

ARTICLE

# A dynamic perspective on profiling financial-aid eligibility: the case of South Africa

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## Abstract

The sustainable funding of tertiary education is a subject of significant policy debate worldwide. In South Africa, the need to balance equitable access within a constrained fiscal environment has been a complex challenge. A legacy of racially segregated educational opportunities, together with student activism and protests, has shaped the political economy surrounding tertiary education funding. Policymakers continue to be faced with the challenge of funding students whose household income is too high to meet state financial aid eligibility, yet who struggle to afford tuition and accommodation expenses. In this context, exploring a policy instrument that differentiates students based on multidimensional socioeconomic need is critical. We motivate for a differentiated policy instrument that considers economic uncertainty of households as a dimension of socioeconomic need. A purpose of our paper is therefore to illustrate that income mobility can contribute to household vulnerability, and therefore to funding need. Household income mobility is estimated using a multivariate probit model that explicitly accounts for endogeneity of initial conditions, unobserved heterogeneity, and non-random panel attrition. We operationalise this model as a relevant empirical tool for analysing and understanding the implementation, expansion, and targeting of social policy more generally.

**Keywords:** financial aid; higher education; social stratification; vulnerability; mobility; funding policy

## Background, objectives, and contributions

Education is widely regarded as a fundamental tool for promoting upward social mobility. In South Africa, returns to tertiary<sup>1</sup> education are high, even by global standards, and these returns have increased over time (Branson & Lam, 2022). Unsurprisingly, one of the aims of South African education policies in the post-apartheid era has thus been to expand access to tertiary education. However, economic and educational disadvantages persist under pernicious conditions of poverty, inequality, and unemployment. Consequently, expansion of access to tertiary education has not only required that places be made available, but also that

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education is affordable for potential students from a range of socioeconomic backgrounds. Balancing the need for expanding access with constrained fiscal resources has been a complex challenge, with the legacy of limited access to education for marginalised communities together with student activism in recent years shaping the current discourse and political economy surrounding tertiary education funding.

The government invests significantly in student financial aid through the National Student Financial Aid Scheme (NSFAS). In 2018, it was announced that full cost of study bursaries would be extended to all academically eligible students whose annual household income is up to R350 000 (approximately \$19,000). This increased the threshold from R122 000 that existed under the previous income-contingent loan scheme. Since 2018, the amount of funding has more than doubled from R20 billion to R47 billion in 2022.

Policy attention has now shifted to the lack of affordability of tertiary education for the ‘missing middle’ – a group colloquially defined as those whose household income levels are too low for them to afford fees, but too high to meet the income threshold for funding eligibility. In March 2022, student debt to institutions was estimated to stand at R16.5 billion among this group (Gumede, 2022).

At the same time, the sustainability of the present policy is under scrutiny. The design of a sustainable, comprehensive, and progressive financial aid scheme for the future will require a thorough deliberation of the complexities that affect access to and success in tertiary education. If free education for all students is not viable, a policy that differentiates students according to socioeconomic need may be relevant. Before policy solutions can be designed, the circumstances of households both below the current funding threshold, and within the missing middle, need to be interrogated and understood.

One of the possible approaches to differentiating socioeconomic need would be to simply consider the household circumstances of those on either side of an income threshold. However, guided by the poverty dynamics literature, we argue that economic stability – or lack thereof – is a key dimension off which to differentiate households, because it affects the type of decisions that individuals can make. That is, relatively more secure and stable households are better able to absorb risk and plan for the future.

Mobility is associated with measurable differences in household characteristics, related to dimensions of economic security and stability. Another approach to differentiating socioeconomic need thus recognises that mobility patterns over time, as well as current living standards, are important for thinking about policy tools. We propose a framework of social stratification that links the demarcation of strata to an analysis of mobility around the current NSFAS income eligibility threshold (threshold hereafter). This approach recognises that an individual’s household income position relative to a threshold can change and is linked to economic stability, or lack thereof. This emphasises that vulnerability and economic insecurity are perhaps more relevant for determining economic welfare compared to income status as observed at a single point in time.

Our study has three primary objectives. First, we seek to investigate the patterns of household income mobility across the threshold. Second, we aim to assess the contribution of our classification schema to understanding household circumstances in relation to the existing threshold. Lastly, we aim to analyse the

implications of our findings for education funding policy. That said, our methodological approach ensures relevance and applicability in a global context, fostering a broader understanding of the complexities involved in the targeting of scarce public funds. Therefore, in addition to contributing to the education funding and financial aid literature (e.g. Callender & Jackson, 2005; Callender & Wilkinson, 2013; Lochner & Monge-Naranjo, 2016), by operationalising the multivariate probit model as an empirical tool, we aim to contribute to the understanding of issues related to policy making, implementation, and targeting (e.g. Barrett et al., 2008; Asri, 2019) more broadly.

In the following section (Contextualising the controversy), we foreground relevant details of the South African tertiary education sector and the funding policy environment. In 'Analytical and empirical frameworks' Section, we provide a high-level overview of the poverty dynamics literature off which our analysis is based, followed by a detailing of our conceptual framework and empirical strategy. Thereafter, we describe the data (Data Section), with results presented in sections 'Empirical application, Structuring stratification around the threshold and Profiles by funding class'. In Concluding remarks section, we conclude.

### Contextualising the controversy

The tertiary education sector in South Africa comprises 503 registered institutions, of which 26 are public higher education institutions (universities), 131 are private universities, 50 are technical and vocational education and training [TVET] colleges, 287 are private colleges, and 9 are community education and training colleges. Students enrolled at public universities and TVETs are eligible for NSFAS funding (Department of Higher Education and Training, 2020).

Since 1994, the sector has made significant progress in expanding access to tertiary education opportunities (Department of Higher Education and Training, 2020). That said, South Africa's gross enrolment ratio (GER) lies markedly below that of the average for upper middle-income countries, at 1,901 enrolments in tertiary education per 100,000 of the population (Department of Higher Education and Training, 2020). The Department of Higher Education and Training (2020) notes that to reach the 2030 National Development Plan target participation rates of 27% and 25% in universities and TVETs, respectively, the system still requires a substantial increase in enrolment rates over the coming years.

In achieving this, equity in access to tertiary education programmes remains key: the ramifications of the inequitable distribution of access to and quality of education across racial groups, gender, and geography during apartheid remain as stark inequalities in access and completion in the system to date. In this regard, NSFAS has and continues to play a crucial role in transforming the student body and considerably broadening access to universities and colleges (NSFAS, 2016).

### The emergence of the missing middle

Before 2018, NSFAS existed primarily as an income-contingent loan scheme, with partial bursary conversions functioning as incentives for students to pass and graduate. Under this policy, NSFAS funding was capped at a maximum level. Although increases in the cap occurred at rates above inflation, the maximum often

remained below the full cost of study. The cap led to students accumulating what is commonly referred to as ‘historic debt’ – monies owed to institutions by students who could not cover their expected family contribution, or who were underfunded due to the cap. Expected family contributions were calculated via a means test that accounted for household income, the number of dependants in the household, and the family’s cost of living.

It is against this backdrop that the student-led Fees Must Fall protests began in late 2015, which introduced volatility into the student-funding landscape. In addition to the NSFAS shortcomings mentioned above, students further stressed that government funding was failing to match increasing enrolments causing roughly a third of eligible candidates to be denied funding (Universities South Africa (USAf), 2016), and the income threshold failed to include many students in need of financial support. Moreover, since the majority of NSFAS beneficiaries were from disadvantaged backgrounds, it was argued that loan repayments and the burden of student debt – a current and pressing issue in many countries – could further entrench socioeconomic inequalities (Commission of Inquiry into Higher Education and Training, 2017).

