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Age Homogamy, Gender and Earnings: Sweden 1990-2009

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Abstract

Previous research has shown considerable marriage premiums in earnings for men, but often penalties for women of being in a union. In this study we extend this research by analyzing how the age difference between spouses affects the earnings profiles by gender. As we follow people over time in advance as well as within their marriage we can separate pre-marital from post-marital earnings movements. The data consists of information on annual earnings 1990-2009 for all Swedes born 1960-1974 (N=926,219). The results indicate that age-homogamy is related to higher earnings for both men and women, and that larger age differences are generally associated with lower union premiums, quite independently of which spouse is older. However, most of these results are explained by assortative mating, in which men and women with greater earnings potentials find partners of a similar age. Overall, the age-difference between spouses seems to have a limited causal effect, if any, on individual earnings.

Keywords: Age homogamy, age difference, wage gap, gender, earnings

Introduction

Gender differences in career outcomes, such as earnings, have received enormous attention both in the scholarly literature and in media and political circles because of their large implications for gender relations overall. Many theories and a vast amount of empirical research attempt to capture the causes of these inequalities in life conditions between men and women. Especially in economics, these inequalities are often attributed to the division of labor within the household and its implications for labor supply and wages (Albrecht, Edin, Sundström, and Vroman 1999; Edin and Gustafsson 2008; Light and Ureta 1995; Mincer and Polachek 1974; Polachek 1975). The gender division of labor is thought to originate from the reproductive roles of men and women, as childbearing promotes specialization according to comparative advantages (Becker 1981) and through bargaining over household labor (Lundberg and Pollak 1996; Manser and Brown 1980). Thus, small initial gender differences in household and labor market productivity are reinforced and can help to explain the gender gap in wages and earnings. Other explanations instead focus on discrimination against women in the labor market and other public spheres (see, e.g., Blau and Kahn 2000) or on male dominance at home (e.g., Hartman 1981).

Related to these explanations, it has also been argued that the age difference between spouses is an important cause of gender inequality in general, and of the gender wage gap in particular (Rothstein 2012; Polachek, Zhang, and Zhou 2015). In most western countries, women are 2-3 years younger, on average, than their spouses (Presser 1975; Atkinson and Glass 1985; Bergstrom and Lam 1989; Bozon 1991; Ní Brolcháin 1992; Van Poppel et al. 2001), which creates an advantage for the man in intra-household bargaining due to his longer work experience and stronger position in the labor market at union formation, implying a higher earnings potential. Although this advantage starts small, it grows with successive

bargaining in the household, ultimately creating gender imbalances in earnings, labor market attachment and status in general.

In this article, we study the association between age heterogamy and earnings for men and women in contemporary Sweden. Using registry-based data, and by following people over time both before union formation and within unions, we can separate pre-union from post-union earnings movements. This is important if we want to assess whether the association between spousal age difference and earnings is primarily due to selection into the union (i.e., that people of certain earnings thresholds tend to match according to specific age patterns), or if the association arises within unions and thus potentially could be casual, as argued in the literature. This approach is not experimental in the sense that the treatment (age difference) is randomized, which means that it is impossible to actually prove a causal effect in a strict sense. Nonetheless the analysis is highly valuable in being able to distinguish selection forces before union formation from the development of earnings within the union.

Our results clearly show that age homogamy is related to higher earnings for both men and women, and that larger age differences are generally associated with lower union premiums, quite independently of which spouse is older. These results do not support the hypothesis that (man-older) age heterogamy is an important explanation for the gender wage gap. They are also difficult to reconcile with standard economic and sociological theories focusing on intra-household bargaining and relative resources. Instead, it seems that men and women with high earnings potentials sort themselves into age-homogamous unions, while there is no direct (causal) impact of age heterogamy on individual earnings.

Background and hypotheses

Marriage or cohabitation not only affect immediate family life but may also have long-term economic effects. A large number of studies of Western populations have shown that married

men earn more than unmarried men, but the same result does not hold for women (Korenman and Neumark 1991, 1992; Nakosteen, Westerlund, and Zimmer 2004; Nakosteen and Zimmer 1997; Richardson 1997). Women often experience a marriage penalty that is at least partly connected to the adverse effects of children on earnings (e.g., Hill 1979; Budig and England 2001; Loughran and Zissimopoulos, 2009; Budig and Hodges 2010; Ginther and Sundström 2010; Staff and Mortimer 2012) or labor supply (Angrist and Evans 1998). The extent to which the marriage premium for men is related to the selection process into marriage or to marriage actually causing men to become more productive is still under debate, despite considerable attention devoted to this issue in previous research (Akerlof 1998; Chun and Lee 2001; Ginther and Zavodny 2001; Nakosteen, et al. 2004; Nakosteen and Zimmer 2001). However, it is not only marriage as such that might have an impact on the earnings of men and women but also the characteristics of the partner. There is extensive research on the patterns and development of assortative mating in terms of education, earnings, ethnicity, and age in the marriage market (e.g., Mare 1991; Björklund 1992; Kalmijn 1998; Smits, Ultee, and Lammers 1998; Henz and Sundström 2001; Birkelund and Heldal 2003; Blossfeld and Timm 2003; Henz and Jonsson 2003; Schwartz and Mare 2005). More recently, there have also been efforts to connect partner selection to earnings, especially in regard to ethnic endogamy (Meng and Gregory 2005; Meng and Meurs 2009; Dribe and Nystedt 2015; Elwert and Tegunimataka 2016) but also for educational homogamy (Dribe and Nystedt 2013). A recent study on the U.S. also shows that individuals married to a spouse of a similar age earn more (Mansour and McKinnish, 2014), which is in line with the results presented in this study.

