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Crime and Partnerships

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ABSTRACT

Crime and Partnerships*

This paper tests whether being convicted of a crime affects marriage market outcomes. While it is relatively well documented that crime hurts in terms of reduced future income, there has been little systematic analysis on the association between crime and marriage market outcomes. This paper exploits a detailed Danish register-based data set to fill this gap in the literature. The main findings are that male convicts do not face lower transition rates into partnerships as such, but they face a lower chance of forming partnerships with females from more well-off families. In addition males who are convicted face a significantly higher dissolution risk than their law abiding counterparts.

JEL Classification: J12

Keywords: crime, marriage, divorce

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There's a lot of strange men in cell block ten
But the strangest of them all
Was a friend of mine who spent his time staring at the wall
Staring at the wall

In his hand was a note that his gal had wrote
And it proves that crime don't pay
She was the very same gal that he robbed and stole for
For naming her wedding day
For naming her wedding day.

Johnny Cash - the Wall

1 Introduction

The economic consequences of crime in terms of reduced employment possibilities and lower market wages have been shown to be quite substantial (see e.g. Waldfogel (1994), Freeman (1999), Western et al. (2001), and Holzer (2007) for the effects of incarceration and Grogger (1995) for similar albeit smaller effects for arrestees)). A less investigated, but perhaps equally important, consequence of engaging in criminal activities is the potential spill-over to marriage market outcomes. The purpose of the present paper is to take a closer look at this issue.

There are numerous payoffs to forming and maintaining a partnership, and some of these returns are economic by nature. As listed in e.g. Weiss (1997), gains from marriage include specialization gains, the possibility of sharing public goods, of coordinating investment activities, and of sharing risk. To enjoy these benefits, a necessary condition is that there is someone who is willing to marry you. This paper investigates whether the possible stigma effect of being convicted of a criminal offence affects an individual's chances in the marriage market.

This paper uses a sample of Danish males (since males by far are the most active in terms of committing crime) to investigate whether being convicted of a crime affects marriage market outcomes like finding a partner, quality of partner, and dissolution risk. An obvious empirical challenge is to identify the causal effect of conviction on marriage market outcomes. It is likely that individual characteristics, both observable in the data and unobservable, affect the process related to crime and to marriage market outcomes at the same time. To address the potential endogeneity of crime, I follow a strategy that has been used in (e.g.) the -- somewhat related -- literature that assesses the effects on the exit rate from unemployment of sanctioning unemployed individuals that do not comply with eligibility criteria for unemployment insurance (van den Berg et al. (2004), Abbring et al. (2005), Lalive et al. (2005), and Svarer (2007)). The method simultaneously estimates the process that describes criminal activity and the process of marriage market activities. It hereby exploits that timing of crime differs across individuals. Under some well-defined assumptions (which I will return to later), the model causally identifies the effect of crime on the transition rate into and out of partnerships (Abbring & van den Berg ((2003)). Another empirical cause of concern is the possibility of reverse causality. Difficulties in finding a partner or maintaining a relationship might affect the propensity to commit crime and hence to get convicted. To address this issue, I supplement the timing-of-events methodology with an instrumental variable approach basically using pre marriage market criminal activity as instrument for being convicted in the analysis of partnership formation and pre relationship criminal activity as instrument for being convicted in the partnership dissolution analysis.

The interdependency between marriage market status and crime has been studied intensively in the sociological literature. However, the main emphasis has been on the effect of marriage on the propensity to commit crime. The conclusion from this literature is that marriage causally reduces crime (see Sampson et al. (2006)). Studies that look at the other side of the coin -- the effect of crime on marriage market outcomes -- are much fewer in number.

Sampson & Laub (1993) look at the relationship between juvenile delinquency and adult outcomes using US data. They find that delinquency when young is associated with weaker attachment to a spouse and higher divorce propensity in adult years. Levitt & Lochner (2001), also based on US data, find no difference in marriage or divorce patterns by age 30 for youth criminals compared to non-

criminals. Lopoo & Western (2005) investigate the effect of incarceration on the formation and stability of marital unions, and using US data they find that the probability of finding a partner or divorcing the current partner is higher during incarceration, but not significantly so afterwards. Neither of these studies address the issue of endogeneity, and in that sense this paper is the first (as far as the author is aware) that tries to estimate the causal effect of crime on marriage market outcomes.

The study uses a large Danish register-based data set to investigate how the incident of being convicted of a criminal offence affects the probability to form partnerships, the quality of partners, and the partnership dissolution risk. The data has individual level information for 10% sample of the Danish population between 15 and 66 years old. For each individual we know whether the person has been convicted for a crime. The type of conviction and the sentence is also known. In addition, the data set includes an array of information on partnership start and dissolution and various socioeconomic variables for all individuals, their partners, and the parents of both individuals in a given couple. The sample is observed from 1990-2003.

We show that being convicted is associated with a reduced probability of being in a relationship. We find that being convicted does not affect the transition rate into partnerships as such, but males who have been convicted face a lower chance of forming partnerships with females from more well-off families, suggesting that crime does carry a penalty in terms of forming partnerships. In relation to partnership dissolution, it is found that males who are being convicted face a significantly higher dissolution risk than their law abiding counterparts.

The structure of the paper proceeds as follows. In Section 2, I provide a brief discussion of the expected association between crime and marriage market outcome. Section 3 presents the data, and details on sample selection. Section 4 describes the empirical strategy and in particular under which assumptions inference is obtained. In Section 5, the results are presented, and finally in Section 6 I conclude.

2 The association between crime and marriage market outcomes[1]

In the classical economic framework, individuals commit crime when the expected gain from doing so exceeds the expected cost of punishment (see e.g. Becker (1968)). Related to the marriage market a possible return from committing crime is that it can raise individual income and thereby serve as a tool to become more attractive as romantic partner. The marriage market literature finds that males' attractiveness is positively associated with income and labour market attachment (see e.g. Gautier et al. (2005) and Svarer (2007)). It has, however, been shown that there exists a real cost of being caught and subsequently punished for a crime related to subsequent labour market success (see e.g. Waldfogel (1994), Freeman (1999), Western et al. (2001), and Holzer (2007)), but it is not obvious whether this is also the case when it comes to the marriage market. However, it follows that males who have been convicted might face lower chances of attracting a partner and perhaps especially a high quality partner. Likewise, males who are found guilty of a felony and who are already in a partnership face the risk that their partners reassess the value of the partnership and realise that it has decreased and thus choose to leave the partnership. The empirical divorce literature almost consistently finds that males who experience a major drop in income have increased dissolution risks (e.g. Weiss & Willis (1997) and Svarer (2005)). On the other hand, income prospects might not be the only trait that females evaluate when they decide on who to admire romantically.

Turning an eye to the sociological literature and in particular drawing on social learning theory, it might be the case that delinquency and risk-taking behaviour in general might be seen as evidence of qualities such as nerve and bravery, which, as pointed out in Rebellon & Manasse (2004), might attract potential romantic partners.