An overwhelming endeavour of protest action was to call for government to provide fee-free higher education for all students. This, however, was deemed financially unfeasible (Commission of Inquiry into Higher Education and Training, 2017). In the end, protests led to a restructuring of NSFAS funding announced in December 2017 that brought about important changes to the rules of the scheme.

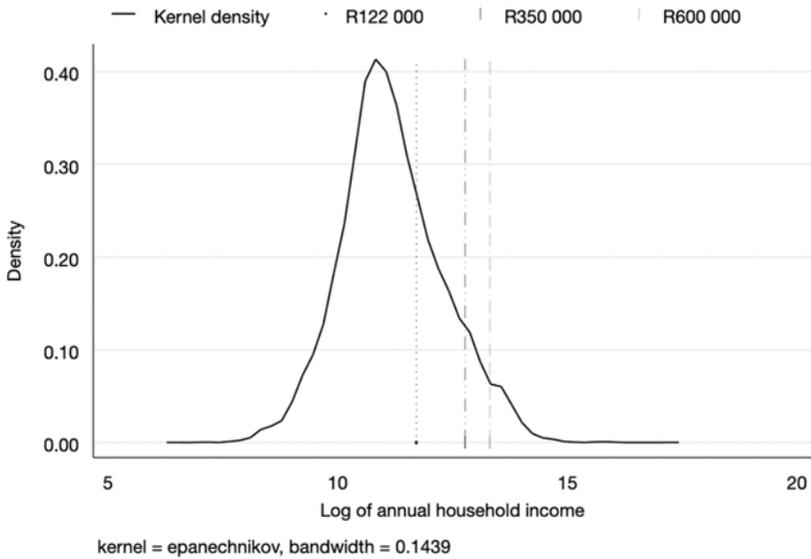
### *The ubiquity of the missing middle*

Overruling the recommendations of the Commission of Inquiry into Higher Education and Training (2017) that all students be funded through a cost-sharing model of government guaranteed income-contingent loans sourced from commercial banks, the country’s former president, Jacob Zuma, announced a large increase in and restructuring of NSFAS funding. For first-time entering new students from 2018 onward, NSFAS eligibility was extended to those with combined household income<sup>2</sup> levels up to R350 000 per annum, and funding now occurs in the form of a full bursary. The scheme also no longer caps funding. The full cost of institution-specific tuition and campus accommodation is covered, with nationally standardised limits on transport, books, food, and off-campus housing.

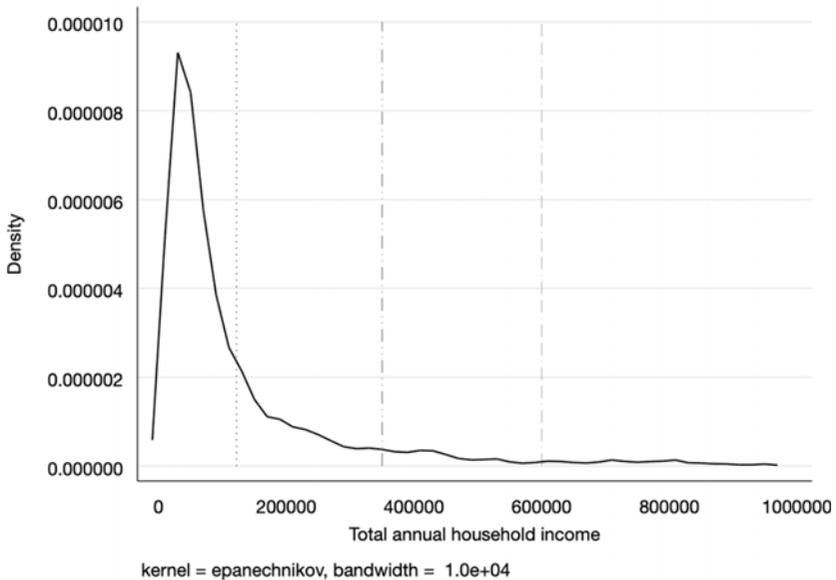
The R350 000 threshold roughly coincides with the mid-point of the third personal income tax bracket at the time (R296 541 – R410 460). At this threshold, an additional 24% of South African households were covered by the scheme, bringing the total share of households covered to approximately 90% (Garrod & Wildschut, 2021).

Funding thresholds inherently partition the household income distribution, as shown in Figure 1. It is apparent that the majority of the distribution falls below the R350 000 threshold, with a small share remaining in the missing middle (classified as having household income falling between R350 000 and R600 000). The Commission of Inquiry into Higher Education and Training (2017) notes that the upper limit of R600 000 is thought to be premised on an announcement made by the Minister of Higher Education and Training during 2016, in which he

(a) Annual household income (log) - policy stratification



(b) Annual household income (levels)



**Figure 1.** Distribution of household income in South Africa, 2017.

Source: Authors' own calculations using NIDS Wave 5 (post-stratified weights).

Notes: Distribution in levels is trimmed at the 99th percentile. One observation per household, income in December 2017 Rands.

pronounced that R600 000 would be used as the upper cut-off for exempting the poor and missing middle from fee increases the following year.

## Analytical and empirical frameworks

### *A poverty dynamics approach*

Literature on the patterns and determinants of poverty in post-apartheid South Africa is well established (see e.g. Carter & May, 2001; Zizzamia et al., 2016); Finn & Leibbrandt, 2017; Schotte et al., 2018, 2022, and recognises that households can move in and out of poverty over time. In recognising that households may face non-negligible risks of falling into poverty, Zizzamia et al. (2016) interrogate what this means for the definition of the middle class. They argue that the notion of ‘empowerment’ is central to both social and political meanings of the middle class. Where a monetary definition of the middle class begins just above a poverty line, the notion of empowerment is at odds with vulnerability to poverty. In an attempt to define a middle class that is more appropriately aligned with the idea of empowerment, Zizzamia et al. (2016) present a model for social stratification based on the predicted risk of staying in or falling into poverty (following López-Calva & Ortiz-Juarez, 2014).

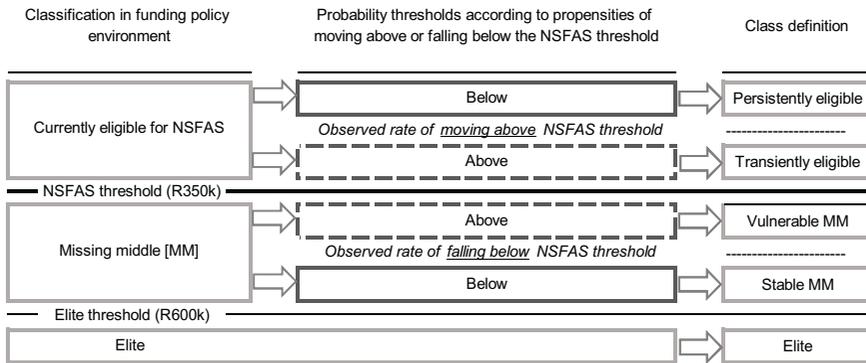
A related approach to modelling vulnerability follows Cappellari and Jenkins (2004), who use panel data from Britain to model poverty transitions, classifying households as chronically or transiently poor depending on their chances of exiting poverty or the risk of remaining poor. The authors estimate these transitions using a first-order Markov model, which controls for both initial conditions (those poor in the base year may be a non-random sample) as well as for attrition (panel retention may be non-random). This approach has been applied in South Africa by Finn and Leibbrandt (2017), who find that ignoring the correlations between the unobservables affecting initial conditions, sample retention, and poverty transitions can lead to biased results.