While some previous research has examined both age homogamy and the marriage premium in earnings, few efforts have been made to connect the two in analyzing the impact

of the spousal age gap on the career development and earnings profiles of men and women. There are several reasons why the age of the partner could be important in this respect.

In the historical and sociological literature, age homogamy is often connected to gender equality and marital quality (e.g., Presser 1975; Mitterauer and Sieder 1982; Atkinson and Glass 1985). In the past, man-older heterogamous couples were characterized by male dominance (patriarchy) and an overall lower quality of married life, including sexual relations (e.g., Mitterauer and Sieder 1982: 65-66; Van Poppel et al. 2001; Van de Putte et al. 2009). In fact, the trend in several Western countries toward greater age homogamy between pre-industrial and industrial society (Vera, Berardo, and Berardo 1985; Berardo, Appel, and Berardo 1993; Van Poppel et al. 2001; Esteve et al. 2009; Van de Putte et al. 2009) has been interpreted as a sign of the declining importance of instrumental aspects of partner selection and the greater importance of romantic love and a trend toward greater equality between spouses (Shorter 1975; Van de Putte et al. 2009). As shown in Figure 1 there is no similar downward trend in Sweden after 1870, but there might well have been such a development towards more age homogamy in the preceding period (see Van Poppel et al. 2001 for a similar increasing trend during the first decades of the twentieth century following the decline from 1850). The fact that greater age heterogamy in favor of the man might have been associated with patriarchal household dominance in the past does not automatically translate to modern conditions. Nonetheless, it is indisputable that more patriarchal societies with a strong patrilineal kinship structure also have larger age differences between spouses (man older) than less patriarchal societies (Casterline, Williams, and McDonald 1986). However, it does not immediately follow from such evidence that greater age heterogamy within a certain context (time and place) must be associated with greater gender inequality (see, e.g., Ní Brolcháin 1992).

The average age difference between spouses in most western countries is approximately 2-3 years for first marriages (Presser 1975; Atkinson and Glass 1985; Van Poppel et al. 2001). Figure 1 depicts the average age difference at first marriage in Sweden from 1871-2010 together with the corresponding figures for a couple having their first child from 1970-2010 (Statistics Sweden 2012; see also Bergstrom and Lam 1989). Sweden fits the traditional pattern well; since the turn of the nineteenth century, men are 2-3 years older than their spouses on average. Most first births in contemporary Sweden occur out of wedlock, but there is a close correspondence between the age differences for marriage and parenthood during the period for which information on first births is available (i.e., 1970-2010). Although the age differences between partners seem rather fixed, age at first marriage/birth varies over time and increased rapidly during the last decades. For instance, average age at first birth increased from 24 to 29 for women between 1970 and 2010, whereas the corresponding increase for men ran from 27 to 32.

It has been argued that by being older than their spouses men have a better bargaining position because they are more strongly attached to the labor market at union formation and have a higher earnings potential (Rothstein 2012; Polachek et al. 2015; see also Rothstein 1999, 2005; Halleröd 2005). Consequently, women would start losing intra-household negotiations over household work, labor supply, etc., which would further weaken their bargaining position. In the long run, the initially rather small differences in bargaining position would widen, which could explain the weaker position of women in society generally, and in the labor market more specifically. Overall, this explanation fits well into the economic literature on household bargaining more generally, which suggests that the more outside options an individual has, the greater the individual's influence over the allocation of time in the household (Lundberg and Pollak 1996; Blundell et al. 2007).

Similarly, in sociological resource theory, outcomes such as the division of household labor and labor supply depend on the relative resources of the partners (Blood and Wolfe 1960; Edwards 1969; Brines 1993; Shelton and John 1996). The partner with the most resources in terms of income, education or occupational prestige is usually assumed to be able to negotiate away housework and child care and specialize in market work. There is also some empirical support for the hypothesis that a smaller income gap between spouses is related to a more equal division of housework, although the effect seems to be quite small and often is bigger for women than for men (Bittman et al. 2003; Evertsson and Nermo 2004, 2007; Halleröd 2005).

Figure 1 here

For these reasons, women who are married to older men could be expected to have lower earnings than homogamously married women because of a lower labor supply and lower wages, which follow lower investments in market-skill formation and instead a greater responsibility for home production. However, this result should also mean that women who are married to younger men should have higher earnings than the homogamously married. Moreover, because the entire explanation is based on age-related productivity differentials, the effects should be similar for men, i.e., men married to older women should have lower earnings than the homogamously married, while those married to younger women should have higher earnings.

