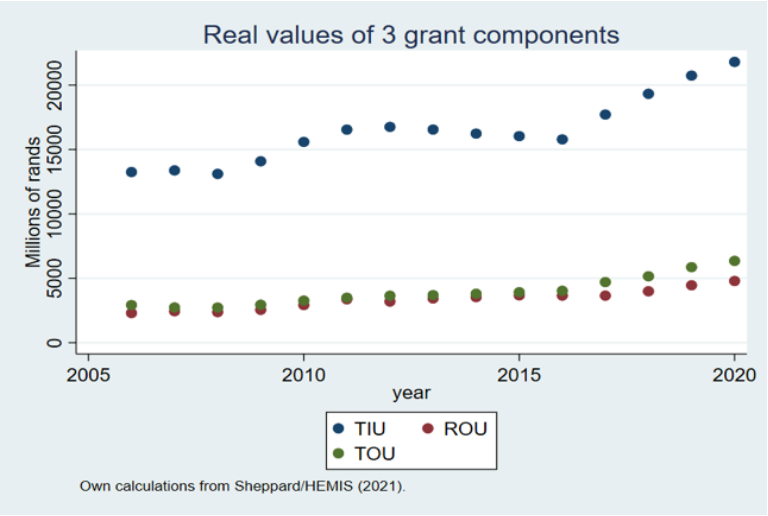
Optimising behaviour

For the purposes of the present report, the primary interest in relation to the funding formula is its effect on the behaviour of institutions in relation to undergraduate performance and throughput. The focus is on how the DHET budget line items are divided up between universities and how each university could modify their behaviour to increase the income they receive. In doing so it is assumed that the overall DHET subsidy budget and each line item is fixed and outside the control of universities. Optimising behaviour is possible for the teaching input, teaching output and research grants despite the fixed subsidy budget. This is because of the way the budget for these line items is allocated to different universities. There is a fixed amount of subsidy to be allocated and the more teaching inputs, teaching outputs and research outputs a university produces the larger its share of each of these three budget items is.

The enrolment planning process and the penalty system imposed by the DHET limits the extent to which universities can expand their enrolment to gain teaching input subsidy. However, the teaching output subsidy, which is the focus of the analysis below, can be manipulated to increase the share of the teaching output subsidy accruing to a particular university. The same is true for the research output subsidy, although this is not the subject of this analysis. As shown by various studies (Pouris 2012; ASSAf 2019) there has been a large increase in the amount of research outputs produced. In separate research, it was argued that this is partly driven by a rent-seeking dynamic (Muller 2017), and raised concerns along with other scholars that a significant proportion of the increase in research output has been due to publications with predatory publishers (Mouton and Valentine 2017; Kerr and de Jager 2021). While a great deal has been written on such concerns in relation to the current subsidy system, going back to at least 2008 (Walwyn 2008; Vaughan 2008), very little has been written on corresponding concerns relating to the teaching output subsidy.

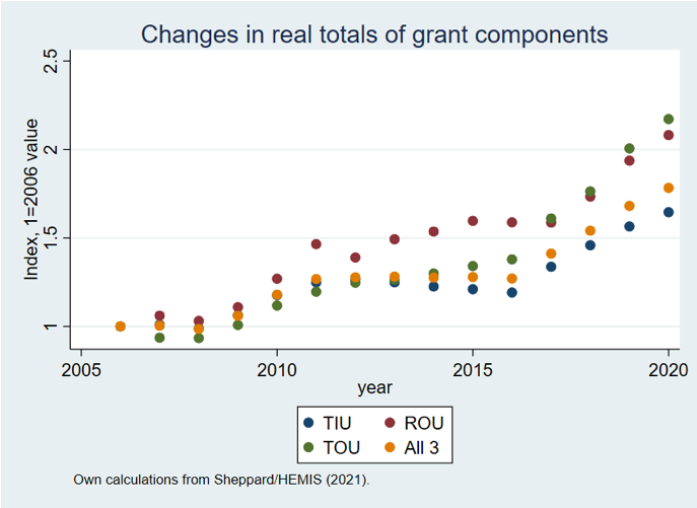
Changes in the block grant components over time

Data from HEMIS is used to describe the changes in the three largest components of the block grant (the teaching input grant, the teaching output grant, the research output grant) over time. Figures 19 and 20 show the real values over time, in rand values and in index form. Similar to the Stats SA data discussed above there have been increases in the real values of total subsidy and for each of the 3 components of the block grant – around 80% for the combined 3 parts of the block grant available for this analysis.



Notes: TIU denotes Teaching Input Units. ROU denotes Research Output Units. TOU denotes Teaching Output Units.

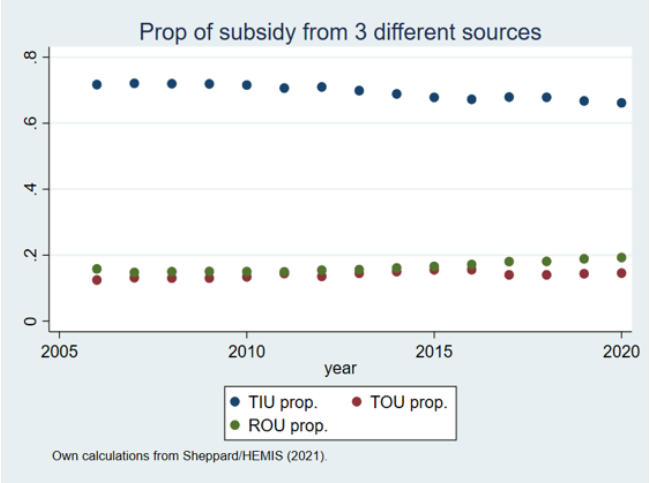
Figure 19: Real values of University Grant Components



Notes: TIU denotes Teaching Input Units. ROU denotes Research Output Units. TOU denotes Teaching Output Units.

Figure 20: Real values of university grant components in index form

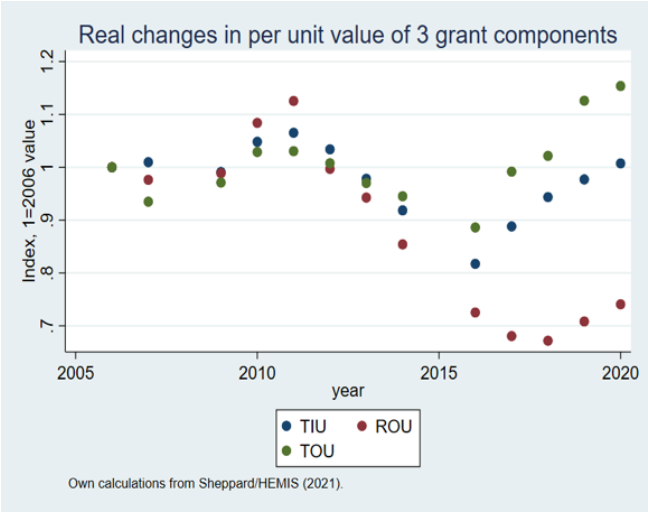
Figure 20 shows the composition of the block grant over time. TIU is the dominant source of subsidy, but this has declined from 72% in 2006 to 66% in 2019, with TOU proportion increasing by 4 percentage points and ROU by 2 percentage points.



Notes: tiuprop denotes the proportion of subsidy derived from Teaching Input Units. rouprop denotes the proportion of subsidy derived from Research Output Units. touprop denotes the proportion of subsidy derived from Teaching Output Units.

Figure 21: Composition of the 3 parts of the block grant

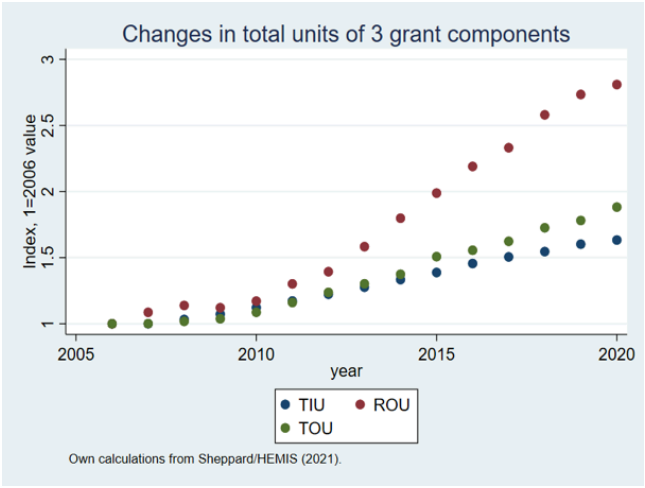
Figure 22 shows the changes in the real rand value of a TIU, a TOU and a ROU, expressed in December 2019 rands. There have been relatively large fluctuations for all three over the period. The real value of one TIU (the biggest component of the grant) is about the same in 2019 as it was in 2006. The value of a TOU is about 15% higher than in 2006 and there was very strong growth since 2016. The value of an ROU has declined by about 25%.



Notes: TIU denotes Teaching Input Units. ROU denotes Research Output Units. TOU denotes Teaching Output Units.

Figure 22. Per unit changes in the real value of each of the 3 block grant components

This is partly because of the very large increase in total ROUs compared to TIUs and TOUs, which is shown in Figure 23.

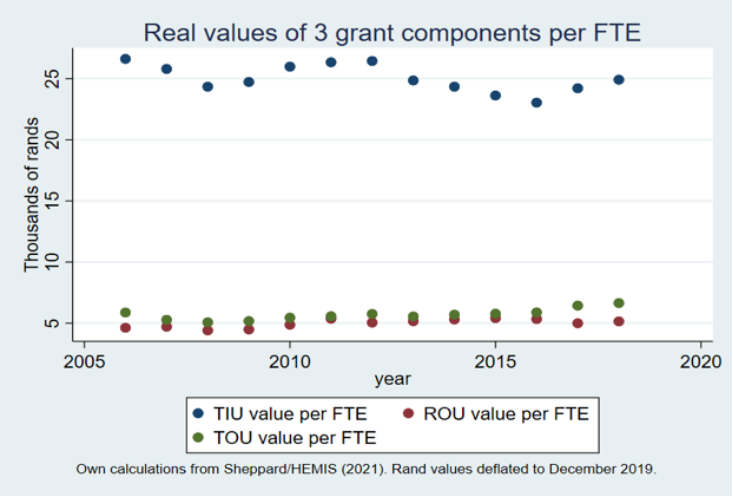


Notes: TIU denotes Teaching Input Units. ROU denotes Research Output Units. TOU denotes Teaching Output Units.

Figure 23: Changes in subsidised units

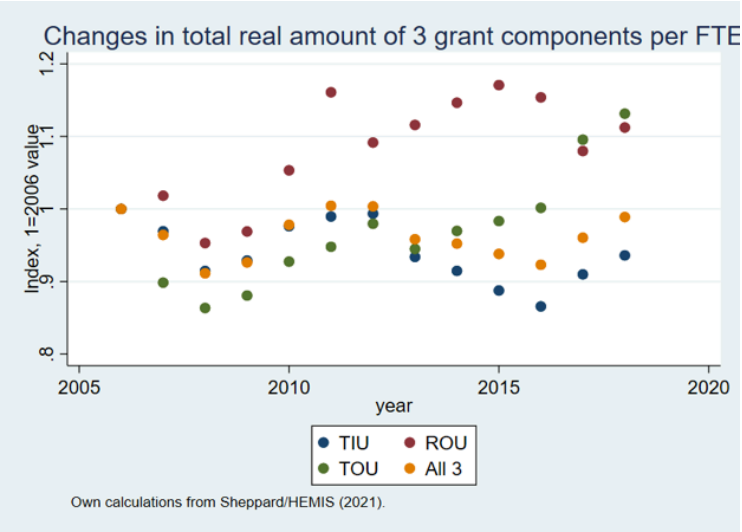
Figure 24 uses the number of full-time equivalent (FTE) students in each year to show changes in the real value of the 3 grant components per FTE. The overall subsidy amount per FTE is about 1% lower in 2018 than it was in 2006. The TOU values per FTE grew substantially in 2017 and 2018, such that they were 13% higher than in 2006. The ROU real subsidy per FTE has increased by about 11%.

Figures 24 and 25 show that while the teaching output grant value was substantially less than the TIU value, it was more than the ROU value and grew substantially over time. This provides some basis for believing that the TOU would have functioned as a material incentive for university managers to reorient institutional decisions — the potential consequences of which is discussed further in Section 12.



Notes: TIU denotes Teaching Input Units. ROU denotes Research Output Units. TOU denotes Teaching Output Units.

Figure 24: Grant per Full Time Equivalent (FTE) student



Notes: TIU denotes Teaching Input Units. ROU denotes Research Output Units. TOU denotes Teaching Output Units.

Figure 25: Grant per Full Time Equivalent (FTE) student index

12. An overview of the National Student Financial Aid Scheme

The NSFAS aims to increase access to tertiary education[51] for academically eligible, low-income South African students who are registered or intending to register for their first undergraduate qualification, by funding their tuition and living expenses. This funding provides fee income to universities[52] as well as income through students using NSFAS funding to pay for university accommodation and other sundry costs. The overview in this section provides detail on the NSFAS policies for funding students, how these have changed over time, and how the new 2018 policy was implemented. It also includes a brief description of the data obtained for analysis for this report.

This section of the report begins by discussing three periods in the NSFAS's history that correspond to distinct features of its implementation. Before 2017, the NSFAS application

51 NSFAS funding covers students enrolled in universities as well as Technical and Vocational Education Training (TVET) colleges.
52 South African universities are financed through a combination of government subsidies, fees paid by students and "third stream" income (external research grants, donations and so forth).

process was decentralised, and funding decisions were made by institutions. From 2017 onward, administration was centralised, and the NSFAS allocated and disbursed funding itself. In 2018, the scope and nature of the financial support changed from income-contingent loans to bursaries, with the income eligibility threshold increasing to R350,000 per annum. This policy change is the focus of this report. This section provides further details on the implementation of the new policy for 2018 and 2019. Some aspects of the policy implementation after 2019 are mentioned, although since the analysis in this report stops in 2019, that discussion is fairly brief.[53] Finally, the NSFAS administrative data obtained for use in the analysis, is described. The data is utilised to provide some descriptive statistics on the number of funded students and the total funding dispersed between 2014 and 2019.

12.1 Describing the three 'eras' of the NSFAS

The initial era of NSFAS (1999-2013)

The Tertiary Education Fund of South Africa (TEFSA) was established as a public entity under the Department of Education (DoE) in 1991 and was formally replaced by the NSFAS in 1999 with the gazetting of the NSFAS Act of 1999 (SALDRU 2017). Prior to 2017, the NSFAS operated in a decentralised manner, and NSFAS funds were allocated to institutions based on an allocation factor (AF). The AF was determined by multiplying the institution's disadvantaged student index – the weighted sum of the number of Black, Coloured and Indian students[54] enrolled – with an institution specific calculation of the full cost of study (FCS)[55] to get what was known as the disadvantaged student cost index (DSCI).[56] The DSCI was then divided by the sum of all institutions' DSCI's to get the AF percentage. The intention was for institutions to rank their students based on socioeconomic need and academic merit, and allocate an amount equal to the FCS less an expected family contribution (EFC).[57]

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53 At the outset of the project it was not expected that 2020 HEMIS data would be obtained, but after various delays briefly described at the beginning of the technical analysis part of the publication, the 2020 HEMIS data was obtained. The decision to exclude post-2019 years from the analysis was largely based on the dramatic and complex effects of the Covid-19 pandemic and associated policy responses, which would confound most attempts at comparisons of other trends across time.

54 Black students were given a weight of 3, coloured students 2, and Indian students 1.

55 Full cost of study being: tuition fees, accommodation, meals, books, and travel, as provided by the institution

56 The enrolment statistics appear to be taken from two years prior (t-2) and the estimated cost of study from one year prior (t-1), however it was not possible to find this stated explicitly in official documents.

57 EFC was calculated as a third of household disposable income for households supporting one student, and a fifth for households with more than one student. Disposable income was determined as net annual income less a number of allowances determined based on area specific tables (Bhorat *et al*. 2017).

Institutions used a means test to calculate a student's EFC, which accounted for family income,[58] the number of dependents in the household, and the family's cost of living. For dependent students the family was defined as:

> *The parents (where the parents are married and living together), Unmarried siblings under the age of 21 and their children; The applicant and his/her children; Any "dependent" siblings at tertiary education institutions; The spouse of the applicant (if he/she is living in the family home or being supported by the family); The spouse of any sibling at a tertiary education institution (if he/she is living in the family home or being supported by the family). (NSFAS, n.d.).*

This family concept does not include all individuals living under the same roof, who would be defined as belonging to the same household, in a household survey.

From 2014, the NSFAS began rolling out means test waivers for students who attended quintile 1-3 schools ('no fee' schools) or who received social grants. They were automatically assigned a zero EFC as well. Despite there being no official household income threshold for eligibility during this time, R122,000 is typically referred to as the income threshold prior to 2018 (Department of Higher Education and Training 2010). The Commission of Inquiry into Higher Education and Training (2017) noted that the R122,000 threshold was premised on the assumption that it represented the upper limit on the lowest band of the personal income tax table, although, it was not revised for a number of years, nor was it an official NSFAS policy guideline. This meant that in practice, institutions could adopt different approaches to allocating and disbursing NSFAS funds.

For example, the University of Cape Town (UCT) had its own policy to fund students with household income up to R230 000 per annum using a combination of NSFAS and UCT funds.[59] Other institutions may have allocated funds on a first-come first-served basis (Jansen 2015; Commission of Inquiry into Higher Education and Training 2017), which meant that some qualifying students did not get funded at all and funding amounts may have had no relation to need (within those who qualified). Other institutions engaged in a practice

58 The definition of 'family income' and its implementation in practice is discussed in later sections.

59 Together with fairly good fee payment rates on high student fees from the student body that could afford to pay fees, this financial aid structure allowed UCT to cross-subsidise many students who would otherwise not have been able to afford to study at UCT.

known as 'top-slicing' – a distributive process whereby in a response to receiving insufficient funding from NSFAS, institutions shared loan amounts equally among all students who qualified[60] for NSFAS. This necessarily left students underfunded (Department of Higher Education and Training 2010).

The underfunding that led to top slicing was a particular concern since the NSFAS funding was capped at a maximum level per student by the NSFAS, which was less than the rising FCS at some institutions. That was particularly a problem at traditional universities, largely due to escalating fees.[61] Additionally, the FCS of certain programmes may have been above the cap, even where the institutional average FCS fell below the cap (NSFAS 2016b). While some institutions (such as UCT) contributed funding to top up the shortfall, students at other institutions remained with funding that was insufficient to cover their FCS (Cornerstone Economic Research 2016b), and students were still expected to make a family contribution (EFC). This led to NSFAS students accumulating what is commonly referred to as 'historic debt' - monies owed to institutions by students who could not cover the shortfall (between the NSFAS allocation and actual FCS) or/ and their EFC.

During this time, the NSFAS existed primarily as an income-contingent loan-scheme,[62] with up to 40% of the loan for a given year eligible to be converted to a bursary annually, depending on students' academic success.[63] From 2011 — following a Ministerial review of the NSFAS (Department of Higher Education and Training 2010) — qualifying students in the final year of their programmes were eligible to have the full loan amount of that year converted to a bursary. Together, these conversions were intended to function as incentives for students to pass and graduate timeously.

60 Here, although R122,000 was not an official threshold, it appears that some institutions used it as such, dispersing funds equally across all students with family incomes below this amount.

61 Although increases in the cap occurred at rates higher than inflation, universities blamed government underfunding for hikes in fees. Similarly, they argued that a weakening currency pushed up the cost of books and equipment, and increasing utility costs and academic salaries (to retain high performing academic staff) further lead to the higher education inflation rate [HEPI] growing faster than CPI (Universities South Africa 2016).

62 Loan repayments began once a student had found employment and earned at least R30 000 per annum. Interest was charged at 80% of the repo rate (interest rate charged by the South African Reserve Bank on loans to banks) on the capital amount of the loan and would only accrue to a maximum of the initial capital amount. In other words, the most a student could owe was double the amount of their initial loan. The repayment amount was calculated starting at 3% of a student's annual salary and increasing to a maximum of 8% when the salary reached R63 100 or more per year (SALDRU 2017). Interest did not accrue while the student studied, nor for up to 12 months after the student left the institution. This provision came into effect at the same time as the final year full bursary mentioned above, following Ministerial review of NSFAS in 2010 (Department of Higher Education and Training 2010).

63 For example, if a student passes all their courses, they will have 40% of their loan converted to a bursary. If they pass 50% of their courses, 20% would be converted to a bursary,. (Cornerstone Economic Research 2016b). To be eligible for the final year bursary, a student must pass all subjects in their final year, else the 40:60 conversion rate will apply (NSFAS 2017b).

The NSFAS funding was only available for the prescribed length of a student's qualification plus two additional years (colloquially referred to as the 'N+2 rule') and thus students who failed to complete their degree within this timeframe were ineligible for continued funding. This timeframe included any time spent previously registered at any post-school institution.[64] Students also became ineligible for continued NSFAS funding if they did not pass 50% of their courses in a given year (the 'fifty percent rule').[65] The stated aim of this rule was to improve targeting of funds to students with academic potential in a context of escalating budgetary pressures. As of 2020 (beyond the time covered in this analysis), the fifty percent rule was removed. It has been reported that it would be replaced in the 2023 academic year by a new rule under which students will be required to pass a certain share of courses per year to be eligible for continued aid. At a course load of seven, the rule closely mirrors the previous fifty percent rule. Students with a lighter course load (such as four courses) would be required to complete 75% of their courses (NSFAS 2022a).

The 'student-centred' model (2014-2017)

In 2014, the NSFAS began piloting a new administrative model to manage loans and bursaries. Under this model, applications for funding became centralised, and administration was removed from university financial aid offices. This new model, called the Central Application Process (CAP) model, or sometimes the student-centred model, aimed at streamlining administration and improve accountability and consistency across institutions. The institutions no longer received an annual NSFAS allocation upfront, and funding then followed the student – where the student registered, funding followed. That is, tuition and residence costs (where relevant) were paid directly from the NSFAS to the institution. This administrative model was fully operational from 2017 onwards, with pilots having been in place at some institutions between 2014 and 2016.

Before 2017, the decision about which students would be eligible for funding had been taken by the institutions. From 2017, the NSFAS therefore needed to make this decision centrally. Students who were personally in receipt of South African Social Security Agency (SASSA) child support

64 In other words, the N+2 rule is not based on the number of years that a student has been funded, but on the number of years that the student has been registered for tertiary study in South Africa (NSFAS 2016a).

65 The extent to which this rule was enforced by institutions is not clear. For example, UCT only began enforcing this rule in 2015 in anticipation of moving to the NSAS centralised application system in 2016 (see Section 1.2). Moreover, NSFAS (2016b) recognises that this rule alone is not sufficient to ensure students graduate in N+2. They recommended using a progressive courses-passed rate that is more forgiving in first year when institutions are making decisions about academic eligibility for continued funding when the allocation is not sufficient to fund all eligible applicants.

or disability grants were automatically eligible (NSFAS 2017b; DHET 2018a). But there is some ambiguity about the income threshold adopted. One NSFAS document (NSFAS 2017b) says no income threshold was used but another, NSFAS (2017b), suggests that there was and that this was R120 000 per annum, very close to the previous unofficial threshold of R122,000.[66]

As discussed above, prior to 2017, the family concept was used in calculating income available to the applicant. The 2017 NSFAS Handbook (NSFAS 2017b, 33) defined the household as:

members of the students' immediate and/or extended family that are living under the same roof, living off the wages/salary/grants earned by those contributing to the same household income. For the purposes of assessing household income, this may include a guardian so appointed by the State who is not living with the family but contributing to the household income. This may also include grandparents receiving a grant to support children whose parents are absent. Caregivers informally supporting a student are not obliged to provide their financial information, but all attempts to determine the extent of this support on the expected contribution of the students' family to his/her study costs should be undertaken.

However, the income information required by the NSFAS includes only the applicant, their spouse and parents or guardians. This means that the household income used to calculate the funding amount was for a narrower set of people compared to the pre-2017 era. It also means that this concept of household income is less comparable to household income obtained from a household survey. This issue is discussed further in later sections.

Before 2017, all continuing students had to re-apply for the renewal of their funding, and were re-assessed based on financial eligibility, academic eligibility, and available funding. The CAP model uses only the latter two as the basis for decisions on which students are funded (NSFAS, 2017). Therefore, since the introduction of the CAP model, the financial need of the student is assessed at the point of first application, and continuing students do not need to re-apply annually. However, from 2021, the NSFAS (2021: 8) explicitly states that it "may re-assess the eligibility of any student at any point whilst funded by NSFAS and reserves the right to withdraw funding if the student no longer meets the eligibility criteria".

66 The empirical work below shows that the actual income threshold adopted in 2017 seems to have been R122,000.

Under the CAP model, the NSFAS Handbook (NSFAS 2017b) suggests that allocations remained ring-fenced for institutions, using the same principles and baseline as the allocation formula. Based on financial need (according to the EFC calculation and ranked from most negative to most positive) and academic potential (students most likely to complete the qualification within the minimum time), the NSFAS then determined which students were to receive funding. The 2017 guidelines stressed that, "if there are insufficient funds to assist all financially needy applicants at an institution, preference should be given to those applicants whose financial need and potential to succeed is greatest" (NSFAS 2017b, 33). The NSFAS also administers bursaries on behalf of a number of partners, such as the National Skills Fund (NSF) and Sector Education and Training Authorities (SETAs) which target funds toward students enrolled for scarce skill qualifications.

The 'free higher education' era (2018-)

In late 2015, the discourse surrounding the student-led Fees Must Fall (FMF) protests stressed that government funding was failing to match increasing enrolments causing roughly a third of eligible candidates to be denied funding (Cornerstone Economic Research 2016b); and, the funding allocated to students was often inadequate. Students argued the issues above were contributing to academically eligible students dropping out, experiencing hardship or facing financial exclusion due to inability to pay and the subsequent accumulation of historic debt.[67]

The protest action led to a nation-wide implemented 0% fee increase for the 2016 academic year for all students, and a significant increase in funding for NSFAS. In January 2016, the DHET, through the NSFAS, made additional funds available to cover NSFAS students' historic debt (debt-relief) at institutions which was increasing as a result of the NSFAS cap or EFC from the period 2013-2015, in an attempt to circumvent disruptions from occurring at the beginning of 2016 (Commission of Inquiry into Higher Education and Training 2017). In 2017, an 8% fee increase was covered by government through a grant (DHET Fee Grant) allocated to universities for all NSFAS students and those classified as the missing middle.[68]

Nonetheless, the student protests continued because of ongoing concerns about underfunding

67 This being particularly because institutions do not allow students who owe money to register or collect graduation certificates.

68 This term typically refers to students not financially eligible for NSFAS and whose household income is less than R600 000 per annum. The Commission of Inquiry into Higher Education and Training (2017) notes that the focus on R600 000 as the upper limit for the missing middle is thought to be premised on this announcement made by the Minister of Higher Education and Training during 2016.

and exclusion of less wealthy students. Ultimately, these dynamics culminated in a large increase in and restructuring of NSFAS funding when former president, Jacob Zuma, announced a 'free' higher education policy on 16 December 2017.

For first-time entering new students (FTENS) from 2018 onwards, the new policy extended NSFAS eligibility to students with household income levels below R350,000 per annum[69] (increased from the previous R122,000). Household income was defined as, "the direct family income (namely, parents, legal guardians or spouse) of the prospective student. It does not include the income of extended family members (for example, brothers, sisters, aunts and uncles, grandparents), if these are not their legal guardians." (DHET 2018a, 5). This means the income concept was the same as in 2017 and narrower than the pre-2017 era. Again, this means that the income concept was narrower than the typical definition of 'household income' from a household survey.

A substantive change was that all NSFAS funding would take the form of a bursary (known as 'NSFAS-DHET Bursary'), essentially abolishing the previous loan-bursary combination of the previous scheme. The new scheme covers the (institution-specific) full cost of tuition and campus accommodation with nationally standardised limits on transport, books, food and off-campus accommodation (DHET 2018a).

Under the new NSFAS Bursary scheme, the NSFAS now only funds N+1 years of study (previously N+2),[70] and a community service component has been introduced for all students from their second year of study onwards - although the details of this remain unclear and this requirement has not yet been strictly enforced. According to the 2020 DHET Guidelines, consideration will be given to the practicality of implementing this as a compulsory obligation linked to the bursary in the future.

From 2020, the fifty percent rule no longer applied to students on the NSFAS-DHET Bursary. This meant that if the university allowed students to re-register, they would be funded.[71] This was effectively an easing of progression requirements because passing 50% of courses

69 Which DHET believed was around the 90th percentile of the household income distribution (DHET 2018a: 2).

70 Although, in 2020 the minister approved a once-off concession on this rule, allowing N+2 years of funding. "Final year students and N+2 students, who have psychosocial and medical considerations were reviewed. The facility to submit appeals was closed by the end of June 2020" (NSFAS 2020a, 31).

71 "Institutions will confirm with NSFAS at the start of the academic year that students have qualified for progression according to standard institutional policy and approved rules of progression for the specific programme they are studying." (DHET 2021, 15).

taken is typically a stricter requirement than institutions' academic eligibility requirements for re-enrolment/progression. However, this change had not yet occurred in the time period covered by the data analysed for this report (up to 2020).

The NSFAS-funded students first registered at higher education institutions prior to 2018 continued on the capped amount of the previous scheme, but with their full loan amount converted to a bursary (known as a NSFAS-DHET Grant). For those students, both the N+2 rule and fifty percent rule continued to apply. The threshold on household income for continuing students remained at R122,000 per annum. Notably, students who had entered the system prior to 2018 with a household income above R122,000 but below the new threshold of R350,000 remained ineligible for NSFAS . In 2019, the NSFAS undertook to write off further debt owed to institutions by continuing NSFAS students who had been funded under the pre-2018 funding policy (DHET 2019c). But any loan amounts accumulated before the introduction of the new scheme remain repayable as well.

Under the new schemes (NSFAS-DHET Grant and NSFAS-DHET Bursary) the stated intention is that the NSFAS funds are allocated to all financially eligible students who successfully register at a public institution. Following registration, the NSFAS releases funds to institutions based on the registration records it receives. Institutions remain responsible for administering direct payment of allowances to students from their advances received. The NSFAS (2019) states that, "Universities are required to transfer funds to ensure that students are able to access funds for living expenses (accommodation, food, transport and other expenses) and learning materials, and then secondly apply funding towards paying the first instalment of the tuition fee." Since all eligible students are funded, budgetary pressures can increase dramatically, especially if institutions do not stick to their approved enrolment plans. The COVID-19 pandemic exacerbated these pressures due to falling household incomes, but that period is outside the sample for this analysis.

Between 2017 and 2019 the number of new NSFAS applicants who had not previously attended university and who were funded by the NSFAS increased by more than 40%. Around 77 000 new applicants who had not previously attended university were funded in 2017, versus 113 000 in 2018 and around 107 000 in 2019.[72]

72 The percentage increases each year for new first year NSFAS-funded students are larger than the percentage increase in the total number of NSFAS-funded students each year because the total number includes students who first obtained funding in prior years, whose numbers would not be affected by the change in policy in 2018.

12.2 Details of the 2018 policy change

The ensuing subsections describe how implementation of student funding policy has differed from what is described in the policy documentation (or where the documentation has been unclear or ambiguous), particularly with regard to the 2018 policy change and the implications of this for empirical analysis.

Timing of the announcement

The announcement of the free higher education policy (as described above) came after the NSFAS and university applications for the 2018 academic year had already closed (Pather 2017; Tshangela 2021). While an announcement may have been anticipated in November of 2017 (Munusamy *et al*. 2017), the details of such a plan were unclear. Notably, the policy that was ultimately announced differed in a number of key respects from the recommendations by the Commission of Inquiry into Higher Education.

Given the timing of the announcement, the implementation of the policy change therefore has the potential to act as a 'natural experiment' such that the composition of the student body entering in 2018 did not change, but the funding package they received did. Moreover, for pre-2018 cohorts the funding change was only from a loan to bursary, without an increase to FCS or an increase in the income eligibility threshold. The implication is that one can use these cohorts to identify the impact of different funding mechanisms, such as bursary versus loan with bursary conversion component[73], on student outcomes. This is elaborated later in the report.

The extent to which the policy change can be treated as a genuinely exogenous event – details of which were not anticipated by relevant actors within these systems – depends also on how it was implemented. The new policy would have made university attractive to some students who did not apply, or perhaps changed the preferred university[74] of some who had already applied

73 The change from a loan-based scheme to bursaries should further decrease the direct present value costs of schooling by removing the obligation to make loan and interest repayments in the future. Alternatively, the change may induce students with lower probabilities of academic success to (re-)enrol.

74 Previously capped funding amounts may have filtered lower-income students into historically disadvantaged universities, which typically charge lower fees. Under the new scheme, which offers FCS funding, students may have greater choice in which university they choose to attend.

and been accepted at another university. So it is important to document how universities and the state attempted to implement the policy in the first year in which it applied (2018).

Various sources suggest that the NSFAS, together with universities, put a process in place to ensure that students who already had firm offers from universities, but who had not applied to the NSFAS the previous year, could identify themselves[75] as students from families earning a gross household income of up to R350,000 per annum (DHET 2018a; University of Pretoria 2018). Universities were responsible for verifying that the students were first time entrants (since students already in the university system did not qualify under the new income threshold) along with collecting income and other information. The NSFAS was subsequently responsible for verifying the income data, and for making the final decisions about who was awarded funding.

In practice, it appears that some continuing students may have been able to make a late application for funding in 2018 too - especially if it was the case that they were applying for NSFAS for the first time. In this case it seems as if they may have been funded based on the new, R350,000 threshold erroneously. From 2019, however, this was reportedly rectified.[76] There are not expected to have been many such cases in 2018, given that students did not expect to receive funding and the late application cycle was targeted at first year students.

There does not appear to be a way to distinguish those who applied in 2017 through the usual process from those identified as potentially eligible in 2018 after the change in policy. In the case of 'late applications', the extent to which information was captured (at the institution or at NSFAS) on crucial variables like household or family income is unclear. Where such information existed, it was not centralised, which is why income data is almost entirely missing for 2018 in the dataset provided by the NSFAS. However, one unexpected discovery in the process of conducting the analysis for this report was that income data is missing even for those who applied in the usual way; that suggests the late application process is at most a partial explanation for the unavailability of income data.[77] A broader explanation is that, for unexplained reasons, analysis of eligibility and associated decisions for 2018 were made at the level of individual NSFAS staff and not subsequently aggregated.

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75 They were instructed to identify themselves at their institution's financial aid office.

76 Personal communication with Tasneem Salasa, Director: Student Undergraduate Funding at UCT, 25 March 2022.

77 The relevant officials indicate that they defer to the audited figures, but the impression given is that it would be hard to reproduce such figures consistently.

