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Wage Premiums on Education and the Increased Female University Enrollment Rate in Sweden 1970-1990

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Abstract

Before 1977 more men than women enrolled in university education in Sweden. The female enrollment rate started to increase compared to male in 1973 and in 1977 it surpassed the male enrollment rate. Between 1978 and 1990 women remained at a stable level of c.60% of the newly enrolled students. The years 1970-1990 also represents the time period when women greatly expanded their participation in the labor force.

This thesis investigates why women increased their university enrollment and why it remained at a level higher than men. Ocular inspection of time series over the period 1970-1990 as well as regressions are used to analyze potential financial causes, such as the wage premiums to education, of the changes.

The conclusion is that both financial factors and political reforms like the reform of higher education in 1977 influenced the enrollment rates for women. This is true especially for the jump in female enrollment rates. Why a higher proportion of women compared to men enrolled in university is harder to determine, but the combination of political reforms, changed expectations on work, wage premiums and unemployment rates are likely to have effected this.

Key words: Returns to Education, University Enrollment rates, Sweden, Gender, 1970-1990

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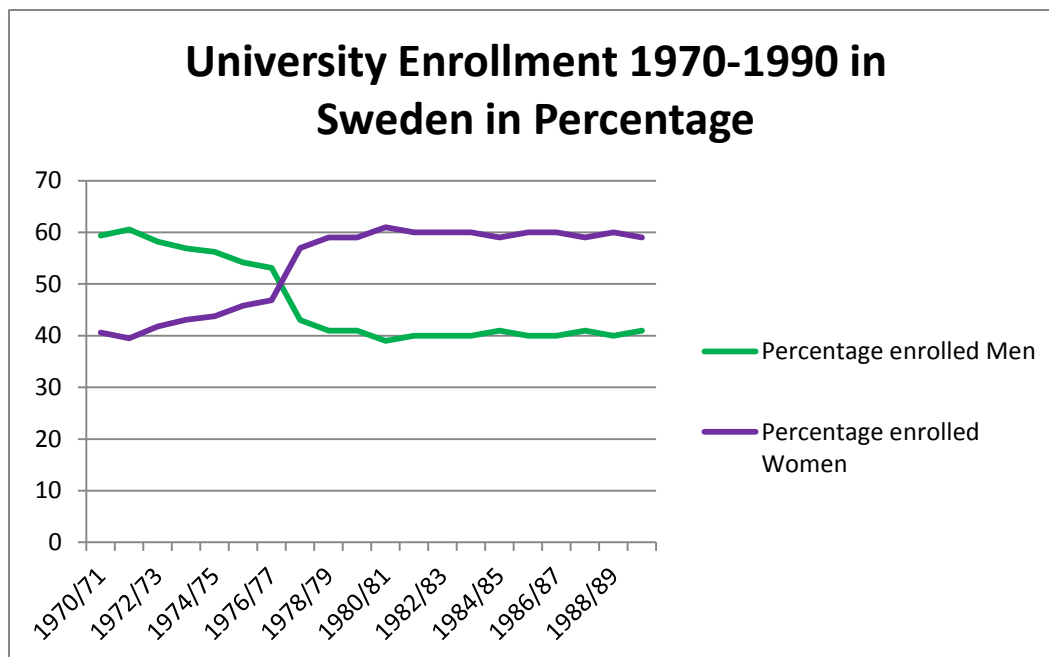
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1. Introduction

Education is important for growth. According to Psacharopoulos (1985) increased education, and then especially education of women, contributes strongly to the development of countries. Goldin & Katz (2009) emphasize that improved education on all levels, and college and university education in particular, helps a country develop and industrialize. When already industrialized countries make the transition to information societies higher levels of education becomes even more important.

In order to create policy reforms that seek to maintain or increase people enrolled in universities it is important to know peoples' incentives to pursue higher education. According to the human capital theory one incentive to invest in an education is that of higher future and life-time earnings. In an important early study first published in 1964, Becker found when studying enrollment rates and rates of return to education for Americans in 1939 that the returns were higher for men than women and higher for Caucasians than African Americans. Enrollment rates followed the distribution of returns to education so that the groups with relatively higher returns to education pursued education to a higher degree (Becker, 1975).

Before 1977 more men than women enrolled in university in Sweden. Already in 1973 women started to increase their enrollment rates compared to men until they finally surpassed them in connection with the educational reform in 1977. This is displayed in Graph 1 which shows the male and female enrollment rates as percentages of the total enrollment rates. This was a long run trend; women's enrollment rates increased more than men's up until the beginning of the 1980s and thereafter they continue to permanently make up a larger part (around 60%) of the newly enrolled students.



Graph 1 University Enrollment 1970-1990 in Sweden in Percentage of Total Number Enrolled (Source of data: National Central Bureau of Statistics)

According to Ljunglöf (2004) women earned, and still earn, less than their male counterparts after graduating. Women are also overrepresented in the sectors of the market where skills are less valued and which thus generate lower returns to education. Furthermore women also tend to engage in part time work more than men which leads to women having lower de facto wages (Arai & Kjellström, 2001; Elgqvist-Salzman, 1988). However, since women earn less than men regardless, the increased returns to wages for education can still serve as an incentive for women to continue studying. Could these potentially relatively higher benefits have helped bring about the change in enrollment rates? The period of 1970-1990 was also the period when women started to expand their involvement on the labor market. This means that they would be able to reap the benefits of returns to education to a larger degree than before which means that higher returns to education would be even more of an incentive for women to continue to university.

1.2 Purpose

The purpose of this thesis is to investigate whether financial incentives in terms of wage premiums to education caused the sustained change in proportion of men and women enrolled in university studies in Sweden. Through regressions and ocular inspection the thesis seeks to answer the research question: “What were the causes of the change in and sustained higher levels of female university enrollment rate during the time period of 1970-1990 in Sweden?”

1.3 Hypothesis

The main hypothesis is that the change in female enrollment rates took place and was sustained at a higher level mainly because women had high returns to education and more specifically higher returns compared to men in terms of wage premiums. There should therefore be a positive effect on wages from having gone to university at the end of the time period and this positive effect should be larger for women than for men.

This hypothesis can be falsified by finding that education does not have a positive effect at all or if the positive effect is weaker for women than men in 1990.

1.4 Methodology

The time period of interest has been specified as 1970-1990 both because it is during this time that changes in the enrollment rates take place. It is also a time period for which there exists appropriate data. The data used for the regressions have been drawn from the two censuses Folk- och bostadsräkningen 1970 (FoB 70) and Folk- och bostadsräkningen 1990 (FoB 90). However, the censuses only show two points in time. In order to be able to look at the changes over time, ocular inspection of enrollment rates, unemployment rates and skill premium have been carried out. Statistics used for the ocular inspection have been drawn from scientific articles or official publications by Statistics Sweden (formerly National Central Bureau of Statistics).

The theories and previous studies presented here have been gathered from articles and working papers available from academic or state institutions. Care has been taken to make sure that the information presented is as correct and reliable as possible.

1.5 Disposition

The outline of this thesis is as follows: first some basic background information is presented. This contains a description of the Swedish educational systems that were in place within the time period and the results of the different systems on university enrollment rates. Female participation in the labor force in the years leading up to and during 1970-1990 is also outlined in this section. The second section contains the theoretical framework and previous research. Discriminatory theories within education and the labor market is described followed by theories on returns to education as well as a summation of previous studies of gender differentiated returns to education in countries in general and Sweden in particular.

The third section starts by outlining the potential causes to the changes in enrollment rates. It moves on to explain the different methods, data and models used in the study. In the first part of the fourth section the ocular inspections of the enrollment rates, general skill premium and unemployment rates are performed. The second part displays the results from regressions on the returns to university education in Sweden in 1970 and 1990. The final part of the fourth section summarizes the results from both the ocular inspection and the regressions.

The fifth section contains the analysis where the results are discussed in the context of theory and previous research. The conclusions and suggestions for future research drawn from this thesis are presented in the final section.

1.6 Background

1.6.1 The School System in Sweden Before 1977

In Sweden primary education has been mandatory since 1842. Over this long time period there have been several educational systems in Sweden. After the Second World War the idea of a more uniform school system where education was open and free for everyone regardless of geographical location and socioeconomic status took form (Marklund, 2011). This equality in terms of possibilities regardless of background or gender became the theme for school reforms during the next 40 years (Elgqvist-Salzman, 1988).

One of the first steps towards a more uniform school came in 1950 when a new school system where nine instead of six years became mandatory was initiated as an experiment. In 1962 the Swedish parliament decided to implement the nine year school reform nationwide. By then a quarter of the Swedish municipalities had already switched over to the new system. Before this system change only those with certain grades could continue three more years after the mandatory six. For those who did not complete more than six years high school and, later, university was an impossibility (Marklund, 2011; (Meghir & Palme, 2004). The result of the reform was, just as had been intended, that more people continued their studies (Meghir & Palme, 2004).

In 1968 a more uniform type of upper secondary education in terms of accessibility and later possibilities to continue with university studies was created (Marklund, 2011). This was part of the reforms aimed at increasing the number of students that would be eligible for university

education no matter what their family background was by creating a system similar to that of the American high school (Heidenheimer, 1974).

In 1960 higher education in Sweden was both exclusive, gender segregated -in terms of fields of study- and male-dominated. All through the decade the demand for higher education by both men and women increased. Although in the beginning of the 1970s it decreased somewhat when the demand for unskilled labor was higher than for skilled, it was men rather than women who reduced their demand for education (Stanfors, 2006; National Central Bureau of Statistics, 1991; Elgqvist-Salzman, 1988).

Since the reforms enabled more people to go to university, although only those who had been lucky enough to use the new system, voices were raised to make university studies more practically oriented and increase the possibilities for people without high school diplomas to enter university. In 1968 a committee was created to investigate potential changes in the university system. The result from this investigation was the reform of 1977 (Elgqvist-Salzman, 1988).

1.6.2 The School System of Higher Education in Sweden 1977-1990

The new university reform was introduced on the first of July, 1977. The main purpose of the reform was to make it possible for more people to enter into university studies and to extend the concept of university education in terms of which fields of education that were incorporated. After the reform the education of students within many female dominated fields such as nurses, primary school teachers, medical assistants and a number of artistic fields were transferred from other institutions of tertiary education to universities (National Central Bureau of Statistics, 1980: 413-14). All in all, this represented a transfer of around 50 000 students and there was no longer any difference between university and non-university higher education (Arai & Kjellström, 2001). The inclusion of many female dominated fields into university education naturally caused the number of women enrolled in university to increase. The separate courses also attracted many new students. With respect to fields of study the university was however still very gender segregated with a low proportion of women in for instance engineer and technological studies. This segregation remained throughout the time period of interest for this study (Stanfors, 2006) (Elgqvist-Salzman, 1988).