Schotte et al. (2018) extend Cappellari and Jenkin’s model, distinguishing a vulnerable group from the stably middle class. Modelling poverty transitions, the authors predict a person’s propensity to remain in or fall into poverty based on household characteristics and observed poverty status. Using conditional propensities of falling into poverty, they define social classes based on a vulnerability criterion, where vulnerability concerns an above average propensity of falling into poverty.

To elicit a deeper understanding of household circumstances from a perspective that overlooks the dynamics generating mobility will be fundamentally limiting. In this section, we draw on the work of Schotte et al. (2018) to introduce a framework for examining mobility in relation to the NSFAS threshold. By exploring household income fluctuations above or below the threshold, we aim to provide a more comprehensive assessment of individuals’ and households’ well-being prospects over the medium term. This approach offers valuable insights into the broader context of welfare, going beyond a snapshot of income at a particular moment in time.

### *Analytical framework*

Figure 2 illustrates our strategy for classifying individuals based on the probabilities of their household income fluctuating above or below the threshold. The left column



**Figure 2.** Proposed stratification based on current household circumstances and future mobility. Source: Authors' own adaptation from Schotte et al. (2018).

Notes: Observed rate reflects the estimated share of the population to move above or fall below the threshold within two years.

shows conventional class definitions, typically used to reference groups in the tertiary funding policy environment. The middle and right columns show how we propose to re-conceptualise funding classes based on predicted probabilities that an individual's household income moves above or below the threshold in the near future. We use the term 'funding classes' to refer to the class structure constructed in our schema, so as not to confuse them with social classes e.g. poor, working class, etc.

We propose five classifications. Those whose household income is below the threshold are divided into those who we term 'persistently eligible' and those who we term 'transiently eligible', where eligibility refers to NSFAS funding eligibility according to household income. Those who are persistently eligible face below average (predicted) probabilities of household income moving above R350 000. Those who are transiently eligible face above average probabilities of household income exceeding R350 000. The persistently eligible are thus considered to be a relatively more resource constrained group than those that are transiently eligible. For example, the transiently eligible may have suffered some negative financial shock that only temporarily pushed their income below the threshold.

Those in the missing middle are classified as either 'vulnerable missing middle' or 'stable missing middle'. Through using the term 'vulnerable', we hope to capture the idea that households' circumstances can make them vulnerable to income falling below a given level. We use the term 'stable' to capture the idea of a relative non-vulnerability. However, we recognise that while a household may be non-vulnerable, it may not be completely resilient to economic shocks. Those whom we classify as vulnerable have above average probabilities of household income falling below R350 000. Those whom we term stable have below average probabilities of household income falling below this level. The elite are defined as having household income in excess of R600 000 per annum.

The 'average' we refer to is the observed share of respondents whose household income either moves above or below the threshold in the following period (detailed in Section 'Structuring stratification around the threshold'). It is these observed rates, or average shares, of household income moving above or falling below the funding

threshold that we term ‘probability thresholds’. This terminology reflects that it is against these rates that we evaluate individuals’ predicted probabilities of their household income moving above or falling below the funding threshold. Thus, unlike a threshold against which income is evaluated (an income threshold), our threshold is one against which predicted probabilities are evaluated (a probability threshold).

Through these classifications, we aim to foreground how information on the socioeconomic circumstances of households in relation to current thresholds can inform and provide context to complex policy considerations. Our methodology facilitates a more comprehensive understanding of the socioeconomic circumstances of South African households, on both sides of the current funding threshold, through two key contributions. First, it enables us to compare individuals who are currently eligible for funding with those who are not, such as comparing the missing middle to those whose household income is below the threshold. This comparison allows us to assess the targeting of the current policy along various dimensions of household well-being. Second, it provides valuable insights into the heterogeneity of household circumstances within the missing middle by distinguishing between those likely to fall below the threshold in the near future and those who are relatively more secure. This distinction helps shed new light on the range of household circumstances within the missing middle category.

### *Empirical strategy*

Before proceeding, an econometric approach to modelling household income transitions – i.e. the probability that an individual’s household income moves above or falls below the funding threshold – is required. To estimate these probabilities, we employ a multivariate probit model. The multivariate probit is an econometric tool used to analyse relationships between multiple categorical variables and is therefore often applied in situations where there are several related outcomes of interest.

Our approach follows Cappellari and Jenkins (2004), who examine transitions in and out of poverty while explicitly controlling for initial conditions effects (those found to be poor in the base year may be a non-random sample) and non-random panel attrition, by jointly estimating three related outcomes of interest: current poverty, initial poverty, and sample retention. Following Cappellari and Jenkins (2004), we implement a first-order Markov model to estimate household income transitions around the threshold by fitting a multivariate probit regression that jointly estimates three equations for the following outcomes: 1) the probability of household income being below the threshold in time  $t$ , 2) the probability of household income being below the threshold in time  $t - 1$ , i.e. the initial condition, and 3) the probability of sample retention in time  $t$ . Joint estimation takes into account the correlation between these outcomes, as well as the correlation between unobserved factors that influence each of the processes.

The first equation takes into account the influence of household characteristics in the base year on income in the next period, additionally allowing for the impact of these characteristics to vary depending on whether the individual’s household income was initially above or below the threshold. That is, certain characteristics can have different effects on the likelihood of the household income staying above or falling below the threshold, depending on the initial income level.

The initial conditions equation accounts for the fact that the point at which we observe an individual in the panel at time  $t - 1$  does not coincide with that start of the process that generates an outcome in time  $t$  (Heckman, 1981). As such, controlling for the observed and unobserved determinants of household income being below the threshold in time  $t - 1$  ensures the estimates of transition determinants are less likely to be biased by effects of the covariates on initial conditions. Similarly, non-random panel attrition would lead to a bias in estimates of transition determinants if there is differential response related to transition propensities. Since the multivariate probit model adjusts directly for attrition, we can still predict conditional probabilities of household income moving above or falling below the threshold, even for those who attrit. As such, our class structure is defined for all respondents in the sample. The full specification of the model, along with its required assumptions and validity tests, is outlined in Appendix A.

The covariates – which are chosen following previous literature on poverty dynamics and structural well-being (e.g. Carter & May, 2001; Cappellari & Jenkins, 2004; Schotte et al., 2018) – consist of a core set of variables expected to be predictors of household income in the South African context (e.g. characteristics of the household head including gender, race, education, age, and employment, together with characteristics of the household including number of residents employed, location of the household, access to certain types of infrastructure, number of durable assets owned, and access to other types of assets, as well as a constant term). The initial conditions and retention equations include these variables, as well as additional variables that act as exclusion restrictions, required for identification of the model parameters (see Appendix A). Following Cappellari and Jenkins (2004), we estimate the trivariate standard normal distribution function using simulated pseudo maximum likelihood estimation methods based on the Geweke, Hajivassiliou, and Keane simulator (Gourieroux & Monfort, 1996) with 251 Halton draws.<sup>3</sup>

## Data

Given that a key feature of this framework is its focus on mobility over time, the empirical application requires detailed panel data. We fit the model to data from the National Income Dynamics Study (NIDS) (Southern Africa Labour and Development Research Unit (SALDRU), 2017), the first and only nationally representative panel study in South Africa. The first wave of data was collected in 2008 on a sample of over 28 000 individuals in about 7,300 households across the country. Individuals from the baseline survey were then recontacted every two years and interviewed along with their current household residents. Along with individually administered questionnaires, a household questionnaire was completed by the oldest woman in the household and/or another member who was knowledgeable about the household. The NIDS data therefore contain a wealth of information that can be leveraged to evaluate mobility over time.

