Who benefits from university admissions tests? - A comparison between grades and test scores as selection instruments to higher education

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Abstract

In Sweden, there are two separate instruments for ranking applicants in the admission to higher education; the GPA from upper secondary school and the Swedish Scholastic Assessment Test (the SweSAT). A problem in the selection is that different groups of students perform differently on the instruments. Also, while the GPA is regarded more valid but with reliability problems, the test is seen as reliable but with lower predictive validity. Hence, in 2011, the test was revised, with the purpose to increase its relevance for university studies. New item types and new subtests were introduced, and the weights of the verbal and quantitative parts of the test were made more balanced. This study compares how students are ranked on the basis of the new test compared to their GPA, to find out if previous group differences still remain. The data consists of test participants in the autumn of 2011 and spring of 2012 at the ages 17 to 25. The results show that the correlation between test scores and GPA is approximately the same as before the revision. It is also found that there are still group differences in terms of boys performing better on the test and girls on the GPA. However, when studying separate sub-tests and grades and national course tests from isolated subjects, the students seem to be ranked more similarly than in the overall SweSAT-GPA comparison. Although students with a non-Swedish background are performing lower than other students on both instruments, boys in this group seem to be graded more leniently than the girls with a similar background in mathematics, and the opposite is the case in verbal subjects.

Keywords: admission; selection; higher education; score differences

JEL classification: I23

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1 Introduction

When there are more eligible applicants to higher education than there are study places, a selection must take place. Different systems have different strategies for making this selection. In Sweden, there are two main routes and two selection instruments, by which students are ranked; the grade point average based on the upper secondary school grades and an admissions test called the SweSAT. The SweSAT has been introduced as an option to the GPA, to function as a "second chance". The test has many similarities to other well-known admissions tests such as the American SAT and the Israeli PET, in both content and format. It consists of a number of subtests measuring verbal and quantitative skills that are expected to be important for academic performance, and the expectation is that the higher the score, the more likely is the test taker to be successful in higher education. The main difference between the Swedish test and other similar tests is generally that the Swedish admissions test is not used in combination with grades, but as an optional alternative for students who compete for study positions.

It is well known that the admission to higher education is not without problems, often raising questions about fairness, but also about practical usefulness and potential consequences when it comes to selecting students. By having two instruments it is possible to make comparisons, but if the instruments rank students in different ways it is not always clear what is to be preferred. Who "deserves" to be first in line? Should it be the highest performing students, or should other aspects be regarded equally or more important?

In the research on selection instruments, it is generally found that there are systematic differences in the information that is given by grades and tests, as will be discussed in this paper. Research has also shown that the upper secondary school grades are slightly better at predicting academic performance, compared to the test. One hypothesis often discussed is that the higher predictive strength can be explained by the GPA representing cognitive as well as non-cognitive aspects, both important in education, while the test does not capture motivation, industriousness, social skills etc. to the same extent. Although this hypothesis seems plausible, it has been difficult to provide

evidence that this is the reason for the difference in predictive strength between the instruments.

The test has also been criticized on other grounds, most often with the argument that the predictive validity could be improved with a change of content. It has been claimed that the strong emphasis on verbal items has been negative, especially when the test is used in the admission of students in technical or mathematically oriented study programmes (see, for instance, Svensson, 2004). Consequently In 2011, the SweSAT was revised. The main changes were that the verbal and the quantitative parts of the tests were made more balanced. New subtests were added, and the test now consists of more items (38 more items, making a total of 160 instead of 122). The main purpose of adding items was to make it possible to calculate a normed score for the verbal and the quantitative parts separately. The test score is now reported as a total score, as well as two separate scores. The idea with this is to make it possible to put extra weight on either the verbal or the quantitative part in the admissions process, if this is regarded important for a specific programme.

1.1 Aim of the study

This study investigates how applicants to higher education in Sweden are ranked on the basis of the revised SweSAT in comparison with the upper secondary GPA. The purpose is to find out if groups of students scores higher or lower depending on the instrument, and to see if recent revisions of the test have changed the patterns that have been found in previous research. The main focus will be on gender differences, since this has been a recurring topic in previous research, but we also discuss differences that are related to the applicants' socio-economic and ethnical background, as well as educational experience.

2 The admission system

Since this study focuses on analysing the selection instruments and how they work in terms of rank ordering students, it may be useful for the reader to have an understanding of how the Swedish admissions system works and what characterises the two selection instruments have. For a more detailed description, see Stage (2004).

2.1 Eligibility vs. selection

In order to get admitted to higher education in Sweden, the applicant needs to fulfil the requirements for previous education, which generally is to have graduated from upper secondary school. For some university programmes or courses, there are special requirements regarding advanced courses. However, if there are more applicants than study places, a selection must take place. There are mainly two instruments used in this selection: the GPA from upper secondary school, and the SweSAT (in Swedish: *Högskoleprovet*). The instruments are never combined as in many other countries; instead the applicants are ranked in different quota groups depending on which instrument he or she is applying with. An applicant with both a GPA and a test score from the SweSAT will be admitted on the basis of the instrument that is most favourable. Universities are required to admit at least 30 per cent of their students from each group. The universities usually admit just above this limit from the SweSAT group, and the majority of the students from the GPA group.

Since the SweSAT is optional to take, but grades are necessary for eligibility, basically all students will apply with their grades and consequently their GPA, but only the students who have taken the SweSAT and submitted their results will be placed in the SweSAT group. The selection group based on grades is therefore considerably larger than the SweSAT group.

2.2 The upper secondary grades and GPA

Since 1994, the Swedish grading system has been criterion-referenced. Upper secondary school is not compulsory, but most students continue to this level after compulsory school, at the age of 16. After each course students are graded from A-F, where E is the lowest approved grade, and A is the highest. Prior to 2012, the grading scale had only four grades, and ranged from Fail (IG) to Pass (G), Pass with distinction (VG) and Pass

with special distinction (MVG). The GPA is the average from all upper secondary school grades, where also the length of the course determines its weight. Some courses also give extra credit. In order to make the calculation, the letter grades are converted to a numerical measure (IG=0, G=10, VG=15, MVG =20). Although the letter grades are criterion referenced, the GPA (0-20) should be regarded norm referenced, with the sole purpose of ranking students (Wikström, 2005).

2.3 The SweSAT

As previously described, The SweSAT is a norm-referenced test, used for ranking students who apply for higher education. The test is administered twice a year, and simultaneously at a number of places throughout Sweden and also in some places abroad. The SweSAT is optional and open for anyone to take. There is no limit when it comes to how many times the test can be taken, and the test taker has little to lose by retaking the test since it is the best result that counts. For most test takers, retaking the test generally gives a positive effect on the test score, especially between the first and second time. This is interpreted as a learning effect that mainly has to do with becoming more familiar with the test format and better at allocating time (Henriksson & Bränberg, 1992; Henriksson & Wolming, 1998).

Since the autumn of 2011, a number of changes have been made to the test. The number of items in the test has changed from 122 to 160, and the test takers are given 25 extra minutes to compensate for this. In order to avoid making the test more speeded, some of the old items that need longer time to answer have been removed or changed. Still, the allotted time is not extensive considering the length of the test.

Prior to the autumn of 2011, the SweSAT consisted of six subtests: Swedish Reading comprehension (READ), English Reading comprehension (ERC), Vocabulary (WORD), Diagrams, Tables and Maps (DTM), and Data Sufficiency (DS). In the autumn of 2011, three new subtests were added: Sentence complementation (SC), Mathematics (XYZ) and Quantitative comparisons (QC), which means that the SweSAT now includes eight subtests. Consequently, the quantitative part of the test consists of 80 items and includes the subtests DS, DTM, XYZ and QC, and the verbal part of the test consists of the subtests READ, WORD, ERC and SC (Stage & Ögren, 2010).

A test score is valid for five years and it is the best score that counts. This means that the student has little to lose by re-taking the test. The results are public, which means that the items and the test forms are changed for each administration. To ensure comparability, the test is standardised and equated over time (Lyrén, 2009).

2.4 Previous research on the selection instruments

Internationally, a relatively large amount of studies, focusing on the selection to higher education, have previously been carried out. The main part of this research has focused on the instrument's predictive validity, i.e. their ability to predict performance in higher education. Other studies have often focused on group differences, i.e. differences in performance on the selection instruments that systematically can be related to the test taker's gender, age, and socio-economic or ethnical background.