In the criminological literature the rational choice explanation for criminal activity does not receive as much support as in the economic literature (see e.g. Gottfredson & Hirschi (1992) and McCarthy

[1] I focus entirely on male criminality in this paper. Hence, the following only view the gains and costs from delinquency from the male perspective.

(2002)). As pointed out in e.g. Leung & Brittain (2009) more focus is attributed to factors such as social structure, theories of strain, and cultural deviance to explain why people commit crime. Related to the current studies there might therefore be confounders that both affect the propensity to commit crime and the propensity to form partnerships that are not observable in the data. This should be taking into account when the results are interpreted.

The remainder of the paper contributes with an empirical investigation of the association between crime and marriage market outcomes.

3 Data

The data used in this study arise from two different registers. First, we use a data base maintained by Statistics Denmark with information on demographic and socioeconomic characteristics for a 10% sample of the Danish population between 15 and 66 years old is subtracted from IDA. The sample is observed from 1990-2003. The information is on an individual basis and is register-based. Since each inhabitant in Denmark has a social security number we can merge the data with data from the crime registers. The crime register is maintained by the Ministry of Justice. In the crime register all individuals who are convicted for a crime are registered. By merging the two data sets we have at the individual level information about transitions in the marriage market together with information on convictions and a range of socioeconomic variables. The crime register also contain information for the exact date of a given conviction, the type of felony for which the conviction is given, and the sentence type.

I only focus on criminal activities conducted by males. Males commit more than 80% of (solved) crimes in Denmark (source: Statistics Denmark, 2005), and since I intend to model crime behaviour, female criminal activity will be too low to give precise results.

In the remaining part of the data section, I first give a short overview of criminal activity in Denmark. Second, I discuss sample selection and choice of explanatory variables in relation to the three sets of

analyses that are carried out in this paper. I first look at the association between being convicted and being in a partnership. In this analysis I use information for all individuals in all years in a simple fixed effect panel data model where the dependent variable is the probability of being in partnership in a given year. Here I do not address the potential endogeneity of convictions. This exercise is supposed to provide a preliminary picture of the association between convictions and partnerships. In the two subsequent analyses I more carefully address the issue of endogeneity. First I consider how crime affects the transition rate into partnerships and the quality of partners. Subsequently, I investigate how crime affects the dissolution risk of partnerships.

3.1 Criminal activity in Denmark - some numbers

To get an impression of the amount of crime in Denmark compared to other countries, I use data from the Seventh United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems[2]

The most recent US figures are from 1999, and I therefore base the comparison on 1999 numbers. Below, I report the total number of recorded crimes in the US, England & Wales, and Denmark. In addition, I report some numbers by type of crime.

	Rate per 100,000 inhabitants, 1999		
	Denmark	US	England & Wales
Grand total of recorded crime	9,291.31	8,571.19	10,061.11
Total recorded intentional homicide, completed	0.98	4.55	1.45
Total recorded burglaries	1,896.90	755.29	1,721.33
Total recorded drug offences	15.60	231.29	560.11
Total recorded thefts	3,443.18	2,502.66	3,357.60

[2] See http://www.unodc.org/unodc/en/crime_cicp_survey_seventh.html

The figures presented above suggest that the crime rate is not lower in Denmark compared to countries like England & Wales and the US, but the crime pattern varies somewhat. The US has a remarkably higher homicide rate and more drug offences than the two other countries, whereas burglaries and thefts are more pronounced in the European examples.

In Figure 1, I present the age specific crime rate for 2003 for Denmark. The figure shows the fraction in each age group that has been convicted of a crime in 2003.

Figure1 about here

Figure 1 confirms that a non-negligible number of individuals are found guilty of criminal felonies. The age pattern suggests that the propensity to commit crime dies out when individuals grow older and peaks around the age of 18 (see e.g. Levitt & Lochner (2001) and Freeman (1999) for similar age patterns for the US).

3.1 Data for the analysis of being in partnership

Data for the first analysis is collected by sampling all males that are between 18 and 22 years old in 1990. They are then followed to 2003. For each year I observe their marriage market status. The dependent variable is whether they in a given year are in a partnership. A partnership can take the form of legal marriage or cohabitation. The latter partnership form is widely used in Denmark, and of those who marry, more than 80% premaritally cohabit (see e.g. Svarer (2004)). Since data on marriage market behaviour come from register data, I have no information on partnerships that do not entail shared housing (i.e. dating is not observed).

I use information on convictions and in addition I investigate whether different types of criminal activities and sentences are associated with the partnership status. Specifically, I look at the following crime classifications: violence, property and others (which include sexual offences and drug crimes) and the following four types of sentences: mandatory prison sentence, suspended prison sentence, fine,

and community service plus other sentences[3]. I do not include traffic crimes in the analysis. Descriptive statistics for these variables are presented alongside the explanatory variables in Table 1.

I also investigate whether different types of criminal activities and sentences have different effects on partnership formation. Specifically, I look at the following crime classifications: violence, property and others (which include sexual offences and drug crimes) and the following four types of sentences: mandatory prison sentence, suspended prison sentence, fine, and community service plus other sentences[4]. I do not include traffic crimes in the analysis. Descriptive statistics for the crime variables are presented in Table 1.

Table 1 about here

As is seen in Table 1 there are a substantial number of men that are convicted more than ones in the time period I investigate. To get a picture of the association between different types of crimes I present in Table 2 the fraction of those who have been convicted for a given crime that also have a conviction for another type of crime.

Table 2 about here

[3] In some cases, more sentences are issued simultaneously, i.e. a male can get a suspended sentence and a fine. In the following, I record types of sentences according to how severe they are. A mandatory prison sentence is assumed to be the toughest followed be suspended prison sentence, fines and community service plus other sentences. That is, in the example mentioned above the male will be recorded with a suspended prison sentence.

[4] In some cases, more sentences are issued simultaneously, i.e. a male can get a suspended sentence and a fine. In the following, I record types of sentences according to how severe they are. A mandatory prison sentence is assumed to be the toughest followed be suspended prison sentence, fines and community service plus other sentences. That is, in the example mentioned above the male will be recorded with a suspended prison sentence.

It is clear from Table 2 that those who commit crime and get convicted are active on more than one arena. Of those who have a conviction for violence more than half also have a conviction for property crime.

3.2 Data for partnership formation analysis

Data for partnership formation is collected by sampling all males as they enter the marriage market. I assume that this occurs at age 18, and I consequently flow sample all males when they turn 18. I then follow them through time until they either form a partnership or the sampling period ends. The sampling framework has the advantage that I do not have to model left censored partnership observation since the incident of partnership is non-existing before individuals turn 18. I measure the time until a male gets formally married or shares a housing unit with a female[5]. Dates of both occasions are given on a daily basis in the registers.

