

# **Does Marriage Lead to Specialization? An Evaluation of Swedish Trends in Adult Earnings Before and After Marriage**

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## **Abstract:**

We examine whether marriage leads to specialization in Sweden by implementing a model that differentiates specialization in the household by cohabitation and marriage. Our paper evaluates this model using panel data to analyze trends in earnings before and after marriage between 1985 and 1995 for married and long-term cohabiting Swedish couples with children. To identify the effect of marriage on earnings we use the reform of the widow's pension system that resulted in a marriage boom in Sweden in 1989 and difference-in-difference estimation. Our results show that most of the male marriage premium can be explained by positive selection whereas the female marriage penalty reflects increased specialization in home production and childcare. The findings suggest that the positive selection of men into marriage translates into the increased specialization of women. We also find evidence that marriage facilitates specialization in the few couples where mothers earn more than fathers, resulting in a marriage premium for women and a marriage penalty for men. Finally, we find that the net effect of marriage on family earnings is zero because the male marriage premium is offset by the female marriage penalty. Our results show that specialization results from the legal arrangement of marriage, not from the living arrangement of the household.

**JEL Codes: J31, J12**

**Key Words: Marriage, Cohabitation, Specialization, Marriage Premium**

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## 1. Introduction

Does marriage lead to specialization? Becker's model of the household division of labor in *A Treatise on the Family* (1981, 1991), and further developed in Becker (1985), argues that marriage makes spouses more productive because men typically specialize in market work while women typically specialize in household production. Becker's model does not require the marriage contract, thus the gains from specialization could accrue to both married and cohabiting couples. Although many researchers have evaluated whether marriage promotes specialization and higher wages (see Ribar 2004 for a review) few studies have examined whether marriage leads to specialization relative to cohabitation. This paper explores the specialization hypothesis by modeling the effect of marriage on household specialization relative to cohabitation and estimating the effect of marriage on men's, women's, and family earnings in Sweden. We find that selection of men with greater earnings potential into marriage facilitates specialization by couples, which leads to increased male earnings, decreased female earnings and no change in family earnings for Swedish cohabiting couples who marry.

Our paper compares earnings for married and cohabiting Swedish couples who have children. Sweden is interesting because it has a high prevalence of cohabitation among couples with children compared to the U.S.<sup>1</sup> In addition, since the 1960s the Swedish government has enacted reforms intended to promote gender equality in the labor market and in the home, resulting in high female labor force participation, thus making specialization less likely to occur. Sweden has also enacted the cohabitation laws that provide for the division of community property in a cohabiting relationship. The social norm in Sweden is to treat cohabiting and married couples the same. A priori, we would expect to find almost no difference between married and cohabiting couples in terms of specialization and earnings in Sweden. That said, marriage in Sweden (and elsewhere) may lead to a greater

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<sup>1</sup> Stevenson and Wolfers (2007) point out that cohabitation is difficult to study in the U.S. context because of lack of data.

specialization than cohabitation because its expected duration is longer and the legal arrangements may provide for pooling of resources to a higher degree. This greater specialization is expected to result in higher male productivity in the labor market. If this is the case, we should also expect higher earnings for cohabiting women than for married women.

Changes in Swedish law allow us to estimate and potentially identify the effect of marriage on earnings and specialization. Typically, identifying the effect of marriage on outcomes is complicated by the selection problem. It could be that men who have higher wages or who are expecting a faster wage growth are more likely to marry. For this reason, we use a quasi-natural experiment to control for selection into marriage. In 1988, the Swedish parliament enacted a reform abolishing the widow's pension system. The reform included transitional provisions that allowed women who were born before 1945 and married by the end of 1989 to be entitled to a widow's pension if their husbands died. Those already receiving a widow's pension would continue doing so as long as they lived. The implications became gradually known to the Swedish public and resulted in a dramatic marriage boom in the last two months of 1989 (see Figure 1). We use the change in the widow's pension system to assess the effect of marriage on earnings, since marriage in the end of 1989 can be assumed to be less correlated with previous earnings, and thus less selective, than other marriages.

Our analysis makes several contributions to the study of the economic impact of cohabitation and marriage. First, we use a model to demonstrate why marriage and cohabitation may have a different impact on specialization. Second, we examine the effect of marriage relative to cohabitation in Sweden, where we would expect to find very limited differences between the two institutional relationships. Thus, if we do find differences between marriage and cohabitation, this will provide evidence that the institution of marriage is distinct from cohabitation. Third, we employ a quasi-natural experiment to evaluate the economic impact of marriage. Most studies of specialization in

marriage use fixed-effects methods that may not fully address the selection problem. Finally, we study the economic impact of marriage for three distinct groups: men, women, and couples. We are the first to evaluate the effect of marriage on women's earnings in Sweden. This is also the first study (that we are aware of) to examine the impact of marriage on a couple's earnings.

In contrast to our original expectations, we find that married men have higher earnings than cohabiting men; there is a male marriage premium relative to cohabitation also in Sweden. We find a marriage penalty for women; married women have lower earnings than cohabiting women. Our results also show that most of the male marriage premium can be explained by positive selection on pre-marriage characteristics whereas the female marriage penalty results from both a direct and an indirect effect of increased specialization in home production and childcare. In addition, we find evidence that couples specialize according to comparative advantage: in the few cases where the mother earns more than the father, she receives a marriage premium and he receives a marriage penalty after marriage. When we examine the effect of marriage on total family earnings, we find evidence that the positive selection of men into marriage translates into increased specialization in household production by women after marriage, resulting in no net change in real family earnings.

We begin the analysis by discussing the previous literature on the economic impact of cohabitation and marriage. Next we examine cohabitation and marriage in Sweden using the institutional structure of marriage and cohabitation to implement a model of the effect of marriage on specialization. We then discuss the data, estimation methods, and empirical results. The final section concludes.

## **2. The economic impact of cohabitation and marriage**

Studies that compare the economic impact of cohabitation and marriage are limited in number and in scope. El Lahga and Moreau (2007) find increased specialization in home production by women in German couples that transition from cohabitation to marriage. Thus, legal marriage facilitates specialization in the German context. However, El Lahga and Moreau do not examine earnings.

Although related studies find that cohabitation and married relationships differ in terms of economic behavior, they do not examine the specialization hypothesis. DeLeire and Kalil (2005) compare the expenditure behavior of cohabiting and married couples with children. They find that cohabiting couples spend more on adult goods such as tobacco and alcohol, and less on children's educational expenditures, than married couples. Heimdal and Housekecht (2003) compare how married and cohabiting couples organize income in the U.S. and Sweden. In both countries, cohabiting couples are more likely to keep money in separate bank accounts, although this is more prevalent in the U.S. Oporesa, Landale, and Kenkre (2003) show that married Puerto Rican fathers are more likely to pool income than cohabiting fathers, although Kenney (2004) does find that cohabiting couples do pool resources. These few studies do not explore causal relationships, however, they do suggest that marriage may have a distinct effect on specialization relative to cohabitation.

Our research is related to the marriage premium literature, but features two distinct differences: we do not observe wages in our sample, nor do we compare the effect of marriage relative to being single. This literature tests Becker's model of specialization in marriage. Becker (1991) argues that households are most productive when individuals specialize in a division of labor according to their comparative advantage. This specialization is often gendered such that men specialize in market work and women in household production. One testable implication of the Becker model is that marriage makes men more productive and increases their wages. As a result,

studies of the economic impact of marriage have focused almost exclusively on the male marriage premium. That said, the marriage premium literature typically relies on fixed effect methods and finds contradictory results. Some studies conclude that marriage does make men more productive (Korenman and Neumark 1991; Ginther and Zavodny 2001) whereas others attribute the male marriage premium to selection bias (Cornwell and Rupert 1997) or argue that it is decreasing over time (Blackburn and Korenman 1994; Gray 1997).