1.6.3 Female Participation in the Swedish Labor Force

The female participation rates in the Swedish labor force began to increase in the middle of the 20th century as society moved from an industry based industrial life to one of services. Furthermore, wages rose and more jobs were created in sectors that were traditionally female dominated. The women responded to the incentives as well as changing political and normative attitudes and moved into the labor force. The public childcare system was greatly expanded from the 1960s and onwards which enabled women to both have a career and family. Technological advancements within these sectors also meant that demand for skilled labor increased which made women increase their demand for education (Stanfors, 2006). This led to the proportion of women working in the official market rapidly increased in the 1970s- 80s (Ohlander & Strömberg, 2002; Elgqvist-Salzman, 1988; Statistics Sweden, 2004). According to Palme & Wright (1994) the number of years of education, especially in the case of university education, rose for both men and women in the labor force between the end of the 1960s and 1990.

Women tended during the period of 1970-1990, just as today, to work part time to a higher degree than men. In fact Arai & Kjellström (2001) found that the proportion of women working less than 35 hours have remained at a level of between 40 and 50% throughout the period of 1968-1996. The higher levels of part time work means women have even lower actual wages than men.

2. Theoretical Framework and Previous Research

2.1 Gender Segregation and Wages

The theory of education leading to higher efficiency and thus higher wages was put forward in the 1960s and 70s in the human capital theory. The resulting wage premium to education which is also referred to as returns to education or skill premium will be discussed in depth further on in the text. Before looking closer at the human capital theory though, theories of gender, segregation and discrimination within the labor market and in the context of choosing education will be presented.

That gender (as well as country of origin) can have effects on wages seems to be true for most, if not all, countries. Being a woman can have detrimental effects on wages as well as inclusion in the labor market (Goldin, Katz, & Kuziemko, 2006; Sloane & O'Leary, 2004;

Elgqvist-Salzman, 1988). High gender segregation is also present in the labor market and fields of education in several countries around the world, including Sweden and wages tend to be lower in female dominated sectors. According to Ferber & Lowry (1995) this is due to women working in sectors where additional schooling is less rewarded than it is in male dominated sectors. The occupational distribution can therefore be argued to make out a large part of the wage gap.

Why do women choose to work within sectors with lower wages? Virtually all economic theories are based on the assumption that people make rational decisions and this includes the decision to invest in a certain education. People thus invest in an education considering their personal characteristics, likes and other constraining conditions as well as the assumption that they will later on participate in the labor force reaping the benefits from that particular education. Stanfors (2006) emphasizes that educational segregation therefore comes from rational decisions made by both women and men to invest in different types of training and work in different fields. Because women plan to have more breaks due to children during their lifetime they tend to invest study and working time in fields that lead to jobs with low penalties for career breaks (Stanfors, 2006; Granberg, 2007). However, this statement has been refuted by for instance England (1995) who states that there is no difference in the reduction in life time earnings due to having children depending on if women start working within male or female dominated areas. There are thus no economically rational incentives for women to choose to go into the traditionally female sectors where wages on average also are lower.

Instead factors that may influence study and work area decisions are feedback and reinforcement effects. People are brought up and socialized to display and to believe that there are gender specific characteristics. These beliefs affect their decisions of whether and what to study both directly and indirectly through the preconceived notions of employers. These notions may prevent women from entering certain jobs although there are no formal bars. If the women are aware of this then those notions will also affect their choices since they will know in what fields they are more likely to advance (Leathwood, 2005). These preconceived notions and beliefs of what women and men are capable or not capable of have also been observed in the setting of wages (Voutilainen, 2010).

2.2 Gender Discrimination and Wages

Closely related to these theories of preconceived notions and beliefs are the theories of discrimination. There are several theories as to why there is discrimination in terms of wages and possibilities to enter the work force. One theory is that of taste discrimination. Employers, colleagues and clients may prefer to hire, work with or be served by for example men and therefore members of this group of people are hired to a larger degree. There is also the theory of what is known as statistical discrimination where women's credentials are valued lower than those of men because men are seen as more efficient. If one believes that men are usually more efficient then by employing men the employer reduces the risk of making a bad investment. Another theory as to why women in general earn less than men is known as the error discrimination theory where people simply underestimate the work of women compared to the work of men. This applies both to the evaluation of individual performances of women and of the value of the work performed in traditionally female sectors of the economy. Female achievements and achievements in female dominated areas are less valued and therefore less paid (Woolley, 1995).

Time allocation is another factor that has been pointed to as to account for discrepancies in returns to education between men and women. After starting a family many women shift from full time to part time jobs in order to work more at home where there are no wages. This reduces life time participation of women in the labor market and therefore life time earnings (Mincer & Polachek, 1995). The part-time jobs also tend to be constructed so that less skills are needed which reduces wages even further (Horrell, Rubery, & Burchell, 1995).

Ferber & Lowry (1995) also argue that the only way to explain the lower wages in sectors that are dominated by women is discrimination. The rates of direct discrimination of individual women may therefore be low, but the cumulative effects are large. Machado & Mata (2001) who studied the case of Portugal with the intention to find out why wage inequality between workers with respect to education began to increase in the 1970's and 80's in most of the developed world discovered that one of the largest factor for wage differentials in Portugal overall was personal attributes such as whether the worker was male or female and that changes in the distribution of gender between the sectors accounted for much of the changes in wages. Women in Portugal in the beginning of the 1990's earned 9-17% less than their male counterparts. The effects of discrimination are also something which is observed by Horrell, Rubery & Burchel (1995) who further state that women tend to be employed in work

seen as demanding less years of schooling. As a consequence women are not rewarded for their higher levels of education with higher wages but generally seen as overqualified for the tasks they perform.

2.3 Financial Incentives for University Education

Despite the discriminatory theories outlined here, financial incentives for education are often noted as being of the utmost importance both for men and women. For several reasons wages are strongly related to education. Higher education is seen as an improvement of an individual's efficiency, not only in terms of having more knowledge but also because it is a signal in terms of an educated person being able to learn new tasks. Education combined with technological advancement has often been cited as necessary conditions for growth (Goldin & Katz, 2009).

For individuals the potential higher wages due to the actual, or assumed, higher efficiency after graduating provides an incentive to go to university. Just as there are other factors than productivity and efficiency that determine wages there are, of course, other motivations for pursuing higher education; personal interest for example. However, although it should be kept in mind that non-economic motivation plays a part, only financial incentives will be discussed in this study. The main financial incentives to enroll in university education are the returns to education as specified in the human capital theory.

2.4 The Human Capital Theory

That raising education and especially the number of people educated increases growth has been shown in several empirical studies. Although there is an important theoretical distinction between the augmented neo-classical approach and the new growth theories as to how exactly education raises growth, a general conclusion is that education positively contributes to economic growth (Sianesi & Van Reenen, 2002; Björklund & Lindahl, 2005; OECD & UNESCO Institute for Statistics, 2003).

The origins of the empirical research concerning social and private returns to education is derived from the concept of the effect of human capital on the income distribution which was constructed by Becker and Mincer. Becker and Mincer were among the first to link education to economic growth even though the roots to human capital can be found even further back in

“The Wealth of Nations” by Adam Smith (Kazamaki Ottersten et al., 1994; Altonji, 1991).

The theories by Becker and Mincer were formulated after a long debate as to why the American economy seemed to grow more than its input of capital and labor. Economists tried to find out what this residual growth might be due to and discovered that including technological change reduced the unexplained factor. One way of looking at technological change in the growth model is to see it as increased quality of labor inputs. This led to a new field of economics known as the “economics of human capital” or “economics of education”. Within this field human capital, rather than physical capital, is proclaimed the major source of economic growth (Psacharopoulos & Hinchliffe, 1973:1-2).

“Human capital” constitutes the productive skills and knowledge individuals have. This can be improved with training, experience and education. The incentives to invest in human capital is just as with other types of investment based on the rate of returns. Education tends to lower wages early in life when the individual is foregoing wages to get education, but render higher wages as the individual graduate and starts working (Becker, 1975). The increase of human capital creates high social and private benefits in terms of economic growth and higher wages (Palme & Wright, 1994).

As education started to be seen as an investment the question arose as to what amount the returns to education were as well as what they should optimally be in order to ensure an efficient distribution and investment in education. (Psacharopoulos & Hinchliffe, 1973:2) The theories of Becker and Mincer state that an individual will choose an education that will maximize the present discounted value of income depending on the individual’s rate of borrowing and the effect of education and earnings as well as the earnings she or he will receive after completing the education. The problem of uncertainty as to whether the individual is going to complete his or her studies is retracted from the model by assuming that at the point in time when the individual chooses his or her education they believe they will complete their degree. Should the uncertainty of whether or not an individual will graduate be taken into account, the returns to education would be different (Altonji, 1991).

It can be assumed that individuals with higher ability will invest more in themselves because they know that they will be better able to reap the benefits from additional years of education and training. Indeed this has been shown in several studies. This may skew the actual returns to education since it is possible that these able individuals would have received higher wages

even without education something that can also be seen empirically (Altonji, 1991) (Becker, 1975).

However, Cawley, Heckman, & Vytlačil (1998) state that only a small part of the wage premiums to education reflect ability, unless the individual is very young. But ability may also have an indirect link to returns to higher education in the respect that university education *signals* ability. Education has been found to increase the returns to individuals with education more than it increases that individual's production. In other words the wage premium to education is higher for an educated individual than the increased productivity that is due to that individual being educated. This goes against the notion that the higher wages of educated or skilled labor is derived solely from the higher productivity of skilled labor. Signaling theory states that this discrepancy exists because people with higher ability go to university, then higher degrees of education signals this higher ability rather than improves it. The effect to wages that can be attributed to the signaling effect of higher education should however be quite small compared to that of actual increased ability (Björklund & Lindahl, 2005).

Regardless of why, education seems to raise individual wages. Although future wages to a large degree also depend on what field of study an individual chooses as well levels of education and financial state of the country in which the individual is living. Human capital accumulation seems to work in the same way as physical capital accumulation with diminishing returns to scale. Thus education in countries with a labor force that already enjoys high levels of income and education yield lower returns in terms of its effect on wages than in countries where human capital is more scarce. The rates of return for different levels of education thus vary between countries depending on how large the proportion of the workforce that is educated is (Psacharopoulos & Hinchliffe 1973:6-12,50-59, 83; Sianesi & Van Reenen, 2002; Goldin & Katz, 2009:7).

Although private returns to education may decrease as more and more people obtain higher levels of education, a more widely educated workforce leads to growth and development of the whole society (Palme & Wright,1994). It should however reduce the incentives to continue with higher levels of education. However, even though the general skill premium decreases as the number of skilled workers increases faster than demand for skilled labor, it is still a premium and may be higher for certain groups.

