

# Summary

## Introduction

Governments in Sweden have since long strived to reduce gender segregation in education and in the labor market. This report describes trends in gender segregation over half a century, covering upper secondary school, higher education as well as the labor market. In short, the results show that gender segregation has decreased by about one third, in all three areas. However, the decrease has varied over time, across educational fields and across occupations. The development has generally been driven by increasing shares of women in areas traditionally dominated by men, while the opposite has been much less common. However, the proportion of men has increased within certain traditionally female-dominated occupations in most recent years.

There are several reasons why gender segregation is of interest to examine. If individuals refrain from choosing the career that would best suit them, for example due to gender norms or gender discrimination, it is costly not only for the individual but also for society. This is because it sets restrictions on individuals' choices, thereby decreasing the flexibility of the workforce and the possibility to adjust to changes in the labor market, for example technological changes, increased skill requirements and changing demographics. Gender segregation is also often put forward as a main cause of inequality in working conditions between women and men and of the gender wage gap. There are also arguments related to the importance of representation from the welfare recipients' perspective, for example that children and elderly should be able to meet both women and men in childcare, school and elderly care (to a greater extent than today), according to the same reasoning which has been put forward about the police force, that it should be

represented by more ethnic minority groups. Furthermore, there is often a concern that women at the societal level risk falling behind in terms of digital influence, as men are overrepresented in IT and technology. Similarly, it can be argued that professional groups such as journalists influence the topics of debate in a society, while for example, sociologists, economists and political scientists constitute an important recruitment base for civil servants within public decision-making bodies, also with the possibility to affect the political priorities and political discourse. Hence, it is important that both women and men are represented.

In summary, there are many arguments for encouraging gender integration. A better understanding of women's and men's educational choices and allocation in the labor market is therefore important for identifying areas of priority for Swedish equality policy.

## **Background – theory and policy**

The report presents brief accounts of some of the most important theoretical explanations as to why gender segregation occurs. The explanations cover issues such as social norms, unequal household responsibilities and gender discrimination. There have also been several significant policy initiatives implemented during the past decades both in the educational system and in the labor market. These include for example the introduction of a bonus point on the average grades of the underrepresented sex when applying to programs in upper secondary school as well as the right for employers to apply affirmative actions and hire the underrepresented gender if two candidates have equal or nearly equal merits. However, it is often assumed that gender socialization starts early in childhood and affects gendered educational and occupational choices later in life. Hence, since 2000, the importance of avoiding gender stereotyping has been emphasized in the education of preschool teachers.

## Upper secondary school

The Swedish educational system includes compulsory school for nine years with very limited tracking. After the ninth grade, at age 16, most individuals continue to upper secondary school where they choose between a number of programs. Some of these are vocational and others are preparatory for higher education. Historically, there has been around 20 programs to choose between, and some of these have been strongly dominated by either women or men. This report uses register data and focuses on 12 different program categories which have roughly remained similar during the observation window 1971–2019. The segregation measure we apply states the share that would need to change programs to make the share of women the same in all programs in upper secondary school. This share shrank during the period studied from 53 percent to 34 percent. This decrease was, up until the 2000s, mainly driven by an increased share of women in natural science, technology as well as an increased share of men in the care program. During the 2000s, decreased segregation instead mainly originated in the vocational programs. More generally, gender segregation tends to be strongest in vocational programs which attract individuals with low grades. These vocational programs often lead to occupations that are traditionally gender typed.

An interesting and potentially important aspect is that we observe, for some fields of study, large differences in the development of gender segregation across time even though the fields of study appear to be relatively close. For example, the three programs electronics, construction and vehicle engineering all attracted less than 5 percent women between 1971 and 1999. Since 2000, electronics has remained at low levels whereas construction has more than doubled the share of women. For vehicle engineering, in stark contrast to electronics, the latest numbers indicate that almost every fourth slot is taken by a woman. A better understanding of these differences may be key to better understand what is required to further reduce gender segregation in educational choices.

## Higher education

Gender segregation in higher education differs from upper secondary school in that the education is more specialized and concerns a smaller share of the population. We use register data and define 65 categories of college majors which existed throughout the period 1978 to 2018. We find the overall development of gender segregation in higher education to be similar to that in upper secondary education. To make the share of women the same in all educational categories in higher education would have required that 51 percent changed majors in 1978, but this was reduced to 34 percent in 2018. During these decades, more women enrolled in higher education in the fields of engineering, business, law and medical doctor. The overall decrease in segregation mainly occurred between 1990 and 2000. While the development started in the 1980s, the change in the overall measure of segregation was then hindered by a few large education programs (e.g. teachers, social workers), which saw the majority share of women increase further. Since 2000, the changes have been relatively modest. It potentially reflects that the increased influx of women in the labor market, which started in the 1960s, plateaued in the 1990s.

