

# Trading off or having it all?

## Completed fertility and mid-career earnings of Swedish men and women<sup>\*</sup>

by

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### Abstract

Earnings in mid-career and children are two fundamental outcomes of the life-choices of men and women. Both require time and other resources and reflect the accumulated priorities of individuals and couples. We explore how these outcomes have changed for Swedish men and women born 1945-1962 by documenting changes in education, assortative mating patterns, completed fertility and mid-career earnings. We find an overall increasing inequality in career and family outcomes of men, reflecting a rise in the family-career complementarity. For women, the family-career trade-off has eased for non-professionals, and there appears to be a convergence in the life-choices of women across education groups. Despite these different developments for men and women, we find that within-family specialization, measured by the average spousal earnings contribution, is remarkably stable through the period.

Keywords: Fertility, mid-career earnings, education, gender, assortative mating, family-career trade-off.

JEL-codes: J12, J13, J16, J24

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# 1 Introduction

Increased female labor force participation, expansion of higher education, and the emergence of a female dominance among the highly educated have changed the conditions for family formation, fertility decisions and careers of men and women over the past decades. Bertrand et al (2010) show that there is still a sharp trade-off between career and family for US female top professionals. Evidence for other countries and other parts of the distribution of women show weaker effects of children on careers.<sup>1</sup> Shang and Weinberg (2009) and Goldin and Katz (2008) suggest that highly educated women in the US recently both have more children and work more, which is consistent with the reversal of a previous negative correlation between female participation rates and fertility rates in cross-country comparisons found in Ahn and Mira (2002). In Sweden, active policy promotion of gender equality through the introduction of individual taxation, expansion of subsidized childcare and generous parental leave has aimed to ease the family-work trade-off. It is debated if policies have been successful or not (Albrecht et al 2003; Boschini 2004; Henrekson and Stenkula 2009; Economist 2009)

This paper aims to uncover what has happened to the family-career trade-off for Swedish men and women by presenting how long-run trends in completed fertility and mid-career earnings relate to education and partner choices. Our starting point is that earnings in mid-career and children are two fundamental outcomes of the life-choices of men and women. Both require time and other resources and reflect the accumulated priorities of individuals. Competition for time may result in a trade-off between career and children, but to the extent that own time can be substituted by spousal or market provided time some individuals manage to have it all.

Rich and universal Swedish register data from Statistics Sweden allow us to document trends in educational assortative mating, family formation patterns and labor market outcomes for the cohorts born 1945-1962. We measure and document changes in completed fertility, mid-career earnings and contributions to joint spousal earnings by

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<sup>1</sup> See Albrecht et al (1999), Granquist and Persson (2004), and Westerberg (2009) for studies on Swedish data and Datta Gupta and Smith (2002), and Skyt-Nielsen et al (2004) for studies on Danish data.

own and spousal education. We further analyze how the association between mid-career earnings and completed fertility for men and women has developed over time. We have chosen total annual earnings, not wages, as our outcome measure, since our interest is on the accumulated career effects of long-run allocation of time towards family and career, rather than on wage penalties for work interruptions or part-time work. The main analysis focuses on three educational groups, non-university educated, university educated and the select group of university educated holding professional degrees. We also explicitly account for compositional changes by categorizing individuals according to their position in the distribution of years of education.

Becker (1981) emphasized the family as a production unit where the spouses specialize according to their comparative advantage for doing market or household work and rearing children. Modern families are less specialized, at least in the sense that it is more common for both spouses to engage in market work. Stevenson and Wolfers (2007) argue that this is the result of a number of forces that have reduced the importance of family production complementarities.

Technological advances in household production, e.g. dishwashers, washing machines etc, and the expansion of the markets for services that allow modern families to outsource a number of household and child related activities have drastically lowered the returns to household specialization. Increased female wages, higher returns to education, and in the case of Sweden, introduction of individual taxation, high marginal tax rates and substantial child care subsidies, have further decreased the returns to traditional household specialization. It may be the case that if the family used to be a production unit with specialized tasks, the modern family has developed into a partnership, where the returns are potentially high for equal and similar partners to engage in multi-skilling and multi-tasking and where utility is derived both from joint consumption and from the fruits of teamwork. A consequence would be more equal spousal contributions to family earnings and increased positive assortative mating.

A pattern of increased educational assortative mating was indeed documented in the US in the seminal paper by Mare (1991). Moreover, the trend is found to be mainly driven by university educated marrying each other – see Schwartz and Mare (2005) for updated references. Liu and Lu (2006), however, find evidence that this trend was reversed in the 1980's. There is surprisingly little research on Swedish data. Henz and

Jonsson (2004) find decreasing assortative mating in Sweden when comparing cohorts born between 1919 and 1935 with those born between 1955 and 1973, accounting for changes in the education structure of men and women. Sweden experienced a significant expansion of higher education during the second half of the 20<sup>th</sup> century. The expansion was more rapid among women than among men (Björklund et al, 2010); causing women to face an increasing relative scarcity of educated spouses.

The developments of the Swedish labor market are more studied and some important facts relevant to this paper have been uncovered. Importantly, the labor force participation of Swedish mothers increased rapidly from below 40% to around 80% from the early 1960s to the early 1980's (Gustafsson and Jacobsson, 1985) when the oldest cohorts studied in this paper were in their mid-thirties. Since then, changes in participation rates slowed down. In addition, the closing of Swedish gender wage gap stagnated already in the early 1980's (Edin and Richardson, 2002)<sup>2</sup> and Albrecht et al (2003) argue that a glass-ceiling emerged for women on the Swedish labor market in the 1990's. We believe that uncovering the changes in family formation patterns and fertility choices can shed useful light on the developments of gender differences in the Swedish labor market.

There are several reasons to believe that the incentives for fertility and career decisions facing Swedish men and women have changed between cohorts born in the mid 1940's and those born in the 1960's. While individual taxation of spouses introduced in 1971 created an incentive for reduced household specialization, major cuts of marginal tax rates following the 1991 tax reform potentially had an effect in the opposite direction. Family policy, such as introduction of parental leave in 1974 and successive extensions during the 1980's and 1990's and introduction of quotas for fathers and the expansion of child care coverage from some 20 percent of 3-6 year olds in the mid 1970's to around 60 percent in the mid 1990's are also important for family and career choices.<sup>3</sup>

Björklund (2006) and Andersson et al. (2009) document that the overall cohort fertility of Swedish women was rather stable around replacement throughout the period

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<sup>2</sup> Figure 17 in the Appendix shows the raw gender wage gap between 1992 and 2007.

<sup>3</sup> Various Swedish reforms are discussed in e.g. Selin (2009), Björklund (2006), Mörk et al (2008), Edlund and Machado (2009).

of rapid expansion of female labor force participation. Björklund argues that family policy has played an important role in allowing women to combine family and work, and hence to maintain fertility levels. Moreover, this stability over time is present also when considering fertility of women with different levels of education, although the last cohorts studied suggested a slight fanning out of the distribution of fertility such that fertility increased among lower skilled women and decreased among the highly educated. Such a development could suggest that highly educated women are forced to trade off career and family and that this trade off favored increased career orientation at the cost of fertility. Much less is, however, known about the fertility patterns of men, but while there appears to be an inverse relation between education and fertility for women, the reverse is true for men (Statistics Sweden, 2002).

Our contribution is to uncover long run trends in assortative mating, completed fertility and mid-career earnings in a uniform framework for the universe of Swedish men and women born 1945-1962. Several important patterns emerge in the data. First, it is evident that for the cohorts studied, there was a slowdown in the education expansion in particular for men. While women continued to get more education, men did not. Furthermore, there is a rising trend in childlessness for men at all education levels. For women, there is instead a pattern of convergence, the gap in childlessness between women with low and high education has narrowed. As a result, the relative supply of educated men participating in the family market has declined over time.

These changes have come parallel to altered family formation patterns of Swedish men and women. We find that the increase in the age at first parenthood has taken place in a similar way within all education groups for men. For women, however, the increase is less pronounced for university non-professionals than for less educated women, which is somewhat at odds with the idea of a rising delay premium for the high skilled (Buckles, 2008). Furthermore, counter to the idea that spouses should have become more similar over time, we find an increase in the spousal age gap in all educational groups. Using population wide register data, we can also confirm the overall decline in educational assortative mating found in Swedish survey data in Henz and Jonson (2004).

We replicate the pattern found in Björklund (2006) showing a negative association between education level and average fertility for women. Although we find that fertility

rises with education for men, the relation between average fertility and education is weaker than for women.

Over the cohorts studied, mid-career earnings have grown rapidly for professional men born after 1950, causing a fanning out of the earnings distribution. The gender earnings gap for professionals actually grew wider, stabilizing around 70 percent for the cohorts born after 1950. For the other educational categories the earnings gap instead closed, stabilizing at around 72 percent. We find that the association between mid-career earnings and fertility is stronger for men than for women. Mid-career earnings of childless men are significantly lower than the earnings of fathers for all education categories. Also among non-professional women<sup>4</sup>, childless women earn less than mothers. An interesting contrast to the idea of a child wage penalty for high skilled women, is that childless professional women never show up at the top of the female mid-career earnings league, and in the most recent cohorts they earn the least also among professional women.

In spite of changes in mating patterns, fertility and earnings, when we explore the change in the contribution of women to joint spousal earnings, a notable stability emerges. The spousal mid-career earnings-gap has remained stable over the period regardless of education and spouse's education. Hence, it would appear as if little had changed over time at the level of the household. However, when we investigate the changes in the association of mid-career earnings and completed fertility, it is clear that there is a positive association for men, which has grown stronger over time. For less educated women, there is on average a negative association between the number of children and mid-career earnings. This trade-off has remained stable. However, over time the association between motherhood per se and mid-career earnings has turned positive for this group. The latter is true also for university non-professionals, for whom the negative trade-off between the number of children and mid-career earnings has disappeared over time. Interestingly, for professional women we find no significant positive or negative association between mid-career earnings and fertility.

After describing our data sources and definitions, we proceed, in section 3, to describe the changes in the supply of men and women with different levels of education

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<sup>4</sup> Non-professionals = non-university educated + university non-professionals.

and show that the 1945-1962 cohorts experienced a relative slowdown in the expansion of higher education, in particular for men. We move on to document a rising fraction of childless men in all education categories and a convergence in childlessness for women. We also document an overall downward trend in assortative mating. Next, in Section 4, we explore the developments of fertility and how it varies by own education and spouses education. Section 5 focuses on changes in mid-career earnings and shows how the association between mid-career earnings and completed fertility had changed for men and women depending on education level. Section 6 concludes.

## 2 Data and definitions

We use population wide register data from Statistics Sweden. Linking vital statistics from the multi-generation register and population wide labor market statistics from LOUISE for the years 1990-2007 we can construct a dataset containing complete fertility measures, education, mid-career (age 45) earnings and spouse characteristics for the universe of Swedish men and women born between 1945 and 1962.

There are several reasons for measuring characteristics in mid-career. First we want to measure completed fertility. At age 45, for women and for a vast majority of men, fertility is complete.<sup>5</sup> We measure fertility by counting the individual's total number of live biological (or adopted) children born by the time the individual is 45.<sup>6</sup>

Second, a measure of earnings at mid-career is arguably a reasonable measure of the quality of an individual's career.<sup>7</sup> Also, it has been argued that intertemporal earnings variability is small in the mid-forties (Baker and Solon, 2003). We measure annual earnings from employment and self-employment at age 45. The resulting dataset includes rich labor market data, such as annual earnings, complete fertility histories, and educational attainment for all individuals and their spouses. Detailed definitions of all variables and sources are presented in Table 3 in the Appendix.