However, within gender theory it has also been argued that people who cross boundaries, e.g., by the woman earning more than her husband, compensate by filling traditional gender roles in other parts of the union (Berk 1985; West and Zimmerman 1987; Brines 1994; West and Fenstermaker 1995; Greenstein 2000). Accordingly, men who earn less than their spouses may reduce their contribution to unpaid housework as a manifestation of their gender (Brines 1994; Bittman et al. 2003; Evertsson and Nermo 2004; Halleröd

2005). This hypothesis could also explain why women with similar, or even higher, status (income or education) than their husbands still do more housework. In terms of spousal age differences, it could also imply that woman-older heterogamy is not associated with better career opportunities and higher earnings for women, as we would expect from a bargaining perspective, but with a more traditional division of labor and thus lower earnings.

It is also possible that age homogamy could be beneficial to the careers of both men and women because they can draw upon each other's networks and benefit from their mutual understanding of the demands of working life. Although these types of effects are likely of greater importance in terms of educational homogamy (cf. Benham 1974; Bernasco 1994), it cannot be ruled out that similar mechanisms could also be at work in terms of age differences

To sum up, we can formulate three different hypotheses:

1. According to bargaining theory and relative resource theory, being older than one's partner is associated with higher earnings than being of the same age (1a). Being younger than one's partner is associated with lower earnings than being of the same age (1b). This is true for both men and women (1c).
2. According to gender theory, earnings of women in woman-older couples are expected to be lower than earnings for women in age-homogamous couples.
3. According to the mutual career perspective, age homogamy is associated with the best earnings prospects for both men and women.

Methods

The main problem in studying effects of partner characteristics is the endogeneity of partner choice. Assuming that there is at least some sharing of resources within the household, individuals will look for a partner who maximizes their joint productive potential; therefore, marital sorting may create an association between age heterogamy and earnings without a

causal effect. In the quite extensive literature on the overall marriage premium, where a similar endogeneity problem exists, this issue has been addressed by using either fixed-effects estimations (e.g., Korenmark and Neumark 1991; Richardson 1997) or some type of quasi-experimental design (e.g., Ginther and Zavodny 2001; Krashinsky 2004; Ginther and Sundström 2010). In the standard fixed effects approach, the earnings specification is assumed to contain unobserved, *time-invariant* individual characteristics captured by the fixed effects. Whereas this procedure effectively handles selection processes according to permanent characteristics (e.g., that inherently more productive men are more likely to be married), it cannot address the impact of characteristics that change over the life course, for instance, when individuals develop through adolescence and early adulthood into mature adults. Both labor and marriage market success could be outcomes of such a process, which calls into question the validity of traditional fixed-effects models in estimating earnings premiums.

In this study, we instead use distributed fixed-effects models (Dougherty 2006; see also Dribe and Nystedt 2013, 2015; Elwert and Tegunimataka 2016) to allow for these kinds of changes over the life course in unobserved characteristics that could influence both partner selection and earnings. The model can be written as:

$$\ln Y_{i,t} = \sum_j \beta_j x_{j,i,t} + \sum_{p=-s}^s \gamma_p M_{i,t}^p + \alpha_i + \varepsilon_{i,t}$$

where $Y_{i,t}$ is earnings, and $x_{j,i,t}$ is the vector of observed covariates j for individual i at time t . Being in a union is indicated by a set of dummy variables, M_{it}^p , which capture the time to/since union formation, where p represents years in the union if positive, and years before union formation if negative. α_i is a factor picking up unobserved, time-invariant individual characteristics (washed out in the fixed-effects estimation), and $\varepsilon_{i,t}$ is the idiosyncratic error term. This model essentially adds a new time dimension when estimating the union premium, allowing us to compare the earnings development at the individual level before and after

union formation. We compare earnings at each point in time in relation to union formation, with the reference point 10 years before union formation. In essence this implies that 10 years before union formation, people who are to form a union are assumed to be similar to people, who never form a union (at least during the period of observation) in terms of the aforementioned maturity level. From the fixed effects construct it follows that all time-constant factors at the individual level are controlled for when we compare the earnings development for each individual in relation to the time of union formation. It should be noted that the distributed fixed-effects model of the union premium is just an extension of the traditional fixed-effects model (merely indicating whether an individual is in a union or not) in which the union indicator has been subdivided into finer segments. From this perspective the traditional model could be viewed as a special case of the distributed fixed-effects model where the “time to/in a union” indicators have been aggregated into a simple dummy variable indicating whether an individual is in a union or not.

In this study we are not primarily interested in the overall union premium, but the premium related to age heterogamy. In other words, we want to study the earnings of individuals partnering with spouses of different ages compared with the homogamously partnered. To do this, we estimate the following model:

$$\ln Y_{i,t} = \sum_j \beta_j x_{j,i,t} + \sum_{p=-s}^s \gamma_p M_{i,t}^p + \sum_{p=-s}^s \delta_p H_{i,t}^p + \sum_{p=-s}^s \rho_p L_{i,t}^p + \alpha_i + \varepsilon_{i,t}$$

where $M_{i,t}^p$ denotes the time to/since union formation, and the corresponding H and L dummy vectors denote the time to/since union formation for individuals with an older and a younger partner, respectively. Hence, whereas γ_p gives the time profile of the union premium for age homogamy, δ_p and ρ_p give the *additional effect* of having an older or younger partner, respectively. In this analysis, we refer to these parameters as the *heterogamy premiums*, because they show the individual earnings premiums relative to the homogamously partnered.

Positive values indicate a larger union premium than for homogamy (or smaller penalty), while negative values indicate the opposite.

