# Equity trends in the Swedish school system

A quantitative analysis of variation in student performance and equity from a time perspective



**Skolverket**
Swedish National Agency for Education

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# Foreword

During the last few years Sweden has participated in a number of international surveys that have provided an insight into the quality of the Swedish compulsory school system from an international perspective. The results indicate that the Swedish compulsory school achieves a relatively high standard and Swedish students generally perform at a level above the OECD-average, despite a slight deterioration in recent years.

Average student performance is however only one quality indicator of school systems. Equity, or equal opportunity in education, is also considered to be an important aspect of school quality, and internationally the Swedish school system achieves a high level of equity. In particular, the variation in performance between schools is very low in Sweden compared to many other countries. Of concern however is that even equity in the Swedish school system may have deteriorated in recent years, as PISA 2003 suggests that the difference in performance between schools may have increased.

International surveys are based on relatively small samples with a main focus on the average level of performance rather than equity issues. The aim of this report is therefore to provide a more robust assessment of how variation in student performance and other equity indicators have changed over time. To achieve this, results from a number of different data sources have been used.

During the 1990s the Swedish school system went through a number of reforms that had the potential to affect equity in the school system. The most notable reforms were decentralisation (from government controlled schools to municipality controlled schools), freedom of choice reforms, transition from an input controlled system to an output controlled system, as well as the introduction of a new standard referenced grading system.

In a separate report (Skolverket 2003b), the effects of the freedom of choice reforms were evaluated using interviews with parents and principals. Both the variation in quality between schools as well as school segregation were identified as having increased. The present report complements the above opinion based survey by providing a quantitative analysis of performance output, and relating it to the effects of freedom of choice reforms on equity.

This report is an English summary of the original report, "*Vad händer med likvärdigheten i svensk skola?*" (Skolverket 2006a). Anders Auer wrote the original report and this English summary. Anders Auer is also responsible for the layout of the reports. Anita Wester, Daniel Gustavsson, Bo Palaszewski, Marika Sanne and Kristian Ramstedt at the Swedish National Agency for Education contributed valuable comments and helped write the report. A special thanks is also given to Kajsa Yang-Hansen at Gothenburg University and Niklas Eriksson at Umeå University for their help with some of the analyses.

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# Contents

# 1. Introduction

The Swedish school system has traditionally emphasized equitable distribution of learning outcomes. The international surveys PISA 2000 and 2003 (see OECD 2001 and OECD 2004), confirm that the Swedish school system achieves a high level of equity, and in particular a low variation in average student performance between schools. However, some results in PISA 2003 suggest that Sweden achieved a lower standard for some of the indicators measuring equity compared to PISA 2000. But these results are not conclusive as they are based on a relatively small sample size (ca 4000-5000 students), typical of international surveys such as PISA.

Therefore, the aim of this report is to analyse the results from a number of different data sources, including international surveys as well as national final grades. Thereby, providing a more robust indication of current trends in equity in the Swedish compulsory school system.

## Equity indicators

This report defines equity in learning outcome as "equal opportunity to learn", including a degree of compensation for students with a less advantageous background.[1] The report addresses a number of questions that relate to particular aspects of equity:

1. *Has the total variation in student performance changed over time?*

2. *Has the variation in average performance between schools changed over time?*

3. *Has the importance of a student's individual socioeconomic background on performance changed over time?*

4. *Has the importance of a student's individual migration background on performance changed over time?*

5. *Has school segregation changed over time?*

6. *Have school level effects of socioeconomic and migration background changed over time?*

7. *How do eventual changes in the above indicators affect an equitable distribution of learning outcomes?*

## Data sources

To obtain a robust picture of the trend in equity over the last few years, a number of independent data sources have been used. These are:

1. PISA 2000-2003: 15-year olds, *Mathematics*, *Science* and *Reading literacy*.

2. TIMSS 1995-2003: year 8 (14-year olds in Sweden), *Mathematics* and *Science*.

3. IEA RL 1991-2001[2]: year 3 (9-year olds in Sweden), *Reading literacy*.

4. National final grades from compulsory school: year 9 (15-year olds), all subjects.

PISA, TIMSS and RL are all based on relatively small sample sizes (4 000 – 5 000 students), which implies that the uncertainty of the observed point estimates can be quite large. In contrast, data from final grades are census data and encompass the whole student population for that cohort. Therefore there is no uncertainty due to sample size. One consideration however, is that the comparability of final grades can be questioned as they are subjective to different interpretations of grading criteria by different teachers, schools and regions. In international surveys, the margin for subjective interpretation is smaller.

## Outline of report

This report includes six chapters that address the questions outlined above. Chapters 2 (pp. 8-9) and 3 (pp. 10-11), address whether the variation of student performance has changed over time among students (Ch. 2) and between schools (Ch. 3). Chapter 4 (pp. 12-15) determines whether the influence of a student's individual socioeconomic and/or migration background on his/her performance has changed over time. Chapter 5 (pp. 16-19) shows that the performance of a student is not only influenced by his/her own socioeconomic background and migration background, but also by the aggregate socioeconomic background at the school as well as the proportion of foreign born students. This is followed by an analysis of whether these "school level effects" have changed over time. Chapter 6 (pp. 20-22) describes trends in school segregation in terms of aggregate socioeconomic and migration background and addresses potential implications for equity in the distribution of learning outcomes. Chapter 7 (pp. 23-25) provides a summary of the findings.

# 2. Total variation in student performance

One important aspect of equity is how much performance differs between students, i.e. how large is the variation in student performance? On an international scale, the total variation in student performance is relatively small in Sweden (OECD 2001). This chapter addresses whether this variation in performance has changed in recent years.

