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Is Cohabitation Bad for Children? Assessing the Causal Impact of Legal Marriage on Child Outcomes

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ABSTRACT:

This paper examines children who live with both biological parents and analyzes whether parental marriage confers educational advantages to children relative to cohabitation in Sweden. Cohabitation is more common in Sweden, but few studies have analyzed whether outcomes differ by parent's marital status. We measure educational outcomes by grade point averages (GPA) at age 16 and take account of the self-selection of marriage by using instrumental variable methods and estimating family fixed effects. We use the marriage boom in Sweden in late 1989 created by the change in the Widow's Pension as an instrument for the marriage decision. Our family fixed-effects models are identified by sibling differences in age and the fact that over half of Swedish children are born to cohabiting parents, thus siblings will differ in the fraction of childhood lived with cohabiting and married parents. We use Swedish register data on over 160,000 full siblings born 1972–87. Our results show that children living in cohabiting unions have lower educational outcomes without controlling for selection. Using the instrumental variables estimator, we find no causal effect of marriage. Our siblings difference results also show no significant impact of differences in fraction lived with married parents on GPA at age 16.

JEL Codes: I21, J12

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1. Introduction

Marriage provides opportunities for couples to share in joint production and consumption. In particular, Weiss (1997) notes that marriage serves four main functions: 1) Division of labor within the household that gives rise to specialization in market work and home production; 2) Coordination of investment activities; 3) Sharing in public goods such as children; and 4) Risk pooling. Marriage allows for coordinated investment by parents in children's human capital. However, this paper considers whether legal marriage is necessary to ensure parental investments in children's human capital. We focus on children who live with both biological parents and analyze whether parental marriage confers any educational advantages to children relative to cohabitation in Sweden. Cohabitation has been increasing in most countries and is more common in Sweden than anywhere else in the industrialized world. Furthermore, cohabitation in Sweden is more similar to legal marriage than in other countries, but it does not have the same legal implications. In this paper we use a policy change in Sweden, namely the marriage boom in the last two months of 1989 created by the reform of the Widow's Pension system to identify the causal effect of marriage on child outcomes.

Despite its increasing prevalence, research on the impact of cohabitation on children is scarce, but suggests that cohabitation may have adverse outcomes for children (Graefe and Licther 1999, Manning 2002, Smock and Gupta 2002, Bumpass and Lu 2000, Manning and Lichter 1996). Our research will provide the first evidence on the impact of cohabitation on children's outcomes in Sweden. In this paper, we analyze children who lived with both biological parents and use a large random sample of children born in Sweden in 1977-87 drawn from the population registers. The data sample roughly 20 percent of children born each year. This data set is combined with family and individual information from the bidecennial censuses from 1980, 1985 and 1990 and with information on the full siblings born in 1972-87. Our outcome variable is grade point average (GPA) at age 16 obtained from educational registers.

The change to the Swedish Widow's Pension in 1990 provides a useful case for evaluating the impact of marriage on children's educational outcomes. In 1989, when the Swedish Parliament enacted a reform abolishing the Widow's Pension starting in January 1990, it 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 husband died. Those already receiving a Widow's Pension would continue to do so as long as they lived. The implications became gradually known to Swedish public and resulted in a dramatic marriage boom in the last two months of 1989.

We use this marriage boom to assess the causal effect of a marginal increase in children's exposure to married parents using instrumental variables techniques. We then compare educational outcomes for children whose parents married in November and December 1989 to those of children whose parents continued to cohabitate or were married prior to the birth of the children. To take account of the self-selection of marriage we also estimate family fixed-effects models using a sample of more than 160,000 full siblings. These models are identified by siblings differences in age, and the fact that over half of Swedish children are born to cohabiting parents who may or may not eventually marry; thus, siblings will differ in the fraction of childhood lived with cohabiting and married parents. Descriptive regressions show that legal marriage is positively correlated with children's GPA. However, we find no causal of marriage on children's GPAs, neither for children of parents who married in the end of 1989, nor for siblings who lived with married parents during a larger fraction of their childhood. These results suggest that the positive correlation between legal marriage and children's GPA is the result of selection.

The paper proceeds as follows: Section 2 describes the trends in cohabitation and marriage, and discusses the legal differences between marriage and cohabitation in Sweden. Section 3 presents our theoretical perspectives. In Section 4 we present our data, describe the marriage boom in the end of 1989

and discuss our estimation strategy. Section 5 presents our findings. We end with a discussion of the results.

2. Cohabitation and marriage in Sweden

2.1 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; 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.

2.2 Legal differences between cohabitation and marriage in Sweden in 1989[1]

It is commonly believed that there are very minor differences in the legal implications of marriage and cohabitation in Sweden. However, this is only true as long as the union stays intact, if the couple has no children together (or prior to their union), or if they have no savings or property. These 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. However, if the parents are unmarried or cohabiting, the father has to acknowledge paternity, and they will have joint custody of the child provided they both agree on that, which most couples do. While earnings of married couples have been taxed individually since 1971, wealth and income from property and businesses are taxed jointly. Cohabitants are taxed jointly on wealth and property income only if they have children under age 18 together or if they have previously been married to each other.

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 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.[2] 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.