The effect of marriage on the wages of women has attracted less research attention, and like the literature on men, the results are varied. Some find that marriage increases the wages of women (Waldfogel 1997; Budig and England 2001). Others argue that children have a separate, negative effect on married women's wages (Korenman and Neumark 1992; Anderson, Binder, and Krause 2002).

Even fewer studies have compared the married and cohabiting male wage premiums. Stratton (2002) uses U.S. data and finds that married white men earn higher wages than cohabiting white men, who in turn earn more than single men. Analyzing the marriage premium for Swedish males over the period 1968-1991, Richardson (2002) estimates a fixed-effects model and finds a statistically significant premium of about 10 percent for married men for the whole period and one of about 5 percent for cohabiting men relative to single men. Using register data on about 35,000 young Danish men over the years 1984-2000, Gupta, Smith and Stratton (2007) find a marriage premium of about 4 percent, which is reduced to 2 percent after controlling for selectivity using fixed-effects. The cohabitation wage premium is of the same size. They, further, find that part of the marriage premium is in fact a 'fatherhood' premium-- men receive a wage premium during their first years as fathers.

The contradictory results described above underscore the difficulty of using estimates of the wage premium to assess the specialization hypothesis. First, specialization requires changes in the

behavior and outcomes for both partners and the majority of studies examine only male wages. By only investigating one partner's earnings behavior, the conclusion of specialization is an inference drawn from limited evidence. None of the above studies examine the effect of marriage or cohabitation on the labor market outcomes of the unobserved spouse or partner. Second, most of this research uses fixed-effects to control for selection into marriage. If people respond to changes in incentives and economic conditions, then fixed-effects will not eliminate selection bias, and the estimates used to draw the inference of specialization may as well be biased. The reliance on fixed-effects may explain the contradictory findings in the literature. Third, the gains from specialization may differ depending on whether the couple is married as opposed to cohabiting. Fourth, no study, that we are aware of, examines the effect of marriage on total family earnings.

Next we consider the effects of marriage on household specialization in Sweden. In order to do so we describe cohabitation and marriage in Sweden, along with changes in the policy environment that may allow us to identify the effect of marriage.

### **3. Cohabitation, marriage, and family policy in Sweden**

#### **3.1 Trends in cohabitation and marriage in Sweden**

Cohabiting unions are more common in Sweden than anywhere else in the industrialized world, although levels in Denmark now come rather close. Marriage rates have been declining since the late 1960s, while cohabitation rates have been rising. At the same time, the duration of cohabitation has increased. For example, among women born in the late 1940s about half had married their partner after three years of cohabitation while this was the case for only about one-tenth of women born in the late 1960s – after five years of cohabitation about two-thirds and one-third of the respective cohorts had married (Bracher and Santow 1998).

Thus, cohabitations in Sweden are stable and relatively long-lasting unions. These unions are, however, less stable than formal marriages, and break-up rates have increased over cohorts. For example, about one-tenth of the first consensual unions for women born in the late 1940s were dissolved within three years, while this was true for about one-fourth of the first unions for women born in the mid-1960s (Hoem B. 1995). In spite of elevated marriage rates for pregnant cohabiting women, the majority of women are not formally married at first birth, but cohabiting in Sweden. Births to non-cohabiting, unmarried women are rare (less than 10 percent of all births). Sweden is probably unique in the industrialized world in having a lower median age for women at first birth than at first marriage.<sup>2</sup>

### **3.2 Legal differences between cohabitation and marriage in Sweden in 1989<sup>3</sup>**

It is commonly believed that there are only minor differences in the legal implications of marriage and cohabitation in Sweden. There are, however, substantial differences in case the union breaks up, if one of the partners dies, if the couple has children together or prior to their union, or if they have savings or property. The differences are summarized in Table 1. A crucial difference between married spouses and cohabitants is that married spouses are obliged under the law to support each other according to their ability. Further, for a child of married parents, paternity is automatically attributed to the husband of the mother and the couple will have joint custody of the child. But if the parents are unmarried or cohabiting, the father has to acknowledge paternity, and they only have joint custody of the child if they both agree to that, which most couples do.

Moreover, in a consensual union there is no community property as there is in marriage. The 1988 “cohabitation-law” stipulates that if cohabitants split-up, what they have acquired for common use should be divided between them. This applies to dwellings, provided they have been acquired for

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<sup>2</sup> Both medians have been increasing, the former from 25.0 years in 1980 to 26.2 years in 1993 and to 28.4 years in 2001 and the latter from 25.6 years to 27.4 years and to 29.6 years in the same years.

<sup>3</sup> This section draws on Agell (1982, 1989), Insulander-Lindh & Thunberg (1996) and Ståhlberg (2004).

common use. In the event of a separation, according to the law, the partner who is most in need of the apartment/house should have it, regardless of who bought it.<sup>4</sup> Private property, such as stock and bank savings, is not divided. This is true also for property that was acquired before cohabitation and for property that has been acquired for private use. Dissolution of the relationship is immediate and no income support is provided after the separation, although the non-custodial parent must pay child support.

In the case of marriages, community property is equally divided upon divorce. Furthermore, in the case of separation, couples with children have a six-month waiting period until the divorce is finalized, during which time the absent parent is obliged to contribute to the economic support of the children and the spouse to the same extent as during marriage. Thus, divorce is more costly and the custodial parent has a longer period to adjust to the new economic situation.

Finally, cohabiting couples do not automatically inherit each other. Cohabiting partners may write testaments in favor of each other, but bequests are taxed.<sup>5</sup> Survivors from a cohabiting union have never been entitled to widows' or widowers' pension in the public supplementary pension system, but, under certain very specific circumstances, they were eligible in the general pension scheme. Thus, these legal implications should affect the incentives to marry differently for different groups. We should expect the selection into marriage and cohabitation to be non-random processes, and as a result, married and cohabiting couples should differ.<sup>6</sup>

### **3.3 Family policy and specialization**

Sweden has implemented several policies designed to encourage mother's attachment to the labor force and discourage specialization. Swedish mothers were entitled to 7-12 months of paid leave for

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<sup>4</sup> However, if the house/apartment was bought by one of the partners, the other one has to buy the owner off.

<sup>5</sup> The tax on (any) inheritance was abolished from January 1, 2005. However this is after our study period.

<sup>6</sup> Henz and Sundström (2001) show, for example, that married mothers were more highly educated and older at first birth, on average, than cohabiting mothers. The differences between the two groups have increased over time.

the cohorts of children studied here (fathers could also use the leave). Parents are entitled to return to their jobs after the leave is completed. After parental leave, Swedish families are entitled to subsidized childcare that reduces the opportunity cost of working. In addition, the pension system was redefined from being a widow's pension to a survivor's benefit. Thus retirement benefits were tied to having been employed. These policies have had a significant impact on mother's labor force participation. In 1990, during our study period, about 90 percent of mothers with children under ten participated in the labor force. The rate was somewhat lower among married mothers, 88 percent, than among cohabiting mothers, 95 percent (Swedish Level of Living Survey 1991). Thus, complete specialization by mothers in household production is rare (for further details about family policy and female labor force participation in Sweden, see e.g. Rønsen and Sundström (2002)).