## Variation in student performance and international surveys

The IEA Reading Literacy (RL) surveys from 1991 and 2001 focus on *Reading literacy* among year 3 students (9-year olds in Sweden) and provide the earliest data for comparisons over time. RL results suggest that the total variation (measured as the variance) in student performance did not change between 1991 and 2001. That is, the difference between the lowest and highest performing students neither increased nor decreased over the time period.[3]

The TIMSS surveys of *Mathematics* and *Science* of year 8 students (equivalent to 14-year olds in Sweden) suggest a small decrease in the total variation in performance between 1995 and 2003. Swedish students performed at a lower level in 2003 compared to 1995, but this reduction was greater for the highest performing students, thus reducing the performance gap (i.e. the variation in performance) over the time period (Skolverket 2004d).

PISA tests 15-year old student competence in *Reading literacy*, *Mathematics* and *Science*. The PISA results indicate a marginal, but not statistically significant, increase in total variation in performance for *Mathematics* and *Reading* during the period 2000 - 2003. For *Science* there is a larger and significant increase in total variation in student performance during the same time period.

## Variation in student performance and national final grades

National final grades use the average final grade of the best 16 subjects (i.e. the subjects with the highest grades) for each student[4]. Therefore this data provides an indicator of the overall performance of a student. Since the grading system is a standard referenced system, designed to assess and grade absolute skill and knowledge levels, it should reflect changes in both average student performance as well as the distribution of student performance over time.

Figure 1 shows how the total variation (standard deviation) in average final grades changed during the time period 1998 to 2004.[5] The figure shows that there was a significant increase from 60 to 66 points (11 % increase) in the standard deviation of average final grades between 1998 and 2001. This was followed by a period of stable variation between 2001 and 2004.

Does the observed increase in variation of average final grades reflect an increase in variation in student performance? As mentioned in chapter 1, final

## Total variation in student performance
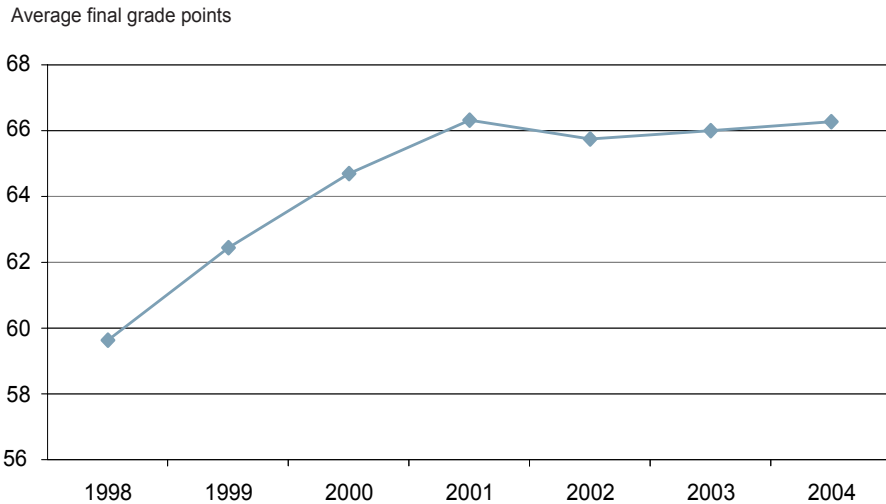
Average final grade points



**Figure 1.** *Total variation in student performance 1998-2004, measured as the standard deviation in average final grades. Note that the scale on the vertical axis does not start at zero.*

grades are awarded by teachers based on their own experience and interpretation of the grading criteria. Grades are therefore liable to subjectivity to some extent. Unfamiliarity with the new grading system that was implemented in 1998, may have resulted in teachers awarding more conservative grades, i.e. being restrictive in awarding the highest and lowest grades[6]. This could have the effect of a relatively low spread of final grades in 1998. In subsequent years, as teachers became more familiar with the new criteria, more high and low grades were awarded. This would consequently lead to an increase in the observed total variation of average final grades and then stabilise, similar to the pattern observed for final grade variation between 1998 and 2004.

To summarise, there is no conclusive evidence that the variation in total student performance has increased over time. The international surveys do not indicate any clear trend and the observed increase in the variation of average final grades may, at least to some extent, be influenced by the implementation of the new grading system.

# 3. Variation in student performance between schools

Variation in student performance between schools is a key indicator of equity since it indicates the extent to which the school system is segregated in relation to student ability. Most education policy decision makers would agree that from an equity perspective, there is a desire to minimise variation in performance between schools.

Variation between schools is analysed here in two different ways. First, the variance in average performance between schools is measured in absolute numbers. Second, the above measure is expressed as a proportion of the total variance in student performance.[7]

## Between school variation and international surveys

Analyses of the results of year 3 students in *Reading Literacy* (IEA RL-1991 and RL-2001), indicate that between school variance as a proportion of total variance increased from 9.1 percent in 1991 to 9.7 percent in 2001, an increase of 7 percent.[8]

Results from PISA 2000 and 2003 indicate a relatively large increase in between school variance in absolute numbers for *Mathematics* and *Science* but no change at all for *Reading Literacy*. If between school variance is considered as a proportion of total variance, *Mathematics* still shows a relatively large increase of 38 percent (from 7.6 percent in 2000 to 10.5 percent in 2003). In *Science* there is a corresponding 7 percent increase (8,2 percent in 2000 and 8,8 percent in 2003). *Reading Literacy* however indicates a decrease of 7 percent in between school variance, from 9.7 percent in 2000 to 9.0 percent in 2003.[9]

## Between school variation and average final grades

Figure 2 shows the between school variance in average final grades as a proportion of total variance during the time period 1998-2004. The light grey curve shows the trend in between school variance for all schools while the dark grey curve represents public schools only. The between school variance increased from 7.8 percent in 1998 to 11.6 percent in 2004, an increase of nearly 50 percent. The between school variance for public schools only shows a similar but less dramatic trend, with an increase from 6.8 percent in 1998 to 8,7 percent in 2004. This is an increase of nearly 30 percent. These results could indicate that the development of more independent schools[10] contributed to an increase in between school variation, but there is also an increase in between school variation for public schools.