Finally, cohabiting couples do not automatically inherit each other. Cohabiting couples may write testaments in favor of each other, but bequests are taxed. Survivors from a cohabiting union have never

[1] This Section draws on Agell (1982, 1989), Insulander-Lindh & Thunberg (1996) and Ståhlberg (2004).
[2] However, if the house/apartment was bought by one of the partners, the other one has to buy the owner off.

been entitled to widows' or widowers' pension in the supplementary pension system, but under certain very specific circumstances, they were eligible in the general retirement scheme.[3] Those who received a widow's/widower's pension prior to 1990 and those who were eligible under the pre-1990 rules still receive their pensions and will do so as long as they live. There continues to be widow's/widower's pensions available from collective bargaining agreements, however, the availability and size of such pensions differ across agreements. Thus, blue-collar workers and low-earning white-collar workers in the private sector have no such protection for their survivors. In contrast, widows/widowers of high-earning white collar workers in the private sector, receive survivor's pensions as long as they live and as long as they do not remarry. 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 parents should differ.[4]

3. Theoretical perspectives on the effect of marriage on children

Unlike cohabitation which ends when one partner moves out, marriage requires a legal separation of property and custody rights, as indicated above, making it more difficult to dissolve. Thus, it could be that marriage is a signal of greater commitment. Also, the expected duration of a marriage is longer than that of a consensual union. These aspects together with the legal arrangement of marriage may provide for pooling of family resources, greater specialization within the family leading to economies of scale in household production, and greater investments in children. We know, for example, that in Sweden among employed mothers of children below age 10, the fraction working part time was 62 percent among married mothers but only 35 percent among cohabiting mothers in 1990 (Swedish Level of Living Survey

[3] In the new 1990 pension system there is a general 'readjustment' pension for survivors who have children under 12, regardless of whether they were married or cohabiting. If there are no children the adjustment pension is only available for ten months.

[4] 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.

1991).[5] Further, Sundström and Duvander (2002) find that married fathers used a larger share of the parental leave for newborn children than cohabiting fathers, net of earnings and other factors. In addition, using U.S. data Stratton (2004) finds that cohabiting households engage in less intrahousehold specialization than married households. These results indicate that marriage may provide for greater investments in children.

If both parents value a child's well-being, then investments in children by one parent may create a positive externality for the other parent. The absence of legal marriage may create a coordination failure where a parent has an incentive to under-invest in their children and free-ride off of the investments of the other parent. Thus, the legal status of the parent's relationship may lead to better (worse) outcomes in the case of marriage (cohabitation). It could be that the legal status of marriage makes a difference in outcomes for children.

Given the potential differences in their impact, few studies exist that examine the differences in the impact of cohabitation and marriage on child outcomes. Research on the impact of cohabitation on children is limited in the United States, and we are unaware of any studies of the impact of cohabitation on children in Sweden. Cohabitation may have adverse outcomes for children because adults in cohabiting families have lower educational attainment and earnings and cohabiting unions are less stable than married unions (Manning and Lichter 1996, Graefe and Licther 1999, Bumpass and Lu 2000, Manning 2002, Smock and Gupta 2002, Manning 2002, Manning, Smock and Majumdar 2004, Acs and Nelson 2002, Acs and Nelson 2004a, Acs and Nelson 2004b). Other research has found mixed effects on children's well-being of living in cohabiting families. Poverty rates for children are reduced by 29 percent when researchers account for the income of cohabiting partners (Manning and Lichter 1996). Cohabiting households with children spend more on alcohol and tobacco and less on education than married households (DeLeire and Kalil 2002). When researchers compare outcomes for children in

[5] We are grateful to Elin Olsson for help with these computations.

married biological parent unions with those for children in all cohabitating unions, children in cohabiting families fare worse (Manning 2002, Brown 2004).

However, Manning (2002) argues that key comparisons should be made between cohabiting biological parents (cohabiting parents) and married biological parents (married parents), and cohabiting partners and stepparent families. When Manning makes these distinctions, she finds no significant differences in behavior outcomes and school achievement for children living with cohabiting compared with married parents. Brown (2004) makes the same comparison. In contrast, she finds that young children and adolescents of cohabiting parents have lower school engagement and more behavior problems than children of married parents. However, the impact of cohabitation becomes insignificant for young children when parental education and resources are included in the specifications. Manning and Lamb (2003) examined adolescent well-being in cohabiting partner, stepparent, and married families. They find worse behavioral and academic outcomes for adolescents in cohabiting partner families when compared with stepfamilies. Studies based on U.S. data are plagued by relatively small numbers of cohabiting biological parents. Yet, taken together, this research suggests that outcomes for children in cohabiting families are dissimilar from outcomes for children in married families.

Although research on marriage suggests that it benefits adults and children alike, much of this research does not control for the selection of marriage (Lerman 2002, Ribar 2004) and in the case of children's outcomes the biological relationship of cohabiting adults to children. In their comprehensive book, McLanahan and Sandefur (1994) show that educational, fertility, and inactivity outcomes for children who grow up with a single-parent or stepparent are far worse than for those children who grow up in an intact family with both (married) biological parents. They conclude that the biological relationship of parents to children matters the most. Manning (2002) suggests that current research on children's well-being in cohabiting families would be enhanced if studies included controls for selection

into cohabitation, used dynamic measures of family structure, and considered the effect of cohabitation on outcomes in other countries. Thus far, studies that compare children's outcomes in cohabiting and married families do not take these issues into account (Manning 2002). This study seeks to address Manning's critique by examining cohabiting biological parents, controlling for family structure over the entire childhood, and addressing the selection into marriage. We examine whether there are significant differences in children's educational outcomes as a function of parent's marital status using data from Sweden.

4. Data and methods

4.1 Data

For most of the analysis in this paper we use a random sample of children born in Sweden in 1977-87 drawn from the population registers of Statistics Sweden. The data sample roughly 20 percent of Swedish children born each year (approximately 20,000 children per year) and their siblings. We also impose the restriction that the parents were born in Sweden. These data are combined with family and individual information from the bidecennial censuses from 1980, 1985 and 1990 and from Statistics Sweden's special multigenerational register. From the censuses we obtain information on whether the child lived with his/her biological parents or not and only include children living with both biological parents in our analysis. All these requirements leave us with about 14,000 children of each cohort, in total over 130,000 children.