Other reasons to think that the policy announcement could have changed the applicant pool to some degree is a statement released by Universities South Africa (USAf), a body representing the 26 public universities, on 10 January 2018. The statement says that universities would allow new students to apply and register if institutions had unfilled places, and that universities that did not have places would help individuals find places at other institutions using the DHET Central Application Clearing House (CACH) system (Universities South Africa 2018).

However, typically the CACH system does not place many students. In 2018, there were roughly 1 million students in the public higher education system and a report from DHET to Parliament in March 2019 stated that 8 000 students of the total number of students had found placements using CACH in 2018 (Parliamentary Monitoring Group 2019). The CACH places students in TVET colleges and universities, and not all of the 8 000 students would have been placed as part of a late application process. On the basis of these figures it is concluded that in early 2018 at most a few thousand individuals would have been able to apply to a university through CACH, be matched to a university that had a free place and register at that university. And of those only a proportion could then have also been late NSFAS applicants.

Some universities also allowed late, direct applications. Of the three higher education institutions in Pretoria, the University of Pretoria (UP) was not allowing late applications, but Tshwane University of Technology (TUT) was, though only through its website (Mahlokwane 2018). The University of KwaZulu-Natal and the University of Limpopo were reported to be allowing late applications in mid-January 2018 (Macupe and Richie 2018), whilst Durban University of Technology (DUT) and the University of the Free State (UFS) allowed late applications (DUT, 2018, UFS 2018). It is not clear if these universities accepted any late applicants, and if they did, how many registered. Again, it is expected that these numbers were relatively small and therefore have minimal effect on the composition of applicants due to the policy change.

At the University of South Africa (UNISA), South Africa's leading open distance learning institution, FTEN undergraduate students could submit late applications until 19 January 2018 (UNISA 2018b), and any UNISA FTENS who thought they qualified for NSFAS funding could apply for the extended 2018 NSFAS funding from 3 January to 20 February 2018 as part of the registration process (UNISA 2018a). The 2018 Statistics on Post-School Education and Training in South Africa report suggests that between 2017 and 2018, the number of FTEN students increased by 8% (15 379 students), and that the major contributor to

this increase was UNISA that enrolled 13 050 more students in 2018 compared to the previous year (DHET 2020). This represented an enrolment above the institution's enrolment target for 2018, which the DHET flagged as an ongoing problem (Magubane 2021). In the analysis of the policy change the focus is on traditional, contact undergraduate degree programmes and, therefore, the core analysis would not be affected by changes to the composition of the UNISA first years due to late applications. However, as discussed later, this has implications for some of the inequality (welfare) impacts of the new policy.

In conclusion, it is possible that some universities did allow direct late applications in early 2018 and subsequently registered these students before the semester started in January or February. It is not clear how large a proportion of the new 2018 first year students this would have constituted, although it is understood that the number of students placed through the CACH system was probably less than 0.5 percent of all students. Furthermore, only a proportion of these late applicants would have been motivated by the policy change and would have applied for NSFAS. Overall, therefore, treating the policy change as exogenous in the analysis when it comes to the composition of the 2018 first year cohort (not in distance learning) appears plausible.

Means test waivers

In 2017, applicants were not required to report household income if they attended quintile 1, 2 or 3 schools (no fee schools) or if they were recipients of South African Social Security Agency (SASSA) child support[78] or disability grants (NSFAS 2017b; DHET 2018a; PMG 2017).[79] The SASSA waiver was enabled by an agreement between the NSFAS and the Department of Social Development that clears all social grants beneficiaries from submitting any proof of income when they apply for student funding (SAnews 2018). These students were also automatically assigned a zero EFC. The logic of this is that the means test requirements to qualify for these social grants are more stringent than the income test for eligibility for the NSFAS funding, so if an individual or household meets the

78 To be eligible for a child support grant, one's parents cannot earn more than R105 600 per annum combined, or more than R52 800 per annum if they are a single parent (Western Cape Government 2022).

79 The implication is that means-test waived students do not need to provide income information when submitting their application and thus it would be missing. Students needed to simply answer a yes/no question on their application form and NSFAS would validate their response (NSFAS 2016a).

SASSA requirements, they would also meet the NSFAS requirements and there would be no need to repeat the process. In 2018 and 2019, the NSFAS and DHET policy documentations suggest that only SASSA recipients were exempt from providing income information, and school quintile was no longer considered (DHET 2018a; 2019a).

For the years applicable to the analysis in this report (2017-2019), it appears that the way validation checks against SASSA data were made have changed, but also potentially improved, over time. In 2017, it appears that the NSFAS began running some checks against SASSA data (or at least, had planned to – see NSFAS (2017a, 11)). In 2018, the NSFAS validated an applicant's SASSA status against the 2017 SASSA database.[80] In 2019, an applicant was verified as a SASSA recipient if they had received a social grant in the previous two years.

Although beyond the timeframe of the analysis in this report, in 2020 the verification period for SASSA receipt extended to five years prior and included whether or not an applicant's parents were social grant recipients. This latter criterion was removed in 2021, and as of 2022, the verification period has been shortened to three years prior.[81] One would expect that broadening the criterion to count family member grant receipt and considering a longer period over which grant receipt was observed would substantially increase the number of students recorded as 'SASSA recipients'. Statements made in Parliament by the NSFAS and the DHET suggest that may have been the case. In February 2021, it was reported that 62% of the NSFAS applicants were SASSA beneficiaries (PMG 2021). Unofficial data suggests that the proportion of the NSFAS recipients who were also classified as having been SASSA recipients increased from 8.7% in 2017 to 13.95% and 16.11% in 2018 and 2019, respectively, then jumped to 46.3% in 2020. This information has not been corroborated.

In the data obtained from the NSFAS, there is only household income data for around 26% of new applicants in 2017, none in 2018 and 44% of applicants in 2019. The percentages for new funded applicants are 18%, 0% and 44% respectively. The Revised NSFAS Strategic Plan for

80 The DHET Frequently Asked Questions provide an ambiguous answer about SASSA eligibility in 2018, namely "Prospective students from families who are recipients of child support grants or disability grants administered through SASSA will automatically qualify for funding and will not have to undergo a means test" (DHET 2018a, 9)

81 Personal communication with Kirstin Barth, General Manager Business Operations at The National Student Financial Aid Scheme, 5 May 2022.

the fiscal years 2020/21– 2024/25 states that, "from the 760 000 applications received in 2021 academic year, it is believed that over 460 000 (61%) applicants are SASSA beneficiaries" (NSFAS 2022b, 27).

Missing income data

According to current and former NSFAS officials contacted, the lack of 2018 household income data is because in 2018, the NSFAS application system was not able to process all the data and decisions were made "off-system" by the NSFAS employees, whose application decision data was not later collated into the main database. Therefore, some applicants in 2018 are likely to have provided income data, but it was not in the data obtained for the analysis in this report.

If similar issues were present in 2017 or 2019, this would explain why the percentage of applicants with income data was so low. On the other hand, the missing income data in 2017 and 2019 could be due to some of these applicants obtaining a means test waiver because of attending a no fee school or being a SASSA beneficiary. Alternatively, it could be that the data was missing for some other reasons that have not been considered herein.

When applicants have to report household income, there are strong incentives for them to under-report their household income. During the period covered in the analysis for this report, applicants were required to provide affidavits if their family received little to no income (DHET 2019a), although the legitimacy of these cannot be easily determined. After the period covered in the analysis for this report (from 2020 onward), the NSFAS instituted a data sharing agreement with the South African Revenue Services (SARS) through which the NSFAS can check on the incomes of the parents and guardians of applicants (NSFAS 2020b).

Where there is household income in the application data, this has been reflected in the analysis below that the NSFAS clearly used this income data to make decisions about funding – the funding probabilities dropped very sharply at the respective eligibility thresholds in 2017 and 2019. This could mean that the NSFAS believed the income data that applicants reported, but it is also possible that the NSFAS had little choice other than to accept the information the applicants provided, without necessarily believing it was accurate.

Approved qualifications

The NSFAS 2017 Handbook (NSFAS, 2017: 32) indicates that only the first higher education qualification would be funded by the NSFAS. From 2018 onwards the NSFAS still only funded the first qualification but there was an exception for the one-year higher certificate programmes if students then proceeded to a degree or diploma (DHET, 2019). Higher certificate programmes have lower entry requirements than diplomas and degrees, and since socioeconomic status and high school performance are positively correlated, this aspect of the change in the policy is likely to have benefitted students from relatively low socio-economic backgrounds.

The analysis below shows a large increase in funded students enrolled in higher certificates in 2018 at UNISA only. One possible explanation is that, as noted above, UNISA allowed late applications (until 20 Feb 2018), and overenrolled students (above their DHET approved target). However, it is shown later when discussing the impact of the policy on inequality, that even in 2019 higher certificate enrolment did not increase at universities other than UNISA.

Institutional problems and challenges

The work on this report began in late 2020 and, as already described, it experienced some delays. In the interim, a number of issues have been reported in the public domain regarding institutional problems and challenges at the NSFAS. Those followed a period in which the NSFAS had been placed under administration (2018-2020). These institutional issues may explain some of the data challenges described above, as well as lack of clarity on how certain policies or positions were implemented in practice.

The most notable information in this regard emerged in 2023 in public reports and statements by the Special Investigating Unit (SIU). In 2022 the SIU was mandated by the President to investigate a range of issues at the NSFAS (Republic of South Africa 2022). In 2023 the SIU stated in Parliament that it was investigating 'undue funding' of over 40,000 students over the period 2018 to 2022, at an approximate total amount of R5.1 billion (PMG 2023). Although most public statements conflate them, there are two separable issues here: funding of students who should not have received NSFAS funds, and overpayment to institutions of amounts that were never subsequently paid on to students. Particularly notable for the purposes of the analysis in later sections of this report, is the statement

by the SIU that these "are students whose household income is above R350,000 and therefore would not qualify for NSFAS funding based on the funding rules" (SIU 2023).

Those findings may suggest that the problems at the NSFAS were a consequence of the very late announcement of the new funding policy at the end of 2017. However, as already noted, there is a substantial amount of missing household income for applicants in the 2017 NSFAS data received for the analysis, which suggests that there may already have been internal problems. That is consistent with the fact that the SIU investigation also found 'weak internal controls', 'weaknesses and flaws in IT systems', and misalignment between institutional and NSFAS lists of funded students. The NSFAS itself has noted a range of such problems (NSFAS 2021). All of which could explain some of the missing data, but also potentially raises concerns about the data that does exist.

Since the purpose of this report is an empirical analysis of questions of policy interest, rather than a forensic investigation, the data that exists is taken at face value. In the concluding remarks some possible implications of the SIU findings for the findings of the analyses, are briefly considered.

12.3 Brief description of the NSFAS data

The datasets obtained from the NSFAS included applicant level data for 2014-2019. For 2014-2016 only data on successful applicants was obtained, whereas for 2017-2019 data on both successful and unsuccessful applicants, was obtained. Also available were anonymised identifiers that enable linking applicants to HEMIS (for those who entered higher education) and to DBE NSC results for 2017-2019.

This section of the report provides a brief description of the number of individuals funded by NSFAS for 2014-2019, the total funding provided to these funded, individuals and the number of all applicants (successful and unsuccessful) for 2017-2019. These numbers broadly match those reported in official NSFAS documents, although there are some differences. The data obtained contain several other variables that are used in later parts of the report.

Table 16 below shows the number of funded individuals from 2014-2019, the total funding disbursed to these individuals, and the total number of applicants (successful and unsuccessful) in 2017-2019. The number of funded students more than doubled, with large increases between 2016 and 2017 and between 2017 and 2018, when the new policy was implemented. The figures differ from the official ones presented in NSFAS Annual Reports (shown in row 2), with the figures for 2016 and 2019 being somewhat below the official figures while the 2017 and 2018 figures are higher. Given the various concerns about NSFAS records no attempt was made to reconcile the figures or to explain the differences.

Administrative data on unsuccessful applicants was only available for 2017 to 2019. The number of applicants increased by nearly 50% over this period, whereas the number of funded students increased by around 30%. Row 4 shows the total funding disbursed to the funded students adjusted for inflation- this rose from 10.5 billion rands in 2014 to 27.6 billion in 2019- a 170% increase. Mean funding per student rose from R57000 to R71000, a 25% increase. The subsequent chapters investigate both funding amounts and who was funded.

Table 16: Descriptive Statistics from NSFAS Administrative Data: 2014-2019

	Year					
	2014	2015	2016	2017	2018	2019
Total Funded Students	183208	176866	214734	296464	364745	388590
(official figures)	186150	178961	225950	260002	346966	393767
Total Applicants				469818	577499	692219
Total Applicants/ Total Funded	0.00	0.00	0.00	1.58	1.58	1.78
Total funding (Billions)	10.49	10.38	13.13	18.47	23.97	27.63
Mean funding per student	57240	58668	61132	62317	65711	71103

Note: Own calculations from NSFAS, except official figures which are taken from NSFAS Annual Reports. Rand values deflated to Nov 2023 rands

13. The university funding formula and student outcomes

In seeking to empirically examine the potential impact of a new policy on an outcome or outcomes of interest, a general concern is the possibility of pre-existing trends in the variables of interest. One specific hypothesis as to why such trends may exist in the South African case is the incentive structure of higher education funding – an issue of interest in its own right. As discussed further below, the 'teaching output' component of the block grant system determines a significant proportion of public funding for higher education institutions. This potentially creates an incentive for these institutions to increase graduation rates. If that occurs, through whatever means, there could be a pre-existing trend in that variable - and associated variables - which could generate misleading results in an empirical analysis of policy impact.

The subsequent empirical analysis examines the possible effect of the new policy on student within-year performance and dropout rates. The original intention was to focus on graduation as one of the key outcome measures. However, the effect of the Covid-19 pandemic on society in general and the provision of higher education in particular, including institutional responses, means that 2020 graduation data is notably different from preceding years for all students. That undermines the usefulness of graduation as a measure of policy impact. As a consequence, alternative measures of student performance (credits completed) and dropout for a given year of study, are considered.

13.1 Conceptual model for funding formula analysis

The basic motivation for this aspect of the research is two-fold. Firstly, an interest in university optimising behaviour in response to incentives in the funding model, of which 'teaching output' and postgraduate output are two components; and secondly, a desire to check, ex ante, the robustness of any before-and-after econometric analysis of 'free higher education' by examining whether there may have been a pre-existing trend in student performance linked to institutional optimising behaviour on the relevant dimensions.

The specific hypothesis is that there may be a pre-existing trend of increased student throughput as a result of university optimising behaviour. The issue of performance funding linked to student outcomes has received some attention internationally (Rutherford and Rabovsky 2014; Hillman,

Tandberg, and Gross 2014). While there have been a number of analyses of the impact of research funding incentives in South Africa, similar such analyses of teaching 'output' incentives, have not been undertaken. This is despite the fact that the teaching output grant has ranged between 13.9% and 17.1% of the block grant total over the period 2008 and 2017, versus 12,3% and 13.5% for the research output grant over the same period . And as shown Figures 26 and 27, the teaching output component of block grant funding can be substantially more than the research output component in many institutions.

It is important to restate that adopting and developing this conceptual framework does not necessarily mean endorsing such an approach to higher education management. Indeed, if anything, the analysis is premised on a concern that institutions may react to incentive mechanisms in a manner that is contrary to the intentions of policy and the public interest (Muller 2022). The framework should be considered a hypothesis as to how institutions may respond to such incentives.

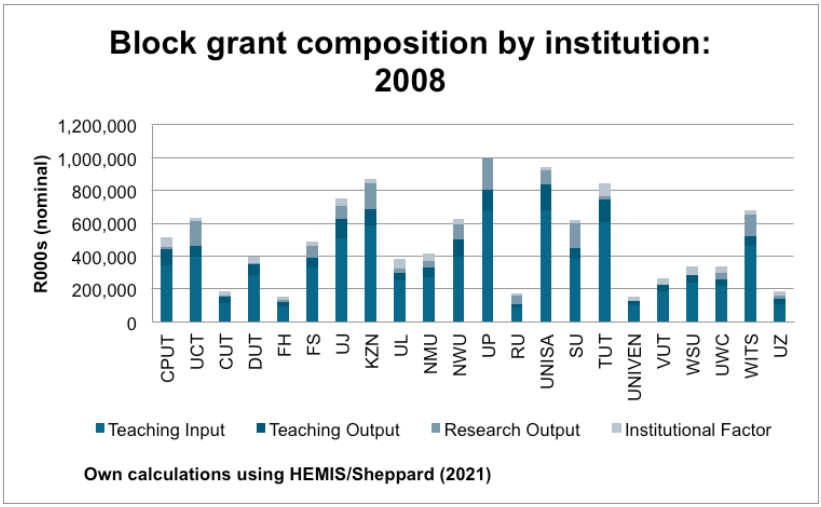

Figure 26: Components of block grant funding by institution (2008)

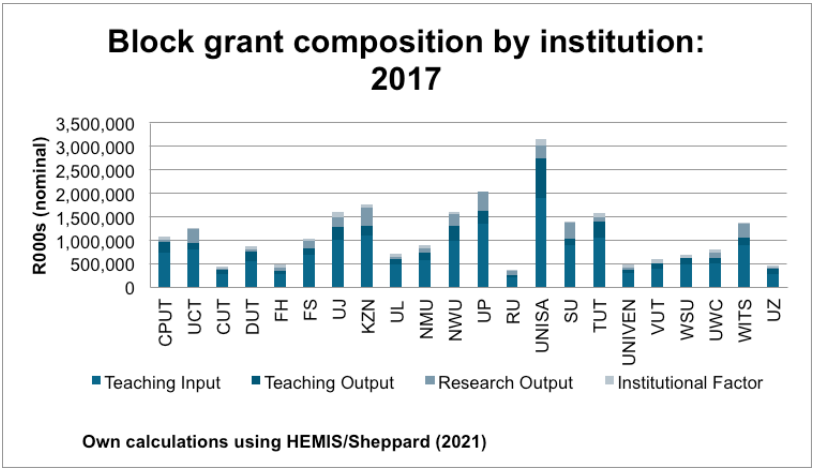

Figure 27: Components of block grant funding by institution (2017)

Assuming the quality of applicants to be exogenous, there are two main instruments available to universities to increase student throughput. The first one is improving the quality of support and instruction; and the second one is mechanically increasing pass rates (or lowering quality thresholds). It may not be possible to distinguish between these in the current research, but the difference is crucial for policy and public interest purposes.

As noted above, on average the teaching output grant consists of approximately 13.89-17.08% of universities' block grant allocation from government. Across institutions it varied from a minimum of 8.72% to a maximum of 26.75%. Furthermore, actual allocations are a function of the behaviour of all institutions: the allocation for teaching output, for instance, is a function of the proportion of output units a given institution contributes to the national total.

One may wonder whether these percentages are large enough for the teaching output component of funding to affect university behaviour to a significant degree. However, it is suggested that the logic of optimisation as working on marginal effects means that the implicit, but deliberate, incentives arising from this component of funding are pertinent to the analysis of institutional behaviour. Somewhat in support of that view, extant evidence suggests that the research output component has had a dramatic effect on the quantity of research output despite such funding ranging from a minimum of 0.64% to a maximum of 27.86% of universities' government block grant funding across institutions.

Given the structure of the funding formula, the university optimisation problem can be structured by first specifying a revenue equation and then considering which dimensions of this are subject to influence by actions by/within individual institutions.

The revenue equations are as follows:

$$Y_t = G_t + F_t + E_t \quad \#(1)$$

$$G_t = I_t + O_t + R_t + B_t \quad \#(2)$$

$$F_t = FA_t + NA_t \quad \#(3)$$

Where G is government funding, F is fee income, E is external ('third-stream') income, I is input grant, O is output grant, R is research grant, B is institutional block grant, FA is financial aid fee income (NSFAS) and NA is non-financial aid fee income.

For the present analysis, the focus is on G, but F may also be salient since where students are paying fees this may partially offset the incentive to get them through the system faster. E, is ignored because it is arguably disconnected from student intake, throughput, and graduation. Doing so does require assuming away a broader optimisation problem pertaining to the allocation of institutional resources and effort.

Given the concern with students, it makes sense to elaborate the university income equation accordingly:

$$Y_t = I_t(s_t\text{-}2) + O_t(s_t\text{-}2) + R_t(r_t\text{-}2),p_t\text{-}2) + B_t(d_t\text{-}2) + FA_t(s_t,p_t) + NA_t(s_t,p_t) + E_t \quad \#(4)$$

Where s represents undergraduate students, p represents postgraduate students, d represents students from designated historically disadvantaged groups, r represents accredited research units. The funding allocation in a given year is based on actual values for the relevant variables from two years prior, hence the lagged values used in the equation.

From here one must consider what control an institution has over these variables. The first dimension is admission decisions. Admissions are negotiated with the DHET, which negotiation informs I. Deviations are penalised, but to different degrees and this has varied over time. Those

agreements concern both the total number of student admissions and the composition of those according to CESM categories, but for penalties to date only the totals are considered. A second dimension is the composition of admissions in terms of privately and publicly funded students. If the two groups are charged the same fees, then what matters for university revenue will be how progression affects fee paying. For example, a privately funded student who fails a year may be more likely to pay to repeat the year then a non-private funded student who thereby fails to meet the NSFAS requirements for continued funding. But that may depend on the source of the private funding, such as family wealth versus a private scholarship or bank loan. A third dimension is historically disadvantaged status of students, since presumably universities have discretion in terms of how HDI status informs admission decisions. Finally, the institution can influence or control throughput rates. There are two aspects to that, as mentioned already above. One pertains to the actual quality of educational experience provided, ranging from instruction to learning materials, supplementary institutional funding for students and psychosocial support. The other pertains to the standards or criteria used to determine whether students pass or fail courses, as well as any other progression criteria.[82]

Given the variables that are subject to maximisation it is clear that one needs to account for costs as well: the number of students admitted to a university, and possibly the composition thereof, will (and should) have implications for institutional costs incurred. The optimisation problem can be presented, as institutional managers may perceive it, as it pertains to students in a similar way to the typical expression in economics for profit maximisation by firms:

$$\Pi = Y - C \quad \#(5)$$

In the context of the overall project, the concern is with how institutions' revenue optimisation might influence student throughput and success rates over time. In that sense, the concern would only be with $O_t(s_t-2)$, and $R_t(p_t-2)$ to the extent that it relates to postgraduate students. There is also some basis for being concerned with other components of the formula to the extent that they might influence the ex-ante probability of student success. For example, a university may

82 For example, one author of this paper observed pressure being placed by deans on heads of department, and then by heads of department on individual academics, to increase pass rates – especially for final year undergraduate courses. In the first case, pressure was placed on the author to raise the pass rate of a third year course. After the author and the external examiner declined to support this, the head of department indicated they would revise the marks upwards themselves. In the second case a head of department pleaded in a faculty board meeting that they could not increase the pass rate any further despite their best efforts. In both instances faculty-generated revenue was reported to be a key consideration. A worthwhile topic for a separate study would be to survey academics' experiences with such pressures in a more systematic way.

admit more students to increase I but this lowers the average quality of entrants, driving down success rates, and could therefore reduce O proportionally. Similar such dynamics may play out with FA, NA and B. To simplify matters for the purposes of a feasible analysis it will be necessary to make some strong assumptions about the presence or absence of such dynamics, which can then be interrogated to some degree, qualitatively or quantitatively, in the robustness analysis of this particular paper.

In order to add further depth it is useful to consider the matter in relation to a series of marginal decisions, and associated considerations, pertaining to a hypothetical individual student:

- Admitting an additional undergraduate student, s_i, with DHET's agreement secures a revenue stream of:

$$y_{i1}^{I} + \rho_1 y_{i2}^{I} + \rho_2 y_{i3}^{I} + y_{iT}^{I} \#(6)$$

Where ρt represents the probability of not dropping out and the last term represents the net present value of the discounted revenue stream based on the probabilities of the student completing after a given number of years.[83]

If the student pays their own fees then the additional revenue stream is[84]

$$y_{i1}^{FA} + \rho_1 y_{i2}^{FA} + \rho_2 y_{i3}^{FA} + y_{iT}^{FA} + \partial y_i^{O} \#(7)$$

The second-last term is the net present value of the discounted revenue stream based on the probabilities of the student completing after the prescribed number of years, and in the last term δ represents the probability a student will complete at all.

83 For the period covered in this analysis, the DHET would continue to pay the subsidy for enrolled students regardless of how long they have been in the system.

84 It may be that δ should also reflect the discount rate, in which case it would be the sum of the probability of completing in each year (from the intended date of completion onwards) multiplied by the discount factor for that year.

If the student has their fee subsidised and is subject to associated conditions, then the additional revenue stream is, instead:

$$y_{i1}^{NA} + \psi_1 y_{i2}^{NA} + \psi_2 y_{i3}^{NA} + \delta y_i^O \ \#(8)$$

Where ψt represents the probability of meeting the (NSFAS) requirements to obtain funding for year t +1.[85] It is assumed that a student receiving subsidised funding loses that if they do not complete in the prescribed time.

If the student is from a designated historically disadvantaged group then the institution receives additional revenue of $b_1 + b_2 + b_3$, which is the amount received as a result of having a higher proportion of such students. In reality the extent to which an individual student affects this, and therefore revenue, is likely to be extremely small.

Admission of an additional undergraduate student is expected to generate a cost stream of:

$$\rho_1 c_{i1} + \rho_2 c_{i2} + \rho_3 c_{i3} + c_{iT} \ \#(9)$$

The core revenue and cost streams arising from admission of an additional student may vary with the degree being studied or category thereof (CESM), however this is supposed to be reflected in the relative weights used in the enrolment planning process. If it is assumed that the input subsidy is proportional to marginal costs, th $y_{it}^I = \lambda c_{it}$.

Note that in not utilising additional notation to represent CESM categories it is assumed that the proportion of costs covered by the input subsidy is the same across all categories of study.[86]

In addition to admission decisions, the institution notionally can influence or determine some of the key parameters: ρt (probability of not dropping out), δ (probability of completion), ψt (the probability of meeting NSFAS requirements).

85 One could have different deltas for the two categories of students.

86 This appears to be the intention of the government's policy, so in effect the assumption in this instance is that the relative subsidies achieve that objective.

The above parameters are of course related and it is useful to make that explicit.

$$\psi_t = 1 - \rho_t - \beta_t \#(10)$$

$$\beta t = \bar{\beta}_t + \tilde{\beta}_t \#(11)$$

$$\delta = 1 - \sum_{t=1}^{T} (1 - \rho t) \#(12)$$

$$\rho_t = \bar{\rho}_t + \tilde{\rho}_t \#(13)$$

Where $\bar{\rho}_t$ represents exogenous causes of dropping out, $\tilde{\rho}_t$ represents endogenous causes (within the control/influence of the institution), β represents additional factors that influence attainment of NSFAS requirements and its subcomponents are exogenous ($\bar{\beta}_t$) and endogenous ($\tilde{\beta}_t$) respectively. Thus the university can affect outcomes through $\tilde{\beta}_t$ and $\tilde{\rho}_t$. One way is substantive improvement, the other is simply bureaucratic manipulation. The former requires resources and effort that may extend to large-scale institutional reorganisation and restaffing, the latter does not. In this framework, if the input subsidy corresponds to marginal costs then the admission decision per se is only relevant to the maximisation problem in as much as it indirectly affects other revenue components and parameters.

A note on postgraduate students

To accurately capture the subsidisation of postgraduate students requires a slight addition to the above conceptual framework: while postgraduate enrolment is funded through the teaching input subsidy, postgraduate output (graduation) is funded through the research output subsidy rather than the teaching output subsidy. This was reflected in (4) through the terms: O_t (s_{t-2}) and R_t (r_{t-2}),p_{t-2}). The former captures the revenue from undergraduate graduation while the latter captures research income that is a function of accredited research publication and postgraduate graduation.

The above analysis of cost and revenue streams associated with undergraduate admission carries-over to the postgraduate case. However, the key parameters are likely to differ. If it is again assumed that the teaching input subsidy covers a fixed proportion of costs that is consistent across qualifications and levels of study $y_{it}^{I} = \lambda c_{it}$, then the differences between undergraduates and postgraduates will be across two dimensions:

- value of the output subsidy
- probability of successful completion/graduation

All Ministerial Statements on Funding from 2015/16 onwards contain the clear statement of intention that, "The aim of [research output sub-block] grant is to fund actual research outputs and simultaneously incentivise increases in research outputs." However, while this has a fairly clear interpretation in the context of published research, the intended interpretation in relation to postgraduate students is less clear. Is it to encourage a shift to a higher enrolment of post-graduates, higher graduation rates, shorter time to graduation, or some combination of these?[87]

In relation to the value of the output subsidy, consider the following illustrative example: in 2018/19 the value of the teaching output subsidy per undergraduate student was R26,358, whereas the research output subsidy per postgraduate student was R81,276 for Master's research graduates and R243,828 (R81,276 x 3) per doctoral graduate. On the face of it, then, institutions may maximise revenue by altering the relative composition of undergraduate and postgraduate students. Given the assumption that the input subsidy covers the same proportion of costs for all categories of student, a greater share of postgraduate students is more lucrative.[88]

Completion rates vary widely across institutions, qualifications and categories of students. Aside from differences in the average graduation rate, differences in the overall distribution may also be important, but for the purposes of the present analysis a simplifying assumption that the mean captures the properties of the distribution that are important for the decision maker (revenue maximiser) is made. Given that, the incentives within the above framework evidently incentivise higher graduation rates and lower times to completion. As with undergraduates, that could in theory be achieved either by providing better quality education and student support, or through methods that effectively lower the threshold for graduation.

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87 The National Development Plan (Republic of South Africa 2012) set targets that required a dramatic increase in the number of doctoral graduates from 28 per million of population per year (as estimated at the time) to 100 per million. The most recent assessment by DHET (Khuluvhe and Netshifhefhe 2023) based on a recent tracer study of doctoral graduates (Mouton et al. 2022) suggests that the number increased from 36 per million to 59, but with growth in the number stagnating from 2016. However, the initiatives to increase doctoral graduates seem to have been external to block grant funding and successive ministerial statements make no mention of a link.

88 One of the researchers/analysts observed an instance in 2018 where a dean of a large faculty at a South African university explicitly stated in a faculty board meeting that they saw postgraduates as more financially lucrative and indicated that the faculty ought to reorient itself accordingly.

13.2 Methodological approach

The analysis proceeds in two parts. In the first part, aggregated funding data across institutions and years is examined, focusing on the final units utilised by DHET to calculate the block grant for teaching output. Using only descriptive statistics changes in this over time, with reference to earlier enrolment numbers, are examined. If institutions are seeking to maximise funding by increasing the student completion rate, this would have to reflect in the institution's teaching output unit numbers in order to be effective.

The second part of the analysis uses HEMIS data to look at aggregate student performance over time. Teaching output units are based on verified student completion, so it follows that – all else being equal – an increase in the output grant requires an increase in student completion rates (δ in the model of section 3.1). The overall completion rate will be a function not just of the probability of graduation from the third year onwards, but also dropout and progression rates from first year. In this manner, an overview of these different performance measures over the period of time for which there is data prior to the implementation of the new funding policy (2012 to 2017) and subsequently, are provided. Individual-level performance measures from the course-level data, are constructed. This allows identification of student course load and share of courses passed. Furthermore, enrolment across years are examined to identify dropout rates. Section 5 provides related analysis, but only on a narrower sub-sample of HEMIS students with linked NSC results – for reasons discussed there and in the preceding section on data challenges.

One complication in looking at student performance in higher education is that it is likely to be affected by the quality and effectiveness of students' schooling. A higher level of quality in schooling could lead to improved performance at university, while a lower level of quality in schooling may similarly be mirrored in declining university performance. Using matched data from National Senior Certificate results, the changes in the prior schooling performance of students admitted to higher education institutions are also examined.

In the analysis that follows – in this section and Section 14 – dropout is defined by students who exit without completing their qualification. Students may, however, return in subsequent years or may enrol at a different institution. The HEMIS data captures enrolment at a mid-year point, therefore students who initially enrol and subsequently drop out before the HEMIS census date

are classified as dropouts. The measure of dropout used in the analysis for this report, therefore, includes both those students who did not enrol at the start of the year and those who dropped out by the HEMIS census date. Given this, dropout can only be defined from year 2 onward as students who initially enrol in year 1, but dropout in the first half of the year do not feature in the HEMIS data that was obtained. For this reason, the estimated dropout rates are expected to be lower than those calculated by in DHET cohort studies (DHET 2022) – to the extent that those studies have more comprehensive data.

Descriptive analysis over time: institutions

First evidence at the level of institutions, is examined using official information on university funding allocations (HEMIS/Sheppard, 2021).

As discussed in earlier, universities are funded via block grants, one of which is the teaching output grant. In order to calculate the appropriate allocations to institutions, the DHET utilises a formula that aggregates teaching output units. Different degree types receive different weightings. For example, undergraduate diplomas of one or two years receive a weighting of 0.5, a standard three-year undergraduate degree receives a weighting of 1, and an honours degree year receives a weighting of 0.5. While this may create incentives for institutional revenue maximisation behaviour across degree types, for present purposes – and as in the formal model above – this is not examined any further as it has no direct bearing on student throughput per se.

University funding in year *t* reflects teaching and research outputs from year *t*-2 and the data is adjusted accordingly to reflect year in which the 'outputs' occurred. At the aggregate level, it is not possible to link 'inputs' (the students entering) and 'outputs' (students graduating) directly. This presents a challenge since only looking at graduation numbers could generate a misleading trend when overall enrolments are increasing or decreasing.

To address this a rough proxy of the actual ratio of graduates to enrolments is used, by dividing the teaching output units for year *t* by the teaching input units for year *t*-3. Then the change in that ratio over time and express it in percentage terms, is calculated. Figure 28 shows this calculated using all teaching inputs and outputs.

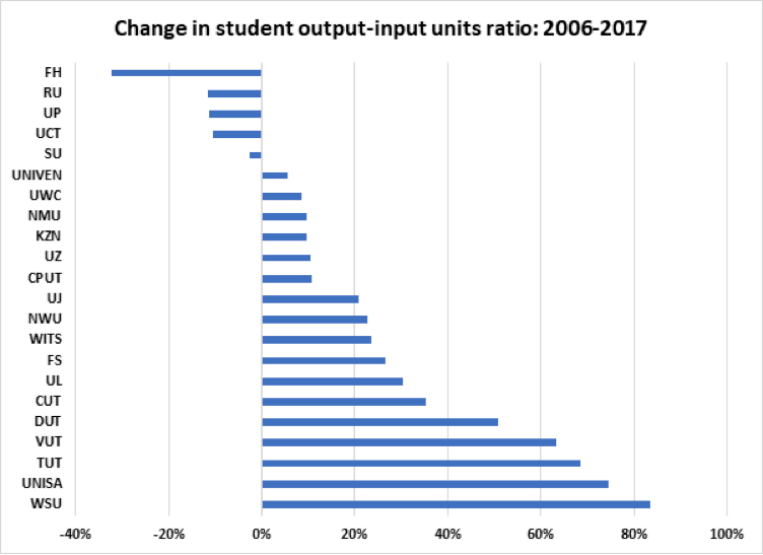

Figure 28: Change in teaching unit output-input ratio over time

A limitation of that approach is that, as already noted, teaching output units are weighted combinations of degree programmes of different lengths. Figure 29 therefore examines these trends only for the sub-sample of three-year qualifications. While the specific institutional values and positions change, the broad pattern remains the same, namely an apparent general – and sizeable – increase in student output relative to input.

