

Family Formation and Crime

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November 11, 2019

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Abstract

While economists typically study the effects of punishments and taxes on crime and drug use, sociologists have emphasized transformative “turning points” which reduce deviant behavior by strengthening social bonds. We use administrative data from Washington State to perform a large-scale study of childbirth and marriage as turning points. Our event-study analysis indicates that pregnancy triggers sharp declines in crime rivaling any known intervention. For mothers, criminal offending drops precipitously in the first few months of pregnancy, stabilizing at half of pre-pregnancy levels three years after the birth. Men show a smaller, but still important, 25 percent decline beginning at the onset of pregnancy, although domestic violence arrests spike for fathers immediately after the birth. A design using stillbirths as counterfactuals suggests a causal role for children. In contrast, marriage is a stopping point, marking the completion of a roughly 50 percent decline in offending for both men and women. The data present a unique opportunity to test the implications of a dynamic rational addiction model, which suggests forward-looking behavior among married and unmarried mothers.

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1 Introduction

Researchers have long sought to understand the drivers of crime. Economists traditionally study rational models where forward-looking agents consider factors such as the certainty and severity of punishment when choosing whether to offend (Becker, 1968). In this vein, several studies focus on the impacts of expected punishments using discrete changes in sentencing regimes (Chalfin and McCrary, 2017). These efforts suggest that dissuading offenders is difficult: prominent studies find small deterrence effects, consistent with extreme rates of discounting or myopia (Lee and McCrary, 2005; Helland and Tabarrok, 2007).¹

A parallel strand of research in economics studies addictive behavior through a rational lens, where drug users choose their consumption levels fully aware that present use affects the future utility of consumption (Becker and Murphy, 1988). Tests of the rational model typically center on the responsiveness of drug users to expected changes in prices (Becker et al., 1994; Gruber and Köszegi, 2001). However, large, anticipated shocks to the utility of drug use are rare, and even direct monetary incentives may have limited effects on consumption (Schilbach, 2019).

Sociologists have emphasized different determinants of criminal behavior and drug use, positing that “turning points” such as marriage and childbirth have the potential to spur drastic life improvements, independent of past circumstances, by strengthening social bonds (Sampson and Laub, 1992). Low-income parents often report that, without their children or spouse, they would be in prison or on drugs (Edin and Kefalas, 2011; Edin and Nelson, 2013; Sampson and Laub, 2009). While a number of sociological studies provide anecdotal evidence based on relatively small samples, there is limited systematic evidence using large-scale administrative data on prominent turning points and crime.

In this paper we provide such evidence using administrative data on over a million births, taking an unprecedentedly close look at criminal offending around key turning points related to family formation. We implement a novel match between Washington state records covering the universe of criminal offenses, births, marriages, and divorces, by far the largest such study ever

¹California convicts with “two strikes” showed decreased offending—but in response to a massive increase in punishment, implying an elasticity of -0.06 (Helland and Tabarrok, 2007). However, a notable exception is Drago et al. (2009), who find an elasticity of -0.5 in a large natural experiment on released Italian prisoners.

conducted in the United States. Our comprehensive data allow us to highlight sharp changes in both the timing and types of offending, control flexibly for key confounds such as age, and explore important differences across subgroups. The high frequency data also allow us to explore whether the timing and speed of response are consistent with anticipatory responses as in rational models of addiction (Becker et al., 1994).

We begin our investigation with mothers. An event study analysis shows that pregnancy triggers enormous positive changes: drug, alcohol, and economic offenses decline precipitously at the start of the pregnancy, bottoming out in the months right before birth. Shortly after birth, criminal offending recovers, ultimately stabilizing at 50 percent below pre-pregnancy levels. The sharpness of the response suggests that these declines likely reflect the impact of pregnancy rather than the onset of a romantic relationship or the decision to form a family. Finally, we find similar long-term consequences for teen mothers, an important result given that extant studies have found flat or negative effects on conventional economic outcomes such as income and education (Hotz et al., 2005, 1997; Fletcher and Wolfe, 2009).

We find substantial, if quantitatively smaller, impacts on fathers. Men sharply desist from all crimes at the start of the pregnancy and continue to offend at lower levels following the birth, with reductions around 25 percent for economic and drug crimes. New to our context, the timing of the fathers' response suggests that pregnancy, not childbirth, is the primary inducement to decrease criminal behavior. The results for men and women are in a sense stronger than turning points theory anticipates; Laub and Sampson (2001) write that desistance around family formation "will be gradual and cumulative."

We next compare these responses to the impact of a conventional policy lever, the ability to purchase alcohol at age 21. We replicate the findings of Carpenter and Dobkin (2015), showing that the men and women in our sample exhibit a strong offending response to the legal availability of alcohol: alcohol-related offenses before turning 21 are 24 percent lower for men and 32 percent lower for women. However, effects on other crimes are small and insignificant. Thus, for both mothers and fathers we find evidence that strongly supports the sociological model, with impacts comparable to, or larger than, the impact of alcohol availability.