Thus, we address the endogeneity of age heterogamy for earnings by separating out the part of the premium originating before union formation from that emerging within the union. No positive earnings development before union formation but a strong increase thereafter would be indicative of a causal effect of the age difference. However, it should be emphasized, once again, that this approach is not equivalent to an experiment with well-defined identification mechanisms in which the treatment, in this case being in a union with a partner of a certain age, can be viewed as truly randomized. Instead, we base our conclusions on earnings profiles in relation to the time of union formation.

Data

We use data from the population registries maintained by Statistics Sweden, including the entire population residing in Sweden. Data from a number of different registries are linked together to study the earnings development for the birth cohorts of 1960–1974 during the period from 1990–2009, for which we have full information on income, level of education, and municipality as well as basic demographic measures such as the presence of children in each household. The considered birth cohorts are followed from 20–30 years of age (in 1990–1994) until they are 35–49 years old (in 2009).

Non-marital cohabitation is a common form of union also among parents in contemporary Sweden. For instance, an overwhelming majority (75%) of all children, (below age 18), live with both their parents, but more than half of all births since 1993 took place outside marriage (Statistics Sweden 2013, 2014). This clearly indicates that cohabitation often is a stable form of union, and raises doubts about limiting a study of this kind to the formally married. Beginning in 1990, the Swedish population registries record non-marital

cohabitation in cases where the couple has common children (based on information about residence at the house-unit level; *fastighet*). To capture long-term commitment in union formation, we include in our definition of partnership both formal marriages and non-marital cohabitation with common children, which we believe is the most relevant indicator of a stable partnership in the Swedish context. In a separate analysis we also show that our results are not sensitive to how we define a union (only legally married, only people in cohabitation with common children, or both combined). Our core sample consists of people who either form a union, or live without a partner during the sample period. To observe union formation, ever-partnered individuals in 1990 have been excluded. Because we estimate a distributed fixed-effects model with a maximum time lag and a lead of ten years, we delete observations outside of this range for people who experience union formation. As we focus on the estimation of age heterogamy, and to avoid influence of underlying cultural variations in union formation characteristics and earnings patterns, immigrants and second-generation immigrants are excluded as well as all observations for people partnered with a first or second-generation immigrant. Further, people are censored upon union dissolution, implying that we only study individuals before, and within, their first partnership (it could be a second partnership for the partner, however). In the sensitivity analysis we exclude the ever divorced, as well as limit the analysis to cases where it is the first partnership for both partners, which do not alter the conclusions.

Age homogamy is defined as the man being 0-3 years older than the woman, man-older heterogamy is when the man is more than 3 years older, and woman-older heterogamy is when the woman is older than her husband. The reason for this categorization is that men are on average 2-3 years older than their partners. In a more detailed analysis, we also look at the overall union premiums across different age-difference groups. Then homogamy is defined as both partners being born in the same calendar year and eight heterogamy categories

are constructed symmetrically around this according to whether the partner is 1-2, 3-5, 6-9 or ≥ 10 years younger or older. The increasing range of the age spans with distance from homogamy is due to decreased density of observations, i.e. people in unions where the woman is older.”

We have no information on hourly wages (or hours of work), which, under the assumption that labor markets are competitive, are commonly used as a measure of productivity. Instead, we use annual earnings, which in principle is a product of hourly wages and time spent working. Under the assumption that household division of labor implies that men specialize in market work and women in household work, making men both more productive as well as spending more time performing market work, earnings, rather than wages, should capture both effects. Earnings are defined as annual income from employment, self-employment, parental leave benefits, unemployment insurance, and sickness leave benefits. Disbursements of the last three of these sources of income are taxable and are based on earnings. Together with income from employment and self-employment, they yield a measure of labor-related income. Including these benefits serves the purpose of smoothing temporary earnings shifts due to sickness, unemployment or parenthood and is a more valid measure of overall market productivity potential than pure labor earnings. Our sensitivity analysis shows that the results are very robust to changes in the definition of earnings (i.e. excluding social benefits).

To focus on people who have already obtained a certain degree of attachment to the labor market, we impose an earnings restriction on included observations of at least two price base amounts (PBAs). The PBA is a measure that is commonly used in Swedish law to define benefits and public insurance terms. It strictly follows the consumer price index over time. In 1991, the PBA was SEK 32,200 and in 2009, it was SEK 42,800. Hence, the individuals in the included observations, expressed in current (2009) values, have an income of at least SEK

85,600, which is equivalent to a gross monthly salary of approximately US\$1,100 (2009 average exchange rate). It should be noted that this amount is a very low salary in Sweden. There are no legislated minimum wages in Sweden nor in any of the other Nordic countries. Instead, wages are subject to bargaining between employers and trade unions, and the resulting effective minimum levels are among the highest in the world (Skedinger 2008). A study of seven major labor market negotiation sectors in 2004 showed that the lowest monthly full-time salary was SEK 12,790 (Skedinger 2006). On an annual basis, two PBAs were equivalent to 51% of this amount. In other words, our income restriction excludes individuals whose attachment to the labor market is so weak that their total earnings do not exceed the revenue from working half time at the lowest wage. As shown in the sensitivity analysis, the results are robust to changing these cut offs.