2.5 Female Returns to Education and Changing University Enrollment Rates

As previously mentioned, Becker (1975) found that the groups in society that had, not higher wages, but higher *returns* to education tended to enroll in higher education to a larger degree than other groups. The emphasis should hence be on relatively higher returns to education. Even if women have lower wages than men in general due to for instance discrimination, they may still have relatively higher wage premiums to education. If this was the case it would help explain why, despite having lower post-education wages, women still go on to college to a higher degree than men which they do in several developed countries including Sweden (Ljunglöf, 2004).

Dougherty (2005) found that this indeed was the case for the US. Specifically, women in the US seem to have higher returns to education than men even when controlling for personal characteristics. Not only do wages increase in absolute terms as a result of higher skills, but at higher levels of education the wage gap due to gender seems to be lower. This might explain why more women than men go to college and university in the US.

Goldin, Katz, & Kuziemko (2006) found that in the US the increased female enrollment is a long-term trend spanning over all social groups and beginning with the cohorts of the 1930s. As possible explanations for this upwards sloping trend and its origin with the 1930s cohorts they point to women beginning to perform better in tests in math and science and having higher expectations of future work and wages at this time. They also had a longer time between starting college and getting married due to more efficient methods of contraception which meant that the years during which women expect to work and reap the benefits from returns to education increased (Goldin & Katz, 2002).

The extent to which gender determines wages can also be related to the skill premiums at different wage levels. García, Hernández, & López-Nicolás (2001) found that in Spain the wage gap between men and women that could be attributed to gender and personal characteristics tended to increase with wage level. The same patterns of higher levels of gender-based wage differences at higher wage levels of wages was found in a study of the situation in Sweden made by Ljunglöf & Pokarzhevskaya (2009). Even after having accounted for differences in education and work experience there remained a wage gap in 60 out of the 76 studied academic occupations that could not be explained by anything other than differences in gender. In all cases these gaps favored men. The higher positions for people

with university degree also tended to be dominated by men. These two effects are of course related: in two out of three occupations the overrepresentation of men in higher positions caused or augmented the wage discrepancies at higher wage levels.

Bonjour & Gerfin (2001) investigated the wage gap in Switzerland. They found that there too it was strongly related to wage premiums and wage levels, but the pattern was opposite to that of Spain and Sweden. A reason to why so many Swiss women chose to continue their education could, according to Bonjour & Gerfin (2001), be that the part of the wage gap due to discrimination was much larger at low wage levels and low levels of education in Switzerland. However, gender segregation both in the labor market and in terms of fields of study was also present in Switzerland. Women tended to choose professions with low future earnings to a higher degree than men. One factor they believe affect this is that women place lower values on future earnings when choosing education than men, something that has also been shown in previous studies. Another factor might be that women without education have so low wages that the wage premiums in the skilled professions in the female dominated areas with lower wages even though they are lower, they are still high enough for women to choose them.

In Great Britain a study made by Sloane & O'Leary (2004) also showed that women have higher wage premiums than men. They examined returns to education depending on degree, subject and personal attributes. They found that while the number of people enrolled in full time education rose from 13% 1980 to 33% in 2000 in Great Britain returns to education decreased for both men and women in most disciplines. This seems to favor the argument that an increased supply of skilled labor will lower wages and it seems counterintuitive that people would still invest in an education. There were however large differences between disciplines and the authors pose the question as to whether students self-select so that the ones with the highest skills end up in certain areas which would then explain the higher wages. In all disciplines return to education was higher for women due to the prevalence of very low wage in the low-skilled sectors for women, just as in Switzerland. Women had higher premiums on education in some disciplines, men in others. Just like Bonjour & Gerfin (2001) they found that women tended to choose degrees leading to lower future earnings to a higher degree than men. Still, because of their higher wage premiums, women gained more than men on continuing their education.

2.6 Actual Returns to Education in Sweden

Sweden is an example of a country which has experienced quick growth in both the economy and the educational system. The returns to education have not been as large as they could have been because of wage compressing policies of both trade unions and the government which to a greater extent introduced progressive tax policies implemented in the 1960s and 70s. The major change in returns to education took, according to Arai & Kjellström (2001), place between 1968-1974 which is in line with the argument that wage compression policies in Sweden did indeed compress wages. In the beginning of the 1970s the supply of skilled labor increased and was followed by a decrease in demand for skilled labor and the combined effect led to a further decrease in returns to education.

The solidarity wage policies and central wage negotiating were abandoned in the 1980s and the tax system was reformed to make it less progressive. The combination should have made private returns to education in terms of wage premiums to education larger (Palme & Wright, 1994). However, in total returns to education is among the lowest in Europe. The rate of return to education decreased substantially between 1968 and 1991 (from a 7.4% increase in wage for an additional year of schooling to 3.9 1991) but between 1981 and 1991 there was very little change. The decline in returns to education was larger for university education and that larger for women: from 161% wage increase for a university degree in 1968 to 43.8% in 1991 (Palme & Wright, 1994). In the early 1990s there was another surge of educated labor, but no decrease in returns to education. Still, returns to education and work experience remained lower than in 1968 (Arai & Kjellström, 2001; Palme & Wright, 1994).

Arai & Kjellström (2001) found that returns to education differ between the public and private sector. In the public sector human capital variables explain the difference in hourly wages more than they do in the private sector which seems to imply that the wage premium on education is larger in the public sector. When controlling for ability though, the importance of education is reduced in both sectors. Interestingly enough Arai & Kjellström (2001) found that the gender gap in wage was equally large in both sectors despite the fact that women dominate in the public sector in Sweden. Even within the spheres of the private sector where women dominate such as retail, women have lower wages than men regardless of education (Granberg, 2007). Some of wage differences could still be due to differences in educational attainment. Despite the increased female enrollment rates Palme & Wright (1994) claim that

men did, on average, have higher education than women and that this did not change from 1968-1991.

3. Methods

3.1 Potential Causes

The research question in this project was specified as: “What were the causes of the change in and sustained higher levels of female university enrollment rate during the time period of 1970-1990 in Sweden?”

The time period of interest runs from 1970-1990. This was a time period during which female participation in the labor force increased in several countries including Sweden (Goldin, 2002; Stanfors, 2006). As the expectations in society shifted to women working outside the home, the wage premiums should play a larger part in their decision to go to university, which is partly why the chosen time period begins in 1970. This marks a significant difference because if women do not expect to remain at home and be provided for by their husbands but work this will raise the value they put on having an education with respect to the increased future and life-time earnings thus increasing their incentives to enroll. That expectations of future work and wages are instrumental in women’s decisions to enroll was, as previously mentioned, also shown by Goldin, Katz, & Kuziemko (2006)

The changes in female university enrollment in the 1970s in Sweden probably depended on several factors because expected future earnings are not the only incentives to invest in higher education. Other financial incentives are related to income taxes, provision of student loans, cost of education, employment security and unemployment rates (Palme & Wright, 1994). Particularly different unemployment rates for those with and without education would discourage or encourage people to attend university. If women have less possibilities of getting a job without university education or if the unemployment rate for women is higher in general, they may choose to go on to have an education rather than being unemployed.

This is especially important for Sweden where university education is public and free and students are provided benefits and loans while studying (Arai & Kjellström, 2001). Studying might therefore be a means of sustenance as to getting a more highly paid job. The political factors as well as the different effects from unemployment rates will not be included in the model for the empirical part of the thesis due to restrictions in the data and practical circumstances, but will be discussed on a more analytical level by ocular inspection.

The school reform of 1977 has probably played a major part in enrollment rates for women because it resulted in the incorporation of the female dominated fields of nurses and teachers into universities rather than other institutions of tertiary education. To make sure that the potential changes in return to education between 1970 and 1990 are as accurate as they can possibly be the educational programs that were included in university study after 1977 must be treated as university degrees also in the data from before 1977. This will not be possible for the time series of enrollment rates due to lack of data, but for the regressions on rates of return to education it is feasible.

3.2 Methods Concerning the Ocular Inspection

Due to restrictions in the data and for reasons of clarity, certain parts of the analysis will be performed through ocular inspection. First graphs depicting the gender specific enrollment rates over the time period are displayed and analyzed in order to find out what the changes were and when they took place. This provides the basis for the further analysis.

According to the human capital theory, rates of return in the form of wage premiums to education provide strong incentives for higher education. To see if high wage premiums may have caused the increased enrollment rates a graph over skill premiums in the private sector in Sweden during the time period is inspected.

To see if university education as means of sustenance may have played a part in the increased female enrollment rate, an ocular inspection of unemployment for men and women a graph of the unemployment rates for men and women respectively over the time period is inspected.

3.3 Methods Concerning the Regressions

To obtain the rates of return to education in 1970 and 1990 in total four regressions are performed using two censuses, one from 1970 and one from 1990. These data sets are inspected and constricted to involve only those between the ages of 16-64, that is to say, those of working age. There are several ways to calculate returns to education. In some cases lifetime earnings, which are the sum of total earnings that an individual makes during his or her entire life, are calculated. The results are that those with higher wages would also have higher pensions, thus even higher total life time earnings (Ljunglöf, 2004).

In this particular study the focus is on the returns to education that an individual has during his or her career. This is partly due to constrictions of the dataset, but mainly due to the fact that the purpose of this thesis is to look at possible causes to changes in returns to education affects enrollment rates. Since people discount future earnings at an accelerating rate earnings so far in the future as pensions should play only a very small role in their decision to go to university.

It could be argued that there is not the returns to education from the same year that influences the decision to go on to university education. Since it is not a decision taken lightly and is probably affected by the wage premiums to education several years back as well. However, under normal circumstances the wage premiums do not differ very much from year to year. The perceived returns to education during 1970 will therefore be assumed to have effect on the enrollment rates of 1970 and the years just after. The wage premiums to education in 1990 should reflect those of 1990 and a couple of years before.

Both datasets are analyzed individually. As has been noted in previous research not only gender but other personal characteristics, such as country of origin, has an effect on both employability and wages. The effect of being born in a foreign country is even more complex because education received abroad may not be accredited in Sweden and this means that well-educated people may be found in sectors and occupations with unskilled labor. Naturally this will have an effect on the estimated returns to education and since the effect will be hard to quantify the results will be hard to interpret. In order to circumvent this problem and to constrict this thesis to only consider potential differences based on gender the analysis will only be performed on individuals born in Sweden. Therefore only Swedish-born individuals will be included in the model which means that first of all the datasets are cleared of all observations of individuals born outside Sweden.

In the next step, all wages are transformed into fulltime wages in the 1949 SEK using CPI obtained from Statistics Sweden. This is done in order to make sure that the changes observed are due to actual changes and not due to inflation. The deflator for 1970 is 2.36 and for 1990 it is 11.87.

Next, a dummy variable is created for gender where being female took the value one and being male the value zero. The listed educations of the dataset are transformed into three

categories: Bachelor, Master and Phd. These are then summed into one dummy variable of having gone to university. Those that continued to study at Master or PhD levels are also included in the dummy variable labeled degree to be able to study the effects of investing in even higher levels of university education.