In the subsequent empirical analysis, I investigate whether being convicted affects the transition rate into partnership[6]. I only look at the effect of the first conviction. That is, I do not investigate the

[5] Notice that this implies that individuals who are sharing housing without having a real partnership are registered as cohabitors. In circumstances where the age difference is larger than 15 years or the two individuals are biologically related, they are not registered as cohabitors. I have no further information that enables me to disentangle these observations from true partnerships. On the other hand, they are presumably few in number and the alternative is to ignore cohabitations. I am reluctant to follow this strategy since cohabitation is by far the most frequent partnership type, especially among the younger cohorts in Denmark.

[6] I use convictions as indicators of crime. Alternatively, I could have investigated how both charges and convictions affect marriage market behaviour. There are a number of arguments for focusing on convictions only. First, convictions might be more visible to the market than charges (that might be dropped) and therefore more likely to cause a change in marriage market possibilities. Second, the empirical investigation is kept more tractable when only convictions are endogenized. Anyway, results

marginal effect of subsequent convictions for the same individual. This approach is similar to the literature on the effect of UI benefit payment sanctions on the exit rate from unemployment (see van den Berg et al. (2004), Abbring et al. (2005), Lalive et al. (2005), and Svarer (2007)), and has the advantage that the empirical model becomes more tractable. The strategy is, however, not completely innocuous since, as will become clear later, many males who have been convicted once get convicted again. Preferably, the empirical model should allow for multiple convictions. However, the econometric literature is not sufficiently developed to address the endogeneity issues that arise in these situations, and therefore I follow the route of many predecessors and consider the first conviction (event) only. In the current context the empirical strategy probably works well in the main part of the paper where I compare marriage market outcomes of convicted to non-convicted. The drawbacks of the empirical model are more serious when I look at the effects of different crime types and sentences. By restricting focus to the first conviction, I risk measuring the effect of the least serious crime and the mildest sentence. I will return to these issues when I interpret my results in section 5.

To account for confounding characteristics of the individuals, I include a number of explanatory variables. In addition, I analyse whether a criminal conviction affects the quality of the marriage partner. Unfortunately, the data do not contain information on beauty, weight, IQ or other characteristics that could be used to assess the attractiveness of females. I therefore follow the strategy in Gautier et al. (2005) and use income and educational level as measures of attractiveness. Since individuals in the sample typically match when they are quite young, and therefore before they have completed an education and entered the labour market, I use information on the fathers of the females as a proxy for quality of females[7]. I use the following information to proxy quality (all measured at the year of partnership start): a dummy for whether the wealth of the father is in the top 50% of the wealth distribution, a dummy for whether the disposable income of the father is in the top 50% of the income

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from an empirical model where both charges and convictions are modelled (along the lines of Lalive et al. (2005)) provide the same main conclusions as the current analysis.

[7] Chadwick & Solon (2002) present evidence that the intergenerational transmission of income status between fathers and daughters is quite substantial.

distribution, and a dummy for whether the father has completed a medium- or long-term further education.

3.3 Explanatory variables

In the subsequent analysis, the following variables are included: age; children, an indicator variable taking the value 1 if the individual has children, student, an indicator for currently attending school; work, indicator if the individual is currently working (the reference category for school or work is unemployed); gross income is the sum of personal income, capital income, housing benefit, child support, and tax free retirement subsidies and is inflated to 2003 price level using the official wage deflator published by Statistic Denmark, unemployment rate, gives the annual average unemployment rate; wealth father, an indicator variable that equals 1 if the father of the male has a level of wealth in the top 50% of the wealth distribution; and educated father, which is an indicator variable that takes the value 1 if the father has completed a medium- or long-term further education. Again, the latter two variables are included to reflect the marriage quality of the male who has not yet been able to signal his earnings potential in the labour market.

All variables are time-varying and updated on an annual basis. The explanatory variables are included both in a model for partnership formation and in a model that estimates the time until an individual is convicted. In the latter model I also include an indicator variable, convicted before 18, that takes the value 1 if the person has received a conviction prior to his 18th birthday, and educated mother, which is an indicator variable that takes the value 1 if the mother has completed a medium- or long-term further education. Table 3 gives descriptive statistics for the data set used. In total, I observe 32170 young men from the age of 18 until they either form a partnership or the observation period ends. I disregard observations for which there are missing information on the included variables in the analysis, which primarily is due to missing information on parent's characteristics.

Table 3 about here

Table 3 shows that around 10% of the males get convicted during the observation period, which again indicates that criminal activity is not a rare event among Danish youths. To supplement this, around 4% of the sample was convicted before they turned 18. Most crimes are property crime followed by violent crimes. The convictions typically result in a fine or community service[8]. Very few of the young men in the sample get a mandatory prison sentence. Around 49% of the individuals form a partnership during the period, and the mean age at which this happens is 22.

3.4 Data for partnership dissolution analysis

Data for the partnership dissolution analysis is obtained by flow sampling all relationships that start in the sampling period. The main objective of this analysis is to investigate whether being convicted affects the length of a given relationship. Information on convictions is similar to the data set used in the partnership formation analysis.

The included explanatory variables are: age; for both partners; children, an indicator variable taking the value 1 if the couple has children; working, indicator for whether either of the spouses work; man older/woman older, indicator for whether the age difference is larger than 4 years (in both directions); gross income, for both individuals in the couple the sum of personal income, capital income, housing benefit, child support, and tax free retirement subsidies is included, and numbers are inflated to 2003 price level using the official wage deflator published by Statistic Denmark; married, an indicator for whether the couple is formally married or cohabiting; low education, indicator for whether the highest completed educational level of either person is lower than vocational training;, high education, indicator for whether the highest completed education of either person is medium- or long-term further education (the reference category consists of individuals with vocational or short-term further education).

[8] Note that since I only look at first conviction, the sentences tend to be milder than if I also considered repeat offenders.

In the crime equation, I include the same list of variables as in the partnership formation analysis plus an indicator variable, conviction prior to partnership start that takes the value 1 if the event has occurred.

Descriptive statistics for the data used in the partnership dissolution analysis are presented in Table 4.

Table 4 about here

Men who have a partner commit less crime than single men. Compared to Table 3, the fraction of males who have been convicted is now around 3% measured at the moment of dissolution or when the sampling period ends. Clearly, this sample is also older, which might explain most of the difference. However, as pointed out by e.g. Sampson et al. (2006), partnerships seem to protect males from committing crime. Again, most convictions are for property crimes, and the sentence is often fine or community service plus other sentences. Around 36% of the partnerships that begin in the sampling period end in dissolution. The mean length of partnerships is around 4 years. The average length of formal marriages in Denmark is around 7 years (Svarer, 2005). The inclusion of cohabiting unions, which are typically shorter, reduces the average length of partnerships.