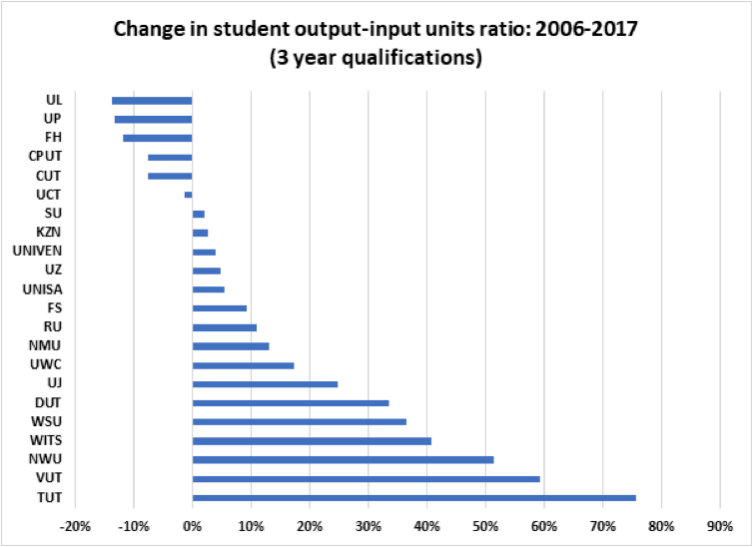

Figure 29: Change in teaching unit output-input ratio over time: 3 year qualifications

This pattern is consistent with the hypothesis that the funding formula incentivises institutions to increase student output. However, these changes are also consistent with other explanations – such as more selective admissions, better teaching and/or better support for undergraduates. More selective admission appears unlikely given the dramatic increase in enrolments over time and, as discussed below, an aggregate decline in school-leaving results or qualifications. Given institutional concerns about inadequacy of resources relative to growing intake, it also seems unlikely that better teaching and support could explain such large improvements, but it is not possible to rule those explanations out entirely.

Figure 30 presents a visual comparison of the share of institution block grant coming from teaching output units (in 2006) and the subsequent change in the proxy for conversion of teaching input units to teaching output units. It shows no clear relationship between the two. On the one hand, one might intuitively expect that institutions more reliant on the TOU would be more likely to increase teaching outputs if engaging in optimising behaviour. However, as discussed in Section 0, optimisation is driven by marginal gains. A more comprehensive analysis of this relationship is warranted but was not possible within the time available for the present analysis and is left for subsequent work.

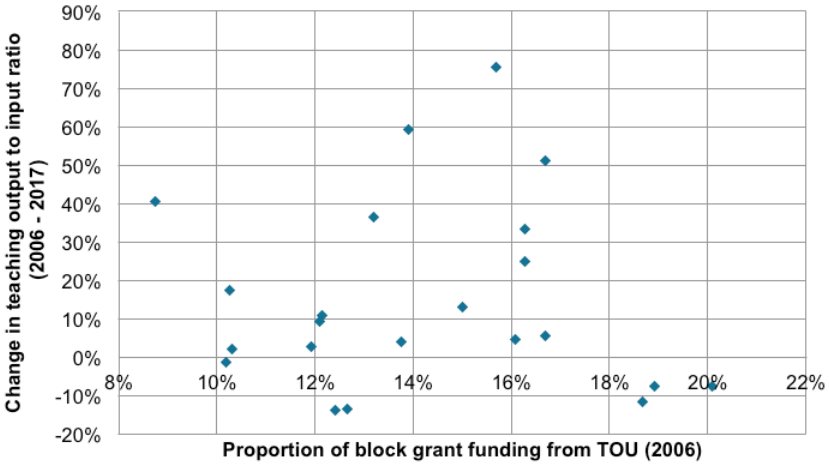

Figure 30: Comparison of teaching output conversion ratio with TOU block grant share

Descriptive analysis over time: students

As a second form of analysis, the individual-level data from HEMIS is examined, but initially aggregating this over time. In principle that provides a more direct resolution to the problem above, where using the ratio of teaching 'outputs' to teaching 'inputs' is only a rough proxy for the actual outcome of interest: individual performance and graduation rates. For this project only individual-level HEMIS data from 2012 onwards was available, with the result that the individual-level results are not directly comparable to the institution-level results. However, the findings are supplemented with discussion of those from the latest cohort study provided by DHET which utilises data back to 2000 (DHET 2022).

Higher education performance

As a first attempt to examine whether there has been a significant change in student completion rates over time, the focus is on comparison of aggregate changes for 2012 against those of 2017. The reason for using these two years is that 2012 is the earliest year for the HEMIS dataset obtained, while 2017 was the last year before the implementation of the new student funding policy. Nevertheless, since the dataset is to 2020 the statistics for the full sample (2012 to 2020), are presented.

Aside from time period, another key difference from the preceding institution-level analysis is that it is possible to distinguish between types of study using individual-level data. This is also important to the extent that the focus in this report is on a particular subset of undergraduate students in traditional universities studying for full-time, traditional undergraduate degrees. These changes are therefore examined for different subsamples of the HEMIS data.

Undergraduate students in contact, full-time degree and diploma programmes

The first subsample is limited to contact, full-time students. Along with removing duplicates and other data cleaning, this reduces the dataset to 4,527,578 observations from 8,777,572.

Table 17 shows the average percentage of qualification credits completed by year of study and calendar year. Recall that the focus is on the period 2012 to 2017, prior to the policy change - the later years are included for completeness. From 2012 there is an increase in the proportion of qualification credits completed in the first year of study, but a decline in the second and third years. The same pattern is also visible for the subsequent period with the exception of 2020, where the patterns for 2nd, 4th and 5th years change. As it has already been noted, 2020 is likely to be an outlier due to Covid-19.

Table 17: Percentage of qualification credits completed

Year	Year since started qualification					
	1	2	3	4	5	Total
2012	0.252 150115	0.249 99151	0.250 81046	0.195 48490	0.147 17232	0.239 396034
2013	0.245 165468	0.238 109644	0.240 87711	0.191 52711	0.147 22475	0.231 438009
2014	0.248 175416	0.237 109357	0.241 90891	0.199 53853	0.152 22157	0.233 451674
2015	0.251 189454	0.240 110713	0.243 83264	0.204 53637	0.154 20942	0.237 458010
2016	0.258 190883	0.245 128557	0.246 91419	0.201 52763	0.151 19635	0.242 483257
2017	0.261 195288	0.241 126909	0.241 102609	0.196 56961	0.146 21813	0.240 503580
2018	0.265 198073	0.241 132264	0.241 104601	0.192 63113	0.144 23475	0.240 521526
2019	0.273 200246	0.236 138075	0.235 108178	0.188 65881	0.138 25925	0.239 538305
2020	0.279 190861	0.256 140848	0.250 115520	0.196 69781	0.145 28287	0.249 545297
Total	0.260 1655804	0.243 1095518	0.243 865239	0.196 517190	0.147 201941	0.239 4335692

The trend is suggestive but mixed and no strong conclusion can be drawn. That is further corroborated by the results in Table 18, which shows the proportion of total credits passed over time by year of study. The pattern there is broadly one of increases over the period, but only after an initial decline from 2012 to 2013.

Table 18: Percentage of total credits passed

Year	Year since started qualification					
	1	2	3	4	5	Total
2012	0.768 150209	0.800 99176	0.821 81042	0.813 48397	0.774 17177	0.793 396001
2013	0.731 165542	0.776 109598	0.808 87680	0.800 52614	0.753 22391	0.767 437825
2014	0.741 175385	0.782 109299	0.815 90815	0.813 53749	0.765 22071	0.776 451319
2015	0.757 189304	0.793 110611	0.819 83129	0.825 53469	0.778 20839	0.786 457352
2016	0.763 190193	0.804 128465	0.826 91296	0.820 52605	0.766 19553	0.792 482112
2017	0.759 194401	0.789 126823	0.815 102425	0.812 56504	0.752 21504	0.784 501667
2018	0.761 197599	0.788 132173	0.809 104437	0.801 62732	0.743 23131	0.782 520072
2019	0.763 199974	0.786 137711	0.804 107887	0.793 65587	0.721 25678	0.779 536837
2020	0.793 190831	0.838 140810	0.853 115460	0.834 69546	0.766 27973	0.821 544620
Total	0.760 1653438	0.796 1094666	0.819 864171	0.812 515203	0.756 200317	0.787 4327795

The above tables examine in-year performance, which must contribute to successful degree completion, but which ultimately is a proxy for that. To examine it more directly the proportion of students from a given cohort graduating in minimum time, is calculated. Minimum time is relative to the degree type and so should also provide a more accurate picture of any aggregated trends over time. These results, in Table 19, are more directly consistent with the findings from the aggregated institution-level changes from the funding data: a sizeable increase of five percentage points from 2012 to 2017, which equates to an increase of approximately 17%.

Table 19: Proportion of cohort graduating in minimum time

First year of study	Graduated within the min time specified		
	No	Yes	Total
2011	202639 71.23	81841 28.77	284480 100.00
2012	323517 70.75	133732 29.25	457249 100.00
2013	313543 69.82	135512 30.18	449055 100.00
2014	322871 68.15	150882 31.85	473753 100.00
2015	348095 66.60	174538 33.40	522633 100.00
2016	348443 67.73	166053 32.27	514496 100.00
2017	333357 66.48	168051 33.52	501408 100.00
Total	2192465 68.45	1010609 31.55	3203074 100.00

Finally, dropout rates over time are examined. The implication of 'profit' maximisation by institutions for dropout is less clear than for completion or progression rates. In theory, a student dropping out simply creates a space, within an institution's enrolment plan, for admitting an additional student. In that sense it is 'profit neutral'. However, for two students with identical *ex ante* graduation probabilities, the dropout of the first reduces the expected graduation year (and therefore teaching output subsidy received) by a year. Yet as a student stays in the system beyond the minimum graduation time, the conditional probability of their graduating falls and it could be 'optimal' for institutional revenue for the student to drop out and be replaced by one with higher probability of graduation.

With these complexities in mind, Table 20 shows a declining dropout rate over time for the first four years of study and increasing rate for the fifth year. Note that dropout information used is from 2013 onwards (rather than 2012) because information on dropouts as derived from HEMIS is only available from the year after the first year of study.

Table 20: Proportion of students dropping out

Year	Year since started qualification					
	1	2	3	4	5	Total
2013	0.103 165935	0.067 109944	0.062 87977	0.069 53159	0.076 22959	0.080 439974
2014	0.102 175764	0.071 109651	0.057 91123	0.066 54301	0.090 22674	0.080 453513
2015	0.101 189759	0.065 110968	0.065 83508	0.060 54041	0.086 21438	0.080 459714
2016	0.093 191176	0.050 128760	0.046 91612	0.052 53167	0.070 20065	0.067 484780
2017	0.093 195565	0.059 127194	0.041 102767	0.058 57368	0.086 22269	0.070 505163
2018	0.081 198529	0.054 132477	0.052 104744	0.053 63467	0.083 23822	0.065 523039
2019	0.080 200497	0.058 138379	0.052 108410	0.065 66283	0.084 26376	0.067 539945
2020	0.095 191087	0.069 141088	0.065 115712	0.080 70207	0.133 28775	0.082 546869
Total	0.093 1508312	0.061 998461	0.055 785853	0.063 471993	0.090 188378	0.074 3952997

Undergraduate students in contact, full-time traditional undergraduate degrees and universities

The second subsample reduces the dataset to only traditional undergraduate degrees (three or four year) and traditional and comprehensive universities (as opposed to universities of technology). This reduces the sample to 2,079,781 observations.

Table 21 to Table 24 reproduce the ones above for this, more focused, sample of higher education students. While the levels of the various outcomes differ, the findings are broadly the same. For example, for this sample the proportion of student graduating in minimum time is higher to begin with (in the 2011 cohort): 36.24% versus 28.77% in the larger sample. However, the trend is approximately the same: an increase of 15% in the proportion graduating in minimum time between the 2011 and 2017 cohorts.

Table 21: Percentage of qualification credits completed (2012 to 2017)

Year	Year since started qualification					
	1	2	3	4	5	Total
2012	0.213 73584	0.232 43486	0.244 37653	0.204 21095	0.152 7495	0.220 183313
2013	0.204 76566	0.222 51419	0.236 39941	0.202 25059	0.151 9184	0.212 202169
2014	0.208 82083	0.220 47944	0.233 44565	0.207 25530	0.156 10066	0.213 210188
2015	0.210 80634	0.227 53456	0.233 38235	0.213 28595	0.161 10264	0.217 211184
2016	0.210 89900	0.229 54756	0.239 44340	0.205 25998	0.150 9186	0.217 224180
2017	0.210 93492	0.224 57237	0.234 44532	0.197 28139	0.142 10288	0.214 233688
2018	0.211 95680	0.224 59997	0.233 46825	0.196 28227	0.139 11060	0.213 241789
2019	0.211 96274	0.223 62885	0.231 48677	0.195 29938	0.135 10518	0.213 248292
2020	0.222 94796	0.239 64074	0.246 52897	0.204 31643	0.149 11701	0.226 255111
Total	0.211 783009	0.227 495254	0.237 397665	0.202 244224	0.148 89762	0.216 2009914

Table 22: Percentage of total credits passed (2012 to 2017)

Year	Year since started qualification					
	1	2	3	4	5	Total
2012	0.786 73584	0.815 43485	0.845 37651	0.858 21094	0.831 7494	0.815 183308
2013	0.755 76565	0.792 51417	0.831 39940	0.845 25058	0.813 9180	0.793 202160
2014	0.773 82082	0.795 47942	0.835 44564	0.850 25529	0.822 10066	0.803 210183
2015	0.788 80634	0.813 53456	0.838 38234	0.861 28592	0.831 10254	0.815 211170
2016	0.790 89900	0.819 54756	0.845 44340	0.851 25997	0.813 9186	0.816 224179
2017	0.782 93492	0.806 57237	0.831 44532	0.840 28139	0.784 10286	0.804 233686
2018	0.778 95680	0.804 59997	0.828 46825	0.832 28227	0.776 11056	0.800 241785
2019	0.781 96274	0.805 62884	0.830 48672	0.833 29937	0.772 10513	0.802 248280
2020	0.824 94796	0.860 64073	0.874 52895	0.871 31641	0.826 11698	0.849 255103
Total	0.785 783007	0.813 495247	0.840 397653	0.849 244214	0.806 89733	0.811 2009854

Table 23: Proportion of cohort graduating in minimum time (2012 to 2017)

First year of study	Graduated within the min time specified		
	No	Yes	Total
2011	81947	46581	128528
	63.76	36.24	100.00
2012	141797	80056	221853
	63.91	36.09	100.00
2013	130012	75891	205903
	63.14	36.86	100.00
2014	136399	89697	226096
	60.33	39.67	100.00
2015	129804	92670	222474
	58.35	41.65	100.00
2016	141711	95154	236865
	59.83	40.17	100.00
2017	135153	96888	232041
	58.25	41.75	100.00
Total	896823	576937	1473760
	60.85	39.15	100.00

Table 24: Proportion of students dropping out (2013 to 2017)

Year	Year since started qualification					
	1	2	3	4	5	Total
2013	0.085 76754	0.052 51509	0.043 40029	0.038 25196	0.055 9324	0.061 202812
2014	0.085 82309	0.071 48035	0.042 44656	0.044 25653	0.055 10214	0.066 210867
2015	0.086 80818	0.053 53528	0.055 38319	0.036 28722	0.056 10424	0.064 211811
2016	0.064 90143	0.049 54840	0.033 44404	0.038 26089	0.049 9341	0.051 224817
2017	0.075 93718	0.047 57327	0.035 44581	0.036 28244	0.055 10404	0.055 234274
2018	0.065 95880	0.048 60066	0.038 46887	0.042 28345	0.060 11192	0.053 242370
2019	0.068 96446	0.050 62950	0.043 48735	0.045 30019	0.071 10633	0.056 248783
2020	0.077 94961	0.062 64098	0.053 52948	0.061 31743	0.091 11902	0.067 255652
Total	0.075 711029	0.054 452353	0.043 360559	0.043 224011	0.062 83434	0.059 1831386

Schooling performance

One factor that could affect performance in higher education is the quality of prior schooling and school-level achievement. And a good, consistent proxy for achievement should be school-leaving results. If that is the case, then all else being equal it would be expected that an upward trend in schooling achievement would be associated with a subsequent upward trend in higher education outcomes. Alternatively, if a downward trend in schooling achievement of those entering higher education is accompanied by an upward trend in higher education performance then that may reflect a change occurring within the higher education system.

To examine this, the HEMIS data discussed above was linked with data on National Senior

Certificate (NSC) schooling results, in order to examine trends in the schooling performance of students who enter the higher education system. Some caveats are in order. Students who wrote non-NSC examinations, such as the Independent Examination Board (IEB) examinations are excluded from the resultant sample. Furthermore, entrants to the higher education system who completed the NSC prior to 2011 will also not be in the resultant sub-sample.

Table 25 suggests a downward trend in the average subject mark of students in higher education, from 66.52% for first years in 2012 to 63.82% in 2017 (the period of focus in this analysis) and down to 60.79% in 2020. The lower sample sizes in earlier years reflect the fact that some NSC students do not enter higher education immediately after schooling and therefore because the NSC sample starts in 2011 the match rate grows over time.

Table 25: Subject average from NSC examination: undergraduates in full-time, contact study

Year	Year since started qualification					
	1	2	3	4	5	Total
2012	66.52 54014					66.52 54023
2013	64.33 90732	67.43 41153				65.46 133734
2014	64.12 120165	65.06 66748	68.34 37839			65.20 226419
2015	63.52 137980	65.48 82687	65.59 54252	68.88 24083		64.91 299944
2016	63.90 150903	64.38 100514	65.63 71410	65.94 35696	68.13 8509	64.66 367032
2017	63.82 160952	64.25 105254	64.69 83236	65.46 45405	65.78 14954	64.36 409801
2018	63.62 168083	64.14 112204	64.43 88810	64.70 52293	65.14 18768	64.11 440158
2019	63.51 173215	63.81 120157	64.26 93789	64.49 56891	64.24 21489	63.89 465541
2020	60.79 104042	63.72 124534	63.98 102162	64.19 61480	64.04 24630	63.14 416848
Total	63.64 1160086	64.47 753260	64.95 533347	65.26 277515	65.14 89292	64.32 2813500

As above, the sample is reduced further to a sub-sample of students who were registered for traditional undergraduate degrees at traditional universities. Unsurprisingly, given the higher entrance requirements, these students have higher averages overall. A similar trend is present across years. For first years the subject average declines from 70.29% to 67.98% in 2017 and 64.19% in 2020. For third years, the subject average declines from 72.15% to 69.66% and 68.72% respectively.

Table 26: Subject average from NSC: students in full-time, contact, traditional undergraduate degrees and universities

Year	Year since started qualification					
	1	2	3	4	5	Total
2012	70.29 29816					70.26 29852
2013	68.54 43322	71.32 23121				69.70 68306
2014	67.85 57055	69.77 30910	72.15 22427			69.38 112064
2015	67.70 61347	69.60 39975	69.96 25994	72.38 15350		69.20 143611
2016	67.86 72545	69.36 43209	69.65 34647	70.27 18374	72.88 4912	68.99 173687
2017	67.98 77771	68.85 47164	69.66 35847	69.29 22555	70.92 7442	68.78 190779
2018	67.69 81195	68.94 50428	69.22 39101	69.44 23220	69.86 8919	68.59 202863
2019	67.42 82624	68.40 53622	69.26 41065	69.22 25508	70.28 8677	68.36 211496
2020	64.19 46211	68.12 54995	68.72 45263	69.07 27175	69.96 10100	67.52 183744
Total	67.64 551886	69.08 343445	69.66 246208	69.84 133864	70.70 40999	68.71 1316402

These findings do not support the notion that downward trends in dropout and upward trends in graduation in minimum time are explained by improving student preparedness or calibre.

13.3 Discussion

The above analyses are based on individual-level data but aggregate that for the purposes of comparison over time. An alternative, which in principle should enable greater confidence in the interpretation, is multivariate analysis that statistically tests for the significance and magnitude of a time effect on student performance (outcomes) while simultaneously 'controlling for' other factors such as school performance. Such analysis is not straightforward, however, due to the potential complexity of the underlying causal dynamics. For example, if universities target efforts to increase graduation or reduce dropout at students with weaker schooling backgrounds, controlling for schooling may in a multivariate regression may generate misleading coefficients on the variable of interest (time). Due to such concerns, the application of more complex methods was not undertaken.

The model in subsection 13 formalised the incentive for higher education institutions and/or institutional managers to increase student graduation in order to maximise revenue and 'profit'. The descriptive statistics in showed, using a rough proxy for the conversion of teaching inputs into teaching outputs, that there has been a sizeable increase in this conversion rate over time for many institutions. There is not, however, a simple or clear relationship between the proportion of funding received from the teaching output grant and such changes. The direct analysis of student performance finds no clear trend in intermediate measures of student performance such as proportion of credits passed. However, it does find evidence of increases in graduation in minimum time, which is the key performance measure in terms of the model. The decline in dropout rates is also consistent with the hypothesis of the analysis for this report.

Furthermore, cohort studies undertaken by the DHET over longer periods of time – back to 2000 – show that both these trends already existed in the period prior to that covered by the data used in the analysis for this report (DHET 2022). For example, the dropout rate for students in contact undergraduate 3- and 4-year qualifications in third year dropped from 32.9% in 2002 to 19.2% in 2011. Cumulative graduation rates by 5th year of study increased from 42.9% in 2001 to 59% by 2011.

The analysis also shows a declining trend in schooling performance of students entering higher education. Qualitative information suggests that schooling quality may also have declined over time – at least on some dimensions. Or at least that it has become less useful as an indicator of preparedness and/or suitability for university studies. This is reflected in the increasing reliance by many universities on the National Benchmark Test (Yeld 2007). If that is the case, then the improvement in dropout and graduation is, counterfactually, even larger.

All of the above suggests that the potential of the teaching output grant causing increases in performance unrelated to substantive educational improvements is a concern. For the narrower purpose of the policy impact analysis, it means there exists a pre-existing trend which could confound naïve estimates. Section 5 examines that possibility in greater detail.

14. An inequality analysis of the new funding policy

14.1 Introduction

This part of the report presents the analysis aimed at assessing the impact of the 2018 "free higher education" policy on inequality, broadly conceived. This is important given the critique that higher education students are privileged in terms of employment and income opportunities compared to young people not in education, employment and training – and in that context free higher education would result in increased inequality. Calculating the impact on inequality rests on using the distribution of funding across household income to infer the change in fiscal incidence, and therefore inequality. The methodology is, therefore, empirical but descriptive since causation is not in question.

A review of the literature in this area is presented first, and followed by a framework to analyse the potential impact of the new policy, including in relation to alternative approaches. Thereafter, the datasets used are described, namely data from Statistics South Africa's General Household Survey (GHS) and administrative data from NSFAS, HEMIS and NSC results from the Department of Basic Education (DBE). The GHS is used to describe the household income distribution, and to compare it to the old and new NSFAS household/family income thresholds and show the position of households containing public university students relative to households without such students. In

doing, a form of fiscal incidence analysis[89] is undertaken. Subsequently, the NSFAS, HEMIS and DBE NSC data are used to provide some conclusions about the impact of the new policy on who was funded and how much funding was received.

14.2 Literature review

Previous research on the targeting of tertiary education spending in South Africa

The extent to which tertiary education spending in South Africa is targeted at high or low-income individuals is an important question and has been addressed in several papers. These include van der Berg (2005), van der Berg (2009), World Bank (2014) and (Inchauste *et al*. 2017). These studies used household surveys to examine where the students who reported studying at public tertiary education institutions fell in the income distribution. Van der Berg (2005) used the IES 2000, van der Berg (2009) used the IES 2005 and the GHS 2005, whilst (Inchauste *et al*. 2017) and the World Bank (2014) used the 2010/2011 Income and Expenditure Survey. The conclusion from these papers is that higher education spending is not pro-poor, in the sense that enrolment rates are higher in households with higher per capita income levels. The World Bank (2014) estimated that half of the benefits of higher education spending for students go to students from households in the top decile (top 10%) of the per capita income distribution, and two thirds of the benefit goes to those in the top quintile (top 25%).

All of the South African studies cited make the simplifying assumption that the amount of higher education subsidy per student is the same for all students. But in Germany (Barbaro 2002) and the United States of America (Choy and Berker 2003), the finding is that the poor obtained larger amounts of state subsidies than the rich, and that this is an important part of the discussion about the extent to which state higher education spending is targeted at lower income households. This question is addressed in the analysis below for both the old (in 2017) and new (in 2019) NSFAS funding policies.

The South African papers cited above focus on public spending on tertiary education in general. However, the focus in this analysis is on NSFAS funding explicitly targeted at higher education

89 For a description of what a more comprehensive fiscal incidence analysis involves, see *Inchauste et al*. (2015).

students from relatively low-income families. A key tension to be explored is that while the rhetorical case for expanding the NSFAS funding was that it would benefit 'poor and working class students', the key change in 2018 was to expand the income eligibility threshold from R122,000 to R350,000 in family income, which the DHET itself believed would increase eligibility to households above the 90th percentile of the household income distribution. None of the extant scholarly analyses of class in South Africa would classify the top decile as 'poor' or 'working class' (Muller 2006; Nattrass and Seekings 2008; Schotte, Zizzamia, and Leibbrandt 2018). In the analysis below, survey data is used to examine where in the household income distribution these thresholds were in practice, basing the analysis on the previous South African studies mentioned above, but using newer data from the General Household Survey. The results are not directly comparable to the older studies because this analysis uses household income and not household income per capita. The reason for this is because the NSFAS income thresholds are expressed in terms of total family or household income – as discussed in Section 2. Using household income will make larger families seem better off than they would be if per capita income was used, and since, on average, larger families have lower income per capita, this means that the benefits accruing to students at the bottom of the household per capita income distribution will be over-estimated.

Both the World Bank (2014) and van der Berg and Moses (2012) acknowledge that the household surveys may produce an inaccurate picture of the family income levels of students if some are surveyed away from their families of origin, which the researchers argue may make them appear poorer than the households that they come from. However, these papers do not acknowledge that the household surveys used in these fiscal incidence studies specifically exclude students in university residences by design, and while van der Berg (2009) acknowledges that the surveys produce biased estimates of the number of tertiary students when compared to administrative data, he does not mention that this bias is likely to be downwards, because residence students are excluded by design in Stats SA household surveys. The missing higher education students may be from higher or lower income households than the students interviewed in the surveys, and so taking these students into account may either strengthen or weaken the argument that state spending on higher education benefits mostly high-income students. This issue is examined in the analysis below.

Finding the budget to pay for the large increase in NSFAS funding

Strictly speaking, a comprehensive assessment of the inequality impacts of a policy change like

the free higher education policy requires examining not only the distribution of expenditure but also where those resources came from. All else being equal, a new expenditure programme could be financed through increased taxes, reductions in expenditure on other programmes, or increased debt. Each of which has implications for the overall societal distribution of costs and benefits. An analysis of such considerations is outside the scope of this report.

Nevertheless, it is noted that there are indications that the increase in funding for the NSFAS was partly financed by cutting expenditure to other programmes, tax increases and larger increases in public debt. For example, Msimango (2019) quotes an unnamed National Treasury representative as saying "In order to get most of the money to fund [NSFAS] last year [2018], the budgets for other departments had to be cut. We took a lot of money from school infrastructure budgets…It's easier to cut spending programmes which have only been planned but not yet implemented. The school infrastructure budgets which were cut were for schools which were intended to be built because nobody needed to be fired, nobody was affected." Williams (2021) links the increase in VAT from 14% to 15% announced in February 2018 to the new 2018 NSFAS policy. In practice, it is hard to corroborate such claims because of the complexity of public budgets and the absence of very specific, official information on why a given budget item was reduced or taxation measure introduced. It is nevertheless important to highlight such considerations because of the findings in this part of the report, which suggest that, as was to be expected from the design of the policy, a large share of the increase in NSFAS funded students came from households towards the top of the income distribution and these students received more funding, on average, than students from lower income households. If it were true that a portion of the additional funds for NSFAS came from a broad tax like VAT and the reduction in expenditure on infrastructure for public schools, that would compound the inequality implications of the policy change.

A Sub-optimal policy by design

The stated intention of the 'free higher education' policy was improving access for poor, working class and missing middle students. Official statements emphasised the first two groups: the original announcement by former President Zuma used the phrase 'poor and working class' fourteen times. It specifically stated that:

- *Noting our nation's staggering levels of income inequality and considering the definition of Poor and Working Class Students that has remained stagnant and outdated despite the escalating cost of living and studying, and in order to maximize the developmental impact of our pro-poor higher education policies, the definition of poor and working class students will now refer to "currently enrolled TVET Colleges or University students from South African households with a combined annual income of up to R350,000" by 2018 academic year. The Minister of Higher Education and Training shall revise this quantum periodically in consultation with the Minister of Finance.*

- *Having amended the definition of Poor and Working class students, government will now introduce fully subsidised free higher education and training for poor and working class South African undergraduate students, starting in 2018 with students in their first year of study at our public universities. Students categorised as poor and working class, under the new definition, will be funded and supported through government grants not loans.*

- *NSFAS packages already allocated to existing NSFAS students in their further years of study will be converted from loans to 100% grants effective immediately.*

- *This policy intervention will enable government to extend fully subsidized free higher education to youth from well over 90% of South African households.*

As noted by Muller (2018), this presents an apparent contradiction. The NSFAS threshold for household income for 2017 was R122,000 and the policy increased that to R350,000 from 2018 onwards. While it is clear that the real value of the threshold had eroded over time due to rising inflation in consumer and higher education prices, only a smaller adjustment was needed to remedy that. In effect, the policy remedied the previous failures to increase the threshold and went further by substantially expanding the eligible group. To understand the contradiction it is useful to consider prior studies that sought to define or identify household income levels linked to being in poverty or being 'working class'.

While neither the term 'poor' nor the term 'working class' can be defined in an entirely objective way, some empirical and conceptual definitions are more consistent with typical

usage and actual data than others. For example, the official poverty lines published by Statistics South Africa (Stats SA) for 2018 utilise different definitions of poverty to estimate poverty lines that ranged from R547 to R1,183 per person per month, implying household poverty lines of R2,735 to R5,915 per month for a household of five persons.[90] That translates into a household income definition of poverty of R32,820 to R70,980 per year for a household of five. Budlender, Leibbrandt, and Woolard (2015) previously proposed using the upper bound household poverty line to define poverty, and the value estimated was R1,042 per person per month in 2011 Rands. That amounts to roughly R120,000 in household income for a household of five people, at the end of 2023.

The definition of 'working class' may be even more open to interpretation and contestation than that of 'poor'. Nevertheless, there is a large body of literature on approaches to defining class categories. One reasonably consistent aspect of this literature consists of distinguishing the working class from the 'middle class' and the 'upper class' or elite. A study using data from the South African National Income Dynamics Study (NIDS) sought to define class categories with reference to the probability of transitioning into poverty (Schotte, Zizzamia, and Leibbrandt 2018). The median expenditure per person per month for those defined as 'middle class' was equivalent to approximately 5,393 in 2023 Rands, which is approximately R240,000 in household expenditure in 2018 Rands[91]

These studies suggest that even before the policy was implemented the empirical evidence showed that (a) the existing threshold of R122,000 covered all those households categorised as 'poor' even using higher ('upper bound') poverty lines; and (b) the new threshold of R350,000 would go substantially beyond the median household income (expenditure) of the 'middle class'.

Increased access to higher education can be seen as good in-and-of itself. However, since reducing inequality was one of the primary stated motives for the policy, it seems appropriate to examine in what sense, if any, the policy was indeed inequality reducing. To do so, data available is used to empirically examine the broader question: how were the benefits of the policy distributed across household income categories?

90 Reference to household of five is made here because that is approximately the average size of a poor or 'chronically poor' household (Budlender, Leibbrandt, and Woolard 2015; Schotte, Zizzamia, and Leibbrandt 2018).

91 This is likely an overestimate since such households have lower average household size than five. The reason for converting to 2018 Rands is that this corresponds to when the policy was implemented.

Prior to the empirical analysis that examines the actual distribution of benefits in practice, it is useful to examine whether the policy was optimal from a theoretical perspective. In other words, was the policy adopted the most inequality reducing option available given the resources provided? To address this a fixed resource envelope is assumed and then a question on whether those resources could have been allocated to actual or potential students in a way that would have been more progressive is asked, where progressiveness is defined as allocating a greater proportion of funds to students from lower income households. Greater progressiveness would imply a less unequal distribution of resources and therefore better serve the stated objective of the policy. In this sense, no position is adopted or proposed regarding what would be normatively desirable for South African society. The policy is assessed by the criteria that were presented as justification for it.

Even before examining what evidence exists for the policy's effect, two apparent contradictions between its objectives and its design, can be identified. First, prior to 2020 the vast majority of young adults received very little social or economic support from public funds, while those in higher education received substantial fiscal resources – directly and indirectly (Inchauste *et al*. 2017). Indirect benefits relate primarily to the subsidisation of higher education institutions by the state – as described earlier. Increasing the resources allocated to individuals within the higher education system would therefore increase the gap between those receiving resources and those who did not. Second, the staggered introduction of the policy had implications for the progressiveness of the resource allocation that do not appear to have been adequately considered. The approach taken was to fully implement the policy for new first years, then extend it to second years and third years in subsequent years. That effectively amounted to disregarding the challenges faced by inadequately resourced students who were already in the higher education system.

The effect of increasing inequality among the youth was, therefore, essentially inevitable given the decision to allocate limited fiscal resources to higher education while largely keeping the number of students constant. However, there was still scope to allocate those resources in a manner that was more or less progressive within the population of students in higher education. To see why the approach taken was sub-optimal from an inequality perspective, it is informative to compare it to a counterfactual alternative: implementing a lower threshold across the first three or four years of study. Figure 31 illustrates the simple intuition.

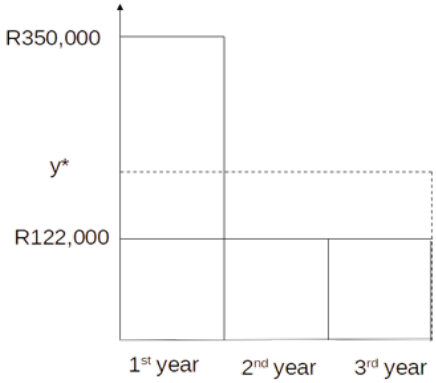

Figure 31: Optimal and sub-optimal thresholds

For the first year it was implemented, the new policy would have allocated all the additional resources to first year students from households with income between R122,000 and R350,000. It retained the existing threshold for students in the system from 2nd year onwards, meaning that students with household income only slightly above R122,000 from those years continued to receive no support.[92] 0 illustrates the more equitable or progressive alternative of raising the threshold to y* for all students in the system in 2018 within the prescribed period of study for their degree.