The variable for experience was generated using the age variable minus 19 for those with no university experience and age minus 22, 24 and 28 for Bachelor, Master and PhD respectively. Since some individuals had one year masters, some were still involved with studying and some started to work before the age of 19 there are some observations where individuals come up with negative experience. For these observations the value of the experience variable is changed to zero.

A dummy variable for having at least one child under the age of 18 within the household is created as are interaction variables for being female. Another dummy variable will be generated for married and cohabiting women. After this the sample is split in two: one with married and cohabiting women and one with men and single women. This is done since married and cohabiting women have a choice as to whether or not they want to join the workforce or be provided for by their husbands. A method to adjust for this known as the Heckman or Heckit procedure will be used here. The Heckit procedure uses two estimation steps to account for the fact that the sample of married women is non-random. It does so by creating an inverse Mills ratio using a probit model and determine to which degree certain variables affect the likelihood of an individual to being in the sample (that is being married and within the labor force) in the first place (Hill, Griffiths, & Lim, 2008). Then a least squares regression is performed with wages being the dependent variable. The resulting standard errors will be somewhat larger than normal to account for the fact the inverse Mills ratio is an estimated variable as well.

For the part of the dataset containing men and single women a basic model of Mincerian quadratic earnings function will be used as base for the econometric model of this thesis since it has been shown by Palme & Wright (1994) that it renders virtually the same results as a more flexible functional form when it comes to rate of return to education in Sweden between the years of 1968-1991, except for when there is an interaction effect between formal schooling and working experience.

Once the rate of return to university education has been calculated for both years and for all groups the regression will be tested for the problems of homoscedasticity as well as omitted variables.

3.4 Data

3.4.1 Data used in the Ocular Inspection

The data on university enrollment for 1970 comes from several publications listed in the reference section from the National Central Bureau of Statistics published 1980-1995. Sometimes the numbers differ between the publications for observations over the same periods. Those with data that also matches other publications, such as Elgqvist-Salzman (1988), have been selected.

Unemployment rates and real wages have been drawn from statistical yearbooks ranging from 1971-1993 published by National Central Bureau of Statistics. Graph 5, which depicts the skill premium in Sweden in the years 1970-2002, has been taken from Domeij & Ljungqvist (2006).

3.4.2 Data used in the Regressions

Two censuses are available for the case of Sweden with regards to education, gender, age and earnings: Folk- och bostadsräkningen 1970 (FoB 70) and Folk- och bostadsräkningen 1990 (FoB 90). These provide the two cross-sectional datasets that are the basis for the calculations of the returns to education. The different ages in the datasets make it possible to control for the effect of work experience. Not including the effect of different years of work experience may result in potentially misleading results since women only really began to enter the labor market in earnest in the end of the 1950s and did not start to expand their participation rapidly until the 1970s (Ohlander & Strömberg, 2002; Elgqvist-Salzman, 1988; Statistics Sweden, 2004). In 1970 they thus had less work experience on average than men and since work experience has been observed to be highly correlated with wages this would give the impression of a too large wage gap.

1970

From Table1, which presents the descriptive statistics over the entire census from 1970, it can be seen that there were all in all 5 264 945 observations of men and women born in Sweden between the age 16 and 65. Women made up around 49% of the population. Out of the entire

population 33 % of the women were married or cohabiting and 23 % of the women had at least one child. Out of these only 5% had gone to university or similar, but only 1.5% of the population were, or had been, involved with master and phd studies. This number was even lower for women where only 2.6% had studied at university and only 0.4 % had studied at a higher level. The average years of experience for the entire population was 20.3.

As can be seen from Table 2 the mean wage was on average nearly three times higher for men than for women and median wages were five times higher, in 1970. For individual information on the two datasets see Tables 9 and 10, Appendix 1 for men and single women and Table 19, Appendix 2 for married and cohabiting women.

Table 1 Descriptive Statistics Over All Observations in 1970

All observations 1970	Observations	Mean/frequency	Std. Dev.	Min	Max
Fulltime Wage	5264945	7432.807	7850.497	0	1498273
Fulltime Wage if Employed	4008405	9762.816	7629.055	1.271186	1498273
University	5264945	0.051604	0.221226	0	1
Master, Phd	5264945	0.015586	0.123868	0	1
Experience, years	5264945	20.3457	14.47537	0	46
Women	5264945	0.494307	0.499968	0	1
Has Child	5264945	0.431231	0.495248	0	1
Married/ Cohabiting Women	5264945	0.32751	0.469305	0	1
Women with University	5264945	0.026415	0.160366	0	1
Women with Master, Phd	5264945	0.004472	0.066726	0	1
Women with Child	5264945	0.227802	0.419414	0	1

Source: Folk- och Bostadsräkningen 1970

Table 2 Full Time Wages for Men and Women in 1970

	N(wf)	Median (wf)	Mean (wf)
Men	2662444	10582.63	10767.28
Women	2602501	2604.237	4021.528

Source: Folk- och Bostadsräkningen 1970

1990

In the case of 1990 it can be seen from Table 3 that the number of Swedish born people of working age had decreased to 4 668 687 people. The proportion of women had increased very slightly to 49.7% of the population. The proportion of people who had gone to university or similar had increased massively from 5% to 19.5%, however the ones studying or having studied at a higher levels increased marginally to 1.6%. Average experience for the entire population had decreased from 20.3 years to 19.5 years, which would be an effect from the increased part of the population that had pursued higher education. A higher proportion of the population which chooses to study decrease years of experience because years that would have been spent accumulating working experience are spent accumulating knowledge.

In 1970 the married or cohabiting women made up 33% of the population and remained at virtually the same level (32%) in 1990. The number of people with at least one child had increased slightly. The proportion of women who had gone to university had increased from 2% to 10% which suggests that the increase of women with a university degree in working age had been larger than for men. However, only 0.6% of the women had studied at a higher level. The average and median fulltime wages had increased for both men and women. Even though they were still higher for men than women, see Table 4, the difference was much smaller in 1990.

For individual information on the two datasets see Tables 14 and 15, Appendix 1 for men and single women and Table 21, Appendix 2 for married and cohabiting women.

Table 3 Descriptive Statistics Over All Observations in 1990

All observations 1990					
	Observations	Mean/frequency	Std. Dev.	Min	Max
Fulltime Wage	4668687	10500.32	7569.603	0	1042367
Fulltime Wage if Employed	4317860	11353.47	7229.674	8.4246	1042367
Women	4668687	0.496996	0.499991	0	1
Married/Cohabiting Women	4668687	0.322773	0.467537	0	1

University	4668687	0.195422	0.396525	0	1
Experience	4668687	19.42957	13.83147	0	46
Master, PhD	4668687	0.01608	0.125783	0	1
Has Child	4668687	0.437339	0.496058	0	1
Women with Master, PhD	4668687	0.099935	0.299913	0	1
Women with Degree	4668687	0.00689	0.082718	0	1
Women with Child	4668687	0.225781	0.418096	0	1

Source: Folk- och Bostadsräkningen 1990

Table 4 Full Time Wages for Men and Women in 1990

	N(wf)	Median (wf)	Mean (wf)
Men	2348370	12990.73	12632.6
Women	2320317	8812.132	8342.262

Source: Folk- och Bostadsräkningen 1990

3.5 Pitfalls in Measuring Returns to Education

When constructing the model, there are several potential pitfalls that must be adjusted for. Common pitfalls in the measurement of returns to education are selection bias, omitted variable bias and random error in the measurement of schooling. Kazamaki Ottersten et al. (1994) conclude that omitted variables, especially in the case of social capital can have a great effect on earnings. However, this is hard to measure and with the restrictions of data it will not be possible to include social capital in this thesis. There are a number of other unobservable attributes, which also seem to be strongly correlated to education and wages and together they result in most models estimating returns to education suffering from omitted variable bias (Kazamaki Ottersten et al., 1994; Arai & Kjellström, 2001).

There are a number of biases that can be present in the estimated coefficients when using Ordinary Least Squares (OLS) if one is only able to see the wages of people who are working. The problem is especially severe when it comes to women because as previously mentioned married or cohabiting women have a choice as to whether or not to participate in the labor market (Arai & Kjellström, 2001). The probability of them entering the labor market must therefore be taken into account, as is done using the Heckit approach in this thesis. Since the data is census data it also contains observations of those who do not work which reduces the

impact of those problems. Other possible problems discussed in the literature is the endogeneity of schooling (Arai & Kjellström, 2001) and bias from only studying young people for which the ability has greater importance (Cawley, Heckman, & Vytlačil, 1998). These last problems are not an issue in this particular study since even though the individuals are observed at the same point in time they have different ages.

3.6 Limitations to the Model

What level of wages a person receives is, as mentioned in the theoretical framework, highly correlated with their chosen fields of study (Ljunglöf, 2011; Sloane & O'Leary, 2004). The distinction between different fields of study will not be considered here. Since the purpose of this thesis is to look at general enrollment rates for men and women, not that of particular educational degrees, and wage premiums only the potential differences caused by gender will be treated in this thesis.

Naturally, enrolling in university does not necessarily mean that a person will graduate. A person dropping out after two years face very different returns to education compared to a person who graduates with a degree. The distinction between people who have studied a few years in university without getting a degree and people who have graduated will not be analyzed in this study. This is partly due to limitations to the data, but it has also been observed in previous studies that at the moment a person chooses to enroll they believe they will graduate (Altonji, 1991). They are therefore motivated by the returns to education or employability they expect to have as graduates thus only those who have obtained a degree will therefore be considered in the computations of returns to education.

The type of degree (Bachelor, Master or PhD) also has effects on the returns to education as can be seen from Ljunglöf (2011) and Sloane & O'Leary (2004). This *will*, as previously mentioned, be considered in this thesis through the use of a dummy variable.

In summary the limitations to the model is as follows:

- A person enrolled in university education is assumed to graduate.
- Only the effect of university education overall and in higher levels will be examined regardless of fields of study.
- Only individuals born in Sweden will be included.

3.7 The Estimated Model

The traditional, or Mincerian, formulation of the human capital equation looks like this:

$$\ln y_i = \ln y_0 + \beta_1 s_i + \beta_2 x_i + \beta_3 x_i^2 + \varepsilon_i$$

where y is wages, s equals schooling, x stands for experience and ε stands for the random error term.

Extending this model based on theoretical framework already presented in order to account for potential gender differences and with respect to the constraints put up by the dataset as previously described in the Methods concerning Regressions section renders the model:

$$\ln y_i = \ln y_0 + \delta_1 u_i + \beta_2 x_i + \beta_3 x_i^2 + \delta_1 f_i + \delta_2 c_i + \delta_3 f x_i + \delta_4 f x_i^2 + \delta_5 f u_i + \delta_6 d_i + \varepsilon_i$$

where y is wages, u equals university, x stands for experience, f stands for female, c stands for children, fx stands for the effects of experience when the individual is female, fx^2 is the effects of experience squared when female, fu is the effect of a university degree for a female person on wages, d represents the effect of continuing with master and phd studies after obtaining one degree and ε stands for the random error term.