Could the implementation of a new grading system, as explained in chapter 2, also explain the increase in between school variation? In contrast to figure 1, the between school variance in figure 2 does not level out after the initial years

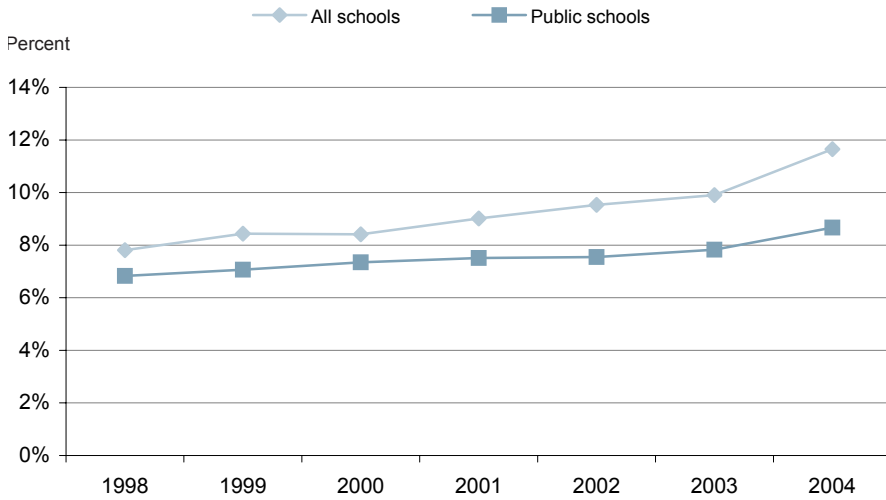## Between school variance as a proportion of total variance

Percent



**Figure 2**. *Between school variance as a proportion of total variance in average final grades for 1998-2004.*

(1998-2001) as was the case for the total variance in student performance in figure 1. Instead it continues to increase during the whole time period. If the implementation of the new grading system was the only explanation behind the observed increase in between school variance, it would be reasonable to expect that this increase should level out as teachers became more familiar with the new system and its grading criteria.

The observed increase in between school variance of final grades is therefore likely to be a reflection of a real increase in between school variation in student performance. One possible explanation behind this trend could be increased residential segregation translated into an increase in school segregation. Another possibility results from the freedom of choice reforms, leading to academic segregation through relocation of high achieving students to more reputable schools. A final possibility could be a failure by municipalities to compensate schools with a less advantageous composition of students in terms of socioeconomic and/or migration background. These aspects will be discussed in more detail in chapter 6.

# 4. The importance of student background factors

A student's individual background is one important factor that determines student success in terms of school performance. For school systems that prioritise equity, there is a focus on minimising negative effects of student background on performance in order to provide all students with an equal opportunity to learn. This section investigates whether the relationship between socioeconomic or migration background and student performance has changed over time in Sweden.

The importance of a background factor can be measured in two different ways. First, the size of the "slope" coefficient in a regression analysis measures the average effect of a background factor on performance. Alternatively, the proportion of total variance in student performance explained by a background factor can be calculated. This describes the strength of the relationship between a background factor and performance and how reliable the relationship is. Both measures provide information about the importance of background factors on student performance, but from different perspectives.

## Socioeconomic background

### Socioeconomic background and PISA

Of the international surveys, PISA is the only one where the relationship between socioeconomic background and performance can be analysed over time. Table 1 shows the importance of socioeconomic background for performance using PISA's index for Economic, Social and Cultural Status (ESCS[11]). This index is based on occupation, wealth and education of parents as well as cultural capital. The table presents the "effect" (the size of the slope coefficient) of socioeconomic background on student performance, as well as the strength of the relationship (the proportion of explained variance) between socioeconomic background and student performance in *Mathematics* and *Reading Literacy* for 2000 and 2003.

For example, the estimated effect of socioeconomic background on *Mathematics* performance in PISA 2000 was 37.8 points. This means that a difference of one unit in the socioeconomic background index corresponds to a difference in student performance of 37.8 points.[12] In 2003, the corresponding effect was 42.1 points, a slight but not statistically significant increase. Generally the results suggest an increase in the importance of socioeconomic background on performance, both in terms of the size of the effect and the proportion of explained variance. However, none of the estimated increases are statistically significant and could therefore be due to random variation in the sample.[13]

### Socioeconomic background and final grades

The importance of socioeconomic background on average final grades is measured by level of parent education, or more precisely, whether or not at least one parent (mother or father) has a tertiary education (ISCED level 5-6).

**Table 1** The importance of socioeconomic background, measured with ESCS (Index of Economic, Social and Cultural Status), for student performance.

|  |  | PISA 2000 | PISA 2003 | Change |
|---|---|---|---|---|
| **Effect size** | *Mathematics* | 37.8 (2.2*) | 42.1 (2.1*) | +4.3 (3.0**) |
|  | *Reading* | 36.0 (1,9*) | 40.9 (2.1*) | +4.9 (2.8**) |
| **Proportion explained variance** | *Mathematics* | 12.1 % (1.3*) | 15.3 % (1.3*) | +3.2 percentage points (1.8**) |
|  | *Reading* | 11 % (-) | 14.2 % (1.3*) | +3.2 percentage points (-) |

The values are points on a scale with a mean of app. 500 and standard deviation of app. 100.
Source: Table 4.3a and 4.3b in PISA 2003 report and table 8.1 in PISA 2000 report.
* = Standard errors, ** = Approximate standard errors.