Throughout, we find important heterogeneity by marital status at birth. First, long-run crime declines are much larger for unmarried parents. Second, unmarried parents offend at much higher rates than married couples throughout the sample period. This latter finding raises the question of whether marriage plays a direct role in decreasing crime. Sociological research suggests that these events might have qualitatively different effects: according to interviews with low-income mothers, marriage is “reserved for couples who have already ‘made it’” (Edin and Kefalas, 2011, p. 111).

Our analysis supports this view. To study offending around marriage, we augment our data with the state marriage index, matching over two hundred thousand marriages to the parents in our sample and applying a similar event study methodology that controls flexibly for age. We find that marriage is preceded by a substantial multi-year period of desistance: both men and women exhibit a 50 percent decrease in criminal offending across categories in the 3 years prior to the marriage. After marriage, offending rates are flat or increasing. This suggests that, while romantic partnership may be a turning point, marriage itself does not promote additional desistance.

Theoretical accounts in economics and sociology suggest that the patterns should be different for marriages ending in divorce (Becker et al., 1977; Laub and Sampson, 2001). We combine our data with statewide divorce records to study effects for unsuccessful marriages. Despite showing similar trends prior to the birth, couples and especially fathers headed toward divorce show a relative increase in offending afterwards. While not dispositive, these findings are consistent with predictions from two prominent theories of marital quality: An economic theory that divorces result from negative surprises about the expected gains from the match (Becker et al., 1977), and Laub and Sampson’s turning points argument that desistance is more likely in the presence of strong social bonds.

Finally, while the data support that family formation events are important turning points for most categories of crime and drug use, these same turning points also clearly mark the onset of a new and particularly costly set of crimes. Men exhibit a large spike in domestic violence offenses at birth and marriage, an effect that, in the case of birth, is almost large enough to undo an overall decrease in arrests for some groups. Some of this increase is likely due to an increase

in cohabitation. However, these offenses are strongly related to our administrative information on divorces. Within married parents, domestic violence is much more common among those who eventually divorce, and, using the exact divorce date from our data, we show that divorce filings clearly coincide with increases in these offenses.

These empirical findings help clarify a large literature based primarily on small, selected (i.e., at-risk) samples with conflicting findings, which we review in [Table A.1](#). Most papers were found to show no or minimal effects of motherhood on crime, and results for fathers have been similarly mixed.² Further, the marriage results qualify a large literature that argues for a causal negative effect of marriage on crime.³ Also novel to our context is the ability separate out key types of offenses and study the precise timing of the crime reductions, which helps rule out the possibility for long-term coincident changes that may have also played a role in desistance. The two most comparable studies, on the effects of marriage and childbirth on crime for men and women ([Skardhamar et al., 2014](#); [Skarhamar and Lyngstad, 2009](#)), use Norwegian register data and find broadly similar trends at an annual level but lack these important advantages.

We next turn to robustness. An important concern is whether sample attrition may be responsible for some of the observed decreases in crime around turning point events, as we observe administrative outcomes only within the state of Washington. One piece of evidence against such sample attrition for fathers is the earlier observation that despite the declines in other crime categories, domestic violence arrests increase substantially. We also address this important concern explicitly in two ways. First, we use traffic offenses as a proxy for presence in the state and find that they are stable after births. Second, we find similar patterns when we re-estimate the results on a subsample for which we observe a ticket for an innocuous offense in Washington state 4-5 years after birth.

An additional concern is that the decrease in crime for women may reflect a decreased likelihood of apprehension among pregnant women. While all analyses use the recorded date of the offense, not the date of the arrest, this channel could explain some of the decrease during pregnancy. However, it does not explain its persistence in the years following childbirth. A separate

²For another recent review on mothers, see [Giordano et al. \(2011\)](#); for fathers, see [Mitchell et al. \(2018\)](#).

³For a critique and detailed review of the marriage effect, see [Skardhamar et al. \(2015\)](#).

concern for women is that drug use may shift indoors following birth. Yet, we find that driving-related offenses gradually increase for mothers following birth, which is inconsistent with a broad decrease in activities outside of the home.

Finally, while much of the effects are concentrated during the pregnancy, we isolate the effect of having a child by building a control group using 3,281 stillbirth records, reported when gestation exceeds 20 weeks. The results reinforce the qualitative findings from the main analyses: fathers of liveborn children have greater levels of domestic violence following the birth, and mothers and fathers of liveborn children show decreased rates of drug offending. This suggests that having a child, and not just making the decisions that typically lead to one, decreases criminal behavior.

The pregnancy and childbirth results show strong reduced-form impacts on the levels of crime and drug use. In addition, and novel to the literature, the detailed data allow us to study features of the transition paths to the decreased levels of offending, such as the speed of the reduction and whether it occurs in advance of birth. These questions are especially relevant for drug-related crimes because the key prediction of economic models of addiction such as [Becker et al. \(1991\)](#) is that current and future drug use are complementary. Indeed, responses to future price shocks have the hallmark of studies of rational addiction ([Gruber and Köszegi, 2001](#); [Becker et al., 1994](#)).