2.4.1 Research programmes

In Sweden, the main part of the research on the selection to higher education has been carried out within three research programmes. The first programme focused on the validity of the admission system. Among the studies, Henrysson (1984a) analysed methodological problems relating to how to analyse the predictive validity in selection instruments, and studied the impact of previous knowledge, study motivation and general aptitude (Henrysson, 1984b). Henrysson & Henrysson (1984) studied the effect of giving extra credits for work experience. Another study by Henrysson, Kriström, & Lexelius (1984) aimed to analyse the importance of characteristics relating to the students' background, which resulted in a discussion regarding the problem of identifying criteria for study success.

A second research programme was characterised by a lot of focus on the criterion for academic success, as it had been found to be problematic when carrying out studies on prediction (Andersson & Grysell, 1992, 1995; Wester, 1995). Lexelius & Wolming (1995) discussed the problems with restriction of range in such studies, and found this to be a problem that is difficult to solve, especially when studying university programmes where most students perform equally well on the criterion. Henriksson & Wolming (1998) studied group differences in academic performance, with special focus

on students who had been given extra credits due to previous work experience, and found that these students performed lower than traditional students. Another study in this programme focused on how students in higher education performed on the SweSAT, compared to test takers without academic education, and found that further education generally improves performance on the test (Allergren, 1995). An interpretation of this is that the test seems to measure knowledge and skills that are relevant for higher education.

A few years later, the third and largest research programme was carried out (for an overview of this project, see Löfgren, 2005). The programme had the purpose of validating the selection system in a wider perspective. Different validity perspectives were considered; Åberg-Bengtsson (2005), Carlstedt & Gustafsson (2005), Cliffordson, (2006) and Cliffordson & Askling (2006) studied the characteristics of the SweSAT for construct validation, and results from their studies showed, for instance, that the test was dominated by *Gc* factors (skills, knowledge, and experience) rather than what is interpreted as *g*, or general intelligence. The grades were also in focus in this programme. Reuterberg & Hansen (2001) and Reuterberg (2003) studied group differences and found that test takers with a non-Swedish background performed lower on the test compared to test takers with a Swedish background. Studies by Stage (2004a; 2004b) focused on the gender differences on the test, where male test takers on average performed higher than female test-takers. The gender differences have been thoroughly investigated, both within this research programme, but also before and after. One example is a study by Reuterberg (1997) who analysed all subtests within the SweSAT with regards to gender differences but could not find any other explanation than that male students are higher performing, and especially in comparison with the grades where the differences were reversed, with female students performing higher than male students. The effect of repeated test taking was investigated also in this programme (Henriksson & Törnkvist 2002; Törnkvist & Henriksson 2004a, 2004b, 2006). Still, the main focus of the research within this project was the predictive validity of the selection instruments. Studies by Cliffordson (2004a, 2004b, 2004c); Cliffordson and Askling (2006), Löfgren & Törnkvist (2004a, 2004b), Svensson (2004), Svensson & Nielsen, (2005) all showed that students selected by their GPA performed slightly higher at university compared to students selected by their test scores. For an overview of

prediction studies, see Lyrén (2008). However, Wikström & Wikström (2005) and Wikström (2005a) showed that the grades had problems with reliability, and could not be strictly compared between schools or over time. The criterion problem was discussed also in this programme (Wolming, 2001, Andersson, 2003).

From an international perspective, research generally supports the findings described above. Similar group differences with regards to ethnic background and gender have been found in the American SAT (Zwick, 2002, 2004), but also that underperforming groups on the SAT (non-whites) are over predicted in terms of academic success. The latter has not been investigated in a Swedish context. Research on the admissions test in Israel, PET, has to a large extent also focused on performance differences relate to socio-economic background (Beller, 2001). As has also been confirmed by a number of other studies, student background is important for explaining both study success and performance on high stakes tests.

2.4.2 Evaluations

Since the Swedish model differs from most other countries by having two separate selection instruments that are also used in a centralised admission system, the instruments need to be validated separately, but also together, to see how students are ranked on the basis of each instrument.

Over the years, there a few studies have focused on making such comparisons. The most recent is Lexelius (2004), who studied correlations between the upper secondary grades in the basic and compulsory courses in English, Mathematics and Swedish and the SweSAT. The timing of this study is important, since it focuses on the upper secondary grades just after the Swedish grade system had been changed from being norm referenced to criterion-referenced (or "goal referenced"). The analysis shows a general positive correlation between the grades and the test. There is a weaker correlation between the grades in Swedish and the SweSAT, in comparison with the grades in English and Mathematics. The second level course in English (B course) had the highest correlation with the verbal subtest and the subtest DTM (Diagrams, Tables and Maps) and also the total score of the test. The grades in mathematics had the highest correlation with the quantitative subtests DTK and NOG (mathematical reasoning).

Lexelius also studied the correspondence between grades and subtests by factor analysis, which confirmed the relationships between the quantitative tests and upper secondary mathematics, and also the verbal tests and upper secondary English. The relationship between Swedish and the verbal tests was considerably weaker. Similar results were found in a study by Wikström & Lyrén (2009), who discussed if the course grades in Swedish are more sensitive to construct irrelevance and measure aspects such as industriousness and motivation, compared to other course grades. If so, this could explain a weaker relationship with tests scores or other grades.

3 Data

In this study, the SweSAT results from the autumn of 2011 (2011B) and spring of 2012 (2012A) are used. In the autumn of 2011, the total number of test takers was 41,247, and in the spring of 2012 the number of test takers was 57,634. 16,049 took both tests and can therefore be observed in both groups. Since the test is open for all, some of the test takers are unlikely to apply to university studies, since they are too young or already enrolled. From the total number of test takers, we select two groups of potential university students; (i) students who had finished upper secondary school by the time the test was administered, and (ii) a group of students who had not yet finished upper secondary school in 2011-2012.

3.1 Upper secondary school graduates

The first part of this study contains individuals born between 1986 and 1992. This means that they were between 19 and 25 years old in 2011. The major reason for restricting the upper limit is to exclude individuals who are 25 years or older, since their upper secondary grades may be problematic in terms of making comparisons. In 1997 a new criterion referenced grading system was introduced, and it is generally known that grade point averages increased dramatically for a number of years, meaning that it is difficult to compare GPA for different cohorts (Wikström, 2005). By 2005, the tendency for grades to be inflated over time had decreased considerably. For this reason, we therefore choose to include individuals born from 1986 and onwards.

The key variables concerning the SweSAT used in this study are the normed SweSAT test score (SWESAT), the normed test score on the quantitative parts of the test (SWESATQ), and the corresponding score for the verbal parts (SWESATV). The test scores are compared with the upper secondary grade point average (GPA). Also, since the SweSAT is supposed to capture basic verbal and quantitative skills corresponding to an achievement level at the first years of upper secondary school, school grades in the first two mathematics courses (MATA and MATB) and English courses (ENGA and ENGB) are compared with the quantitative and verbal parts of the SweSAT, respectively.

Test scores and grades are complemented with a number of background variables aimed at controlling for differences between groups of individuals. The dummy variable MALE controls for gender differences and AGE for age differences. Immigrant status is known to affect test scores as well as grades. We impose controls for first generation immigrants, i.e. those born abroad with both parents born abroad (FIRSTGEN). Second generation immigrants are defined as those born in Sweden with both parents born outside of Sweden (SECONDGEN). Finally, we also control for individuals born outside of Sweden with at least one parent born in Sweden (FORBORN). Other important information is what upper secondary program the applicant has graduated from. Students who are participating in a theoretically oriented programme in upper secondary school on average perform better on the SweSAT and are more prone to advance into higher education. Furthermore, students in theoretically oriented programmes are not necessarily comparable to students who have participated in other programmes, since the courses vary, and especially between theoretical and practical programmes. Therefore, we define the variable ACTRACK to include the students who participated in a theoretically oriented upper secondary programme. Another difference between individuals is that some students who did not finish upper secondary school regularly did so by participating in the municipal adult education (kommunala vuxenutbildningen). These are controlled for with the variable KOMVUX. To identify the students with previous experience with higher education (university level) the variable (HIGHEXP) is used. In the analysis of SweSAT 2012A, we also control for if they participated in the round of 2011B (PART11).