Our initial sample of native Swedes born 1960-1974 and present in Sweden 1990 and later includes 710,000 men and 670,000 women. 93,000 men and 96,000 women are excluded because they marry an immigrant, and an additional 98,000 men and 147,000 women are excluded because they marry before 1990. 700 men and 1,400 women are excluded because they are students throughout the observation period, and 7,000 men and 10,000 women do not meet the income threshold. In total, this leaves us with about 510,000 men and 410,000 women in the analytical sample, for which we have a total of 7 million (men) and 5.2 million observations (women), respectively. In the sensitivity analysis where we limit the sample to those whose partners are also in their first partnership 34,000 men and 30,000 women are excluded.

We control for educational level classified in five categories as recorded in the educational registry, ranging from “ ≤ 9 years” to “ ≥ 3 years of university” (students are excluded from the analysis) and the presence of children of different ages (0-2, 3-6, and 7-15 years) because these factors affect labor supply and earnings. We also analyze whether our

results vary with education (aggregated into three broader categories: basic up to 9 years, high school, and university). To account for broader geographical differences, we include type of municipality according to the categorization made by the Swedish Association of Local Authorities and Regions (SKL), which is commonly used in regional analyses. It captures both population density and character of the municipality in 9 categories (metropolitan cities, metropolitan suburbs, big cities, commuter, rural, manufacturing, other >25,000 inhabitants, other 12,500-25,000 inhabitants, and other <12,500 inhabitants). It is necessary to control for age to avoid mixing up age effects and effects of time to/from union formation. We include both age and age squared to capture non-linear dependencies. Hence, a basic assumption in the empirical model (as in many other models including age as an explanatory variable) is that there is an underlying age effect on earnings common to all people. In the fixed effects framework this age effect is isolated and identified via estimation on all included individuals regardless of whether they form a union or not during the studied time period. Controlling for age, the additional effect of union formation (or time in/to union formation) is identified via changes in the union formation indicator, which obviously pertain to people forming a union but not to people who never enter a union. Hence, one could think of our estimations as isolating the effects of age and time to/from union formation in consecutive layers, though the actual model parameters are, of course, estimated simultaneously. First, an underlying age effect is controlled for, and identified by, changes in age among all individuals. Second, and given this age effect, a general union (or time to/from union) formation effect is identified and estimated for people who form a union. Third, and at the core of our study, the additional effects of age heterogamy are identified among the subgroups of people getting married to an older or younger spouse.

Results

Table 1 shows the descriptive statistics of the sample. Approximately 13% are in homogamous unions when defining homogamy in the most restrictive manner as being born in the same year. As expected, it is much more common for men to be older than their partners than the other way around. Approximately 66% of the men are older than their spouses, and 38% are more than 2 years older. Among women, only 7% are more than 2 years older than their husbands.

Table 1 here

Table 2 displays the total union premiums by age difference estimated by ordinary least squares and traditional fixed effects (FE). Looking first at the OLS estimates for men in panel A, the premium is largest among the homogamously partnered, and then it declines with larger age differences. The FE estimates are smaller, but the basic pattern is the same, with the largest premium for homogamy and then lower premiums, or no premiums at all, for heterogamy. What is most striking, and most unexpected, is that the premiums are more or less the same regardless of whether the man is older or younger. For example, a man who is 3-5 years older than his partner has the same premium as a man who is 3-5 years younger (0.025 vs. 0.028).

For women, the picture is very different. In the OLS estimations there are positive union premiums, but much smaller than for men. In the FE estimates, however, there is no overall union premium but a penalty. As will be made clear later, this can be explained by lower earnings in the years immediately following union formation and could be a result of a low labor supply in conjunction with childbearing. The penalty is lowest for the homogamously partnered and highest for women with much older husbands (6 years or more). Thus, it is also most beneficial for women to be homogamously partnered, as was the case for men as well.

Table 2 here

Looking at the pattern by education reveals some interesting differences, although homogamy is still associated with the highest premiums (results based on separate FE estimations by education group). In the highly educated group, men are clearly better off being the older partner than the younger when comparing the same age difference groups, while this is clearly not the case among men with the least education. For women, the pattern is less clear. In the high education group, heterogamy seems to be associated with greater union penalties if we go outside normal age differences, while there is no coherent pattern in the two lower educational groups.

As has been stressed in many previous studies, the likelihood of heterogamy varies with age at union formation (e.g., Bozon 1991; Ní Bhrolcháin 1992; Esteve et al. 2009). It also seems plausible that any influence of heterogamy on labor market outcomes could also depend on age at union formation. For instance, the relative importance of labor market attachment for initial negotiating positions may decline with age because both parties have had more time to establish themselves on the labor market. For these reasons, it seems relevant to look at the heterogamy premiums when taking age at marriage into account. The last rows of Table 2 show that age homogamy is connected to the highest premiums for men regardless of age at marriage. Among the heterogamous, it seems more beneficial, given the absolute level of the age difference, to be partnered with an older woman for those entering the union before 30, while the direction of the age difference does not matter for those partnering after 30. For women, we find the lowest penalty among the homogamous in both age groups. Among the heterogamous women, being younger than the man is connected with a larger penalty for women partnering late but not for women partnering early.