For the sibling analysis, however, we construct a sample by combining information on the children in our random sample born in 1977-84 who had any full siblings born in 1972-87 (about 68,000 children), with information on these siblings (about 94,000 children). That leaves us with a sample of over 162, 000.

Our outcome variable is grade point average (GPA) at age 16. The grades at age 16 are the final grades from compulsory school and used for entrance to different high-school tracks and are therefore vital for pupils. Further, there are compulsory national tests (in Math, Swedish and English) aimed at guiding teachers' grading so that grades should be comparable across the whole country. For the cohorts covered by our study, Statistics Sweden has collected the grades at age 16 for all students who have graduated from a school in the country and made the data available for research purposes (*Årskurs 9 registret*).

To exploit this information for our study, we must overcome two problems.[6] First, all pupils do not follow the same study tracks through compulsory school; for example in some fields of study there are both advanced and elementary level courses. We avoid this problem by only using the fields of study that all pupils study. These are Swedish, (natural) science and social science.[7] Second, the grading system underwent a major change during the period of our study. Through graduation year 1997 Sweden had a so-called relative grading system ranging from 1 to 5. The goal was that the national average should be 3.0 with standard deviation 1. In practice the averages in most fields of studies were between 3.1 and 3.2. For this period we simply use the pupil's average grade and standardize it by the overall mean and standard deviation in our sample. From graduation year 1998 and onwards, Sweden has had a so-called criterion referenced grading system with grades at four levels: IG (not pass), G (pass), VG (pass with distinction) and MVG (pass with special distinction). For entrance to high school these grades are valued 0, 10, 15 and 20 points. We use these weights to compute a GPA for each student and standardize by the mean and the standard deviation in our sample.

[6] Another problem in using grade data is that pupils with immigrant background often study special courses from which the grades are not comparable to the rest of the population. By only including Sweden-born pupils with Sweden-born parents, we avoid this problem.

[7] Some schools apply an overall grade in science and social science, whereas other apply separate grades in biology, physics, chemistry in science and in geography, history and social issues in social science.

We create marital history for the parents of the children using information from population records and the censuses. We have information on all changes in marital status since 1968. For the analyses on the random sample we create dummy variables for married parents according to date of marriage from this information. The explanatory variables include child's gender and year and month of birth, father's and mother's age, parents' earnings and the sibling composition of the household (his children, her children, and their joint biological children).

For the analysis of sibling differences – models with family fixedeffects – we create the explanatory variable 'proportion of childhood lived with married parents' based the parents marital history. This variable takes values from 0 to 1. We define childhood as up to and including age 16 since our outcome variable is GPA at age 16. However, since our information on whether cohabiting parents still cohabited does not go beyond 1990 we only observe the whole childhood until age 16 for children born in 1972-74. For the younger cohorts the proportion lived with married parents is constructed as the proportion of their childhood up to 1990 their parents were married.

4.2 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. 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; starting at age 65 she received 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-- receive an Adjustment pension for up to 12 months.

The Adjustment pension depends upon the age of the children and the income of the deceased, thus, it is not an unconditional right like the Widow's pension. Survivors receive the Adjustment pension as long as they have children below age 12. For example, if the husband died in 1990 and the couple had a 16-year old child, the child would receive a Child Pension until age 18 and the widow would get the Adjustment pension for a maximum of 12 months. Survivors who have no children at home could get the Adjustment pension for a maximum of ten months. In sum, the Adjustment pension is only available for about one year or until the youngest child turns 12, whereas the widow's pension was for life. The change in the Widow's pension was particularly disadvantageous for women with older children or no children at home.

Widows who received a pension prior to 1990 and those who were eligible under the pre-1990 rules receive their Widow's pensions and will do so as long as they live. Importantly for our analysis, there were a number of transitional provisions included in the reform, the main impact of which was that all non-married women born before 1945 could gain rights to the Swedish Widow's Pension by marrying before the end of 1989 (Hoem 1991).[8] In addition, some women who were born in 1945 or later and who 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. The effect of the policy change was dramatic. The propensity to marry sky-rocketed in December 1989, especially for cohabiting couples; the number of marriages increased from an average of 3,000 in previous Decembers to 64,000 in December, 1989 a 21-fold increase (Andersson 1998, Hoem 1991). Figure 1 reproduces results from Andersson (2003), showing the impact of the change in the Swedish Widow's Pension on marriage rates in 1989.

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 benefit directly from marrying. We can interpret the latter change as a "band-wagon" effect--couples who

[8] The transitional provisions for women born in 1945 or later were more restrictive and more complicated.

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 to just to marry. Still another interpretation of the "band-wagon" effect is that the marriage boom made it less expensive to marry since it became acceptable to marry without having a costly reception.[9] This dramatic response to the change in Widow's Pension system constitutes a quasi-natural experiment that will enable us to examine the causal marginal effect of marriage on child outcomes.