Finally, we control for the test takers' socioeconomic background. This is often measured by parental education and/or occupation. In this paper, we use parental education since it appears to be the most important factor by which education is transferred over generations. We define the parent with the highest level of education into two dummy variables; HIGHEDU if the parent with the highest education has some experience with higher education (post upper secondary school) and MIDEDU if the parent has upper secondary education. The reference group consists of those whose parents have secondary education or less. Variable definitions and data sources are presented in Table A1 in the Appendix A. Tables A2 and A3 presents descriptive statistics for the 2011B and 2012A test administrations respectively. The number of individuals selected is 23,214 and 27,075 for the 2011B and 2012A round, respectively. Missing information pertains to GPA and subject grades.

3.2 Upper secondary school students

The second part of the study contains individuals that have not yet left upper secondary school at the time the tests were administered. We select students born in 1993 and 1994, meaning that they were between 17 and 18 years old in 2011.[2] The number of test takers in this selection is 12,272 from the 2011B administration and 23,113 from 2012A. The background control variables are the same as in the first part of the study; the difference is in the upper secondary school variables used. For students currently participating in upper secondary school, subject grades cannot be observed. Therefore, we choose as outcome variables the national course (curriculum) tests that are administered at various times during the upper secondary school. These tests are used for information about student and school achievement and for grade calibrating purposes (in Sweden, there are no examination tests as grades are set by the teachers). The SweSAT normed quantitative and verbal scores (SWESATQ and SWESATV) are used together with the national test scores in mathematics (NMATA and NMATB), English (NENGA and NENGB) and Swedish (NSVB). Although these tests are administered to all students taking the relevant courses, only a random sample were collected from the schools at the time this data was collected. This means that the number of observations

[2] As some students leave upper secondary school before the age of 19, this selection criterion implies that a few individuals included will have left the upper secondary school at the time the SweSAT was taken. In the 2011B administration 170 individuals have a final GPA from upper secondary school, and in the 2012A administration this number is 189.

that can be used is restricted by the information collected centrally. The number of observations used varies between 1,076 and 6,821 depending on the test and SweSAT administration. In addition, previous evaluations have used secondary school grade point averages to study those who have not completed upper secondary school. Therefore, secondary elementary school GPA (GGPA) is used in this evaluation as well. Definitions of the national course test variables are given in Table A1 in Appendix A, and descriptive statistics are presented in Tables B1 and B2 in Appendix B.

4 Methodology

The main purpose of this evaluation is to study how graduates and students with different characteristics perform on different instruments. Previous evaluations have mainly concentrated on the covariance between SweSAT scores and grades to see to what extent one can predict the other. In order to make comparisons with these earlier evaluations, we will also report correlations between grade points and test results.

One way of studying if two instruments treat individuals differently is to form score differences, see e.g. Wikström and Wikström (2005), and to correlate the score difference with key characteristics. This will be the main focus of the present evaluation. We use as dependent variable the difference between the grade point average (or separated grade points) and the SweSAT score (or scores on the verbal and quantitative parts), where both scores are placed on the same scale (in the present case a standard normal scale). Key characteristics include gender, socioeconomic background, and ethnicity. If a coefficient associated with a particular trait is positive, we say that individuals in this group benefits from being graded relative to the SweSAT and vice versa.

One should, however, note that there are several possible interpretations as to why a particular difference exists. To mention a few, the instruments may firstly differ in what they measure. This is true in the present case, since the SweSAT should measure knowledge assumed important for success in higher education, which to a large extent is assumed to be related to core subject knowledge (reading, writing, arithmetics etc.), while the GPA is made up by a large number of subject grades to reflect a student's knowledge from certain criteria. As such, the GPA measures a broader spectrum of

knowledge, and has a multiplicity of purposes. Secondly, differences can depend upon format and practices. Grades are aggregates of written tests, tasks performed in and out of classroom etc., while the SweSAT is a single multiple choice test. Thirdly, differences may arise because of selection of the group of students taking the SweSAT. For example, older students may perform better on the SweSAT other things being held constant, since they have greater experience, e.g. when it comes to vocabulary. Older students are also more likely to have performed worse in upper secondary school, which is one of the reasons why they have not already entered higher education. For these reasons one should not necessarily interpret differences as unjust or as a bias in one or the other instrument.

To facilitate interpretations, score differences are complemented with regression models where the instruments are studied separately. Here we study if the SweSAT (and grades) can be considered as being neutral over key characteristics. As above, it is natural to study how disaggregated scores (a quantitative and a verbal part of the SweSAT) vary with key characteristics, and we will therefore study separate grades and the verbal and quantitative parts of the SweSAT. Finally, although this evaluation uses a large amount of data, occasionally one cannot reject a particular hypothesis although it is not true. To avoid misinterpretations as far as possible, the study is conducted for two different SweSAT administrations, and we can check for consistency of the results over the two administrations. Also, since the observable instruments vary with the SweSAT test taker, and, as mentioned above, samples with younger and older individuals are studied separately, we find it to be plausible to look for systematic differences that remain over administrations and across samples.

5 Results

5.1 Upper secondary school graduates

As mentioned above, this part of the study concerns the relationship between the SweSAT results and the grade point average and basic level course grades in upper secondary school for individuals who have graduated from upper secondary school. This section is divided into four different parts; the first concerns the covariance between SweSAT scores and GPA/course grades, the second concerns the determinants of grades and SweSAT scores, the third score differences, and the final part discusses differences between male and female participants. The final part is a natural step in the evaluation because of the gender differences that have been observed in previous studies.

5.1.1 Correlations

In Table 1, correlations between SweSAT scores and grade points for the two administrations are presented. The SweSAT/GPA correlations are 0.51 and 0.46 for the 2011B and 2012A respectively. These correlations can be compared to previous studies. Stage (1992) studied test takers in 1990 that graduated from upper secondary school the same year, and found an overall correlation coefficient of 0.51. In a similar study by Lexelius (2004), focusing on test scores and grades of students leaving upper secondary school in 1997 and taking the test in the autumn of 1996 or spring of 1997, the overall correlations were 0.52-0.53. Thus, the results from previous studies are quite similar to the results we obtain. Comparing the two administrations, we note that the overall correlation is slightly higher in the 2011B administration.

Table 1: Pairwise correlations between SweSAT scores and grade points; upper secondary school graduates

	Test administration	
	2011B	2012A
SweSAT/GPA	0.51	0.46
SweSATQ/MATA	0.66	0.61
SweSATQ/MATB	0.59	0.54
SweSATV/ENGA	0.55	0.56
SweSATV/ENGB	0.54	0.53

Note: Pairwise correlation coefficients. All coefficients are significantly determined on the 1 per cent level.

In the overall comparison, the correlation between the quantitative part of the SweSAT and the mathematics A-course (A representing the first course in upper secondary school) is the highest (0.66 and 0.61 for the 2011B and 2012A administrations respectively). Correlations between the verbal parts of the test and English grades are somewhat lower (0.55 and 0.56 when using English A-course grades). The subtest-grade correlations are higher than the test-GPA correlations. This is also what we expect, since the SweSAT is designed to capture core subject knowledge. Lexelius (2004) carried out similar estimations to those presented here, for subtests and separate grades regarding the students of 1997. The highest correlations were found between the English B-course grade and ERC (the English reading comprehension part of the SweSAT) (0.65), the English B-course grade and WORD (Swedish vocabulary subtest) (0.61), and mathematics A and DS (data sufficiency) (0.58). Although the studies are not entirely comparable, the comparison nevertheless shows no major differences over time.

We also estimate correlation coefficients for different subgroups; gender, immigration status, parental education, and educational experience. These are presented in Tables A4 to A6. When studying the different subgroups, we note that correlation coefficients are reasonably stable over different subsamples. However, in two dimensions there are differences that we want to highlight. First, correlations differ conditional on parental education. The correlation coefficients are slightly higher if we restrict the sample to the group of students with highly educated parents. Second, the correlation is higher for students on academic track compared to students that participated in non-academic school programmes. These differences are more pronounced for the overall GPA/SweSAT comparison than for subtests/grades, although they largely remain when comparing mathematics A with SweSATQ.

5.1.2 Determinants of SweSAT scores and grade points

Next, we turn to the question if one or the other instrument favours different subgroups taking the test. To this end, we start by presenting results from regression analysis performed using the different instruments as dependent variables. The results are presented in Tables A7 to A9.