In the dataset that consisted of only married women the interaction variables that accounted for the effect of being female were, naturally, excluded. The Heckit method requires an additional probit model that defines certain variables effect on the probability of being in the workforce. Here the variables age, university and child were selected.

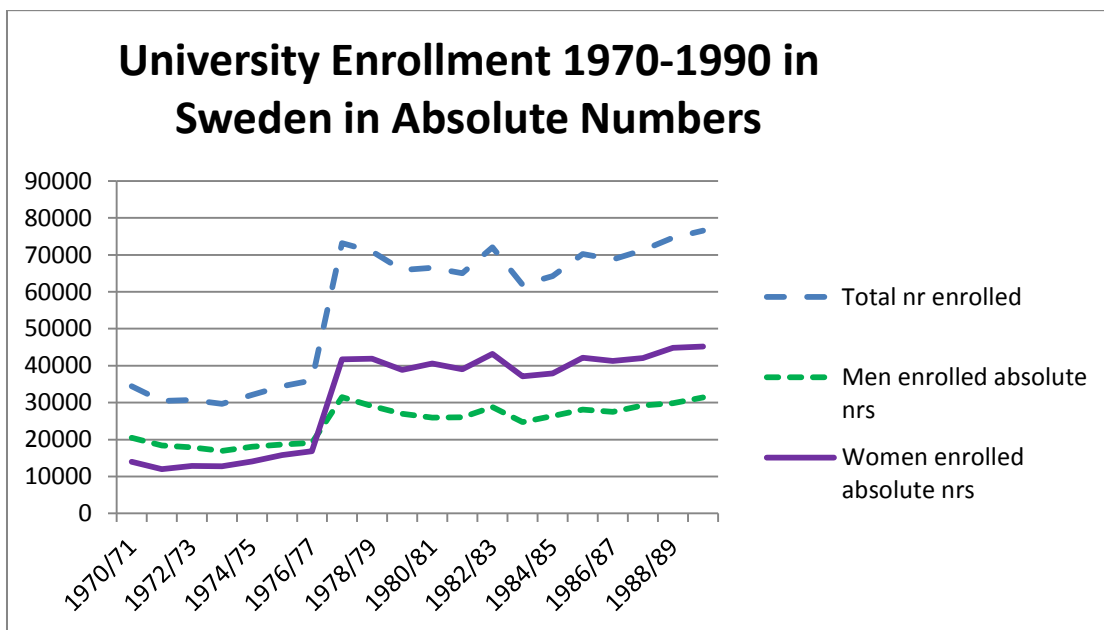
4. Results

4.1 Results of the Ocular Inspection

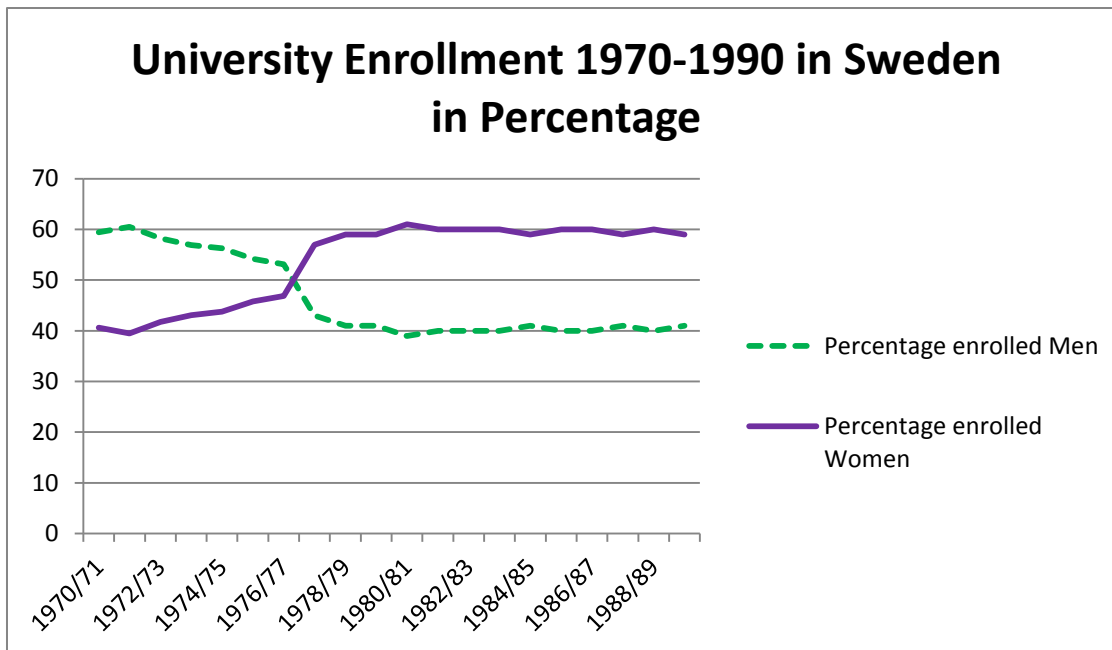
4.1.1 University Enrollment- an ocular inspection

Looking at Graph 2 which depicts the changes of university enrollment of new students between the years 1970-1990 it can be seen that there is a significant kink in the curve for

year 1977. After this year the enrollment rates of both men and women continue at a permanently higher level. This is also the year when female enrollment surpasses male. However, already before 1977 the female enrollment rate is increasing faster than male enrollment, something that is even more clear in Graph 3 (Graph 3 was also presented as Graph 1 in the introduction). Here it can be seen that female enrollment rates relative to male pick up speed already in 1973 and keep increasing at a higher pace up until 1977 where it jumps to a permanently higher level. After 1982 up to 1990 the proportion of men and women enrolled in university in Sweden appears to be essentially unchanged and women have continuously higher enrollment rates than men.



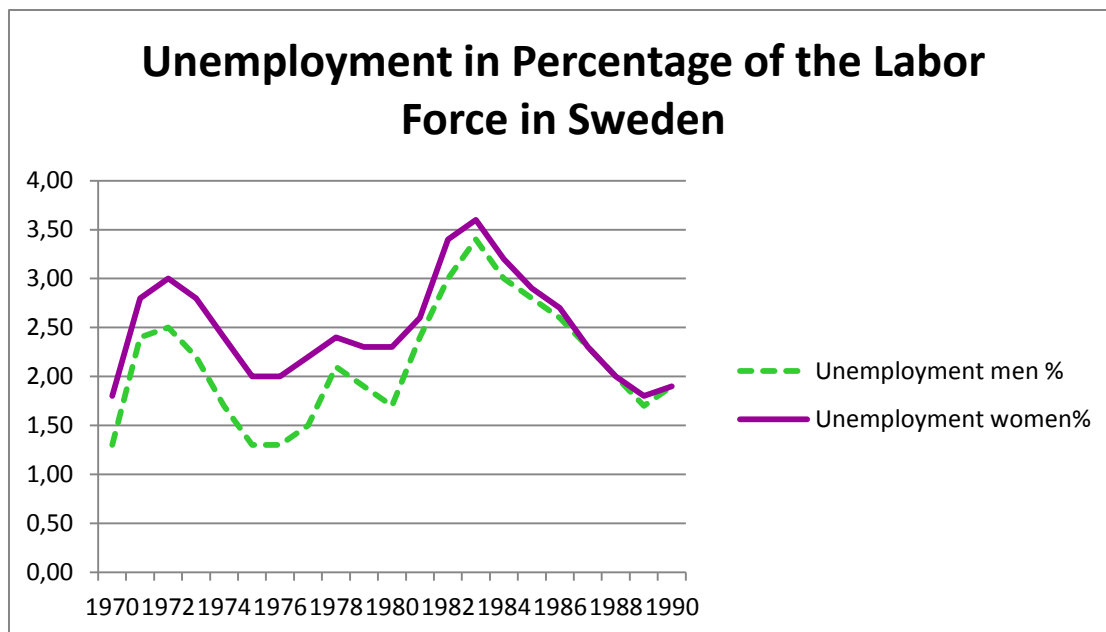
Graph 2 University Enrollment in Sweden 1970-1990 in Absolute Numbers for Men and Women (Source of data: National Central Bureau of Statistics)



Graph 3 (1) University Enrollment 1970-1990 in Sweden in Percentage of Total Number Enrolled (Source of data: National Central Bureau of Statistics)

4.1.2 Unemployment rates- an ocular inspection

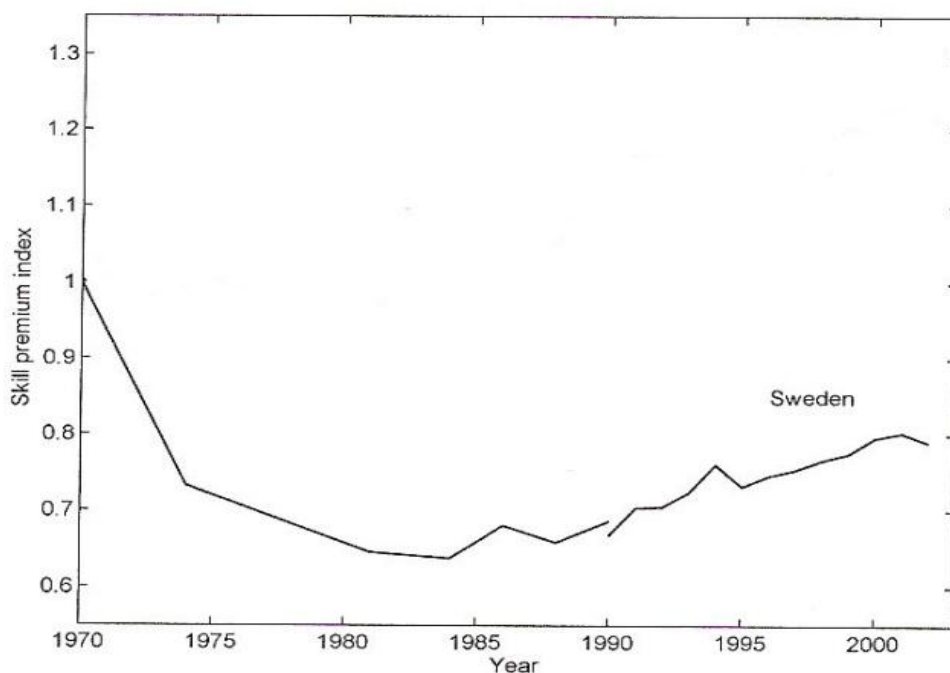
Looking at the unemployment rates from 1970-1990 displayed in Graph 4 it is apparent that the female unemployment rate was higher than for men all the way up to 1987 when it converged to the same rate as the male unemployment rate. The difference is quite small, but then the entire unemployment is just a few percentage. It is interesting to note that the gap was at its largest around the same time that female enrollment rate to university started to increase relative to male. This might imply that women increased their enrollment into university partly as a mean of sustenance and perhaps also to improve their chances of entering the labor market after their studies were completed. Increased employability as well as the possibility to provide for oneself would serve as financial incentives to increase educational attainment even at low skill premiums. Since the female unemployment rates were higher until 1987, women would have higher incentives to enroll in university if their decision was solely based on the unemployment rates. Still, from the 1980s the difference between male and female unemployment rates were very small and yet the proportion of newly registered students that were women remained at 60%.