4 Empirical strategy

In order to investigate the effect of being convicted on the exit rate to and from partnership, I use duration models. Since the occurrence of a conviction is potentially endogenous to the partnership process, the goal is to disentangle the selection effect from the causal effect. Since I have no good sources of exogenous variation in crime rates, I exploit the richness of the data in terms of detailed information on the timing of convictions and on marriage market events. Following Abbring and van

den Berg (2003), I apply the so called timing-of-events model[9]. That is, I estimate the process into and out of partnership simultaneously with the process of being convicted, allowing the processes to be interdependent through the unobservable heterogeneity terms. Below, I present the finer details of the timing-of-events model. In the partnership formation analysis, I look at a competing risks specification where I distinguish between single males who join partnership with females of different qualities. Specifically, I group females into two marriage market segments depending on the characteristics of their fathers. In the partnership dissolution analysis, I look at a single risk specification. Below, I present the basic model illustrated as a situation of partnership dissolution. After this I discuss the amendments for the partnership formation analysis.

4.1 Timing-of-events method[10]

The timing-of-events method enables me to identify the causal effect of convictions on the exit rate from partnerships. The estimation strategy requires simultaneous modelling of the conviction rate and the partnership hazard. Let $T_{p(artnership)}$ and $T_{c(onviction)}$ denote the duration of a partnership and the duration until a male gets convicted. Both duration variables are continuous nonnegative random variables. I allow them to interact through correlation of unobservables and through a possible treatment effect of getting convicted on the partnership hazard. I assume that all individual differences in the joint distribution of the processes can be characterized by observed explanatory variables, x, and unobserved variables, v. The occurrence of a conviction and the exit rate out of partnerships are characterized by the moments at which they occur, and I am interested in the effect of the realization of T_c on the distribution of T_p. The distributions of the random variables are expressed in terms of their hazard rates $h_c(t|x_{c,t},v_c)$ and $h_p(t|t_c,x_{p,t},v_p)$. Conditional on x_p and v_p, I can therefore ascertain that the

[9] Notice that this identification strategy has been applied in a related situation where the goal is to estimate the causal effect of unemployment benefit sanctions on the exit rate from unemployment (see van den Berg et al. (2004), Abbring et al. (2005), Lalive et al. (2005), and Svarer (2007)).

[10] The basic model presented in this section corresponds to the model used by Lalive et al. (2005).

realization of T_c affects the shape of the hazard of T_p from t_c onwards in a deterministic way. This independence assumption implies that the causal effect is captured by the effect of t_c on $h_p(t|t_c,x_{p,t},v_p)$ for $t>t_c$. This rules out that t_c affects $h_p(t|t_c,x_{p,t},v_p)$ for $t\leq t_c$ i.e. anticipation of the conviction has no effect on the partnership dissolution hazard. This assumption could potentially be a bit strong in the context of convictions since trials normally are announced some time in advance, e.g. when the crime is detected and a charge is filed. However, the exact outcome of the trial is unknown since the accused might be found not guilty or the charges might be dropped. Abbring & van den Berg (2003) show that the assumption only requires that the exact date is not known - the agents are allowed to know the distribution of the timing. Furthermore, as noted by Abbring & van den Berg (2003), the time span between the moment at which the anticipation occurs and the moment of the actual sentence is short relative to the duration of relationships. This implies that the potential bias in the effect of convictions on the relationship hazard presumably is rather small. In addition, it is not obvious in the present context what kind of information that is available to the other marriage market participants. It might be natural to assume that it is easier to hide the filing of a charge than the conviction itself. Hence, the reactions to a conviction in terms of marriage market outcomes are likely to happen after the moment the conviction is given.

Given the independence and no anticipation assumptions, the causal effect of a conviction on the partnership dissolution hazard rate is identified by a mixed proportional hazard model. That is, it is a product of a function of time spent in the given state (the baseline hazard), a function of observed time-varying characteristics, x_t, and a function of unobserved characteristics, v

$$h(t \mid x, v) = \lambda(t) \cdot \phi(x_t, v)$$

where $\lambda(t)$ specified as $exp(\lambda_m(t))$ is the baseline hazard, and $\phi(x_t, v)$ is the scaling function specified as $exp(\beta' x_t + v)$. More specifically, the system of equations is:

$$h_c\left[t \mid x_{c,t}, v_c\right] = \exp\left[x_{c,t}\beta_c + \lambda_c(t) + v_c\right]$$

$$h_p\left[t \mid t_c, x_{p,t}, v_p\right] = \exp\left[x_{p,t}\beta_p + \delta D(t_c) + \lambda_p(t) + v_p\right]$$

Where x_c, x_p are vectors of possible time-varying covariates, $D(t_c) \equiv I(t_c < t)$ is a time-varying indicator variable and v_c and v_p are unobserved heterogeneity terms.

Intuitively, the timing-of-events method uses variation in partnership duration and in duration until a conviction (conditional on observed characteristics) to identify the unobserved heterogeneity distribution. The selection effect is captured by the correlation between v_c and v_p, while the causal effect of the conviction on partnership duration is captured by the effect of the conviction conditional on the observables and v_c and v_p.

The empirical model is non-parametrically identified without the use of instrumental variables on the basis of the mixed proportional hazard assumption (Abbring and van den Berg, 2003) and also on the basis of time-varying explanatory variables (e.g. Brinch, 2007). It is possible to strengthen identification through various sources. One is the use of repeated spells (see e.g. van den Berg, 2001), however, in the present context this is not particularly attractive. First, in the partnership formation analysis I focus on the time until first partnership, and allowing for repeated spells requires that conditional on observable characteristics, the unobserved heterogeneity terms of an individual do not change over time (see e.g. Roed & Westlie, 2007). This is problematic if partnership formation and partnership duration are affected by duration dependence and this is not appropriately addressed in the econometric model. Given the duration of most partnerships, my data is not rich enough to allow for careful treatment of repeated spells of singlehood and partnerships. Second, in the partnership formation analysis the unobserved heterogeneity term is related to the partnership and not to the particular person. It does not seem appropriate to assume a time-invariant unobserved heterogeneity term across different partnerships for a given person.

4.2 Parametrization

The baseline hazards, $\lambda_p(t)$, $\lambda_c(t)$, are specified as a piecewise constant hazard, where I divide the time line into a number of intervals. For all hazards, I divide the time line into $M=3$ intervals measured in

days (0-1200, 1200-3600, 3600-), and I let $\lambda_i(t) = (\lambda_{i1}(t),..., \lambda_{i3}(t))$, i = partnership,conviction denote the estimated parameters in these intervals.

I use a flexible and widely applied specification of the distribution of the unobservables; it is that each unobserved heterogeneity term follows a discrete distribution with only two mass-points. One of the mass-points in each marginal distribution is normalized to zero so $V_c \in (v_c^1 = 0, v_c^2)$ and $V_p \in (v_p^1 = 0, v_p^2)$. This normalization is required as a consequence of the piecewise constant baseline specification. The correlation between V_c and V_p is important because this is the way in which this procedure allows selection on unobservables without a resulting bias in the estimates. The associated probabilities for all the possible combinations from the discrete distributions are defined as

$$P_1 = \Pr\left(V_p = v_p^1, V_c = v_C^1)\right)$$
$$P_2 = \Pr\left(V_p = v_p^2, V_c = v_C^1)\right)$$
$$P_3 = \Pr\left(V_p = v_p^1, V_c = v_C^2)\right)$$
$$P_4 = \Pr\left(V_p = v_p^2, V_c = v_C^2)\right)$$

where $0 \leq P_j \leq 1$, $j=1,2,3,4$ and $\sum_{j=1} P_j = 1$. For more details on this class of mixture distributions in duration models, see e.g. van den Berg (2001).