It is generally known that male test takers perform better on the SweSAT than what females test takers do. The results in Tables A7 and A8 confirm this. For the overall test result, males score on average 1.3 points higher than females. This corresponds to about 0.35 standard deviations of the overall SweSAT score. For the different parts, we note that the difference is the largest in the quantitative part; 2 points or 0.44 standard deviations, while it is smaller in the verbal part (0.5 points or 0.11 standard deviations). Table A7 also reveals another well-known fact; that females have higher GPA (1 point or 0.38 standard deviations). However, when looking at results regarding the core subject grades, one can note that males perform better in both mathematics and English (A-courses). The difference is larger in mathematics; 0.37 grade points in the 2011B sample corresponding to approximately 0.1 standard deviations. It is important to note that SweSAT test takers differ from the general student population in at least two respects. Firstly, they are on average more high achieving than the student population as a whole, and, secondly, a larger proportion have graduated from an academically oriented programme. The fact that we observe positive male-female grade differences in this sample is due to the latter fact. In academically oriented programmes the gender differences are small, and in some programmes males have higher grades in e.g. English and mathematics.[3]

Age contributes to explain differences in grade points and SweSAT results. First, older persons have lower GPA and course grades than younger. These results are moreover stable across the test administrations. The yearly average age difference is about 0.3 GPA points. Second, with respect to the SweSAT, the results are different. The overall SweSAT score does not depend on age. But if we look at the two parts of the SweSAT, older individuals do better on the verbal part and worse on the quantitative part. The yearly average age difference is about 0.28 in the verbal part, meaning that a 24 year old individual scores approximately 1.4 points (0.33 standard deviations) higher than a 19 year old individual other characteristics held constant. The (negative) age difference is less stable in the quantitative part, but of similar magnitude as the verbal part in the 2011B administration. These differences are qualitatively the same as those found in previous studies (Stage, 1992, Lexelius, 2004).

[3] Information on grades, aggregated as well as for different programmes are available at the National Board of Educations web site; see http://www.jmftal.artisan.se/

Previous studies found large differences in SweSAT results with respect to immigration status (Reuterberg & Hansen, 2001, 2003). We also find differences, both when it comes to the verbal as well as the quantitative part of the SweSAT. Second generation immigrants have, on average, lower scores than test takers with a Swedish origin, and first generation immigrants have lower scores than second-generation immigrants. The differences are the largest in the verbal part; a first generation immigrant has on average a 2.9-point lower score than a test taker with Swedish background, other things held constant. Similar differences exist when comparing grades and GPA, except for the English A-course. A second-generation immigrant has, on average, the same English A-course grade as a native Swede.

Educational background is here measured by the variables ACTRACK and HIGHEXP, the former distinguishing students who graduated from a theoretical upper secondary school programme, and the latter those who had some experience with higher education at the time the test was administered. Core grades and GPA, as well as SweSAT results, are higher for academic track graduates and those with higher education experience. Finally, socioeconomic background is measured by parental education, influences grades and SweSAT results. This is especially important for those individuals where at least one parent has post upper secondary education.

5.1.3 Score differences

One central question when comparing grades and SweSAT results concerns how the different instruments rank students. As mentioned in section 4, we form the difference between the GPA and the SweSAT, both measured on a standard normal scale. This means that coefficient estimates are interpreted as standard deviations of either instrument. Although the GPA-SweSAT difference is the relevant measure for discussing how the two instruments function in the admission of university students, we nevertheless make similar comparisons using results for the SweSAT parts and the A-course grade points. The results are presented in Tables 2 and 3.

Table 2: Score differences GPA versus SweSAT; upper secondary school graduates

	Test administration	
Independent variable	2011B	2012A
Constant	3.188**	3.551**
MALE	-0.716**	-0.773**
AGE	-0.123**	-0.133**
FIRSTGEN	0.073*	0.085**
SECONDGEN	0.051*	0.028
FORBORN	0.149	0.170
MIDEDU	-0.036	-0.060
HIGHEDU	-0.082*	-0.104**
ACTRACK	-0.250**	-0.206**
KOMVUX	-0.611**	-0.552**
HIGHEXP	-0.138**	-0.098**
D11B	-	-0.167**
R-squared	0.203	0.216
N	19,708	22,030

Note: The dependent variable is the difference between GPA and SweSAT, both measured on a standard normal scale. A positive coefficient means that an individual scores higher on GPA, and a negative coefficient that the SweSAT score is higher. ** Coefficient significantly determined on the 99% level, * significant on the 95% level.

Let us start by presenting the results concerning the overall GPA-SweSAT difference. As can be seen from Table 2, the relative rankings vary over most of the characteristics that are included. The estimated coefficients in most cases show differences that are consistent over the two test administrations. The largest effects on the relative rankings come from gender and age. Males do relatively better on the SweSAT compared to the GPA. On average, a male student is placed 0.7-0.8 standard deviations higher in the overall distribution of the SweSAT. Older students also do relatively better on the SweSAT. This is entirely due to the fact that older students participating in the SweSAT have lower GPA than younger students. The same goes for students who finished upper secondary school through the municipal adult education. One can interpret the effects of AGE and KOMVUX as a second chance mechanism that makes it possible for these groups to get admission into higher education.

We also note a significant but small difference for first generation immigrants. The GPA ranks this group slightly higher than natives. The SweSAT and the GPA rank second-generation immigrants the same way as natives. Educational experience affects the

relative rankings. First, individuals that graduated from academic track programmes do better on the SweSAT than on the GPA compared to students with other educational experience. Academic track students are likely to be better prepared for the test, explaining their higher scores on the SweSAT. However, as we mentioned earlier, grades are not necessarily comparable between different educational programmes, and the estimated differences in Table 2 may be explained by more lenient grading in non-academic track programmes. Second, students with experience from higher education do better on the SweSAT. Social background also has explanatory power on the GPA-SweSAT difference. Individuals from a high education environment fare better by the SweSAT. Although this difference is small, it may indicate that the SweSAT contributes to the social recruitment bias.

Table 3: Score differences grades versus SweSAT quantitative and verbal parts; upper secondary school graduates

	Dependent variable/Test administration			
	MATA/SWESATQ		ENGA/SWESATV	
Independent variable	2011B	2012A	2011B	2012A
Constant	1.382**	1.723**	3.213**	3.184**
MALE	-0.379**	-0.430**	-0.074**	-0.111**
AGE	-0.053**	-0.065**	-0.148**	-0.139**
FIRSTGEN	-0.033	0.024	0.249**	0.237**
SECONDGEN	-0.068**	-0.030	0.395**	0.388**
FORBORN	-0.115	-0.137	0.425	0.336
MIDEDU	0.013	-0.007	-0.014	-0.013
HIGHEDU	-0.027	-0.017	-0.083*	-0.070*
ACTRACK	-0.081**	-0.019	-0.037**	-0.040**
KOMVUX	-0.383**	-0.154	0.006	-0.108
HIGHEXP	-0.150**	-0.146**	-0.247**	-0.223**
D11B	-	-0.198**	-	-0.113**
R-squared	0.078	0.097	0.121	0.111
N	19,704	22,026	19,698	22,015

Note: The dependent variables are constructed as the difference between the course grade and the SWESATQ/V, both measured on a standard normal scale. A positive coefficient means that an individual scores higher on the course grade, and a negative coefficient that the SweSAT part has a higher score. ** Coefficient significantly determined on the 99% level, * significant on the 95% level.

Let us also briefly discuss the results from the comparison of core grades and the SweSAT parts. Given that we believe that the core grades better should correspond to the SweSAT parts than the GPA does, it is natural to expect that the estimated

differences are smaller in this case. Indeed, looking at the results in Table 3, the estimated coefficients are generally of smaller magnitude than the corresponding estimates in Table 2. This is also evident by looking at the degree of explanation (R-squared), which is considerably lower in the SweSAT/course grade comparisons. Comparing estimates between the quantitative and verbal rankings (MATA/SWESATQ versus ENGA/SWESATV), it is notable that the estimated coefficients are generally larger in the verbal ranking. The exception to this is the male-female difference, which is relatively large in the quantitative comparison and small (but still statistically significant) in the verbal comparison. In the quantitative comparison, it should be noted that many of the estimated coefficients are not consistent comparing the two test administrations. In fact, only three explanatory variables have coefficients that are consistent over the administrations (statistically significant of the same sign and of similar magnitude) in the quantitative comparison; MALE, AGE, and HIGHEXP. Therefore, it is in the verbal part that the major differences arise.

5.1.4 Male-female score differences

As previously shown, there are important gender differences both when it comes to grades and SweSAT results. We can potentially obtain a better understanding of these differences by looking at male-female differences within different groups. To accomplish this, the regression models of the previous subsection are extended by including interaction terms. In Appendix A, the results concerning the relative ranking of the instruments are presented in Tables A10 and A11. The results regarding the determinants of the instruments can be obtained from the authors upon request.