4.3 Estimation strategy

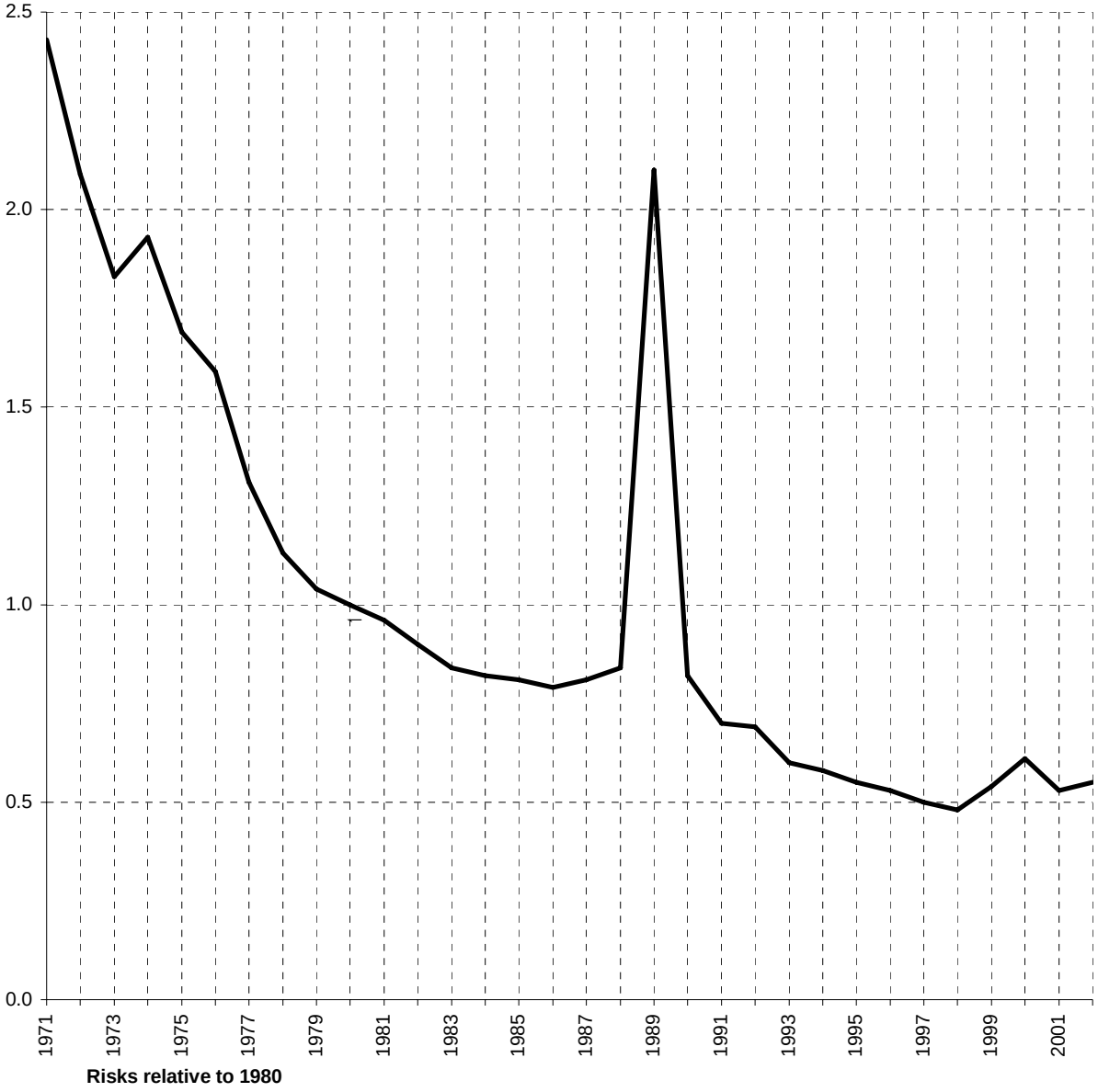
Our approach is based on the assumption that marriage is not randomly assigned and we pose the following research question: How does a marginal increase in the exposure to married parents affect the educational outcomes of children? In other words, suppose parents are initially cohabiting, if they marry, how does parents' marital status affect children's GPAs?

We begin by estimating descriptive regressions of the correlation between parent's marital status and children's GPA. These results will establish whether marriage is correlated with better educational outcomes relative to cohabitation.

A second approach is to relax the assumption that marriage is randomly assigned and use an instrumental variables (IV) estimator to identify the causal effect of marriage on children's GPAs. IV models require an instrument that is correlated with the probability of marriage and uncorrelated with children's GPAs. Let M_i be an indicator for the marriage treatment, and let there be two potential

[9] The most common answer among cohabiting women to the question why they were not planning to marry was that they could not afford the wedding they wished to have (Hoem B 1995).

Figure 1: Annual index of marriage-risk level.
Never-married Swedish women, 1971-2002,
standardized for parity and age.



Source: Gunnar Andersson 2003: "Demographic trends in Sweden: An update of childbearing and nuptiality through 2002". MPIDR Working Paper, WP 2003-034. Max Planck Institute for Demographic Research, Rostock.

outcomes for each individual i, y_{Mi} is the married outcome and y_{Ci} is the cohabitating outcome with u_i as the random error term. The constant effects of cohabitation and marriage are given below:

$$y_{Ci} = \alpha + u_i$$
$$y_{Mi} = y_{Ci} + \delta .$$

The causal relationship between marriage and the outcome y is given by:

$$y_i = \alpha + M_i\delta + u_i \qquad (1)$$

The constant effect δ is the parameter of interest. Since marriage is not randomly assigned, estimates including married and unmarried individuals will not identify δ in equation (1).

In the case of Sweden, the change in the Widow's Pension system provides a quasi-natural experiment that allows us to examine the effect of marriage on children's outcomes. Let Z_i be an indicator variable for whether parents married in the fall of 1989 in response to the change in the Widow's Pension system. The identifying assumption is that Z_i , the marriage boom, has no effect on children's GPAs. When this is the case:

$$\delta = \frac{E[y_i \mid Z_i = 1] - E[y_i \mid Z_i = 0]}{E[M_i \mid Z_i = 1] - E[M_i \mid Z_i = 0]} \qquad (2)$$

Equation (2) is the Wald-IV estimator found in Angrist (1999, 2003). Under the assumption of constant causal effects both the Average Treatment Effect (ATE) and Treatment on the Treated (TT) parameter is equal to δ. The previous discussion did not allow for additional covariates. We can estimate a modified version of equation (1) using two-stage least squares:

$$y_i = \alpha + X_i'\beta + M_i\delta + u_i \qquad (1')$$

The first stage regresses the marriage indicator on all the exogenous variables in the model and an indicator for whether or not the couple married during the boom in November and December of 1989.