Data from pairs of consecutive waves are pooled (i.e. Wave 1 to Wave 2, Wave 2 to Wave 3, etc.), and are treated identically in the analysis, controlling for period-specific fixed effects. Data from the first wave (time  $t - 1$ ) comprises base year information, with data from the consecutive wave (time  $t$ ) indicating whether or not

**Table 1.** Sample size by funding policy classifications

NSFAS classifications	Share of households
Household income below R122 000	73.12
Household income between R122 000 and R350 000	18.61
Household income between R350 000 and R600 000	4.43
Household income above R600 000	3.84
Total	100

Source: Authors' own calculations using NIDS Waves 1 to 5 pooled sample.

Notes: Data are weighted using post-stratified weights from the base period.

the individual's household income fluctuated above or below the threshold. There are currently five waves of data available, with an individual contributing up to four pairs. This results in an estimation sample of 116,462 observations from 46,034 individuals. Note that an individual who does not attrit between waves can contribute the same information in time  $t$  in the wave 1 to wave 2 pooling as time  $t - 1$  information in the Wave 2 to Wave 3 pooling.<sup>4</sup>

Total household monthly income has been multiplied by twelve to get an annual estimate for comparison with the funding threshold. All monetary measures are deflated to December 2017 (the month the new policy announcement was made) prices using Stats SA's headline consumer price index (Stats SA, 2017).

Table 1 shows that roughly 92% of households receive less than R350 000 per annum, the income eligibility threshold of the present NSFAS policy. Households in the missing middle comprise 4.43% of households in the sample. This is slightly lower than the 6% share estimated by Garrod and Wildschut (2021). Although the missing middle represents a relatively small portion of the population, individuals' characteristics within this group may result in a higher proportion accessing tertiary education. For instance, a larger share of the missing middle may meet the academic requirements for admission compared to individuals with lower household incomes. This distinction makes the missing middle a group of policy significance, despite their lower representation in the overall population. We acknowledge that young adults are more likely to enrol in post-school education, and hence give special consideration to households with youth (defined as those aged 15-35 in South Africa)<sup>5</sup> in our discussion. However, due to the already limited sample within the missing middle, to ensure sufficient identification in our empirical model, we retain individuals in all households, even those without resident youth. This is important, since a household survey such as NIDS will not capture youth who are resident elsewhere (e.g. at a university residence) but nonetheless may be financially linked to a household interviewed in NIDS.

Table 2 shows transitions into and out of these categories over time. The figures on the diagonal of Table 2 indicate the share of individuals who remained within the same household income category. Those below the diagonal were downwardly mobile, whereas those above the diagonal were upwardly mobile.

Residents of households with annual income between R350 000 and R600 000 show particularly interesting mobility patterns. While those in the other categories

**Table 2.** Transitions between NSFAS classifications

Household income (time $t-1$ )	Household income (time $t$ )					Total
	Below R122 000	R122 000- R350 000	R350 000- R600 000	Above R600 000	Missing	
<i>(a) Sample not missing income (time <math>t</math>)</i>						
Below R122 000	86.78	12.19	0.82	0.21	-	100
R122 000 to R350 000	33.36	54.48	9.29	2.88	-	100
R350 000 to R600 000	16.33	31.99	29.91	21.76	-	100
Above R600 000	6.11	23.95	24.82	45.12	-	100
Total	71.4	21.54	4.25	2.81	-	100
<i>(b) All respondents</i>						
Below R122 000	73.14	10.28	0.69	0.18	15.72	100
R122 000 to R350 000	27.27	44.54	7.59	2.35	18.24	100
R350 000 to R600 000	11.37	22.27	20.82	15.15	30.38	100
Above R600 000	4.12	16.15	16.74	30.43	32.57	100
Total	58.93	17.78	3.51	2.33	17.45	100

Source: Authors' own calculations using NIDS Waves 1 to 5 pooled sample.

Notes: Data are weighted using post-stratified weights from the base period. Table 12 in Appendix C applies attrition adjusted weights to the shares in panel (a).

are most likely to remain where they are, those in the R350 000 to R600 000 category seem as likely, indeed marginally more likely, to fall below the R350 000 threshold in the near future. Panel (b) shows that those with higher household income levels are more likely to attrit over time. This highlights the importance of the empirical analysis correcting for non-random attrition.

## Empirical application

### Structuring stratification around the threshold

To construct a stratification schema around the funding threshold, we calculate the share of individuals in the data for whom we observe household income to fall below or move above the funding threshold. That is, using observations from Waves 1 to 5, we estimate the share with household income below the funding threshold in time  $t-1$ , but who moved above it in time  $t$ . This follows Schotte et al. (2018) and López-Calva and Ortiz-Juarez (2014), who both set a lower threshold of the middle class to a probability of becoming poor, based on empirical evidence. An estimated 3.6% of individuals have household income move above R350 000 in the next period, when it is below in the base period.

Similarly, we estimate the share of those whose household income was above the funding threshold in time  $t-1$ , but whose household income fell below it in time  $t$ . This is the average probability of falling below the threshold, estimated based

**Table 3.** Probability thresholds

	(a) Probability threshold (%)			(b) Associated income threshold		
	Mean	S.E.	95% C.I.	Mean	S.E.	95% C.I.
Observed rate of moving above for those below in the last period	3.60	0.14	3.33, 3.88	88 342	1 744	84 922, 91 762
Observed rate of falling below for those above in the last period	37.79	1.48	34.89, 40.69	465 280	6 334	452 803, 477 757

Source: Authors' own calculations using NIDS Waves 1 to 5 pooled sample.

Notes: Probabilities are weighted using post-stratification weights from the base period and corrected for panel attrition.

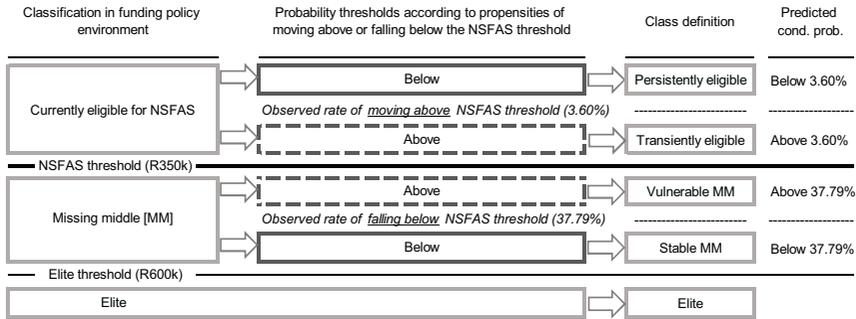
S.E. abbreviates standard error and C.I. abbreviates confidence interval. Annual household income is in Rands.

on observed rates in the data. Thirty-eight percent of individuals are estimated to have household income fall below R350 000 in the next period, when it is above in the base period. Panel (a) of Table 3 reflects these probability thresholds. It is against these probability thresholds that we evaluate the predicted conditional probabilities of household income moving above or falling below the funding threshold. These predicted conditional probabilities are predicted using coefficient estimates from the multivariate probit model.