Comparing the GPA-SweSAT relative rankings (Table A10), we find very limited evidence of interaction effects. Male-female differences do not vary with age and social background. In the 2012A administration, first- and second generation male immigrants are ranked relatively higher than females by GPA. The SweSAT score is, however, independent of the male immigrant interaction variables, meaning that male-female differences are entirely due to differences in grading. We also pick up a positive coefficient from higher education experience for males in the 2011B sample, but this is close to zero in the 2012A sample.

The comparison of course grades and the SweSAT parts yield different results from the overall comparison (Table A11). First, looking at the quantitative comparison, we note that there is a rather large difference for natives; the male coefficient is larger in absolute value than the corresponding estimate in Table 3. However, the immigrant interaction effects are positive, meaning that, among the immigrant groups, males are either graded more lenient than females or score worse on the quantitative parts of the SweSAT. Looking closer at these relations, it appears to be mainly driven by differences in grading. The exception to this is first generation immigrant males who score lower on the SweSAT in the 2012A administration. There is also some (although not consistent over the two administrations) evidence of a positive age difference.

While immigrant males appear to fare better being graded in the quantitative comparison, the opposite holds in the verbal comparison. Immigrant males do relatively better on the SweSATV. The estimated differences are mainly due to differences in grading. In the verbal comparison, there is a negative age effect, meaning that older male students do relatively better on the SweSATV. However, the male-female difference among natives is close to zero, and the estimated difference in Table 3 is therefore mainly due to the differences in the immigrant groups.[4] To sum up, male-female differences remain largely unexplained (constant over different characteristics) in the quantitative comparison, while it is to a large extent explained by differences among the immigrant groups in the verbal comparison.

[4] Assuming that statistically insignificant coefficients are zero, the average male-female difference for a 20-year old native is 0.508-0.026*20=-0.012 using the point estimates in column 3 (2011B), Table A11.

5.2 Upper secondary school students

As mentioned in the data section, it is not possible to observe individual grades (and the GPA) for those who have not yet finished upper secondary school. This section therefore concentrates on comparing the SweSAT quantitative and verbal parts with national course tests that were carried out during upper secondary school.

5.2.1. Correlations

As with upper secondary school graduates, the different instruments are compared by pairwise correlations. As mentioned above, the quantitative (verbal) part of the SweSAT is correlated with the grades obtained in the national tests in key subjects. For the purpose of comparison with previous studies we also report the correlation between the overall SweSAT score and the GPA from secondary school (GGPA). The results are presented in Table 4 and Tables B2 and B3 in appendix B. The SweSAT/GGPA correlations are 0.53-0.54 in the two administrations, which is well in line with previous evaluations. Correlations between SweSATQ/V and national test grades are generally higher; the exception is the Swedish B-level national course test, where the correlation is considerably lower (0.34-0.35). This supports previous findings since Lexelius (2004) also found lower correlation between course grades in Swedish and the SweSAT in comparison with other core subjects.

Table 4: Pairwise correlations between SweSAT scores and grade points/ national test scores; upper secondary school students

	Test administration	
Group	2011B	2012A
SweSAT/GGPA	0.54	0.53
SweSATQ/NMATA	0.68	0.64
SweSATQ/NMATB	0.70	0.66
SweSATV/NENGA	0.58	0.63
SweSATV/NENGB	0.61	0.59
SweSATV/NSVB	0.34	0.35

Note: Pearson correlation coefficients. All coefficients are significantly determined on the 1 per cent level.

Tables B2 and B3 present correlations for different subgroups for the national test grades in core courses. The correlations vary some over subgroups, but there does not seem to be any particular group where the correlations are systematically higher or lower. Comparing the results presented here with those concerning graduates, we note

that the correlations between national test grades and SweSAT scores are slightly higher than those between course grades and SweSAT scores. One plausible explanation for this is that the core grades are determined on the basis of a combination of tests and other forms of assessment, while the national course test is more similar in format to the SweSAT (although the types of tasks in the tests are different).

5.2.2 Score differences

In Table 5 below, estimates of score differences between the SweSAT and the national course tests (A-courses) are presented. Given that national course tests are more similar in format to the SweSAT than the assessments underlying the course grades, we expect to find less systematic variation in the score differences between different groups of test takers. The degree of explanation (R-squared) varies between 0.04 and 0.07 in Table 5. Although not perfectly comparable, the corresponding range in Table 3 (course grades/SweSAT) is 0.08-0.12. Thus, our conjecture seems to be consistent with the data at hand and what was found from studying the pairwise correlations.

Table 5: Score differences between national course test grades and SweSAT quantitative and verbal scores; upper secondary school students

	Dependent variable/Test administration			
	NMATA/SWESATQ		NENGA/SWESATV	
Independent variable	2011B	2012A	2011B	2012A
Constant	0.517**	0.527**	0.596**	0.044
MALE	-0.374**	-0.374**	0.050	0.029
BORN94	0.195**	0.086	0.288**	0.181**
FIRSTGEN	-0.143	-0.083	0.091	0.221**
SECONDGEN	-0.020	-0.040	0.493**	0.343**
FORBORN	0.115	-0.072	0.234	0.099
MIDEDU	0.008	-0.070	0.636**	-0.067
HIGHEDU	-0.002	0.009	0.468**	-0.066
ACTRACK	-0.146*	-0.077	-0.109	-0.075
HIGHEXP	-0.704*	-0.513*	-0.034	0.063
D11B	-	-0.129**	-	-0.171**
R-squared	0.074	0.062	0.061	0.040
N	1,076	2,120	1,565	3,056

Note: The dependent variables are constructed as the difference between the national test score and the SWESATQ/V score, both measured on a standard normal scale. A positive coefficient means that an individual is ranked higher by the national test, and a negative coefficient that the SweSAT ranks the individual higher. ** Coefficient significantly determined on the 99% level, * significant on the 95% level.

There is a consistent male-female difference in the quantitative comparison, but there is no difference in the verbal comparison. In the verbal comparison, immigrations status explains a part of the difference. First- and second generation immigrants appear to score higher on the national test, although the coefficient associated with first generation immigrants fails to reach significance in the 2011B-administration. There is also an inconsistency in the verbal comparison regarding socioeconomic background. In the 2011B sample, students from low-educated homes perform lower on the SweSAT than on the national test compared to other students. In the 2012A sample this effect is not present. The difference observed in the 2011B administration may be a coincidence, but it may also be due to an identification problem or a problem with outliers as the number of observations covering students coming from low-educated homes is very small in this case. We also note that experience with SweSAT matters and that younger students have higher national test grades than SweSAT scores.

Tables B5 and B6 present the estimation results regarding the determinants of SweSAT and national course tests. As the results are very similar (at least qualitatively) to those regarding upper secondary school graduates, we do not comment upon them further. However, let us briefly compare the score difference results across the student and the graduate samples. Most of the differences found in the sample of graduates are also present in the student sample. The size of the gender difference in the quantitative comparison is 0.37 standard deviations (see Table 5), which is more or less the same as the difference found in the study of graduates. There is no gender difference found in the verbal part in the student sample, although a small difference in the graduate sample. The results also show that immigration status matters. The parameter estimates are qualitatively the same in both samples. Comparing the estimates regarding socioeconomic background, we found no or small differences in the graduate sample, which is why we are reluctant to interpret the corresponding estimate in the verbal comparison of 2011B as a true effect.

Finally, age differences go in the same direction in both samples, but likely for different reasons. The age differences observed in Table A8 imply that older individuals do better on the verbal part of the SweSAT and worse on the quantitative part. However, older individuals have lower grades (Table A9), and this is what drives the estimate of the

score differences. So, in this respect, the SweSAT as a second chance instrument appears to be working. In the student sample, the selection mechanism of individuals taking part of the SweSAT appear to be different; in this sample, those born 1994 have higher national test scores as well as SweSAT scores, indicating that younger students in this comparison are slightly more high-achieving.