Graph 4 Unemployment Rates for Men and Women in Sweden 1970-1990- at a closer look (Source of data: National Central Bureau of Statistics)

4.1.3 General Skill Premium between 1970 and 1990- An Ocular Inspection

Graph 5, taken from (Domeij & Ljungqvist, 2006) depicts the general skill premium using an index. The skill premium to education in the private sector in 1970 constitutes one in the index and the development of the skill premium in Sweden during the years 1971-2002 is displayed in proportion to the skill premium in 1970. From this we can deduct that the wage premium to education decreased continuously from 1970 to the beginning of the 1980s, which is the same pattern of increased educational attainment in the labor force and decreased demand for skilled labor described in Palme & Wright (1994) and Stanfors (2006). In 1990 it had increased slightly, but remained at a level well below the premium in 1970. This means that university enrollment in Sweden increased in general and for women in particular during the part of the period where the average wage premium was at its lowest. If women's skill premium followed that of the general skill premium this would imply that women enrolled in university despite lower returns to education. The lower wage premiums may of course also have been an effect of more people entering into university thus causing an increased supply of skilled labor. Nevertheless, it should have worked towards a decrease in enrollment rates.



Graph 6 Skill Premium in Sweden for Men and Women 1970-2002 (Source: Domeij & Ljungqvist (2006))

Unemployment rates and political reforms may thus to a large degree account for the rise in female enrollment rates, but not why it remained at a continuously higher level from 1978 all the way to 1990. From the curve depicting the changes in skill premium it would seem that female enrollment rates started to increase at the same time as skill premium started to decline. It has been observed in several studies that men and women have different skill premiums. The increased female enrollment rate was described as at least partly a result of higher wage premium for women (Goldin, Katz, & Kuziemko, 2006). If this was the case also for Sweden in 1970-1990 that might explain the radical shift and sustained higher levels of female enrollment rates. Relatively higher returns to education for women from the beginning of the 1970s and onwards this would be in line with the observed changes in university enrollment rates.

4.2 Results of Regressions

The regression of the census from 1970 shows the state of things at the beginning of the selected time period when male enrollment rates were higher than female enrollment rates. The dataset of 1990 tests the contribution of the explanatory variables on wages at the end of the time period when the changes in enrollment rates had taken place and the higher female enrollment rates had been sustained for several years.

The null-hypotheses for the regressions of both datasets are that none of the explanatory variables can account for the variation in wages.

4.2.1 The Year of 1970
Men and Single Women

The results from the regression are displayed in Table 11, Appendix 1. When testing for heteroscedasticity using the Breusch-Pagan test where the null hypothesis is that the variance does not vary with wage, which means that there is homoscedasticity. It can be seen that the null hypothesis must be rejected, in other words there is heteroscedasticity present in the model (see Table 12 Appendix 1). There are several ways to deal with heteroscedasticity. Since the main problem of heteroscedasticity is the effect it has on the standard errors the problem has been taken care of here by redoing the regression with robust standard errors, see Table 5. The estimated coefficients do not change, but the standard errors become slightly smaller which changes the probability to reject or not reject the null-hypothesis.

Table 5 Regression on logged Wages for Men and Single Women Using Robust Standard Errors in 1970

Men and Single Women 1970 Robust Standard Errors		
	Est.Coefficients	Std Errors
University	0.535***	(0.002)
Female	-0.145***	(0.001)
Experience	0.058***	(0.000)
Experience squared	-0.001***	(0.000)
Child	0.161***	(0.001)
Master, PhD	0.349***	(0.003)
Female Experience	-0.004***	(0.000)
Female Experience squared	-0.000***	(0.000)

Female University	-0.022***	(0.003)
Female with Master, PhD	-0.028***	(0.007)
Female with Child	-0.324***	(0.002)
Constant	8.637***	(0.001)
R-squared	0.306	
N	2920895	
* p<0.05, ** p<0.01, *** p<0.001		

Source: Folk- och Bostadsräkningen 1970

From Table 5 it can be deduced that the null-hypothesis can be rejected for all the tested significance levels. All the explanatory variables are statistically significant at the 0.01 level. Being female had a small negative effect on wages in 1970. Having attended university and/or having continued studying at a higher level had a positive effect on wages in general. If the individual was female the effect of attending university was slightly smaller (0.513 instead of 0.535), but it is still strongly positive. The positive effects of having one more year of experience was smaller than that of having attended university. Having at least one child seems to have had a generally positive effect on wages, but when controlling for being female the opposite is evident.

The positive effect observed for men might actually reflect age more than having a child. People usually have children when they are older which means that they have had time to accumulate more work experience and therefore tend to earn higher wages. It should also be kept in mind that female in this case actually means female and single while both single and cohabiting or married men have been included in the dataset. This may to some degree explain why having at least one child has such a negative effect for women's wages compared to for men. At this time women were responsible for taking care of their children and although the child care was increased in the 1960s single women still had to run the household.

The size of the betas are generally small which implies that the economic significance of the variables is small, however even slim differences cumulate to large discrepancies over time, especially when it comes to wages (Ljunglöf & Pokarzhevskaya, 2009).

The R^2 lies at 0.306 which is quite good for this rather limited model. It is likely that the model suffers from omitted variable bias, a common problem in estimating returns to education that has been pointed to in the literature by for example Kazamaki Ottersten et al. (1994) due to the many unobservable variables that affect wages. Omitted variable bias is a problem since it may change the signs and size of the estimated coefficients in the regression (Hill, Griffiths, & Lim, 2008). Checking for omitted variable bias using the Ramsey RESET test the results of which are displayed in Table 13, Appendix 1 it is apparent that the model does indeed suffer from omitted variable bias. The restrictions to the dataset do however constrict the possibilities to extend the model further. The size of the estimated coefficients and the direction of the variables effects are in line with theory and previous research so although the potential bias should be kept in mind, the analysis will be continued.

Married Women

As previously mentioned married and cohabiting women have a choice whether to join the labor force or not. For reasons of comparison a least squares regression of the married women in Sweden in 1970 are shown in Table 20, Appendix 2. The results from adjusting for the choice that married or cohabiting women have in terms of entering the labor market or being provided for by their husbands using the Heckit method are displayed in Table 7. Firstly, the estimated coefficient of the inverse Mills ratio is statistically significant at the 0.001 level which implies that there is indeed a selection bias in the least squares regression and that the results estimated in the Heckit model rather than those estimated by the least squares regression should be used.

Looking at the coefficients estimated in the Heckit model it can be seen that years of experience have less of an impact on wages for married and cohabiting women than for men and single women. Having gone to university as well as having continued studying at master or phd levels, on the other hand, have very strong effects on wages for married/ cohabiting women. University studies actually have stronger positive effects on wages for married women than for any other group. Having gone to university also has a strong positive effect on the probability of being in the workforce as it can be seen from the probit estimation part

of the model outlined in bold italics in Table 7. Children seem to have a negative effect both on the probability of being in the workforce and on wages. Age has a negative effect on the probability of being in the workforce implying that married women may choose to retire earlier or that older married women were part of a generation when women withdrew from the labor force after marriage.

Table 6 Regression on logged Wages for Married or Cohabiting Women in 1970 Using the Heckit Method

Married Women 1970 Heckman		
	Est.Coefficients	Std Errors
ln_wf		
University	1.624***	(0.057)
Experience	0.026***	(0.001)
Experience squared	-0.001***	(0.000)
Master, PhD	0.481***	(0.019)
Child	-0.899***	(0.027)
Constant	7.351***	(0.063)
Select		
<i>Age</i>	<i>-0.013***</i>	<i>(0.000)</i>
<i>University</i>	<i>0.802***</i>	<i>(0.005)</i>
<i>Child</i>	<i>-0.299***</i>	<i>(0.002)</i>
<i>Constant</i>	<i>1.006***</i>	<i>(0.005)</i>
<i>Mills</i>		
<i>Lambda</i>	<i>2.495***</i>	<i>(0.167)</i>

R-squared		
N	1724320	
* p<0.05, ** p<0.01,*** p<0.001		

Source: Folk- och Bostadsräkningen 1970

4.2.2 The Year of 1990

Men and Single Women

The same model was applied for the data from 1990 as for 1970 and the results from the regression of men and single women in 1990 are displayed in Table 7. After finding heteroscedasticity in the 1990 model, see Tables 16 and 17 in Appendix 1, the regression was performed again, this time with robust standard errors. The resulting estimated coefficients and standard errors are displayed in Table 7.

As can be seen from this table all explanatory variables are statistically significant at the 0.01 level. The effects of having gone to university or continuing with higher levels of education have decreased for both men and women. The adverse effect for single women who had studied at university is virtually unchanged in 1990, but the negative effect on returns to higher levels of university education for women is stronger in 1990. This would imply that although women have relatively lower returns to continuing with master and PhD studies, the returns to education on a bachelor level are practically unchanged.

Having a child still had a negative effect for single women, even more so than in 1970, but in 1990 it is also negative for men. Experience has a stronger positive effect in 1990 than it had in 1970 to experience as men.

Table 7 Regression on logged Wages for Men and Single Women in 1990 Using Robust Standard Errors in 1990

Men and Single Women Robust Standard Errors 1990		
	Est.Coefficients	Std Errors
University	0.379***	(0.001)
Female	-0.111***	(0.003)

Experience	0.135***	(0.000)
Experience squared	-0.003***	(0.000)
Child	-0.207***	(0.001)
Master, Phd	0.234***	(0.003)
Female Experience	-0.003***	(0.000)
Female Experience squared	-0.000***	(0.000)
Female University	-0.021***	(0.003)
Female with Child	-0.431***	(0.003)
Female with Master, Phd	-0.042***	(0.009)
Constant	8.167***	(0.002)
R-squared	0.378	
N	2933261	
* p<0.05, ** p<0.01,	*** p<0.001	

Source: Folk- och Bostadsräkningen 1990

The R^2 is higher for the dataset in 1990, 0.378 instead of 0.306, which indicates that the variables included in the model is a better fit to explain differences in wages in 1990 than in 1970. However, the model still suffers from omitted variable bias, as can be seen from the Ramsey RESET displayed in Table 18, Appendix 1. Once again this probably results from the many unobservable traits and circumstances that influences an individual's wage. Since the estimated coefficients look reasonable the analysis will be continued.