In addition to the sub-optimality of raising the threshold only for cohorts from 2018 onwards, the allocation of an identical quantum of resources within qualifying household income categories is potentially also sub-optimal. Leaving aside implementation challenges, an optimal policy would allocate funds according to the gap between available household resources and the quantum required for enrolment and participation in higher education. Indeed, this logic was recognised in the earlier logic of NSFAS which specified an 'expected family contribution' (EFC) for some qualifying students. This is the focus of the analysis below.

The intuition for the basic policy problem is captured in Figure 32.

92 With the exception of students at institutions such as the University of Cape Town that were reportedly able to supplement NSFAS funds with donor funds.

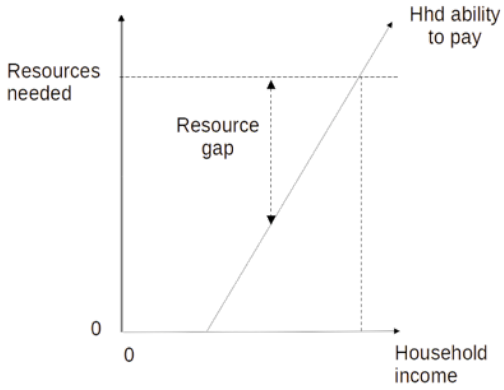

Figure 32: Policy problem

Figure 33 attempts to visualise the policy that was actually implemented. The solid grey areas represent resource needs that were funded under the new policy. Hashed area A represents the non-funding of the needs of cohorts prior to 2018. This can be contrasted with the hashed area B which represents the 'over-funding' of cohorts from 2018 onwards.[93] Under an optimal policy, B would not be funded and A would be.

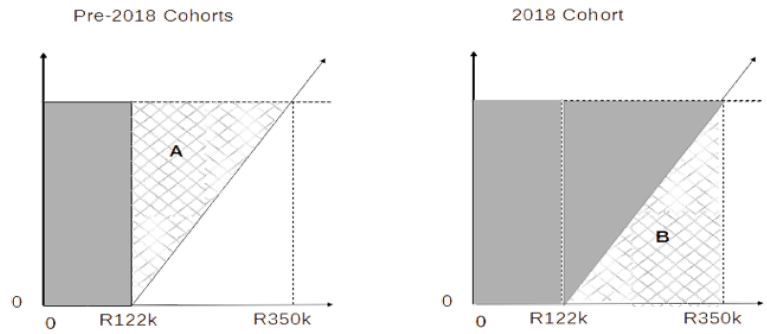

Figure 33: Visualisation of new (2018) funding policy

93 The notion of overfunding is more controversial than underfunding. The latter can be proven from household disposable income (if any) after meeting basic needs, whereas the former may depend on more subjective notions of what constitute household priorities.

To assess the relative sizes of A and B would require detailed knowledge of the household income distributions within and across cohorts, as well as how resource availability varies with household income. In practice, it appears – as discussed further below – that the NSFAS only had partial information on the income distributions. Moreover, there has been no detailed assessment of how households' ability to pay varies with income. A first best policy of this kind may therefore not have been possible in practice without at least obtaining more comprehensive information on household income and ability to pay.

Nevertheless, there is still a second best that would have been more progressive (less unequal) than the policy that was implemented. That second-best policy would have been to set a lower threshold and apply that across all cohorts that could still complete within the minimum time of three years, or a prescribed period such as the 'N+2' utilised at the time. Intuitively, one can think of this as taking funding from first years higher up the household income distribution (but below R350,000) and transferring it to second and third years lower down the income distribution (but above R122,000).

One could write this formally as follows. Assume for simplicity that the shape of the household income distribution, $g_t(y)$ of enrolled students, is the same across cohorts and years (but the actual frequency of students at any level may vary across years). Households with income above some level Y can fully afford the costs. Furthermore, that the ability to pay is represented by a function of household income $f(y)$ and the resources needed per student per year are fixed at R. Then the total resource need across the three years of undergraduates is:

$$\sum_{t=1}^{3} \left(\int_{0}^{Y} g_t(y)(R - f(y)) \right)$$

If needs only are prioritised by the Rands required, and the fiscal resources available are W, then the optimal policy which allocates a fixed amount of support B to individual i can be written as:

$$B^*(y) = min \sum_{t=1}^{3} \left(\int_{0}^{Y} g_t(y_i)|(R - f(y_i) - B(y_i))|.dy \right) s.t. \sum_{t=1}^{3} \int_{0}^{Y} B(y_i) g_t(y_i).dy \leq W$$

This is the expression of the first-best solution. But it was noted that the information needed to implement a sophisticated policy of this kind was not available. With Y set at R350,000, and R≥f(350,000), the result of the policy that was implemented can be worked out as:

$$\left(\int_0^{R350k} \square\, g_1(y_i)|(R - f(y_i) - B|.\, dy\right) +$$

$$\sum_{t=2}^{3} \square \left(\left(\int_0^{R122k} \square\, g_t(y_i)|(R - f(y_i) - B(y_i)|.\, dy\right) + \left(\int_{R122k}^{R350k} \square\, g_t(y_i)|(R - f(y_i)|.\, dy\right)\right)$$

The first term captures the gap in resources, or excessive support, for students in first year in households with incomes below R350,000. The second term captures any shortfall in support for students in second and third year below the R122,000 threshold.[94] The third term captures the shortfall in support (resources) for students in second and third year who rely entirely on family/household resources. The resource constraint is satisfied as:

$$\left(\int_0^{R350k} \square\, B(y_i) g_1(y_i).\, dy + \sum_{t=2}^{3} \square \int_0^{R122k} \square\, B(y_i) g_t(y_i).\, dy\right) \leq W$$

Since *f(yi)* is increasing in y, it follows that this is sub-optimal since one could decrease the sum (in the first expression above) by taking B from the highest-earning household in the first expression and allocating it to the lowest earning household in the third expression. For example:

$$|R - f(340{,}000) - B(y_i)| + |R - f(130{,}000)| > |R - f(340{,}000)| + |R - f(130{,}000) - B(y_i)|$$

It follows that the second-best optimal policy is to set the same threshold across cohorts such that the budget constraint is satisfied as follows:

$$\left(\sum_{t=1}^{3} \square \int_0^{Y^*} \square\, B(y_i) g_t(y_i).\, dy\right) \leq W$$

The difference between this policy and the one that was implemented would be even larger if one counted the need of less wealthy households more than that of wealthier ones.

Allocation problems of this kind arise in a range of social policy settings. For example, using a single threshold for determining eligibility for social grants creates an artificial division in which those just below the threshold benefit the most and those just above the threshold receive no support. However, in the case of the new higher education policy there was a very

94 There would be no excess in support because if that were the case then there would be no justification for a higher threshold.

straightforward way to improve the progressiveness of the policy: select a lower household income threshold and apply that to all students in the system who were still within the prescribed time limits for their degrees.

14.3 Data sources

The official policy and its practical implementation need not be the same for a variety of reasons. To examine empirically the impact of the free higher education policy, several sources of data were used in the analysis. To examine the impact of the new policy on students, the administrative data from NSFAS and HEMIS, as well as NSC matriculant data from 2011-2018 sourced from the Department of Basic Education (DBE), were used. As mentioned earlier in the report, there are limitations and problems with the NSFAS data obtained for the analysis. Where relevant, these are briefly discussed in the analysis below. To examine the impact on inequality, the General Household Survey (GHS) data were used. All these datasets are described below in detail.

NSFAS administrative data

Applicant level data from NSFAS for 2017-2019 with anonymised identifiers was obtained. This data could be used to link the applicants to HEMIS records for those that subsequently enrolled, or were already enrolled, in higher education institutions.[95] The NSFAS data used in the analysis presented below includes information on whether the applicant was successful, whether they reported being a SASSA beneficiary, household income (although in practice this data was missing in many instances – as discussed below), and the amount of funding received.

HEMIS administrative data

The individual level HEMIS data obtained from DHET from 2012 to 2020, could be linked to the NSFAS applicant data for 2017-2019 as well as the NSC data from DBE (described below). In the analysis below, the information used include the type of qualification and university an individual attended, as well as their age, whether they were in residence, the

95 A person should only appear in the HEMIS data if at some point they enrolled in a higher education institution.

individual's reported race, sex, whether they were studying a contact or distance programme and whether they were post-graduate or undergraduate. The focus of this report is on undergraduates, since NSFAS only funds undergraduate qualifications (including 4-year degrees that include honours-level components). Crucially, the HEMIS data provides information that can be used to determine when an individual first entered the university system. Those who started in 2018 or 2019 qualified for the new 2018 bursary conditions whereas those who had entered in 2017 or earlier did not- as explained earlier.

The General Household Survey

The General Household Survey (GHS) is a nationally representative household survey conducted annually by Statistics South Africa. It asks questions about all household members, including whether they are students and the institutions at which they study. One can use these questions to identify university students, whether these students attend public or private universities, whether they are undergraduate or postgraduate (based on whether they say they have already completed a degree or diploma) and whether they are contact or distance students. Comparable questions have been asked about students and household income since 2013 and the 2013-2019 years are used.

One weakness of the GHS for the current analysis is that by design the GHS does not survey individuals in university residences. This means that only university students living in private accommodation could potentially be surveyed. It is shown below that estimating the number of university students from GHS data produces numbers that are too low; that is probably a result of residence students being excluded. However, it is also shown that several statistics estimated from the surveys closely match proportions and trends shown in the HEMIS administrative data, which means the GHS is still a very useful dataset to better understand the potential impact of "free higher education". [96]

96 Prior research (Moses, van der Berg, and Rich 2017; Inchauste *et al*. 2017) has used the Income and Expenditure Surveys (IES) to undertake analysis of university students, despite residence students also being excluded from the sampling frames of these surveys. There is thus precedent for using surveys like the GHSs to examine who was likely to benefit from increased spending on higher education spending. The IES was not used because the most recent survey with publicly available data was undertaken in 2010/11.

Household income data in the GHS

To understand the potential impact of the policy on inequality in education it is necessary to know the socioeconomic status (SES) of students and the households they live in, as well as the SES of non-student households. To do so, the GHS and the household income data were used. The GHS asks questions about several sources of household income. These include all social grants, earnings from work, private pension income and remittances from family members in other households. Social grants and employment income are asked for each person, and pension income and remittance income are asked about for the household. The income sources are not as comprehensive as Stats SA's Income and Expenditure surveys, but they cover the key sources of income. Income or equivalent income from subsistence agriculture is not included and neither is income from investments.

Around 25% of employed individuals report an earnings bracket rather than an exact amount. For example, they say they earn between R2500 and R3500 a month. For such individuals, the midpoint of the bracket is imputed. A further 20% of employed individuals do not report their earnings at all - either refusing or saying they do not know. For such, a regression imputation is used to impute earnings for these individuals, utilising data from those other individuals who reported an earnings amount.

Household income is constructed by adding up the individual incomes reported from social grants and employment income and then adding in the remittance and private pension values. After having done this, about 8.5% of households report zero income. This is unrealistic, and the 2014/15 Living Conditions Survey found many fewer households with zero incomes. GHS households were asked a once off categorical question about the monthly household expenditure. To solve the zero-income issue, the household income value is replaced with the midpoint of the household expenditure value if the expenditure value was more than the income value, leaving only around 1% of households with zero income/expenditure. The method is not perfect but is the best of the available alternatives.

In addition to the issue of unrealistic fractions of households with zero incomes, Kerr (2021) showed that earnings from work in the GHS (and QLFS) seems to be under-reported on average, by comparing the GHS earnings with administrative tax data on earnings from SARS. A simple solution to check the importance of this for the current analysis is to inflate all earnings by a fixed

amount. In some of the analyses below, all *earnings* are adjusted (but not other forms of income) by 66%, which is the difference between the aggregate employee income estimated from the GHS and the same quantity in the National Accounts data. This then is used in the calculation of an adjusted household income amount. A similar method has been used in research by the United Nations Economic Commission for Latin American and the Caribbean (Lustig 2020).

In the analysis below the NSFAS family income thresholds are compared to the GHS household income distribution. The household income concept in the GHS is the incomes of all resident members of the household. As discussed earlier, the household income definitions used by NSFAS were narrower, and only included incomes of parents, legal guardians or spouses and not extended family members. Conceptually, this means that incomes of other people living in the same household as an NSFAS applicant would be considered household income in the GHS but not for NSFAS. For a hypothetical applicant this would generally mean that NSFAS family income would be equal to or less than GHS income for most applicants. However, if an individual is supported by both parents, and one of these is not present in the household, then NSFAS household income would be more than GHS household income. The analysis below examines where the NSFAS income thresholds fit into the GHS household income distribution. If NSFAS household incomes are generally less than GHS for the same household, then the estimates are lower bounds for where in the GHS household distribution the NSFAS household income thresholds lie.

NSC data

Individual level NSC data was obtained from the DBE for the years 2011-2020.[97] Having been provided with the appropriate identifiers it was possible to match the same individuals to their NSFAS and HEMIS records. The data also contains a school identifier and, in some years, the school quintile and whether the school was an independent school. (Some independent schools write the state NSC examinations and so are present in the data and identified as such). School quintile and whether the student attended an independent school are key variables from this dataset because they provide a source of information on the socioeconomic status of the student that is external to the household. In addition, and as discussed above, in 2017 NSFAS applicants reportedly qualified for a "means test waiver" (they did not need to show proof of income) if they attended a quintile 1, 2 or 3 school (and/or if

97 Attempts were made to obtain data from DBE for earlier years but these were unsuccessful.

they were a SASSA grant recipient). If school quintile or whether the school was independent or not was missing in some years, the information could be imputed from later or earlier year information on the same school, where this was available.

Around 0.7% of new NSFAS funded students in 2017-2019 were merged into the NSC data but their school had a missing school quintile and were also missing whether the school was independent. It is unclear why this occurs. Another 8% were missing school quintile because they were not merged into the NSC data we have at all. There are two main reasons this can occur. The first is that individuals wrote NSC before 2011, and so are not in the NSC data used, and so information about their school or school quintile is not known. The second is that some students will have written non-NSC matric examinations, such as the Independent Examination Board (IEB). It is assumed that students who applied and entered in 2017 and who were 25 or older in 2017 who had missing data, had missing school data because they wrote NSC in 2010 or earlier. It is assumed that students younger than 25 wrote a non-NSC examination. The same is assumed for 2018 and 2019 but add one year and two years of age for 2018 and 2019 respectively.

Higher education enrolment in HEMIS and the GHS

The investigation into whether the GHS data on tertiary students is a reasonable source of data to use for understanding the possible impact of the "free higher education" policy on inequality, begins by undertaking some comparisons between the GHS and administrative data in HEMIS. Some weaknesses of the GHS are highlighted, but it is nevertheless concluded that it is a reasonable source of data.

Table 27 shows the number of public university students from HEMIS between 2013 and 2019.[98] This is administrative data and so it should capture all students in the public university system. There were around 900 000 public university students in 2013, rising to just over one million by 2019. Undergraduate students comprise around 85% of all students throughout this period, and the share of undergraduate contact students rose from 50% to 55% over the period. The number of new undergraduate students fluctuated over the period. Between 2017 and 2019 the increase was around 10%.

98 Initially the HEMIS data obtained was up to 2019, but given delays, subsequently 2020 HEMIS data was also obtained. The analysis in this section was completed with the original dataset hence the most recent year being 2019.

Table 27: Number of University Students (HEMIS)

	Number of University Students- HEMIS						
	2013	2014	2015	2016	2017	2018	2019
All students	907755	897048	909222	907080	965517	1019623	1022985
UG students	768419	762835	772968	765552	814857	863206	866979
PG students	139336	134213	136254	141528	150660	156417	156006
UG Contact students	461264	474653	481709	508092	527629	546488	565336
New UG students	211635	203701	202209	183870	207361	231245	225257

Note: Own calculations from HEMIS 2013-2019.

Table 28 below shows the estimated number of university students in the GHS between 2013 and 2019 for several different categories of students. First, it shows all students, then public university students only, then public university undergraduate students and finally public university undergraduate contact students. The trend for all four student groups is stable, with some variation coming because the estimates are from a relatively small sample, as reflected in the row labelled "sample number of students". The year 2019 looks quite different to the previous years, with much higher estimates of students in all four groups.[99]

99 GHS 2015-2018 were conducted in the same primary sampling units (PSUs, small geographical areas) whereas 2019 was conducted in a new set of PSUs. One obvious explanation for the big change between 2018 and 2019 is thus that this set of PSUs contained areas with more students than the previous set of PSUs. 2019 was also the first year that the GHS was conducted using computer assisted personal interviews (CAPI), rather than the traditional paper and pen method. This may also have affected the enumeration of students, although there is no explanation as to how CAPI would have resulted in such changes.

Table 28: Estimated Total University Students (GHS)

	2013	2014	2015	2016	2017	2018	2019
All university students	740893	776325	719188	753066	723660	736821	978784
Standard Error	43330	49076	25218	31006	24043	25480	33141
Sample number of students	1105	1029	843	849	777	790	960
Public university students	571469	614220	531650	577685	581404	613530	828267
Standard Error	41911	44401	24069	28978	26057	26276	32577
Sample number of students	837	818	637	665	621	676	816
Public University Undergraduate students	453192	506673	410472	462445	401279	447707	611217
Standard Error	31815	33415	15077	21570	14223	19496	23609
Sample number of students	673	678	503	542	442	513	640
Public University Undergraduate contact students	285256	325701	270935	325514	270591	318953	344952
Standard Error	32302	28420	13328	18815	13209	17586	16751
Sample number of students	423	421	339	381	308	371	369

Note: Own calculations from GHS 2013-2019

Standard Errors adjusted for complex sample design.

A comparison of Table 27 and Table 28 shows that the GHS underestimates the number of public university students. The GHS totals for public university students, public undergraduates and public undergraduate contact students are about 60% of those in HEMIS. In 2019 the GHS captured substantially more students, around 80% of all public university students, and around 70% of undergraduate students. The undercounts are partly the result of the GHS excluding university student residences from the sample frame. HEMIS implies that around 14-16% of undergraduate university students are in residence, or around 21-24% if UNISA students (none of whom are in residence) are excluded. The undercount may also reflect issues such as student non-response rates being higher than for other groups. There is not enough information to pin down a full explanation.

What is important for the purposes of this analysis is that the distribution of students by relevant characteristics in the GHS resembles those in HEMIS, even if there is an underestimate of the total number of students. Table 29 shows student characteristics from HEMIS and Table 30 shows the same proportions estimated from the GHS for all public university students. The GHS proportions by race closely match HEMIS, as does the trend of an increasing share of black students. Both datasets show a larger share of female students than male students.

The share of contact and postgraduate students estimated from GHS in Table 28 are also reasonable compared to the HEMIS numbers in Table 29. Table 30 thus gives some degree of confidence that, even though the GHS underestimates the number of public university students, it does well in capturing the makeup of the public university student body in terms of race, gender, contact versus distance and postgrad versus undergrad.

The final row of Table 30 shows the proportion of students that live in households with only student-aged members (18-29) in each GHS. Between 13 and 19% of students live in such households. Most of these students are likely to be students living away from their families. As such, their household income might not be a good reflection of their family income, which is the basis of the NSFAS income threshold. More specifically, they may have lower household income than their families. This means these students would look poorer than they are as judged by the NSFAS family income threshold. This is explore more detail in the next section.

The main conclusion from the comparisons of GHS and HEMIS is that whilst there is an underestimate of public university students in the GHS, it nevertheless looks very sensible when examining proportions by race, gender, postgraduate versus undergraduate, contact versus distance and captures some of the trends over time. It is concluded that using the GHS to examine the potential impact of the free higher education policy is sensible. On that basis the next section begins with the use of the GHS to describe where students and their households are in the household income distribution.

Table 29: University Student Characteristics (HEMIS)

	2013	2014	2015	2016	2017	2018	2019
Prop. Black	0.69	0.69	0.70	0.71	0.73	0.75	0.77
Prop. Coloured	0.07	0.07	0.07	0.07	0.06	0.06	0.06
Prop. Indian	0.06	0.06	0.06	0.05	0.05	0.05	0.04
Prop. White	0.18	0.18	0.17	0.16	0.15	0.13	0.12
Prop. Female	0.59	0.59	0.59	0.59	0.59	0.60	0.60
Prop. Male	0.41	0.41	0.41	0.41	0.41	0.40	0.40
Prop. Contact	0.59	0.61	0.61	0.65	0.63	0.63	0.65
Prop. PG	0.15	0.15	0.15	0.16	0.16	0.15	0.15

Note: Own calculations from GHS 2013-2019

Table 30: Public University Student Characteristics (GHS)

	2013	2014	2015	2016	2017	2018	2019
Prop. Black	0.66	0.68	0.71	0.71	0.69	0.77	0.73
Prop. Coloured	0.07	0.06	0.05	0.08	0.08	0.06	0.08
Prop. Indian	0.04	0.05	0.07	0.06	0.06	0.05	0.05
Prop. White	0.23	0.21	0.17	0.15	0.18	0.12	0.14
Prop. Female	0.58	0.57	0.54	0.60	0.56	0.52	0.61
Prop. Male	0.42	0.43	0.46	0.40	0.44	0.48	0.30
Prop. Contact	0.58	0.61	0.60	0.65	0.59	0.63	0.50
Prop. Post-grad	0.20	0.17	0.22	0.19	0.23	0.18	0.26
Prop. Students living in Student Age HH	0.19	0.17	0.15	0.18	0.17	0.18	0.13

Note: Own calculations from GHS 2013-2019

Student Age HH are defined as Households with all members between 16 and 30 years old.

14.4 Fiscal incidence of state spending on public higher education students

In this section the GHS is used to describe the overall household income distribution, and the position of student households in this distribution. This gives a sense of where the potential beneficiaries of the free higher education policy would fall in the income distribution. Subsequently, some results from the GHS and HEMIS data are combined to estimate the potential impact of the policy on the number of students funded by the NSFAS, and this is compared to the actual number of students funded. The estimates are very close to the actual number of NSFAS funded students, providing more evidence that the GHS provides a very reasonable source of data.

To begin the analysis, the GHS is used to estimate the proportion of households with public university students and where these students are located in the income distribution. This gives a first broad answer to the possible impacts of government spending on higher education in general. Row 1 of Table 31 shows the proportion of households with public university students which is estimated to be about 3-5% in each year. In other words, only a very small fraction of households have public university students in them. However, it has already been shown in Tables 27 and 28 that the GHS only finds around 60% of the student numbers in HEMIS, and around 80% in 2019. Thus, in row two of Table 31 the undercounts in each year is adjusted for by multiplying by the ratio of HEMIS to GHS in each year. This shows that the true proportion of households with public university students is estimated to be between 5 and 6 percent. In general, then, the first conclusion is that any government spending on public university students (of all types, not just through NSFAS) is going to a very small fraction of all households, even after having corrected for undercounts in the GHS.

State spending on university students is unlikely to be randomly distributed across all households. Students from higher income households are more likely to complete matric and attain the grades required to enter university (van der Berg 2016). To investigate this, the proportion of households with public university students across the five household income quintiles is estimated, again adjusting for the undercounting of students in the GHS and assuming the undercounts are the same across the income distribution.[100] The bottom or

100 It was assumed that the missing students in the GHS are distributed randomly throughout the income distribution. This may not be completely correct but is not unreasonable. If all of the missing students are in the bottom quintile of the household income distribution (as an example), then the assumption would be incorrect and there would be an underestimating of the share of households in the bottom quintile that have university students in them and that would benefit from state spending on higher education.

1st income quintile means the 20% of households with the lowest household income, the top quintile is the 20% of households with the highest household income. Rows 3-7 of Table 31 show that the estimated proportion of quintile 1 households with public university students in them is between 2% and 5%, whilst for the top quintile this is between 9% and 12%. The share of households with students in the top quintile is thus between 3 and 6 times that of the same share of the lowest quintile households.

These findings mean that households with public university students are substantially overrepresented in the top income quintile of households and any policy aimed at public university students in general is likely to benefit higher income households. Alternatively, a policy that was perfectly targeted at, for example, only current university students with household incomes in the bottom quintile would have no impact on the 95-98% of the households in the bottom quintile that do not have any students in them.[101]

The next section uses the GHS to describe where the old and new NSFAS funding thresholds are located in the household income distribution.

Table 31: Proportion of HH with public university students (GHS)

	2013	2014	2015	2016	2017	2018	2019
Prop. Student HH	0.03	0.04	0.03	0.03	0.03	0.03	0.05
Prop. Student HH, adj	0.05	0.05	0.05	0.05	0.05	0.05	0.06
Prop. Student HH, adj. Quint 1	0.05	0.02	0.02	0.03	0.03	0.03	0.02
Prop. Student HH, adj. Quint 2	0.02	0.03	0.02	0.03	0.03	0.03	0.03
Prop. Student HH, adj. Quint 3	0.02	0.04	0.04	0.03	0.03	0.04	0.04
Prop. Student HH, adj. Quint 4	0.05	0.07	0.05	0.07	0.07	0.05	0.05
Prop. Student HH, adj. Quint 5	0.12	0.11	0.12	0.09	0.11	0.11	0.11

Note: Own calculations from GHS 2013-2019. Adj means household income adjusted for earnings under-reporting.

101 If this was limited to only households with at least one member aged between 18-35 inclusive, very similar percentages would be generated.

14.5 The household income distribution and the free higher education policy

The 'free higher education' policy expanded the family income threshold for the NSFAS funding from R122,000 per year (roughly R10 000 per month) to R350,000 (roughly R30 000 per month) from 2018 onwards. To understand who might potentially benefit from this policy, Table 32 shows several percentiles and the mean of monthly household income from all sources included in the GHS in 2016 and 2017. This is at the household and not individual level, and the household weights provided with the GHS are used. Using the combination of the 2017 and 2016 GHS was important because 2017 was the final year of the old policy and because also using 2016 helps to increase the sample size and decreases sampling error. Incomes from 2016 are adjusted for inflation to 2017 rands.

The first four rows of Table 32 use the household income data without any adjustments. Row one gives the income distribution for all households and shows that in 2016/17 the median household in South Africa had total household income of R4000 a month, the 25th percentile roughly R2000 a month and the 75th percentile R10 000. What is immediately clear is that both the old and new family income NSFAS eligibility thresholds are high up the household income distribution. The old threshold of R122,000 is at roughly the 75th percentile, which is R10 000 a month. The new threshold of R350,000 a year is the 93rd percentile of household income. The DHET appears to have been aware how large a share of the population would be eligible. The statement in January 2018 noted that the policy entailed "Extending the provision of free higher education and training to the children of the bottom 90% of South African households, provided that they meet the academic admission criteria and requirements of the TVET Colleges or universities" (DHET 2018b).

Table 32: Monthly Household Income Distributions in 2016/2017

	P25	P50	P75	P90	Mean
All Households	2150	4000	10000	22000	9497
Public university student HH	3750	8220	15798	39757	16420
Public university student HH, excl stu only HH	5525	15000	23000	47393	19983
Non-student HH	2150	3949	9479	20800	9170
Adjusted HH Income					
All Households	2317	5661	15000	35104	14066
Public university student HH	3949	12166	24573	66259	24431
Public university student HH, excl stu only HH	7500	15000	37665	78985	30289
Non-student HH	2264	5431	14833	33332	13556

Note: Own calculations from GHS 2016-2017.

Adjusted HH income means all earnings inflated by 66% but other incomes not adjusted.

If the unadjusted GHS household income distribution is accurate, the new 'free higher education' policy increased the income threshold to allow students in households between the 75th and 93rd percentile of the household income distribution to access free higher education. This is in contrast to the framing of the new policy as extending free education to "poor and working-class students": referring to students in households between the 75th and 93rd percentiles of household income as poor or working class does not seem credible.

To show more clearly the differences between the incomes of student and non-student households, and focusing on public university undergraduate students (the beneficiaries of the free higher education policy), row 2 of Table 32 shows that public university undergraduate students come from households that have much higher incomes than all other households. Median household income for households with public university undergraduate students is double that of all households, and the 75th and 90th percentiles for households with public university undergraduate students are more than double those percentiles for all households.

It was noted above that one concern with using the GHS to examine the household income of students is the possibility that students captured in the GHS live by themselves or with other

students and away from their families, an issue that has been noted by Van der Berg (2016) and Inchauste *et al* (2017). To the extent that such students have lower household income than that of their families, this will mean that estimated student household incomes will be too low, and thus that the policy has even less impact on poorer households. To address this, Row 3 shows student households excluding those where all household members are between 18 and 30 years old. Row 4 excludes all households with public university students. Comparing rows 3 and 4 again shows that household incomes in households with public university students are substantially higher than in households with no students- the median is nearly 4 times higher and the mean is double.

A second issue that was raised above is the underreporting of earnings by the employed. Underreporting would mean that the thresholds appear higher up the income distribution than they really are. To account for possible underreporting, the second set of four rows in Table 32 shows the same set of distributions as in the first 4 rows but using adjusted household income (obtained by increasing all earnings by 66% and leaving other sources of income unchanged)[102] because of concerns about the underreporting of earnings (as discussed above). There are 28% of the households that have no employed individuals, so their income is unchanged. The effect of this adjustment is to raise household income at all percentiles but proportionately more at higher percentiles. The mean household income increases by 50%, less than the 66% adjustment because of the households that have no income from employment.

The adjustments mean that the old and new NSFAS thresholds would be at the 66th and 88th percentiles of the household income distribution respectively. These are obviously further down the income distribution than when using unadjusted household income, but households between these two thresholds are certainly not poor, and many are unlikely to be working class. Assuming the adjusted household income distribution is closer to the truth, the change in the NSFAS eligibility threshold meant that students living in households between the 66th and 88th percentiles of the household income distribution were now able to obtain free higher education. If student only households are considered, the old household income threshold of R122,000 was at the 43rd percentile of student household income using unadjusted earnings and at the 35th percentile when using earnings adjusted for underreporting. The new threshold of R350,000 is at the 82nd percentile of student household income using unadjusted earnings and at the 71st percentile using adjusted earnings.

102 This is the percentage increase required for the GHS total earnings to match earnings in the National Accounts.

A third issue is that in the analysis of the GHS above, it was showed that the GHS is missing about 40% of public undergraduate students compared to HEMIS, and that about 40% of these missing students pre-2019 are in student residences. In using the public, undergraduate student household income distribution from the GHS to interrogate household incomes of student households, it is assumed that the missing students have the same income distribution as those captured in the GHS. If this was true then, using the adjusted income percentiles, it would be expected that 35% of the students in residence have incomes less than R122,000, since R122,000 is at the 35th percentile of the student household income distribution. But when using the 2017 HEMIS and NSFAS data, it is found that around two thirds of the undergraduate students in residence in HEMIS are also funded by NSFAS. If it is assumed that all these NSFAS students had household income below R122,000[103], and then add them into the household distribution, then this implies that R122,000 is at the 42nd percentile of the household income distribution.

To know where the new threshold of R350,000 was in the student household income distribution, then it is necessary to know what percentage of the residence students had incomes between R122,000 and R350,000, which is not possible with the data available. But a reasonable estimate of 20% implies that the R350,000 threshold is at the 75th percentile.[104] The 42nd and 75th percentiles were used as estimates of the positions of the R122,000 and R350,000 thresholds for households with students in them in the analysis below. The estimates of where the thresholds lie for all households are those using adjusted household incomes: the 66th and 88th percentile of the household income distribution.

14.6 Examining the robustness of the GHS analysis

The analysis of the GHS and the content of the new policy has suggested that the main beneficiaries of the new free higher education policy would be students from relatively high-income households. In this section the robustness of the GHS estimates of the magnitude of the change in the proportion of students the new free higher education policy would fund, is examined. The aim is to help determine the reliability of the conclusions reached using the GHS about who would benefit from the policy.

103 It is shown below that this is a reasonable assumption, since NSFAS does seem to have used the R122,000 cutoff when deciding on who to fund in 2017.

104 This implies the remaining 13% of residence students had household incomes above R350,000.

An analysis of GHS 2016 and 2017 showed that the old household income threshold of R122,000 was at the 42nd percentile of student household income and the new threshold of R350,000 was at the 75th percentile adjusting for underreporting of earnings and missing residence students. The implication is thus that the increase in the income threshold would increase the proportion and number of students eligible by 88% (from 42% to 75%).[105]

The HEMIS and NSFAS datasets were used to examine the accuracy of these estimates from the GHS, thus providing evidence on their reliability. There were 765 000 undergraduate students in 2016 and 815 000 in 2017 according to HEMIS. Using the adjusted GHS student household income distribution, the estimate was that 42% of all undergraduate students were eligible under the old policy.[106] Using the number of undergraduate students in HEMIS from Table 27 and assuming that all eligible, registered students were funded by NSFAS, one should see about 340 000 students on NSFAS in 2017. The actual number from the NSFAS 2017 administrative data used, is 296 000.[107] This means when combining the GHS estimates with numbers from HEMIS to obtain an estimate of the number of NSFAS eligible students, this fairly closely matches the NSFAS administrative data numbers. The difference may be due to some eligible students not taking up NSFAS funding (for example if they took up private bursaries) or because the estimates of the proportion of students with incomes less than R122,000 in family income are too high. Nevertheless, the reasonably similar numbers give some confidence that the (adjusted) GHS student household income distribution is of adequate quality, and thus that the broader conclusions from the GHS about the potential impact of the policy are reasonable.

In the analysis thus far, it has been implicitly assumed that the new policy did not change the types of students in higher education. If the new policy led to many more low-income students registering at universities to take advantage of free higher education, then more students would be eligible than estimated above. For 2018, it has been argued that a change in the composition of the applicant body was unlikely because of how late the policy announcement was made. From 2019, onwards, this would not apply. On the one hand, it seems unlikely that more low-income students (from households with annual income below R122,000) would register because they were already eligible. However, some low-income students might not have

105 If no additional students with household incomes below R122,000 are induced to enter higher education by the new policy. This assumption is discussed further in the analysis of the NSFAS data below.

106 The adjusted household incomes that correct the under-reporting of earnings, are used.

107 The official number reported in PSET is 260 000.

entered university and taken up NSFAS funding when it was in the form of a loan but would have been interested in doing so when the new policy changed to a bursary system. This is investigated further below, after briefly explaining why the GHS cannot be used to examine the actual impact of the new policy (as opposed to estimating its likely effect).