6 Conclusions and discussion

This study has focused on how students are ranked on the basis of the two selection instruments to higher education in Sweden; the grade point average from upper secondary school (GPA), and SweSAT, an admissions test that serves as the alternative to the GPA. The main findings are in line with previous research, especially similar evaluations of previous forms of tests and previous forms of grades (Lexelius, 2004, Stage, 1992). In the present evaluation a large number of results have been presented. The conclusions that we draw are based on general patterns found across the two administrations and across the two samples. Our main conclusions are:

- The correlations between the SweSAT and the different grading instruments are at the same level as in previous studies. The correlation coefficient between the SweSAT and the GPA is approximately 0.5. The correlation between the course grades (A-courses) and the different parts of the SweSAT are higher, indicating that the SweSAT corresponds more closely to the core courses than the GPA. There are no systematic differences in the correlations over subgroups when comparing all available instruments.
- Gender is the most important trait when it comes to score differences between grades and the SweSAT. In the samples of SweSAT test takers, males have lower GPA but perform better on the SweSAT than females. Males also perform better on separate grades and on the national course tests. Males improve their position in the overall distribution by the SweSAT compared to grades and the GPA. There appear to be little systematic variation in the male-female differences over different traits. In the verbal comparison (SweSAT verbal part versus English A-course grade) females with immigrant background benefit from being graded, while the opposite is true for the quantitative comparisons.
- Test takers with immigrant background do better on the grade scale than on the SweSAT. This is due to differences in the verbal comparison, while the quantitative parts tend to treat natives and immigrants more symmetric.

- We find only partial and quantitatively small differences with respect to social background measured by parental education. Foremost individuals coming from high education backgrounds do slightly better on the GPA.
- Academic track students do better on the SweSAT compared to the GPA. They also perform better on the verbal part of the SweSAT than the English A-course grade, while there is no difference in the quantitative comparison. Thus, it seems that there are other grades where non-academic track students are being graded more highly than academic track students.
- Selection into the pool of SweSAT test takers may play an important role in the comparison of different instruments. In the data, we observe consistent differences with respect to the age of the test takers. Older students have lower grades but perform better on the SweSAT.

The results above, and their similarities to findings in previous evaluations, could be interpreted as a status quo, with no changes to the recruitment regardless of how the selection instruments are modified; certain groups of students perform better on grades than others, some perform better on tests, and some perform equally good on both. However, the selection model is complex and there are some interesting aspects to the results that should be discussed, and also investigated further.

The main purpose of the SweSAT is to function as a second chance in the selection into higher education. Students who have the required knowledge but, for some reason, cannot compete with their GPA, can take this alternative route to attractive university programmes. The intention is to ensure fairness (everybody should be given the opportunity of a second chance) although the main reason for introducing the test was to broaden the recruitment to higher education. For obvious reasons, the task of investigating to what extent the SweSAT serves these purposes is a difficult task that goes far beyond the purpose of this evaluation. However, one necessary condition for the SweSAT to serve the purpose of functioning as a second chance is that potential entrants into higher education who, for whatever reason, did not perform well in upper secondary school, de facto have the opportunity and the knowledge required to gain access into higher education. This means that at least some individuals must “climb the ladder” to be among those selected. Is this likely to happen?

The test is not given exclusively to underrepresented groups or students with low grades. Originally such an intention existed, when the test was open only to older students without a GPA from upper secondary school. For some reason the eligibility requirements were not so emphasised back then, and the test was expected to indirectly give similar information. Nowadays anyone can take the SweSAT and, if he or she meets the eligibility requirements and achieves a test score that is high enough, may gain access to higher education through this quota group. This also means that a student who can compete with his or her GPA can take the test and compete in two quota groups. It is well known that high performing students are more prone to take the test than other students. This is natural, since students on academic track often aim for selective university programmes, and for this reason may see the test as a way of maximising his or her opportunity to get admitted. An important question is if this means that students are ranked similarly in both admission groups, and historically weak students therefore are prevented from gaining access into higher education. This study shows that there is a positive correlation between the instruments, although less than perfect. A less than perfect correlation is good in the sense that the ranking of students otherwise would have been preserved and the second chance would not have had any practical meaning. But even so, the correlation coefficient between the instruments is not a sufficient condition to gain knowledge of the de facto opportunities of those with low GPA.

To shed some light on the possibility to improve one's position in the ranking of the SwSAT versus the GPA, we can make a crude estimate of the number of weak students (according to the GPA) that will be in the pool of applicants admitted by the SweSAT by using the data at hand. Suppose that half of the test takers will gain access to higher education and the other half will not. According to the general rules a university must admit at least 30 per cent (one third) of the students by the SweSAT. Under this assumption 15 per cent of the test takers, assuming that all test takers will apply to a similarly selective programme, will be admitted from the SweSAT group. The question we pose is: what is the proportion of students in the bottom half of the grade distribution that will score well enough to be among the top 15 per cent in the SweSAT distribution? This will then form a lower bound on the number of "weak" applicants who will get access to higher education. Using the 2011B (2012A) administration we

calculate that about 500 (600) students out of the 9500 (11000) students in the bottom half will score well enough to be among the top 15 per cent. This corresponds to about 5.3 to 5.5 per cent of the bottom half. Of course, there are several complications that make this figure unreliable such as repeated test taking and variable application rates among programmes and universities. Nevertheless, the example shows that some students actually do improve their position more than marginally when taking the SweSAT.

We can also say something about those students who improve their position in the way described above by studying their characteristics. Three of the traits stand out. First, in the 2011B (2012A) administration 84 (87) per cent of them are men. This is also what we expect given that males outperform females on the SweSAT and have lower GPA. In the high GPA group (those who would be accepted into higher education in the absence of the SweSAT), the proportion of men is about 43 per cent. The SweSAT therefore contributes to even out male-female representation in the group of admitted students. Second, first- and second generation immigrants are slightly underrepresented in this group. As we have shown above, immigrants benefit from being graded relative to the SweSAT. In this case 7.8 (6.9) are first- or second generation immigrants in comparison to 9.1 (8.6) per cent in the high GPA group. Finally, students who improve are about one year older on average than the average age in the top half with respect to the GPA.
The conclusions from this study, and the reasoning above is that there are some group differences in terms of how students are ranked on the basis of the two selection instruments. There is some uncertainty to the extent of these group differences since we know that there is a selection to the test taking population corresponding to groups who are higher performing on the test (male students, students with a high socioeconomic background, and student with a Swedish origin).

A fair number of students do change their rank in the selection to higher education by taking the test, and actually uses this opportunity as a second chance. Some of these would otherwise have limited possibility to get admitted to any university education where there is a selection. Another interesting aspect is that the second chance also makes the gender differences in higher education smaller, since it is foremost beneficial for male applicants. However, how this second chance really should be viewed – if it

should be reserved for students who have underperformed on grades, or is also relevant for already high performing students – is something that should be discussed from a policy perspective. Future research should focus on investigating selection effects further, and also on how students who have used the second chance perform once admitted.

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Appendix A: Upper secondary school graduates

Table A1: Variable definitions

Variable	Description
SWESAT	The normed score on the SweSAT
SWESATQ	The normed score on the SweSAT quantitative part (includes the subtests DS, XYZ, QC, DTM)
SWESATV	The normed score on the SweSAT quantitative part (includes the subtests WORD, READ, ERC, SC)
GPA	Grade point average, upper secondary school
MATA	Course A grade in mathematics, upper secondary school
MATB	Course B grade in mathematics, upper secondary school
ENGA	Course A grade in English, upper secondary school
ENGB	Course A grade in English, upper secondary school
MALE	Indicator variable that takes the value one if the participant is male
AGE	Age of the test participant defined as the year of the test administration less the birth year
BORN94	Indicator variable that takes the value one if the test participant is born in 1994 and zero if he/she is born in 1993
FIRSTGEN	Indicator variable that takes the value one if the test participant and his/hers parents are born outside of Sweden
SECONDGEN	Indicator variable that takes the value one if the test participant is born in Sweden and his/hers parents are born outside of Sweden
FORBORN	Indicator variable that takes the value one if the test participant is born outside of Sweden and at least on of the parents is born in Sweden
MIDEDU	Indicator variable that takes the value one if the parent of the test participant with the highest education has upper secondary school education
HIGHEDU	Indicator variable that takes the value one if the parent of the test participant with the highest education has post-upper secondary school education
ACTRACK	Indicator variable that takes the value one if the test participant graduated from a theoretical upper secondary school programme
KOMVUX	Indicator variable that takes the value one if the test participant completed upper secondary school within the municipal adult education (kommunala vuxenutbildningen)

HIGHEXP	Indicator variable that takes the value one if the test participant had experience from university by the time the test was administered
PART11	Indicator variable that takes the value one if the test participant participated in both test administrations

Table A2: Descriptive statistics. Participants in the SweSAT autumn 2011, upper secondary school graduates