### **3.4 The Swedish widow's pension reform and the marriage boom in 1989**

In the summer of 1988 the Swedish parliament enacted a reform abolishing the widow's pension beginning in January 1990 with certain transitional provisions. Under the old system, if a woman's husband (and certain cohabiting partners) died, she was entitled to a widow's pension for the rest of her life. The pension was based on the husband's retirement income. A widow who was below the general retirement age of 65 received 40 percent of his retirement income. According to the transitional provisions, after age 65 a widow would receive the difference between the widow's pension and her own pension. This system was replaced in 1990 by a system where children of the deceased receive child pensions at most until age 18 and the surviving partner—both sexes, married or cohabiting—receives an adjustment pension for up to 12 months.

While the parliament's decision certainly was no secret, its significance was not immediately realized. On the contrary, it was not until the fall of 1989 that the implications of the transitional provisions became known to the public. Importantly for our analysis, the main impact of these

provisions was that all non-married women born before 1945 could gain rights to the widow's pension by marrying before the end of 1989.<sup>7</sup> In addition, some women who were born in 1945 or later and had children could improve their rights to a widow's pension by marrying before 1990, but the entitlement was much more restrictive than for older women.<sup>8</sup> The effect of the policy change was dramatic. The propensity to marry sky-rocketed in December 1989, especially for cohabiting couples. Figure 1 shows that the number of marriages increased from an average of 3,000 in previous Decembers to 64,000 in December, 1989 a 21-fold increase.<sup>9</sup>

Although marriage rates in November and December 1989 were particularly elevated for women over 45 (Hoem 1991, Figure 2 and 3), they were also very high for younger women, who would not financially benefit from marrying. We can interpret the latter change as a “bandwagon” effect—couples who held more or less vague plans of marrying in the future, stopped putting it off and married because so many other couples were doing so. Alternatively, they may have found it too time consuming to find out whether the woman would be eligible for a widow's pension and simpler just to marry. In line with this interpretation, there was abundant misreporting and confusion in the media over who would benefit from marrying and who would not. For example, the Swedish newspaper *Västerbotten-kuriren* on November 12, 1989 wrote that women born **after** 1945 who have children with their cohabitant must marry before the turn of the year to be entitled to a widow's pension after their husband. This information was clearly at odds with the Widow's Pension Reform. Still another interpretation of the “bandwagon” effect is that the marriage boom made it less expensive to marry since it became acceptable to marry without having a costly reception. In fact, the most common answer among cohabiting women to the question of why they were not planning to marry

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<sup>7</sup> The transitional provisions for women born in 1945 or later were more restrictive and more complicated.

<sup>8</sup> For women born in 1945 or later, who had children with their spouse and who married before 1990, the widow's pension is based on the husband's accumulated retirement income at the end of 1989. Essentially, in order to have an impact on any widow's pension, the husband had to have earned a sizeable income for at least ten years before 1990.

<sup>9</sup> For further analyses of the marriage boom, see Hoem (1991) and Andersson (1998, 2003).

was that they could not afford the wedding they wished to have (Hoem B 1995). Although many couples who were ineligible for the widow's pension married in December, 1989, Figure 1 shows no corresponding decrease in marriages in the early 1990s. This dramatic response to the change in the Widow's Pension System constitutes a quasi-natural experiment that will enable us to examine the effect of marriage on individual and family earnings.

Prior to examining the empirical impact of marriage on earnings, we implement a model of marriage and cohabitation where we can derive testable implications for the relationship between cohabitation, marriage, and specialization, and use this model to inform our empirical work.

#### **4. Model of marriage and specialization**

Becker's seminal work on the economics of the family argues that households are formed in order to facilitate specialization and gains from trade. Although Becker (1991) couches this in terms of marriage, his model includes no requirement for legal marriage in order to achieve specialization. Few individuals have modeled cohabitation (for an exception see Nordbloom 2004), and many have taken issue with the predictions of Becker's model with respect to income pooling (Lundberg and Pollak 1996) and the marriage premium (Ribar 2004). Here, we adopt a model by Lundberg (2002, 2008) to the Swedish context to demonstrate how cohabitation and marriage lead to different degrees of specialization within the family. In particular, we argue that legal marriage facilitates specialization as compared to cohabitation and test the predictions of the model using Swedish data.

Consider a three-person family, consisting of a father ( $f$ ) and a mother ( $m$ ), and a child ( $K$ ), where the parents make decisions about consumption and time allocation over two periods,  $t = 1, 2$ . The utility of each parent  $i$  depends on the investment in the child (a public good) and consumption of a private good,  $c_i$ . There is no altruism, such that parent  $i$ 's utility depends upon the consumption of

parent  $j$ , no borrowing or saving, and no discounting. The father and mother in period 1 divide their time between market work at a fixed and common wage rate,  $w$ , and investment in the child. In period 2, both individuals work in the market at a wage rate that is positively related to market work performed in the previous period.

In period 1, we assume that the couple maximizes a weighted average of identical utilities, with the mother's utility having a weight  $\alpha$ .

$$W = U_1(c_{f1}, K) + U_2(c_{f2}) + \alpha[U_1(c_{m1}, K) + U_2(c_{m2})] \quad (1)$$

Investments in children are made with inputs of father's and mother's time,  $0 \leq l_i \leq 1$ , such that

$K = h_f l_f + h_m l_m$ , and mothers are assumed to be more productive at home, so that  $h_m > h_f$ . Each parent's time endowment is normalized to one and all time not allocated to the child is spent working in the market. The family's budget constraint in period 1 is:

$$c_{f1} + c_{m1} = w(2 - l_f - l_m) \quad (2)$$

Wages in period 2 are positively related to human capital accumulated during period 1

jobs and determined by  $w_i = w(\beta - l_i)$  where  $(\beta - l_i)$  measures time devoted to market work in period 1. Consumption of the private good in period 2 can be described, without loss of generality, as private wages plus or minus a cash transfer,  $t$ , between the parents:

$$\begin{aligned}
c_{f2} &= w(\beta - l_f) - t \\
c_{m2} &= w(\beta - l_m) + t
\end{aligned} \tag{3}$$

We assume that period 1 utility is strongly separable in the private good and child investment:

$$U_1(c_{i1}, K) = u_1(c_{i1}) + \gamma(K). \tag{4}$$

#### 4.1 Marriage

In Sweden, married spouses are legally obligated to support each other while married, and for six months after separation, until the divorce is finalized. Thus, we assume that marriage allows the couple to commit in period 1 to a transfer in period 2, so that the family problem will be to maximize, with respect to period 1 and period 2 consumption, child investment, and the transfer:

$$\begin{aligned}
W &= u_1[w(2 - l_f - l_m) - c_{m1}] + \gamma(h_f l_f + h_m l_m) + U_2[w(\beta - l_f) - t] \\
&+ \alpha [u_1(c_{m1}) + \gamma(h_f l_f + h_m l_m) + U_2[w(\beta - l_m) + t]]
\end{aligned} \tag{5}$$