In calculating these probability thresholds, we apply attrition adjusted weights. This is done because not all respondents who are observed in time  $t - 1$  are re-observed in time  $t$ . In order to accurately compute the observed share of those whose household income moved above or fell below the funding threshold in time  $t$ , we account for the fact that not all individuals' household income is observed in the next period. Attrition adjusted weights are computed as the product of the post-stratified weight in time  $t - 1$  and the inverse of the conditional probability of re-interview, where the conditional probability of re-interview is estimated using the coefficient estimates from the retention equation in the multivariate probit model.

For comparative purposes, we also compute an income value associated with the probability thresholds. These are shown in panel (b) of Table 3. The monetary values associated with the probability thresholds are computed as the average annual household income of those whose predicted conditional probability of moving above or falling below the funding threshold is within the 95% confidence interval around the respective probability threshold. On average, those with an annual household income of R88 342 fall into the 95% confidence interval for household income moving above the funding threshold. Those with an annual household income of R465 280 fall into the 95% confidence interval for household income falling below the funding threshold. Put differently, R465 280 can be viewed as the value at which individuals are typically able to afford the cost of insuring against their household income falling below R350 000 per annum (Zizzamia et al., 2016). We demonstrate the probability thresholds on Figure 3, an updated version of Figure 2.

The average (observed) rate of household income moving above the funding threshold (3.6%) is set as the cut-off point separating those persistently below the



**Figure 3.** Proposed stratification based on current household circumstances and future mobility (updated with associated income thresholds).

Source: Authors' own adaptation from Schotte et al. (2018).

Notes: Cond. prob. abbreviates conditional probability. Observed rate reflects the estimated share of the population to move above or fall below the threshold within two years.

funding threshold from the transiently below the funding threshold. Correspondingly, on average 37.79% of those initially above the threshold in the pooled sample, fell below it. This is set as the cut-off point separating the vulnerable missing middle from the stable.

To comprehensively inform policy, it is relevant not only to know who the vulnerable are, but the sources of their vulnerability too. To gain a deeper understanding of this stratification schema and its relevance for informing tertiary funding policy, we turn now to provide a profiling of household characteristics by funding class.

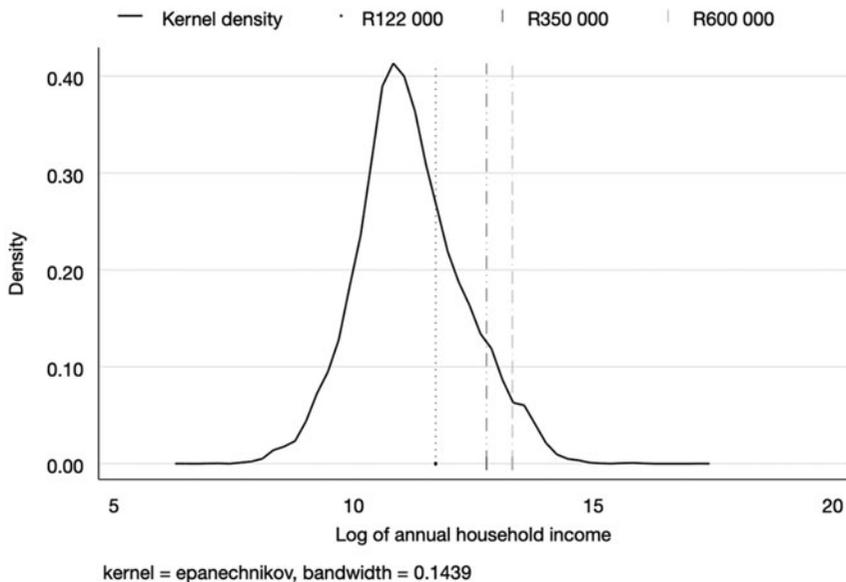
### Profiles by funding class

In Figure 4, we refine the classification of households shown in Figure 1 by taking income mobility into account. The household income distributions of the persistently eligible and the transiently eligible are distinct, indicating that the transiently eligible are better off, on average, in terms of household income. On the other hand, the income distributions of the vulnerable and stable missing middle groups are very similar. As we describe in 'Household circumstances of the missing middle' section, there is nonetheless compelling variation in household circumstances among the missing middle that speaks to relative economic vulnerability and stability.

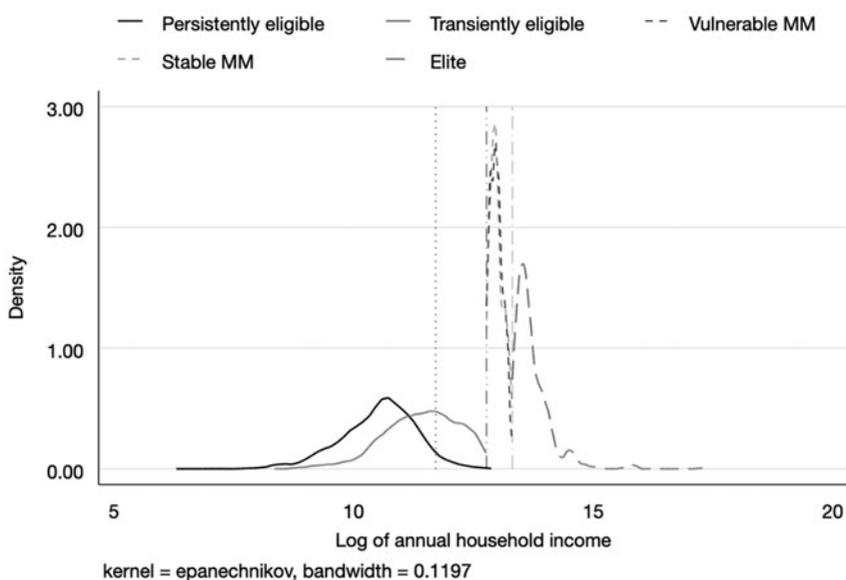
### Household circumstances of the NSFAS eligible

Table 4 shows that over the period 2008 to 2017, approximately 2% of the population fell within the vulnerable missing middle, with a marginally larger share classified as stable. A large majority of South Africans have household income below R350 000 per annum, with 60% of the population facing below average probabilities of moving above this threshold (i.e. they are persistently eligible in our terminology). These households tend to be disproportionately headed by women who are unemployed, African, and who have low levels of completed education

(a) Annual household income (log) - policy stratification



(b) Annual household income (log) - our stratification schema



**Figure 4.** Distribution of household income in South Africa, 2017 (updated to reflect funding class). *Source:* Authors’ own calculations using NIDS Wave 5 (post-stratified weights). *Notes:* Distribution in levels is trimmed at the 99th percentile. One observation per household, income in December 2017 Rands.

(primary or incomplete secondary). The characteristics of the persistently eligible align with findings in Schotte et al. (2022) that persistent poverty affects primarily African, single-parent, female-headed, and rural households. Households in the persistently eligible group have an equal reliance on governments grants and labour market income (39% of household income) on average, and access to credit markets and assets is low. The average per capita expenditure of those in the persistently eligible group is just R877.44, situating the average individual in this group below the upper bound poverty line – R1 158 in 2017 (December 2017 prices).