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<sup>5</sup> In Figure 18 in the Appendix we plot the ratio of male fertility measured at age 45 to male fertility measured as late in life as possible, i.e. in 2007, for the analyzed cohorts. It is clear that male fertility is completed in the early 50's and that only some 2.5 percent of all children born to men are born after their father is 45. In addition this fraction has been stable over time.

<sup>6</sup> We have verified that the patterns in the data do not change if we account for male fertility at older age for the cohorts where this is possible.

<sup>7</sup> Böhlmark and Lindquist (2006) argue that life time earnings of Swedish men can be reasonably captured in the mid-thirties, while women's earnings at a higher age are more representative of life time earnings.



We define education level based on the highest degree attained at age 45 according to the education register. In order to avoid misclassifications due to a major revision of the education classification system in the year 2000, we use the education register from 2001 to classify education for all cohorts born 1945-1950. Hence for these cohorts education is measured when they are older than 45. This poses little problem since very few individuals pursue education beyond age 45. Measuring educational attainment and degrees late in life, rather than at the time of first parenthood, is consistent with Björklund (2006). This gives a correct account of the number of children of 45-year olds by education level, but calls for caution in making causal interpretations of the effect of education on children or the other way around.

We define three education levels, non-university educated, university graduates and professionals. We strive to have a comparable set of degrees over time and we have chosen a restrictive definition of university educated. As university educated we define those having completed at least a 3 year bachelor's degree, i.e. with at least 15 years of education. Individuals with less than a university degree are defined as non-university educated.

Within the group of university educated we define the sub-group holding professional degrees. These are degrees that traditionally have been the most conducive to lucrative and prestigious careers. We have singled out four specific professional degrees; business administration, law, medicine and engineering.

Because this classification is sensitive to changes in the education distribution, we also use an alternative education classification based on the individuals' position in the gender and cohort specific percentile distribution of years of education. We do this to explore the extent to which patterns found are driven by changes in selection or behavior and report the results of the alternative measure when they contribute to the understanding of the patterns found.

We characterize how fertility and earnings relate to own education, but we are also interested in the importance of spousal characteristics and in how family formation has changed over time. Hence, we need to identify the individual's spouse. In the assortative mating literature, it is common to take marriage as the indicator of whether two people have formed a family or not (Mare, 1991). As argued in Henz and Jonsson (2004), cohabitation is an important phenomenon in Sweden and marriage rates are

relatively low. Importantly, a high fraction of firstborns are born out of wedlock. Yet a high fraction of children live with both their parents. Our approach is to identify an individual's spouse as the other parent of the individual's first born. Although a non-negligible fraction have a new spouse by the time they are 45, the other parent of the individual's first child is likely to be influential for shaping the conditions for both family and career choices.<sup>8</sup> Swedish register data allow us to identify cohabiting couples only when they have common children. Our definition of spouse, based on parenthood rather than marriage or cohabitation, unfortunately precludes an analysis of the influence of spouse characteristics on the extensive fertility margin and on earnings of those couples that do not have children. In this paper, analysis of the extensive fertility margin is thus based only on individual characteristics.

### **3 Changes in the supply of educated spouses and assortative mating for the 1945-1962 cohorts**

In this section we study the evolution of the family market, i.e., the market for mates or spouses. In particular, we examine how the expansion of higher education has increased the supply of university-educated spouses. We also consider how the supply of spouses has been affected by changes in the degree to which men and women participate in the family market, i.e. the extensive fertility margin, by studying the evolution of childlessness in the different educational groups.

#### **3.1 Education**

It is well documented that higher education has expanded dramatically in Sweden over the last 50 years (Björklund et al 2010). The first major expansion took place in the 1960's and 1970's when the university system was reformed. The second major expansion took place during the 1990's. Some reforms have aimed at increasing enrollment within traditional educational fields; other reforms have integrated training programs for professions, such as nurses, police officers and elementary and pre-school teachers into the university system.

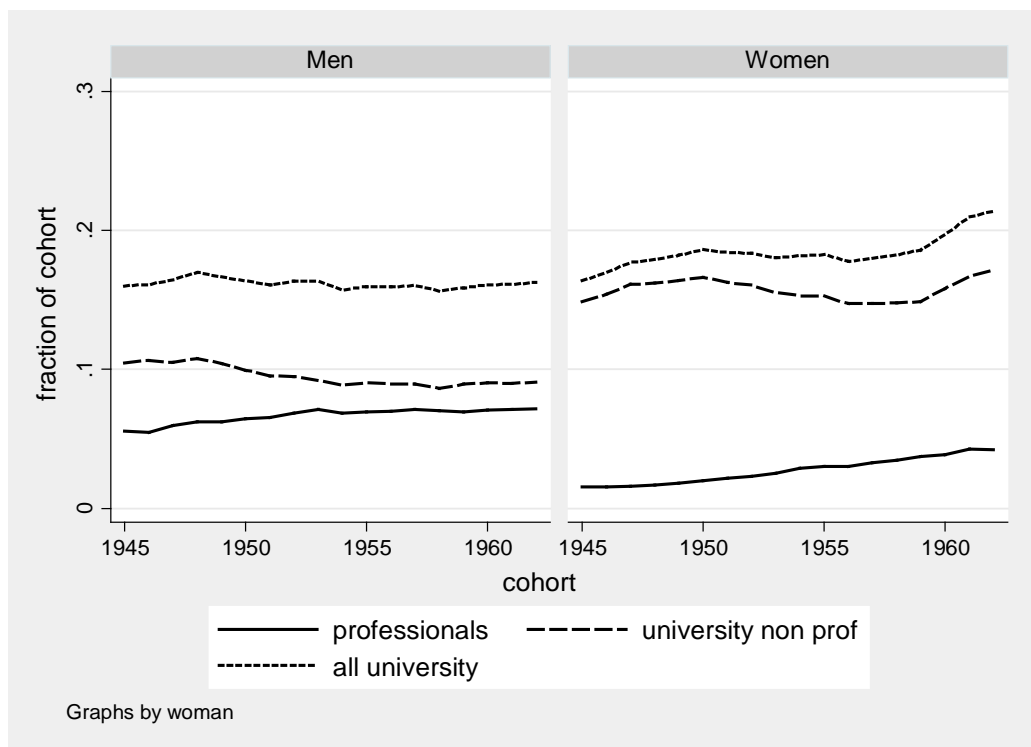
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<sup>8</sup> As a robustness check, the analysis is also carried out using the individual's current spouse. Results are insensitive to the definition of spouse.

Figure 1 shows the percentage of men and women respectively with a university degree, equivalent to at least three years of university studies, for the cohorts that are the focus of this paper. Within the group of university educated we also study *professionals*.

Overall, the figure shows that the period we study is one of rather slow education expansion. In the early cohorts the fraction of university educated is similar for men and women, but through the cohorts studied, women become increasingly more educated than men. The divergence starts already for the cohorts born in mid 1940's, with a slow but steady increase in the share of professionals. The increase in the share of female university graduates levels off somewhat during the first half of the 50's, due to a slight fall in the share of university non-professionals. It is interesting to note, that while women born in the in the 1950's continued to get more educated, the fraction of university-educated men remained rather stable. Similar to the pattern for women, the share of men with a professional degree increased steadily over the period. However, this increase is totally offset by the decline in the share with a non-professional university degree, leaving the total rather stable.

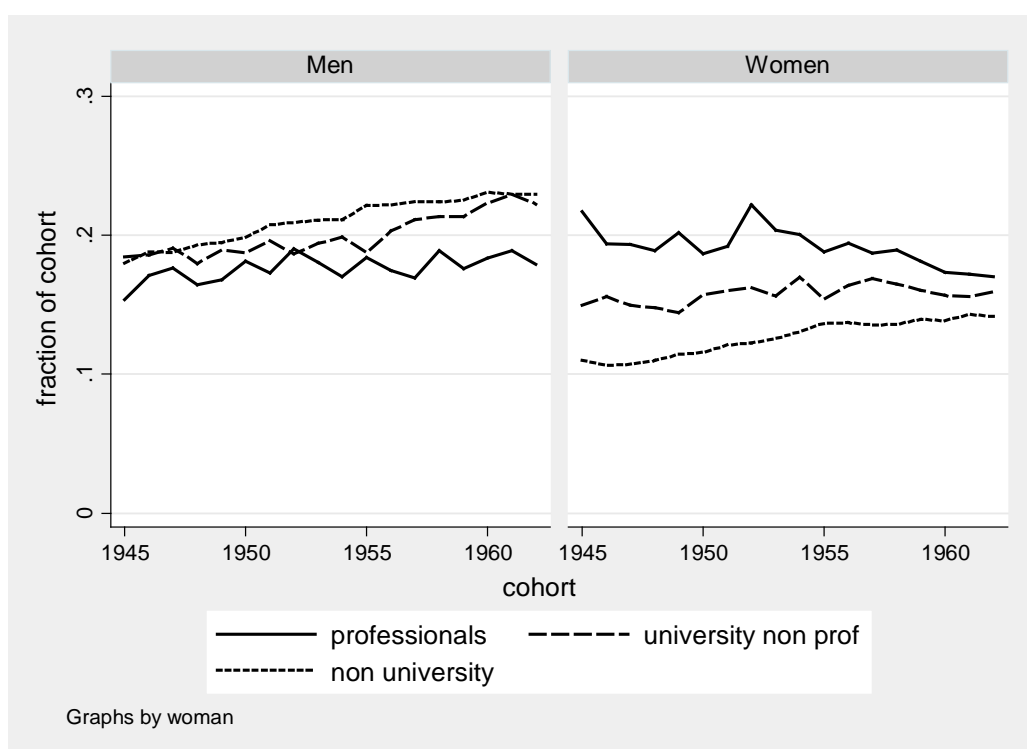
Figure 1: The expansion of higher education



### 3.2 Childlessness – rise and convergence

In order to understand how the supply of men and women at different education levels influences family formation patterns we need to recognize that not all men and women participate in the family market and have children. Figure 2 shows the fraction of childless individuals by gender and cohort for our education categories.

Figure 2: Childlessness rise and convergence



An interesting pattern emerges where it is clear that the fraction of men that do not have children, and hence stay out of the family market, has risen over time in *all* the educational categories. For the least educated in the 1962-cohort, well over one in five men never have children as compared to around 18 percent in the 1945 cohort. In accordance with Statistics Sweden (2002) childlessness is less frequent among the professional men and the time trend is similar across the education spectrum. This pattern is found also for Norwegian men born 1940-1964 (Kravdal and Rinfuss, 2008)

Women show a quite different pattern. Overall, fewer women than men are childless, but interestingly the differences between education groups have declined over time. There is a downward trend in childlessness among professionals, who still are more likely to be childless compared to those less educated. Consistent with Anderson et al

(2009), we also find an upward trend in childlessness among the non-university educated. Thus, the overall pattern for women is one of convergence in childlessness between the education categories studied here.

However, as was shown in Figure 1, the education distribution has changed over time. In particular, the fraction of professional women has grown. It is thus interesting to understand to what extent the decline in childlessness for this group is driven by changes in behavior or by the changing selection of women choosing a professional career. Figure 19 in Appendix shows the development of childlessness when we instead categorize individuals according to their position in the education distribution. The share of childless women among the top five percent in the education distribution of women does not decline over time suggesting that the pattern found for professionals could be due to selection changes.

### **3.3 Assortative mating and family formation patterns**

Rising education for women and stagnation for men at the same time as childlessness declines among female professionals while fewer men in all education groups participate in the family market, voluntarily or not, have implications for family formation patterns. One consequence is that the supply of educated men falls relative to the supply of educated women.