The first-order conditions with respect to  $c_m$  (mother's utility) and the transfer  $t$  are:

$$u_1'(c_{f1}) = \alpha u_1'(c_{m1}) \tag{6.1}$$

$$U_2'(c_{f2}) = \alpha U_2'(c_{m2}) \tag{6.2}$$

The first order conditions with respect to the investment in the child  $l_f$  and  $l_m$  are given by:

$$\begin{aligned}
(1 + \alpha)h_f \gamma'(K) - w[u_1'(c_{f1}) + U_2'(c_{f2})] &= 0 \text{ and } 0 < l_f < 1, \text{ or} \\
(1 + \alpha)h_f \gamma'(K) - w[u_1'(c_{f1}) + U_2'(c_{f2})] &< 0 \text{ and } l_f = 0.
\end{aligned} \tag{7.1}$$

$$\begin{aligned}
(1 + \alpha)h_m \gamma'(K) - w[u_1'(c_{f1}) + U_2'(c_{m2})] &= 0 \text{ and } 0 < l_m < 1, \text{ or} \\
(1 + \alpha)h_m \gamma'(K) - w[u_1'(c_{f1}) + U_2'(c_{m2})] &< 0 \text{ and } l_m = 0.
\end{aligned} \tag{7.2}$$

Given the child investment function and the comparative (and absolute advantage) the mother has in child investments, an interior solution in both  $l_m$  and  $l_f$  will not be optimal. Instead, the model predicts that the husband will fully specialize in market work, and the wife will specialize in child investments. The outcome will be an efficient allocation of resources with optimal investments in the child,  $K$ , in period 1. The allocation of time reflects the husband's comparative advantage in market work and the wife's comparative (and absolute) advantage in child investments. When  $\alpha=1$ , (6.2) shows the consumption levels of husband and wife in the second period will be equalized by a transfer

$t^* = \frac{w(l_m - l_f)}{2}$ . Labor income will be distributed between the parents in order to equate the weighted marginal utilities of consumption.

#### 4.2 Cohabitation

In order to achieve the efficient solution in 6.1 and 6.2, an intertemporal contract must be negotiated between the husband and wife and enforced by Swedish law. When the parents are cohabiting, the enforceability of the intertemporal contract is limited. This model allows us to examine the role of parental investments in market work and children in the absence of marriage. In order to obtain an efficient solution, the couple must commit in period 1 to a transfer from the father to the mother of  $t^*$  in period 2. Given the legal limitations of cohabitation, any promise by the father to share his income with the mother would not be legally enforceable, resulting in the renegotiation of control over family resources given period 2 earnings. If the expected transfer is less than  $t^*$ , the parents will have an incentive to change their allocation of time in period 1. Suppose  $t < t^*$ , then

$\alpha U_2'(c_{m2}) > U_2'(c_{f2})$  and  $h_m \gamma'(K)$  (from equation 7.2) the marginal cost of the mother's investment in the child will increase relative to  $h_f \gamma'(K)$  (from equation 7.1) the marginal cost of the father's investment in the child. The model shows that in equilibrium there will be less specialization in

cohabitation than in marriage because intertemporal commitments are more difficult to enforce. This results in an increase in the relative price of investments in children, and the inability of mothers to specialize fully in child-rearing. Thus, cohabitation results in investments in children  $K$  below the socially efficient level.<sup>10</sup>

Cohabiting couples may under-invest in children, may have fewer children, and fail to commit to the optimal second-period transfer for a number of reasons. First, if dissolution of the relationship occurs between periods 1 and 2, goods acquired for common use must be divided between the cohabiting parents, however, private property acquired before and during the relationship remains with the owner. Thus, in cohabiting relationships, the mother has no legal claim on the father's earnings. In contrast, marriage allows for community property that is equally divided upon divorce and the absent parent must contribute to the economic support of the family for six months pending the divorce. Second, the cost of dissolving a cohabiting relationship is minimal and involves no legal costs. Thus, cohabiting relationships dissolve more frequently than marriages in Sweden (Hoem 1995). These differences between marriage and cohabitation create a situation where individual shares of total family income in a cohabiting relationship will depend upon individual market earnings and the agreed transfer will not satisfy (6.2). This means that the mother's period 1 investments in children will decrease her expected period 2 consumption, and implies that the cohabiting family will be unable to achieve an efficient level of investments in children. In the absence of marriage, there is no credible promise to compensate mothers for investments in children in period 1 with transfers in period 2.

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<sup>10</sup> We observe this phenomenon in related research, Björklund, Ginther, and Sundström (2007) which shows that children from cohabiting relationships have lower grade point averages compared to children from married relationships. Sundström and Duvander (2002) find that married fathers use a larger share of parental leave for newborn children than cohabiting fathers.

### 4.3 Implications

This simple model yields several testable hypotheses with respect to the effect of marriage and cohabitation on earnings in Sweden. First, under complete specialization, the father's wage in periods 1 and 2 will exceed the mother's wage.<sup>11</sup> In an egalitarian family where the father and mother allocate their time equally to home production,  $l_f = l_m$ , it follows from period 2 wage determination, that the father's and mother's wage would grow at the same rate. Thus, if marriage does not lead to specialization, we would expect to find neither a wage premium for men, nor a wage penalty for women. Finally when both spouses work, but  $l_m > l_f$  and mothers specialize in home production in period 1, in period 2  $w_f > w_m$  fathers will earn more than mothers. Thus, we should observe more specialization by married mothers than cohabiting mothers, which suggests that married mothers would earn less than cohabiting mothers. Likewise, we should observe married men earning more than cohabiting men even with incomplete specialization.

The above model is predicated on the assumption that mothers have a comparative advantage in home production. Although this is usually the norm, especially in the presence of young children, it could be that a mother has a comparative advantage in market work and the father has a comparative advantage in home production where  $h_f > h_m$ . If a cohabiting mother earns more than the father of her children and the parents marry, it could be that marriage facilitates the gendered pattern described up to now: women earn a marriage penalty and men earn a premium. Alternatively, it would be more efficient for the highest earner (the mother) to specialize in market work. In this case, married mothers would earn a premium and their husbands who specialize in home production

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<sup>11</sup> In period 1  $w_f > w_m = 0$  she has no earnings and his earnings are positive. In period 2  $w_f = w\beta > w_m = w$  he earns more as a result of his human capital accumulated in period 1. However, the prediction of complete specialization is not realistic in Sweden because of family policies designed to promote parental employment.

would earn a penalty. We examine whether specialization deviates from the gendered norm in our empirical analysis. Next we describe the data that we will use to test these hypotheses.

## **5. Data and methods**

### **5.1 Data and sample**

As mentioned, an important limitation of previous studies of marriage and cohabitation is the access to sufficiently large data sets on cohabitants with accurate information on earnings and explanatory variables. We have the advantage of using administrative data on earnings in 1985, 1987, 1989, 1990, 1992 and 1995 of the biological parents of a random sample of about 130,000 children born in 1977-87 (drawn from the population registers of Statistics Sweden). We focus on parents because children provide the impetus to specialize. All parents in our samples were born in Sweden and married or cohabiting with each other in the 1990 Census and, in addition, all those who had children born in 1985 or earlier were married or cohabiting with each other in the 1985 Census. (A consequence of the sample design is that no fathers or mothers enter the sample after 1987). Additional information was obtained from the 1985 and 1990 censuses and from Statistics Sweden's special multigenerational register, allowing us to create parents' marital history, number of siblings, and their year of birth, as well as the number of children at home (including any number of children from previous unions and adoptive children). If parents happened to have two children in the random sample, they have only been included once.