Figure 3 presents the effect of having at least one parent with tertiary education. The effect is estimated first using a simple regression model where no control is made for other background factors (light grey curve). Second, a two-level regression model is used, where other relevant background factors are controlled for (dark grey curve), such as student gender and migration background as well as the proportion of foreign born students and the proportion of parents with tertiary education at the school.

As figure 3 shows, the effect of parent education increased somewhat during the time period, especially between 1998 and 2001. After 2001, the effect is more or less constant.[14] Both curves show the same pattern.
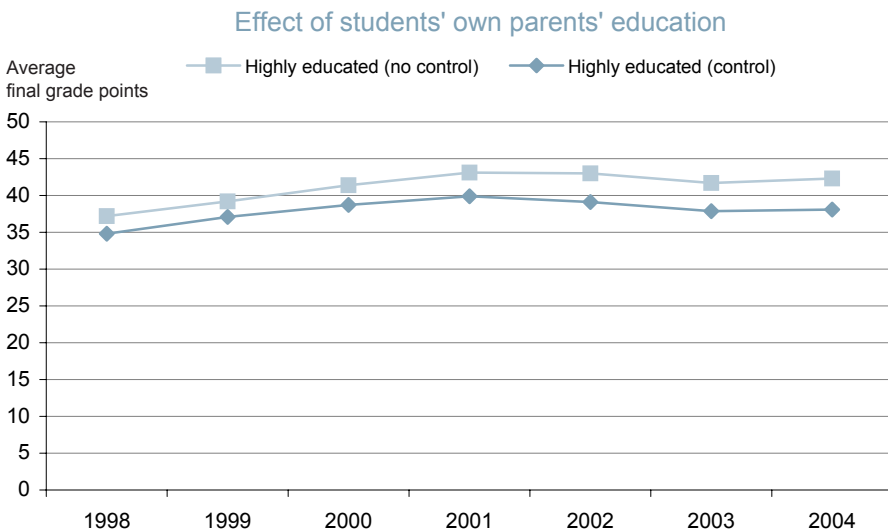


**Figure 3**. *The effect on a student's average final grade of the students' own parents' level of education.*

In contrast, if the proportion of variance explained by parent education is analysed, it varies between 12-14 percent but there is no increasing or decreasing trend over the time period.

To summarise, a reasonable conclusion is that there has been a small but not substantial increase in the importance of a student's own individual socioeconomic background on performance during the last few years.

## Migration background

Generally, there is a considerable performance gap between native students and students with a migration background, particularly for foreign-born students. This section addresses whether there has been a change over time in the performance gap rather than the absolute size of the gap itself.

*The importance of migration background and PISA*
The PISA surveys indicate that while the estimated performance level of native students did not change at all between 2000 and 2003, the estimated performance of students with a migration background showed some fluctuation. However, as the subgroup of students with migration background is small, in an already small country sample of students in international surveys, there is a high degree of uncertainty associated with the estimates. Consequently, none of the observed changes in performance in PISA is statistically significant.

*The importance of migration background and final grades*
Figure 4 shows the effect of migration background on average final grades over the time period 1998 to 2004. The effects are estimated using a two level regression model where background factors such as student gender and parent education as well as the proportion of foreign born students and the proportion of parents with tertiary education at the school are controlled for. The light grey curve represents the estimated effect of being born in Sweden with migration background, while the dark grey curve represents the estimated effect of being a foreign born student.

As figure 4 shows, the effect of being born in Sweden with migration background is quite small and fluctuates between –1 and –5 average grade points. In 2001 and

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**Definition of migration background**

*Native students*: The student and at least one parent were born in Sweden.

*Students born in Sweden with migration background*: The student was born in Sweden but both parents were born outside Sweden.

*Foreign born students*: The student was born outside Sweden.

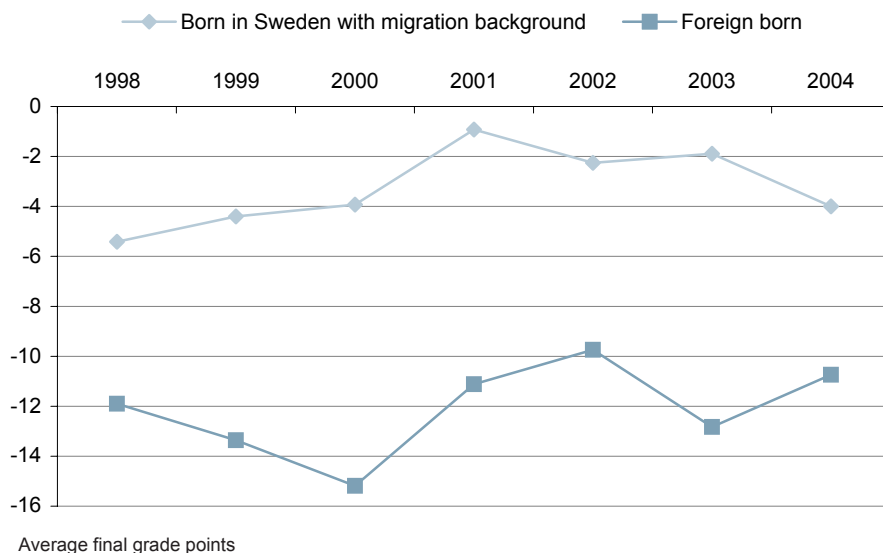Effect of students' own migration background



**Figure 4**. *The effect of migration background on mean final grades. 1998-2004.*

2003, there is not even a significant effect of being born in Sweden with migration background. In contrast, the effect of being born outside Sweden is, as expected, larger and fluctuates between –10 and –15 average final grade points. None of these fluctuating curves however, indicate any clear trend over the time period.