The parameters are found by maximizing the corresponding log-likelihood function.

4.3 Extension for partnership formation analysis

In the partnership formation analysis, I also distinguish between the quality of partners as measured by their fathers' wealth, income and level of education. In order to accommodate this, I specify a competing risks version of the model presented above. I include an additional random variable, $J=\{1,2\}$, which denotes the exit state from singlehood. Compared to the basic model this extension

introduces an additional hazard function into partnership. The cause-specific hazard function for entry into partnerships takes the following form:

$$h_{p,j}\left[t \mid t_c, x_{p,j,t}, v_{p,j}\right] = \exp\left[x_{p,j,t}\beta_{p,j} + \delta_{1,j}D(t_c) + \lambda_{p,j}(t) + v_{p,j}\right]$$

where $h_p=\sum_{j=1,2} h_{p,j}$. This specification introduces a new unobserved heterogeneity term, which in line with the preceding specification is assumed to have two points of support. Hence, there are now eight possible combinations of the three unobserved heterogeneity distributions.

5 Results

In this section, I first present the results for the preliminary analysis where I look at the propensity to be in a partnership in a given year conditional on being convicted or not. In this analysis I do not address endogeneity of convictions. This is more carefully addressed in the two subsequent sections. Here I first present the results from the partnership formation analysis and then for the partnership dissolution analysis. For both of the latter analyses, I report how men who have been convicted of a crime are affected in the market for partnerships compared to men who have not been convicted. For various reasons, this comparison may be noisy. First, among those who are not convicted are potentially many criminals. In particular, these criminals might be the more talented criminals who are successful in their occupation and do not get caught and sentenced by the authorities. Second, the information about criminal behaviour might (or might not) be more visible to potential marriage partners than what is observed in the registers. I keep these complications in mind in the following.

5.1 Partnership analysis

In Table 5, I show the association between convictions and partnership status. The coefficients are from a fixed effect panel data model where the dependent variable equals 1 if the man is in a partnership in a given year and 0 otherwise.

Table 5 about here

It is seen that being convicted is associated with a reduced probability of being in a partnership. In addition, there do not seem to be much difference between the association between different types of convictions or sentences or the partnership probability. This might be due to the finding reported in table 2 that many of those who receive are convicted for one crime is also convicted for other types of crimes. The final column in Table 5 reveals a negative association between the number of convictions and the partnership probability.

5.2 Partnership formation analysis

As a starting point, I present in Table 6 the results from a single risk partnership formation model. That is, where I do not distinguish between the quality of the potential partner, but only consider the transition from singlehood to partnership. This analysis reveals that being convicted does not affect the exit rate from singlehood into partnerships as such. This suggests that there is no obvious marriage market penalty for convicted men in the Danish marriage market.

Table 6 about here

The other explanatory variables in the partnership hazard show that males who are older, who have a higher income and are not unemployed are more likely to form partnerships. These results are in accordance with other studies on partnership formation (see e.g. Aassve et al. (2002) and Xie et al. (2003)). The unobserved heterogeneity terms (not shown) reveal a negative association between the unobserved heterogeneity terms in the partnership formation hazard and in the conviction hazard[11].

[11] In fact, the unobserved heterogeneity terms are perfectly negatively correlated. In order to empirically identify the mass points and related probabilities, I had to restrict the correlation to be either 1, -1 or 0. It turned out that -1 gave the best fit in terms of likelihood value.

That is, those who, based on unobservables, are less likely to form partnerships are more likely be convicted of a crime. This pattern works, in some sense, against the intuition provided in Section 2. Here I argued that a reason why men commit crime might be to attract women -- either by increasing their income and wealth or by signaling bravery and nerve. On the other hand, the males that are identified as criminal in the current analysis are those who get caught. This tentatively suggests that based on unobservable characteristics there is a group of men that are neither successful as criminals nor as marriage partners. Supporting evidence for this interpretation can be found in Mocan & Tekin (2006). Based on US data, they find that being very attractive reduces a young adult's (ages 18-26) propensity for criminal activity, and being unattractive increases it for a number of crimes.

In the conviction hazard, I find that males who are younger, unemployed and who come from poorer households have higher conviction rates. These findings are in accordance with the literature that looks at determinants of crime (see e.g. Levitt & Lochner (2001) and Imai et al. (2006)). In addition, there is a remarkably high rate of recidivism. The conviction hazard for those who were already convicted prior to their 18th birthday is more than 500% higher than for those who turned 18 with a clean record.

To proceed, I present in Table 7 the results for a competing risks partnership formation analysis where I distinguish between female partners by the wealth level of their fathers[12]. The first columns give the estimates for males who match with females who have a father with wealth belonging to the top 50% of the wealth distribution (measured in the year of partnership formation). Being convicted reduces the hazard rate into partnership with women from more wealthy families with 29% (exp(-0.35)-1=-29%)[13]. In terms of forming partnerships with females from low wealth backgrounds, the incident of being convicted does not significantly affect the partnership formation rate. In sum, Tables 6 and 7 show that

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[12] To save space, I do not present the results for the analysis where I use level of education or income as quality proxies - the qualitative findings are similar to the results presented here.

[13] If I calculate the expected duration for a male with mean characteristics, the reduction in the hazard rate into partnerships with females from more wealthy families can be translated into approximately 1 additional year of singlehood. This number is clearly sensitive to the chosen characteristics, but it gives an indication of the magnitude of the effect.

being convicted of a crime does not affect the rate at which young males form partnerships, but it reduces the rate at which they form partnerships with females from more successful backgrounds even after we condition on a number of other characteristics of the males.

Table 7 about here

The earlier literature on the association between crime and partnership formation (e.g. Sampson & Laub (1993), Levitt & Lochner (2001), and Lopoo & Western (2005)) did not find strong effects of being convicted on subsequent partnership formation chances. The single risk results in the current analysis corroborate these earlier findings. The results presented in Table 7 therefore highlight the relevance of distinguishing between different types of partners as the results show that being convicted is associated with a reduced partnership formation rate with women from more well-off backgrounds.

In Tables 8 and 9 (see appendix), I have investigated whether the effects of conviction on partnerships formation rates are affected by the type of committed crime and the sentence. It should be noted that the empirical model does not allow for causal interpretation of the crime or sentence specific effects since I do not model crime specific conviction rates in the current specification of the model. It is relatively easy to extend the econometric model to do this, but the low occurrence of some types of crime and sentences would lead to rather imprecise statistical estimates. Instead, I hold on to the model presented in the previous section and interpret the findings accordingly.