As discussed previously, these types of estimates do not consider time-varying unobserved heterogeneity, which could bias the results. Figure 2 shows the distributed fixed-effects estimates of the overall union premium. The development of this premium in advance

of union formation is rather gender neutral. The year before the partnership is formed, men and women earn premiums of approximately 0.11 and 0.08, respectively (because the dependent variable is log earnings, this result is approximately equal to 12% and 8%, respectively). For men, this positive development continues within marriage, and after approximately 10 years in the union, the premium is 0.25, which is quite substantial (more than 25%). That almost half of this premium is already evident at the time of union formation highlights the endogeneity of partner selection. Men on a steeper earnings trajectory are more likely to marry, which explains a considerable part of the union premium. This positive earnings development post union formation might be connected to either a higher labor supply of men in unions or to better wage development due to spousal support, network transfers and social capital, or possible discrimination against single men in the labor market.

Figure 2 here

Turning to women, the pattern after union formation is completely different. There is a sharp decline in earnings during the first years of a partnership, which is connected to a lower labor supply following childbearing and possibly slower wage growth. There is some recovery, but overall, women in unions do not earn more 10 years after union formation than they did one year before. This result also explains the union penalty we found in the fixed-effects estimates.

Looking at the impact of age heterogamy, Figure 3 shows the heterogamy premiums (additional union premium of heterogamy compared with homogamy) for men and women using the broader definition of homogamy (man being 0-3 years older). A heterogamy penalty emerges in advance of the union and the year preceding it amounting to approximately -0.04 regardless of the direction of the age difference. After 10 years in a union, heterogamous men more than 3 years older than their wives earn approximately 8% less than comparable homogamous men. The corresponding figure for men in woman-older unions is 4%. The fact

that the whole difference in the latter case is already visible at union formation shows that it is entirely explained by selection. For men in man-older unions, the decline continues within the partnership. Nonetheless, also in this case, approximately half of the difference came before union formation, again highlighting the importance of selection processes.

Figure 3 here

For the earnings development of women, age differences play a lesser role. Being in a man-older union implies an additional penalty of approximately 3% compared with homogamy, and in man-younger unions, this figure is 2%. In both cases, however, the entire difference emerges before union formation. It is interesting to note that women partnered with younger men have less negative development the first years after union formation compared with homogamous women, which might be connected to a more equal division of domestic work and time with children. It can also be noted that for both sexes, man-older heterogamy is related to slower earnings development than woman-older heterogamy.

Figure 4 displays union premiums for a number of more detailed age-difference groups (based on separate distributed fixed-effects models for each age-difference group). From Figure 4A, it is evident that men in age-homogamous unions earn a higher premium than other men. After 10 years in a union, their premium amounts to approximately 0.3 on the log scale. The premium one year in advance of union formation is approximately 0.13, showing that slightly less than half the final premium has already emerged before entering the union. However, the most striking feature of Figure 4 is the consistent negative association between age heterogamy and earnings. The lowest marriage premium after 10 years of partnership is found for men who are partnered with women at least 10 years older *or* younger. Next in turn are men in unions with women 6-9 years older or younger, 3-5 years older or younger, and 1-3 years older or younger. This result clearly indicates that it is the age

gap as such, and not its gender distribution, that is related to slower earnings development for men.

Figure 4 here

The corresponding pattern for women is shown in Figure 4B. The union premium increases before union formation, reaching approximately 5% one year before entering the union, and then decreases the first few years in the partnership (becoming negative for all age-difference groups one year post union formation). Women's union premium then increases to levels comparable to those obtained just before union formation. Though the variation is much less pronounced, the ranking of the premiums after 10 years in a union is identical to the pattern found for men, which means that the premiums decrease with the absolute value of the age gap. For women, this pattern qualitatively resembles the results found in a study using Danish data (Drefahl 2010) in which it is shown that age homogamy is beneficial for wives in terms of mortality (i.e., the closer in age a married woman is to her husband, the lower her mortality risk). For men, however, the mortality risk continuously increases with the age of the partner (i.e., the younger the spouse, the smaller the mortality risk).

Now turning to earnings development within a partnership, Figure 5 shows the earnings development subtracted by the premium obtained one year before union formation. For men (Figure 5A), the age gap pattern qualitatively remains unchanged, as the age gap is also negatively related to earnings development within a marriage. For women (Figure 5B), the earnings profiles within a partnership are highly similar regardless of the spousal age gap, indicating that any differences in earnings between the groups are due to selection into the union.

Figure 5 here

Thus, there seems to be strong assortative mating according to age, with men and women on steeper earnings trajectories finding partners of similar ages to themselves. For

men, this pattern continues after union formation insofar as the earnings profile is steeper with a smaller age gap. For women, earnings development within a marriage seems to be completely unrelated to the age gap.

Sensitivity analysis

Our baseline results presented above were based on several sampling criteria. To check the robustness of the results to changes in these criteria, a number of sensitivity analyses were performed (results are not shown but are available upon request). Models on the overall union premium were estimated for only cohabiters, only married, excluding all ever divorced (divorcees are censored in the baseline estimates), and including intermarriages with foreign-born individuals. The results obtained were similar and substantively the same as for the baseline estimates, but the earnings drop following union formation was somewhat less pronounced among married women compared to cohabiting women. This is most likely explained by the fact that not all women get a child soon after marriage, which, by definition, is the case for the cohabiters in our sample. We also ran a series of sensitivity analyses to check the robustness of the results in relation to different income measures and cutoffs. We estimated models excluding all social transfers (parental leave, unemployment benefits etc.) and only excluding parental leave. In both cases, the results were also highly similar to the baseline results. Models separated by age at marriage below, or over, 30 yielded qualitatively similar results, although the marriage premium increased somewhat more steeply for men in the former group and for women in the latter.