The proportion of variance in student performance explained by migration background does not change during the same time period either. That is, the strength of the relationship between mean final grades and migration background did not change.

Therefore, the importance of a student's migration background on his/her mean final grades has not changed in either effect size or the strength of the relationship between migration background and mean final grades.

# 5. The importance of socioeconomic and migration background at the school level

Chapter 4 describes how important a student's own socioeconomic and migration background is in determining his/her school performance. However, a student's performance is not only affected by his/her **own** background but also by the **aggregated** socioeconomic background at the school as well as the **proportion** of *foreign born students* at the school. Such **school level effects** have been identified in other surveys. PISA 2000 (OECD 2001) reported that in some countries, school level effects of socioeconomic background are even larger than the effect of individual background on student performance. In Sweden however, PISA indicated that this school level effect is relatively small compared to other countries and is smaller than the individual background effect of socioeconomic background.

From the perspective of equity, it is desirable to keep school level effects at a minimum as these school level effects could reduce students' equal opportunities to learn.

This chapter describes how large the school level effects of socioeconomic and migration background are and determines if these school level effects have changed over time. In chapter 6, the consequences of school level effects, with regard to equity and segregation in the school system, will be analysed and discussed.

## Underlying factors contributing to school level effects

**School level effects** of socioeconomic background (e.g. parent education) implies that differences in mean student performance between schools remain, even after the students' **individual** socioeconomic background is controlled for. If the **mean** (aggregated) socioeconomic background of all students within each school explains some of these remaining differences in performance between schools, it is defined as a **school level effect of socioeconomic background**.[15]

There could be many different underlying factors that contribute to these **school level effects**. For example, schools with a relatively high mean socioeconomic background may recruit better qualified teachers and provide a better school environment, more educational resources etc. This is defined as **school factor effects**. A second underlying factor may be the **peer group effect** (Henderson et al 1978), where a student's performance is affected by the performance level of other students within the same school. This implies that students perform relatively better in an environment of high performing students than in an environment of low performing students. **School factor effects** and **peer group effects** can be categorised as *contextual effects*. A *contextual effect* implies that a student is affected by his/her school environment.

Additionally, students attending schools with a high mean socioeconomic background may possess certain attributes that cannot be controlled for in

these statistical analyses. For example, among students with a relatively low socioeconomic background, the more motivated students tend to seek schools with a higher mean socioeconomic background, while less motivated students within this socioeconomic group tend to stay in schools with a lower mean socioeconomic background. This is defined as *compositional effects*.

To summarise, the school level effects are likely to reflect the existence of underlying factors, which in this report are categorised as either *contextual effects* or *compositional effects*. *Contextual effects* and *compositional effects* are likely to coexist, but there are different implications for equity depending on the relative contribution of the two different effects.

In order to describe the different implications for equity of these two effects, assume first that there are no *contextual effects* at all so that the school level effect reflects only the existence of *compositional effects*. Under this assumption, relocating a student from a school with a low mean socioeconomic background to a school with a high mean socioeconomic background, would **not** affect the student's performance, all else equal. The reason for this is that the school level effect (under the assumption), only reflects a different composition in student attributes that the statistical model cannot control for, e.g. motivation. In such a situation, the higher performance levels of schools with higher mean socioeconomic background is solely due to the individual attributes of the students themselves rather than the school.

As an alternative scenario, assume instead that the school level effect consists solely of *contextual effects*. Under this assumption, relocating a student from a school with a low mean socioeconomic background to a school with a high mean socioeconomic background, would affect the student's performance, all else equal. The reason for this is that the student, under the assumption, is now affected by his/her school environment. The student will therefore perform better in the school where the other students perform at a higher level.[16]

In reality, the school level effect is most likely to consist of both *compositional* and *contextual effects*. However, it is very difficult, if not impossible, to estimate exactly how large the *contextual* and *compositional effects* are individually. Therefore, this report does not estimate these effects separately. Rather it is assumed in the report that school level effects consist of both *compositional* and *contextual effects*.[17]

## School level effects of socioeconomic background

Figure 5 presents the estimated school level effects on student performance due to socioeconomic background. Here, socioeconomic background is measured as the proportion of students at the school with highly educated parents.[18] Student performance is measured using student average final grades.
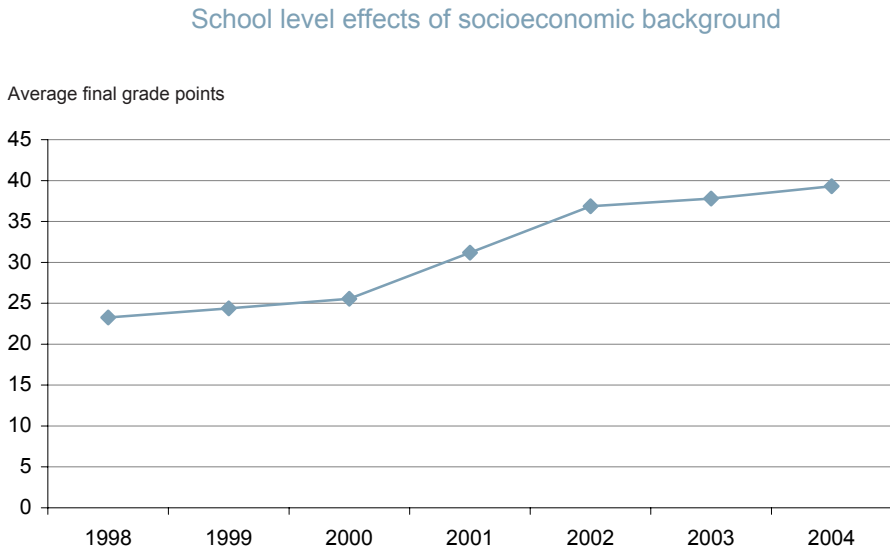


School level effects of socioeconomic background

Average final grade points

**Figure 5**.[19] *School level effects of the proportion of students with highly educated parents on performance (average final grade). 1998-2004.*

The figure shows that in 1998, the effect size of the proportion of students with highly educated parents, is 23 average final grade points. This effect size increased to 39 average final grade points in 2004, an increase of 16 points or 70 percent.