14.7 The unsuitability of the GHS for investigating the impact of the new policy

In the analysis above the GHS was used to describe the South African household income distribution, as well as the income distribution of student households. Unfortunately, the GHS did not look for potential changes in the household income distribution resulting from the NSFAS policy change in 2018. There are several reasons for this. Firstly, there are no direct questions on NSFAS receipt in the GHS. Secondly, the sample sizes of public undergraduate students are fairly small and so the possibility of picking up changes in the income distribution of student households between 2017 and either 2018 or 2019 is very small, especially when considering that by GHS 2019 only the 2018 and 2019 cohorts had experienced the new policy, and HEMIS data indicates that these two cohorts represented only around 42% of all undergraduate students in 2019.

14.8 The impact of the new policy: evidence from NSFAS, NSC and HEMIS data

The key question to be answered in this section is how the change to the new free higher education policy changed the socioeconomic status of NSFAS beneficiaries. The analysis seeks to investigate whether the new beneficiaries had much higher incomes or went to more resourced high schools than the beneficiaries prior to the change in policy - as one might expect given the extension of the income threshold to R350,000. The analysis also seeks to investigate whether the new policy resulted in changes to the relationship between socioeconomic status and the amount of funding received, conditional on receiving funding.

An obvious point of departure would be to use the family incomes reported to the NSFAS by applicants. Unfortunately, there is almost no income data included in the 2018 NSFAS data available, and for the successful new NSFAS applicants in 2017 and 2019 the missing income rate is 88% and 58% respectively. As already noted, this required substantial changes to the planned approach to the overall project including this section. Thus, to begin, a description of the income data that was accessed and how it was utilised to estimate changes in the incomes of beneficiaries between 2017 and 2019, is provided.

The partially missing income data in 2017 and 2019 means that the above questions can be addressed only by making some additional assumptions about the (missing and present) NSFAS income data and use additional data.

The data from the 2011-2019 NSC results about the type of school each individual attended and data from HEMIS with the available NSFAS data were merged. The information used from the NSFAS data is family income, where available, and whether the student reported being a SASSA beneficiary. The sets of information used from the NSC data, are the school quintile of the school each student attended when they wrote the NSC and whether the school was an independent school. If the student wrote IEB or another non-NSC high school leaving examination, then they will not have any school information. Those who wrote NSC before 2011 will also not have any data on school quintile. An attempt was made to distinguish between the first two groups using the age of the beneficiaries from HEMIS — based on the assumption that students older than 25 in 2017 or 26 in 2019 wrote pre-2011 NSC, but this is imperfect. The use of SASSA beneficiary status and Quintile 1-3 was informed by the fact that they were the criteria used for means test exemption in 2017 (only SASSA status was used in 2018 onwards), and because they are markers of disadvantage and likely to be correlated with family income.

The eligibility conditions to obtain NSFAS funding under the new policy from 2018 onwards required applicants to have registered for the first time at a public university in 2018 or later. Thus, to examine possible changes after the policy was introduced, new applicants funded in 2017 who had not previously registered at a university were compared with new applicants funded in 2018 and 2019 who had not previously registered at a university.[108] The changes between 2017 and 2019 were not examined across all students because this would mix up students funded under both the old and new policies in 2018 and 2019.

The analysis starts with an overview of the changes for newly funded NSFAS students by institution type and qualification type. Table 33 below shows the number of newly funded NSFAS beneficiaries in 2017, 2018 and 2019, by the type of university that they enrolled in. The number of new students funded increased by around 48% between 2017 and 2018, and then declined slightly, so that the increase between 2017 and 2019 was 40%. The largest change is the

108 For brevity, this section refers to new funded applicants who had not previously registered at a university as "new funded applicants".

massive increase in the number and share of UNISA students funded in 2018 and 2019 compared to 2017, with 2019 being triple the 2017 number. The increase for other institutions was only 20% between 2017 and 2019.

Table 33: Newly funded NSFAS students by Institution Type

Institution Type	2017		2018		2019	
	Num	%	Num	%	Num	%
Traditional University	28209	36.6	34325	30.31	34938	32.46
Comprehensive University	17716	22.98	20975	18.52	22604	21.00
University of Technology	23592	30.61	27198	24.01	26787	24.89
UNISA	7563	9.81	30762	27,16	23308	21.65
Total	77080	100.00	113260	100.00	107637	100.00

Note: Own calculations from HEMIS and NSFAS

Table 34 shows the qualification types of the newly funded students in 2017-2019. The two most obvious changes are the very large increase in the number and share of students registered for 1-year higher certificate programmes and the large increase in the absolute number of students registered for bachelor's degrees. In 2017 and 2019 58% and 77% of students undertaking higher certificates respectively were studying at UNISA.

Table 34: Qualification Type for Newly Funded NSFAS students

Institution Type	2017		2018		2019	
	Num	%	Num	%	Num	%
Higher certificate	6570	8.52	21220	18.74	17671	16.42
Diploma	26282	34.10	32242	28.47	30668	28.49
Bachelor's degree	26503	34.38	36419	32.16	42282	39.28
Bachelor's Professional	17033	22.10	22150	19.56	16297	15.14
Other	692	0.90	1229	1.09	719	0.67
Total	77080	100.00	113260	100.00	107637	100.00

Note: Own calculations from HEMIS and NSFAS

Tables 35 and 36 show the qualification types of newly funded NSFAS students for non-UNISA and UNISA separately. For non-UNISA universities the largest absolute increase came from Bachelor's degrees, and this plus higher certificates had the highest percentage increases, around 50%. As shown above, the overall increase in funded students was around 20%. For UNISA the changes are much more dramatic. The number of higher certificates tripled, with an extra 10 000 students funded to undertake this qualification at UNISA. The number funded to undertake Bachelor's degrees increased by 4000 students, which was more than a thirteen-fold increase. These numbers imply that nearly half of the increase in newly funded students between 2017 and 2019 came from UNISA students studying either higher certificates or bachelor's degrees.

Table 35: Qualification Type for Newly Funded NSFAS students, excluding UNISA

Institution Type	2017		2018		2019	
	Num	%	Num	%	Num	%
Higher certificate	2742	3.94	3673	4.45	4025	4.77
Diploma	25468	36.64	28610	34.68	27901	33.09
Bachelor's degree	26165	37.64	35132	42.59	37930	44.98
Bachelor's Professional	14894	21.42	14689	17.81	14350	17.02
Other	248	0.36	394	0.48	123	0.15
Total	69517	100.00	82498	100.00	84329	100.00

Note: Own calculations from HEMIS and NSFAS

Table 36: Qualification Type for Newly Funded NSFAS students for UNISA only

Institution Type	2017		2018		2019	
	Num	%	Num	%	Num	%
Higher certificate	3828	50.61	17547	57.04	13646	58.55
Diploma	814	10.76	3632	11.81	2767	11.87
Bachelor's degree	338	4.47	1287	4.18	4352	18.67
Bachelor's Professional	2139	28.28	7461	24.25	1947	8.35
Other	444	5.87	835	2.71	596	2.56
Total	7563	100.00	30762	100.00	23308	100.00

Note: Own calculations from HEMIS and NSFAS

The 2017 NSFAS handbook (NSFAS, 2017: 32) states that only the first higher education qualification would be funded by NSFAS. From 2018 onwards NSFAS still only funded the first qualification but there was an exception for the one-year higher certificate programmes if students then proceeded to a degree or diploma (DHET 2019b).

Higher certificate programmes have lower entry requirements than diplomas and degrees and thus the high school performance of students in higher certificate programmes is likely to be worse. The NSC data merged into the HEMIS and NSFAS records shows this is true: the median of the NSC subject average for higher certificate students was 52% and 50% in 2017 and 2019 respectively, whereas it was 62% and 61% for other qualification types in these two years. Since high school performance and socioeconomic status are positively correlated, the large increase between 2017 and 2019 in the number of NSFAS funded students undertaking higher certificates is likely to have benefitted students from relatively low socio-economic backgrounds. Why this led to large increases at UNISA and not at the other institutions is not clear.

The results suggest that the new 2018 NSFAS funding policy seems to have had an important effect on enrolment that was not obvious from how the policy was framed by DHET. In the next section the changes in the socioeconomic status of the newly funded students and how this varied by university and qualification type, are described.

14.9 NSFAS income data description

The analysis of the differences in the socioeconomic status of newly funded NSFAS students, begins with describing the family income data obtained from the NSFAS and the extent of missing income data, as well as explaining the reasons why the data is useful notwithstanding its shortcomings. In particular, the concern is with estimating the change in the share and number of funded applicants with family incomes above R122,000 between 2017 and 2019, which is a key measure used to determine whether the new policy benefitted those with higher incomes.

Table 37 shows the share of new funded applicants in five different categories in 2017 and 2019. In 2017 those who attended quintile 1-3 schools or who were SASSA beneficiaries reportedly did not need to provide income information. These funded students are in the first three rows of the table and were about 61% of all newly funded applicants in 2017. Row 4 includes those who did not provide income when the NSFAS rules suggested they should. This was around 33% of all

successful new applicants in 2017. The final row is those who were required to provide income and did, around 6% in 2017. Thus, the missing income rate for those who should have provided income is around 33% of 39%, or around 85% in 2017.

In 2019 only those receiving SASSA grants were supposed to be exempted from submitting income, those in rows 2 and 3 of Table 25, or 19% of the new beneficiaries. Of those who were in quintile 1-3 schools and not SASSA beneficiaries, 39% provided incomes. Thus 35% provided income and were required to, whilst 46% were not exempt but did not provide income information. This implies the missing income rate in 2019 is 46% of 81%, or 57%. Thus, the missing income rate is much higher in 2017, even after accounting for the fact that a larger share of individuals was not required to submit incomes. Unfortunately, income data for those with missing incomes or an explanation for why the data is missing for these individuals in 2017 or 2019, could not be obtained. Similarly, no information was obtained pertaining to how the NSFAS made funding decisions for individuals who were not means test exempt and who did not provide income, or for whom there is no income information in the data. The anecdotal information available was that for 2018, the NSFAS officials made application decisions on personal computers and that the income information was never stored in a centralised database. It was further reported anecdotally, that as part of this process NSFAS officials may have used information from credit bureaus. Corroborating this and further establishing the details of the process were outside the scope of the present report.

Table 37: Socioeconomic Status of Newly Funded Students

Student Category	2017		2019	
	Num	%	Num	%
Quintile 1-3, not SASSA	42489	55.12	49773	46.24
SASSA, not Quintile 1-3	1912	2.48	6961	6.47
Quintile 1-3 and SASSA	2557	3.32	13144	12.21
Other missing inc	25486	33.06	19709	18.31
Non-missing inc+ not Cat 1-3	4636	6.01	18050	16.77
Total	77080	100	107637	100

Note: Own calculations from HEMIS, NSFAS and NSC

In both 2017 and 2019 some individuals who were exempt from providing income information nevertheless did provide it. Table 38 shows the fraction of individuals in each of rows 1-3 of Table 25 who provided income data in 2017 and 2019 despite (reportedly) not being required to (those in row 1 in 2019 were required to provide income data). A total of approximately 9% of individuals in any of these three categories provided incomes in 2017, and around 39% in 2019 in the two income exempt categories. These individuals are important because their information is used — as along with those in row 5 from Table 10 who provided incomes as they were required to — to impute incomes for those who did not provide it. The goal is to estimate how the share of individuals with family income above R122,000 changed between 2017 and 2019, which is one indicator of whether the policy benefitted relatively high income individuals.

Table 38: Fraction of newly funded students reporting incomes

Student Category	2017 %	2019 %
Quintile 1-3, not SASSA	8.75	39.35
SASSA, not Quintile 1-3	17.10	40.34
Quintile 1-3 and SASSA	12.79	38.50

Note: Own calculations from HEMIS, NSFAS and NSC

Table 39 shows the share of all newly funded individuals that reported positive income data (including both those that were and were not required to report it), separated into 7 categories. These 7 categories reflect different levels of socioeconomic status. These are used to impute the share of individuals with income above R122,000 in each. In 2017 only 12% overall reported positive income, whilst this was 42% in 2019. But there are low income reporting rates in 2017 across all categories, including those where individuals were required to report it (row 5 for example, which is individuals in richer schools who are also not SASSA beneficiaries). In 2019 the positive income rates are again much higher and also fairly similar across the categories.

Table 39: Positive Income Values by School Type

School Type	2017 %	2019 %
Q1-3, SASSA=0	8.75	39.35
Q1-3, SASSA=1	12.79	38.50
SASSA=1, missing quintile	13.61	40.75
Q4-5 or indep, SASSA=1	18.26	40.20
Q4-5 or indep, SASSA=0	17.20	49.07
Missing Quintile: likely IEB	14.29	45.88
Missing Quintile, likely pre-2011 NSC	7.56	45.88
All	11.69	42.28

Note: Own calculations from HEMIS, NSFAS and NSC

Given the lack of information about why incomes are missing and the low share of individuals reporting incomes, it was necessary to establish that the income data available is reasonable. Table 40 shows the same categories as Table 39, but now gives the share of newly funded individuals who provided household income in 2017 and 2019 that had household income above R122,000 an annum. In 2017 it would have been expected that almost all individuals had incomes less than R122,000 per annum, since this was the maximum imposed by the NSFAS. However, since those attending quintile 1-3 schools or who were SASSA recipients were means test exempt and yet some provided income data, it is possible that some of these individuals had incomes above R122,000. Table 40 shows this was indeed the case for a small number. Individuals in the first 4 rows were mean test exempt in 2017 and some indeed had incomes above R122,000. The last 3 rows are individuals who were not means test exempt and some of whom reported incomes above R122,000 yet still received funding from NSFAS. It is not clear why this occurred. Of those receiving NSFAS funding in 2017 and who gave incomes, 9% had incomes above R122,000. It might have been expected that the new policy allowed a larger fraction of those with incomes above R122,000 to access NSFAS funding and Table 40 shows this is true: about 24% of those receiving NSFAS in 2019 who reported income had family incomes above R122,000.

Table 40: Share of newly funded students with income above R122,000 per year, conditional on reporting positive Income

School Type	2017 %	2019 %
Q1-3, SASSA=0	10.03	16.61
Q1-3, SASSA=1	3.67	6.28
SASSA=1, missing quintile	0	12.83
Q4-5 or indep, SASSA=1	5.31	12.71
Q4-5 or indep, SASSA=0	10.47	43.19
Missing Quintile: likely IEB	5.32	31.01
Missing Quintile, likely pre-2011 NSC	0.38	21.16
All	8.96	23.91

Note: Own calculations from HEMIS, NSFAS and NSC

Table 40 also shows that the shares above R122,000 correlate sensibly with the measures of SES used — the group of SASSA recipients generally had lower proportions above R122,000 than non-SASSA recipients and the group of those in quintile 1-3 had lower proportions above R122,000 than quintile 4-5 or independent NSC writing schools, although the differences are more pronounced in 2019 than 2017. These results suggest that the incomes provided are plausible.

A second piece of evidence that the family income data accessed is reasonable is that it can be shown that the NSFAS used this data when implementing the differing 2017 and 2019 policies. Figure 34 below shows the relationship between family income and the probability of funding for new applicants in 2017 who had not been in university before and who provided income data. Students are grouped into household income categories and each group is one bubble. The probability of funding for all individuals in each household income category is shown by the height of the bubble on the y axis. The size of the bubble represents the number of students. The first crucial point is that, broadly speaking, the 2017 policy was followed when using the income data available: there is a large drop-off in the probability of funding for those individuals reporting incomes just above R122,000. Only 9% of the new funded applicants that provided income had family incomes above R122,000, and around 45% of these were means test exempt but provided household income anyway.

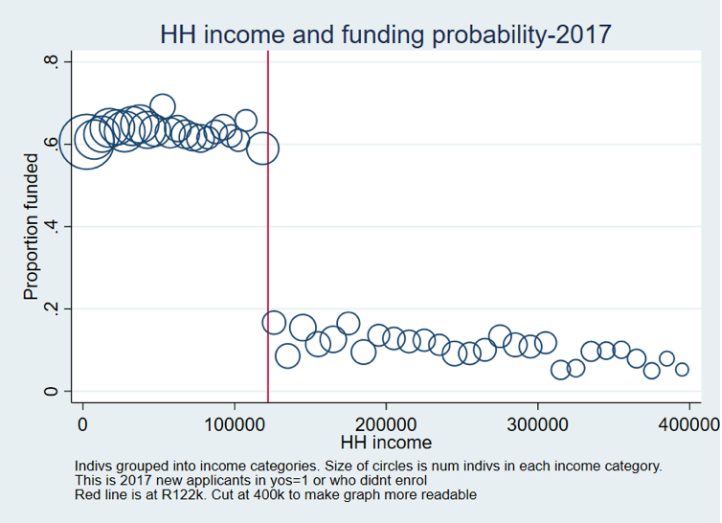

Figure 34: Household Income and Funding Probability for new Applicants in 2017

Figure 35 shows the same relationship as Figure 34, but for new applicants in 2019 who had not attended university before. Again, the figure shows that the new policy was broadly followed for those with family income information - there is a large drop off in the probability of receiving funding at the new cut-off of R350,000 per annum, and no discernible change at the old R122,000 cut-off. As expected, the policy thus benefitted many individuals with incomes above the old threshold in 2019. Around 3% of the newly funded students who provided income had incomes above R350,000. This could have been due to the student being means test exempt, but only 7% of the 3% were SASSA beneficiaries. Other potential explanations include that the student was disabled, since the family income threshold was R600 000 for these students, or data entry errors or other issues such as those raised in SIU reports.

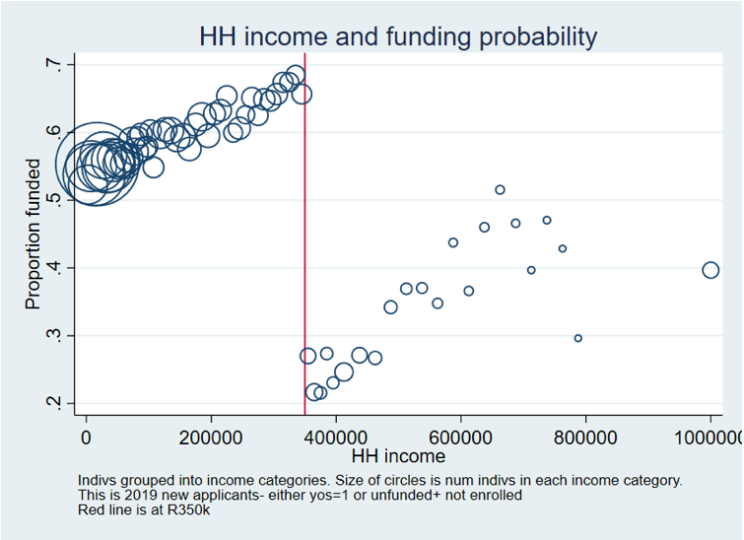

Figure 35: Household Income and Funding Probability for new Applicants in 2019

As discussed above, the new NSFAS policy applied to those who began university study in 2018 and later years. Some of those who applied to the NSFAS for the first time in 2019 began studying in 2018, a group that has not been considered in the analysis above, since the analysis was limited to those who applied and had not previously attended university. These students were subject to the R350,000 in family income threshold. Figure 36 shows the relationship between funding probability and family income in 2019 for those who began studying in 2018. The probability of receiving funding is much higher than in Figure 35, because all these applicants were already in the university system. Again, the new policy seems to have been broadly followed. The probability of receiving funding also increases with family income, although not as strongly as for the new applicants in 2019.

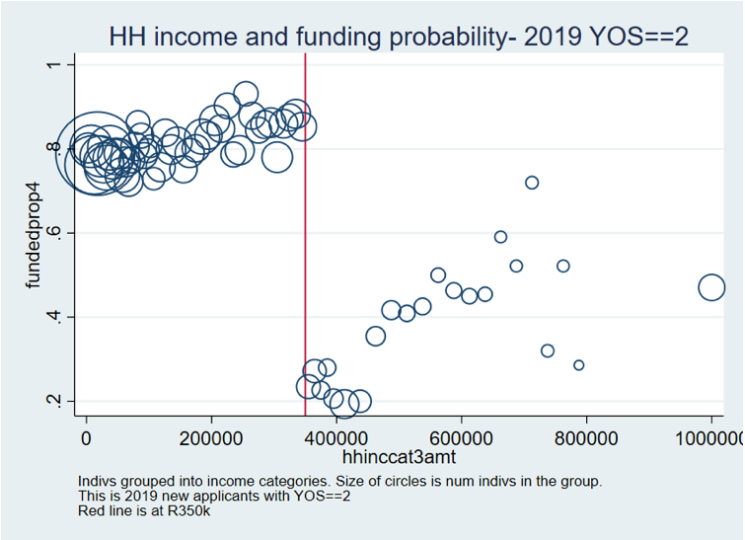

Figure 36: Household Income and Funding Probability for Second Year Applicants in 2019

Finally, the analysis sought to examine whether the policy was followed for those students who began studying in 2017 or earlier, who had not previously received NSFAS and who applied for the first time in 2019. For these students the old threshold of R122,000 should have applied. Figure 37 shows that the policy does not seem to have been applied as strictly as for new applicants in 2017. There is a decline in the probability of funding as family income increases, but there is no large drop off at R122,000.

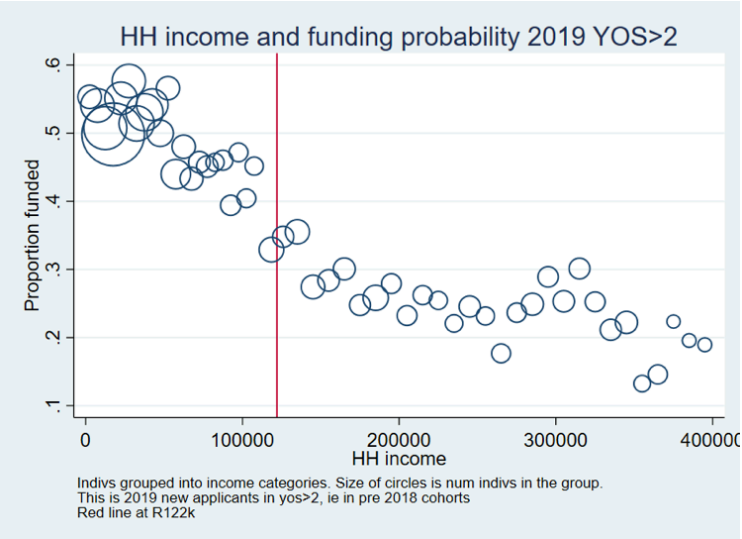

Figure 37: Household Income and Funding Probability for 3rd year and above Applicants in 2019

14.10 Changes in the socio-economic status of NSFAS beneficiaries

Whilst there is unexplained missing income data, it has been shown both that the income data available correlates sensibly with other markers of SES and that it was used by NSFAS to make decisions about who was funded. To examine the extent to which the new policy benefitted higher socioeconomic status individuals two pieces of evidence about changes between 2017 and 2019 are provided: changes in the types of schools beneficiaries attended and changes in the share of newly funded beneficiaries with incomes above R122,000.

Changes in school type

Table 41 shows the number of individuals by school type for 2017, 2018 and 2019. As used above, there is information on NSC from 2011 onwards. Table 42 shows the number and shares of students in 9 school types. The first 6 categories are self-explanatory. Category 7 is for individuals that appear in the NSC data but their school has a missing quintile.

Categories 8 and 9 are for individuals who are not matched to the NSC data available (from

2011 onwards). Category 8 is individuals whose age suggests they could have written the NSC in 2011 or later. It is assumed that these students had problematic ID numbers, as discussed above, or wrote a different matric exam such as IEB. Category 9 is students whose age suggests they could have written the NSC before 2011.

Table 41 - shows relatively stable shares of Quintile 1-5 schools between 2017 and 2019. As shown above and in Table 38 the total number of newly funded students increased from 77000 to 107000: a nearly 40% increase. The increase in the number of students from quintile 1-3 schools was around 18000 individuals, or 60% of the total increase. The increase in the number of students from quintile 4 or 5 schools or independent NSC writing schools between 2017 and 2019 was around 9000, about 29% of the total increase.

Table 41: School type for newly funded students

School Type	2017		2018		2019	
	Num	%	Num	%	Num	%
Quintile 1	15670	20.33	21899	19.34	23067	21.43
Quintile 2	11702	15.81	17081	15.08	16249	15.10
Quintile 3	17674	22.93	24533	21.66	23601	21.93
Quintile 4	11254	14.60	16512	14.58	15713	14.60
Quintile 5	9532	12.37	14924	13.18	13950	12.96
Indep NSC writing school	2228	2.89	2770	2.45	3178	2.95
NSC writing school but Missing quintile	3044	3.95	4310	3.81	4312	4.01
Missing quintile: likely IEB/non-NSC	2366	3.07	3722	3.29	2791	2.59
Missing quintile: likely pre-2011 NSC	3610	4.68	7509	6.63	4776	4.44
Total	77080	100	113260	100	107637	100

Note: Own calculations from HEMIS and NSC

On the face of it, the increase in the number of beneficiaries from lower quintile schools after the policy was implemented is puzzling. As already noted, the NSFAS reportedly gave means test waivers to individuals in Quintile 1 to 3 schools in 2017 so even those with high household incomes would have qualified. And the results in Table 39 suggest that was the case: 13.89% of beneficiaries in low quintile schools who reported household income were above the R122,000 threshold. And that proportion increases in 2019, to 22.72%.

It is not possible to determine the cause of this for certain using the data available. Among the possible explanations, one reason for the increase in numbers could be that the prospect of a full bursary was more appealing to this group. In other words, there were NSFAS-eligible individuals from low quintile schools who did not apply or did not accept offers under the previous income contingent loan policy because they did not want to be indebted. With the change to a bursary policy such individuals then decided to apply. However, an alternative explanation is considered below.

14.11 Estimating the share of NSFAS beneficiaries with family income above R122,000

The main method of estimating the difference in socioeconomic status of NSFAS beneficiaries after the policy change is to estimate the changes in the share and number of new NSFAS beneficiaries with incomes above R122,000 between 2017 and 2019. This was done using the available income data plus other data that were merged in and a simple imputation method. The 2019 incomes to 2017 prices deflated. The analysis above has shown that the applicant income data available seems to be reasonable and was used by NSFAS to make decisions about who was funded. But, as noted above, income data for a very large share of those who obtained funding in 2017 and a smaller but still large share in 2019, is missing.

To make progress the proportion of NSFAS funded students who have parental incomes above R122,000 in 2017 and 2019 using a simple cell mean imputation and the results above, was estimated. The share of individuals in each of the seven socioeconomic status categories that had family income of above R122,000 is used to impute that same proportion for the individuals in the same socioeconomic status category who did not provide household income. To believe this imputation one must believe that the distribution of incomes of those who did provide incomes was similar to the distribution of incomes in the same categories who did not provide incomes.

Table 42 shows the number of newly funded individuals with missing incomes, the actual number of newly funded individuals with incomes above R122,000 in the same 7 categories, and the estimated total number of newly funded individuals with incomes above R122,000.

The estimated share of newly funded students with family incomes above R122,000 increased from 9% to 23% between 2017 and 2019. These are fairly similar to the shares for those who actually reported incomes, shown in Table 39 above.[109]

The total increase in the number of newly funded students between 2017 and 2019 was around 30500, and so the increase in the number of beneficiaries with family incomes above R122,000 was about 58% of the total increase. Thus, as expected, a large share of the increase in beneficiaries from the new policy were those with incomes above R122,000. In the discussion of the household income distribution of South Africa and in Table 42 above it was showed that, adjusting for under-reporting of earnings, R122,000 was at the 66th percentile of the household income distribution. This means that 58% of the increase in NSFAS beneficiaries between 2017 and 2019 came from individuals in households in the top third of the South African household income distribution.

Table 42: Predicted Share above R122,000 by School Type

School Type	Missing Income		Income Above R122,000		Predicted above R122,000	
	2017	2019	2017	2019	2017	2019
Q1-3, SASSA=0	38722	30187	373	3254	4264	8269
Q1-3, SASSA=1	2230	8084	12	318	94	826
SASSA=1, missing quintile	330	442	0	39	0	96
Q4-5 or indep, SASSA=1	1012	3066	12	262	66	652
Q4-5 or indep, SASSA=0	16231	12522	353	5210	2052	10618
Missing Quintile: likely IEB	6308	5452	56	1368	392	3058
Missing Quintile, likely pre-2011 NSC	3190	2380	1	427	13	931
All	68073	62133	807	10878	6880	24450
Total newly funded					77080	107637
% of all newly funded above R122k					8.93	22.72

109 Given that quintile 1-3 and SASSA beneficiaries were means test exempt in 2017 and SASSA beneficiaries were means test exempt in 2019, one might expect that the imputed proportions above R122,000 would be lower than the actual proportions for those who provided income in both 2017 and 2019, since it was low-income individuals who were not required to provide incomes. But, as previously showed, the proportions giving household incomes across the different SES categories were (surprisingly) not very different.

One important question is why an estimated 42% of the increase in new funded students came from individuals with family income below R122,000, when such individuals would have qualified under the old NSFAS policy. As it has been showed above, newly funded students from UNISA undertaking higher certificates and bachelor's degrees made up half of the increase in the number of newly funded students between 2017 and 2019. To investigate this further, the previous analysis estimating the number of beneficiaries with family income above R122,000 but separately for UNISA and non-UNISA, is repeated. Table 44 shows the estimated number of students with family incomes above R122,000, excluding UNISA. Of these students, 9.5% were estimated to have family incomes above R122,000 in 2017 and this increased to 25% in 2019. The estimated increase in the number of funded non-UNISA students with family incomes above R122,000 was 14641 and the total increase in the number of funded non-UNISA students doing qualifications other than higher certificates was 14812. This means that almost all of the total increase in funded students at universities other than UNISA was estimated to be for students with family incomes above R122,000.

Table 43: Predicted Share above R122,000 by School Type for non-UNISA students

School Type	Missing Income		Income Above R122,000		Predicted above R122,000	
	2017	2019	2017	2019	2017	2019
Q1-3, SASSA=0	35839	23127	359	2879	4100	7287
Q1-3, SASSA=1	2034	7176	12	285	98	742
SASSA=1, missing quintile	219	201	0	18	0	43
Q4-5 or indep, SASSA=1	938	2753	11	243	61	599
Q4-5 or indep, SASSA=0	14872	10179	349	4831	1977	9563
Missing Quintile: likely IEB	5569	4079	55	1209	364	2652
Missing Quintile, likely pre-2011 NSC	1752	793	1	168	12	386
All	61223	48308	787	9633	6612	21273
Total newly funded					69517	84329
% of all newly funded above R122k					9.51	25.23

Note: Own calculations from from HEMIS, NSFAS and NSC

Table 44 shows the same figures as Table 43 but for UNISA newly funded students only. It is estimated that only around 3% of these students had incomes above R122,000 in 2017 and this increased to 13% in 2019. This implies that UNISA students come from lower income families, on average, than students at other universities. The increase in the number of funded students at UNISA between 2017 and 2019 was just under 16,000, and in 2019 only around 3,000 of these were estimated to have family incomes above R122,000. This means that only 17% of the increase in the number of students at UNISA came from students with incomes above R122,000.

Table 44: Predicted Share above R122,000 by School Type for UNISA students

School Type	Missing Income		Income Above R122,000		Predicted above R122,000	
	2017	2019	2017	2019	2017	2019
Q1-3, SASSA=0	2933	7060	14	375	162	966
Q1-3, SASSA=1	196	908	0	33	0	84
SASSA=1, missing quintile	111	241	0	21	0	53
Q4-5 or indep, SASSA=1	74	313	1	19	5	52
Q4-5 or indep, SASSA=0	1359	2343	4	379	34	910
Missing Quintile: likely IEB	739	1373	1	159	13	379
Missing Quintile, likely pre-2011 NSC	1438	1587	0	259	0	551
All	6850	13825	20	1245	213	2994
Total newly funded					7563	23308
% of all newly funded above R122k					2.82	12.85

Note: Own calculations from from HEMIS, NSFAS and NSC

The analysis has thus shown that the different components of the new 'free higher education' policy had different effects on NSFAS funding and higher education enrolment. It was estimated that almost all of the increase in the number of students on NSFAS that were studying at universities other than UNISA came from students with incomes above R122,000, and that a quarter of all these new NSFAS students in 2019 had incomes above this threshold. Prior to that it was shown that the R122,000 threshold was at approximately the 66th percentile of the income distribution. This means that almost all the benefit of the policy for newly-funded undergraduate students at contact institutions went to individuals from households in the top third of the income distribution. It was also shown that the picture was quite different for the increase in the number of NSFAS-funded students studying at UNISA, where only 17% of that increase consisted of students estimated to have had family incomes above R122,000.

14.12 Changes in NSFAS funding amounts

Up until now this section has focused on whether an individual received NSFAS funding and whether the policy change in 2018 made the policy more regressive in terms of the allocation of funds across the national income distribution. It has been shown that the share of higher income individuals (those with family income above R122,000) funded by NSFAS increased substantially between 2017 and 2019. The analysis in this section examines how much funding went to the funded individuals, whether there is any relationship between the amount of funding received and the family incomes of those who both benefited from NSFAS and who reported family income, and how this changed between 2017 and 2019.

In 2017 the NSFAS used the applicant's family income to determine the applicant's expected family contribution - the amount that the student and their family should have to contribute to their studies. The smaller the family income, the smaller the expected family contribution, and thus one would expect the larger the funding received from NSFAS. There was also a cap on total funding received, which was R76000 in 2017 (NSFAS 2017b).

In 2018 and 2019 the new policy meant that the funding for contact students included the full cost of tuition and accommodation if in a university residence, or funding for private accommodation with a cap of the maximum cost of equivalent university accommodation (DHET 2018a). There were also standardised amounts for books, food for those in self-catering residences or private accommodation, and transport for those living at home more than 30kms from the university.

Distance students received funding for tuition and learning materials allowance only. Given the different funding regimes, it would have been expected that funding amounts were negatively correlated with family income in 2017 and perhaps uncorrelated with family income in 2019, which would mean that the new policy was less progressive than the old one. Provided below are some basic descriptive statistics on NSFAS funding in the years 2017-2019 for all students and then focusing on the newly funded students, as was done in the previous analysis in this section. Subsequently, the primary question of interest as described above, is examined.

Table 45 shows descriptive statistics on the number of students funded by NSFAS for 2017-2019. The total number of students increased by 32% from just under 300 000 to just under 400 000. It was showed above that the number of newly funded students increased by 40%, from 77 000 to 107 000 between 2017 and 2019. Table 46 shows that the number of new UNISA students increased from 7500 to 30 500 between 2017 and 2018 and then declined to 23000 in 2019, meaning that the UNISA share rose from around 10% of all new NSFAS funded students in 2017 to 27% in 2018 and then declined to 22% in 2019. This large increase in the share of UNISA students amongst all newly funded students is an important consideration when looking at changes in funding amounts, since the funding provided for each distance student is much lower than for each contact student, as shown below.