Annual earnings are obtained from Swedish tax records and include earnings before tax from employment, sickness benefits, and parental-leave benefits.<sup>12</sup> To obtain estimates as close as possible to those for hourly wages, we restrict the analysis to earnings above SEK 100,000<sup>13</sup> in 1990 prices all

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<sup>12</sup> Annual earnings do not include transfer payments such as unemployment insurance. Hourly wages are not available in the data.

<sup>13</sup> 100,000 SEK was approximately \$16,667 in 1990 which is equivalent to \$24,406 in 2008 dollars.

years for both mothers and fathers.<sup>14</sup> We use the same earnings limit for both mothers and fathers because we want to distinguish the effect on wages from that on labor supply. However, this means we exclude the very few individuals who stop working after marriage or who may be unemployed as a result of the severe recession in Sweden between 1991 and 1993. That said, the earnings limit also results in us losing a substantial fraction of the female sample, about 70 percent in 1985 and 45 percent in 1990 as compared to 12 and 9 percent, respectively, of the male sample. This most likely reflects the high fraction of part-time work among employed mothers of young children<sup>15</sup> and may lead us to understate the extent of specialization among couples. To shed light on this, we also present results without the earnings limit for mothers.

Our explanatory variables include educational attainment in 1990 (obtained from the educational registers of Statistics Sweden), marital duration, and number of children at home. The latter variable is made time-varying through the addition of the number of younger children in the year they are born. Since we do not know when the couples began to cohabit and since most Swedes cohabit before marriage, we use age of the oldest common biological child as a proxy for union duration for both married and cohabiting parents. For those who married prior to the birth of the oldest child, union duration is equal to marriage duration.<sup>16</sup> In case of divorce, marriage duration is set equal to zero in the year of divorce and the father or mother is dropped (censored) from the panel estimation in that year.

Our analysis sample features some key differences from data used in previous research that examines the effect of marriage on wages. First, most studies examine the effect of marriage

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<sup>14</sup> This is, in fact, the same earnings limit as Antelius and Björklund (2000) apply when they demonstrate (for both sexes in 1991) that this limit produces estimates on returns to education that are highly similar to those obtained using hourly wages. We do not observe wages because we have no information on hours worked.

<sup>15</sup> In 1990 about 54 percent of mothers with children under ten worked part time, 62 percent among married mothers and 34 percent of cohabiting mothers (Swedish Level of Living Survey 1991). This provides additional evidence of more specialization among married couples.

<sup>16</sup> Since we are missing date of marriage for those who married before 1968 but we know if they were married in 1985 or not, we compute marriage duration from 1968 for these couples.

compared to being unmarried. Our study examines the effect of marriage relative to cohabitation. Thus, the estimated effects of marriage relative to cohabitation may be smaller than those compared to being single. Second, our sample is restricted to parents who are observed over time because many couples in Sweden have children prior to marriage, and specialization is more likely to occur when children are present. Third, most studies of marriage examine its effect on wages. We do not observe wages or hours worked and cannot do a similar analysis. As described above, we use an earnings limit to proxy for wages because Antelius and Björklund (2000) find this is a workable solution in the Swedish context. Given the differences in our sample from data typically used to examine the marriage premium, our results will not be directly comparable to the existing literature. Nonetheless, having information on the earnings of couples before and after marriage will allow us to determine whether marriage leads to specialization in Sweden.

We present means and frequencies for our samples in 1985 and 1990 in Tables 2a and 2b. Clearly, there are large differences between married and cohabiting fathers and mothers in both years. Married persons have higher earnings and higher education, they are older, have more children, and their unions have lasted longer. We also observe the large number of couples marrying in late 1989. As expected, the marriage boom contributed to make the married in 1990 more similar to those cohabiting in 1985, for example, reducing considerably the fraction with a university education among married mothers in 1990.

## **5.2 Estimation methods**

We estimate the effect of marriage on earnings for men, women, and couples to evaluate whether legal marriage leads to specialization. We use the marriage boom resulting from the widow's pension reform as a quasi-natural experiment to estimate the effect of marriage on earnings. Unlike most previous studies, our test of the specialization hypothesis does not rest on the behavior of men or

women only. Instead we observe the couple's earnings before and after marriage. By examining the effect of marriage on men, women, and couples together we can make a stronger inference about the effect of marriage on specialization.

As the previous literature has noted, estimates of the effect of marriage on earnings may be subject to selection bias because employers and potential spouses value the same characteristics such as loyalty and dependability, or because individuals with higher earnings potential are more likely to get married. If unaddressed, both sources of selection bias would lead to an overestimate of the effect of marriage on earnings and the incorrect conclusion that marriage leads to specialization. Formally, let  $y_{it}$  measure male, female, or family earnings, where  $i$  indexes individuals and  $t$  indexes time. Let  $X_{it}$  be characteristics that vary across individuals and time such as education or number of children,  $M_{it}$  be marital status,  $D_i$  be desirability of the individual as a spouse or worker,  $v_t$  be time dummies, and  $\varepsilon_{it}$  be a random error term:

$$y_{it} = \beta X_{it} + \gamma M_{it} + D_i + v_t + \varepsilon_{it} . \quad (1)$$

If  $D_i$  is positively correlated with marital status, then the estimated coefficient on  $M_{it}$  will be biased upward. For example, dependability and individual ability are likely to be positively correlated with wages and marital status, and in the data we observe that people with higher levels of education are more likely to be married. The standard approach is to assume that  $D_i$  is fixed over time and  $\varepsilon_{it}$  is uncorrelated with desirability; then first-differencing equation (1) with respect to time will eliminate selection bias and lead to an unbiased estimate of the effect of marriage on earnings.

However, fixed-effects methods may not entirely eliminate selection bias. Lundberg (2005) argues that marriage, cohabitation, and family formation respond to economic conditions and not just unobserved, fixed individual characteristics. Both Lundberg (2005) and Ribar (2004) note that fixed-effects estimates are only valid when marriage and wages are only correlated with the time-constant

individual, unobserved characteristic. When we allow for life-cycle decision-making by the family, the fixed-effects assumption is invalid. The widow's pension reform in Sweden is one example of how marriage may be affected by changes in economic and policy conditions.

In order to use the marriage boom as a random source of variation in marital status, we assume that marriages during the boom are less correlated with an individual's earnings prior to marriage. Figure 1 indicates that the marriage boom created an exogenous change in both the timing and the number of marriages. To the extent that marriage makes men more productive and facilitates specialization by women in home production, we should see the same estimated effect of marriage regardless of when the marriage occurred (before or during the marriage boom). However, if the marriage boom in 1989 caused an exogenous change in the propensity to marry, or if marriage has no impact, then the marriage premium should be lower or zero for those who married during the boom.

We examine our hypotheses by first estimating cross-sectional regressions that include separate marital status indicator variables for the two types of marriages where  $y$  and  $X$  are defined as before and  $M_{it}$  is an indicator for being married prior to the boom and  $MBOOM_{it}$  is an indicator for those who married in response to the change in the Swedish Widow's Pension.

$$y_i = \beta X_i + \gamma M_i + \delta MBOOM_i + \varepsilon_i. \quad (2)$$

We can evaluate the impact of the quasi-natural experiment by comparing the effect of marriage on earnings of the two types of marriages, those who marry before the pension reform and those marrying as a consequence of the change in the Swedish widow's pension, with those who remain as cohabitants. The fact that some couples married because they had a financial incentive to do so and some other couples married because they *believed* they had such a financial incentive, or because they were caught up in the historical moment, does not matter for our purpose as long as it creates an exogenous change in the marriage rate.