Those who are transiently eligible are distinct from those persistently eligible along these above-mentioned dimensions. For example, over half the individuals in this group reside with a household head who is employed (59% compared to 37% among the persistently eligible) and a much larger share reside with a household head who has a tertiary qualification (38% compared to 3% among the persistently eligible). Reliance on government grants diminishes among this group (15% vs. 39%), and over two-thirds of household income comes from the labour market on average, possibly reflecting the higher household employment rate for this group (55% of working age residents employed vs. 32% among the persistently eligible). Moreover, access to credit markets appears markedly higher for those transiently eligible compared to those persistently eligible.

Some similarity between the transiently eligible and the vulnerable missing middle is to be expected, since these groups are those whose household income is most likely to churn around the funding threshold. For example, the household employment rate is comparable across these groups, as is the share of individuals living with female household heads and household heads who have a tertiary qualification. However, Table 4 makes it apparent that those who are transiently eligible are, in some respects, distinct from the vulnerable missing middle group. More than double the share in the vulnerable missing middle live with someone who has a home loan or bond compared to those who are transiently eligible (9% vs. 24%) and over three times the share in the vulnerable missing middle live with someone who has accessed vehicle finance (8% vs. 29%). In a sense, these results do suggest that the current policy is relatively well targeted to the most resource constrained households.

### *Household circumstances of the missing middle*

South Africa is plagued by unprecedented levels of young people not in employment, education or training (NEETs) (Schirmer & Nkomana, 2021), and globally NEETs have increasingly becoming an important topic among policy makers (see e.g. Högberg, 2019). Education is a promising way of connecting NEETs to the labour market, making a focus on youth circumstances in relation to student funding particularly relevant. In this section, we spotlight the differences between the vulnerable and stable missing middle groups among youth (aged 15-35) and show how grouping all youth in the missing middle together could mask important variation in their household circumstances.<sup>6</sup>

It is relevant to note that while those in this bracket may be ‘missing’ funding, they are in no way in the middle of the household income distribution. This echoes a reflection in Visagie and Posel (2013) that a sizeable share of South Africans in the

**Table 4.** Average characteristics of households and household heads by funding class

	Eligible		Missing Middle			Total
	Persistent	Transient	Vulnerable	Stable	Elite	
Share of respondents	60.56%	31.09%	2.17%	2.41%	3.76%	100%
(a) Characteristics of the head						
Household head is employed	0.37	0.59	0.64	0.79	0.78	0.47
Age of household head	47.43	45.4	49.1	44.69	46.64	46.74
Female household head	0.64	0.47	0.48	0.26	0.28	0.56
Race						
African	0.92	0.72	0.76	0.16	0.24	0.81
Coloured	0.06	0.13	0.13	0.13	0.08	0.09
Asian/Indian	0.01	0.03	0.05	0.06	0.1	0.02
White	0.00	0.12	0.06	0.65	0.58	0.08
Highest education						
Missing	0.00	0.01	0.00	0.01	0.01	0.00
No schooling	0.20	0.02	0.03	0.01	0.00	0.13
Primary	0.31	0.13	0.09	0.00	0.03	0.23
Incomplete secondary	0.38	0.24	0.29	0.08	0.09	0.32
Matric	0.07	0.21	0.22	0.19	0.15	0.12
Post-school qualification	0.03	0.38	0.37	0.71	0.72	0.19
(b) Household characteristics						
Income and expenditure						
Per capita expenditure <sup>a</sup>	877.04	2 872.53	5 265.14	9 943.06	14 903.00	2 339.01
Per capita income <sup>a</sup>	1 209.42	3 279.34	8 835.43	11 986.31	31 796.22	3 429.11
Share of income from <sup>b</sup> :						
Labour market	0.39	0.70	0.80	0.88	0.83	0.53
Government grants	0.39	0.14	0.05	0.01	0.01	0.28
Investment income	0.01	0.03	0.03	0.04	0.07	0.02
Remittances	0.07	0.04	0.03	0.01	0.01	0.06
Subsistence agriculture	0.01	0.00	0.00	0.00	0.00	0.00
One-shot response (no source)	0.12	0.09	0.08	0.05	0.07	0.10
Assets, credit, and infrastructure						
At least one resident has a:						
Home loan/bond	0.00	0.09	0.24	0.53	0.47	0.07

*(Continued)*

Table 4. (Continued)

	Eligible		Missing Middle		Elite	Total
	Persistent	Transient	Vulnerable	Stable		
Bank loan	0.07	0.22	0.34	0.28	0.22	0.13
Study loan with a bank	0.00	0.01	0.03	0.03	0.03	0.01
Vehicle finance	0.00	0.09	0.30	0.35	0.39	0.06
Credit card	0.02	0.14	0.32	0.47	0.51	0.09
Store card	0.18	0.42	0.55	0.44	0.42	0.28
Financial assets	0.59	0.90	0.94	0.94	0.95	0.71
Pension assets	0.01	0.17	0.31	0.52	0.47	0.09
Household member owns dwelling	0.76	0.71	0.86	0.78	0.85	0.75
Household owns livestock assets	0.09	0.02	0.04	0.00	0.01	0.06
Number of rooms in house	3.78	4.95	5.47	5.93	6.78	4.34
Access to electricity	0.79	0.95	0.94	0.97	0.98	0.85
Piped water on site	0.64	0.92	0.94	0.99	0.96	0.75
Has a flush toilet	0.40	0.81	0.82	1.00	0.97	0.57
Household composition						
Number of household residents	5.47	5.39	5.84	3.78	4.03	5.36
Number of children under 6	0.96	0.69	0.83	0.33	0.37	0.84
Number of children aged 6–18	1.74	1.58	1.56	0.87	0.96	1.63
Number of elderly residents <sup>c</sup>	0.34	0.30	0.28	0.26	0.25	0.32
Household employment rate <sup>d</sup>	0.32	0.55	0.57	0.74	0.70	0.42
Location						
Traditional	0.46	0.20	0.19	0.04	0.05	0.35
Urban	0.47	0.77	0.78	0.95	0.94	0.60
Farm	0.06	0.02	0.03	0.01	0.02	0.05

Source: Authors' own calculations using NIDS Waves 1 to 5 pooled sample.

Notes: Data are weighted using post-stratification weights from the base period.

<sup>a</sup>Income and Expenditure are monthly values in Rands.

<sup>b</sup>Share of income excludes imputed rental income.

<sup>c</sup>Elderly residents are defined by age 60+.

<sup>d</sup>Household employment rate is computed for working age adults.

middle of the income distribution in fact live in poverty. This motivates for the need to unpack the circumstances of the missing middle to ascertain the extent of vulnerability and the potential for co support in a differentiated funding model.

Of the key differences between vulnerable and stable missing middle youth visible in Table 5, many may be attributed to the urban-rural split between groups. While 76% of youth in vulnerable missing middle reside in urban locations, a much larger share of stable missing middle youth reside in urban areas (94%).

On average, stable missing middle youth live in households that have better access to the labour market (73% household employment rate among the stable compared to 54% among the vulnerable), resulting in a greater share of household income from the labour market – ten percentage points more than the vulnerable. Furthermore, over double the share of stable missing middle youth live in a household with access to a home loan/bond, compared to youth who are in the vulnerable missing middle (54% vs. 21%), and a much lower share of vulnerable missing middle youth reside in households in which a resident has access to vehicle finance and pension assets. Stable missing middle youth also reside in households that are smaller on average, have fewer dependants, and are more likely to be headed by an employed male with a tertiary qualification. The fact that the stable missing middle have such a high share of household heads with tertiary education is relevant since first-hand experience of application and enrolment could facilitate access. Comparing the averages for both of these groups individually to those in the final column, it is apparent that aggregating household circumstances within the missing middle would overstate the long-run well-being of the vulnerable group and understate the relative economic security of the stable group. For example, it would appear as if the share of the missing middle with access to a home loan/bond in their household is just over a third, when in fact it is over half for the stable group but below a quarter among the vulnerable.