Finally, we re-estimated all the models including only pure first partnerships, i.e., requiring that the partners of our study subjects had no previously recorded partnerships. If people were selected out of their first partnerships and into second or higher order partnerships due to limitations in their productivity traits, and age homogamy decreased with

partnership order due to marriage market mismatches following adverse selection, an association between age heterogamy and lower earnings would arise. However, our estimations were insensitive to the exclusion of unions in which the partner was in one or more previous relationships, and the negative association between age heterogamy and earnings remained virtually unchanged.

Taken together, the sensitivity analysis show that the results presented in the previous section are very robust to changes in the sampling criteria and definitions of unions and earnings.

Conclusions

Our analysis shows that age differences between spouses matter for their earnings, although the effects are generally smaller than for educational homogamy (Dribe and Nystedt 2013) or endogamy by country of origin (Dribe and Nystedt 2015). Moreover, the association between age difference and earnings is largely explained by selection through assortative mating rather than by causal effects of age differences on earnings.

Age homogamy appears to be more beneficial for earnings than age heterogamy for both men and women. For men, the union premium is largest for those partnered with women born in the same year as themselves, and similarly for women, the union penalty is lowest for those in homogamous unions. Heterogamy is negatively associated with earnings: the greater the age difference, the lower the earnings. The pattern is essentially the same for men and women, and what is perhaps most interesting, the pattern is similar regardless of which partner is older.

These results do not support the idea that man-older heterogamy is the fundamental explanation behind the subordination of women in society in general, and in the labor market in particular (Rothstein 2012). Similarly our findings are difficult to reconcile with our first

hypothesis derived from the standard theories in economics and sociology focusing on bargaining and relative resources as drivers of the household division of labor, gender-specific labor supply and ultimately earnings. Women in man-older unions indeed earn less than homogamous women, which supports hypothesis 1b, but so do women in woman-older unions, which is contrary to hypothesis 1a. Moreover, the fact that men show a similar pattern is not in line with this hypothesis because we would expect men in man-older unions to earn more since they can bargain away household labor and increase labor supply and wages (hypothesis 1b).

Based on gender theory (hypothesis 2), we would instead expect non-traditional unions (in terms of power relations) to be associated with a more traditional division of labor. Hence, in terms of age difference, we would expect men in woman-older unions to have higher union premiums because of a higher labor supply and less domestic work, while women in these unions would earn less than homogamous women. Obviously, our results do not support this hypothesis.

At first sight the results are more in line with hypothesis 3, stressing the beneficial role of age homogamy for the career of both men and women. However, our analysis clearly shows that most of the differences in earnings in relation to age difference emerge well before union formation. Individuals with high earnings potentials apparently prefer to marry homogamously (cf., Henz and Sundström 2001) or interact more intensely in age-homogenous groups during periods of life when stable relationships are formed, e.g., in higher education (Mansour and McKinnish 2014). This explains the observed relationship between age difference and earnings development. In all cases except one there is almost no difference in the development of the union premium after union formation; instead, everything happens before entering the partnership. The only possible exception is men in

man-older heterogamous unions, for whom earnings relative to homogamous men continue to decline after union formation.

All in all, these findings suggest strong links between earnings potential, gender, and age homogamy, but mainly through the process of assortative mating rather than as a causal effect of spousal age differences on earnings through labor supply decisions or other forms of career investments.

About the authors

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Recent publication:

Dribe, Martin and Jonas Helgertz (2016). “The Lasting Impact of Grandfathers: Class, Occupational Status, and Earnings over Three Generations in Sweden 1815–2011.” *Journal of Economic History* 76:969–1000.

Paul Nystedt is Professor of Economics at Jönköping International Business School, and Jönköping Academy for Improvement of Health and Welfare (Sweden). His main line of research concerns the associations between health, education, labor market and marital outcomes over the life course. His work has appeared in *Demography*, *Journal of Human Resources*, and *International Migration Review*.

Recent publication:

Lundborg, Petter, Carl Hampus Lyttkens, and Paul Nystedt (2016). “The Effect of Schooling on Mortality: New Evidence From 50,000 Swedish Twins.” *Demography* 53:1135–1168.

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Figure 1. Average age difference among partners upon first marriages (1871-2010) and first child birth (1970-2010).

Figure 2. Overall union premium for men and women.

Figure 3. Heterogamy premiums.

A. Men.

B. Women.

Figure 4. Union premiums by age difference between spouses.

A. Men.

B. Women.

Figure 5. Union premiums by age difference between spouses in relation to one year before marriage.

A. Men.

B. Women.

Table 1. Distribution of the main variables (%).