The share of women among medical students was 40 percent at the start of the period, increased to 55 percent in 2000 and remains similar today. The increase of women was slightly larger for business and law, from roughly 30 percent to 60 percent, but these shares have also remained relatively stable during the 2000s. The share of women among engineers increased from a little over 10 percent in 1980 to over 30 percent in 2018. An important difference compared with other prestigious majors is that the share of female engineers has continued to increase during the 2000s. However, there are also some majors, traditionally dominated by women, which have seen increased segregation, for example social workers, study advisors and some teacher educations.

## The labor market

Women's labor force participation increased during the 1960s and reached almost the level of men in the 1990s when it plateaued. During these years, there was a parallel expansion of the public

sector which enhanced the demand for labor in occupations which have traditionally been dominated by women (e.g. health care, pre-school). At the start of the 1990s, a deep economic recession hit Sweden which halted the expansion of the welfare sector. Another trend during the last half decade is the upgrading of skills requirements in the labor market. For example, traditionally male dominated jobs in manufacturing became fewer while the female dominated service sector expanded.

The report uses register data to analyze gender segregation between 1960 and 2019. Until 2010, gender segregation decreased by roughly one third, that is the same order of magnitude as for upper secondary and higher education. For the latter part of the period, gender segregation continued to decrease (the 2011-2019 register data on occupations is not possible to fully harmonize with the register data on occupations for the prior period). Segregation was higher in the public sector until 2000 when the private and the public sector converged, and from 2010 private sector gender segregation is slightly higher than for the public sector. This development may reflect that services provided by the public sector have increasingly become privatized, such as elderly care, pre-school and schooling up to upper secondary level.

When analyzing other dimensions of occupations, the report finds that the share of women has increased in prominent positions in the labor market and in occupations which demand post-secondary education. There is also a sharp increase in women's share in the primary sector (forestry, agriculture, fishing), which used to be heavily male dominated. The development in the primary sector mirrors a similar trend that we report from specific educational programs in both upper secondary level and in higher education. In contrast, the share of women has decreased in construction and manufacturing. Interestingly, in the latter part of the period of study, some occupations traditionally dominated by women have seen their shares decrease, for instance in administration, service, care and sales. This could mark the start of a trend where men to a greater extent enter occupations previously dominated by women.

The overall decreased gender segregation between 1960 and 2010 is further analyzed by decomposing the changes into three different parts; changes pertaining to variation in women's labor force participation, changes connected to variation of the occupational

structure and changes related to what we label as “pure” segregation, that is an increase of the underrepresented gender. The analyses indicate that only a small part of the decreased segregation can be attributed to changes in women’s labor force participation or in the occupational structure. Thus, most of the decrease in gender segregation is due to that specific occupations have in fact become less gender segregated. Additional analyses also find that there tends to be less gender segregation among later born cohorts, which is consistent with the idea that the labor market becomes less gender segregated as a new generation enters.

The report also seeks to provide a picture of today’s labor market by analyzing detailed survey data from the Swedish Labor Force Survey conducted in 2020. Analyzing vertical gender segregation, managerial positions are found to be gender balanced. This may be important in terms of signalling but potentially also for the labor market opportunities of subordinates. However, within the category of managers, there is still strong gender imbalances as men dominate in eight out of the ten larger occupational categories.

## **The relation between gender segregation in educations and occupations**

The report also analyzes the relation between gender segregation in fields of study and gender segregation in occupations, that is if an increase in the share of women in a specific field of study also yields an increase in the occupation(s) associated with that field. Some academic studies have questioned this link. Most research on this subject has studied STEM and what is referred to as the “leaky pipeline” theory. The theory states that the share of women in STEM tends to decrease from upper secondary school to higher education and then even further in STEM occupations. This could, for example, reflect unequal opportunities or a preference for not being the minority gender in an education or occupation.