Table 45: NSFAS Funding Numbers[110]

	2017	2018	2019
Total Funded Students	296945	366981	393042
Total Funded Students, excl UNISA	264339	298095	309169
Total Funded Students, UNISA	32606	68886	83873
Total New Funded Students	77080	113260	107637
Total New Funded Students, excl UNISA	69517	82498	84329
Total New Funded Students, UNISA	7563	30762	23308

Note: Own calculations from from HEMIS and NSFAS

110 These numbers are slightly different to the ones provided in Section 0.

Table 46 shows descriptive statistics on the funding amounts received by the NSFAS beneficiaries. The amounts are adjusted for inflation and shown in 2019 rands. Total NSFAS funding to students increased by 49% in real terms between 2017 and 2019, whilst funding to new first year students increased by 69%. It is the change for new first year students that is important for longer term changes- since by 2019 only around 42% of all NSFAS-funded students were funded under the new, more generous conditions. Mean real funding for new students increased from R50000 to R60000 per annum, or by 20%, between 2017 and 2019. When excluding UNISA the increase was from R54000 to R73000, an increase of 35%. And the increase for UNISA students was from R11000 to R13500, a 23% increase. The overall increase was smaller than both UNISA and non-UNISA increases because of the composition effect of a large increase in the share of all newly funded students that were at UNISA, which was showed in Table 46.

Table 46: NSFAS Funding Amounts

	2017	2018	2019
Total Funding (billions)	14.93	19.33	22.33
Total Funding - new students (billions)	3.84	5.83	6.50
Mean funding amt- all students	50281	52680	56820
Median funding amt- all students	51763	56314	63010
Mean funding amt- new 2017 students	49756		
Median funding amt- new 2017 students	51500		
Mean funding amt- new 2018+ students		51459	60351
Median funding amt- new 2018+ students		54306	65870
Mean funding amt- new 2017 students, excluding UNISA	53962		
Median funding amt- new 2017 students, excluding UNISA	54245		
Mean funding amt- new 2018+ students, excluding UNISA		64850	73294
Median funding amt- new 2018+ students, excluding UNISA		63918	74366
Mean funding amt- new 2017 students, UNISA only	11091		
Median funding amt- new 2017 students, UNISA only	10294		
Mean funding amt- new 2018+ students, UNISA only		15547	13523
Median funding amt- new 2018+ students, UNISA only		16203	12750

Note: Own calculations from HEMIS and NSFAS. Amounts expressed in Dec 2019 rands

14.13 The NSFAS funding and family income

The analysis now turns to examine how the funding amounts for those who were funded by NSFAS were distributed across socioeconomic status, using family income in the NSFAS data where this was available and school type, for newly funded students in 2017 and 2019. As in the analysis above, only information about incomes for a small proportion of newly funded students in 2017 and a higher, but not very large, proportion in 2019, was available.

There has been no definitive study of the full costs of attending higher education institutions. Nevertheless, to put the figures above and below in context, it is useful to consider some rough approximations used in other studies. Estimates range between R90,000 (2018 Rands) in a study by the World Bank (Dessus, Hanusch, and Nagashima 2019), R100,000 (N Branson, Hendry, and Ranchhod 2020) and R135,000 in one of the submissions to the Commission on Free Higher Education (Commission of Inquiry into Higher Education and Training 2017, 488). On the basis of those and the above evidence, one could call into question the claim that the new NSFAS policy really did fund 'full cost of study'.

Figure 38 shows the total funding received by family income levels in 2017. Each bubble represents an income range and the position of the bubble on the y axis is the average funding amount received for all funded individuals in that family income range. The size of the bubbles indicates the number of students with family incomes in that family income range. Funding amount seems to be first increasing with family income and then perhaps decreasing around R100 000. This is surprising because, as noted above, the policy in 2017 implied that students with lower family incomes would receive more funding.

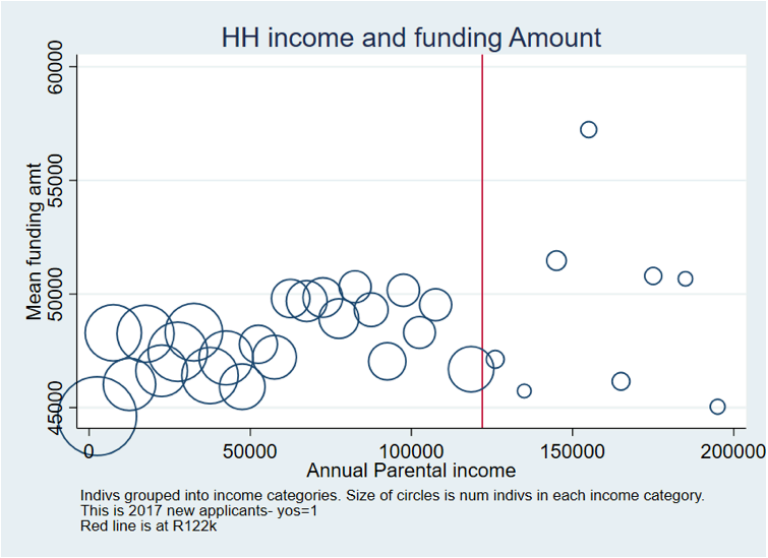

Figure 38: Funding amounts and annual parental income for new 2017 funded students

Figure 39 shows the same relationship but for 2019 new funded applicants. There is a much stronger positive relationship between family income and the amount of funding received, with those reporting family incomes just under R350,000 receiving around 35% more funding than those with the lowest incomes, on average. Given that the full cost of fees and accommodation at the student's university were paid but standardised amounts for food, books and transport were provided to all students (although this differed between contact students and distance), the relationship shown in Figure 39 is likely driven by higher income students attending universities with higher fees and higher costs of accommodation, on average, as well as the fact that distance students, who are almost all UNISA and on average poorer, received allowances only for learning materials and not accommodation, travel and incidental allowances.

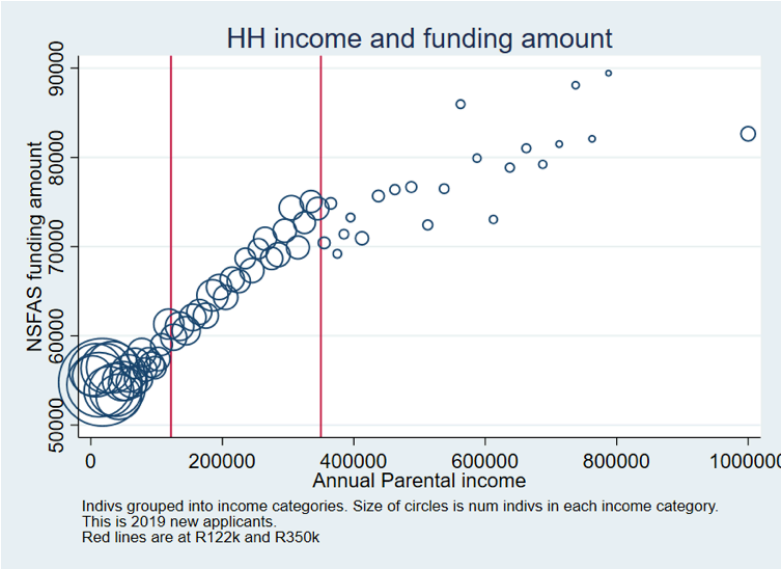

Figure 39: Funding amounts and annual parental income for new 2019 funded students

Figure 40 shows the same graph as Figure 39 but includes only contact students, since it was noted that distance students (90% of whom attend UNISA) received less funding than other students under the new policy. The relationship is not as strong as in Figure 39, but those with the highest incomes still received funding that was 35% higher on average than those with the lowest incomes.

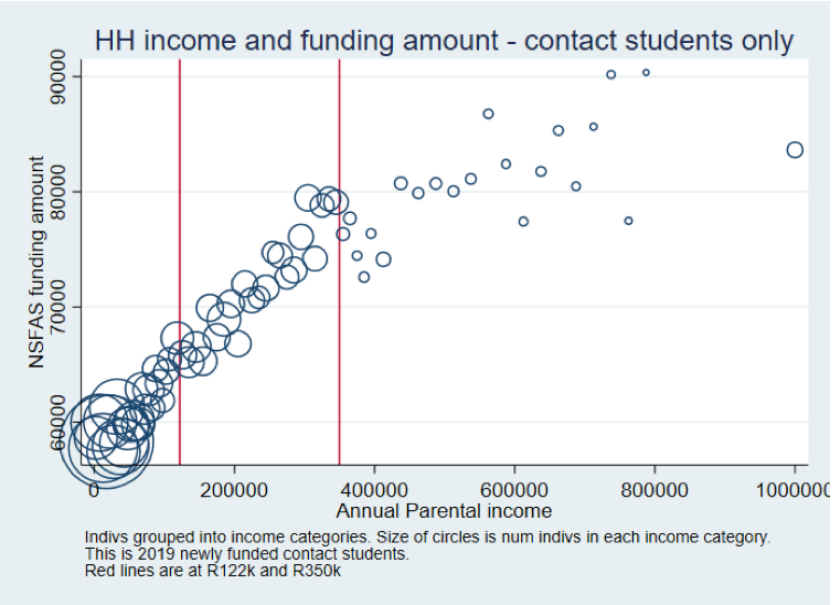

Figure 40: Funding amounts and annual family income for new 2019 funded students, Contact Only

Another way of describing how funding was distributed by family income is the change in the share of funding going to those with household incomes above R122,000, similar to what was showed above for funded or not funded students. Given that the family income missing rate was similar across socioeconomic status, and that the imputation above did little to change the results from just those who reported family income, this is estimated only for those who provided household income. It is found that in 2017 around 9% of funding went to those with family incomes above R122,000, which is about the same as the share of individuals who were estimated to have family incomes above R122,000, because funding was not strongly correlated with family income. In 2019 it was estimated that 29% of funding went to those with family incomes above R122,000, whereas it was estimated that 23% of newly funded students in 2019 had family incomes above R122,000. The difference is because family income is positively correlated with the amount of funding in 2019, as showed above.

In the theoretical section in this chapter, it was assumed that the cost of attending university, and thus the state funding of that cost, was constant across family incomes. By contrast, in this section it has been shown that funding, and therefore costs, were positively correlated with family incomes in 2019. Hence the policy change resulted in a funding allocation that was even

more regressive than would be the case if only the threshold changed and higher income students benefitted from this change, but the funding amounts were the same across family incomes.

14.14 Conclusion

The new 2018 NSFAS policy was partly motivated by its purported reduction of inequality of various forms (DHET, 2018a: 2). The theoretical analysis and data analysis has instead shown the new policy implemented in 2018 was more regressive than the policy implemented in 2017.

Theoretically, it has been shown that the design of the policy was likely to increase inequality in funding in the short run by expanding access to students with incomes up to R350,000 registering in 2018 and subsequent years, while keeping the cap at R122,000 for students who had registered in 2017 or earlier years. A less regressive policy with the same budget would have raised the threshold by a smaller amount and applied the policy to all students already in higher education, not just new students.

The General Household Survey was then used to describe the overall household income distribution, showing that even after considering under-reporting of earnings, the old and new family income thresholds were at the 66th and 88th percentile of the household income distribution, which DHET knew and acknowledged in implementing the new policy. The GHS was also used to describe the income distribution of public, undergraduate student households. It was found that the GHS is missing some tertiary students, but that even accounting for missing residence students, who are more likely to be NSFAS funded and therefore lower income students, the GHS shows that student households have much higher incomes than non-student households. It was also shown that roughly 95% of households in the bottom three quintiles of the income distribution have no students in tertiary education and thus the new policy was likely to do nothing for these households. Unfortunately, the GHS sample size is too small to pick up possible changes in the income distribution of students resulting from the new 2018 policy and there are no direct questions on NSFAS receipt.

To make progress in investigating the impact of the new policy on inequality in funding, the analysis used the NSFAS administrative data on new beneficiaries, as well as data from the DBE on the type of school attended by the beneficiaries, where this was available. It was

showed that 27% of the increase in newly funded beneficiaries between 2017 and 2019 went to individuals who attended better-resourced schools, a proxy for socioeconomic status. The analysis further used the income data reported by NSFAS applicants to impute the share of all new beneficiaries in 2017 and 2019 with incomes above R122,000, the old income threshold. Before doing so, it was showed that the income data was reasonable, it correlated with external data on school type, as well as SASSA beneficiary status, and that NSFAS seems to have used the income data it had to make decisions about who to fund. It was showed that the increase in individuals estimated to have incomes above R122,000 was around 58% of the increase in new beneficiaries between 2017 and 2019.

But the overall changes hid very important differences between UNISA and all other universities. Between 2017 and 2019, increases in the number of individuals registering for UNISA higher certificates and bachelor's degrees constituted around 50% of the total increase in newly funded NSFAS students. The large increase of those registered for higher certificates may be related to a little-discussed part of the new NSFAS policy that allowed students who were funded by NSFAS for a higher certificate to then obtain funding for a second qualification once they completed the higher certificate. It is unclear why only UNISA had very large increases in higher certificates.

At non-UNISA universities the increase in the total number of funded students was about the same as the increase in the number of funded students with incomes above R122,000, meaning that the policy benefited students from higher income families. The funded students at UNISA had lower incomes, and it was estimated that only 17% of the very large increase in funded students at UNISA had incomes above R122,000.

In the theoretical section discussing the change in the NSFAS policy in 2018 it was assumed that the funding amounts provided by the state declined with household income under the 2017 policy and that they were constant under the new policy. In the empirical work it was showed there was surprisingly not a strong negative relationship between household income and funding amounts received in 2017- although this finding is based on the 9% of funded individuals who had family income in the data that was accessed. But it was showed that in 2019 the policy resulted in higher income beneficiaries receiving higher levels of funding: funding for those just below the R350,000 threshold was around 35% higher on average than those reporting the lowest household incomes. Because of this positive correlation between household income and funding amounts, it was estimated that the

share of funding going to newly funded recipients with household incomes above R122,000 in 2019 was 29% of all funding for new NSFAS funded students, whereas only 24% of newly funded students were in this income group. This meant that the new policy was even more regressive than represented in the theoretical analysis.

One issue that is only addressed indirectly above, is how the policy change may have altered the composition of new entrants by relaxing or eliminating credit constraints – a subject explored previously in South Africa by Lam *et al*. (2013). As discussed previously, and further in the next section, for the purposes of identifying the direct causal effect of the funding change on student outcomes it is preferable for there not to be a change in the composition of new entrants. It has been argued that this is plausible for 2018 entrants given the late timing of the announcement and the analysis envisaged for this report was premised on that. In particular, this appears to hold for the core sample of interest in this report: students doing contact, traditional undergraduate degrees at universities. However, the analysis in this section has shown that taking into account a broader sample that includes non-contact programmes can present a much more complex picture. Moreover, in the context of the broader objective of increasing equity in the higher education system, improving access for credit constrained potential students is one desirable outcome of the policy. For instance, it has been suggested – see discussion in Section 0 – that the proportion of NSFAS beneficiaries from households receiving SASSA grants has increased substantially. Given that such individuals would likely have qualified under the previous threshold, one hypothesis is that – if accurate – the increase could be driven by the appeal of full bursary funding rather than part-bursary, part-income contingent loan. These and other questions are left for subsequent research, using additional years of NSFAS data.

15. Impact of the new funding policy

15.1 Introduction

It is estimated that the cost of attending contact universities far exceeds mean household income for close to half the population in South Africa (Cornerstone Economic Research 2016a). Recognising this, the state invests significant funds towards financially assisting higher education students via the NSFAS and has done so since 1997. However, as outlined earlier in section 12, criticism of the structure, administration, and extent of funding from the NSFAS

resulted in a sudden and unexpected change in the NSFAS funding model from 2018 onwards. The three primary changes for the 2018 entering cohort were:

- The family income eligibility threshold of R122,000 applied in 2017 was increased to R350,000 per annum.

- Financing was *via* a full bursary, rather than the previous combination of a loan with a performance-based bursary conversion component.

- Financing was for full cost of attendance based on actual institutional costs, with the previous funding cap removed.

Students from previous entry cohorts retained the prior funding threshold and caps, but also moved to a full bursary rather than the loan-bursary combination.

Utilising university and schooling data from 2013 to 2019, the analysis employs data to assess the impact of the policy shift on re-enrolment and performance across student cohorts. Specifically, the analysis investigates the following questions:

a) Has student performance and retention changed for cohorts of students (NSFAS funded or not) entering after the implementation of the new funding policy?

b) Has the extension of funding to the R122-350K income band resulted in improved outcomes for students in this income band?

c) Have the new conditions of the bursary scheme impacted student outcomes for those in the <R122K income band?

These questions are considered through a gender lens.

While the primary objective of the increase in student funding related to equity in accessing higher education, intuitively one may expect – or hope – that funding support also leads to

improved outcomes. For example, one may hypothesise that financial stress negatively affects student performance or that variability in households' economic circumstances could cause student dropout. If such negative relationships exist, access to comprehensive funding could improve student performance and completion rates.[111]

One of the aims of this analysis is to contribute to scholarship in the field of higher education funding in two key ways. Firstly, in analysing the effects of the policy change on student outcomes, this work contributes to a better understanding of the role of student financial aid in the process of creating graduates in South Africa. This is important in understanding how accessing higher education opportunities is converted into outcomes such as graduation (Cardak and Vecci 2016), as well as understanding how efficiently student financial aid policy is achieving some of its aims. For instance, if funded students are dropping out or remaining enrolled without progress, then funding is not achieving the objective of enabling those without adequate resources to obtain university qualifications. This could inform reconsideration of the funding approach, whether in increasing the funds provided, changing the structure of the funding support, or reducing the number of funded students.

Secondly, it is becoming increasingly important to understand the effects and benefits of state expenditure. The Department of Higher Education and Training (2019), following the National Development Plan (NDP) (Republic of South Africa 2012), aims to increase the number of university enrolments to 1.62 million by 2030, up from 1.036 million enrolments in 2017. That now occurs in a context of falling household income owing to a Covid-19 related employment shocks (Jain *et al*. 2020) and subsequent increases in demand for financial aid – NSFAS saw a 25% increase in applications for the 2021 academic year (Shoba 2021). In 2023 the Minister of Finance and the National Treasury also signalled their intentions to substantially cut back on a wide range of public expenditure areas in order to achieve macro-fiscal objectives such as 'fiscal consolidation' (National Treasury 2023). Moreover, as it was discussed in section 14, the absence of broader funding and social welfare support for working age South Africans creates a chasm between those who enter the higher education system and those who do not. In this context it is particularly important to regularly assess how equitable and effective the distribution of funding is for youth who are not in employment. In section 14 the focus was

111 Note that such effects on measured outcomes would not occur under all circumstances were learning substantively improved. For example, in higher education systems where it is common to 'mark to a curve' an aggregate improvement in learning may not be observable from student grades.

on equity issues, whereas in this section the focus is on outcomes.

The findings of the analysis are somewhat mixed. Regarding *in-year student performance*, it is found that the 2018 cohort - the first cohort entering university in the new policy environment - did not exhibit significant improvements in first-year performance compared to the 2017 cohort. On the other hand, both cohorts experienced a notable decrease in second year *dropout rates* when compared to earlier cohorts and the 2018 group shows larger declines. Gender differences were evident on all measures examined, with performance and dropout of female students seemingly being more sensitive to the policy changes. Changes in dropout rates were most pronounced among students from lower school quintiles and university of technology students. A larger share of students in these groups are eligible for funding, which provides support for the observed changes across cohorts being attributable to the policy.

The rest of the section is organised as follows. The related literature on the impact of financial aid on student performance is discussed first. This including the findings from three studies from South Africa. Subsequently, the data used in the analysis is described, as well as the available outcome measures, together with their limitations. To mitigate various challenges with the data, it was necessary to define the analysis sample as South African students over the age of 19 who have NSC records. The analysis is further restricted to students in traditional degree and diploma qualifications in order to reduce complex variation that may detract from identifying the empirical relationships of interest. Later in this part of the report, the empirical challenge faced in identifying the impact of the changes in the NSFAS policy is described, as well as the descriptive and regression techniques based on cohorts, institution types and school quintiles used to provide suggestive evidence of policy impact. This is followed by a discussion of the relationship between performance and funding status in year 1, and dropout in year 2.

15.2 Related literature

The relationship between financial aid, enrolment, persistence, and completion has been extensively explored internationally, particularly in the United States of America (USA) and other 'developed' countries. Recent comprehensive summaries, such as that of Dynarski, Page, and Scott-Clayton (2022) provides an overview of this rich literature. Financial aid is typically found to increase the probability of postsecondary student persistence and degree completion by between 2 to 3 percentage points. The size of the estimated effect varies by category

of aid (need-based versus merit-based), the amount of aid given, and the design of the aid programme or intervention. Like all other forms of aid, student financial aid lowers the cost of the service/commodity, in this case higher education, providing financial benefit, or at least reduced cost, to enrolment. By lowering the direct costs of attendance, the cost versus benefit shifts the recurrent decision towards persisting (Nguyen, Kramer, and Evans 2019). Students can devote more time to academic work and less time to paid work, which should translate into higher levels of academic success (see for instance Bettinger *et al*. 2019)). Therefore, sufficient funding serves as a disincentive for students to seek employment opportunities as their financial needs are (better) taken care of. Further, the periodic renewal of grant aid can exert pressure on students to persist from one term to the next as a result of the guaranteed financial aid in subsequent years. It can be argued that if aid encourages enrolment into higher education then the absence of aid in consequent years can compromise students' finances, their performance and their ability to complete.

Loan aid also functions as a price subsidy and encourages college enrolment (Dynarski and Scott-Clayton 2013; Van der Klaauw 2002). However, loans are found to be less favourable compared to other forms of aid (Long 2010; Herzog 2018; Dowd and Coury 2006). This is due to long term impacts associated with repayment and debt accumulation which can affect students' decisions both during their studies and long after completion. As students assess their ability for college work and the private financial returns to investing in education, students with loans are more likely to be dissatisfied with the investment decision in education and withdraw compared to students without loans (Dowd and Coury 2006). Low-income students tend to be risk-averse and hence loans are particularly unattractive for them (Boatman, Evans, and Soliz 2017). They are less willing to take up loans because of the perception that the financial benefits from investing may not cover the costs from loan indebtedness. These considerations will of course vary according to fields of study, institution, labour market and a range of other personal and societal factors.

The challenge that researchers face, as reported in the literature, is to isolate the causal effect of income on education outcomes (or levels), recognising that part of the observed relationship reflects early investments made during childhood rather than credit constraints per se (Carneiro and Heckman 2002). Another empirical challenge is to identify which students have binding credit constraints. As pointed out by Dynarski (2002), subsidising the cost of education lowers costs or increases returns and therefore will increase demand, regardless of how constrained individuals

are. The effect will be magnified in environments where credit markets are imperfect. Educational investment models predict that students who experience binding income constraints will benefit most from access to aid. Therefore, some studies have investigated the relationship between income and educational attainment among low-income students (Cameron and Taber 2004; Brown, Karl Scholz, and Seshadri 2012; Lochner and Monge-Naranjo 2011). Others have used novel techniques to identify those students who are credit constrained (Stinebrickner and Stinebrickner 2008; Andrews, DesJardins, and Ranchhod 2010; Linsenmeier, Rosen, and Rouse 2006).

The literature exploring the connection between income and higher education enrolment and attainment in developing countries is less well established. Solis (2017) uses a regression discontinuity design and finds that students in Chile who score just above the loan cut-off have a 100 percent increase in immediate enrolment and are 50 percent more likely to ever enrol. In addition, loan access eliminates the income gap in enrolment and years of attainment. Melguizo, Sanchez, and Velasco (2016) use a quasi-experiment that resulted from Colombian students being eligible for financial aid based on their school leaving score, which varies by geographic area. This means that academic ability varies within the group that receives funding and allows the authors to identify the impact of access to financial aid on enrolment and persistence. They find increased enrolment and reduced dropout for students who receive support. Finally, Huang *et al*. (2018) use different matching techniques to examine the impact of receiving a loan or needs-based funding in China. They find no impact on academic outcomes, but a small increase in employment among those receiving loans.

In the South African landscape, Lam *et al*. (2013) use longitudinal data and show a stronger relationship between household income and university enrolment at the higher end of the income distribution. In other words, eligible individuals higher up the income distribution were more likely to enrol, suggesting a potential role for credit constraints in enrolment decisions. Gurgand, Lorenceau, and Mélonio (2023) illuminate this relationship more rigorously using matched individual data from a credit granting institution (Eduloan), combined with data from South Africa's Department of Higher Education data (HEMIS) between 2004 and 2007 and a regression discontinuity design for identification.

Applying a gendered lens, Gurgand, Lorenceau, and Mélonio (2023) show that female loan recipients were more likely to enrol, confirming the importance of credit constraints

to university access in South Africa. In contrast, male applicants to Eduloan did not exhibit a similar enrolment sensitivity to loan receipt. The authors propose that this discrepancy between men and women can arise from credit constraints or individual preferences. If both men and women faced similar credit constraints, this difference in impact would suggest that women either have lower returns to education or face higher costs when credit-constrained. Alternatively, the utility men and women derived from education and debt may be similar, but in the absence of Eduloan they encounter different credit constraints. Importantly, the study found that while low income applicants were more sensitive to loan receipt, the 'overall male-female contrast in loan impact is not driven by an income composition effect': indicating that women experience a higher loan impact within each income group. These findings hold relevance for the public university sector in South Africa today. Female participation, progress, and graduation rates have shown sizeable improvements over the last decade, leading to a widening performance gap between women and men. While the low performance of male students is concerning and warrants interrogation, it is investigating whether expanded access to funding through the revised NSFAS scheme played any role in such trends. Eduloan requires students to provide collateral and repayment, and therefore targets a different group of students typically eligible for NSFAS funding.

The findings of the study by Gurgand, Lorenceau, and Mélonio (2023) shed light on South African financial aid, persistence, and completion in higher education but the relevance of these findings to the broader context of the NSFAS policy remains an area for research. Lastly, Branson, Hendry, and Ranchhod (2020) examine the importance of eligibility for continued financial aid for university persistence and performance in South Africa. Using institutional data from the University of Cape Town (UCT) and difference-in-differencing models, they assess the implication of the enforcement of the 50% rule for continued financial aid that occurred in 2015. And they consider differential impacts for relatively lower-income students who received funding from the National Student Financial Aid Scheme (NSFAS). The policy is estimated to have resulted in a 5.5 percentage point decrease in re-enrolment rates amongst students who received non-NSFAS funding from the university, while the corresponding estimate amongst NSFAS students was approximately 13 percentage points. These findings suggest that credit constraints are binding on the decision to re-enrol, but only for a relatively small proportion of the students who were affected by the change in the policy.

Other notable contributions to the South African literature are de Villiers, Van Wyk and Van Der Berg (2013) and Wildschut, Megbowon and Miselo (2020). The former conducted a cohort

analysis of NSFAS beneficiaries entering the system from 2000 to 2004. Overall, they conclude that the NSFAS beneficiaries perform better on average than non-NSFAS beneficiaries and that, while there was room for improvement, the overall performance of the NSFAS recipients reflected success of the scheme. The study does not attempt to formally infer any causal relationship between funding and performance. Wildschut *et al*. (2020) take a different approach, examining a cross-sectional sample of approximately 30,000 students in two universities in 2018. They use descriptive statistics and multiple regression analysis to examine the association between funding source and academic performance, where performance is measured using the student's average annual score across courses. The study finds a negative, bivariate association between the NSFAS funding and performance, and a small, positive association when controlling for other factors in a multivariate regression.

As described, the South African literature on the causal link between outcomes and financial aid is limited. The extension of the income threshold for cohorts entering from 2018 onwards and the shift from loan to bursary support for all students present an opportunity to assess the impact of credit rationing on student persistence and performance.

Utilising university and schooling outcome data from 2013 to 2019, the analysis employs careful data work to assess the impact of the policy shift on re-enrolment and performance across student cohorts. The gender differences in performances following the approach of the Eduloan study, are also examined.

15.3 Data, sample and outcomes

The analysis in this section draws on three sources of institutional data, and small area level information from the Census 2011. First, the analysis uses longitudinal, individual-level data on students entering their first undergraduate (UG) qualification[112] in South African public contact institutions between 2013 and 2019 from the Higher Education Management Information System (HEMIS). Constructed performance measures, as discussed earlier, are used. The sample is restricted to students in full-time contact diploma, bachelor, or professional degree programmes.[113] The sample is further restricted to South African students and those who are

112 Called first time entering new students or FTEN students.
113 This restriction removes most UNISA students and therefore UNISA is excluded from the analysis.

over the age of 18 at the point of first enrolment and those with linked NSC-HEMIS data (see discussion below). Later, the sample is reduced further to those who are 19 or older for reasons explained below.[114] Note that, given these sample restrictions, the descriptive statistics and associated trends will not necessarily be the same as those in Section 3, nor that measures of funding status in this section will be similar to those in Section 4. HEMIS data is relied on as it provides information on all university students within the public higher education system. The analysis is of student outcomes for the university system as a whole and grouped into Traditional Universities (TUs), Comprehensive Universities (CUs) and Universities of Technology (UoTs).

As in the preceding analysis, the HEMIS data is matched to auxiliary datasets. The first auxiliary data source is a database of all NSFAS applicants in calendar years 2017, 2018 and 2019. Although HEMIS includes a variable on a student's NSFAS status, it varies in completeness and accuracy across years. Matching the NSFAS applications data to the HEMIS data therefore provides a more accurate way of identifying students who are funded via NSFAS. It was initially intended that the NSFAS applications data would be used to identify the income bands into which students fall and, therefore, as a means to identify students who became eligible under the new NSFAS policy. Unfortunately, a significant proportion of the data on income is missing in the NSFAS records. As mentioned at the beginning of this report, and described in more detail in Section 4, there is effectively no income information for 2018 applicants and only partial information for the 2017 and 2019 years. That creates a significant impediment to the preferred identification strategy, because it is impossible to be certain about which students benefitted from the new policy and which did not. As a second-best approach school quintile is used as a proxy for eligibility as described in section 14.

Figure 41 presents the number of funded students in the analysis population by year of university entrance. The figure shows an increase from 73670 funded students in 2017 to 86934 in 2018, the first year of the new policy implementation. Students in the 2018 and 2019 cohorts were eligible for funding under the new R350,000 income threshold, while students from the 2017 cohort were only eligible under the previous income threshold (R122,000).

114 The age restriction is to avoid selection in the 2018 cohort. Students from the 2017 NSC cohort born in year 2000+ were not matched to HEMIS data. These students would be 18 or younger if they enrolled in the year after completing their National Senior Certificate (NSC).

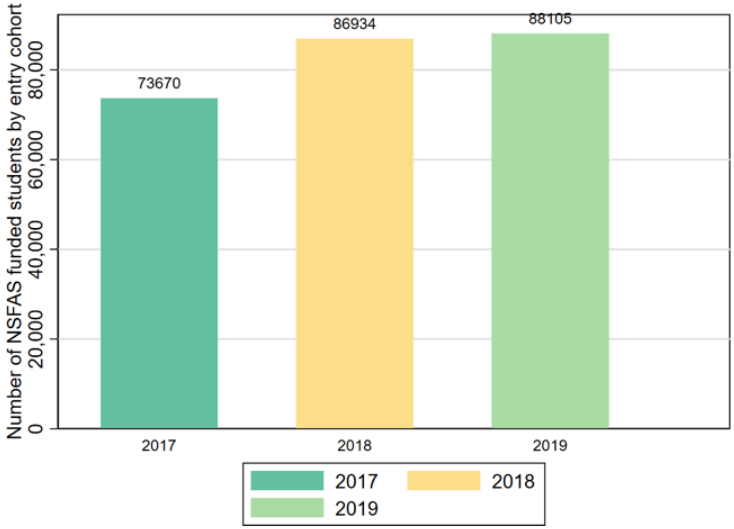

Figure 41: Number of NSFAS funded students by entry cohort

Figure 42 presents the share of students funded by institution type and entry cohort. It can be seen that the share of students funded is lowest in TUs and highest in CUs (albeit marginally higher than UoTs). The increase across cohorts is however largest for UoTs.

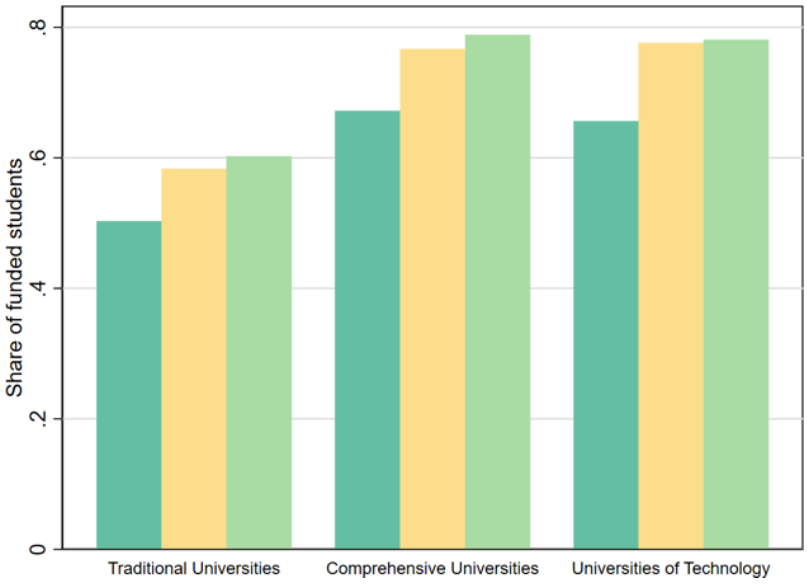

Figure 42: Share of funded students by cohort and institution type

The absence of household income information for NSFAS recipients means that the increase in funded students cannot be decomposed into those who were already eligible and those who became eligible with implementation of the new policy (threshold). Partly to remedy this problem, the analysis draws on two additional auxiliary datasets. The first is the annual National Senior Certificate (NSC) records between 2011 and 2019. These are individual-subject-level records of all students who wrote the NSC during this time period. Learners from the NSC records that enrol in public higher education institutions within South Africa are linked to HEMIS. In addition to learner demographic characteristics and scores, the data contains school quintile. The second dataset is Census 2011 information available at the small area level. Measures of average characteristics are constructed from the census and are then mapped to students via their home postal code (Culligan, 2022). This allows the identification of the socioeconomic circumstances of the postal code (as measured by the Census 2011) in which the student's home is located.

Before proceeding, it is important to take stock of the current limitations in the NSC-HEMIS matched data. Students who wrote the NSC in 2017 and were born from year 2000 onwards are not linked to HEMIS data because of incomplete ID numbers that resulted in failed matches. Given that a majority of students enrol in the year after they complete the NSC, this mostly impacts the 2018 HEMIS cohort but will also impact the 2019 cohort (for those entering two years after NSC completion). This is evident in Table 47 where the share with missing NSC results increases from 17.9% in the 2017 entrance cohort to 29.6% in the 2018 cohort and 20.8% in the 2019 cohort.[115]

115 This limitation will be addressed in later versions of this work but due to obtaining corrected data very late in the research process it was not possible to update the analysis in the time available.