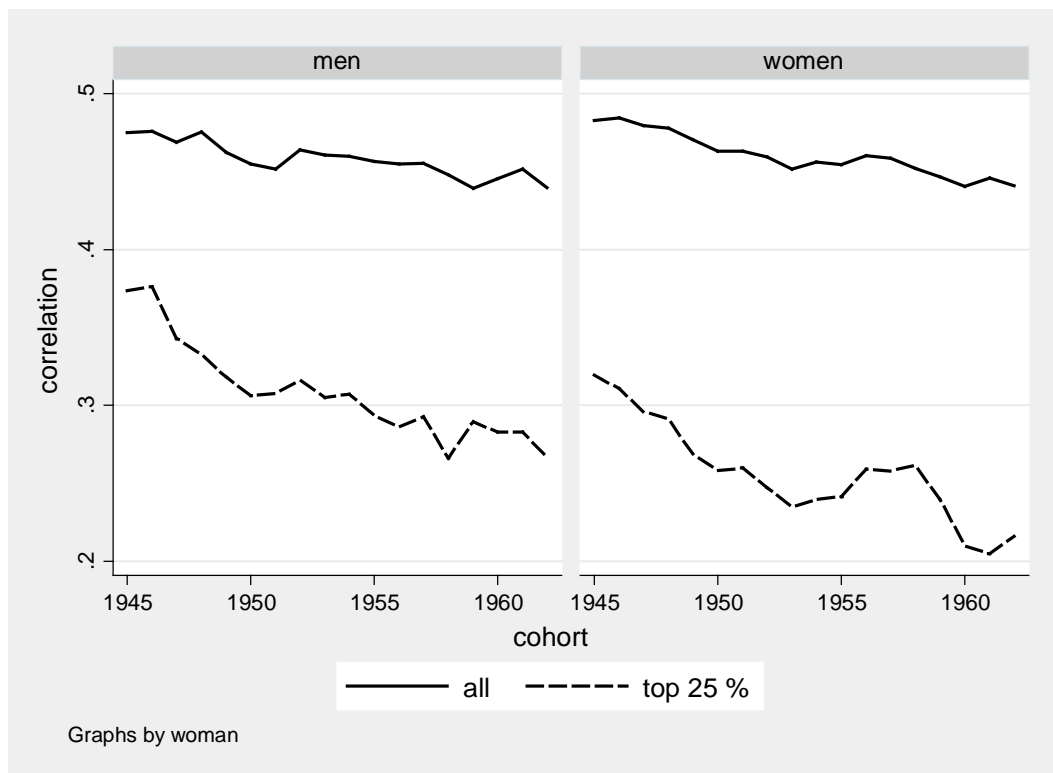
We first explore how the general pattern of educational assortative mating has changed over time. Measuring changes in assortative mating is complicated for several reasons. Education distributions are discrete and have changed over time in different ways for men and women. Moreover, using years of education as a cardinal measure is questionable. We therefore take two different approaches. First, we have computed the correlation in the percentile rank position in the distribution of years of education for individual  $i$  in cohort  $t$  with  $i$ 's spouse's percentile rank in the distribution of years of education of the spouse's cohort and gender (where the spouse is the other parent of person  $i$ 's first child) for each cohort, separately for men and women. We also compute the corresponding correlation for the subsamples of men and women who constitute the

top quartile of the education distribution of their respective cohorts. Note that the spouses can be older or younger. The results are presented in Figure 3.<sup>9</sup>

First, the solid lines (showing the cohort-specific correlation coefficient of own education with spouse’s education for all men and women) depict downward trends. Over time, spouses’ education has become less or strongly correlated. This is consistent with the findings in Henz and Jonsson (2004) and while different from the early US findings (Mare, 1991) it is also consistent with Liu and Lu (2006) for the US after 1980.

Interestingly, the downward trend in assortative mating is present also at the top of the education distribution. The revealed pattern is thus at odds with the hypothesis of increasing assortative mating driven by consumption complementarities and reduced returns to intra-household specialization at higher education levels.

Figure 3: Assortative mating, spouse correlation in years of education



Our second approach is to explore changes in how different education groups are matched over time. In Table 1 we present the distribution of spousal matches by own

<sup>9</sup> The trends in assortative mating are very similar if we instead estimate the correlation in years of education or compute Kendall’s rank correlation coefficient.

and spouse's education category in the beginning and end of the time period studied, i.e. for cohorts 1945-1946 (top panel) and 1961-1962 (bottom panel) for women (left panel) and men (right panel). The table reveals a clear over-representation of matches on the main diagonal. Consistent with the previous analysis of assortative mating, this over-representation has not grown stronger over time.

Table 1: The distribution of matches by own and spouse's education

Cohorts born	Own education	Women				Men			
		Education of spouse				Education of spouse			
		No university	University non professional	Professional	All	No university	University non professional	Professional	All
1945-1946	No university	79153	4960	2337	86450	81819	7678	466	89963
	%	91.56	5.74	2.7	100	90.95	8.53	0.52	100
	University np	7705	5167	2542	15414	5706	5251	421	11378
	%	49.99	33.52	16.49	100	50.15	46.15	3.7	100
	Professionals	459	381	590	1430	2707	2666	697	6070
	%	32.1	26.64	41.26	100	44.6	43.92	11.48	100
	All	87317	10508	5469	103294	90232	15595	1584	107411
%	84.53	10.17	5.29	100	84.01	14.52	1.47	100	
1961-1962	No university	6777	4306	3087	75163	65493	9893	1529	76915
	%	90.16	5.73	4.11	100	85.15	12.86	1.99	100
	University np	10221	3503	2114	15838	4167	3372	702	8241
	%	64.53	22.12	13.35	100	50.56	40.92	8.52	100
	Professionals	1601	660	1678	3939	3006	2192	1728	6926
	%	40.64	16.76	42.6	100	43.4	31.65	24.95	100
	All	79592	8469	6879	94940	72666	15457	3959	92082
%	83.83	8.92	7.25	100	78.91	16.79	4.3	100	



As an example, 84.53 per cent of women’s spouses do not have a university degree, yet a higher share, 91.56 per cent, of the non university educated women born 1945-1946 have a non-university educated spouse. Only 32 percent of professional women of the early cohorts had a non-university educated spouse. Instead 41.26 per cent had a professional spouse although they constitute only 5.29 per cent of all spouses in the early cohorts. In the later cohorts, the patterns are very similar, but while the share of professional spouses available to women has increased to 7.25, the fraction of professional women with a professional spouse only increased marginally.

In Table 2 we summarize the pattern in Table 1 by computing the change over time in the odds ratio, i.e. in the case of professional women with a professional spouse the odds ratio was 7.8 (41.26/5.29) in 1944-1945, and 5.9 (42.6/7.25) in 1961-1962, which implies that the odd ratio has declined over time. Comparing the recent cohorts to the earliest cohorts analyzed the relative ratio declined to 0.8 (5.9/7.8). The pattern emerging again suggests that there has been decreased assortative mating over time, in particular among the highly educated where the main diagonal elements are well below 1.

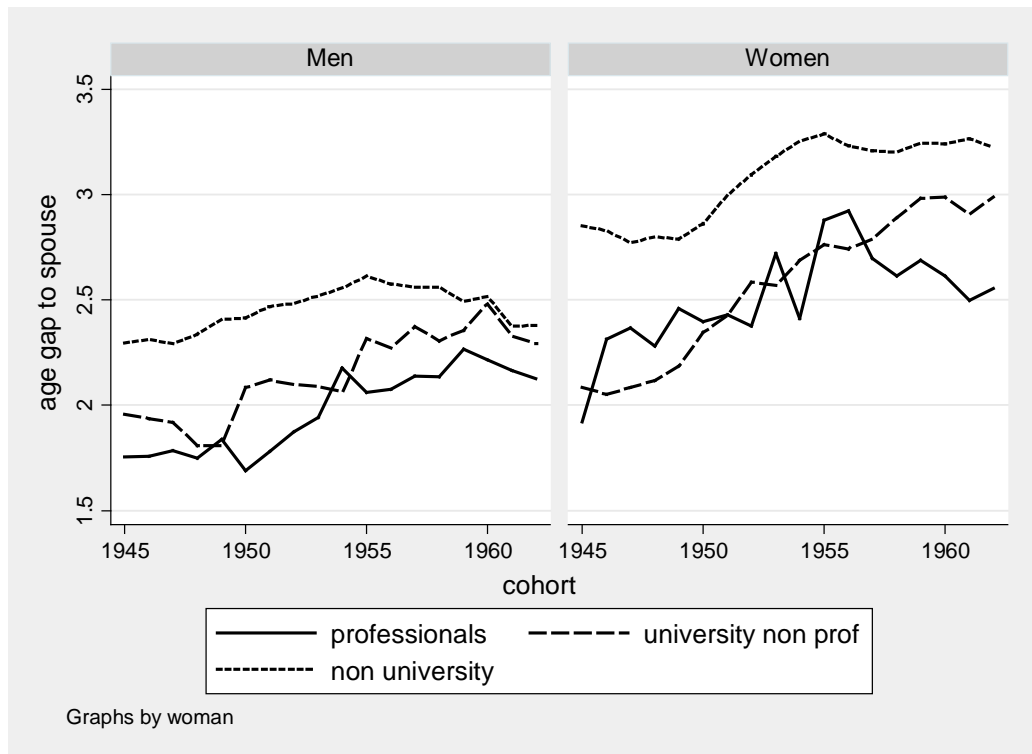
Table 2: Relative odds ratios 1961-1962 compared to 1945-1946

	Women Education of spouse			Men Education of spouse		
	No uni- versity	University non profes- sional	Profes- sional	No uni- versity	University non profes- sional	Profes- sional
No university	1.0	1.1	1.1	1.0	1.3	1.3
University non-prof	1.3	0.8	0.6	1.1	0.8	0.8
Profes- sionals	1.3	0.7	0.8	1.0	0.6	0.7

Although we find that educational assortative mating has declined over time it is still possible that societal changes promoting less household specialization lead to increased assortative mating on other dimensions. Figure 4 shows the spousal age gap (male age –

female age) for the cohorts in our sample. Note that the age gap for all educational groups grows until the cohorts born in the mid 1950's. After that, the age gap flattens out for both women and men overall. Only for non-university educated men and for professional women is there a reversal of the trend. Hence, over time spouses become more different both in terms of education and in terms of age.

Figure 4: Age gap to spouse (male-female)



The difference in levels when considering men and women is puzzling at first. It cannot be reconciled by comparing the patterns for men and women adjusting for an age lag corresponding to the size of the age gap. However, an explanation can be found in gender differences in the probability of forming new families and in their different behaviors when finding a new spouse. First, over the time period studied the share of men and women that also have children with a new spouse increase.<sup>10</sup> For men their new spouse is more often a first time parent, than for women. Second, when men form a new union, on average they do so with a younger woman than their first spouse. The new union is thus more unequal in terms of age. This is not true for women. While a

<sup>10</sup> The increase is about 4 percentage points both for men and women, starting at 36% for men born in 1945 to 40.4% of those born in 1962. The corresponding figures for women are 39.4% and 43.4, respectively.

new union on average also is with a younger spouse than the former, in the case of women, this means that the age difference becomes smaller.<sup>11</sup> Figure 4 includes spouses that have children in a previous union. In Figure 20 in the Appendix we have restricted the sample to include only unions where both spouses had their first child. The rising trend in the age gap persists, but it is no longer the case that the age gap is larger for first time mothers, compared to first time fathers.

## 4 Trends in parenthood and fertility

The secular increase in average age at first parenthood is well documented. Moreover, it is well known that highly educated women delay fertility. It is often hypothesized that these trends may contribute to rising levels of childlessness and lower completed fertility.

Anderson et al (2009) show that the age at which 50 % of a cohort of Swedish women have become mothers has risen over time across education groups, suggesting that the increase in age at first child is not necessarily only a consequence of a rising trend in education. In Figure 5 we explore the trends in age at first child for Swedish men and women. Professional women have their first child about four and a half years later than women without university. For men the difference is somewhat smaller, just under four years later.