Next, we use a difference-in-differences estimate to evaluate the effect of marriages in response to the marriage boom, relative to other types of marriage, on earnings after controlling for unobserved, individual fixed effects in equation (3):

$$\Delta y_i = \beta \Delta X_i + \gamma \Delta M_i + \delta \Delta MBOOM_i + \varphi \Delta v + \Delta \varepsilon_i. \quad (2)$$

where  $\delta$  is the difference-in-difference coefficient, a response to an exogenous change in the incentives to marry. Assuming these marriages are exogenous,  $\delta$  identifies the causal effect on earnings.

Although using the quasi-natural experiment approach has several advantages relative to standard fixed-effects models, it also has some limitations. Choice of treatment and control groups affect the reliability of the estimates. Many women who married during the marriage boom were pregnant, some were older and often had children from previous unions (Hoem 1991). Thus, marriages in response to the Widow's Pension Reform may still be biased by selection. We examine the implications for our parameter estimates of different types of selection on the male marriage premium:

- *Positive selection of all marriages:* If marriages prior to the pension reform and marriages in response to the pension reform are both positively selected, then the marriage boom just changed the timing of the marriage. If that is the case, we would expect that  $M_{it} = MBOOM_{it} > 0$ .
- *Positive selection of marriages prior to boom; no selection of marriages during the boom; and marriage has no effect on earnings:* This would imply that the marriage premium is entirely due to selection and there would be no effect of marriages during the boom on earnings  $M_{it} > MBOOM_{it} = 0$ .

- *Positive selection of marriages prior to the boom, no selection of marriages during the boom, and marriage has a causal effect on earnings.* In this case  $M_{it} > MBOOM_{it} > 0$ . Of course, it could be that some of the marriages that occurred during the boom were positively selected and others were in response to the policy change. If that is the case, then we can interpret  $MBOOM_{it}$  as an upper bound on the causal effect of marriage on earnings.

Thus if marriages during the boom are less-selected than marriages prior to that time, and marriage has a causal effect on earnings, the estimated coefficients on marriage should be lower for those who responded to the Widow's Pension Reform in both the cross-sectional and difference-in-difference estimates. If marriages during the boom are also positively selected, the resulting estimates provide an upper bound on the causal effect of marriage on earnings.

Even if we do not identify an unbiased estimate of the effect of marriage on male earnings, our test of the specialization hypothesis is not tied to this single estimate. Instead, by examining the effect of marriage on the earnings of husbands, wives, and the couple (before and after the marriage) we determine whether marriage leads to specialization. In terms of earnings, the specialization hypothesis predicts that married men will earn more and married women less, and the net effect on the couple's earnings will be unclear. Thus, by looking at both the individuals and the couple, our approach is a more-direct test of the specialization hypothesis.

## **6. Estimates of the effect of marriage on earnings**

We estimate three basic earnings models for men, women, and couples. Model 1 controls for marriage, age and its square, and education level. Model 2 adds union and marriage duration. Model 3 includes children. The theoretical model in section 4 shows that married parents invest more in children, and may indeed have more children. Thus children are endogenous in the theoretical model

and in these estimates. However, we include the number of children in Model 3 in order to investigate their separate effect on earnings and to see whether the effect of marriage remains statistically significant.

## **6.1 Fathers**

We start by estimating cross-section regressions for fathers in 1985 in the top panel of Table 3, and find that married fathers earn about four percent more than cohabiting fathers (Model 1). Although marriage and cohabitation are quite similar in Sweden, legal marriage is associated with higher earnings. The estimates in Model 2 suggest that a small part of the marriage premium can be attributed to the longer duration of marital unions. Model 3 indicates that marriage duration contributes to the marriage premium, although the number of children is negatively related to earnings.

In the bottom panel of Table 3 we estimate cross-section regressions for fathers in 1990, controlling for the marriages prior to and during the marriage boom of 1989. We see that fathers who married before the marriage boom receive a significantly larger marriage premium than those who got married during the boom (Model 1), but when union, marriage duration (Model 2), and the number of children (Model 3) are taken into account, the difference shrinks, yet remains significant.

Interestingly, fathers who married during the boom indeed had significantly higher earnings than those who remained cohabiting (the reference group). As before, longer marriage duration is associated with higher earnings, whereas the number of children is negatively related to earnings.

Estimating the difference-in-difference models with individual fixed effects should remove any time-invariant selectivity under the assumption that those who married in 1985-1995, and who identify the marriage coefficient, are representative of the effect of marriage on earnings. If the marriage premiums observed in the cross-section analyses are due to selection into marriage based on

productivity-related characteristics we should expect to find a smaller or even zero coefficients for married persons in these. Table 4 shows that fathers who did not marry during the marriage boom have a positive and significant marriage premium (Model 1), which is about half of that found in the cross-section analysis (Table 3 Model 1). For fathers who married during the boom we also find a marriage premium, but only about half the size of that for fathers who married at some other time, in all three models. Controlling for the change in union and marriage duration, as well as the change in the number of children (Model 3), the magnitude of the premium decreases somewhat and is quite similar to the cross-sectional estimates in the previous table. As is clear from Model 3, part of the premium can be attributed to the positive and significant impact of an increase in the number of children at home, which is very much in line with the ‘fatherhood’ premium found for Denmark by Gupta et al (2007). The estimates in Table 4 suggest that half of the male marriage premium is due to selection: men who married before or after the marriage boom had twice the marriage premium of those who married during the boom, but both groups of married men had significantly higher earnings than those cohabitating.

To summarize the results, married men earn a small, statistically significant marriage premium compared to cohabiting men. However, about half of the male marriage premium appears to be due to selection in Sweden. The results are consistent with marriage having a causal effect on male earnings and provide an upper bound on that effect.

## **6.2 Mothers**

Turning to the cross-section regressions for mothers in 1985 in the top panel of Table 5, we see that there is a small marriage premium for women too, half a percent (Model 1). When we control for union and marriage duration (Model 2)—the coefficient for marriage is no longer significant. As for fathers, each child is associated with about one percent lower earnings (Model 3). Turning to the

cross-section estimates for mothers in 1990 in the bottom panel, we see that mothers who married before the marriage boom in 1989 had higher earnings than the cohabiting mothers, but those who married during the boom had lower earnings than the cohabitants in Model 1. When we control for union duration and marriage duration the earnings advantage of those who married prior to the boom disappear (Model 2). Once we take account of the number of children there is no longer any difference in earnings between mothers who married prior to the boom and those who remained cohabiting, but both these groups of mothers had higher earnings than those who married during the boom.

When we estimate the difference-in-difference model for mothers in Table 6, we find a significant marriage penalty of similar size for both groups of married mothers (Model 1-3). The results in Model 3 suggest that much of the marriage penalty for those who did not marry during the boom results from number of children at home. Thus, the marriage penalty is likely to reveal specialization in home production and childcare. It is also possible that married mothers are assigned to, or choose “Mommy Track” jobs that involve lower human capital accumulation. The bottom panel of Table 6 presents fixed-effects estimates of the impact of marriage on mothers’ earnings without imposing any earnings limit. The results show that women’s earnings fall drastically after marriage, more for those who married at some other time than in the end of 1989. Clearly, these estimates, which are about four to five times larger than those obtained using the earnings limit, reflect the reduction in hours worked and the increased degree of specialization that follows both the more selected marriages and those in the end of 1989. The coefficients on both types of marriage are significantly different from one another.

Given the significant difference between estimates using the earnings limit, we examined our sample to determine the extent that mothers changed their attachment to the labor force after marriage.