Table 47: Student characteristics: 2013-2019 entry cohorts

HEMIS information:	2013	2014	2015	2016	2017	2018	2019
TU	.473	.479	.478	.477	.48	.489	.49
CU	.236	.245	.245	.241	.218	.221	.232
UoT	.291	.276	.277	.283	.302	.291	.278
Age	20.31	20.207	20.3	20.317	20.393	20.462	20.464
Female	.538	.535	.533	.53	.528	.536	.55
African	.7	.697	.711	.731	.747	.752	.754
Coloured	.071	.072	0.71	0.73	.065	.064	.062
Indian	0.46	.047	.032	.029	.029	.028	.029
White	.181	.181	.183	.163	.152	.145	.138
Other/unknown	.002	.002	.004	.004	.007	.011	.016
Degree	.652	.661	.662	.655	.657	.674	.686
NSC information:							
NSFAS funded - HEMIS	.269	.253	.218	.283	.314	.384	.473
NSFAS funded	0	.001	.001	.001	.557	.646	664
No school info	.242	.16	.144	.12	.111	.103	.177
NSC average	64.908	64.604	64.366	63.959	63.739	63.517	63.626
School's NSC average	40.238	45.754	46.481	47.411	46.916	46.388	43.513
Quintile 1–3 school	.411	.434	.453	.46	.489	.513	.509
Quintile 4 school	.081	.083	.079	.076	.078	.076	.098
Quintile 5 school	.23	.232	.222	.215	.202	.191	.232
Missing Quintile	.279	.252	.247	.249	.231	.221	.16
Postal code information:							
Annual hh inc	138369.6	138438	137865.1	134019.5	131238.8	129656.6	129862.6
log annual hh inc	11.495	11.493	11.482	11.461	11.437	11.424	11.427
Highest education	7.134	7.114	7.079	7.03	6.974	6.935	6.918
No schooling	.069	.07	.071	.072	.074	.075	.075
Grade 12	.178	.177	.174	.173	.171	.169	.168
Diploma or degree	.086	.085	.085	.082	.08	.079	.079
Employed	.491	.491	.49	.488	.485	.483	.482
Electricity	.775	.773	.769	.765	.757	.751	.749
Internet	.115	.115	.114	.11	.107	.105	.106
Piped water	.499	.496	.488	.482	.47	.462	.461
Computer	.257	.257	.253	.247	.24	.236	.236
Observations:							
NSC-HEMIS matched obs	76101	84874	81502	88814	86731	88492	79653
Number of students (entry cohort)	100332	101072	95160	100967	97511	98667	96751

Sample: South African students in degree and diploma qualifications, 19 or older

Note that the other reason students could have missing NSC information is that they wrote the Independent Electoral Board (IEB) examination rather than the NSC examination. Schools that write IEB are most often independent (private), charge fees and typically serve higher SES students. However, 45.6% of students in the group with missing NSC information are NSFAS funded in the 2017 cohort, indicating that students from a range of backgrounds attend these schools and/or that this group could have missing NSC information for other reasons (such as that they are foreign students). The increase in the share to 59.3% in the 2018 cohort aligns with the latter point; students from the 2018 cohort with missing NSC include students missing NSC because of their birth year.

Students without NSC-HEMIS matched data are excluded from the analysis sample. Finally, some students are matched to an NSC record, but do not have information on their schools' quintile. This represents 9.2%, 7.9% and 8.0% of students in the 2017-2019 cohorts. These students are retained in the analysis sample.

An additional challenge is encountered as a result of changes in performance in 2020 due to Covid-19. Dropout increased in 2020 in South African universities, but funded students within institutions that experienced increases appear to have been partially protected (Branson and Whitelaw, 2023). Furthermore, Whitelaw, Branson, and Leibbrandt (2023) illustrate that performance improved, potentially artificially, in 2020 with students in the lowest performance quintiles experiencing the largest changes. Therefore, although the 2020 data was available, it was excluded from the analysis as the effect of the Covid-19 pandemic and policy responses would generate misleading conclusions. This unfortunately means that the effect of the new policy on graduation in minimum time, cannot be examined. Since this leaves for the analysis only first year outcomes for the 2019 cohort and first and second year outcomes for the 2018 cohort, performance is examined only in years 1 and 2.[116]

Table 48 presents average student characteristics by entry cohort. The panels reflect information from different data sources.

116 Even if graduation data for later years (2021 and onwards) were to be available. there would still be a concern that graduation rates could not be compared to pre-Covid-19 outcomes under the older NSFAS policy. If educational achievement, enrolment and dropout are cumulative then 'exposure' to the effects of the Covid-19 pandemic period will still confound comparisons to try and identify the effects of the policy change.

It is important for identification of any causal relationship between the policy change and outcomes that the characteristics of the cohort first enrolling in 2017 are similar to those in 2018. Where there are changes in characteristics, these are in line with the average trend seen across the period. For example, 77.2% of students in 2017 are black versus 77.9% in 2018, but that share has been increasing over time. Annual income as measured by postal code is R126K in 2017 versus R125K in the 2018 entry cohort, another variable seen to be trending downwards over the period. The similarity of characteristics of entry cohorts aligns with the theory that the announcement of the new funding policy was made too late in the year to affect enrolment patterns substantively.

The composition of qualifications, and hence average minimum time to completion, differs by institution type. Almost all students enrolled in TUs are in bachelor degrees or professional bachelor degrees. In comparison, the share in bachelor degrees in CUs ranges from 46% in WSU to 97% in UM. Students in UoTs are mostly enrolled in diploma qualifications, with the share in bachelor programmes ranging from 1% in TUT to 37% in CUT.

The information from NSFAS shows that 55.7% of students were funded via NSFAS in 2017, and this increases to 64.6% in 2018 and 66.4% in 2019. Note that NSFAS data from HEMIS, while available for years prior to 2017, underestimates the share of students funded in the years with overlapping NSFAS and HEMIS records, suggesting that the data is incomplete for entry cohorts 2013-2016 too.

As in section 13, the outcome measures of interest include measures of student progression — number of courses taken, share of courses passed and an indicator for passing 50% or more of courses taken — and a measure of student dropout.

Table 48 presents the performance measures by year of study (year since first enrol) for cohorts 2013-2019 in research (analysis) population. Means are calculated overall (ALL) and separately for students who wrote the NSC at quintile 1-3, 4, 5 and DK schools. Quintile DK represents the group of students who have linked NSC-HEMIS records but no quintile information students. Cells representing outcomes in the new policy environment are highlighted in grey.

In most instances, Table 48 does not show any large differences for performance outcomes between outcomes for cohorts in the new versus older funding policy. The number of courses

taken, share passed and the proportion passing 50% or more looks similar in the shaded versus unshaded cells. If anything, there is a marginal increase in the number of courses taken and in the share passing 50%, which appears to be driven by changes in the quintile DK group. On the other hand, cohorts 2017 and 2018 have lower dropout rates than preceding cohorts, and the reduction is evident in all but the Quintile 5 group. This reduction is confirmed in the multivariate analysis.

Table 48: Performance outcomes by cohort and year of study

All	Year	2013	2014	2015	2016	2017	2018	2019
numcourses	1	9.122	9.066	9.134	9.216	9.303	9.36	9.376
	2	8.515	8.553	8.518	8.539	8.584	8.637	
sharepass	1	.785	.794	.808	.815	.812	.81	.817
	2	.78	.791	.794	.79	.789	.79	
pass50	1	.851	.857	.868	.877	.873	.873	.882
	2	.838	.847	.848	.845	.846	.851	
dropout	2	.115	.122	.104	.107	.094	.082	
Number of student (entry cohort)		100332	101072	95160	100967	97511	98667	96751
Quintile 1–3								
numcourses	1	9.108	9.04	9.154	9.278	9.296	9.342	9.324
	2	8.517	8.531	8.508	8.566	8.592	8.635	
sharepass	1	.76	.768	.791	.805	.796	.79	.793
	2	.766	.769	.779	.781	.773	.77	
pass50	1	.834	.837	.857	.872	.863	.861	.867
	2	.829	.828	.837	.839	.835	.835	
dropout	2	.121	.148	.118	.116	.108	.09	
Number of student (entry cohort)		31244	36804	36890	40849	42398	45357	40582
Quintile 4								
numcourses	1	8.994	8.931	8.975	8.914	9.103	9.094	9.197
	2	8.561	8.608	8.509	8.402	8.541	8.541	
sharepass	1	.783	.794	.809	.812	.81	.804	.828
	2	.779	.797	.791	.777	.784	.782	
pass50	1	.853	.859	.873	.874	.872	.859	.893
	2	.847	.859	.853	.83	.845	.841	
dropout	2	.074	.088	.088	.101	.084	.073	
Number of student (entry cohort)		6153	7032	6409	6761	6761	6695	7830

Quintile 5								
numcourses	1	9.142	9.135	9.133	9.132	9.288	9.208	9.567
	2	8.716	8.788	8.722	8.617	8.716	8.724	
sharepass	1	.816	.826	.837	.835	.84	.838	.853
	2	.814	.828	.824	.811	.82	.823	
pass50	1	.873	.886	.892	.894	.895	.893	.906
	2	.871	.883	.875	.865	.874	.878	
dropout	2	.058	.058	.065	.069	.058	.057	
Number of student (entry cohort)		17475	19650	18099	19122	17529	16922	18467
Quintile DK								
numcourses	1	9.431	9.254	9.297	9.387	9.469	9.67	9.328
	2	8.654	8.568	8.514	8.61	8.597	8.673	
sharepass	1	.796	.801	.81	.815	.815	.823	.816
	2	.797	.798	.797	.791	.788	.799	
pass50	1	.861	.862	.867	.874	.873	.885	.88
	2	.853	.851	.849	.846	.845	.859	
dropout	2	.094	.107	.098	.108	.092	.08	
Number of student (entry cohort)		21229	21388	20104	22082	20043	19518	12774

Sample: South African students in degree and diploma qualifications, 19 years or older who wrote the NSC

15.4 Empirical strategy

Overall impact of policy change

The analysis starts by looking at the overall impact of the policy on student outcomes using a specification based on cohorts entering undergraduate programs up until the 2018 cohort. A key element in identifying the impact of the policy rests on the assumption that the sudden timing of the announcement and implementation of the change presented a 'natural experiment' such that the composition of the student body entering in 2018 did not change, but the funding package they received did. It was shown in Table 48 that there were some differences in student characteristics across cohorts and therefore include controls for these. The following specification is used:

$$Y_{ijt} = \beta_0 + \sum_{j=2013}^{2018} \beta_j C_j + \sum_{t=1}^{2} \beta_t T_t + \sum_{j=2013}^{2018} \sum_{t=1}^{2} \beta_j (C_j \times T_t) + X_{ijt}\delta + \epsilon$$

Where Y_{ijt} indicates student i's outcome in cohort j in year of study t, T_t is an indicator for year of study t = 1, 2, defined as year since started university, and C_j indicates the student's cohort (the calendar year j = 2013, ..., 2018 in which student i started studying). $\boldsymbol{X}$ is a vector of individual characteristics and ϵ_{ijt} is an idiosyncratic error. $\boldsymbol{X}$ includes indicators for average NSC performance, female, a quadratic in age, Classification of Education Subject Matter (CESM), qualification type (degree versus diploma), institution type and historic institution type.[117] This is essentially a version of Table 2 where controls are included as specified in $\boldsymbol{X}$.

Practically the specification is run separately for outcomes measured in year 1 and 2. If it is assumed that, controlling for individual observed characteristics, student outcomes would have remained constant for cohorts in the absence of the policy, then the coefficient estimates of interest are $\beta_{2018,1}$, $\beta_{2018,2}$ and $\beta_{2017,2}$. They represent the differential in the measured outcome for cohorts entering in 2018 or 2017 relative to the omitted cohort. Note that because cohort 2017 is enrolled in year 2 in 2018, their outcomes could also be impacted by the policy change and therefore forms part of the set of coefficients of interest.

117 Race was not included as a control. The results were assessed for sensitivity to the inclusion of race and found not to change.

Comparisons of different coefficients can be argued to yield estimates of the impact of different components of the new funding policy. Table 50 provides details of the different comparisons implemented and what these comparisons represent under the assumptions of model. For example, for first year outcomes, the 2018 cohort is compared to earlier cohorts: comparing β2018,1 to β<2018,1. Given that earlier cohorts completed year 1 under the old policy, this comparison thus yields an estimate of the joint impact of the full suite of policy changes: the income threshold expansion to R350K, the implementation of institution specific full cost of study (FCS) and the switch from loan-bursary combination to full bursary. Similarly, the comparison of outcomes from the 2018 cohort in second year to second year outcomes from the pre-2017 cohorts yields estimates of the full suite of changes.

The comparison of β2018,2 to β2017,2, on the other hand, compares a cohort with the full suite of changes, to one, the 2017 cohort, with only the switch to full bursary. This comparison therefore provides an estimate of the joint impact of the change in income threshold and the extension in coverage to full cost of study (FCS), among students on full bursaries. This comparison is between second-year outcomes in 2018 (for the 2017 cohort) with outcomes in 2019 (for the 2018 cohort). Both years fall in the new policy environment, thus both cohorts would be eligible for bursaries rather than loans but students in the 2017 cohort would remain on capped amounts and eligible under the R122,000 income threshold. Finally comparing β2017,2 to β<2017,2 would account for the switch to full bursary alone. All cohorts starting prior to 2017 were subject to the old funding policy rules, but the 2017 cohort would have been eligible for bursary funding rather than a loan in year 2 (in 2018).

The impact of extending the income threshold for those funded

Equation 1 provided a strategy to measure any overall impact of the policy change on student outcomes, or association with it (research question 1). Next, the analysis is interested in the impact of the policy change for students 1) newly eligible for funding and 2) previously eligible for funding (research questions 2 and 3). Two empirical challenges were encountered in attempting to answer these questions. First, in the post-implementation period, what is known is only who is NSFAS funded versus not funded. It is impossible to identify who within the funded group became eligible to take up funding due to the policy change versus those that would have been eligible for (and taken) funding under the old policy rules. If the treatment is defined as becoming eligible for NSFAS under the new policy (those entering their first qualification in 2018 from households with incomes between 122 – 350k), then

the treatment group in the terminology of Byker and Gutierrez (2021), is 'contaminated'. Second, this treatment status is not observed in the pre-period. For cohorts who first enrol prior to 2018, only students funded via NSFAS under the old rules are identified. Students in the 122 – 350K should not be funded, and would therefore be inseparable from students in the R350+ income band.

Table 49: Treatment versus control cohorts

	Treated cohort	Control cohorts	Treated cohort	Control cohorts	Difference between treated and control
			Aspects of the new funding policy in year of study		Measured 'impact'
Year 1 outcomes	2018	2013–2017	Threshold, FCS, Bursary	None	Threshold,FCS, Bursary
	2018	2013–2016	Threshold, FCS, Bursary	None	Threshold,FCS, Bursary
Year 2 outcomes	2018	2017	Threshold, FCS, Bursary	Bursary	Threshold, FCS
	2018	2013-2016	Bursary	None	Bursary

This problem is addressed by using school quintile as a proxy for eligibility. Students attending quintile 1-3 schools were reportedly automatically eligible for NSFAS funding under the older policy. Estimation 1 is therefore replicated, distinguishing between students who attended quintile 1-3, 4, 5 and DK schools. Equation 1 is extended to include interactions with school quintiles grouped as Q1 = 1 − 3, Q2 = 4, Q3 = 5 and Q4 = Unknown. As before outcomes are modelled separately for year 1 and 2, but use the following specification:

$$Y_{ijt} = \beta_0 + \sum_{j=2013}^{2018} \beta_j C_j + \sum_{q=1}^{4} \beta_t Q_q + \sum_{j=2013}^{2018} \sum_{q=1}^{4} \beta_j (C_j \times Q_q) + X_{ijt}\delta + \epsilon_{ijt}$$

Cohort-year specific coefficients to obtain estimates of the impact of the policy change are, once again, compared, but the addition here is that the comparison is done within school quintile groupings. Students from different quintile groupings have different eligibility probabilities and will therefore be differentially impacted by the policy change. This is motivated empirically in Tables 51 and 52.

Table 50 presents student characteristics by school quintile and entry cohort. As anticipated, the average characteristics of students across quintile grouping correlate with socioeconomic status. Students in quintile 1-3 schools come from postal codes with the lowest annual incomes, education levels and electricity for lighting access. Average NSC performance is below 50% in the schools these students attend. The difference between average NSC individual performance and their school's average performance is, interestingly, highest among this group - about 13% points compared to 9% points and 7% points among students in quintile 4 and 5 schools - suggesting that students who enrol at university from Quintile 1-3 are more distinct from their peers than in other quintile groupings. Students from quintile 1-3 schools are almost all Black African and, are older than the other groups, on average. Interestingly, the share of females in this group is below 50% in all years compared to close to 60% in the other quintile groupings.[118] Finally, it is seen that students from this group are less likely to enrol in TUs and degree qualifications than other groupings.

118 This makes sense: the aggregate performance on the NSC examination is strongly correlated with school quintile. Students who attend university from a school with lower performance must, by virtue of university entry requirements, be more different from their schoolmates' performance than a student who comes from a school were performance is higher.

Table 50: Student characteristics: by entry cohort and school quintile

	School quintile	2013	2014	2015	2016	2017	2018	2019
TU	1,2,3	.388	.369	.359	.366	.37	.371	.374
CU	1,2,3	.277	.29	.295	.291	.26	.272	.283
UoT	1,2,3	.335	.341	.346	.343	.37	.357	.343
Degree	1,2,3	.608	.592	.585	.583	.581	.596	.613
Age	1,2,3	19.832	19.973	20.141	20.233	20.373	20.505	20.747
Female	1,2,3	.49	.484	.487	.482	.48	.488	.497
African	1,2,3	.959	.96	.965	.965	.971	.97	.951
Coloured	1,2,3	.018	.017	.016	.016	.014	.015	.023
Indian	1,2,3	.005	.005	.002	.002	.002	.002	.014
White	1,2,3	.018	.018	.017	.016	.013	.012	.009
NSC average	1,2,3	62.41	62.5	61.864	61.473	61.185	61.122	61.18
School's NSC average	1,2,3	49.528	50.139	49.959	49.306	48.062	47.156	48.738
Annual hh inc	1,2,3	80392.98	81596.13	80461.03	80267.42	79865.83	79710.63	82551.54
Highest education	1,2,3	6.308	6.319	6.292	6.278	6.241	6.217	6.229
Electricity	1,2,3	.685	.683	.68	.679	.673	.668	.667
Number of students	1,2,3	31244	36804	36890	40849	42398	45357	40582
TU	4	.477	.487	.449	.445	.442	.473	.494
CU	4	.17	.19.	.195	.191	.171	.168	.2
UoT	4	.354	.323	.356	.364	.388	.358	.306
Degree	4	.614	.636	.607	.603	.599	.636	.686
Age	4	19.444	19.522	19.698	19.791	19.907	19.944	19.822
Female	4	.558	.556	.556	.564	.549	.572	.566
African	4	.708	.689	.734	.744	.753	.737	.743
Coloured	4	.116	.125	.123	.131	.124	.13	.043
Indian	4	.069	.074	.033	.03	.032	.032	.043
White	4	.107	.112	.109	.094	.088	.096	.092
NSC average	4	64.806	64.887	63.909	63.123	63.066	63.207	64.6
School's NSC average	4	53.958	54.845	53.905	53.156	52.592	52.195	53.593
Annual hh inc	4	103048.2	105130.7	101675.8	101588.8	102165.5	104154.2	114514.2
Highest education	4	6.724	6.746	6.684	6.672	6.708	6.707	6.962
Electricity	4	.736	.742	.735	.733	.735	.737	.766
Number of students	4	6153	7032	6409	6761	6761	6695	7830

TU	5	.665	.664	.647	.648	.662	.672	.684
CU	5	.124	.141	.144	.138	.122	.123	.156
UoT	5	.211	.195	.209	.215	.216	.205	.16
Degree	5	.761	.777	.771	.766	.778	.795	.824
Age	5	19.267	19.304	19.404	19.427	19.463	19.48	19.428
Female	5	.59	.588	.59	.579	.585	.594	.592
African	5	.335	.315	.336	.358	.367	.362	.385
Coloured	5	.201	.2	.204	.219	.204	.21	.155
Indian	5	.118	.108	.061	.053	.06	.062	.037
White	5	.34	.372	.39	.358	.349	.338	.393
NSC average	5	68.32	68.006	68.453	68.273	68.71	68.65	68.904
School's NSC average	5	61.416	61.606	61.836	62.034	62.096	61.592	61.533
Annual hh inc	5	184594	182422.1	184465.4	179520.2	181094.5	180984.1	190721.9
Highest education	5	7.652	7.575	7.564	7.507	7.53	7.52	7.619
Electricity	5	.856	.854	.853	.849	.851	.85	.838
Number of students	5	17475	19650	18099	19122	17529	16922	18467
TU	DK	.533	.499	.51	.496	.503	.514	.454
CU	DK	.267	.295	.274	.264	.247	.236	.274
UoT	DK	.2	.206	.216	.24	.25	.25	.272
Degree	DK	.716	.69	.691	.671	.681	.694	.656
Age	DK	19.449	19.571	19.699	19.754	19.841	19.937	20.383
Female	DK	.566	.56	.557	.555	.553	.561	.552
African	DK	.605	.649	.667	.704	.716	.724	.817
Coloured	DK	.041	.042	.044	.04	.038	.035	.044
Indian	DK	.067	.071	.06	.054	.053	.049	.047
White	DK	.287	.236	.227	.2	.189	.187	.075
NSC average	DK	65.901	65.012	65.439	65.091	65.045	64.764	63.16
School's NSC average	DK	51.083	55.309	55.486	55.574	54.533	53.609	52.925
Annual hh inc	DK	175637.2	173071.5	170160	165203.4	159785.3	156318.6	136503.9
Highest education	DK	7.867	7.874	7.832	7.765	7.704	7.671	7.395
Electricity	DK	.838	.835	.832	.827	.82	.819	.801
Number of students	DK	21229	21388	20104	22082	20043	19518	12774

Sample: South African students in degree and diploma qualifications, 19 years or older

Students from quintile 5 schools on the other hand, are, as expected, the most advantaged on the dimensions measured. The share female, White, attending TUs and doing degree qualifications, is shown to be the highest across the quintile groups.

The socioeconomic characteristics of students from quintile 4 schools fall somewhere between the quintile 1-3 and quintile 5 groups. All racial groups are represented within this quintile with the composition about 74%, 13%, 3% and 9% Black African, Coloured, Indian and White. This group has a similar share of students in UoTs to the quintile 1-3 group, but has a higher share in Tus than Cus, and in degree qualification overall.

Finally, the last panel of the table presents the results of students who wrote the NSC but do not have quintile information. The characteristics of this group appear to fall between the quintile 4 and 5 groupings, possibly reflecting the combination of independent schools with circumstances similar to quintile 5 schools, and a mix of students from a range of backgrounds that are missing school quintile information for other reasons.

In Table 52 presents the results of examining the share of students funded via NSFAS for 2017-2019 entering students by school quintile. It should be recalled that the analysis had complete NSFAS information for this subset of cohorts. Table 52 illustrates two important points. First, as expected, the share funded is highest in quintiles 1-3 schools. However, not all students in these quintiles are funded, even in the new policy environment. In the 2017 cohort, the share funded is 83.3%, 82.7% and 75.2% among students from quintiles 1, 2 and 3 schools, respectively. This increases to 86.5%, 86% and 81.2% for the 2018 cohort and remains similar for the 2019 cohort. Thus while students in quintile 1-3 are in principle eligible for NSFAS funding, access to and/or take-up of funding is not 100%. In terms of take-up, students with scholarships or bursaries from other funders, would not be eligible for NSFAS. The lower share funded in the 2017 cohort could also be a result of limits on funding availability as discussed in section 11 and/or a lower preference for the old versus the new NSFAS funding conditions. A further explanation could relate to the reliability of the quintile data itself: if school quintiles are incorrect in the NSC dataset or change over time that would explain some of these apparent anomalies.

Table 51: Share and number NSFAS funded by school quintile: 2017-2019 FTEN UG

School quintile	2017	n	2018	n	2019	n
1	.833	10883	.865	12634	.856	11864
2	.827	10734	.86	11692	.859	9889
3	.752	12298	.812	13937	.828	12600
4	.521	3521	.681	4562	.717	5615
5	.26	4558	.381	6449	.375	6930
DK	.451	9048	.575	11227	.686	8761
All	.589	51042	.684	60501	.699	55659

Sample: South African students in degree and diploma qualifications, 19 years or older who wrote NSC

The second point from Table 51 is that, even in 2017, a relatively large share of students from quintile 4 and even 5 schools are already funded — 52.1% for quintile 4 and 26% for quintile 5. Relatedly, the share of students funded increases for students in all school quintile groups between 2017 and 2018. However, it can be seen that the increase is largest among students from quintile 4 and 5 schools: a 16% point (or 31%) increase for students from quintile 4, 12% point (47%) for quintile 5, 6% point (8%) for quintile 3 and 3% point (4%) for quintiles 1 and 2. Students from the DK group also had a relatively large increase in the share funded - 12% point or 27%.

Table 52 provides further average student information by school quintile and NSFAS funding status to investigate reasons for the funding gap for students from Quintile 1-3 schools. At the mean, funded students from quintile 1-3 schools have lower incomes than their unfunded peers, using either the NSFAS application data or postal code data. These students also come from postal codes with lower average education and attend schools that have lower average NSC results. Furthermore, although the share funded in 2018 increases, the characteristics of the funded groups in 2017 and 2018 remain similar, with the 2018 funded group possibly being from marginally worse off backgrounds. This aligns more closely with the hypothesis that funding shortages in 2017 prevented students in lower quintile schools being funded, rather than that they chose to use alternative funding sources or were disqualified by virtue of being above the R122,000 income threshold.

Table 52: Student characteristics: by entry cohort, school quintile and funding status

	School quintile	2017 funded	2017 not funded	2018 funded	2018 funded	2019 funded	2019 funded
Family income (NSFAS application)	1,2,3	84993	442269		38573	68663	225300
Has NSFAS application income	1,2,3	.09	.07	0	0	.38	.12
Household income (postal code)	1,2,3	78608	84875	78344	87028	80010	96419
Highest education (postal code)	1,2,3	6.22	6.33	6.2	6.32	6.19	6.45
School's NSC average	1,2,3	47.59	49.96	46.81	49.01	48.39	50.64
NSC average	1,2,3	61.1	61.51	60.87	62.48	60.93	62.54
Number of students	1,2,3	33915	8483	38263	7094	34353	6229
Family income (NSFAS application)	4	59993	351363			114822	336113
Has NSFAS application income	4	.18	.16	0	0	.46	.12
Household income (postal code)	4	94912	110034	97394	118634	102662	144642
Highest education (postal code)	4	6.66	6.76	6.68	6.76	6.87	7.2
School's NSC average	4	51.09	54.22	50.86	55.05	52.45	56.48
NSC average	4	62.32	63.88	62.12	65.54	63.6	67.13
Number of students	4	3521	3240	4562	2133	5615	2215
Family income (NSFAS application)	5	83498	393042			199825	442497
Has NSFAS application income	5	.23	.13	0	0	.6	.07
Household income (postal code)	5	146553	193250	149170	200594	146551	217371
Highest education (postal code)	5	7.27	7.62	7.29	7.66	7.24	7.84
School's NSC average	5	58.81	63.25	58.53	63.48	57.85	63.74
NSC average	5	65.44	69.86	65.42	70.64	64.99	71.25
Number of students	5	4558	12971	6449	10473	6930	11537

Family income (NSFAS application)	DK	68638	441427	125856	64851	119762	333854
Has NSFAS application income	DK	.19	.13	0	0	.43	.09
Household income (postal code)	DK	110137	200801	116257	210733	111177	191878
Highest education (postal code)	DK	7.3	8.04	7.35	8.1	7.17	7.89
School's NSC average	DK	50.06	58.22	49.82	58.73	50.41	58.42
NSC average	DK	62.25	67.32	62.11	68.34	61.59	66.56
Number of students	DK	9048	10995	11227	8291	8761	4013

Sample: South African students in degree and diploma qualifications, 19 years or older who wrote the NSC

Within quintile 4 and 5, on the other hand, it can be seen that the average income of the funded group increases in 2018, in line with an increase in the share eligible for funding due to the expansion of the funding threshold.

Students from different school quintiles have therefore been differentially exposed to the policy change, with the increase in funding in the Quintile 1-3 group being small and likely driven by changes in preference for funding under the new versus old policy. Students from quintile 4 and 5 schools, on the other hand, have shown the largest growth in the share funded and this has been associated with an increase in the average SES characteristics within those who were funded within this group. This suggests that students within these higher-quintile groups are more likely to be the 'newly eligible' ones, as one would have expected ex ante. Thus in examining change in performance within quintile groups, change are identified within groups that have all been impacted by the policy change but to different degrees and by different aspects of the policy change. It is anticipated that the quintile 4 (and 5) groups will be most impacted by the extension of the income threshold, but note that the increase in the share funded across all groups suggests that students attending all types of schools may also have become newly eligible.

Overall impact of policy change

The analysis starts by assessing changes in performance across the system as a whole.

Figure 43 presents predicted values and 95% confidence intervals of the βC,1 coefficients, representing estimated average number of courses taken and the share of students passing 50% or more in year 1 outcomes. Results are presented separately for female and male students. It was shown in Figure 43 that $\beta_{2018,1}$ is similar to $\beta_{2017,1}$ in each quadrant indicating that first year performance on these measures did not change for the 2018 cohort relative to the 2017 cohort.

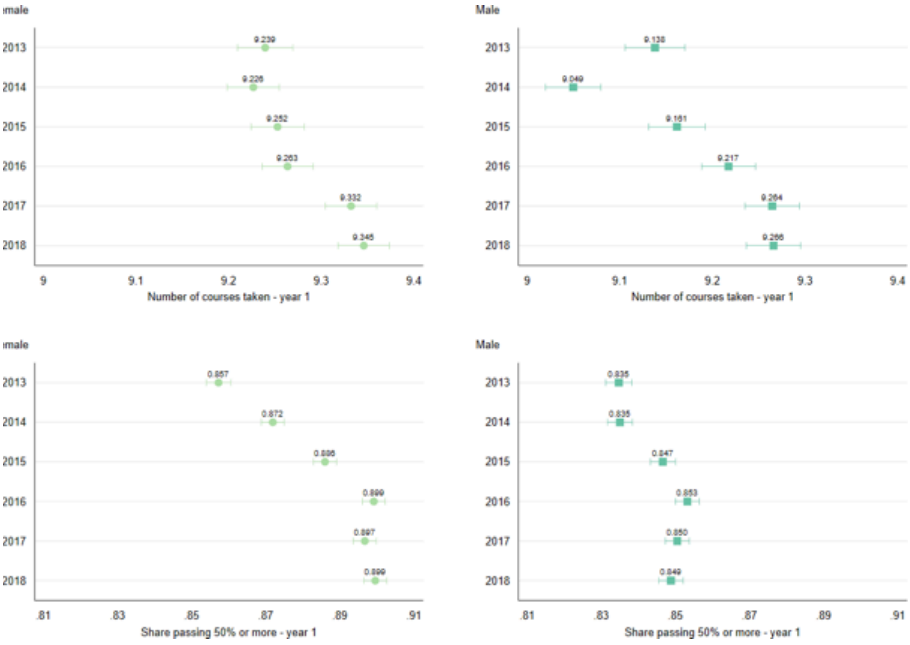

Figure 43: First year outcomes by entry cohort

Two additional points are relevant from Figure 43. First, performance is shown to improve, especially for females, between the 2013 and 2016 cohorts. If this is the anticipated trend in performance in the absence of the policy change, the fact that 2018 cohort performance did not improve relative to the 2017 cohort could suggest a negative impact of the new policy on these outcomes. Importantly, comparing 2018 cohort outcomes to cohorts from before 2017 would erroneously attribute the time improvement to the policy. Second, the figures show stark difference in performance between female and male students and the gender gap has been grown over time; females take on average more courses and a larger share pass 50% or more of their courses than male students.

Figure 44 presents a similar figure for dropout. Recall that this is dropout at the start or in the first half of year 2 and that both the 2018 and 2017 cohorts are impacted by the policy change in year 2, the 2017 cohort shifting from a loan-bursary combination to a full bursary and the 2018 cohort having to full suite of new policy conditions.

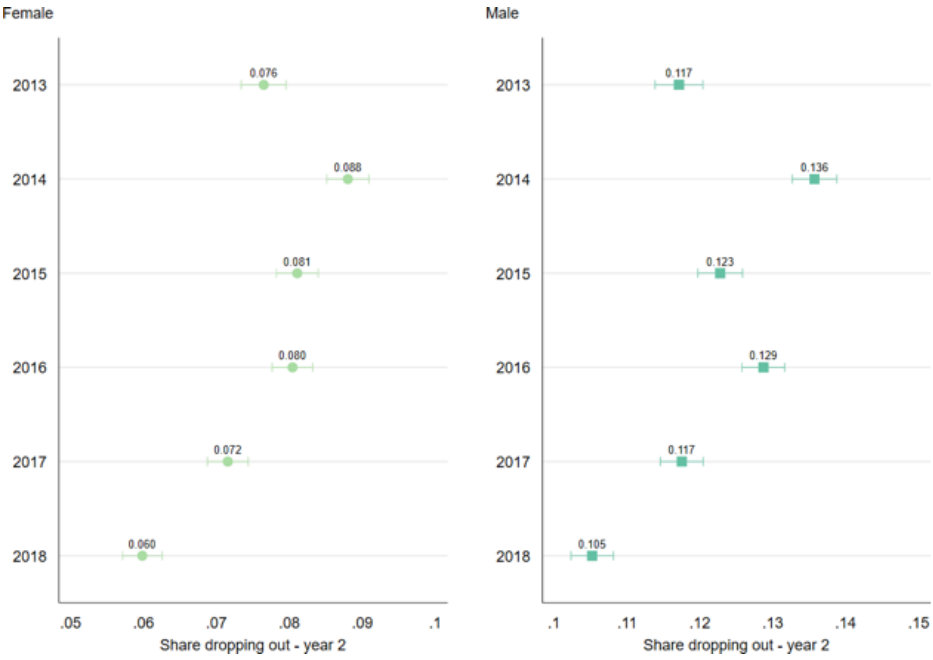

Figure 44: Dropout at the start or in the first half of year 2 by entry cohort

The figure shows a significant reduction in dropout for the 2017 and 2018 cohorts, with the reduction larger for the 2018 cohort than the 2017 cohort. Note, that besides the 2014 cohort, levels of dropout are not significantly different from each other among the cohorts not exposed to the new policy. The 2014 cohort would have been in year 2 in 2015, at the height of the Fees Must Fall campaign, which could explain the increased level of dropout for this cohort. In this instance, grouping the pre-cohorts is less likely to result in significant bias.