Additionally, the proportion of total variance in student performance that can be explained by socioeconomic background at the school level, also increased during the same time period, from 8 percent in 1998 to 20 percent in 2004.[20]

In summary, the importance of socioeconomic background at the school level increased both in effect size (figure 5) as well as in the strength of the relationship.

## School level effects of migration background

Figure 6 presents the estimated school level effects of migration background for the time period 1998 to 2004. Migration background at the school level is measured as the proportion of foreign born students at the school, while student performance is again measured using student average final grades.

As can be seen in figure 6, migration background at the school level has a negative effect on student performance. This effect increased from –22 average final grade points in 1998 to –40 points in 2004. This effect increased every year except in 2003 when it was temporarily reduced.

Additionally, the proportion of variance in student performance explained by this school level factor, increased during the same time period.[21]

In summary, the importance of migration background at the school level on student performance has increased over time.

Previous reports (Skolverket 2004b) have found that foreign born students in schools with high proportions of such students, are dominated by recent migrants compared to foreign born students in schools with a lower proportion of such students. This would contribute to the school level effect. That is, the school level effect can, to some degree, be explained by differences in the proportion of **recent** migrants. As explained above, this effect would be a type of *compositional effect*. Assuming that there is no change in *contextual effects*, a possible explanation for the **observed increase** in the school level effect of foreign born students, could be an **increase** in this *compositional effect*, i.e. an **increased** segregation of recent migrants within the group of foreign born students.
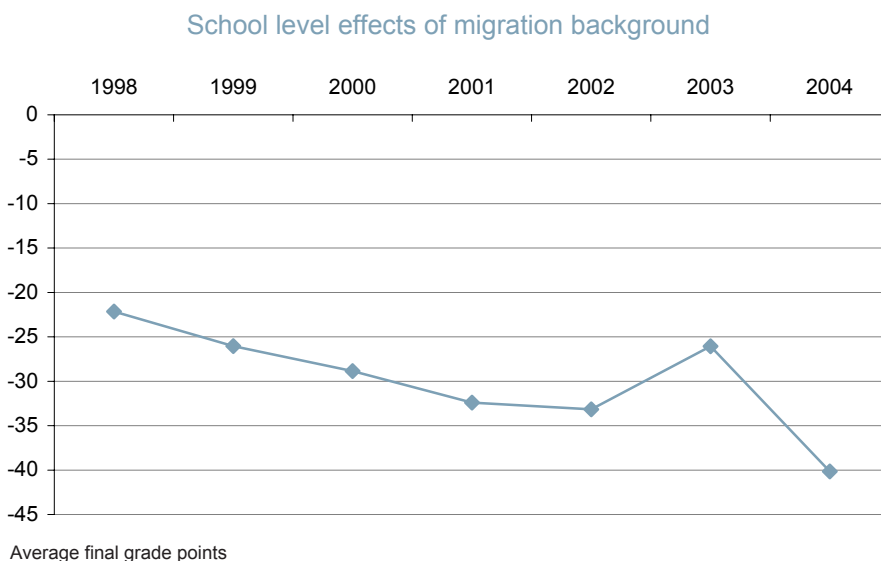
School level effects of migration background



Average final grade points

**Figure 6**.[22] *School level effects of the proportion of foreign born students on performance (average final grade). 1998-2004.*

# 6. Implications for school segregation and equity

The previous chapter showed that there has been an increase in school level effects due to both socioeconomic and migration background. The observed increase in school level effects have implications for school segregation, regardless of whether these school level effects are dominated by *compositional* or *contextual effects*, as explained in chapter five.

As explained above, *compositional effects* reflect that students, actively or passively, attend certain schools depending on some background variable or characteristic that the statistical analysis cannot control for since it is not easily measurable, e.g. student motivation or arrival date of foreign born students. The *compositional effect* can then be interpreted as an "**invisible segregation**" since students are segregated according to a variable that cannot be observed or measured (in this study). For example, if highly motivated students from a group with the same measurable socioeconomic background, seek more reputable schools, while less motivated students, with the same socioeconomic background remain at the local school, this would be a type of **invisible segregation**. In contrast, **visible segregation** is interpreted as segregation along "visible" or measurable variables, e.g. segregation with respect to the education level of parents.

## Has visible segregation changed over time?

It is not possible to measure **invisible segregation** (by definition), however, it is possible to measure **visible segregation** and if it has changed over time. Observe that these segregation indicators are not linked to student performance in any way. They simply describe how the social composition of students varies between schools and how it has changed over time. Figure 7 illustrates how school segregation along socioeconomic lines has changed over the time period 1998 to 2004. This segregation is measured as the variation in the proportion of students with highly educated parents among schools.

It can be seen (figure 7) that the between school variation in distribution of students with highly educated parents increased during the time period 1998-2004 from 17.6 percentage points to 19.4 percentage points, an increase of approximately 10 percent. Consequently, school segregation along socioeconomic lines increased between 1998 and 2004.