As noted in the previous section, the Widow's Pension reform caused a boom in two types of marriages. The first group consisted of those women born prior to 1945 who qualified for the Widow's Pension and thus, had a financial incentive to get married, the "Treatment Sample." The second group consisted of those women born in 1945 or later who would not qualify for the Widow's Pension, but jumped on the marriage bandwagon, the "Bandwagon Sample." The Bandwagon Sample may have intended to get married at some point, and just decided to get married because everyone else was doing so. The Treatment Sample had a well-defined financial incentive to marry. We estimate IV regressions for both groups because the incentives to marry differed significantly between them.

Finally, we estimate sibling fixed-effects models. Fixed-effects methods are advantageous because they allow us to control for unobserved, individual, or family-specific factors that do not vary over time and may be correlated with the marriage decision and observed outcome. In addition, fixed-effects estimates allow us to use the entire sample of cohabiting couples who decide to marry at some point during their child's lifetime.

First, consider the following model of parents' investment in child outcomes in equation (3):

$$C_{ij} = \alpha S_{ij} + \beta M_{ij} + \gamma W_{ij} + \delta X_{ij} + u_{ij} \tag{3}$$

where C_{ij} measures a child's outcome, S_{ij} measures the sibling composition of the household, M_{ij} measures the proportion of childhood with married biological parents, W_{ij} measures observable parental characteristics, X_{ij} measures individual characteristics, and u_{ij} is the error term.

We can decompose the error term into three components: $u_{ij} = \varphi_j + \eta_i + \upsilon_{ij}$, where φ_j is the family-specific component, η_i is the individual-specific component, and υ_{ij} is random error. If φ_j is correlated with parents' marital status, then first differencing across siblings will eliminate selection bias,

but if the parent's decision to marry is correlated with individual-specific error components, then selection remains a problem. By assuming that selection into legal marriage only operates through a family fixed effect, φ_j, and that all family effects are sibling-invariant, $W_{ij} = W_j$, we first difference (3) with respect to siblings and estimate the following equation:

$$\Delta C = \alpha \Delta S + \beta \Delta M + \delta \Delta X + \Delta u$$

Under our assumptions, this model eliminates any observed or unobserved variables that do not vary within a family.

Although fixed-effects estimates have the advantage of allowing us to control for unobserved factors that may be associated with outcomes and marital status, they are subject to limitations as well. In particular, fixed-effects estimates can be biased by measurement error. We expect measurement error to be less problematic in this case since most of our data are from population registers, as opposed to being self-reports subject to recall bias.

5. Findings

5.1 Descriptive regressions and Instrumental Variables estimates

We start by presenting some descriptive statistics. Table 2 focuses on the children who lived with both biological parents in 1990 (our estimating sample) and displays their mean GPAs at age 16 by parents' marital status--if parents were married and when they married. We see that children of parents who married before they were born had significantly higher GPAs on average; the GPA differences between the other groups of children are not statistically significant. Second, children in whose parents married before birth (Group 1), married before the Fall of 1989 (Group 2), or married in the Fall of 1989 but did not qualify for the Widow's Pension (Group 3) had more full siblings and fewer half siblings in 1990 than those in the remaining groups, which reflects the more stable family situation for the former.

Third and unsurprisingly, those who married late 1989 in order for the woman to become eligible for Widow's Pension (Group 4) had fewer divorces than the other groups of married parents.

Next, we estimate descriptive regressions using a random sample of children born 1977-87 in Table 3 with GPA at age 16 as our dependent variable. We specify four different models with marriage as a dummy variable; we then replace marriage with the duration of childhood until age 16 that a child's parents are married in four additional specifications. In model A we include our indicators for gender, year of birth, and month of birth. Marriage has a positive and significant effect on child's GPA as does marriage duration. In model B we add controls for parents' ages and whether or not the parents were teenagers when the child was born, and the coefficient drops somewhat in both sets of estimates. Turning to model C, we see that controlling for parents' income does not appreciably change the estimated effect of marriage or marriage duration on children's GPA. In model D we include the number of full and half siblings (mother's side and father's side), and indicators for birth order. The estimated effect of marriage is now half the size of that in model A, but remains statistically significant at the one percent level. However the coefficient on marriage duration does not change once these variables are added. Taken together, the results in Table 3 show that marriage is positively correlated with children's GPAs.

Table 4 estimates descriptive regressions of the effect of marriage on children's GPA for those children whose parent's were cohabiting in June, 1988 when the Widow's Pension reform was passed into law. This group is eligible for the marriage treatment. Panel I of Table 4 shows a positive and significant effect of marriage on children's GPA in all four models. Panel II of Table 4 limits the analysis to the Treatment Sample, those mother's who would be eligible for the Widow's Pension if they were married prior to 1990. Although the estimated effect of marriage and marriage duration on GPA is the same magnitude as in Panel I, the coefficients are not statistically significant. Panel III shows the

parameter estimates for the Bandwagon Sample. Similar to Panel I, we find a positive and significant effect of marriage on children's GPA in all four models.

In both Tables 3 and 4, we do not control for the endogeneity of marriage. In order to identify the causal effect of marriage on children's GPA, we use the marriage boom in November and December of 1989 as an instrument for marriage. Our sample is the same as Table 4—the children whose parents were cohabitating when the law was passed in June, 1988. Table 5 presents the Wald-IV estimates for both the Treatment and Bandwagon samples. Marriage and marriage duration have a positive effect on GPA for the Bandwagon sample but no significant effect on the Treatment sample. These results are similar to Table 4 which showed no significant correlation between marriage and children's GPA for the Treatment sample.