In line with findings in Dribe and Stanfors (2009), age at first child has increased for both men and women. Comparing the first and last cohort, men and women on average have their first child about two years later. However, what is interesting to note is that while over time parenthood is further delayed for both men and women, we also find, in line with Statistics Sweden (2002), that the magnitudes are similar for *all* the educational groups studied here. This pattern is somewhat at odds with the idea that rising returns to experience and increasing skill premia should have lead to particularly large increases in the premia for delaying child birth for the highly educated.<sup>12</sup> The

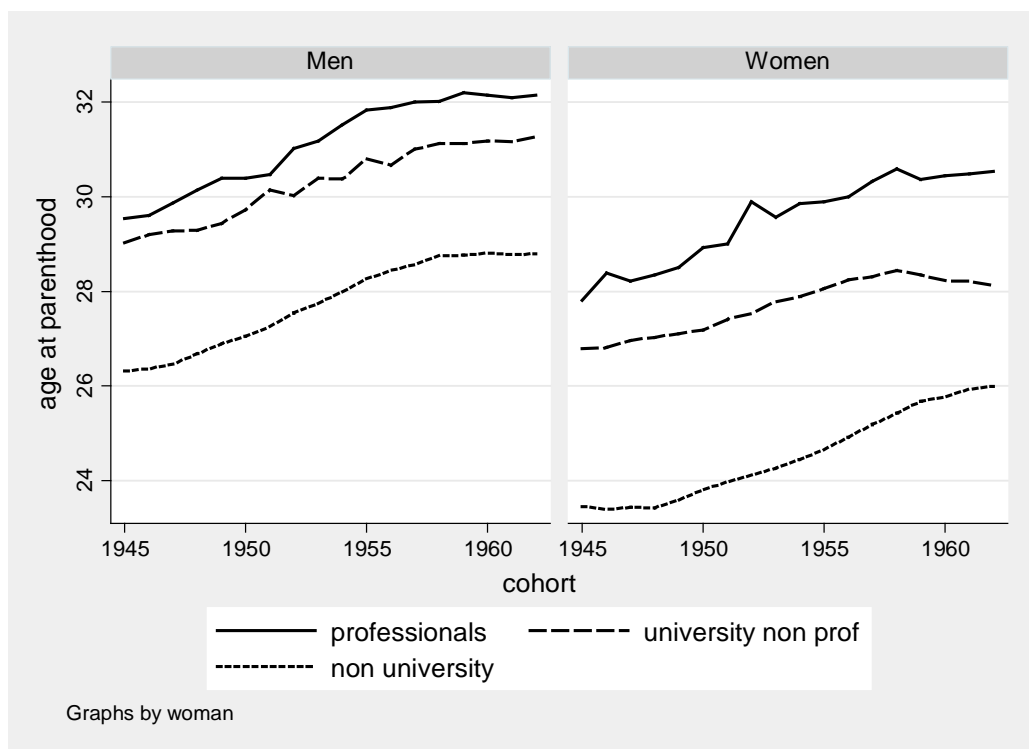
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<sup>11</sup> For men, the average age difference increases from 2.97 years in the first match to 4.85 years in the new match. For women the age gap instead decreases from 2.63 years to only 1.42 years in the new match.

<sup>12</sup> Buckles (2008) shows, for the US, that returns from delaying childbearing is higher for high-skilled women.

pattern found here suggests that, overall, the premium for delayed child birth has increased independently of education for both men and women.

Figure 5: Delayed parenthood



As documented by e.g. Björklund (2006) and Andersson et al (2009), the cohort fertility of Swedish women has been rather stable through the period of rapid expansion of female labor force participation. Less is known about the trends in fertility of Swedish men.<sup>13</sup> Figure 6 shows the fertility trends among Swedish men and women, plotting average completed fertility (at age 45) by cohort and education. Some things are worth pointing out. Men with a professional degree have, on average, more children than other men. For women, on the other hand, the least educated have the most children (around two) and those with a professional degree have the fewest. For all education groups, female fertility, as previously documented, is rather stable.

Figure 7 instead shows the development of fertility on the intensive margin. We showed in Figure 2 that childlessness, i.e. the extensive fertility margin, has risen over time for men and that there has been a convergence for women. Interestingly, male

<sup>13</sup> One exception is Dribe and Stanfors (2009). They study the determinants of entering into parenthood for Swedish men and women for the cohorts born 1949, 1959 and 1964.

fertility does not depend strongly on education, once differences in childlessness are accounted for. For women, however, the converging pattern on the extensive margin and the stability of educational gradients in total average fertility are reconciled once the diverging pattern on intensive margin is taken into account. Over time, the negative education gradient has grown on the intensive fertility margin. For the cohorts studied, mothers with a professional degree have on average had around 2.1 children throughout the time period. Mothers without a university degree have increased their number of children from some 2.2 to 2.4 over the studied cohorts.

Figure 6: Total average fertility of men and women

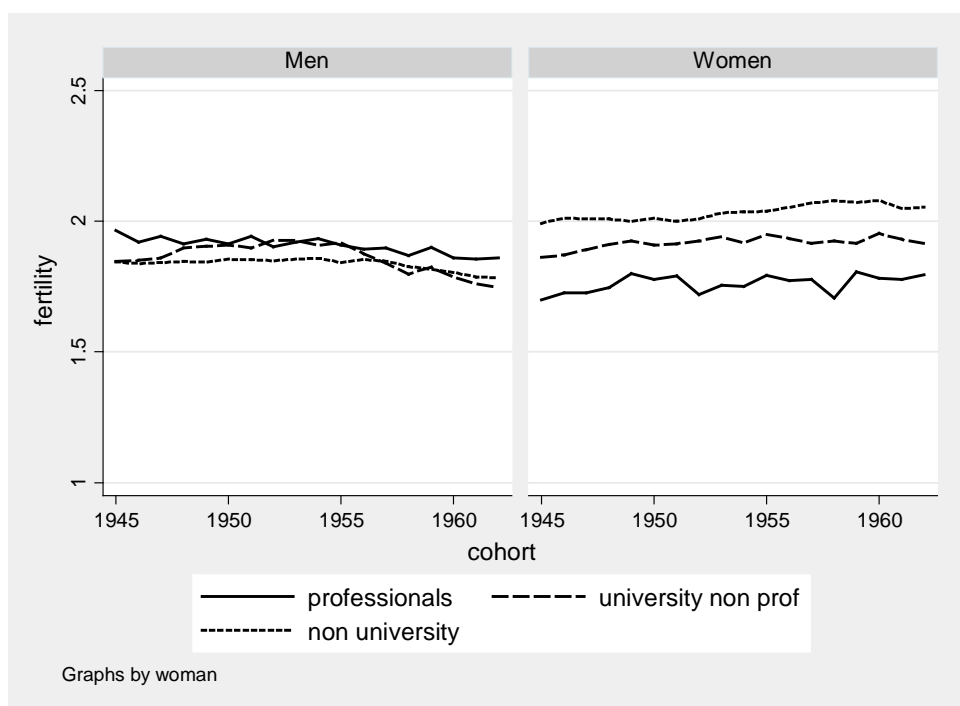
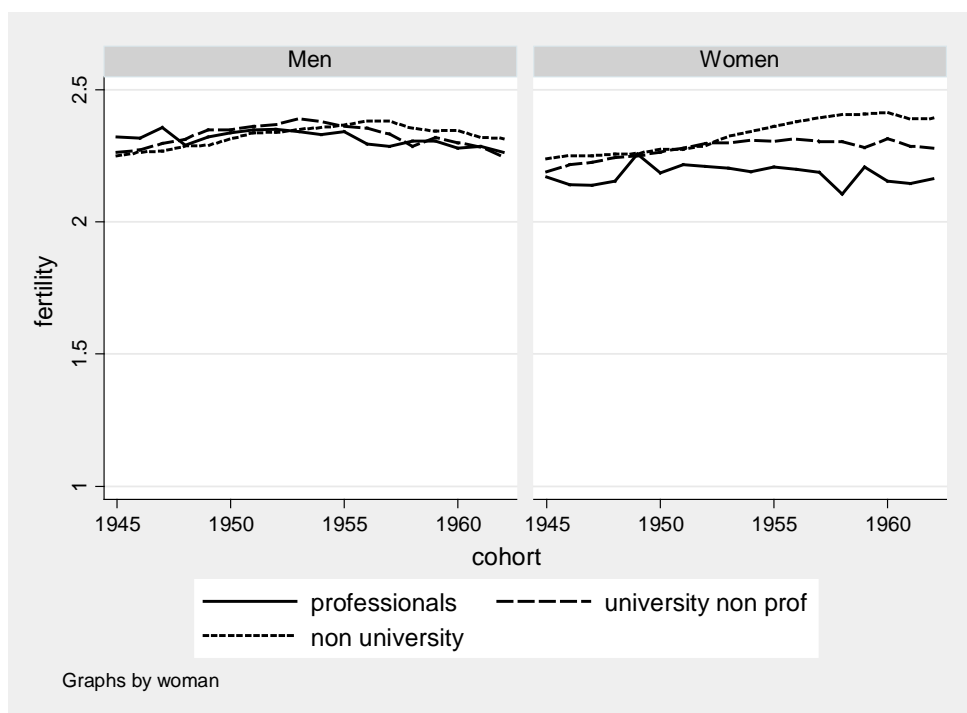


Figure 7: Fertility by education group, intensive margin only



#### 4.1 The fertility distribution

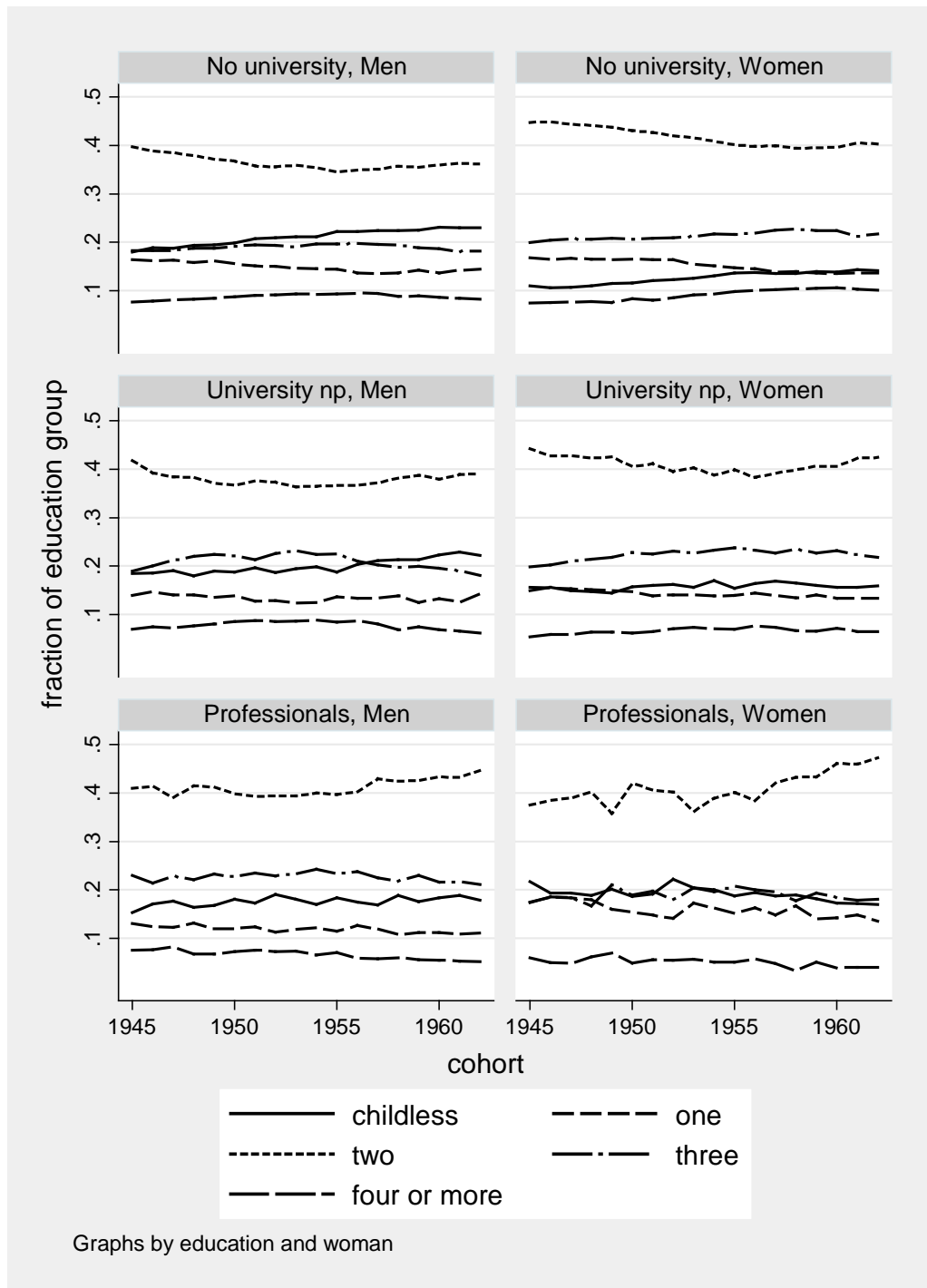
The studied fertility trends have implications for changes in the distribution of fertility. An interesting conclusion that can be drawn on the basis of the analysis of childlessness is that fatherhood has become more unequally distributed over time within education groups due to increased childlessness. Motherhood has become more evenly distributed among professional women, and more unequally distributed for women with less than university. In order to further understand the changing fertility distributions we take a closer look at parity in Figure 8, i.e. we explore how the fractions of men and women who are childless, have a single child, two children, three or four or more have evolved.