Married Women

The inverse Mills ratio is still statistically significant at the 0.01 significance level, as were all the other explanatory variables. Looking at the estimated coefficients in the Heckman model of married or cohabiting Swedish born women in 1990 displayed in Table 8 they differ a lot from those of 1970. Returns to university education is much lower for married or cohabiting women in 1990 compared to 1970, which is consistent with the decreasing rates of return observed for men and single women. So is the increased importance of experience in 1990 compared to 1970 although the estimated coefficients on the importance of experience are still very small.

The returns to continue with studies on master and phd levels for married and cohabiting women surpasses that of just having gone to university in 1990 which would imply that married and cohabiting women gain more on having continued their education in 1990 than they did in 1970. The negative effect on both wages and probability of being in the labor force from having at least one child has decreased substantially in 1990 compared to 1970 which might be due to improved child care and changed expectations of time allocation between men and women. The wage disadvantage from having a child decreased more substantially for married and cohabiting women than for single women.

Having attended university still has the largest positive effect on the probability of being in the labor force although not to the same degree as it had in 1970 while the negative effect of increasing age is stronger in 1990.

Table 8 Regression on logged Wages for Married and Cohabiting Women in 1990 Using the Heckit Approach

Married Women 1990 Heckman		
	Est. Coefficients	Std Errors
ln_wf		
University	0.237***	(0.005)
Experience	0.039***	(0.001)

Experience squared	-0.001***	(0.000)
Master, Phd	0.302***	(0.011)
Child	-0.193***	(0.004)
Constant	8.768***	(0.005)
Select		
<i>Age</i>	<i>-0.061***</i>	(0.000)
<i>University</i>	<i>0.663***</i>	(0.006)
<i>Child</i>	<i>-0.097***</i>	(0.005)
Constant	4.294***	(0.013)
Mills		
Lambda	-1.709***	(0.060)
R-squared		
N	1506924	
* p<0.05, ** p<0.01,*** p<0.001		

Source: Folk- och Bostadsräkningen 1970

4.3 Summary of Main Findings

The female university enrollment rates started to increase faster than male enrollment rates in the beginning of the 1970s. With the reform in 1977 two main changes took place in terms of enrollment rates: the total enrollment rate increased massively and the female enrollment rates overtook male rates, a trend that lasted throughout the period.

The general skill premium decreased from 1971 all the way into the 1980s, that is to say, during the same years that female enrollment increased. For the same years female unemployment remained higher than male. While the different educational reforms and the

higher unemployment rates for women probably to a great deal increased female enrollment rates and helped cause the jump in 1977, they cannot account for why women continued to make up a majority of students enrolling in university education for the rest of time period. A relatively higher skill premium for women would.

Estimating the returns to education in 1970 and 1990 using regressions it was found that all the explanatory variables were statistically significant at the 0.01 level for all regressions. In the case of men and single women the model suffered from omitted variable bias for both years. To adjust for this, regressions with robust standard errors were performed. For married and cohabiting women the inverse Mills ratio was statistically significant at the 0.001 level for both years which implies that the coefficients estimated in the Heckit method rather than those estimated by the least squares regression should be used.

In 1990 the returns to university education had decreased for both men and women. The adverse effect on wages for single women who had studied at university level is virtually unchanged in 1990, but for higher levels of university education the negative effect on returns to for single women is even stronger in 1990.

Having a child still had a stronger negative effect for single women in 1990 and in 1990 it is also negative for men. Years of experience have stronger positive effects in 1990 than it had in 1970 for both men and single women, but it is still quite small. The same goes for married and cohabiting women the results of which in 1990 differ a lot from those of 1970. In some cases they are also different from the results for single women in 1990. The negative effect of having at least one child was much weaker in 1990, especially on the probability of being in the labor force. Having attended university still had the largest positive effect for the probability of being in the workforce in 1990.

While lower returns to university education is consistent with the changes observed for men and single women, the returns to studying at higher levels for married and cohabiting women increased so that in 1990 they surpassed that of having gone to university. This implies that married and cohabiting women had higher returns on master and phd studies than they did in 1970 and also higher returns than single women in 1990. Except for the case of married and cohabiting women in 1970 the female wage premiums to education remained lower than those for men for all groups.

5. Analysis

The purpose of this thesis was to determine the causes of the change in and sustained higher levels of female university enrollment rate during the time period of 1970-1990 in Sweden.

That education increase wages is predicted by the human capital theory and shown in several studies. However, women tend to have lower average wages than men whether they have university education or not. This is also in the case of Sweden between the years of 1970 and 1990. Even if the wage gap decreases over the period the median and average wage remains substantially higher for men. There are many theories as to why these difference in wages between male and female exist. According to some theories it is due to discrimination either by taste, for statistical reasons or due to preconceived misconceptions. Others state that sociological factors not only cause discrimination of women, but make women self-select into fields of work and study within fields that lead to lower future wages (Stanfors, 2006; Woolley, 1995; Leathwood, 2005; Voutilainen, 2010; Ferber & Lowry, 1995). Regardless if the lower wages are due to women being discriminated or to them self-selecting into sectors where wages are lower, several studies have shown that both university education in terms of fields of study and the labor market are highly gender segregated in a number of countries including Sweden (Stanfors, 2006; Elgqvist-Salzman, 1988).

Despite this, from the results of the regression for the years 1970 and 1990 presented in this thesis education seems to lead to higher wages in absolute terms for all parts of the population throughout the time period. Rational people would therefore enroll in university education if they were given the possibility. As reforms made it easier for people to enter the university both financially and geographically the enrollment rates should therefore increase, which was also what could be seen empirically where the proportion of working age population with university education increased significantly during the time period, especially in the case of women. This is logical seeing as the total enrollment rates increased during the period in general and for women in particular. That enrollment rates increased was a logical response to the positive returns to education, but why did it increase more for men than women when the average wage premiums to education were lower for women?

Increased enrollment rates in general and for women in particular is not unique for Sweden. Many countries have seen female university enrollment rates overtaking male. In Sweden these changes took place in the 1970s, particularly in the years leading up to and including 1977 when a major university reform took place that increased the possibilities to enter into university.

Financial incentives, most often in terms of returns to education, as well as changed expectations of working time are usually referred to as driving forces behind increased enrollment rates. According to the human capital theory university education is an investment and the incentives for this investment works much in the same way other forms of investments do which means that individuals will try to maximize their returns. People belonging to a group with relatively higher returns to education will therefore engage in university education to a higher degree (Becker, 1975).

Based on this logic women should only have increased and sustained their higher enrollment rate if their wage premiums to education were higher relative to men. Even if the actual wages after university are lower for women they might still be substantially higher than for women without education. The difference may be larger than between men with and without education. In several studies it has been found that higher wage premiums for women caused the changes in the gender distribution within university education.

The hypothesis at the outset of this study was therefore that women increased and maintained a higher university enrollment rate because they had higher returns to education than men. Since more men than women were enrolled in university in 1970, the difference between the genders in terms of returns to education should be present in the results from 1990 rather than in 1970.

The results from the regressions are therefore somewhat surprising. Single women had significantly lower wage premiums to education than men in both years. Only in 1970 did married and cohabiting women display higher returns to university education than men. In 1990 married and cohabiting women still had higher returns to education than single women, but lower than men. However, in 1990 married and cohabiting women had higher returns to university education at higher levels. For single women returns to education were lower throughout the period. The higher returns to overall university studies for married women

may simply reflect the higher propensity for married women with university degree to be in the labor force at all. High returns to education for individual women could motivate these to stay in the labor force even after marriage. The question is whether these potential higher returns affected women's choice to go to university ex ante?

Since the real change takes place in the middle of the time period the outcome of the regressions may not display the reasons for the change accurately. It is possible that in the years leading up to 1977 the returns to education for women might have been larger than those of men and this difference may then change until the end of the time period. On the other hand the idea that female returns to education would make a jump in the years leading up to 1977 seems illogical, especially since demand for skilled labor and indeed the general skill premium decreased at the same period and the disadvantage for single women is virtually unchanged.

The answer to whether higher wage premiums affected the increased enrollment rates hence depends on whether women choosing to go on to university went into sectors where high returns to education could be expected after graduating, thus reaping the benefits displayed in the case of married women or not. From the literature we know that women did tend to move into traditionally male dominated fields of study with higher returns to education to a larger degree in the 1970s, but that the university still remained a highly gender segregated institution. The increased number of women moving into traditionally male dominated areas with higher returns to education would imply that they took future returns to education into account while the continuous domination of women in disciplines with lower skill premiums suggests that they did not. The female enrollment rate remained high even though returns to education overall, and especially for women, decreased. This would imply that wage premiums did not have a high impact.

However, the median, average and maximum wages for women increased which is probably both a result of women entering the labor market to a larger extent and having more years of experience. This combined with the continuously positive wage premiums to education also provides increased incentives to enroll in university for those that are motivated by higher wages. Extended possibilities of child care would also increase both the perceived and actual possibilities of women to have both a career and family which would also raise their expectations of time spent in the labor force. That having children became less of a

disadvantage for women can be seen in the results from the regressions where having at least one child has a much weaker negative effect for women in 1990 both on wages and on the probability of being in the labor market.

All in all returns to education decrease from 1970-1990 as the skilled part of the labor force increases and wages become more equal between men and women. The rising wage equality can have come from women moving into traditionally male dominated sectors where returns to education were higher. It can also have been affected by the wage compressing policies imposed by the government since it helped keep sectors at around the same wage level whether they were male or female dominated.

Not only the increased child care raised women's access to the labor market and the university. There were several educational reforms in Sweden in the 1960s and 70s, not just concerning university education, but also to primary and secondary school. The combined effects of all these changes was that it became easier to get accepted to high school, especially for women, compared to previous years. With the reform of 1977 it also became easier to get enrolled in university.

Student grants and loans turned university studies into a means of sustenance just as much as an actual investment. Since the unemployment rate was higher for women for a larger part of the period this would create an incentive for women to enroll in order to be able to make a living. This effect should be even more important from the 1970s and onwards when women wanted to, and in some way were expected to, be able to provide for themselves. The combination of these policies and the sustained higher unemployment rate for women would also reduce the opportunity cost for women to continue with university education which is an incentive in itself. Part of the key to women's higher percentage participation in university studies lies in that when women increased their enrollment rates, men did not. Why? Men would still have higher relative returns to education than women. Perhaps since their average wages were higher and their unemployment rates lower their opportunity cost in terms of foregone earnings during the years of study would have been higher. This may to some degree explain why men did not increase their enrollment rates to the same degree as women after the 1977 reform even though they had the same possibilities as women to do so.