	Men	Women
Marital status		
Married/cohabiting	64	77
Never in union	36	23
Age difference (Own age - Partner age)		
0 (Homogamy)	13	13
1-2 Older	28	12
Younger	12	26
3-5 Older	26	6
Younger	7	25
6-9 Older	10	1
Younger	2	11
10+ Older	2	0.2
Younger	1	5
Education		
1: ≤ 9 years	12	7
2: 2 years high school	43	33
3: 3 years high school	16	21
4: 2 years university	15	17
5: ≥ 3 years university	15	21
Presence of children		
Age 0-2	21	26
Age 3-6	19	25
Age 7-15	10	14
Observations	7,007,629	5,215,996
Individuals	513,204	413,015

Note: The distributions are based on the number of observations.

Table 2. Union premiums by gender, education and union type.

A. Men

	Age difference (Own age – Partner age)								
	Homogamy	1-2 Older	1-2 Younger	3-5 Older	3-5 Younger	6-9 Older	6-9 Younger	+10 Older	+10 Younger
All (OLS)	0.156 (0.0017)	0.15 (0.0013)	0.141 (0.0018)	0.135 (0.0013)	0.120 (0.0022)	0.117 (0.0019)	0.093 (0.0035)	0.074 (0.0042)	0.062 (0.0066)
All (FE)	0.061 (0.0015)	0.049 (0.0010)	0.046 (0.0015)	0.025 (0.0010)	0.028 (0.0019)	0.010 (0.0014)	<i>0.009</i> (0.0030)	0.000 (0.0029)	0.000 (0.0054)
Education (FE):									
1: <=9	0.043 (0.0048)	0.044 (0.0032)	0.045 (0.0045)	0.026 (0.0029)	0.039 (0.0055)	0.027 (0.0039)	0.032 (0.0080)	0.035 (0.0073)	<i>0.031</i> (0.0128)
2: High School	0.039 (0.0019)	0.026 (0.0013)	0.031 (0.0019)	0.013 (0.0012)	0.024 (0.0023)	0.010 (0.0017)	<i>0.010</i> (0.0036)	0.014 (0.0034)	0.002 (0.0064)
3: University	0.047 (0.0027)	0.042 (0.0019)	0.031 (0.0029)	0.021 (0.0019)	<i>0.008</i> (0.0039)	0.012 (0.0029)	-0.010 (0.0070)	0.005 (0.0068)	0.001 (0.0133)
Age at marriage (FE)									
<=30	0.074 (0.0018)	0.055 (0.0013)	0.063 (0.0020)	0.019 (0.0014)	0.040 (0.0025)	-0.013 (0.0026)	0.018 (0.0040)	-0.056 (0.0124)	0.002 (0.0069)
>30	0.073 (0.0025)	0.073 (0.0017)	0.054 (0.0014)	0.056 (0.0014)	0.040 (0.0028)	0.035 (0.0017)	0.018 (0.0045)	0.015 (0.0030)	<i>0.016</i> (0.0079)
Observations	7,007,629								
Individuals	513,204								

B. Women

	Age difference (Own age – Partner age)								
	Homogamy	1-2 Older	1-2 Younger	3-5 Older	3-5 Younger	6-9 Older	6-9 Younger	+10 Older	+10 Younger
All (OLS)	0.031 (0.0015)	0.031 (0.0016)	0.036 (0.0012)	0.028 (0.0022)	0.037 (0.0012)	0.027 (0.0041)	0.039 (0.0016)	-0.012 (0.0118)	0.039 (0.0024)
All (FE)	-0.028 (0.0014)	-0.030 (0.0014)	-0.031 (0.0010)	-0.037 (0.0018)	-0.037 (0.0011)	-0.037 (0.0033)	-0.043 (0.0015)	-0.035 (0.0090)	-0.042 (0.0021)
Education:									
1: <=9	-0.017 (0.0065)	-0.017 (0.0055)	-0.021 (0.0043)	-0.013 (0.0062)	-0.008 (0.0041)	-0.010 (0.0111)	-0.021 (0.0050)	-0.004 (0.0330)	-0.014 (0.0068)
2: High School	-0.045 (0.0018)	-0.044 (0.0018)	-0.047 (0.0013)	-0.046 (0.0023)	-0.048 (0.0013)	-0.037 (0.0041)	-0.048 (0.0018)	-0.019 (0.0119)	-0.048 (0.0027)
3: University	-0.033 (0.0022)	-0.032 (0.0022)	-0.033 (0.0017)	-0.035 (0.0031)	-0.042 (0.0019)	-0.036 (0.0061)	-0.051 (0.0027)	-0.048 (0.0150)	-0.045 (0.0039)
Age at marriage									
<=30	-0.012 (0.0016)	-0.016 (0.0018)	-0.014 (0.0012)	-0.021 (0.0028)	-0.019 (0.0012)	-0.022 (0.0079)	-0.023 (0.0017)	0.128 (0.0765)	-0.018 (0.0026)
30+	-0.022 (0.0025)	-0.019 (0.0021)	-0.024 (0.0019)	-0.027 (0.0023)	-0.030 (0.0019)	-0.028 (0.0036)	-0.040 (0.0025)	-0.027 (0.0090)	-0.036 (0.0033)
Observations	5,215,996								
Individuals	413,015								

Note: Robust standard errors in parentheses. Parameter estimates significant at the 0.001 (0.05) level are indicated in bold (italics). Models control for age, age squared, presence of children (aged 0-2, 3-6, 7-15), education and type of municipality.

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A. Men.

B. Women.

Figure 5. Union premiums by age difference between spouses in relation to one year before marriage.

A. Men.

B. Women.