Similarly, school segregation along migration lines can be analysed, using between school variation in the distribution of foreign born students. However, no change in segregation in terms of migration background can be observed.[23]

The observed increase in school segregation along socioeconomic lines makes the impact of the school level effects of socioeconomic background more severe. This is because the impact of school level effects are larger in a school system with relatively high school segregation compared to a less segregated school system. Additionally, because the school level effect has in itself increased in recent years

## Variation in the socioeconomic composition of schools

Standard deviation in
the proportion of students
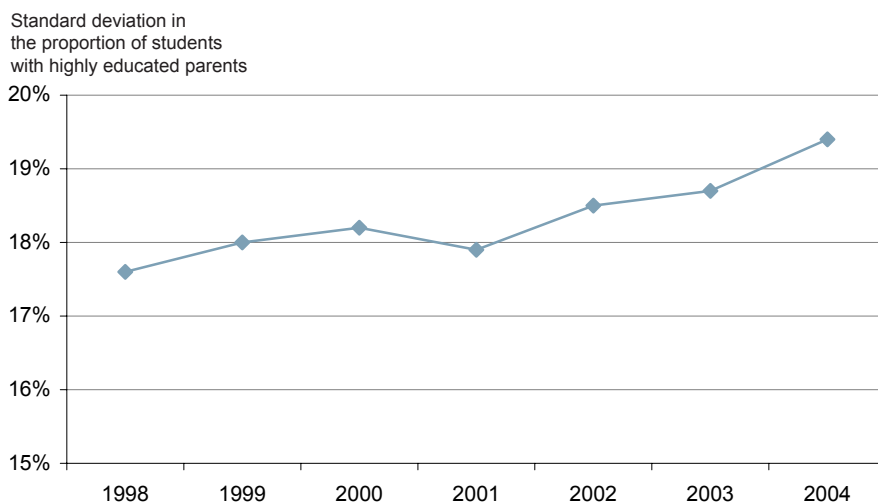with highly educated parents



**Figure 7.** *Variation in socioeconomic composition between schools, measured as the standard deviation in the proportion of students with highly educated parents. Note that the vertical axis does not start at zero.*

(chapter 5), the total impact is further amplified.

## How is equity affected by increases in school level effects and school segregation?

If the observed increase in school level effects is caused by an increase in the underlying *compositional effects*, it means that there has been an increase in **invisible school segregation**. That is, that higher performing students, within a given socioeconomic group, tend to relocate to more reputable schools. In reputable schools, the proportion of students with well educated parents tends to be high and the proportion of foreign born students tends to be low. In contrast, lower performing students within the same socioeconomic group tend to remain in less reputable schools. Here, the proportion of students with well educated parents is lower and/or the proportion of foreign born students is higher. Theoretically, in a world with **no** *contextual effects*, an increase in school segregation (visible or invisible) will not affect equity since students are still given the same opportunities to learn as before. That is, students are by definition not affected by their peers or school environment. However, there may be social problems that arise from an increase in school segregation, e.g. reduced tolerance between different social and ethnic groups.

Alternatively, assuming that *contextual effects* do exist, in addition to *compositional*

*effects*, school level effects will be further amplified (by these *contextual effects*) when there is an increase in school segregation (visible and/or invisible). Consequently, the performance gap between schools will be multiplied, i.e. the increase in school level effects will be even larger than if there were no *contextual effects*. There is comprehensive empirical evidence that contextual effects exist (see for example Hoxby 2000 and Hanushek et al 2003).

The important conclusion is that in a school system where *contextual effects* are present, any increase in school segregation will reduce equity since school segregation **generates** increased differences in performance levels between different groups of students. In other words, students will not be given the same opportunity to learn since they will be affected by their relatively favourable or unfavourable school environment.

To summarise, chapter five showed that school level effects of socioeconomic and migration background on performance have increased. This chapter shows that there has also been an increase in **visible** school segregation, i.e. the socioeconomic composition in schools. Other research in Sweden provides empirical evidence of an increase in **invisible** school segregation (Bunar 2005). These developments, in combination with the existence of *contextual effects,* are likely to have had negative consequences for equity in the Swedish school system, contributing to the observed increase in performance variation between schools.

# 7. Summary and discussion

The overall aim of this report is to analyse the trend for a number of key indicators of equity within the Swedish school system. The analyses are based on results from international surveys as well as final grades from compulsory school (year 9).

The results from international surveys are not always consistent. However, these surveys are based on small samples and therefore the power to detect significant changes over time is low. In contrast, final grades provide complete census data and a number of trends can be observed. These trends are generally consistent with the results from the international PISA study, though PISA results are not always significant.

From the results, the report's initial questions are answered as follows:

*1. Has the total variation in student performance changed over time?*
The total variation in average final grades increased between 1998 and 2004. However, this could partly be explained by the introduction of a new grading system. Consequently, the observed increase in variation does not necessarily reflect an increase in variation of true performance, but perhaps a change in the way teachers have awarded grades.

*2. Has the variation in average performance between schools changed over time?*
The variation in average final grades between schools increased between 1998 and 2004 and is less likely to be attributable to the introduction of a new grading system.

*3. Has the importance of a student's individual socioeconomic background on performance changed over time?*
The importance of the education level of a student's parents increased only marginally during the time period, but still plays a very important role in determining the expected performance of the student.

*4. Has the importance of a student's individual migration background on performance changed over time?*
The importance of a student's own migration background did not change significantly during the time period. However, being born outside Sweden still has a substantial negative effect on performance, even after controlling for socioeconomic background. The effect of being born in Sweden with migration background continues to be small after controlling for socioeconomic background.

*5. Has school segregation changed over time?*
**Visible** school segregation with respect to socioeconomic background increased by 10 percent between 1998 and 2004. School segregation with respect to foreign born students does not show any increase over time but is sensitive to the way it

is measured.[24] In terms of **invisible** school segregation, other research provide evidence for an increase over time.