Relating to type of crime, I find no association between violent crime and partnership rates, whereas property and other crime are negatively correlated with the formation of partnerships with females from well-off families. It should be noted that as shown in Table 2 many of those who are convicted for property crime will also get convicted for violent crimes at later stages. The timing of convictions is important for this part of the analysis and this may tend to bias the results. In relation to type of sentence, the results, somewhat surprisingly, do not suggest a significant penalty of mandatory or suspended prison sentences. Most likely, this finding is due to the relatively low incidence of these sentences in the sample. Again, these relationships are not the main focus of the current investigation,

and a richer data set and a more elaborate econometric model are required to make further progress in this direction. This is left for future work.

5.3 Partnership dissolution analysis

In Table 10, I present the results from the dissolution hazard model.

Table 10 about here

Being convicted significantly increases the dissolution risk by around 76%. In terms of the length of the partnerships, a conviction reduces the expected duration for a couple with mean characteristics with around 2 years. There is accordingly a rather substantial marriage market penalty for being convicted of a crime. In the sense that being convicted of a crime signals reduced future income and hence provider potential the result corroborates other findings in the partnership dissolution literature that show that reduced income (e.g. Weiss & Willis (1997) and Svarer (2005)), higher levels of unemployment (e.g. Ahituv & Lerman (2005)) and increased sickness (e.g. Murray (2000)) for men increase the risk of partnership dissolution. Combining this finding with the results from the previous section indicates that although entry into partnerships is not reduced by a criminal record, exit is. There could be several reasonable explanations for this apparent time inconsistency. On the more anecdotal level, some women might get attracted by the traits of criminal men and believe that once they are protected by the partnership their destructive behaviour will stop. In many cases, this might be true (see e.g. Sampson et al. (2006)), but in relationships were criminal activities continue the women might realize that the deviation between expected and realised utility of the partnership is too large to keep the value of continuation above the value of the outside options. It might also be the case that females are more forgiven towards crime committed when males are younger. Another explanation might be, as the partnership formation analysis revealed, that criminal men are more likely to form partnership with females from less well-off and less educated families than with females from more well-off families. These women are more likely to be low educated themselves, and the increased dissolution risks might follow from the sorting of low educated men to low educated women. Although the partnership

dissolution analysis tries to capture this by including levels of education and income of both partners, there might still be characteristics of the partners that are unobserved in the analysis which are determinants of the partnership formation process and which positively affect the dissolution risk.

In terms of the unobserved heterogeneity terms, I again find a negative correlation[14]. That is, those who based on unobservable characteristics are more likely to end their partnership are less likely to get convicted. Based on the findings in the partnership formation analysis, this is somewhat unexpected. This implies that compared to a model where being convicted is treated as an exogenous event, the effect of conviction on dissolution risk presented in Tables 10-12 increases. In models where being convicted is treated as an exogenous variable, there is, however, also a positive association between conviction and dissolution risk.

The findings for the remaining (control) variables in the dissolution hazards are in close accordance with previous analyses of dissolution risks (see e.g. Svarer & Verner (2008)).

In Tables 11 and 12 (see appendix), I distinguish between different types of crime and sentences. Again, these findings can not be given a causal interpretation conditional on the econometric model. Still, all types of crime are associated with increased dissolution risks, and whereas the same is true for type of sentence, there is -- perhaps not surprisingly -- a remarkably higher dissolution risk if the sentence leads to mandatory prison. In Lopoo & Western (2005), it is found that men who are incarcerated face a higher divorce risk while they are in prison, but not afterwards. The present study also suggests that incarceration is associated with a significantly higher dissolution risk, but so are other sentences. The results shown in Table 10 that being convicted raises the dissolution hazard are therefore not driven solely by men who receive a mandatory prison sentence.

[14] Again, I had to restrict the correlation to be either 1, -1 or 0 to obtain empirical identification. It turned out that -1 gave the best fit in terms of likelihood value.

5.4 Discussion and sensitivity analysis

In the preceding sections, I have presented the results from an analysis where I have relied on empirical identification from a timing-of-events duration model that basically uses a functional form assumption, the proportional hazard formulation, as main ingredient to sort between selection and causal effect of being convicted of a crime on subsequent success in the marriage market. The advantage of this identification strategy is that it uses the richness in the data in terms of timing of convictions and marriage market outcomes. In addition, the timing-of-events model has been shown to be quite robust to various misspecifications (Gaure et al. (2007)). However, as the analysis has shown, I needed to impose restrictions on the correlation between the unobserved heterogeneity terms to obtain empirical identification, which of course questions the power of the estimates. It therefore seems appropriate to ask (1) what would the results have been if I had not addressed endogeneity of convictions, (2) are the findings sensitive to different specifications of the timing-of-events model, and (3) are there superior identification strategies that can be used given the available data.

To address the first question, I have estimated models where I disregard the conviction hazard and hence treat the conviction dummy as an exogenous indicator variable. The findings from this model match the results presented in Tables 6, 7, and 10. That is, I find that convictions are not associated with a reduced partnership formation rate as such, but the rate at which convicted males form partnerships with females from more well-off families is significantly reduced. In terms of dissolution risk, I also find that convicted men are more likely to experience a split-up. So although the introduction of the conviction hazard improves the fit of the model and changes the size of the coefficient somewhat, it does not alter the main conclusion. This suggests that either allowing convictions to be endogenously related to the marriage market processes is not particular important or, perhaps more likely, the empirical model does not do a very good job in terms of determining convictions. Recently, Dills et al. (2008) summarized the last 40 years of economic literature on determinants of crime and concluded that economists know little about the empirically relevant determinants of crime. Whether this conclusion is correct or not, the current analysis could be interpreted along these lines. That is, the process that describes conviction is not very well determined,

which implies that caution should be taken when giving the findings in this study a causal interpretation.

Related to the second question, I have experimented with different empirical specifications based on the timing-of-events model. So far it has not changed the overall conclusions. I have in particular looked at the following variations of the presented models: (1) a model where I follow all males from age 15 and therefore do not include indicators for pre marriage market convictions, (2) like the current analysis without information on previous convictions and education of mother, (3) a model where I include information on charges. That is, first I model the time until a charge is filed, and in addition I model the time from charge until (possible) conviction.

As discussed in detail in Dills et al. (2008), economists have experimented with several strategies to determine crime including arrest and incarceration rates, police levels, abortion laws etc. While all of these have attractive explanations supporting their usefulness as crime instruments, they also share a common deficit in terms of predicting crime rates across time and regions. The identification strategy pursued in this article is new to the crime literature and is chosen based on features of the current data set, which is rich on conviction and marriage market dynamics, but not on exogeneous variation in conviction rates. Future research in this area would benefit from a combination of longitudinal data on crime and partnership dynamics and more suitable candidates to instrument crime.