Table 6 contains the instrumental variables estimates of the effect of marriage and marriage duration on children's GPA for the Treated Sample. We estimate the same four models as in Tables 3 and 4, but this time we use the marriage boom as an instrument for the endogeneity of marriage along with other exogenous variables in the models. In all specifications, marriage and marriage duration have no significant effect on children's GPAs. Taking the results in Tables 4 through 6 together, we find little evidence that marriage has a causal effect on children's GPAs. The marriage by parents responding to financial incentive appears to provide no advantages to children. These results stand in contrast to those in Table 7 which presents the IV estimates for the Bandwagon sample. Specifications A through C show a positive and significant effect of marriage and marriage duration on GPAs. As parent's age and income are added to the model, the estimated effect falls by about half. Once controls are added for siblings and birth order to specification D, the coefficients on marriage and marriage duration become quite small and are no longer significantly different from zero. Given that the Bandwagon Sample had no financial incentive to marry, the positive effect of marriage observed in models A through C may reflect

selection—these couples would have eventually married, but the timing of the marriage changed because of the bandwagon effect. Furthermore, once additional variables are added to model D, the effect of marriage is no longer statistically significant. Thus, we interpret the results in Table 7 as being consistent with finding no causal effect of marriage on children's GPAs.

5.2 Sibling difference estimates

Do children whose parents were married during a greater fraction of their childhood have more favorable educational outcomes than those whose parents were cohabiting during a greater fraction of their childhood? To investigate this we compare the GPAs at age 16 for full siblings born in Sweden in 1972-87 who grew up with both biological parents and whose parents were either married or cohabiting. Since majority of Swedish couples begin their union by cohabiting and often do not marry until after their first child is born and since siblings differ in age, most siblings will differ in the proportion of childhood lived with married or cohabiting parents. We exploit this difference by constructing the variable proportion of childhood lived with married parents which takes the values from 0 to 1. We define childhood as up to and including age 16 since our outcome variable is GPA at age 16. However, since our information on whether cohabiting parents still are cohabiting (and not separated) does not go beyond 1990 we only observe the whole childhood until age 16 for children born in 1972-74. For the cohorts born in 1975-1987 the proportion lived with married parents is constructed as the proportion of their age in 1990 their parents were married. To take account of the fact that a given value for the proportion with married parents has different meanings for the different cohorts we control for year of birth in all models.

In addition, to investigate whether (younger) siblings who lived their whole childhood with married parents (whether until age 16 or until 1990) gain educational advantages over their older siblings who lived longer with cohabiting parents we include a dummy variable (in Model 2) which equals one if

the proportion with married parents equals one and zero otherwise. Finally, as second or third born children are more likely than first borns to have lived with married parents we include controls for birth order (in Model 3).

The resulting family fixed-effects estimates are presented in Table 8 and show no impact of the proportion lived with married parents on children's educational outcomes as measured by their GPAs at age 16. Moreover, the estimates of Model 2 and 3 indicate that siblings who lived their whole childhood with married parents (whether until age 16 or until 1990) have no educational advantages over siblings who lived longer with cohabiting parents. Further, the negative coefficient for year of birth in Model 1 and 2 suggests that younger siblings incur educational disadvantages compared to their older siblings. We observe this in the estimates from Model 3 which controls for birth order.

To check the robustness of our results we also estimated the fixed-effects models for the sub sample for which we observed their whole childhood until age 16, namely the cohorts born in 1972-74. However, we still find no effect of the proportion of childhood lived with married parents and no effect of having lived the whole childhood with married parents. Interestingly, among these about 15,100 relatively closely spaced siblings there are about 2,800 who experienced different proportions of childhood with married parents and who identify the estimates.

6. Conclusions

This research poses the question: for a child who lives with both biological parents, does it matter if parents are legally married or living in a consensual union? Although evidence from the U.S. shows that cohabitation is correlated with poor outcomes for children, this relationship has not been examined in the Swedish context. Furthermore, cohabitation has been increasing in most Western countries, but is most prevalent in Sweden. In this paper we use data from Sweden, and more precisely, we use the

marriage boom in the end of 1989 created by the reform of the Widow's Pension system to identify the causal effect of marriage on children's educational outcomes.

We began by estimating descriptive regressions of the effect of marriage and marriage duration on children's GPAs. We find that marriage is positively correlated with higher GPAs for Swedish children. Next, we use instrumental variables techniques to identify the causal effect of marriage. The marriage boom at the end of 1989 induced two types of marriages—those in which the women financially benefited by being included in the Widow's Pension (Treated Sample) and those where there was no clear financial incentive to marriage (Bandwagon Sample). We find no significant effect of marriage on children's GPAs in the Treated Sample. However, we do find a significant and positive effect of marriage in three of four specifications using the Bandwagon Sample. Once we include birth order and sibship size in the regressions, the relationship is no longer statistically significant. Finally, we use variation in children's ages and the fact that over half of all first-born children in Sweden are born in cohabiting unions to estimate sibling fixed-effects models of the effect of marriage on children's GPAs. Similar to the instrumental variables methods, we find no statistically significant effect of marriage on children's educational outcomes.

Our interpretation of these findings is that there is no causal effect of marriage on children's educational outcomes and that much of the apparent benefit of parental marriage is due to selection. Our results are also bad news for policy-makers who want to "promote healthy marriages." For marriage to have a positive impact on child outcomes, it seems necessary that parents marry because they want to, not because they gain financially from doing so.