When it comes to societal changes it is often hard to pinpoint one specific factor as the catalyst. So also in the case of the increase and sustained higher share of women enrolled in university in Sweden. Although the pattern in Sweden is similar to other countries, the reasons behind it differ which goes to show that it is hard to discern between financial, political and behavioral changes and that it is impossible to understand the mechanics behind a societal change without considering the contemporary sociological and political context. The explanation to why female enrollment surpassed male in the 1970s probably lies, to a large degree, in the unique and generous characteristics of the Swedish educational system when it comes to university studies, as well as sociological and cultural changes. This combined with the possibility of higher wage premiums is likely to have affected the enrollment rates. This is in line with theory where higher expectations of future work and wages have been found to be important for the female enrollment by for example Goldin, Katz, & Kuziemko (2006).

Since the reasons behind increased university enrollment appears so contextual it is hard to formulate policy implications. An encouraging deduction which can be made from the Swedish case is that political reforms can have larger impacts than those set by the market. Increasing the ability for people to enter high school and subsequently university both in terms of actual student intake as well as in terms of financial support seems to have a strong positive effect on female enrollment. Increased possibility to enter university actually increased enrollment rates regardless of gender despite decreasing actual returns to education.

As for wage compression policies, their purpose was hardly to reduce the gender based wage gap or female enrollment rates, indeed a more plausible result would have been a general decrease in university education, but this is not what can be observed from the data. Both female and male enrollment increased despite these policies which would imply that accessibility financially and physically to university education has, so long as there actually are some positive returns to education, a stronger effect.

6. Conclusions

It can be concluded that there were several important factors, including the wage premiums behind the increasing female university enrollment rates relative to male in Sweden in the time period 1970-1990. The wage premium for single women was lower for both years. Married and cohabiting women, on the other hand, had higher wage premiums than men in 1970. This probably has something to do with the probability of married and cohabiting women being on the labor market in the first place. The propensity for women to continue working after marriage is strongly related to them having a university degree, thus higher wages than women in general.

In 1990 returns to education had decreased for all groups. At this time university education was still an important determinant for whether or not married and cohabiting women worked or not, but the wage premiums were lower than for men at this time. Experience and higher levels of study had become more important. One reason to why the returns to education for married and cohabiting women decreased could be that women's probability of being in the labor force was less dependent on her potential earnings. This would lead to women working in fields with less returns to education continuing to work as well which brings down the average returns to education.

The wage premium, although lower, remained positive in 1990. This would provide all individuals in the labor force with incentives to continue to university studies, yet although both men and women increase their enrollment rates, women do so to a much higher degree. Either the potential higher wage premiums displayed in the case of married women were the cause of this or factors other than wage premiums affected enrollment rates. It is hard to determine whether or not higher wage premiums in certain fields did inspire women to go on to university. While it can be deduced from the literature that women did increase their participation within traditionally male dominated areas where skill premiums were higher, they also increased their involvement in areas with low skill premiums.

It is always hard to point to just one factor as the cause behind large, societal changes. Most likely wage premiums had some effect, but other changes such as political and economic reforms as well as unemployment rates probably also played an important part.

The reform that strongest affected enrollment rates appears to be the university reform in 1977 which makes sense as it involved a transfer of several female dominated fields of study into universities instead of other forms of tertiary education. However, since the percentage increase of female enrollment began before that reform it must be concluded that other changes such as expectations of future employment, unemployment rates and other political changes such as the creation of student loans and grants and the extension of childcare probably also had effects. The policy implications are hence to increase accessibility both in terms of financial support and number of receivable students if the goal is to increase university enrollment.

Suggestions for future research are to look deeper into the effects of the non-financial changes pointed to here and to closer study the dynamics of the year to year changes in skill premium and enrollment rates for men and women respectively. A more extensive model including the effects of being born outside of Sweden would also be of interest.

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Appendix 1

Men and Single Women

1970

Table 9 Descriptive Statistics Over Men and Single Women in 1970

Men and Single Women 1970	Observations	Mean/frequency	Std. Dev.	Min	Max
Fulltime Wage	3540625	9349.289	8420.074	0	1498273
Fulltime Wage if Employed	2920892	11332.95	7966.143	1.271186	1498273
University	3540625	0.049404	0.216711	0	1
Master, PhD	3540625	0.018645	0.135268	0	1
Experience	3540625	18.85573	15.06934	0	46
Women	3540625	0.24803	0.431869	0	1
Has Child	3540625	0.365725	0.481633	0	1
Women with University	3540625	0.0119482	0.1086527	0	1
Women with Master, PhD	3540625	0.0021186	0.045979	0	1
Women with Children	3540625	0.0632236	0.2433647	0	1

Source: Folk- och Bostadsräkningen 1970

Table 10 Full Time Wages Men and Single Women in 1970

	N(wf)	Median (wf)	Mean(wf)
Men	2662444	10582.63	10767.28
Women	878 181	4342.796	5050.25

Source: Folk- och Bostadsräkningen 1970

Table 11 Regression on logged Wages Using Normal Standard Errors on Men and Single Women in 1970

Men and Single Women 1970		
	Est.Coefficients	Std Errors
University	0.535***	(0.002)
Female	-0.145***	(0.002)
Experience	0.058***	(0.000)
Experience squared	-0.001***	(0.000)
Child	0.161***	(0.001)

Master, Phd	0.349***	(0.003)
Female Experience	-0.004***	(0.000)
Female Experience squared	-0.000***	(0.000)
Female University	-0.022***	(0.004)
Female with Master, PhD	-0.028***	(0.008)
Female with Child	-0.324***	(0.002)
Constant	8.637***	(0.001)
R-squared	0.306	
N	2920895	
* p<0.05, ** p<0.01, *** p<0.001		

Source: Folk- och Bostadsräkningen 1970

Table 12 Heteroscedasticity Test Men and Single Women in 1970

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of ln_wf

chi2(1) = 12583.10
Prob > chi2 = 0.0000

Table 13 Test for Omitted Variables on Regression on Men and Single Women in 1970

Ramsey RESET test using powers of the fitted values of ln_wf
Ho: model has no omitted variables
F(3, 2920880) = 10224.50
Prob > F = 0.0000

1990

Table 14 Descriptive Statistics Over Men and Single Women in 1990

Men and Single Women 1990						
	Observations	Mean/frequency	Std. Dev.	Min	Max	Median
Fulltime Wage	3161763	11254.21	8389.159	0	1042367	3161763
Fulltime Wage if	2933261	12130,91	8076.213	8.4246	1042367	2933261

Employed						
University	3161763	0.257259	0.437124	0	1	
Master, PhD	3161763	0.182875	0.386564	0	1	
Experience	3161763	17.91575	14.22161	0	46	
Women	3161763	0.016311	0.126669	0	1	
Has Child	3161763	0.4092078	0.491688	0	1	
Women with University	3161763	0.0418779	0.20031	0	1	
Women with Master, PhD	3161763	0.0027409	0.052282	0	1	
Women with Child	3161763	0.0306218	0.172291	0	1	

Source: Folk- och Bostadsräkningen 1990

Table 15 Full Time Wages Men and Single Women in 1990

Men and Single Women 1990	N(wf)	Median (wf)	Mean(wf)
Men	2348370	12990.73	12632.6
Women	813393	7497.894	7274.624

Source: Folk- och Bostadsräkningen 1990

Table 16 Regression on logged Wages Using Normal Standard Errors on Men and Single Women in 1990

Men and Single Women 1990 Normal Standard Errors		
	Est.Coefficients	Std Errors
University	0.379***	(0.002)
Female	-0.111***	(0.002)
Experience	0.135***	(0.000)
Experience squared	-0.003***	(0.000)
Children	-0.207***	(0.001)
Master, Phd	0.234***	(0.004)
Female Experience	-0.003***	(0.000)
Female Experience squared	-0.000***	(0.000)
Female University	-0.021***	(0.003)
Female with Child	-0.431***	(0.003)
Female with Master, Phd	-0.042***	(0.011)
Constant	8.167***	(0.001)

R-squared	0.378	
N	2933261	
* p<0.05, ** p<0.01, *** p<0.001		

Source: Folk- och Bostadsräkningen 1990

Table 17 Heteroscedasticity Test Men and Single Women in 1990

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
 Ho: Constant variance
 Variables: fitted values of ln_wf
 chi2(1) = 346770.18
 Prob > chi2 = 0.0000

Table 18 Test for Omitted Variables on Regression on Men and Single Women in 1990

Ramsey RESET test using powers of the fitted values of ln_wf
 Ho: model has no omitted variables
 F(3, 2933246) = 84402.57
 Prob > F = 0.0000

Appendix 2

Married Women

1970

Table 19 Descriptive Statistics On Married and Cohabiting Women in 1970

Married Women 1970	Observations	Mean/frequency	Std. Dev.	Min	Max
Fulltime Wage	1724320	3497.608	4424.217	0	253133.5
Fulltime Wage if Employed	1087513	5545.677	4435.921	1.271186	253133.5
University	1724320	0.056121	0.230155	0	1
Master, PhD	1724320	0.009306	0.096016	0	1
Experience	1724320	23.40512	12.63269	0	46
Has Child	1724320	0.565738	0.49566	0	1

Source: Folk- och Bostadsräkningen 1970

Table 20 Least Squares Regression on logged Wages for Married and Cohabiting Women in 1970

Married Women 1970		
	Est.Coefficients	Std Errors
University	0.784***	(0.004)
Experience	0.041***	(0.000)
Experience squared	-0.001***	(0.000)
Master, PhD	0.513***	(0.009)
Children	-0.506***	(0.002)
Constant	8.295***	(0.004)
R-squared	0.105	
N	1087513	
* p<0.05, ** p<0.01, *** p<0.001		

Source: Folk- och Bostadsräkningen 1970

1990

Table 21 Descriptive Statistics Over Married and Cohabiting Women in 1990

Married Women 1990	Observations	Mean/frequency	Std. Dev.	Min	Max	Median
Fulltime Wage	1506924	8918.541	5114.917	0	253791.1	1506924
Fulltime Wage if Employed	1384599	9706.467	4563.526	8.4246	253791.1	
University	1506924	0.221747	0.415422	0	1	
Experience	1506924	22.60579	12.38748	0	46	
Master, PhD	1506924	0.015595	0.123901	0	1	
Has Child	1506924	0,496364	0,499987	0	1	

Source: Folk- och Bostadsräkningen 1990

Table 22 Least Squares Regression on logged Wages for Married and Cohabiting Women in 1990

Married Women 1990 Least Squares		
	Est.Coefficients	Std Errors
University	0.333***	(0.002)
Experience	0.052***	(0.000)
Experience squared	-0.001***	(0.000)
Master, PhD	0.278***	(0.005)
Children	-0.233***	(0.002)
Constant	8.704***	(0.002)
R-squared	0.098	
N	1384599	
* p<0.05, ** p<0.01, *** p<0.001		

Source: Folk- och Bostadsräkningen 1990