There is “leakage” between all educations and occupations, but what this report is particularly interested in is to see if the leakage differs between women and men and between fields of study dominated by one gender. We find that these differences vary substantially both between fields of study and in how the differences

develop over time. For engineering college majors, we find that men are 7-8 percent more likely to be in a STEM occupation compared to women (adjusted for the share of women and men with engineering college majors). This difference occurs soon after labor market entry and remains almost constant. Other educational fields of study which we analyze include vehicle engineers and nurses, which are highly gender segregated. In these cases, the minority gender gradually decreases its share in the specific occupation, and almost disappears completely in the case of women in vehicle engineering. This may be related to being a minority gender. Future research will hopefully be able to provide more detailed information about what this reflects.

Finally, we also provide a more sophisticated analysis into whether choice of field of study at age 16 has a *causal* impact on occupational choices at age 38. We find that being marginally admitted to the first choice at upper secondary school has an impact on women which is equally important, or larger, compared with men. One interpretation of this result is that completing a field of study impacts occupational choice of women and men to the same extent. The differences in the leakage that we saw in the earlier analyses therefore seem more likely to reflect other circumstances than the exams *per se*. The causal results also confirm what descriptive analyses have indicated in earlier studies, that policy measures which contribute to gender integrated educational choices are important for decreasing future labor market gender segregation.

## Policy suggestions

**Improve the quality of data.** Swedish register data is renowned for its quality. However, there are important deficiencies for researchers interested in gender segregation. The most problematic area is the registers of college exams, which have high attrition rates when it comes to branches within fields of study. Very few individuals are assigned a code for the most detailed level of categorization. Consequently, while college exams in large groups such as business, law and medicine appear gender balanced, there are clear indications that this hides strong gender segregation within each respective field. Without reliable statistics on educational specializations across

time, such potential trends cannot be studied. To document gender segregation, it is of fundamental importance to have access to more detailed data or we will not be able to detect important development as regards gender segregation.

**Harmonize data over time.** When analyzing trends, it is important that information is comparable over time. The reclassification of occupational categories across time may be problematic from this point of view. For example, the reclassification of occupations (SSYK 2012) is problematic as it does not allow harmonization of occupational data prior to this point in time. It reduces the possibilities to make analyses of occupational changes over time other than at a most rudimentary level.

**Enable evaluations of policies.** To efficiently design policy measures, it is necessary to know what works and what does not work. It is therefore of importance that policy measures are implemented in a way that they can be systematically evaluated. Among very few exceptions, the minority gender bonus implemented in upper secondary school in 1982 was possible to evaluate. It showed that the share of minority gender in engineering and nursing doubled in the following ten years.

**Initiate research about differences between fields of study which attract similar groups.** In some fields of study, we observe large differences in the development of gender segregation even though the fields appear relatively close. An investigation initiated by the government, or new research, could give us a better understanding about these differences, which may provide a key to better understand challenges of reduced gender segregation. One very clear example of this is in upper secondary school and the fields of electronics, construction and vehicle engineering where the development of occupational gender segregation has been very different. A different example is in higher education, where women have traditionally been overrepresented in several fields (e.g., social worker, study advisor), but where the overrepresentation by women is even stronger today.



**Initiate research about minority gender dropouts.** Data shows clearly that individuals from the minority gender are more likely to drop out of an educational field of study. There are several hypotheses why this occurs, but an investigation initiated by the government, or new research, could provide better knowledge about the underlying reasons. This would improve the possibilities to reduce gender segregation in education.

**Encourage upper secondary schools to implement broadened marketing.** So called broadened marketing has been implemented in the marketing of educational fields of study in higher education. It means that the presentation, for example photos and language, is scrutinized and revised to challenge gender norms and stereotypical expectations. Upper secondary schools should be encouraged to also implement similar schemes especially as regards gender segregated programs.

**Encourage upper secondary schools to merge the programs in engineering and natural science.** The programs in engineering and natural science were merged between 1994 and 1999, which led to a marked increase in the share of women engineers. This share fell back to a lower level when the programs again became separate in 2000. By including engineering and natural science as an option in a joint program, the proportion of women in this field may increase.

**Encourage schools to put minority gender individuals in the same class.** One cheap but potentially efficient way to reduce the likelihood that minority gender individuals drop out is to have them placed in the same class in cases where a school has several classes.

**Employers should work with the working environment of the minority gender within the framework of existing structures.** Gender differences in the labor market have often been focused on wages. Most sectors practice individual wage setting and according to law wage mapping must be done with the aim of eliminating unjustified wage differences. It is reasonable to supplement this existing structure with features that monitor the work environment of gender minorities.