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Table 1: Differences in Legal Arrangement of Marriage and Cohabitation in Sweden

Legal Arrangement:	**Marriage:**	**Cohabitation:**
Obligation to Support Spouse	• Yes: Spouses obligated to support one another	• No: Partners not obligated to support one another
Paternity	• Husband of mother is granted paternity	• Biological father must legally recognize child
Custody	• Joint Custody	• Requires agreement by parents
Taxation	• Property Income and Wealth Taxed Jointly	• Property Income and Wealth Taxed Jointly if share children < 18 years
Community Property	• Yes	• No
Inheritance	• Spouses automatically inherit	• Written testament required for inheritance
Dissolution Costs	• Dissolution requires legal costs	• Limited or no legal costs

Table 2. Descriptive statistics by parents' marital status and gender. Children born 1978-87 living with both biological parents in 1990. (# observations in parentheses).

Parental marital Status	GPA	Mums age	Dads age	Dad's Income 1985	Mum's income, 1985	# full sibs, half sibs (mum), half sibs (dad) in 1990	Mum dies 1991-2000	Dad dies 1991-2000	Parents divorce 1991-2000
1. Married before birth of child (N=78,078)	0.167 (0.920)	29.6	32.1	1242 (591)	591 (366)	1.70 0.10 0.13	0.009	0.015	0.121
2. Married after birth but before Fall 1989 (N=23,906)	-0.026 (0.923)	25.8	28.4	1087 (427)	581 (305)	1.51 0.16 0.16	0.005	0.009	0.140
3. Married Fall 1989--mum born in 1945 or later (N=9,468)	-0.121 (0.963)	27.4	30.3	1064 (375)	591 (300)	1.42 0.14 0.17	0.005	0.010	0.132
4. Married Nov-Dec 1989 --mum born before 1945 (N=188)	0.050 (0.935)	37.8	37.9	1178 (489)	609 (375)	0.61 0.83 0.49	0.016	0.037	0.048
5. Not married in 1989, mum born in 1945 or later (N=19,254)	-0.185 (1.019)	27.0	29.8	992 (453)	615 (320)	1.31 0.26 0.28	0.006	0.015	-
6. Not married in 1989, mum born before 1945 (N=535)	-0.015 (0.980)	38.3	37.5	1129 (564)	630 (452)	0.59 1.12 0.61	0.030	0.049	-
All who live with bio parents in 1990 (N=131,429)	0.058 (0.951)	28.4	31.0	1164 (541)	593 (345)	1.58 0.14 0.16	0.007	0.014	-

Table 3. Estimated Effect of Marriage and Marriage Duration on Children's GPA
Full Cross-Sectional Sample

	A	B	C	D	A	B	C	D
Marriage	0.212**	0.152**	0.135**	0.123**				
	[0.008]	[0.008]	[0.008]	[0.008]				
Marriage Duration					0.015**	0.010**	0.010**	0.010**
					[0.000]	[0.000]	[0.000]	[0.000]
Mother's Age[a]		0.157**	0.124**	0.138**		0.154**	0.121**	0.137**
		[0.006]	[0.006]	[0.006]		[0.006]	[0.006]	[0.006]
Father's Age[a]		0.013**	0.009	0.024**		0.011*	0.007	0.023**
		[0.005]	[0.005]	[0.005]		[0.005]	[0.005]	[0.005]
Father's Income[a]			0.914**	0.832**			0.893**	0.811**
			[0.048]	[0.045]			[0.047]	[0.044]
Mother's Income[a]			1.876**	1.545**			1.918**	1.552**
			[0.067]	[0.061]			[0.069]	[0.061]
Full Siblings				-0.010**				-0.018**
				[0.003]				[0.003]
Half-Sibs (Mother)				-0.271**				-0.262**
				[0.006]				[0.006]
Half-Sibs (Father)				-0.119**				-0.111**
				[0.005]				[0.005]
First Born				0.290**				0.295**
				[0.011]				[0.011]
Second Born				-0.012				-0.019
				[0.012]				[0.012]
Third Born				-0.003				-0.016
				[0.012]				[0.012]
Fourth Born				-0.029*				-0.040**
				[0.014]				[0.014]
Sex	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teen Mother	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Teen Father	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Parent's Age Interacted	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	131429	131429	131429	131429	131429	131429	131429	131429
R-squared	0.08	0.11	0.14	0.18	0.09	0.11	0.15	0.18

[a] Specification includes squared term. Robust standard errors in brackets. * significant at 5%; ** significant at 1%

Table 4. Estimated Effect of Marriage and Marriage Duration on Children's GPA For those at Risk of Marriage in June, 1988

	I. Full Sample			
	A	**B**	**C**	**D**
Marriage	0.092**	0.081**	0.073**	0.040**
	[0.011]	[0.011]	[0.011]	[0.011]
Marriage Duration	0.012**	0.012**	0.011**	0.007**
	[0.001]	[0.001]	[0.001]	[0.001]
Observations	29943	29943	29943	29943
R-squared	0.07	0.1	0.13	0.17
	II. Treatment Sample			
	A	**B**	**C**	**D**
Marriage	0.092	0.067	0.076	0.029
	[0.073]	[0.071]	[0.068]	[0.067]
Marriage Duration	0.011	0.009	0.011	0.006
	[0.011]	[0.010]	[0.010]	[0.009]
Observations	728	728	728	728
R-squared	0.12	0.15	0.22	0.28
	III. Bandwagon Sample			
	A	**B**	**C**	**D**
Marriage	0.094**	0.081**	0.073**	0.040**
	[0.011]	[0.011]	[0.011]	[0.011]
Marriage Duration	0.012**	0.012**	0.011**	0.008**
	[0.001]	[0.001]	[0.001]	[0.001]
Observations	29215	29215	29215	29215
R-squared	0.07	0.1	0.13	0.17