To that end, we computed the post-marriage earnings for mothers who married in 1985 or later (since we only have earnings information from 1985) and found that only 0.14 percent of women who married in 1985-88, 1.11 of those who married in 1989, and 7.88 of those who married 1990-95 had zero earnings in all years after marriage. This indicates that the overwhelming majority of mothers work in Sweden even after marriage. Next we examined those mothers whose earnings drop by half in all years after marriage, a proxy for working part time. We find a slightly higher fraction in this case, 3.7 percent among those married in 1985-88, 7.1 among those married in 1989 and 15.5 among those married in 1990-95 experienced a drop in earnings by one-half or more which is consistent with part-time workers generally working more than half time in Sweden. The percentages for marriages between 1990 and 1995 may be larger as a result of the severe recession in Sweden between 1991 and 1993.

The marriage penalty for mothers can be explained in one of two ways. Either marriage facilitates specialization or mothers are negatively selected into marriage. We favor the specialization explanation because negative selection is at odds with assortative mating and with the higher education and average earnings among married mothers compared to cohabiting mothers seen in Table 2b.

### **6.3 Couples**

The top panel of Table 7 compares the earnings of married and cohabiting families in 1985. Marriage is associated with a three percent increase in earnings (Model 1) compared with cohabitation, but this marriage premium is reduced and turns insignificant once we account for union and marriage duration (Model 2) as well as the number of children (Model 3). However, marriage duration is positive and significant, indicating that married couples earn more over time. The bottom panel examines the impact of both types of marriage on family earnings in 1990. The estimates for marriages that

occurred before the marriage boom are very similar to those for marriages in 1985, which is not surprising. These married couples have about 3 percent higher earnings than the cohabitants, and about 4 percent higher earnings than those who married during the boom (Model 1). When we control for marriage duration, union duration, and number of children the earnings advantage of the former group of married couples over the cohabitants disappears, but the disadvantage of those married during the boom remains (Model 2 and 3).

The top panel of Table 8 reports the difference-in-differences estimates of the impact of marriage on family earnings in 1985-1995 where we only include couples in which both earned more than SEK 100,000 (in 1990 prices) including couple fixed effects. At first glance, it may seem as if the impact on total family earnings of marriages before or after the boom is no different from that of cohabitation. This is only because the marriage premium for fathers and the marriage penalty for mothers observed above cancel each other out. Model 1 shows that marriages during the boom in 1989 had a small negative and significant impact on total family earnings, reducing them by about half a percent, but the effect turns insignificant once we control for more covariates in Models 2 and 3.

The bottom panel shows similar estimates where we relax the earnings limit, and the results change significantly. First, there are 31,425 additional couples in the estimation sample where at least one partner (usually the woman) earns 100,000 SEK or less. That so many couples have one partner with low earnings is indicative of specialization within the household. Second, couples who married prior to the boom earn almost three percent more than cohabiting couples in Model 3. This suggests gains to marriage from the combination of selection and increased specialization. Third, couples who married during the boom have no marriage premium, but do not experience the small penalty observed in the top panel. Taken together, the results in Table 8 show that couples gain from

increased specialization within marriage when marriage is self-selected. Couples who married during the boom also specialize, but do not accrue the same gains to marriage as those who self-selected. In this case, the marriage premium for men is completely offset by the marriage penalty for women.

## **7. Sensitivity analysis**

### **7.1 Earnings growth**

We now examine earnings growth in order to evaluate whether selection or specialization occurred prior to marriage. Table 9a shows that the growth in earnings among fathers who married in 1989 was slightly higher than among those who remained cohabiting. But earnings growth was twice as high for fathers who married before the boom (but after 1985). In fact, if we compare these estimates to those in Table 4 we see that the entire male marriage premium can be attributed to earnings growth that occurred before marriage. This finding thus lends further support to our interpretation that the male marriage premium mainly originates from selection on pre-marriage characteristics. If we were to examine only men (as much of the literature does), we would draw the incorrect conclusion that marriage does not cause specialization in the household.

In the bottom panel we see that mothers who married before the boom, but after 1985 experienced a more positive earnings trend in 1985-1989 than those who married in the end of 1989 or remained cohabiting. These results show that most of the marriage penalty occurred after marriage since the estimates for the whole period of 1985-1995 were negative (Table 6). Evidence that mothers' earnings grew prior to marriage, coupled with the marriage penalty, indicates that specialization explains the marriage penalty instead of negative selection into marriage.

Table 9b examines the effect of marriage on family earnings in 1985–89. In line with the findings reported for mothers and fathers, we find that the couples who married before the marriage

boom, but after 1985 had higher earnings growth than those who married in the end of 1989, which is consistent both with positive selection into marriage for men, as well as women, and with marriages during the boom being unplanned.

## **7.2 Mothers who earn more than fathers**

The above analysis has shown that married fathers earn more and married mothers earn less even after controlling for selection into marriage. Both Becker's model of household formation and the model described earlier in this paper assume that mothers have a comparative advantage in home production. Our estimates suggest that this is indeed the case. Now we consider whether specialization occurs in marriages where mothers appear to have a comparative advantage in market work. We identified mothers who earn more than their children's fathers and estimated the difference-in-difference models in Table 10. Fathers who married prior to 1989 earned a two percent marriage penalty (Model 1) that changed sign once additional covariates were added to the specification in Models 2 and 3. However, men who married during the marriage boom earned a significant marriage penalty: between seven and nine percent. In contrast, mothers who earned more than their partners and married during the boom, earned a large, statistically significant marriage premium ranging from five to eight percent.

Although there are fewer couples where the mother earns more than the father, it is interesting that we observe specialization based on comparative advantage: mothers earn a marriage premium and fathers earn a marriage penalty.

## **7.3 The impact of children**

As all individuals in our sample are parents, and since pregnant women have elevated marriage risks also in Sweden (Bracher and Santow 1998), the effect of marriage may be intertwined with that of having young children. In particular, in 1987 women in Sweden were entitled to 9 months maternity leave at 90 percent of their salary. Thus, it could be that women earn less because they are on

maternity leave. In order to separate the two effects we estimate the difference-in-difference models for men and women who did not have any children after 1987 and compare the results to those presented in Tables 4 and 6. The results in Table 11a for fathers show that those who had no more children after 1987 had a very similar marriage premium as all fathers. In contrast, we find a somewhat larger marriage penalty for women who did not have any more children after 1987, and who did not marry during the boom, than among all mothers, but the difference between the estimates is not significant. The effect of number of children at home is, however, less negative than among all mothers and the difference is statistically significant. This is as expected as the mothers who did not have any more children are likely to work more and earn more. Thus, we may conclude that our estimates of marriage premium and marriage penalty are not sensitive to the inclusion of parents of young children.

## **8. Conclusions**

In this paper we implement a model of specialization in marriage and test it using data from Sweden. The model indicates that specialization is more likely to occur in marriage than in cohabiting unions. We use data from Sweden to test this model because of the large sample sizes and a unique policy change that caused the number of marriages to sky-rocket in late 1989. Sweden is also interesting because the governing norm is to treat cohabitation the same as married unions. Our empirical results support the predictions of the model. For men, we find a small, statistically significant marriage premium that increases with marriage duration. Men who married prior to the marriage boom have a marriage premium that is twice the size of those who married during the 1989 boom. These results indicate that half of the male marriage premium is due to selection. In contrast, women in Sweden experience a marriage penalty regardless of when they married. Half of the marriage penalty can be

explained by children. Subsequent analysis indicates that women are not negatively selected into marriage. These results indicate that marriage promotes specialization in home production and child care by women and in market work by men.