Variable	Nobs	Mean	Std.Dev.	Min	Max
SWESAT	23214	9.24	3.95	0	20
SWSSATQ	23214	8.98	4.56	0	20
SWESATV	23214	9.01	4.41	0	20
GPA	19708	14.78	2.66	1.1	20.6
MATA	19704	14.73	4.00	0	20
MATB	18130	12.67	4.81	0	20
ENGA	19698	15.15	3.73	0	20
ENGB	18153	14.49	4.04	0	20
MALE	23214	0.502		0	1
AGE	23214	20.94	1.81	19	25
Firstgen	23214	0.070		0	1
Secondgen	23214	0.074		0	1
FORBORN	23214	0.005		0	1
MIDEDU	23214	0.316		0	1
HIGHEDU	23214	0.646		0	1
ACTRACK	23214	0.648		0	1
KOMVUX	23214	0.007		0	1
HIGHEXP	23214	0.181		0	1

Table A3: Descriptive statistics. Participants in the SweSAT spring 2012, upper secondary school graduates

Variable	Nobs	Mean	Std.Dev.	Min	Max
SWESAT	27075	9.16	3.750	0	20
SWSSATQ	27075	8.71	4.25	0	20
SWESATV	27075	9.12	4.24	0	20
GPA	22030	14.51	2.64	2.9	20
MATA	22026	14.43	3.97	0	20
MATB	19981	12.29	4.83	0	20
ENGA	22015	14.97	3.71	0	20
ENGB	20084	14.26	4.02	0	20
MALE	27075	0.511		0	1

AGE	27075	21.87	1.79	20	26
Firstgen	27075	0.081		0	1
Secondgen	27075	0.073		0	1
FORBORN	27075	0.005		0	1
MIDEDU	27075	0.334		0	1
HIGHEDU	27075	0.621		0	1
ACTRACK	27075	0.601		0	1
KOMVUX	27075	0.010		0	1
HIGHEXP	27075	0.203		0	1
PART11B	27075	0.297		0	1

Table A4: Pairwise correlations between GPA and the SweSAT score, upper secondary school graduates

	Test administration	
Group	2011B	2012A
All	0.508	0.463
Gender		
Men	0.542	0.508
Women	0.582	0.541
Immigration status		
First generation	0.480	0.471
Second generation	0.530	0.487
Natives	0.500	0.444
Parental education		
Low	0.407	0.396
Medium	0.424	0.380
High	0.507	0.460
Educational experience		
Academic track	0.522	0.482
No academic track	0.427	0.381
Higher education	0.502	0.443
No higher education	0.481	0.422

Note: Pairwise correlation coefficients. All coefficients are significantly determined on the 1 per cent level.

Table A5: Pairwise correlations between course grades and the SweSAT scores, upper secondary school graduates, autumn 2011

	SWESATQ		SWESATV	
Group	MATA	MATB	ENGA	ENGB
All	0.656	0.591	0.549	0.535
Gender				
Men	0.664	0.605	0.517	0.512
Women	0.664	0.618	0.579	0.557
Immigration status				
First generation	0.633	0.574	0.567	0.537
Second generation	0.664	0.599	0.552	0.496
Natives	0.652	0.587	0.548	0.538
Parental education				
Low	0.572	0.511	0.547	0.508
Medium	0.621	0.533	0.518	0.494
High	0.651	0.598	0.534	0.531
Educational experience				
Academic track	0.657	0.603	0.534	0.537
No academic track	0.580	0.503	0.546	0.508
Higher education	0.637	0.595	0.532	0.519
No higher education	0.653	0.580	0.539	0.521

Note: Pairwise correlation coefficients. All coefficients are significantly determined on the 1 percent level.

Table A6: Pairwise correlations between course grades and the SweSAT scores, upper secondary school graduates, spring 2012

	SWESATQ		SWESATV	
Group	MATA	MATB	ENGA	ENGB
All	0.614	0.540	0.556	0.525
Gender				
Men	0.629	0.567	0.525	0.499
Women	0.619	0.613	0.586	0.553
Immigration status				
First generation	0.587	0.535	0.542	0.501
Second generation	0.597	0.531	0.541	0.506
Natives	0.611	0.536	0.557	0.527
Parental education				
Low	0.512	0.486	0.484	0.435
Medium	0.583	0.491	0.528	0.490
High	0.606	0.543	0.545	0.520

Educational experience				
Academic track	0.610	0.557	0.544	0.531
No academic track	0.553	0.446	0.544	0.491
Higher education	0.591	0.544	0.528	0.507
No higher education	0.604	0.521	0.546	0.511

Note: Pairwise correlation coefficients. All coefficients are significantly determined on the 1 percent level.

Table A7: Determinants of SweSAT scores and GPA, upper secondary school graduates

	Test adm./Dependent variable			
	2011B		2012A	
Independent variable	SWESAT	GPA	SWESAT	GPA
Constant	6.676**	20.64**	5.076**	20.32**
MALE	1.302**	-1.006**	1.304**	-1.084**
AGE	-0.019	-0.325**	0.059**	-0.300**
FIRSTGEN	-2.065**	-1.216**	-2.238**	-1.313**
SECONDGEN	-1.448**	-0.775**	-1.675**	-0.983**
FORBORN	-0.029	0.264	0.206	0.592*
MIDEDU	0.413**	0.466**	0.232*	0.269**
HIGHEDU	1.903**	1.291**	1.499**	1.019**
ACTRACK	1.097**	0.418**	0.911**	0.355**
KOMVUX	0.394	-1.670**	0.527**	-1.227**
HIGHEXP	2.672**	1.396**	2.367**	1.412**
D11B	-	-	1.350**	0.427**
R-squared	0.210	0.172	0.259	0.187
N	23,214	19,708	27,075	22,030

Note: ** Coefficient significantly determined on the 99% level, * significant on the 95% level.

Table A8: Determinants of SweSAT quantitative and verbal scores, upper secondary school graduates

	Dependent variable/Test adm.			
	SWESATQ		SWESATV	
Independent variable	2011B	2012A	2011B	2012A
Constant	12.36**	9.231**	0.510	0.496
MALE	2.103**	2.045**	0.489**	0.564**
AGE	-0.316**	-0.164**	0.278**	0.279**
FIRSTGEN	-1.232**	-1.496**	-2.911**	-2.960**
SECONDGEN	-1.079**	-1.431**	-1.802**	-1.932**
FORBORN	-0.175	0.219	0.221	0.213
MIDEDU	0.049	-0.101	0.767**	0.553**
HIGHEDU	1.509**	1.085**	2.284**	1.896**
ACTRACK	1.369**	1.052**	0.810**	0.766**
KOMVUX	0.508	0.557*	0.230	0.486*
HIGHEXP	2.486**	2.257**	2.880**	2.477**
D11B	-	1.751**	-	0.944**
R-squared	0.190	0.237	0.192	0.214
N	23,214	27,075	23,214	27,075

Note: ** Coefficient significantly determined on the 99% level, * significant on the 95% level.

Table A9: Determinants of mathematics and English grades, upper secondary school graduates

	Dependent variable/Test administration			
	MATA		ENGA	
Independent variable	2011B	2012A	2011B	2012A
Constant	21.68**	20.72**	19.23**	18.47**
MALE	0.366**	0.269**	0.152**	0.116*
AGE	-0.456**	-0.398**	-0.308**	-0.261**
FIRSTGEN	-1.569**	-1.604**	-1.236**	-1.337**
SECONDGEN	-1.147**	-1.310**	0.045	0.091
FORBORN	-0.900*	-0.550	1.799**	1.603**
MIDEDU	0.608**	0.367*	0.773**	0.654**
HIGHEDU	1.651**	1.373**	1.770**	1.616**
ACTRACK	1.401**	1.288**	0.906**	0.809**
KOMVUX	-1.198*	-0.125	-0.618	-0.233
HIGHEXP	1.538**	1.546**	1.468**	1.343**
D11B	-	0.735**	-	0.316**
R-squared	0.138	0.141	0.096	0.091
N	19,704	22,026	19,698	22,015

Note: ** Coefficient significantly determined on the 99% level, * significant on the 95% level.