For both men and women, the two children norm is rather strong. Around 40% of university non-professionals have two children and the fraction is increasing over time. After 1955, having three or four (or more) children becomes less common in favor of instead having two children. Also in this figure the rising share of childless men is present. Turning to professionals, the pattern is similar. However, the increase in the share of professional women with two children is even stronger than for university non-professionals, reaching almost 50% for the most recent cohorts. It is also interesting to

note that as the fraction of professional women with two children increases, the fractions at all other family sizes decline.

Women without university education, display a different development. The two-child norm weakens over time and fewer have a single child. In this group, however, the fraction of childless women is rising, but so do the fractions of women having three children, and four or more children. In this group of women there is hence an increasing tendency of choosing to have a large family or no family at all, a behavior that has often been associated with highly educated women. It appears that these women increasingly face a trade-off between work and family. One can speculate as to why. The jobs of these women are likely to be low paying with low flexibility of work hours and it is possible that they have become increasingly so.

Figure 8: Parity by educational group





Next we consider how average fertility has evolved for the different education groups when we take into account the education of the spouse.<sup>14</sup> Figure 9 displays the development of fertility by education group and education of the spouse. Note that this implies that we study the intensive margin, i.e. average fertility conditional of having kids. The two top panels show the trends for non university educated men and women. For men average fertility trends somewhat upwards in the beginning of the sample but falls from the 1955 cohort and onwards regardless of the education of their spouse. For non-university educated women the decline starts later, except for those who have a non-university educated spouse, their fertility continues to rise further and then levels off.

We consider the trends for university non-professionals in the middle panel. It is interesting to note that non-professionals matched with a similar spouse get fewer and fewer children throughout the cohorts we are studying, the decline is about -0.25 children comparing the first and last cohorts. University educated non-professional men with a professional spouse on the other hand increased their average fertility in the beginning of the sample, but from the cohorts born in the early 1950's and onward, the trend is reversed. A possible explanation is that this coincides with women putting more weight on career and thus opting for fewer children.

The bottom two panels display the trends for university educated professionals. For professional men fertility is decreasing regardless of spouses' education. However, it is interesting to note that while there in the beginning of the sample period was quite a large fertility difference between those with a professional spouse and those with a non-university spouse, fertility has converged and in the end of the sample the gap is completely closed. The trends for professional women confirm this pattern. Those with a university educated spouse display stable fertility through the mid 1950's cohorts and after that fertility has declined. Professional women with a non-university educated

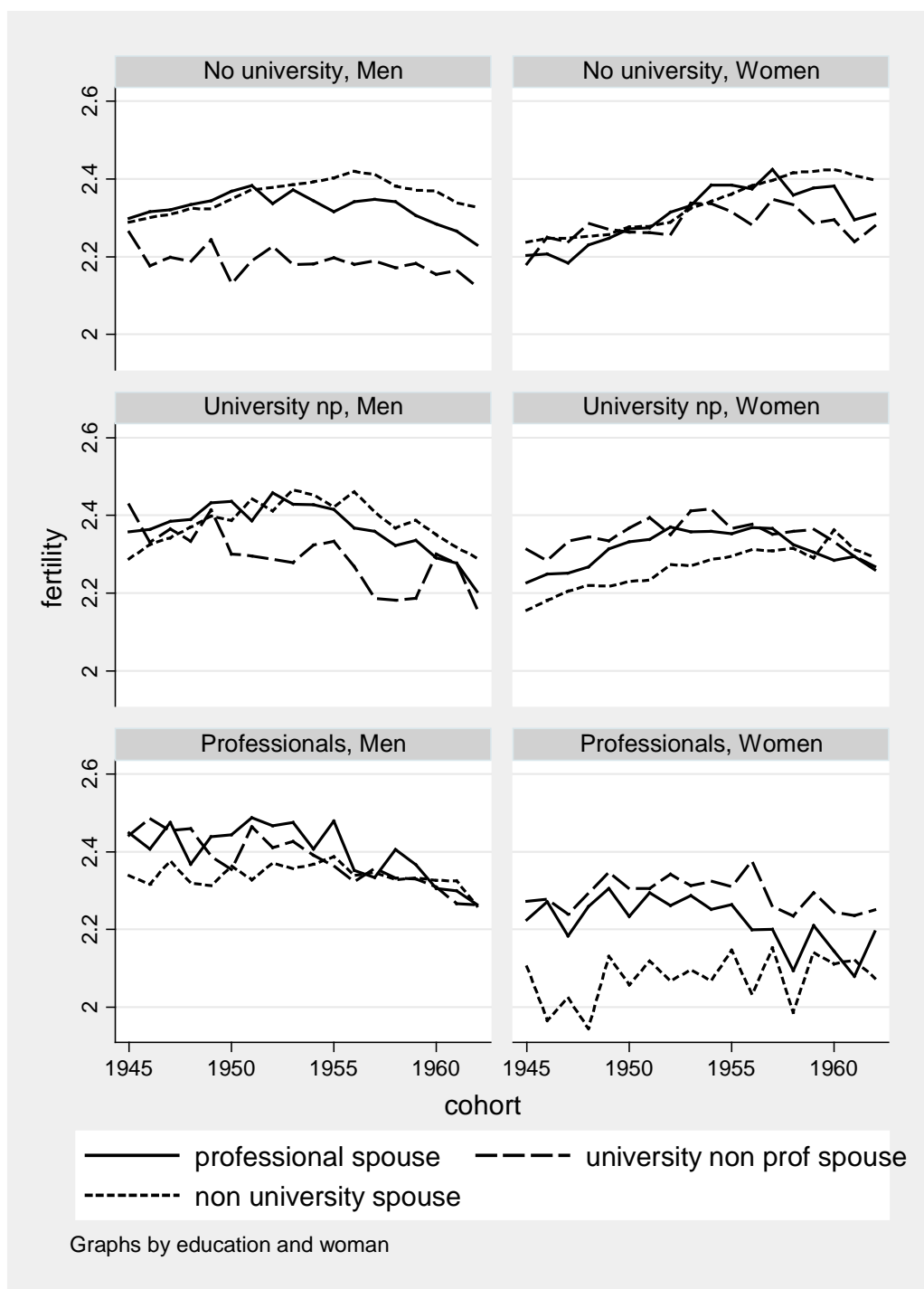
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<sup>14</sup> Studies of fertility by education in a couple perspectives are rare. For Sweden, two exceptions are Dribe and Stanfors (2010) and Stanfors (2009). Both papers study fertility of couples with at least one child when controlling for a number of variables including civil status and age, for the period 1991-2005. Dribe and Stanfors (2010) find that power-couples are more likely to have two or more children, where power couples are identified by level and field of education and sector of employment. Stanfors (2009) finds that among females with a law or medical degree or with a PhD the relative risk of having more than one child increases with the partner's educational status. Another study on Swedish data is Andersson and Duvander (2003). They find that higher income of both men and women increases the propensity to have a second child. Fertility in a couple perspective with German data is studied in Bauer and Jacob (2009).

spouse have on average fewer children than those with a professional or non-professional university educated spouse. Their fertility has been rather stable throughout the cohorts studied.

Overall the pattern that emerges shows that the importance of spousal education for fertility decreases with education for men, while the reverse is true for women.

Figure 9: Fertility by educational group and education of spouse.



## **5 Labor market outcomes and the family-career trade-off**

In this section we explore how the labor market outcomes of men and women of different education relate to their spouse's education, and to their spouse's earnings as well as to the number of children they have. By measuring earnings at age 45, well beyond the child bearing years, we focus on the association between children and the success of one's career rather than on short term trade-offs. We explore the extent to which there is a trade-off between family and career and how this has evolved over time.

### **5.1 Trends in mid-career earnings for different education groups**

We start by studying the evolution of mid-career earnings across cohorts – adjusted for changes in CPI. As expected, women earn on average a much less than men over the entire period as shown in Figure 10. Women professionals have experienced a considerable increase in earnings across cohorts, but the corresponding development for men has been even stronger. In 2007 female 45 year old professionals earn as much as male professionals at 45 years of age earned back in 1990. The deep recession of the early 1990's is likely to be part of the explanation for the stagnating and falling real earnings for the 1945-1950 cohorts. The recovery of the economy and skill biased technical change are likely to be the reasons for the rapid growth of professional earnings from the cohorts born in the early and mid 1950's and onwards.

Figure 10: Annual earnings at 45, by education and gender (SEK thousand).