Our empirical results show that the institution of marriage and selection into marriage are intertwined. Selection of high-earning men into marriage facilitates increased specialization by women leading to a marriage penalty for women. For marginal marriages brought about by the widow's pension reform, we still find evidence of a marriage premium for men which is half the size of that for those who married before the boom. Interestingly, regardless of when the marriage occurred we see women specializing in home production especially if they have additional children. The net effect of marriage on family earnings is positive, or zero, depending on the sample. Marriages prior to the boom earn a premium that suggests the gains from marriage accrue because of the combination of selection and specialization. However, for marriages during the boom, the male marriage premium and the female marriage penalty offset one another, and the net effect on couple's earnings is zero.

Most relationships in Sweden follow the gendered norm where men specialize in market work and women specialize in home production. We examined relationships where mothers earned more than their children's fathers, and we find large shifts in earnings upon marriage. Married women who earned more than their husbands specialize in market work, earning a large marriage premium and the married men earn a penalty. For relationships where women have a comparative advantage in market work we see that marriage facilitates specialization as well.

Despite cohabitation being the social norm and a legal environment that treats cohabiting and married couples very similarly, we find that marriage has a significant impact on male and female earnings in Sweden. Thus, married men earn more than cohabiting men and half of the male marriage

premium is due to selection. The institution of marriage provides for increased specialization in household production for women on average, regardless of how they entered the marriage. Marriage provides a longer lasting commitment that enables women to specialize in household production more than their cohabiting counterparts. The net effect of marriage on family earnings is positive, suggesting that marriage also facilitates income transfers across couples.

Our results have implications for future research on the impact of marriage on earnings. First, marriage and cohabitation are distinct family structures that provide different incentives for specialization. Thus the norm of treating these unions as the same in Sweden is incorrect from a research perspective. Future research on the differences between married and cohabiting unions in Sweden and other countries is warranted. Second, specialization within the household results from a legal contractual arrangement. The gains from marriage accrue from the legal arrangement, as opposed to the living arrangement, of the couple. Third, we have demonstrated that the male marriage premium consists of both positive selection and specialization. As a result, information on the wife's behavior is required in order to identify specialization within the household. Research that only examines the husband's or wife's earnings in absence of information on their partners may draw incorrect conclusions about the true effect of marriage on earnings and specialization. Future research will need to examine the behavior of couples instead of men or women separately. Finally, the effect of marriage on specialization may differ depending on the social norms and family policies in countries besides Sweden. That said, given the prevalence of cohabitation in Sweden, the norm of treating cohabiting and married couples the same, and family policies designed to promote work, and therefore limit specialization in the household, it is quite surprising to find that marriage leads to specialization. Having found this to be the case in Sweden (where it was unexpected), we think that our findings will generalize to other countries.

## **APPENDIX: Analysis of Identifying Samples**

The identifying sample for the period 1985-1995 are the fathers and mothers, respectively, who were unmarried/cohabiting in 1985 but married sometime before 1995 and had earnings exceeding SEK 100,000 (in 1990 prices) in at least two years during that period. To investigate whether the identifying samples differ from the married samples we, first, present means and frequencies in 1990 for these samples (Appendix Table A) and compare them to those for married fathers and mothers in 1990 (Table 2a and 2b). Interestingly, marriages in the end of 1989 only account for about half of the identifying samples. We also see that the fathers in the identifying sample had lower earnings, were younger, and were less educated, on average. They had shorter marriage duration, as expected, but about the same number of children at home as the married fathers. For mothers we see that those in the identifying sample had lower earnings than both the married and the cohabiting mothers in 1990. As for fathers, mothers were younger, less educated and had about the same number of children at home as the married. Next, we estimate cross-section regressions for 1990 for the two identifying samples (Appendix Table B and Table C). Importantly, we observe that for the identifying sample, fathers who married before 1989 had significantly lower earnings than those who married during the boom. For mothers in the identifying sample there is no difference in earnings between those who married before 1989 and those who married during the boom.

Thus, we may conclude that the identifying samples of fathers and mothers differ somewhat from all married fathers and mothers, as could be expected. However, they do not seem to differ in ways that drive the results in the difference-in-difference estimation (cf. Table 4, Table 6 and Table 8).

**Table A. Means and frequencies for the identifying samples<sup>a</sup> for 1990.**

	Fathers	Mothers
Log earnings <sup>b</sup>	7.47 (.45)	6.97 (.52)
Age	36.7	34.4
Compulsory education + $\leq 1$ year educ.	0.309	0.191
Upper secondary education $\leq 2$ years	0.353	0.456
Upper secondary education $\leq 3$ years <sup>c</sup>	0.227	0.245
University education $\geq 3$ years	0.097	0.102
# children at home	2.35	2.29
Union duration, years <sup>d</sup>	9.84	9.76
Marriage duration, years <sup>e</sup>	2.83	2.84
Married before Nov-Dec 1989	0.51	0.52
Married Nov-Dec 1989	0.49	0.48
# of observations	15,253	10,474

<sup>a</sup>The samples used in the cross-section analysis <sup>b</sup>In nominal SEK. <sup>c</sup>Includes those with short post-secondary education. <sup>d</sup>Union duration is approximated by age of oldest child or, if married, prior to the birth of that child by marriage duration <sup>e</sup>.Marriage duration is # years since marriage or, <sup>f</sup> The percentage married in 1989 differs from that in 1990 since some couples married in 1990 and some divorced. <sup>g</sup> Refers to the child in the random sample, see Section 4.1.

**Table B. Identifying sample. Cross-section regressions on fathers' earnings in 1990.**  
**Dependent variable: log annual earnings in 1990. N=15,209**

	Model 1	Model 2	Model 3
Constant	Yes	Yes	Yes
Age and age squared	Yes	Yes	Yes
Education dummies	Yes	Yes	Yes
Married of which:			
married before Nov-Dec 1989	0.003 (.007)	-0.022** (.003)	-0.021** (.003)
married Nov-Dec 1989 (Ref.)	0	0	0
Union duration, years <sup>a</sup>		0.001 (.0003)	0.000 (.000)
Marriage duration, years <sup>b</sup>		0.015*** (.004)	0.016*** (.004)
# Children at home			-0.029*** (.005)
Adj R-sq.	.060	.061	.063

Note: Robust standard errors in parentheses. \*significant at 10%, \*\* at 5%; \*\*\* significant at 1%

**Table C. Identifying sample. Cross-section regressions on mothers' earnings in 1990.**  
**Dependent variable: log annual earnings in 1990. N=10,476**

	Model 1	Model 2	Model 3
Constant	Yes	Yes	Yes
Age and age squared	Yes	Yes	Yes
Education dummies	Yes	Yes	Yes
Married of which:			
married before Nov-Dec 1989	0.011 (.011)	-0.006 (.015)	0.001 (.015)
married Nov-Dec 1989 (Ref.)	0	0	0
Union duration, years <sup>a</sup>		0.013*** (.002)	0.017*** (.002)
Marriage duration, years <sup>b</sup>		0.002 (.006)	0.005 (.006)
# Children at home			-0.012*** (.001)
Adj R-sq.	.064	.068	.094

Note: Robust standard errors in parentheses. \*significant at 10%; \*\* significant at 5%,\*\*\* significant at 1%

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