6 Concluding remarks

This paper tests whether being convicted of a crime affects marriage market outcomes. The empirical strategy exploits a data set that is very rich in the longitudinal dimension and has very precise information on conviction dates and marriage market events. Based on a system of mixed proportional hazard models, the paper finds that convicted men do suffer in the marriage market. First, they can expect to marry females from less well-off families, and second they can expect to hold on to their spouses for a shorter period of time. It is clearly difficult to compare the costs of crime in the marriage market to the costs measured in the labour market in terms of reduced wages and lower employment.

The finding of this paper, however, suggests that looking at the consequences of being convicted of a crime should also make room for how the marriage market is affected.

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Appendix with tables

Table 1: Conviction statistics for partnership sample

Variables:	Mean
Criminal activities	
Conviction	0.1598
-violent	0.0656
-property	0.1174
-other	0.0946
Sentence	
Suspended sentence	0.0465
Mandatory sentence	0.0525
Fine	0.1227
Other	0.0303
Convitions	
1	0.0859
2	0.0303
3	0.0131
4+	0.0230
Number of individuals	10907

Table 2: Fraction with multiple offences

	Convicted for:		
Also convicted for:	Property	Violence	Other criminal offence
Property		0.52	0.47
Violence	0.29		0.29
Other	0.38	0.42	

Table 3: Descriptive statistics for partnership formation sample

Variables:	Mean	Std.dev
Criminal activities		
Conviction	0.0987	
-violent	0.0193	
-property	0.0528	
-other	0.0266	
Sentence		
Suspended sentence	0.0165	0.1275
Mandatory sentence	0.0068	0.0822
Fine	0.0435	0.2039
Other	0.0319	0.1756
Individual characteristics		
Unemployment degree (fraction of year)	0.0468	0.1387
Fraction that start partnerships	0.4912	
Mean age at partnership start	22.0877	3.0762
Gross income (in 2003 DKK)	168781	120331
Student	0.4367	
Working	0.4484	
Criminal before age 18	0.0385	
Males' characteristics		
Wealth father (in 2003 DKK)	415392	2088574
Father is highly educated	0.3083	
Number of individuals	32170	

Table 4: Descriptive Statistics for partnership dissolution sample

Variables:	Mean	Std.dev
Criminal activities		
Conviction	0.030	
-violent	0.007	
-property	0.016	
-other	0.007	
Sentence		
Suspended sentence	0.005	
Mandatory sentence	0.004	
Fine	0.010	
Other	0.011	
Individual characteristics		
Age, male	24.943	5.260
Age, female	23.570	5.514
Children	0.640	
Working, male	0.756	
Working, female	0.767	
Male older (>4 years)	0.197	
Female older (>4 years)	0.060	
Gross income, male (in 2003 DKK)	290009	222685
Gross income, female (in 2003 DKK)	197704	103862
Formally married	0.314	
Low education, male	0.389	
High education, male	0.124	
Low education, female	0.487	
High education, female	0.155	
Males' characteristics		
Unemployment rate (fraction of a year)	0.050	0.150
Wealth father (in 2003 DKK)	546245	2254364
Father is highly educated	0.192	
Convicted prior to relationship start	0.212	
Relationship information		
Mean length of partnership (in years)	3.983	3.268
Fraction of partnerships that dissolve	0.364	0.481
Number of relationships	39370	

Table 5: Probability of being in a partnership

	Coeff.	Std err.	Coeff.	Std err.	Coeff.	Std err.	Coeff.	Std err.
Convicted	-0.089	0.004						
1 conviction			-0.053	0.004				
2 convictions			-0.092	0.007				
3 convictions			-0.128	0.01				
4 or more convictions			-0.211	0.01				
Property					-0.073	0.005		
Violence					-0.088	0.006		
Other					-0.067	0.006		
Suspended sentence							-0.052	0.008
Mandatory sentence							-0.083	0.008
Fine							-0.071	0.005
Other							-0.076	0.009

Note: Based on fixed effects model. Include controls for age, earnings, unemployment, employment status and fathers education and wealth

Table 6 : Results from partnership formation analysis by hazard rates, criminal activity modelled

	Partnership		Conviction	
	Coeff	Std err	Coeff	Std err
Criminal activities				
Conviction	-0.0426	0.0715		
Individual characteristics				
Unemployment degree (fraction of year)	**0.3625**	0.0822	**1.458**	0.1184
Age	**1.9722**	0.1097	**-0.9455**	0.2038
Gross income (in 2003 DKK)	**2.1769**	0.0657	-0.7433	0.3482
Student	**0.1705**	0.0421	**-0.6952**	0.0639
Working	**0.2684**	0.0415	**-0.3024**	0.0687
Criminal before age 18			**1.8943**	0.0572
Parents' characteristics				
Wealth father	**-0.1893**	0.0488	**-0.5964**	0.163
Father is highly educated	**-0.133**	0.0324	**-0.4157**	0.0647
Mother is highly educated			**-0.2387**	0.045
Number of individuals		32170		

Note: To save space, estimates for baseline hazards and unobserved heterogeneity terms are not presented
Bold figures denote significance at 5% level

Table 7 : Results from competing risks partnership formation analysis by hazard rates, criminal activity modelled

Partner's father has	Partnership high wealth level		Partnership low wealth level		Conviction	
	Coeff	Std err	Coeff	Std err	Coeff	Std err
Criminal activities						
Conviction	**-0.3462**	0.0894	0.0922	0.0830		
Individual characteristics						
Unemployment degree (fraction of year)	**0.2803**	0.1209	**0.5398**	0.1348	**1.5374**	0.1178
Age	**2.6902**	0.1356	**1.8691**	0.1583	**-1.1500**	0.1993
Gross income (in 2003 DKK)	**2.8651**	0.1510	**3.2618**	0.1993	-0.5288	0.3279
Student	**0.2995**	0.0580	-0.0092	0.0640	**-0.7630**	0.0591
Working	**0.3073**	0.0581	0.1164	0.0643	**-0.3700**	0.0645
Criminal before age 18					**1.9293**	0.0528
Parents' characteristics						
Wealth father	**-0.3560**	0.0797	**-0.5284**	0.1109	**-0.2950**	0.1240
Father is highly educated	**-0.0903**	0.0391	**-0.2912**	0.0469	**-0.3475**	0.0601
Mother is highly educated					**-0.2765**	0.0424
Number of individuals			32170			

Note: To save space, estimates for baseline hazards and unobserved heterogeneity terms are not presented
Bold figures denote significance at 5% level

Table 8: Results from competing risks partnership formation analysis by hazard rates, criminal activity modelled