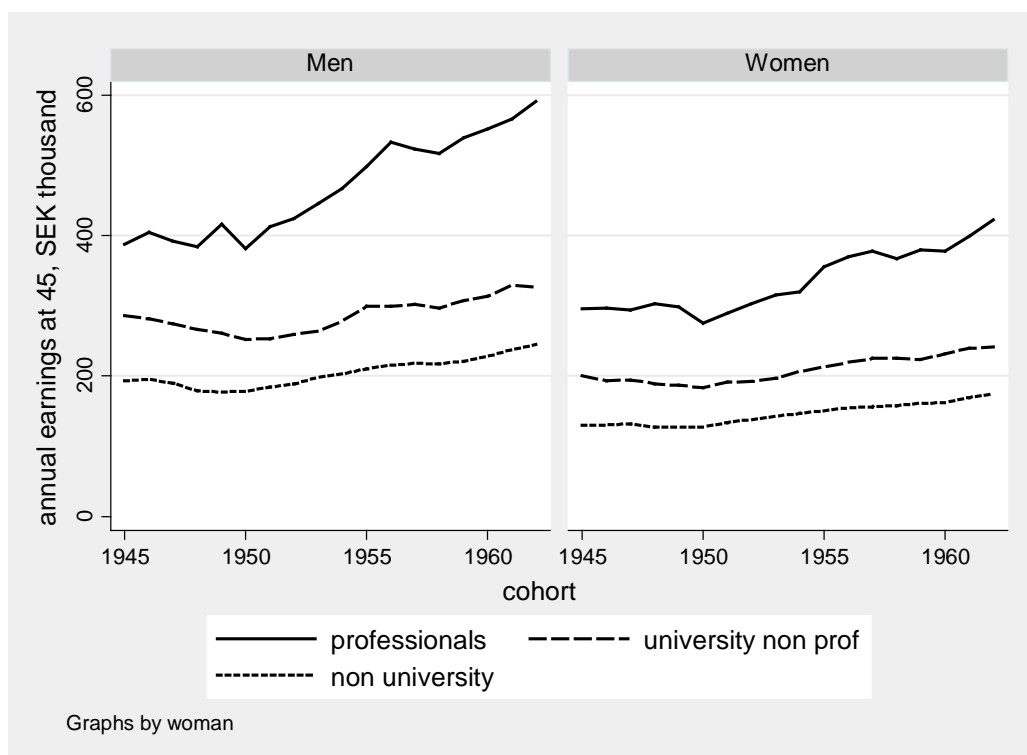
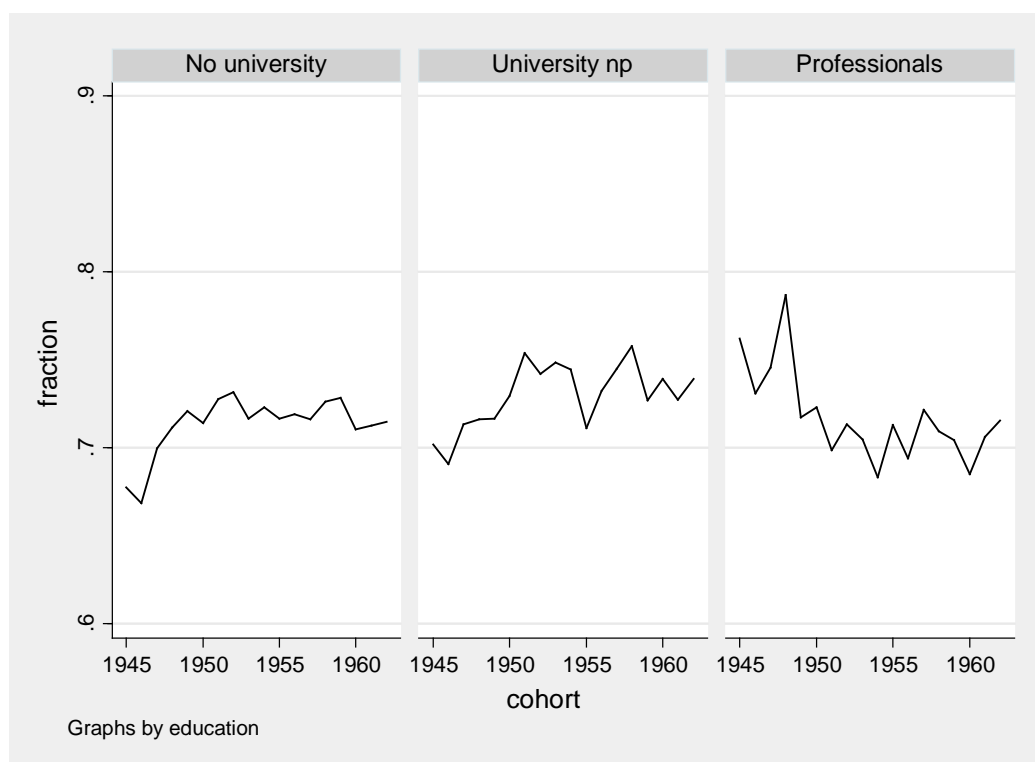


Figure 11 shows the development of the gender earnings gap by education group. The figure displays female average annual earnings as a fraction of male average annual earnings. Note, that we consider the average annual earnings of all men and women, including those that do not have earnings and including individuals working part time. While the ratio of female to male wages has been stable around 80 percent during the time period studied here (1990-2007), the ratio of female to male earnings at 45 shows a different development.<sup>15</sup> For non university educated and university non professionals, female earnings caught up with male earnings for the cohorts born in the late 1940's and leveled off at around 0.72. The relative earnings of female professionals show the reverse development and actually declined for the early cohorts and then leveled off at a lower level than for the less educated groups, all changes being statistically significant. This development is consistent with the emergence of a glass ceiling (Albrecht et al, 2003).

<sup>15</sup> See Figure 17 in the Appendix which shows the ratio of female to male wages for the entire economy for the years 1992-2007.

Figure 11: Gender earnings gap, by education



## 5.2 The earnings of singles and by spouse's education

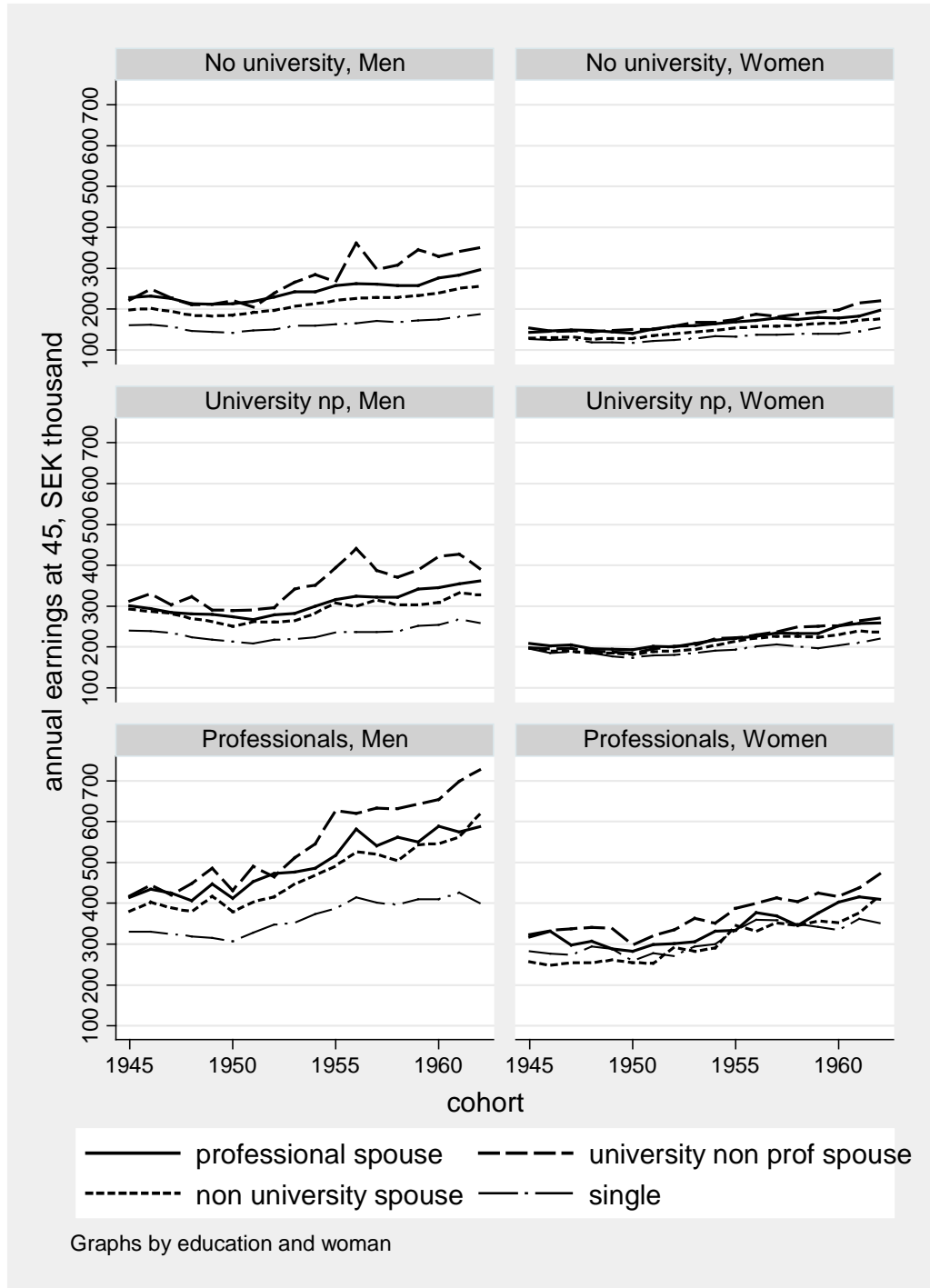
To what extent do mid-career earnings differ between those who do not have children and by the education of the spouse.<sup>16</sup> In Figure 12, the average mid-career earnings is plotted by own education for those who do not have children, i.e. singles, and by spouse's education for those who have children. A first striking observation is that single men have the lowest mid-career earnings, regardless of education category. With the exception of professionals, this is true also for women.

When we consider that university, and in particular, professional degrees to a higher extent lead to more career oriented occupations, Figure 12 shows interesting evidence of a presence of returns to household specialization for both men and women. For men, both university non-professionals and professionals have on average higher earnings when matched to a spouse with a university non-professional spouse compared to when

<sup>16</sup> There are few studies on earnings as a function of the characteristics of the spouse. One exception is Åström (2009). She studies Swedish married couples in the late 1990's and finds a positive spousal education gradient in earning for all men and for university educated women.

they have a spouse with a professional degree. For women, this is the case only for professionals.

Figure 12: Annual earnings, by cohort and spouses education (SEK thousand)



Another observation from Figure 12 is the extent of earnings compression for women relative to men. For women, the difference between the highest and lowest paid group is

less than SEK 100 thousand. For men, the difference ranges between SEK 150 thousand (non-professionals) to SEK 300 thousand (professionals).

We also see the increasing returns to education, primarily for men. Across cohorts mid-life earnings grow faster for those with a university degree than for those without. Men with children (i.e. with a spouse) have a particularly strong earnings growth. For women, the effect of spouse's education is less pronounced.

### **5.3 Changes in household specialization?**

We saw in Figure 12 that highly educated men and women matched to university non-professionals had higher earnings. In this section we consider what has happened to the spouses' contributions to their joint spousal earnings. As women have become relatively more educated also compared to their spouses over time, one can expect that within a couple, the spousal earnings gap (male-female) has decreased.<sup>17</sup> Figure 13 plots the development over time of the women's share of spousal earnings at mid-career. When we consider the households of men born between 1945 and 1962, their spouses' contribution ranges between slightly over 40% for non-university educated men to a little over 30% for the professional men throughout the sample period. Note that the spouses can be younger (or older) and can also have a different education level.