Table A10: Gender differences in ranking of GPA versus SweSAT, upper secondary school graduates

	Test administration	
Independent variable	2011B	2012A
MALE	-0.540**	-0.504**
AGE*MALE	-0.006	-0.010
FIRSTGEN*MALE	0.075	0.219**
SECONDGEN*MALE	0.083	0.107**
FORBORN*MALE	-0.276	0.231
MIDEDU*MALE	-0.107	-0.123
HIGHEDU*MALE	-0.100	-0.100
ACTRACK*MALE	0.021	0.035
KOMVUX*MALE	0.179	-0.375
HIGHEXP*MALE	0.090**	0.004
D11B*MALE	-	0.068*
R-squared	0.204	0.218
N	19,708	22,030

Note: The dependent variable is the difference between GPA and SweSAT, both measured on a standard normal scale. Coefficients in the table are difference-in-difference estimates. A positive coefficient means that males are ranked higher by the course grade than females, and a negative coefficient that the SweSAT part ranks males higher. ** Coefficient significantly determined on the 99% level, * significant on the 95% level.

Table A11: Gender differences in ranking of course grades versus SweSAT quantitative and verbal parts, upper secondary school graduates

	Dependent variable/Test administration			
	MATA/SWESATQ		ENGA/SWESATV	
Independent variable	2011B	2012A	2011B	2012A
MALE	-0.774**	-0.616**	0.508**	0.414**
AGE*MALE	0.019**	0.012	-0.026**	-0.022**
FIRSTGEN*MALE	0.124**	0.252**	-0.145*	-0.131**
SECONDGEN*MALE	0.139**	0.187**	-0.213**	-0.104**
FORBORN*MALE	-0.216	0.107	-0.142	-0.158
MIDEDU*MALE	-0.010	-0.072	-0.002	-0.047
HIGHEDU*MALE	0.006	-0.008	-0.014	-0.029
ACTRACK*MALE	0.015	-0.025	-0.026	0.017
KOMVUX*MALE	-0.110	-0.301	0.072	0.100
HIGHEXP*MALE	-0.099**	-0.130**	0.059	-0.041
D11B*MALE	-	0.068**	-	-0.025
R-squared	0.079	0.097	0.123	0.113
N	19,704	22,026	19,698	22,015

Note: The dependent variables are constructed as the difference between the course grade and the SWESAT part, both measured on a standard normal scale. Coefficients in the table are difference-in-difference estimates. A positive coefficient means that males are ranked higher by the course grade than females, and a negative coefficient that the SweSAT part ranks males higher. ** Coefficient significantly determined on the 99% level, * significant on the 95% level.

Appendix B: Upper secondary school students

Table B1: Descriptive statistics. Participants in the SweSAT autumn 2011, upper secondary school students

Variable	Nobs	Mean	Std.Dev.	Min	Max
SWESAT	12272	9.45	3.83	0	20
SWSSATQ	12272	10.24	4.51	0	20
SWESATV	12272	8.16	4.15	0	20
GGPA	12116	265.8	38.0	20	320
NMATA	1076	14.18	4.75	0	20
NMATB	1342	13.09	5.40	0	20
NENGA	1565	16.28	3.50	0	20
NENGB	1841	14.71	3.60	0	20
NSVB	4304	14.72	3.83	0	20
MALE	12272	0.502		0	1
BORN94	12272	0.155		0	1
Firstgen	12272	0.045		0	1
Secondgen	12272	0.122		0	1
FORBORN	12272	0.008		0	1
MIDEDU	12272	0.292		0	1
HIGHEDU	12272	0.684		0	1
ACTRACK	12272	0.872		0	1
KOMVUX	12272	0.007		0	1
HIGHEXP	12272	0.007		0	1

Table B2: Descriptive statistics. Participants in the SweSAT spring 2012, upper secondary school students

Variable	Nobs	Mean	Std.Dev.	Min	Max
SWESAT	23113	9.16	3.750	0	20
SWSSATQ	23113	8.71	4.25	0	20
SWESATV	23113	9.12	4.24	0	20
GGPA	22844	260.2	39.2	30	320
NMATA	2120	13.63	5.07	0	20
NMATB	2477	12.73	5.58	0	20
NENGA	3056	15.82	3.60	0	20
NENGB	2745	14.39	3.83	0	20
NSVB	6821	14.33	3.87	0	20
MALE	23113	0.484		0	1
BORN94	23113	0.250		0	1
Firstgen	23113	0.049		0	1
Secondgen	23113	0.122		0	1
FORBORN	23113	0.007		0	1
MIDEDU	23113	0.296		0	1
HIGHEDU	23113	0.679		0	1
ACTRACK	23113	0.844		0	1
HIGHEXP	23113	0.007		0	1
PART11B	23113	0.291		0	1

Table B3: Pairwise correlations between national test grades and the SweSAT scores upper secondary school students, autumn 2011

	SWESATQ		SWESATV		
Group	NMATA	NMATB	NENGA	NENGB	NSVB
All	0.684	0.704	0.582	0.609	0.338
Gender					
Men	0.677	0.687	0.581	0.600	0.344
Women	0.702	0.712	0.571	0.608	0.386
Immigration status					
First generation	0.667	0.663	0.477	0.615	0.372
Second generation	0.638	0.686	0.545	0.590	0.315
Natives	0.687	0.706	0.595	0.605	0.322
Parental education					
Low	0.631	0.701	0.471	0.526	0.298
Medium	0.647	0.665	0.557	0.592	0.305
High	0.695	0.689	0.573	0.596	0.331
Educational experience					
Academic track	0.690	0.672	0.581	0.608	0.328
No academic track	0.644	0.712	0.560	0.597	0.383

Note: Pairwise correlation coefficients. All coefficients are significantly determined on the 1 percent level.

Table B4: Pairwise correlations between national test grades and the SweSAT scores upper secondary school students, spring 2012

	SWESATQ		SWESATV		
Group	NMATA	NMATB	NENGA	NENGB	NSVB
All	0.636	0.656	0.628	0.592	0.353
Gender					
Men	0.636	0.659	0.605	0.585	0.361
Women	0.635	0.650	0.639	0.592	0.419
Immigration status					
First generation	0.607	0.646	0.615	0.568	0.407
Second generation	0.603	0.629	0.594	0.553	0.326
Natives	0.631	0.654	0.625	0.593	0.336
Parental education					
Low	0.487	0.363	0.651	0.573	0.416
Medium	0.574	0.636	0.608	0.598	0.337
High	0.654	0.645	0.610	0.560	0.336
Educational experience					
Academic track	0.649	0.647	0.626	0.590	0.344
No academic track	0.513	0.609	0.610	0.592	0.340

Note: Pairwise correlation coefficients. All coefficients are significantly determined on the 1 percent level.

Table B5: Determinants of SweSAT quantitative and verbal scores; upper secondary school students

	Dependent variable/Test adm.			
	SWESATQ		SWESATV	
Independent variable	2011B	2012A	2011B	2012A
Constant	6.263**	5.586**	5.979**	5.840**
MALE	2.329**	2.246**	0.690**	0.666**
BORN94	0.846**	1.118**	0.170	0.317**
FIRSTGEN	-1.808**	-1.710**	-2.77**	-2.303**
SECONDGEN	-1.776**	-1.972**	-2.481**	-2.212**
FORBORN	0.110	0.242	-0.762	-0.156
MIDEDU	0.038	0.122	0.169	0.454**
HIGHEDU	1.765**	1.505**	1.970**	1.907**
ACTRACK	2.100**	1.680**	0.994**	0.925**
HIGHEXP	0.920*	1.504**	0.798	1.110
D11B	-	2.093**	-	1.320**
R-squared	0.177	0.228	0.125	0.136
N	12,272	23,113	12,272	23,113

Note: ** Coefficient significantly determined on the 99% level, * significant on the 95% level.

Table B6: Determinants of mathematics and English national test grades; upper secondary school students

	Dependent variable/Test administration			
	NMATA		NENGA	
Independent variable	2011B	2012A	2011B	2012A
Constant	12.82**	9.965**	13.21**	12.84**
MALE	0.671**	1.192**	0.807**	0.862**
BORN94	1.836**	2.147**	1.019**	1.087**
FIRSTGEN	-2.237**	-2.380**	-1.695**	-1.382**
SECONDGEN	-1.940**	-2.044**	-0.454	-0.924
FORBORN	-1.217	-0.131	0.891	0.855
MIDEDU	-1.117	0.589	1.378*	0.718
HIGHEDU	0.106	2.082**	2.526**	1.979**
ACTRACK	1.791**	1.457**	0.552*	0.747**
HIGHEXP	-5.019*	-2.549	-0.662	0.726
D11B	-	1.517**	-	0.788**
R-squared	0.093	0.146	0.084	0.107
N	1,076	22,026	1,565	22,015

Note: ** Coefficient significantly determined on the 99% level, * significant on the 95% level.