The impact of the different components of the policy can be estimated by referring back to the comparisons in Table 53. First, comparing the 2018 coefficients to those from cohorts prior to 2017 provides an estimate of the full suite of changes jointly. Here, the dropout among female students decreased from 8% in the 2016 cohort to 6% in the 2018 cohort, a decline of a third. For males, the decline is similarly large, from 12.9% to 10.5%, a 23% decline. Comparing the 2018 and 2017 cohorts, on the other hand, an estimate for the impact of the extension of the income threshold and funding amount (FCS) is obtained. Here the decrease is 20% for females and 11% for males. Finally, comparison is made between the 2017 estimate and the 2016 estimate, both cohorts who entered under the old policy and therefore were only eligible for capped funding if their family income was below R122K, but where the 2017 cohort received a full bursary in year 2 and the 2016 cohort had the loan-bursary combination. Dropout decreases by 11% and 9% for females and males, respectively. Thus the largest impact is measured when the full suite of changes are made, but the separate components appear to have an additive impact in reducing dropout.

Figure 45 examines course load and performance in year 2. These outcomes are conditional on remaining enrolled. Given that rates of re-enrolment changed for the 2017 and 2018 cohorts, measurement of the policy for these outcomes may be impacted (especially if the set of controls do not account for compositional differences across cohorts). No substantive differences are found across cohorts. The female 2018 cohort takes marginally more courses and passes a slightly higher share too, but differences are substantively small and statistically insignificant.

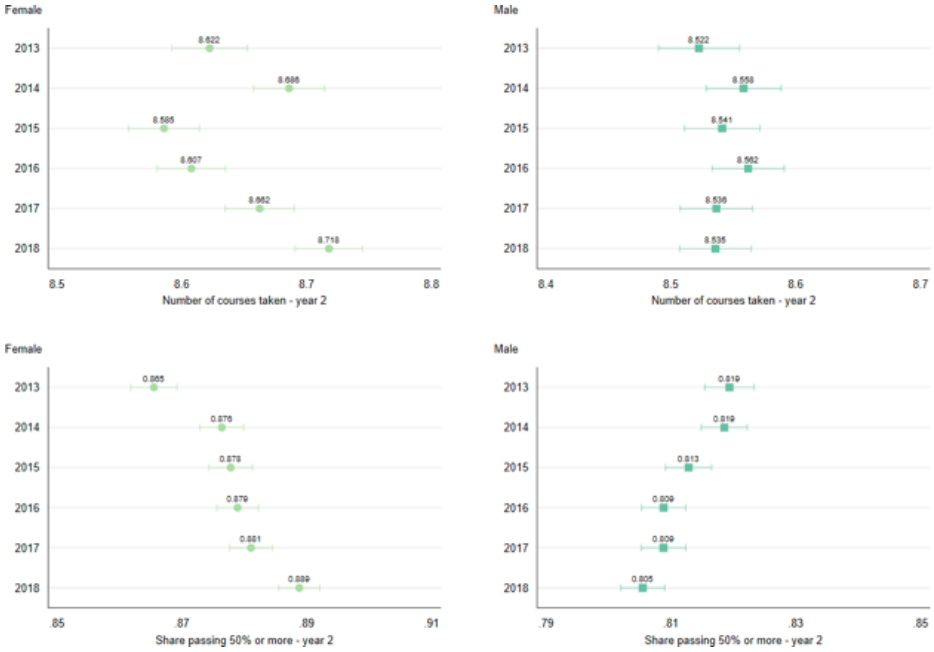

Figure 45: Second year outcomes by entry cohort

Next outcomes are examined by institution type. Figure 46 presents dropout measures at CUs and UoTs by cohort and sex. A similar figure for TUs, are available in Appendix A. The overall decrease in dropout evidence in Figure 46 is driven by a reduction in dropout at UoTs and, to a lesser extent, CUs, with no difference in dropout between cohorts found at TUs. There is a 70% decline in dropout between the 2016 and 2018 female cohorts at UoTs. The decrease for males at UoTs in the 2018 cohort is also large at 56% (if the 2016 cohort is used) and 35% (if the more conservative 2015 cohort estimate is used). Furthermore, the share passing 50% or more increases significantly in year 2, albeit it by a substantively small amount (1.8 and 1.6 percentage points for males and females, results not shown). The decrease is smaller but still significant for students enrolled at CUs — around 28% for females and 9% for males. Interestingly, the difference in dropout rates between the 2017 and 2016 cohorts is insignificant within CUs, and hence the comparison of 2018 to 2017 versus 2016 yields similar estimates. This suggests that only the implementation the full new suite of policy conditions has an impact on student dropout at CUs, and the move to bursary without the removal of the funding cap or extension of the income threshold had little observable impact overall at these institutions. The opposite is evident at UoTs, where the larger component of the decline is evidenced between 2017 and 2016 cohorts who differed on the bursary versus loan condition.

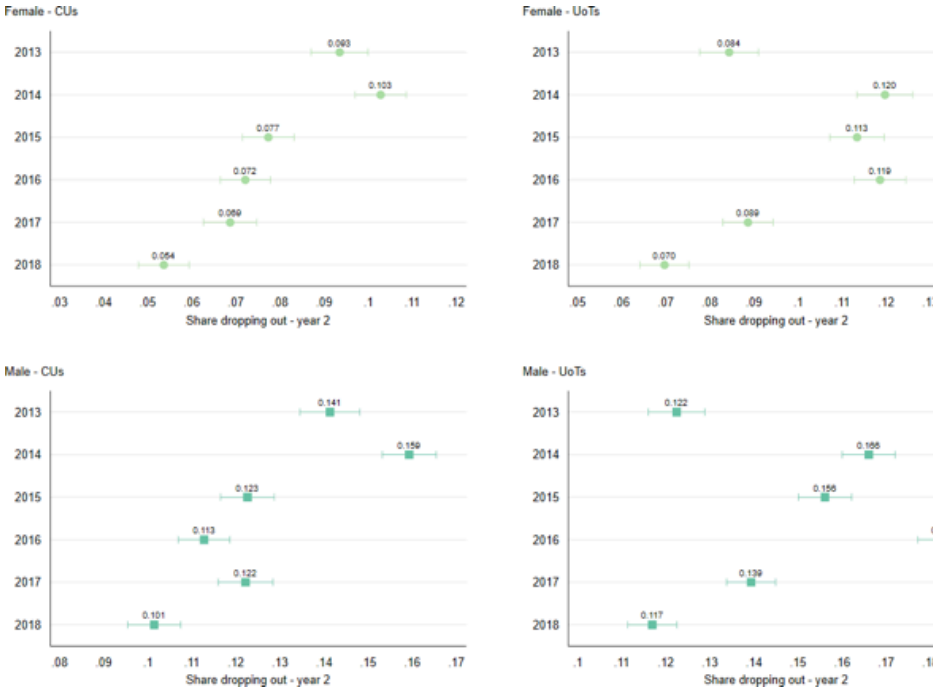

Figure 46: Dropout at the start or in the first half of second year: CUs versus UoTs

The impact of extending the income threshold for those funded

It has been shown that second year dropout decreased overall for cohorts who enrolled under the new policy. This overall impact was seen to be driven by a large decrease in dropout at UoTs, and to a lesser extent, CUs. These institutions have a higher share of funded students, see 0, and therefore it may be anticipated that overall outcomes are more likely to be affected. In this section the differences in dropout for students from different school quintile groupings are assessed in the hope of identifying whether the changes in performance evidenced are focused among groups more likely to be eligible for funding. The focus is on dropout as nothing substantive was found for the other measures.

Figures 47 and 48 present predicted dropout point estimates and confidence intervals from the second year dropout specification as defined in Equation 2 for quintile 1-3, 4, 5 and a group of students with NSC data but missing quintile information. The figures can be interpreted as described in section 14 but here cohorts are compared within school quintile groupings.

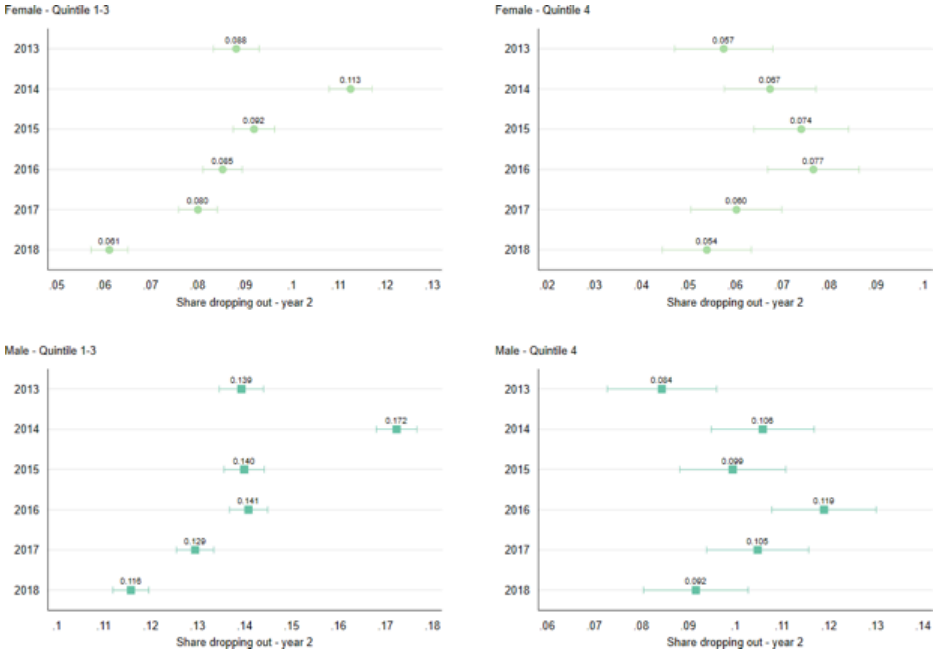

Figure 47: Dropout before mid-year 2: Quintile 1-3 versus 4

Figure 48 presents mid-year 2 dropout levels for students originating from quintile 1-3 versus 4 schools. The levels of dropout vary markedly across the four quadrants. Dropout rates, especially in the pre-2018 cohorts are much higher among students from quintile 1-3 than quintile 4 schools for both female and male students. In each quadrant there is an incremental decrease in dropout from the 2016, 2017 and 2018 cohorts. While the estimates for students from quintile 4 schools are less precisely estimated, the pattern of decline is similar (especially when male students are compared across quintile groups). For example, 6.1% of female students who attended quintile 1-3 schools dropout from the 2018 cohort, 8% from the 2017 cohort and 8.6% from the 2016 cohort. Prior to that dropout rates were around 9% (with the 2014 cohort potentially impacted by FMF). Within the quintile 4 group, dropout decreases from 7.7% in the 2016 cohort, to 6% in the 2017 cohort and 5.4% in the 2018 cohort. This represents around a 40% decline in dropout between the 2016 and 2018 female cohorts in both groups. The decrease, while similar in percentage points for males in quintile 1-3 versus 4, represents a higher percentage decline for students in quintile 1-3 schools (27 versus 19 %).

Figure 48 shows a similar figure for students in quintile 5 and DK groups. The Quintile 5 figures

look almost identical to the Quintile 4 ones in Figure 47, with dropout decreasing but not significantly so, and most of the difference observed for females evident between the 2017 and 2016 cohorts. The DK quintile figures are more similar to the Quintile 1-3 figures (with the exception of the 2014 cohort) in terms of levels of, and decline in, dropout across cohorts.

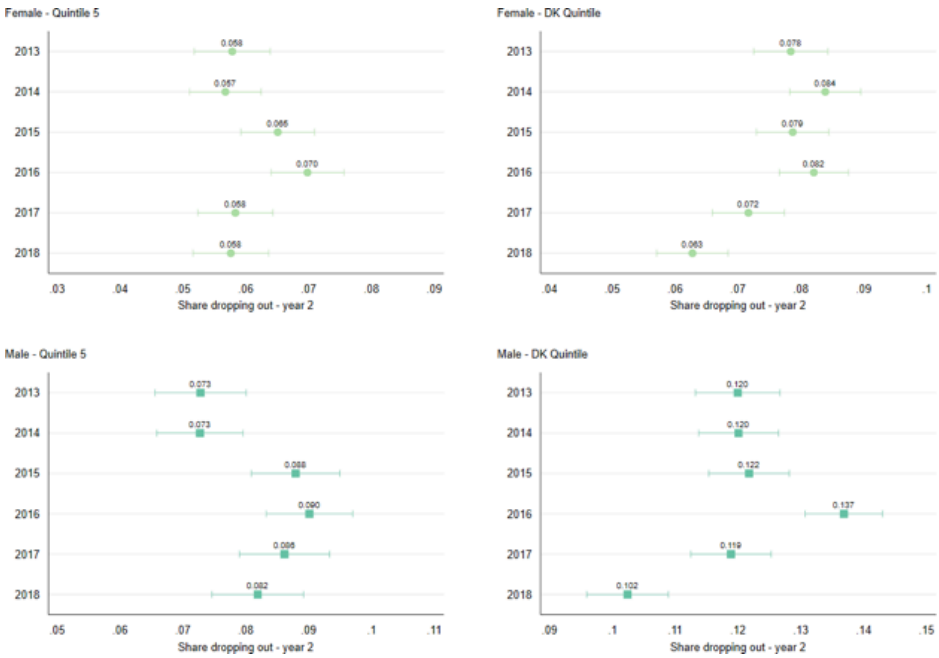

Figure 48: Dropout before mid-year 2: Quintile 5 and DK

Figures 49 and 50 show that dropout rates were relatively stable (with the exception of the 2014 cohort from the quintile 1-3 group) for cohorts not enrolled during the new policy era. Therefore in Figures 49 to 50 the control cohorts are grouped and present estimates of the different policy impacts for all quintile grouping on one graph.

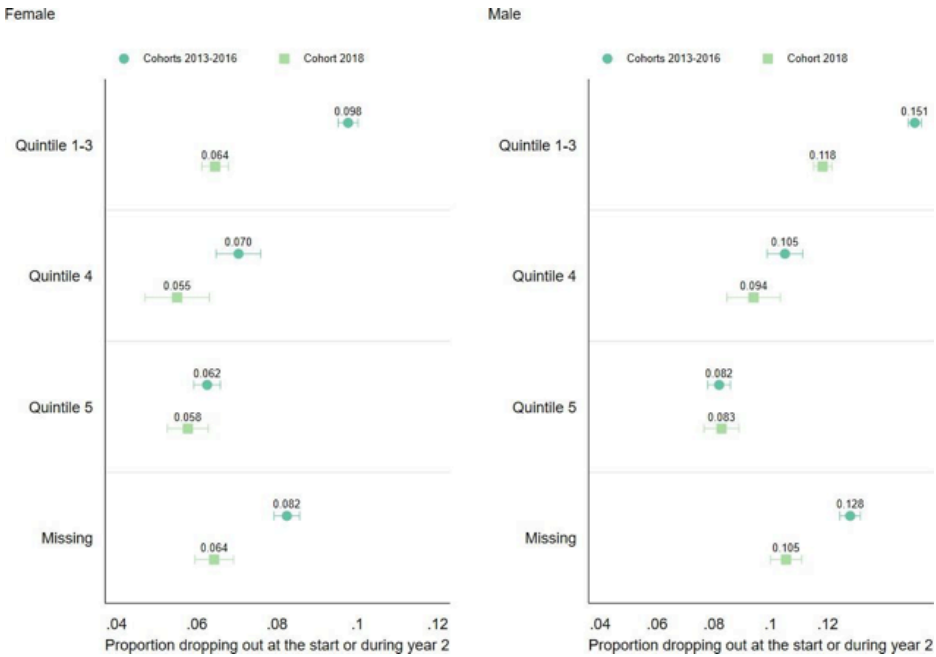

Figure 49: Dropout before mid-year 2: 2018 v 2013-2016

A couple of important points stand out. First, in Figures 49 and 50, within the 2018 cohort, dropout rates for females from quintile 1-3 schools are similar to dropout rates for students from other school quintiles. Thus, if the decline in dropout can be attributed to the policy change, it has had the impact of equalising dropout rates for students from different school quintiles. This is not the case for male students, however. Although, males from quintile 1-3 schools in the 2018 cohort have reduced dropout rates, they are still significantly more likely to dropout than males in other school quintiles. Second, although not significantly so, female students from quintile 4 schools in 2018 have the lowest dropout rates of all school quintiles, thus the linear relationship between school quintile and dropout, evidenced in the earlier cohorts, has been broken for female students in the 2018 cohort.

Lastly, Figure 51 shows that the switch to bursary alone does not have the same equalising impact. Students in quintile 1-3 from the cohort 2017 are still significantly more likely to dropout than their cohort peers in quintile 4 and 5 schools. That being said, the switch to bursaries is associated with equalising the dropout rate among female students in quintile 4 and 5 schools

(although the difference is not large in the control group). Only the quintile 1-3 group shows a decrease in dropout when the 2017 cohort is compared to earlier cohorts. This would align with this group being most eligible for funding under the old policy, and therefore the change in bursary conditions having an impact. In fact, dropout actually increases for males in quintile 5 schools, albeit not significantly, if only the bursary comparison is made.

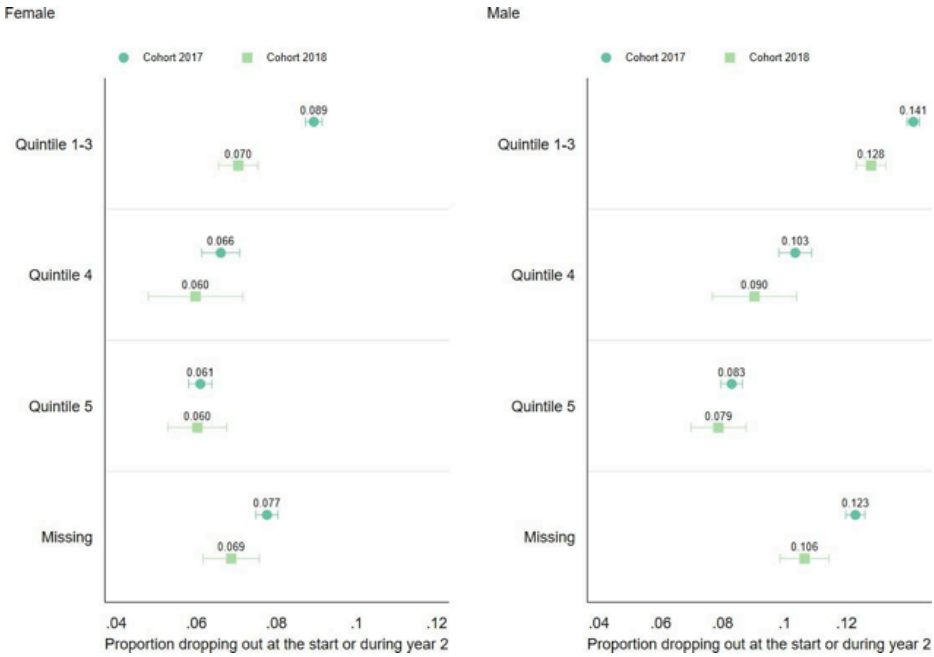

Figure 50: Dropout before mid-year 2: 2018 v 2017

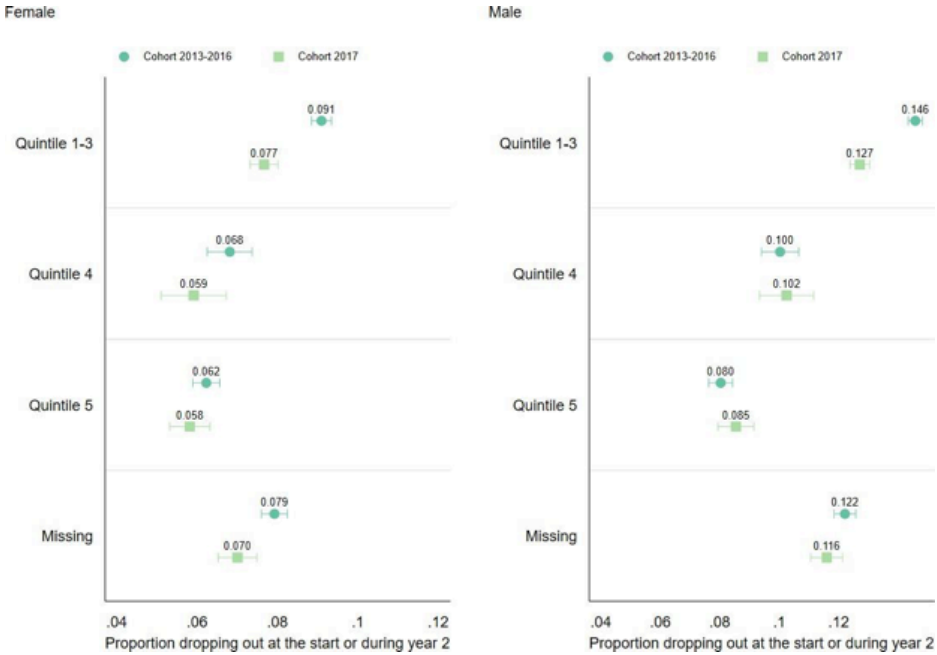

Figure 51: Dropout before mid-year 2: 2017 v 2013-2016

15.6 Discussion

It has been shown that dropout decreased for the 2018 and, to a lesser extent, the 2017 cohorts compared to earlier cohorts. Reduced dropout is generally a positive outcome since it implies greater educational attainment. The benefit is enhanced if students prevented from dropping out are likely to complete their studies.

In terms of the standard 'human capital' framework used by economists, the new NSFAS policy is intended to remove the full financial cost of studying from the student and therefore reduces the cost of studying to that of the 'opportunity cost' of the student's time. Table 54 provides information on the share of students dropping out at the start or by mid-year 2 based on their performance in year 1 (passed 50% or more of their courses) and funding status. Recall that both the 2017 and 2018 cohorts are impacted by the new funding policy in their second year. Unfortunately no information on funding was available and year 2 outcomes for a cohort that are not impacted by the new policy. Therefore changes observed between the 2017 and 2018 funded groups relate to the extension of the income threshold and FCS under the new policy for

students on bursary funding. However, to the extent that the decision to drop out at the start of year 2 is influenced by year 1 circumstances, the 2017 cohort would have still been on the loan bursary package in year 1.

Table 53: Share dropping out by cohort, sex, performance and funding status

Passed 50 in Year 1	Funded in Year 1	Female 2017	N	Female 2018	N	Male 2017	N	Male 2018	N
Yes	Yes	.041	24158	.032	29734	.061	21519	.05	24363
Yes	No	.04	19122	.036	15211	.056	14675	.048	11971
No	Yes	.455	2071	.382	2466	.558	2947	.492	3476
No	No	.513	1538	.488	1255	.56	2240	.557	1940

Sample: South African students in degree and diploma qualifications, 19 years or older who wrote the NSC

The table aligns with expectations. Dropout is higher among students who fail more than 50% of their courses and among students who are not funded. Regarding those who did not pass 50% of their courses in year 1, it is seen that dropout decreased for both the funded and the unfunded groups. However, it decreased by 7 percentage points for funded versus 2.5 percentage points for unfunded females. Similarly for males, the funded group saw a decrease of 6.6 percentage points compared to a 0.3 percentage point decrease in the unfunded group. This suggests that the policy may have encourage academically marginal students to remain enrolled, where they would previously have dropped out.

Turning to those students who did pass more than half of their course, it is also found that there is a decline in the share of students dropping out. Although the unfunded group also shows a decline across the two cohorts, the decrease is larger for the funded group. Dropout decreases from 4.1 to 3.2% for females and 6.1 to 5% for males compared to a decline from 4 to 3.6% and 5.6 to 4.8% among unfunded females and males respectively. The table shows that there is a correlation between the observed patterns of dropout and funding status and although a decrease in dropout is observed among those who do not perform well in year 1, the decrease is larger among those who do perform well (28% versus 19% for females and 22% versus 13% for males) and therefore are on track to complete their qualification.

Aside from the many other caveats, it is possible that the findings are understated to the extent that they do not take into account variation across institutions. For instance, Branson, Hendry, and Ranchhod (2020) note that the University of Cape Town used its own additional resources to provide financial support over-and-above NSFAS: it covered shortfalls between the NSFAS allocated amount and the estimated full cost of study; and, it covered students whose family income was above the NSFAS threshold of R122,000. So in the case of UCT, it would be expected that whatever effect the new policy had would be substantially smaller when conducting the kinds of comparisons used in the analysis for this report.

15.7 Conclusion

This part of the report has examined changes in student outcomes across entry cohorts to assess the impact of the NSFAS funding policy change. Using a novel dataset consisting of individual-level linked data from the Department of Higher Education and Training, the Department of Basic Education and the National Student Financial Aid Scheme, course load, performance and dropout for cohorts entering public university degree and diploma programmes in 2013 through 2018 have been examined. It provides insights into the effectiveness of the new policy for student outcomes and its implications for student from different schooling backgrounds.

Differential exposure across cohorts has been used to identify the impacts of the policy change and a number of its components. Specifically, the comparison of outcomes for cohorts entering in 2018 are compared to the outcomes of cohorts entering in 2016 (for first and second year outcomes) and 2017 (when only first year outcomes are assessed). This yields a comparison of students experiencing the full suite of new policy components: the increased income threshold, the removal of the funding cap and the shift to a full bursary, to students with access to funding under the old policy environment. Comparisons between 2017 and 2016, or 2018 and 2017 (for second years) on the other hand, yield estimates of the switch to bursary with other conditions unchanged and the extension of the income threshold and removal of the funding cap among bursary funded students, respectively.

The analysis reveals several important findings. First, no significant changes in first year course load or performance between the 2018 and 2017 cohorts, suggesting that first year outcomes

did not improve for the cohort entering under the new policy, were found. Indeed, first-year performance had been improving for cohorts entering between 2013 and 2016, especially for females. Therefore the absence of an improvement for the 2018 cohort could, counterfactually, even raise concern of a potential negative impact of the new policy on these measures, at least for this first cohort entering under the new policy environment.

Second, the analysis has found a significant decrease in dropout rates for both the 2017 and 2018 cohorts, with the 2018 cohort experiencing larger declines. The estimation of the impact of different components of the policy showed that the full suite of changes had the largest impact, but each component assessed contributed positively to the decline in dropout. The findings were disaggregated by gender and showed that the gender gap in performance has been growing over time, with females consistently outperforming males in terms of course enrolment, the share passing 50% or more of their courses and lower dropout rates. Dropout among female cohorts exposed to the policy change was also much larger than evidenced for men, suggesting that females may have been more sensitive to the policy change. Remarkably, the policy may have equalised dropout rates across female students from different school quintiles; the 2018 cohort of students entering from quintile 1-3 schools no longer being more likely to dropout than their higher school quintile peers. This positive finding for females aligns with the findings from (Gurgand, Lorenceau, and Mélonio 2023) who show that female students are more price sensitive. Considering this dynamic presents an additional challenge in understanding the gender gap in education in South Africa and presents an interest area for further research.

Third, the disaggregated analysis by institution type and school quintile in an attempt to provide insights into the differential impact of the policy among groups with different funding prevalence. The decrease in dropout is most pronounced at UoTs and to a lesser extent at CUs, with a small and insignificant decrease in dropout among students enrolled at TUs. The analysis of dropout by cohort and school quintile groupings showed that the decrease in dropout is particularly evident among students from lower school quintiles. Together these analyses suggest that the policy has been particularly successful in reducing dropout rates among those more likely to be eligible for funding.

Fourth, while it is acknowledged that reducing dropout is a positive outcome, the analysis investigated whether the reduction in dropout aligns with the goal of supporting students to graduation, the end goal motivating the NSFAS policy. The new NSFAS policy reduces the cost

of higher education in South Africa to the opportunity cost of a student's time. With a labour market with very high unemployment rates, especially among students without higher education qualifications, these opportunity costs could be argued to be quite low (Nicola Branson and Whitelaw 2023). Comparing dropout rates based on performance and funding status in year 1, the data shows that the policy may have influenced academically marginal students to remain enrolled. However, the correlation between increased dropout and funding status is much stronger for students who passed 50% or more of their courses in year 1, suggesting that the benefits of the policy for funded students likely outweigh this potentially negative impact. This is however a nuanced relationship that warrants further investigation.

Finally, while the policy change is associated with a notable reduction in dropout rates, the analysis underscores the need for careful consideration of various factors, including gender, institution type, and school quintile, to fully understand the complex dynamics at play. Importantly, this part of the report does not causally attribute the changes observed across cohorts to the policy specifically, but rather provides suggestive evidence that the changes observed can be attributed to it. That said, the findings provide valuable insights for policymakers and educators as they assess the overall impact and effectiveness of the policy in promoting student success and retention and lay the foundation for more sophisticated studies.

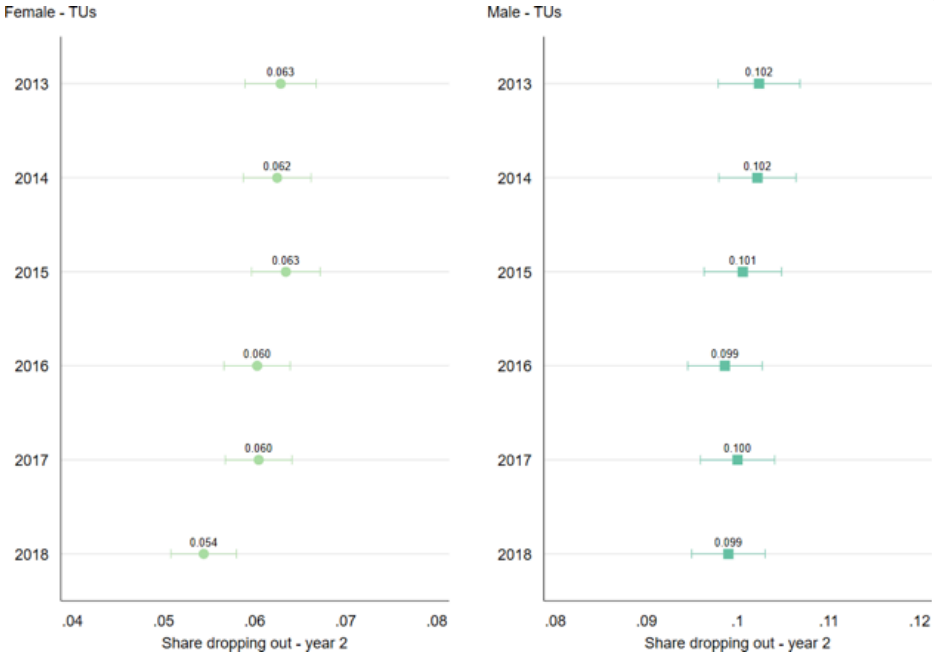

Figure 52: Dropout before mid-year 2: TUs

16. Overall conclusion

The research project presented in this report set out to examine the effect of the new higher education student funding policy introduced in 2018. To narrow the focus somewhat, the analysis was limited to the funding formula and impact of the new student funding policy to undergraduate students enrolled for full-time, contact degrees. The results in section 15 are somewhat nuanced. Overall, there is evidence of an improvement (decrease) in dropout rates associated with the policy change. That was not, however, accompanied by improvements in in-year performance measures. While graduation rates may be the best measure of whether such a policy change led to improvements in attaining the direct objectives of higher education, unfortunately the dramatic and far-reaching effects of the Covid-19 pandemic mean that data from 2020 and 2021 – the earliest years in which undergraduates starting three-year degrees in 2018 and 2019 would graduate – are likely to be misleading if used for estimating the effect of the policy.

One well-known challenge in performing this kind of analysis is that pre-existing trends in the outcome variables of interest may result in misleading conclusions. One specific hypothesis considered in section 13 is that the university block grant funding formula may provide an incentive for 'profit' maximising institutions to increase student throughput. While there have been a number of studies on the potentially distortionary effects of the research output component of the block grants, the possibility of analogous effects of the teaching output grant has not been explored.

The analysis sketches a formal model of the incentives faced by institutions seeking to maximise the gap between revenue and costs. The data on block grant allocations is examined over time and it has been found that for the majority of institutions the ratio of teaching outputs to teaching inputs (a proxy for enrolments) has increased substantially over time. That provides suggestive evidence in support of the concern. The analysis then examines information at the student level. There is no discernible trend in in-year performance measures, such as the proportion of credits passed. However, it was found that there were substantial reductions in dropout, as well as increases in the proportion of students graduating in minimum time. The latter variable in particular is most directly related to the teaching output units calculation that drives the block grant calculation. These results are consistent with cohort studies by DHET, which show even larger changes from the early 2000s. Furthermore, the analysis does not consider the degree to which teaching development grants offset the incentive for institutions to artificially increase outputs: the teaching development grant was calculated based on the shortfall of 'outputs' relative to estimated targets and eventually was scrapped because of concerns that it might reward such shortfalls. The broader incentive context has not been adequately considered.

There are a number of caveats to the impact analysis. The absence of data on household income for the crucial years of 2017, 2018 and 2019 meant that the first-choice estimation approach could not be used. Instead the analysis used school quintile as a (cruder) proxy for the likely beneficiaries of the policy change. Due to initial difficulties in matching the schooling and higher education data, the impact analysis was only performance on a sub-sample of students who were 19 or older when entering higher education. The limited time available after addressing these data challenges also placed some limits on the technical complexity and sophistication of the econometric methods that could be employed.

Performance was not, of course, one of the stated aims of the policy. The primary aim of the policy was to increase equality in accessing higher education, through funding support for 'poor and working class students'. In that regard, the analysis shows that the likely beneficiaries of the new funding threshold (R350,000 compared to the earlier R122,000) were in the top third of the household income distribution – and therefore not plausibly 'poor' or 'working class'. To the extent that the policy directed additional resources to students below the R122,000 threshold, by converting the income-contingent loan system to a bursary-based one – the effects were more consistent with the stated policy goals. Nevertheless, it remains the case that higher education funding largely benefits relatively higher earning households – as found in other studies.

The design of the policy was also such that it did not reduce inequity among students as much as it could have. A more equitable approach in the initial implementation period of three to five years would have been to utilise a lower threshold and apply that across all undergraduates within the maximum allowed period of study ('N+2', which is five years for a three year degree). There are other inequality-promoting aspects of the policy which are notable, such as the fact that there is no differentiation by household income. The result is that a student from a R340,000-earning household receives the same support as one from a household with no income. The exclusion of students who were already enrolled from qualifying under the new threshold is now redundant given the time passed since the policy was implemented. Nevertheless, the broader lesson that the inequality implications of design decisions must be carefully considered remains relevant – especially with the prospect of future changes to address cuts to the overall budget.

Another interesting finding was that a substantial proportion of the increase in funding went to students who enrolled for higher certificates in distance learning, especially at UNISA. There was a large increase in such enrolments after the policy was implemented, but it is debatable whether altering the composition of higher education programmes in this way was consistent with the policy's objective.

The current report is the most extensive analysis of these issues to date. Given the various limitations faced, there remains scope for further work on a number of the research questions. Furthermore, the combination of schooling, higher education and student funding datasets may enable the analysis of a range of other important policy questions.

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