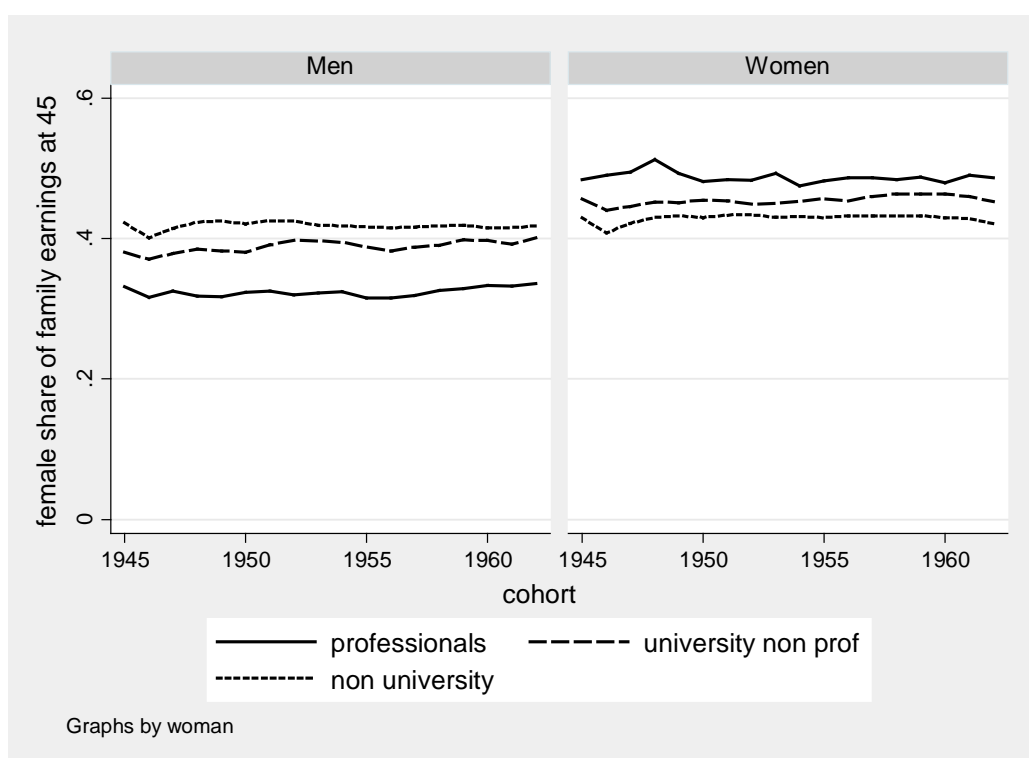
If we consider the households of women in the studied cohorts, the non-university educated women contribute a little over 40 percent of joint spousal earnings at mid-career. The professional women contribute almost 50 percent. However, the contributions are remarkably stable over time. We showed earlier that the spousal age gap has increased over the period. Hence, women's earnings are compared to the earnings of an on average older and older spouse. We have verified that the pattern remains as flat when we account for the changing age gap. Neither is there an overall trend if all educational groups are analyzed together.

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<sup>17</sup> While there exist several cross-countries studies of female share of family income (see e.g. Harkness, 2010, and Cancian and Schoeni, 1998) and studies with Swedish data on trends in spousal earnings correlations (see eg Henz and Sundström, 2001) as well as studies on the impact on wives earnings on inequalities in earnings in households (see e.g. Björklund, 1992), we are not aware of other studies on Swedish data on trends in female share in family income. For Norway, Mastekaasa and Birkelund (2011) report that the wives share of household earnings increased from 17% to 36% between 1974 and 2004.



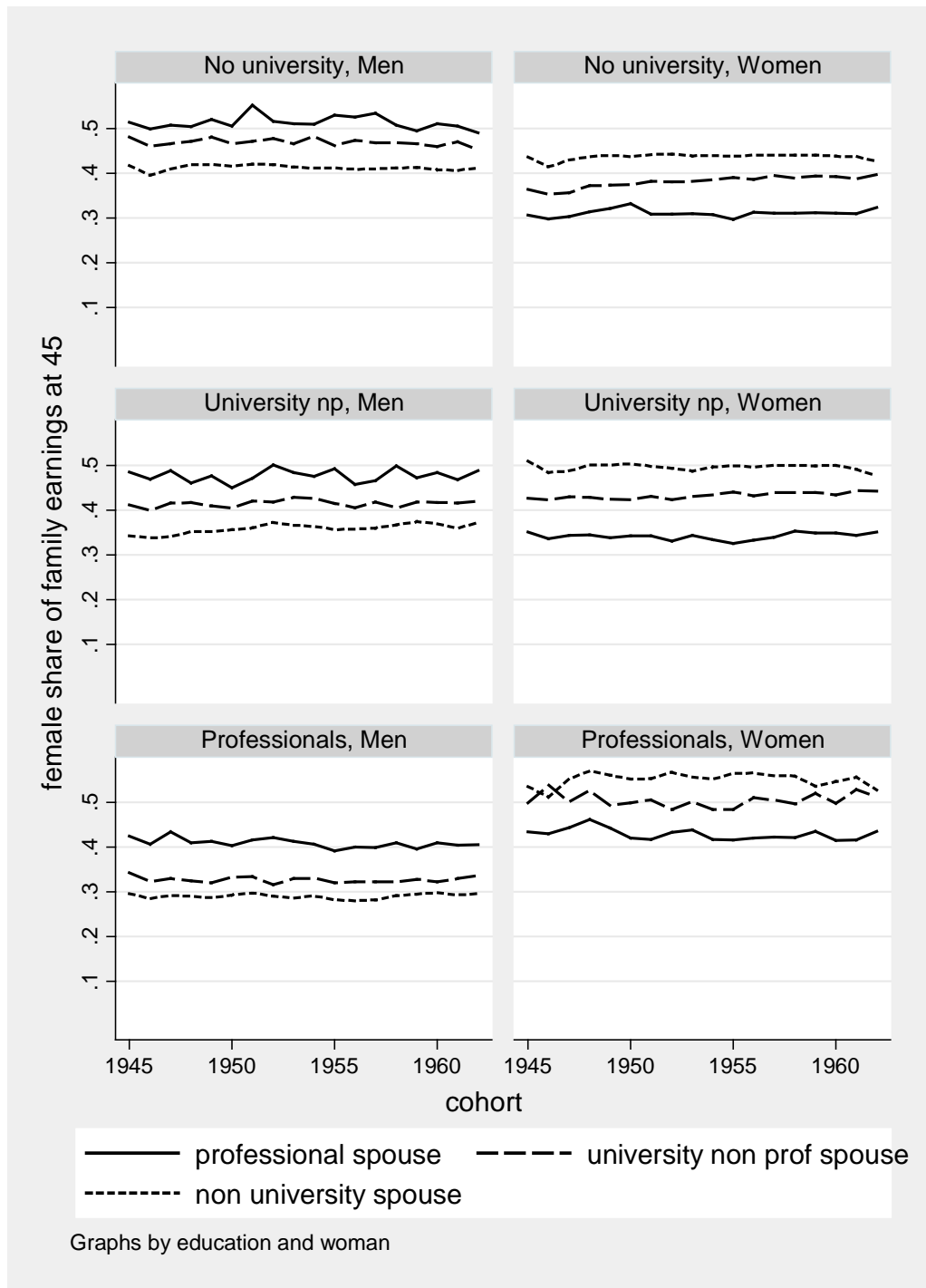
Figure 13: Female contribution to total spousal earnings



In Figure 14 we explore further the female share of total spousal earnings for our different educational groups by spousal education. In line with the results in Figure 13, remarkably little has happened even within match types. We have also explored if there are trends in the female share of total spousal earnings by number of children, using education categories based on percentile ranks in the education distribution and when using current spouse instead of the other parent of one's children. The absence of a trend is robust to all these alternatives.<sup>18</sup> It is tempting to put forth the idea of a societal norm regarding how spouses of different education should contribute to household earnings.

<sup>18</sup> These results are available upon request.

Figure 14: Female contribution to total spousal earnings by education group and spouse education



## 5.4 Trading-off or having it all?

To further explore how the family-career trade off has changed over time, we run regressions estimating how the association between children and earnings has changed over time. We estimate regressions of the following form:

$$Y_{45it} = a + \sum_{t=1945\dots 1962} \beta_t \text{children}_{45it} + \text{cohort}_t + \varepsilon_{it} \quad (1)$$

where  $Y_{45it}$  is annual earnings at age 45 of individual  $i$  in cohort  $t$ , and  $\text{children}_{45it}$  is a) the number of children at age 45 and b) an indicator variable taking the value 1 if the individual has any children at age 45 and 0 otherwise of individual  $i$  of cohort  $t$ . We also include cohort fixed effects.<sup>19</sup> We estimate cohort specific coefficients on fertility, i.e. the  $\beta_t$  for cohorts born 1945 through 1962. The regression is estimated separately for men and women and the three education groups, non-university educated, university non-professionals, and professionals. Since  $\beta_t$  is allowed to vary over time it will capture how the strength of the association between mid-career earnings and completed fertility has varied over time. It needs to be stressed that the relationship is not causal – earnings and fertility at 45 are outcomes of a joint decision. Results are presented in Figure 15, where the  $\beta_t$ 's are plotted with a standard 95% confidence interval. Panel a) displays the results when the number of children is included linearly. Panel b) displays the results when earnings are regressed on a dummy variable for having children or not i.e. the extensive fertility margin.

The results in panel a) show that women without university education face a clear trade-off between mid-career earnings and fertility throughout the time period, (all  $\beta_t$  are negative). For university non-professional women, it is noteworthy that the initial negative association between earnings and children decreases over time and even turns positive for the last cohorts although not statistically significant. For professional women the coefficients are imprecisely estimated and show no clear association between earnings and the number of children. For men in all education groups, fertility is positively associated with earnings, and increasingly so. For professional men the coefficient triples in magnitude over the time period. Compared to average earnings (in

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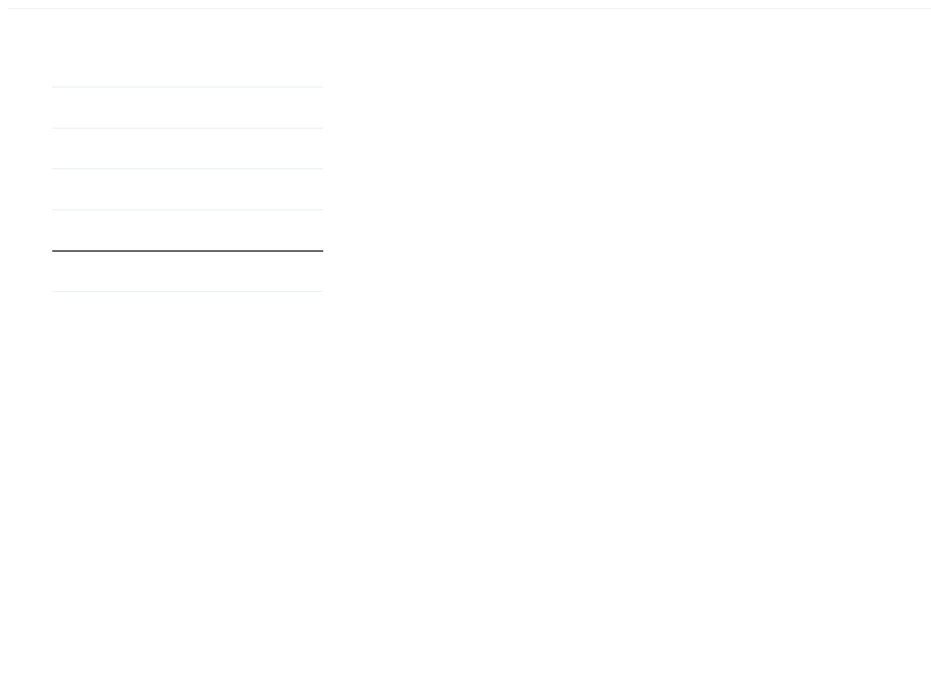
<sup>19</sup> Qualitative results remain unchanged when controlling for education and spouse education.

Figure 10) the coefficients correspond to 5 percent of annual earnings for the early cohorts and 10 percent for the last cohorts.

Panel b) instead shows the association between earnings and being a parent. For men there is an increasingly positive association between fatherhood and earnings. It appears as men are increasingly facing an all or nothing situation with strong complementarity between earnings and children. When considering women, while we saw a trade-off between the number of children and earnings for the early cohorts except for professional women, there is no trade-off between earnings and motherhood per se. Moreover, there is an upward trend in the association and for the late cohorts there is actually a statistically significant positive association between mid-career earnings and motherhood. For these groups, that constitute the vast majority of women, the association now resembles that of men and they can now have it all. The development for professional women deviates in that there is no upward trend in the association between family and career. Instead, for this group the relation displays high variability over time, and it is not obvious that these women face a trade-off at all.

Figure 15: Changes over time in the association between mid-career earnings and fertility

a) the total number of children



b) the extensive fertility margin

Note: y-axis scale in SEK thousand.