Partner's father has	Partnership high wealth level		Partnership low wealth level		Conviction	
	Coeff	Std err	Coeff	Std err	Coeff	Std err
Criminal activities						
Violence	-0.1120	0.1259	0.1316	0.1078		
Property	**-0.3623**	0.0828	-0.0040	0.0741		
Other	**-0.5180**	0.1288	0.0153	0.1038		
Individual characteristics						
Unemployment degree (fraction of year)	**0.2932**	0.1157	**0.4952**	0.1086	**1.4521**	0.1189
Age	**1.5076**	0.1106	**1.1492**	0.1093	**-0.8684**	0.2017
Gross income (in 2003 DKK)	**2.6508**	0.1910	**2.8051**	0.1960	**-0.7028**	0.3484
Student	**0.3991**	0.0605	0.0895	0.0550	**-0.6893**	0.0639
Working	**0.3644**	0.0610	**0.1932**	0.0554	**-0.2952**	0.0689
Criminal before age 18					**1.9001**	0.0573
Parents' characteristics						
Wealth father	**-0.1761**	0.0847	**-0.2527**	0.0588	**-0.6336**	0.1489
Father is highly educated	-0.0289	0.0388	**-0.1481**	0.0391	**-0.4196**	0.0647
Mother is highly educated					**-0.2354**	0.0450
Number of individuals			32170			

Note: To save space, estimates for baseline hazards and unobserved heterogeneity terms are not presented
Bold figures denote significance at 5% level

Table 9 : Results from competing risks partnership formation analysis by hazard rates, criminal activity modelled

Partner's father has	Partnership high wealth level		Partnership low wealth level		Conviction	
	Coeff	Std err	Coeff	Std err	Coeff	Std err
Sentence						
Suspended sentence	-0.1741	0.1416	-0.0889	0.1288		
Mandatory sentence	0.1592	0.2023	0.2604	0.1924		
Fine	**-0.3970**	0.0976	0.0506	0.0852		
Other	**-0.3962**	0.1321	0.0878	0.1044		
Individual characteristics						
Unemployment degree (fraction of year)	**0.2651**	0.1159	**0.5009**	0.1085	**1.4370**	0.1188
Age	**1.5854**	0.1122	**1.2065**	0.1097	**-1.1212**	0.2020
Gross income (in 2003 DKK)	**2.6440**	0.1911	**2.6876**	0.1937	-0.5796	0.3481
Student	**0.3842**	0.0605	0.0888	0.0550	**-0.7178**	0.0640
Working	**0.3503**	0.0611	**0.2025**	0.0554	**-0.3227**	0.0690
Criminal before age 18					**1.8901**	0.0574
Parents' characteristics						
Wealth father	**-0.2242**	0.0838	**-0.2249**	0.0586	**-0.6098**	0.1568
Father is highly educated	-0.0270	0.0390	**-0.1512**	0.0392	**-0.4302**	0.0648
Mother is highly educated					**-0.2309**	0.0451
Number of individuals	32170					

Note: To save space, estimates for baseline hazards and unobserved heterogeneity terms are not presented
Bold figures denote significance at 5% level

Table 10: Results for partnership dissolution analysis

	Dissolution		Conviction	
	Coeff.	Std.dev	Coeff.	Std.dev
Criminal activities				
Conviction	**0.570**	0.077		
Children	**-0.078**	0.013		
Age, male	**-0.130**	0.035		
Age, female	-0.015	0.033		
Gross income, male	**-0.779**	0.076		
Gross income, female	-0.110	0.127		
Working, male	**-0.152**	0.021		
Working, female	**-0.144**	0.021		
Formally married	**-1.798**	0.038		
Male older	**0.206**	0.028		
Female older	**0.378**	0.042		
Low education, male	**0.188**	0.019		
High education, male	**-0.074**	0.037		
Low education, female	**0.233**	0.021		
High education, female	**-0.171**	0.037		
Formally married			-0.084	0.096
Children			**0.146**	0.046
Unemployment rate			**1.126**	0.146
Age			**-0.363**	0.077
Gross income			**-3.136**	0.266
Working			-0.144	0.079
Low education			**0.665**	0.088
High education			**-0.655**	0.259
Wealth father			-0.488	5.563
Father is highly educated			**-0.682**	0.126
Criminal before age 18			**2.772**	0.101
Number of couples		39370		

Note: To save space, estimates for baseline hazards and unobserved heterogeneity terms are not presented

Bold figures denote significance at 5% level

Table 11: Results for partnership dissolution analysis

	Dissolution		Conviction	
	Coeff.	Std.dev	Coeff.	Std.dev
Criminal activities				
Violence	**0.540**	0.082		
Property	**0.486**	0.060		
Other	**0.603**	0.078		
Children	**-0.080**	0.013		
Age, male	**-0.141**	0.035		
Age, female	-0.006	0.033		
Gross income, male	**-0.752**	0.076		
Gross income, female	-0.102	0.127		
Working, male	**-0.152**	0.021		
Working, female	**-0.139**	0.021		
Formally married	**-1.797**	0.038		
Male older	**0.208**	0.028		
Female older	**0.361**	0.042		
Low education, male	**0.186**	0.019		
High education, male	-0.071	0.037		
Low education, female	**0.234**	0.021		
High education, female	**-0.170**	0.037		
Formally married			-0.042	0.096
Children			**0.145**	0.046
Unemployment rate			**1.188**	0.145
Age			**-0.413**	0.077
Gross income			**-3.212**	0.253
Working			-0.124	0.079
Low education			**0.646**	0.087
High education			**-0.690**	0.260
Wealth father			-0.417	5.514
Father is highly educated			**-0.661**	0.127
Criminal before age 18			**2.770**	0.101
Number of couples		39370		

Note: To save space, estimates for baseline hazards and unobserved heterogeneity terms are not presented

Bold figures denote significance at 5% level

Table 12: Results for partnership dissolution analysis

	Dissolution		Conviction	
	Coeff.	Std.dev	Coeff.	Std.dev
Sentence				
Suspended sentence	**0.555**	0.118		
Mandatory sentence	**0.913**	0.126		
Fine	**0.475**	0.101		
Other	**0.527**	0.097		
Children	**-0.078**	0.013		
Age, male	**-0.128**	0.035		
Age, female	-0.016	0.033		
Gross income, male	**-0.780**	0.076		
Gross income, female	-0.115	0.127		
Working, male	**-0.151**	0.021		
Working, female	**-0.143**	0.021		
Formally married	**-1.799**	0.038		
Male older	**0.206**	0.028		
Female older	**0.380**	0.042		
Low education, male	**0.188**	0.019		
High education, male	**-0.073**	0.037		
Low education, female	**0.233**	0.021		
High education, female	**-0.171**	0.037		
Formally married			-0.036	0.096
Children			**0.153**	0.046
Unemployment rate			**1.216**	0.146
Age			**-0.414**	0.077
Gross income			**-3.255**	0.249
Working			-0.131	0.079
Low education			**0.646**	0.088
High education			**-0.691**	0.260
Wealth father			-0.399	5.531
Father is highly educated			**-0.678**	0.127
Criminal before age 18			**2.774**	0.101
Number of couples		39370		

Note: To save space, estimates for baseline hazards and unobserved heterogeneity terms are not presented

Bold figures denote significance at 5% level