This being said, household circumstances are not the only factors affecting access to tertiary education. A number of individual characteristics such as schooling, academic performance, and family background are also relevant, and it is useful to understand how these factors vary by funding class. Table 6 summarises this information.

The highest share of NEET youth (43%) is found among those who face the most economic precarity (the persistently eligible), perhaps a reflection of poorer schooling outcomes among this group. This is compared to a low 8% and 9% of youth who are NEET among the elite and stable groups, respectively. Roughly a quarter of youth in each group are still enrolled in school.

The age and gender distribution across groups is similar, but notable differences appear in school quintile and academic performance. Public schools in South Africa are divided into quintiles based on the socioeconomic status of the school's neighbourhood, and lower quintile schools receive a higher government subsidy per learner. Schools in the first three quintiles cannot (by law) charge fees, whereas schools in quintiles 4 and 5 are allowed to charge fees, as determined by schools' governing bodies (South African Schools Act, section 21). Learning outcomes across school quintiles are markedly different, being particularly low – especially by international standards – in quintile 1-3 schools (Branson & Lam, 2022).

**Table 5.** Average household characteristics of youth (aged 15-35) in the missing middle

	Vulnerable	Stable	p-value*	All MM
<b>(a) Characteristics of the head</b>				
Household head is employed	0.65	0.84	0.00	0.73
Age of household head	49.13	40.95	0.00	44.69
Household head is female	0.46	0.26	0.00	0.37
<b>Race</b>				
African	0.79	0.21	0.00	0.48
Coloured	0.13	0.13	0.85	0.12
Asian/Indian	0.06	0.08	0.47	0.07
White	0.02	0.58	0.00	0.32
<b>Highest education</b>				
Missing	0.00	0.01	0.02	0.00
No schooling	0.03	0.01	0.01	0.02
Primary	0.11	0.00	0.00	0.05
Incomplete secondary	0.33	0.05	0.00	0.19
Matric	0.20	0.17	0.47	0.19
Post-school qualification	0.35	0.76	0.00	0.55
<b>(b) Household characteristics</b>				
<b>Income and expenditure</b>				
Per capita expenditure <sup>a</sup>	5 026.34	10 163.72	0.00	7 664.28
Per capita income <sup>a</sup>	8 748.65	12 609.23	0.00	10 705.20
<b>Share of income from<sup>b</sup>:</b>				
Labour market	0.81	0.91	0.00	0.85
Government grant	0.05	0.01	0.00	0.02
Investment income	0.03	0.03	0.96	0.03
Remittances	0.04	0.02	0.07	0.03
Subsistence agriculture	0.00	0.00	0.02	0.00
One-shot response (no source)	0.08	0.04	0.03	0.06
<b>Assets, credit, and infrastructure</b>				
<b>At least one resident has a:</b>				
Home loan/bond	0.21	0.54	0.00	0.38
Bank loan	0.35	0.30	0.20	0.32
Study loan with a bank	0.05	0.04	0.47	0.05
Vehicle finance	0.28	0.40	0.00	0.35

*(Continued)*

**Table 5.** (Continued)

	Vulnerable	Stable	p-value*	All MM
Credit card	0.31	0.49	0.00	0.41
Store card	0.56	0.46	0.02	0.52
Financial assets	0.94	0.94	0.98	0.94
Pension assets	0.32	0.49	0.00	0.40
Household member owns dwelling	0.83	0.73	0.02	0.77
Household livestock assets	0.03	0.00	0.00	0.02
Number of rooms in house	5.58	5.84	0.16	5.74
Household has access to electricity	0.95	0.98	0.03	0.97
Piped water on site	0.93	0.99	0.00	0.96
Has a flush toilet	0.81	1.00	0.00	0.90
Household composition				
Number of household residents	6.04	3.70	0.00	4.81
Number of children under 6	0.84	0.35	0.00	0.58
Number of children aged 6–18	1.44	0.70	0.00	1.06
Number of elderly residents <sup>c</sup>	0.28	0.16	0.01	0.22
Household employment rate <sup>d</sup>	0.54	0.73	0.00	0.64
Location				
Traditional	0.21	0.04	0.00	0.12
Urban	0.76	0.94	0.00	0.86
Farm	0.03	0.02	0.60	0.02
No. individuals	929	517	–	1 515

Source: Authors' own calculations using NIDS Waves 1 to 5 pooled sample.

Notes: Data are weighted using post-stratification weights from the base period.

\*p-value for the difference between vulnerable and not vulnerable mean characteristics.

<sup>a</sup>Monthly value in Rands.

<sup>b</sup>Share excludes imputed rental income. Labour market income reflects after tax income.

<sup>c</sup>Aged 60+.

<sup>d</sup>Of working age adults.

The majority of youth whose household income is below the R350 000 threshold attended a quintile 1–3 school (75% and 54% for the persistently and transiently eligible, respectively), whereas attending a quintile 4–5 school is more prevalent among the stable missing middle (62%). The vulnerable group falls somewhat in between the transiently eligible and stable, but more vulnerable missing middle youth attend a quintile 1–3 school (43%) than a quintile 4–5 school (34%). Here, youth in the vulnerable missing middle appear more similar to transiently eligible youth, on average, than the stable missing middle.

Higher incidences of grade repetition and lower numeracy scores are prevalent among those persistently and transiently eligible, a stark reflection that household socioeconomic status and schooling outcomes are inextricably linked. Moreover,

**Table 6.** Average individual characteristics of youth (aged 15-35) by funding class

	Eligible		Missing Middle		Elite	Total
	Persistent	Transient	Vulnerable	Stable		
<b>Activity in time t-1</b>						
Enrolled but level is unknown	0.00	0.01	0.01	0.01	0.02	0.01
Enrolled in school	0.25	0.19	0.24	0.24	0.23	0.23
Enrolled in post-school	0.04	0.09	0.15	0.14	0.22	0.06
Employed	0.28	0.45	0.36	0.53	0.44	0.34
NEET <sup>a</sup>	0.43	0.26	0.23	0.09	0.08	0.36
Community unemployment rate	0.65	0.62	0.63	0.60	0.59	0.64
<b>Demographics</b>						
Age	24.18	25.17	24.17	25.07	24.33	24.52
Gender (Male)	0.48	0.52	0.49	0.47	0.46	0.49
<b>Race</b>						
African	0.93	0.76	0.79	0.22	0.30	0.84
Coloured	0.06	0.12	0.12	0.13	0.09	0.08
Asian/Indian	0.01	0.03	0.06	0.08	0.11	0.02
White	0.00	0.09	0.02	0.57	0.49	0.06
<b>Schooling</b>						
School quintile 1-3	0.75	0.54	0.43	0.08	0.16	0.64
School quintile 4-5	0.15	0.3	0.34	0.62	0.53	0.22
School quintile missing, with match <sup>b</sup>	0.02	0.03	0.06	0.05	0.06	0.03
School quintile missing, no match <sup>b</sup>	0.09	0.13	0.17	0.24	0.25	0.11
<b>Academic performance</b>						
Completed or enrolled in Grade 9	0.82	0.94	0.96	0.97	0.99	0.87
Completed or enrolled in Grade 12	0.29	0.56	0.59	0.76	0.75	0.4
Repeated a school grade <sup>b</sup>	0.56	0.47	0.38	0.19	0.22	0.51
Repeated a school grade missing	0.14	0.14	0.18	0.22	0.17	0.14
Repeated a secondary grade	0.28	0.24	0.17	0.06	0.08	0.25
Repeated a secondary grade missing	0.34	0.38	0.41	0.44	0.49	0.36
Repeated a primary grade	0.19	0.12	0.09	0.09	0.06	0.16
Repeated a primary grade missing	0.34	0.38	0.42	0.44	0.49	0.36
Standardised numeracy score <sup>c</sup>	-0.64	-0.44	-0.14	0.08	-0.08	-0.55