Notes: Specifications described in Table 3. Robust standard errors in brackets. * significant at 5%; ** significant at 1%

Table 5. Wald-IV Estimates of Effect of Marriage and Marriage Duration on Children's GPA

	Treated	**Bandwagon**
Marriage	0.061	0.091**
	[0.085]	[0.012]
Marriage Duration	0.009	0.004**
	[0.013]	[0.001]

Robust standard errors in brackets.
* significant at 5%; ** significant at 1%

Table 6. Instrumental Variables Estimates of Effect of Marriage and Marriage Duration on Children's GPA for Treated Sample

	A	B	C	D	A	B	C	D
Marriage	0.087	0.057	0.062	0.013				
	[0.080]	[0.079]	[0.076]	[0.074]				
Marriage Duration					0.013	0.009	0.009	0.002
					[0.012]	[0.012]	[0.011]	[0.011]
Mother's Age[a]		-0.022	-0.074	-0.047		-0.017	-0.069	-0.046
		[0.315]	[0.301]	[0.295]		[0.316]	[0.302]	[0.295]
Father's Age[a]		-0.141	-0.146	-0.155*		-0.142	-0.147	-0.156*
		[0.080]	[0.080]	[0.079]		[0.080]	[0.080]	[0.079]
Father's Income[a]			2.145**	2.159**			2.128*	2.155**
			[0.824]	[0.826]			[0.828]	[0.830]
Mother's Income[a]			0.057	-0.105			0.071	-0.101
			[1.108]	[1.035]			[1.105]	[1.034]
Full Siblings				0.019				0.019
				[0.066]				[0.066]
Half-Sibs (Mother)				-0.184**				-0.184**
				[0.030]				[0.030]
Half-Sibs (Father)				-0.089*				-0.089*
				[0.037]				[0.037]
First Born				-0.038				-0.037
				[0.119]				[0.119]
Second Born				-0.242				-0.242
				[0.130]				[0.130]
Third Born				-0.112				-0.110
				[0.208]				[0.208]
Fourth Born				-0.537				-0.537
				[0.356]				[0.356]
Sex	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teen Mother	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Teen Father	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Parent's Age Interacted	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	728	728	728	728	728	728	728	728
R-squared	0.12	0.15	0.22	0.28	0.12	0.15	0.22	0.28

[a] Specification includes squared term. Robust standard errors in brackets. * significant at 5%; ** significant at 1%

Table 7. Instrumental Variables Estimates of Effect of Marriage and Marriage Duration on Children's GPA for Bandwagon Sample

	A	B	C	D	A	B	C	D
Marriage	0.087**	0.048**	0.047**	0.014				
	[0.014]	[0.014]	[0.014]	[0.014]				
Marriage Duration					0.010**	0.006**	0.005**	0.002
					[0.002]	[0.002]	[0.002]	[0.002]
Mother's Age [a]		0.157**	0.134**	0.116**		0.157**	0.134**	0.116**
		[0.015]	[0.015]	[0.015]		[0.015]	[0.015]	[0.015]
Father's Age [a]		0.019	0.017	0.025*		0.019	0.017	0.025*
		[0.011]	[0.010]	[0.010]		[0.011]	[0.010]	[0.010]
Father's Income [a]			1.342**	1.165**			1.339**	1.164**
			[0.076]	[0.074]			[0.076]	[0.074]
Mother's Income [a]			2.644**	1.911**			2.643**	1.910**
			[0.216]	[0.217]			[0.216]	[0.217]
Full Siblings				-0.003				-0.003
				[0.008]				[0.008]
Half-Sibs (Mother)				-0.263**				-0.262**
				[0.011]				[0.011]
Half-Sibs (Father)				-0.113**				-0.112**
				[0.010]				[0.010]
First Born				0.239**				0.238**
				[0.024]				[0.024]
Second Born				-0.067**				-0.067**
				[0.025]				[0.025]
Third Born				-0.041				-0.042
				[0.028]				[0.028]
Fourth Born				-0.140**				-0.140**
				[0.040]				[0.040]
Sex	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Teen Mother	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Teen Father	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Parent's Age Interacted	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Observations	29215	29215	29215	29215	29215	29215	29215	29215
R-squared	0.07	0.1	0.13	0.17	0.07	0.1	0.13	0.17

[a] Specification includes squared term. Robust standard errors in brackets. * significant at 5%; ** significant at 1%

Table 8. Fixed-effect estimates of the relationship between the proportion of childhood lived with married parents and educational outcome for full siblings born in Sweden in 1972-87. Dependent variable: Grade Point Averages at age 16.

GPA	Model 1	Model 2	Model 3
Prop. w married parents	-0.034	0.051	-0.068
	[0.015]	[0.073]	[0.073]
Year of birth	-0.017*	-0.017*	0.013*
	[0.001]	[0.001]	[0.002]
Prop w married parents=1		-0.075	0.060
		[0.063]	[0.063]
Oldest child			0.136*
			[0.010]
Youngest child			-0.040*
			[0.010]
Sex	Yes	Yes	Yes
Month of birth	Yes	Yes	Yes
# Families	74,706	74,706	74,706
# Observations	162,234	162,234	162,234
#Identifying observations	23,168	23,168	23,168
R-square within	0.092	0.092	0.098

The GPA:s have been standardized by subtracting the mean and dividing by the standard deviation. The proportion lived with married parents has been computed as (i) proportion of years up to age 16 parents were married for children born 1972-74, and (ii) proportion of age in 1990 parents were married for children born 1975-87. The proportion lived with cohabiting parents is equal to 1 - prop lived with married parents.
Robust standard errors in brackets.* $p < .01$.