*6. Have school level effects of socioeconomic and migration background changed over time?*
The school level effects with respect to both socioeconomic and migration background increased substantially over the time period.

*7. How do these results affect an equitable distribution of learning outcomes in the school system?*
Under the assumption that *contextual effects* exist, the empirical results presented in this report indicate that equity in the Swedish school system has been reduced. The reason being, that an increase in visible and invisible school segregation amplifies the impact of *contextual effects*. Consequently, the opportunity for students to learn will not be equal and will, to a larger extent, depend on which school the students attend.

From a broader perspective, increased school segregation could have negative consequences for society, such as reduced tolerance between different ethnic, religious or socioeconomic groups. Additionally, one of the main goals in the Swedish school system, the dissemination of common democratic values to all citizens within society, would be challenged in an environment of more segregation.

### Who's responsible? The school system or society?
Although there is evidence that suggests equity in the Swedish school system has deteriorated during the last decade, it does not necessarily imply that the Swedish school system is solely responsible for this development. Despite the introduction of freedom of choice for students and parents, most students choose to go to the school that is geographically closest to their home. Therefore, an increase in school segregation, to some extent, also reflects an increase in residential segregation (Andersson 2000).

Taking into account changes in society (e.g. increased immigration, larger income gap, residential segregation) that have affected the context the school system operates within, it is hard to overlook that school reforms have contributed to the increase in variation of average student performance between schools as well as increased school segregation. Those reforms are freedom of choice, increased numbers of independent schools and the decentralisation of the operation of schools to municipalities.

Therefore, the results presented here support the findings of an earlier report (*"School choice and its effects in Sweden"*, Skolverket 2003b), which was based on the experiences of principals and parents in relation to consequences of the freedom of choice reform on equity.

It should be made clear that the observed deterioration in equity, likely due in part to school reforms, does not necessarily imply that the total net benefits of

these reforms are negative. Increased freedom of choice as well as an increased diversity of schools have generated many positives effects unrelated to equity. The **political** question is therefore, how much variation and freedom of choice a school system can accommodate while claiming to maintain an equitable distribution of learning outcomes?

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* References are not directly refered to in this summary but are referred to in the original report (Skolverket 2006a).

# Endnotes

[1] The original report (chapter 1, p 7-9) includes a more detailed discussion on the definitions of equity in terms of education.

[2] RL was an optional part in PIRLS 2001 which linked results to the IEA-91 survey.

[3] These analyses have been conducted by Dr Kajsa Yang-Hansen at Gothenburg University.

[4] Final grades are awarded and quantified as follows: EUM (Not attained goals) = 0 points, G (Pass) = 10 points, VG (Pass with distinction) = 15 points and MVG (Pass with special distinction) = 20 points.

[5] 1998 is the first year for which students who completed compulsory school were graded according to the new standard referenced grading system. In the previous relative referenced grading system, comparisons over time were not meaningful since the distribution of grades was held constant by definition (see Skolverket 2005a).

[6] Another reason for teachers to be restrictive with awarding the highest grade (MVG) is that there were no nationally established grading criteria for that grade until 2001.

[7] This second measure is also called the intra-class correlation.

[8] Analysis by Dr Kajsa Yang-Hansen at Gothenburg University. The statistical significance of the trend was not reported.

[9] To make comparisons with the changes in variation analysed in chapter 2 where the standard deviation in total student performance was used as measure, the changes in standard deviation in between school variation (in absolute numbers) for *Mathematics*, *Science* and *Reading* are +19, +18 and –1 percent respectively.

[10] During the time period 1998-2004, the proportion of independent schools increased from 6.2 percent in 1998 to 15.9 percent in 2004.

[11] For a definition of the index, see PISA 2000 (OECD 2001), appendix A1, page 220.

[12] The ESCS-index is constructed in such a way that one unit corresponds to one standard deviation in the index. This means that approximately two thirds of all students lie within one index unit from the mean of the index.

[13] Two other measures of socioeconomic background were also used in the analyses, ISEI (International Socioeconomic Index of occupational status) and mother's level of education. Neither of these measures showed any statistically significant changes in their relationship to student performance.

[14] The increase between 1998 and 2001 as well as between 1998 and 2004 are both statistically significant. The test of significance is based on the assumption that each cohort is viewed as a sample from a "super population", i.e. that all cohorts during the time interval belong to one single population.

[15] The word *explain* should not necessarily be interpreted in a causal way but may well be a pure statistical correlation.

[16] The students at this school perform better on average due to their individually more favourable socioeconomic background.

[17] See for example Hoxby (2000), and Hanushek et al (2003) for empirical evidence of the presence and the estimation of peer group effects.

[18] A student is defined as having highly educated parents if at least one of the parents (mother or father) has tertiary education (ISCED level 5-6).

[19] The effect sizes are estimated using a two level regression model. The student's gender, migration background and whether the parents are highly educated or not, are controlled for at the student level. At the school level, the proportion of foreign born students is controlled for.

[20] See figure 5.2, page 36 in original report (Skolverket 2006a).

[21] See figure A5.1 in the Appendix (page 57) of the original report (Skolverket 2006a).

[22] The effect sizes are estimated using a two level regression model. The student's gender, migration background and whether the parents are highly educated or not, are controlled for at the student level. At the school level, the proportion of highly educated parents is controlled for.

[23] In contrast, using the proportion of students with any kind of migration background (see definition on page 14) rather than the proportion of foreign born students, an increase in school segregation along migration lines can be observed. Similarly, a recent study (Gustafsson 2006), using a different measure of school segregation, does find an increase in school segregation along migration lines.

[24] See footnote 23.