(Continued)

Table 6. (Continued)

	Eligible		Missing Middle			
	Persistent	Transient	Vulnerable	Stable	Elite	Total
Mother's education <sup>b</sup>						
Missing	0.05	0.05	0.05	0.03	0.05	0.05
No schooling	0.25	0.11	0.09	0.03	0.02	0.19
Primary	0.32	0.2	0.12	0.05	0.08	0.27
Incomplete secondary	0.28	0.31	0.31	0.18	0.11	0.28
Matric	0.05	0.13	0.09	0.24	0.20	0.08
Post-school qualification	0.04	0.20	0.33	0.46	0.53	0.12
Father's education <sup>b</sup>						
Missing	0.18	0.16	0.16	0.05	0.10	0.17
No schooling	0.30	0.14	0.12	0.04	0.04	0.23
Primary	0.22	0.16	0.09	0.04	0.03	0.19
Incomplete secondary	0.19	0.25	0.22	0.13	0.11	0.20
Matric	0.07	0.14	0.19	0.30	0.20	0.11
Post-school qualification	0.04	0.15	0.22	0.44	0.52	0.1
No. individuals	38 245	15 654	929	517	745	56 090

Source: Authors' own calculations using NIDS Waves 1 to 5 pooled sample.

Notes: Data are weighted using post-stratification weights from the base period.

<sup>a</sup>This category includes those with missing enrolment and employment information.

<sup>b</sup>Parental education, grade repetition, and school quintile are all constructed using the full panel. That is, missing gaps are filled in with data from previous waves, when available. We include indicator variables for missing information where we are unable to fill gaps with the panel data.

<sup>c</sup>This variable was only asked in Wave 1.

less than one third of youth who are persistently eligible have reached Grade 12, despite their average age being the same as youth in the vulnerable missing middle. Over half of persistently eligible youth have repeated at least one school grade, and grade repetition remains high among vulnerable missing middle youth – over one third have completed a school grade – this being double the share who ever repeated among the stable group.

Family background, as captured by parental education, is also distinct for the vulnerable vs. stable missing middle youth. Double the share of stable youth have a father with tertiary education compared to vulnerable youth (44% vs. 22%), and more than double the share have a mother with a matric education (24% vs. 9%). Lastly, it is impossible to ignore the nature of inequality along racial lines. Although both the vulnerable and stable collectively comprise the missing middle, the vulnerable are disproportionately African (79%) whereas the stable are disproportionately white (57%).

Akin to reflections in Schotte et al. (2018), these results emphasise that by solely using a monetary threshold to classify individuals, there is a risk of mis-identifying a share of the population whose household income puts them in the missing middle,

but who are nevertheless relatively economically secure. These individuals live in smaller households with fewer dependants (both children and elderly) that are more connected to the labour market and have relatively greater access to loans. In fact, in many respects, the stable middle class more closely resembles the elite, on average, compared to the vulnerable missing middle. We highlight these findings not to suggest that those in the missing middle do not face barriers to access but rather to prompt reflection about differentiated targeting of policy. We test the robustness of our findings to our choice of probability cut-off, and the assumptions underlying pooled transitions. Findings are robust and detailed in Appendix B.

### Concluding remarks

This paper contributes both conceptually and methodologically. Conceptually, it establishes a well-defined framework for the analysis of household circumstances as they relate to funding thresholds, over time. Methodologically, our study pioneers the application of an income dynamics approach to studying financial aid thresholds, while addressing simultaneously the endogeneity of initial conditions and panel attrition. This highlights the broader applicability of the multivariate probit model as an empirical tool for thinking about the targeting and expansion of social programs.

The current policy landscape in South Africa calls for the establishment of a sustainable, comprehensive, and progressive financial aid scheme for tertiary education. Given the limitations of providing free education to all students, a differentiated policy becomes relevant. A key value in our approach lies in operationalising the concepts of mobility, vulnerability, and economic stability to differentiate the socioeconomic circumstances of households within the existing policy framework.

We show that economic precarity manifests on either side of the current funding threshold and acknowledge that economic instability can constrain tertiary education access – even when income is above the threshold. Our results reveal that the missing middle is a complex category, comprising at least two distinct groups based on their relative economic stability or vulnerability. In focusing on youth, we show that aggregating household circumstances within the missing middle would overstate the long-run well-being of vulnerable youth and understate the relative economic security of youth we classify as relatively more stable.

While income thresholds are typically necessary for operational purposes in social support programs, our study demonstrates two key points. First, the current funding threshold in South Africa is effectively targeted at the most resource-constrained households and should not be lowered. Second, when considering the expansion of support, a differentiated funding instrument may be appropriate. The vulnerable missing middle looks far more likely to already be engaging in formalised credit markets compared to the transiently eligible, but not to the same extent as the stable missing middle. Although a limitation of this study is that we do not recommend alternative thresholds for this group, we do believe that the identification of a vulnerable group requiring differentiated policy attention is an important insight, since targeting policy in a differentiated way has the potential to

improve resource allocation and enhance equity. The ability to target policy in a differentiated way is likely to become increasingly operationally feasible with, for example, advancements in Artificial Intelligence.

**Supplementary material.** The supplementary material for this article can be found at <https://doi.org/10.1017/S0047279423000636>.

**Data.** Southern Africa Labour and Development Research Unit. National Income Dynamics Study 2017, Waves 1-5 [dataset]. Pretoria: Department of Planning, Monitoring, and Evaluation [funding agency]. Cape Town: Southern Africa Labour and Development Research Unit [implementer], 2018. Cape Town: DataFirst [distributor], 2018. <https://doi.org/10.25828/fw3h-v708>.

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## Notes

1 Tertiary education refers to all post-compulsory education, which occurs until Grade 9 or the age of fifteen, whichever occurs first (South African Schools Act, 1996).

2 Despite using the terminology ‘combined household income’, since 2018 the formal approach has been to calculate income eligibility only in terms of direct family income (parents, legal guardians, or spouse). It is not intended to include the income of extended family members if they are not students’ legal guardians. Income includes all forms, from the formal and informal sector. However, it is not always possible to establish direct family income in NIDS. Therefore, household income is the best measure we have available.

3 This is implemented in STATA 2016 using Roodman’s (2011) user-written command `cmp`.

4 Pooling violates the maximum likelihood estimation assumption of independently and identically distributed errors. We therefore cluster standard errors at the household level in the wave in which a respondent first appears (see e.g. Cappellari & Jenkins, 2004; Finn & Leibbrandt, 2017).

5 High grade repetition means school completion is delayed for a high proportion of students (van der Berg et al., 2019).

6 Table 13 in Appendix C replicates Table 4, but for the sample of youth rather than all respondents (general observations remain unchanged).

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