## 6 Conclusions

We have explored the trends in the family-career trade-off facing Swedish men and women born between 1945 and 1962 and their spouses. Several important patterns emerge. First, we find a rising trend in childlessness for men at all education levels. For women, there is instead a pattern of convergence such that the gap in childlessness between women with low and high education has narrowed. Together with rising education for women, this implies that the relative supply of educated men participating in the family market has declined over time.

These changes have come parallel to other altered family formation patterns of Swedish men and women. We find that the increase in the age at first child is similar across education groups. Furthermore, counter to the idea that spouses should have become more similar over time, we find an increase in the spousal age gap in all educational groups and an overall decline in educational assortative mating. Yet, these developments are possible to reconcile with increased assortative mating on some underlying productivity dimension and with the hypothesis of reduced returns to household specialization. Increased residual variation in earnings making education a worse predictor of future earnings capacity could make young individuals, in particular women, more inclined to wait until earnings capacity is revived.

We document a negative association between education level and average fertility for women. Although we find that fertility rises with education for men, the relation between average fertility and education is not very strong for men. Data show that the gender earnings gap for professionals actually grew wider, stabilizing around 70 percent for the cohorts born after 1950. For the other educational categories the earnings gap instead closed, stabilizing at around 72 percent.

In spite of changes in mating patterns and fertility we find that women's contribution to spousal earnings has remained stable regardless of education and spouse's education. It would appear as if little had changed over time. However, when we investigate the changes in the association of mid-career earnings and completed fertility it is clear that this association, which has always been positive, has grown stronger for men over time. Also, we find that the association between mid-career earnings and fertility is stronger for men than for women.

For less educated women, there is on average a negative association between the number of children and mid-career earnings, suggesting that the trade-off facing these women has not changed much during the time period studied. However, over time the association between motherhood per se and mid-career earnings has turned positive for this group. Increasing childlessness for those with poor earnings is likely to drive the result. The development of a positive association between motherhood and earnings is present also for university non-professionals. For this group, it is also the case that the initial negative trade-off between the number of children and mid-career earnings has disappeared over time. Interestingly, for professional women we find no significant positive or negative association between mid-career earnings and fertility.

Our starting point was that mid-career earnings and children are the outcomes of the life-choices of men and women. While high productivity on the labor market can generate high earnings and thereby affording a large family, it also implies high alternative cost for the time it takes to have and raise children. In particular, if higher alternative cost of time and higher income also induce individuals to substitute child quality for quantity the well-know negative relation between income and number of children may arise. For men, it seems clear that the income effect dominates. Increasing childlessness and the growing positive association between earnings and fertility suggests that increased earnings inequality goes hand in hand with increased fertility inequality. For women, the pattern is more complex. If anything we find reduced earnings inequality (relative to the development of men) and reduced fertility inequality across educational groups. A reason is that professional women appear to have traded-off some of their potential earnings gains for a (larger) family. There is an increased gender earnings gap and lower fraction of childlessness for professional women, at the same time as the opposite pattern is true for less educated women. While men increasingly either have all or nothing, life-choices of women have converged.

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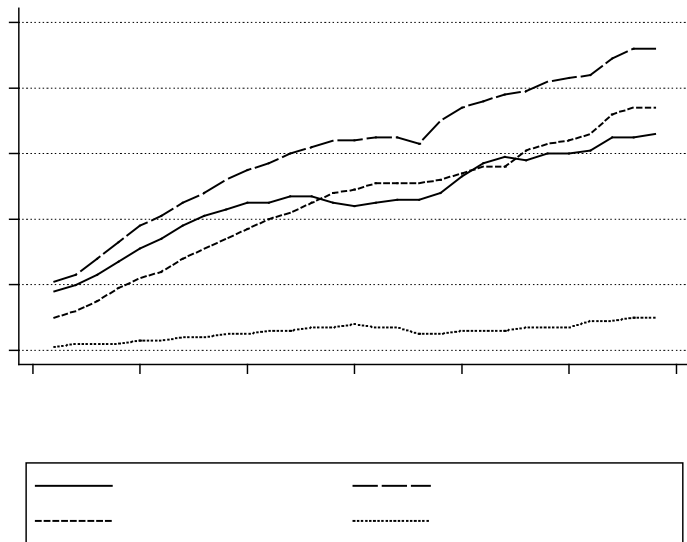
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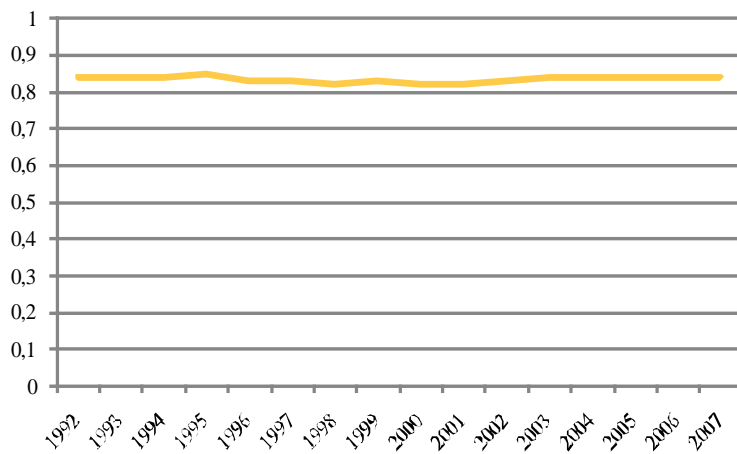
## Appendix 1

Figure 16: The proportion of children enrolled in subsidized childcare by age, 1976–2004



Source: National Board of Education (Skolverket)

Figure 17: The gender wage gap



Source: SCB

Figure 18: Ratio of fertility at 45 to fertility measured as late as possible, i.e. in 2007

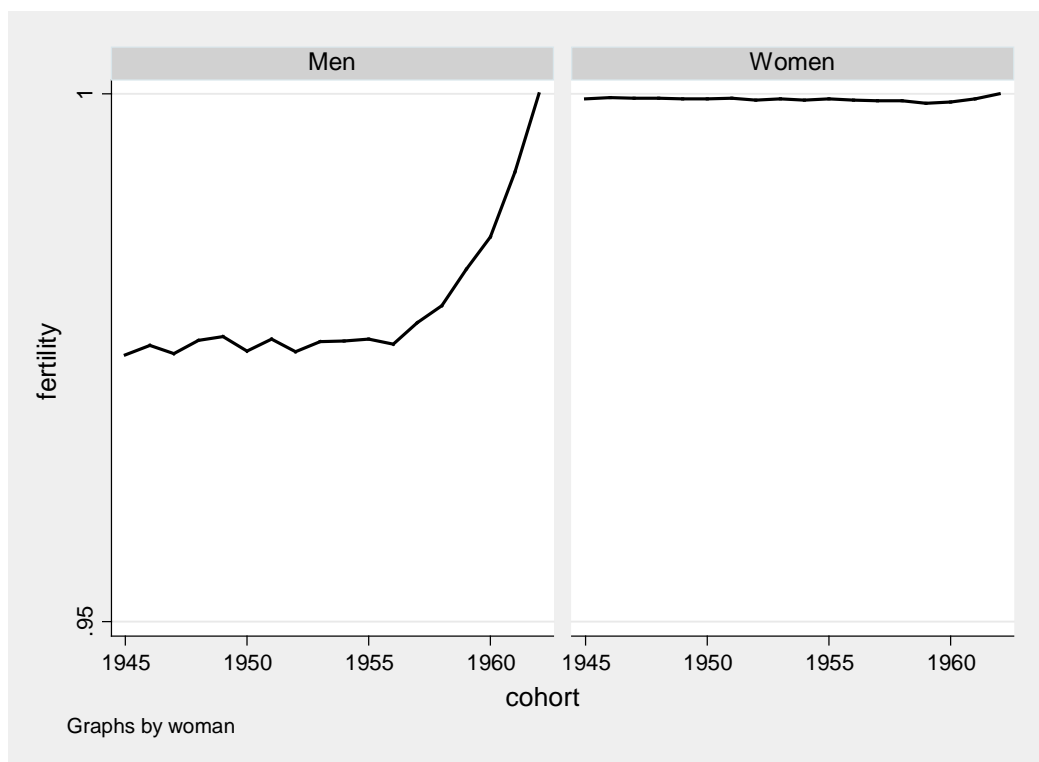


Table 3: Variable definitions and sources

Variable	Definition and data source
Spouse	Other parent of individual's first born child. <i>FlerGen</i>
Earnings at 45	Sum of annual earnings from employment and own business activity. LoneInk+Fink, 2007 prices. <i>Louise</i> .
Education	Highest education according to educations registers <i>HSUN, HSUN2000. Louise</i> .
University Professional  University non professional Non University	15+ years of education Law (in 380), Engineering (ni 547), Medicine(in 720), Business Administration (in 340) Other fields At most 14 years of education <i>HSUN, HSUN2000, (Sun2000in, Sun2000ni) Louise</i> .
Children at 45	Number of biological or adopted children at age 45. <i>FlerGen</i>

Figure 19: Childlessness across the education distribution

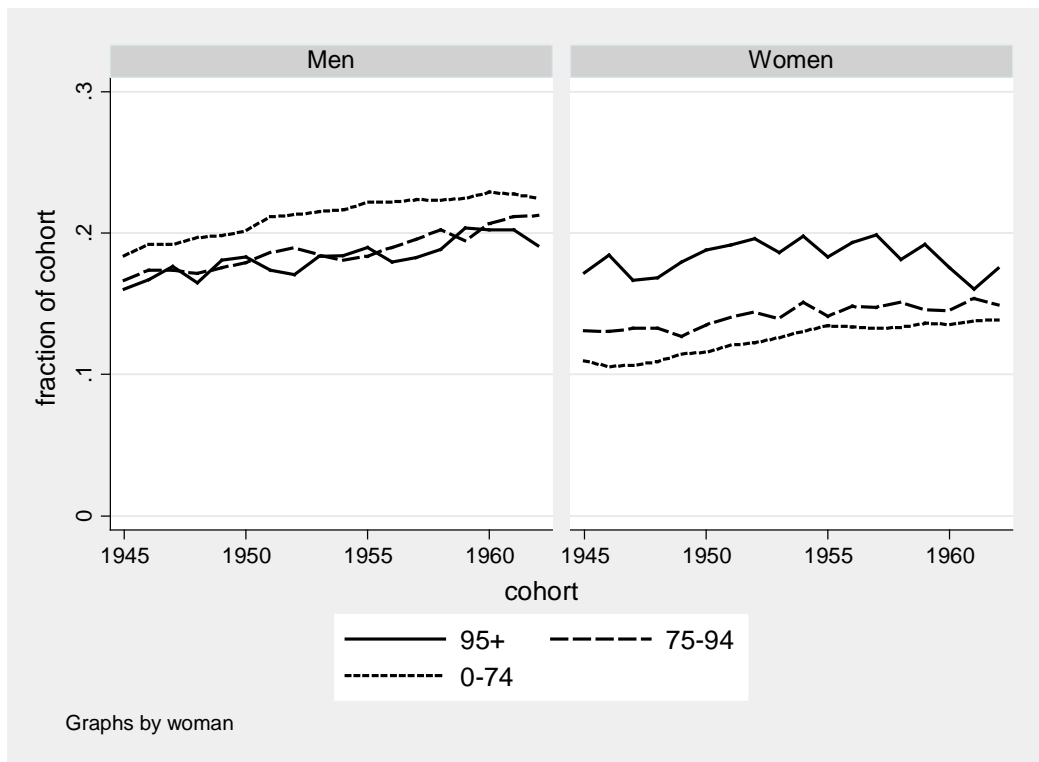


Figure 20: Age gap to spouse, for first unions for both spouses