We set up a version of the Beckerian rational addiction model based on [O'Donoghue and Rabin \(1999\)](#), building on a nascent literature modeling the dynamic decisions of drug users and criminal offenders ([Arcidiacono et al., 2007](#); [Lee and McCrary, 2005](#); [McCrary et al., 2010](#); [Sickles and Williams, 2008](#)). The model has the two key features of rational addiction: recent use lowers the utility from any action but increases the marginal utility of drug use. We assume that childbirth is a shock to the utility of using drugs, and that mothers solve the dynamic discrete choice problem between use and abstention, knowing months in advance of the upcoming birth. While not a direct test of rational addiction, the model helps interpret the transition path around childbirth.

We fit the model to the data to the observed drug offense patterns for mothers using a minimum distance estimator. The model suggests that mothers respond to two utility shocks: one at the end of pregnancy, and a permanent one following birth. Further, we find that the

sharp changes observed in mothers is consistent with forward-looking behavior, as mothers are able to curb their use ahead of childbirth. The gradual adjustment into a new, lower steady state following birth is consistent with a role for habit formation, which is strikingly larger for married mothers.

Taken together, the results suggest that pregnancy is a strong inducement to reduce crime and drug use, even among groups that have not made explicit plans to have children. While the quality of marriages matters, the desistance that precedes marriage is as large if not larger than the childbirth effects. Teen pregnancy and out-of-wedlock births correlate with higher baseline levels of crime and worse outcomes for children, but policies exclusively focused on reducing these forms of childbearing may undervalue the large desistance effects for new parents. In contrast, the documented spike in domestic violence arrests may be important in informing policies targeting the “magic moment” after childbirth as a time to encourage family formation (McLanahan and et al, 2003).

2 Data

Our core analysis is based on two administrative data sources from Washington state: offense information from the Washington State Administrative Office of the Courts (AOC) and birth certificates from the Department of Health (DOH). We augment this with the Washington marriage and divorce indexes, acquired from the Washington State Archives.

The AOC data covers every criminal charge made from 1992 to 2015, including date of the offense, criminal code, and name and date of birth of the alleged offender.⁴ The birth certificates span 1980 to 2009. We restrict to births after 1996 so that all parents are visible in the arrest data five years before and after the birth. The data includes the names and dates of birth of the mother and father, their races, the residential zip code of mother, and an indicator for whether the mother is married. An average of 80 thousand births happen every year in the sample period, for about 1 million births in total.

⁴We attain similar results using a dataset covering all arrests from the Washington State Patrol Computerized Criminal History Database.

We drop 5 percent of the birth certificates in the sample with the father missing. Washington is unusually good at recording fathers as it was one of the first states to implement in-hospital voluntary paternity establishment for unmarried mothers (Rossin-Slater, 2017). Similar data in Michigan has both parents on the birth certificate only 65 percent of the time (Almond and Rossin-Slater, 2013).

We match arrest records to birth certificates by implementing a fuzzy name match across parents and arrestees with the same date of birth. We drop parents who are strongly matched to multiple people in the arrest data, but we include parents who have no matches at all in the arrest data. The never-arrested sample is kept to help identify age controls in the regression analysis, and so that the count results below can be interpreted as population averages. The drops of ambiguously matched names constitute 5 percent of the birth certificates with fathers.

The crimes in the data range from traffic infractions to murder. In most analyses, we group offenses based on categories constructed by the Washington State Institute for Public Policy. Crimes that we call economic consist primarily of 3rd degree theft, 2nd degree burglary, trespassing, and forgery. Drug crimes includes furnishing liquor to minors and possessing a controlled substance. Driving under the influence, the most common crime in the data, is treated as its own category. Destruction includes vandalism and property damage more broadly. The most common domestic violence related crime is fourth degree assault, which is the least severe assault charge.

These five categories account for more than half of the arrests in the data. The bulk of the remaining arrests are either driving-related (e.g., reckless driving, driving with a suspended license), which we omit from the main analyses because they are conflated with driving behavior itself; minor assault charges, which, because of patterns in their timing, appear to often be domestic-violence related due to inconsistent coding in the administrative data; and obstructing a police officer.

In the main analyses, we restrict to the parent's first birth, using the father's full name and date of birth and the mother's full (maiden) name and date of birth as reported on the birth certificates. Since the birth certificates begin in 1980, this means we will mislabel births as firsts if someone in our sample had their first child in 1979 or earlier.

We combine state marriage and divorce records with our sample, which are merged to birth certificates based on a fuzzy string match of the combined names of the spouses. This match comes with the caveat that only couples who at some point have a child together will be included. Since the marriage certificates do not contain birth dates, married couples could not be linked to the crime data without first linking to the birth certificates.

In [Table 1](#), we show how the sample characteristics change as we impose the restrictions mentioned above, starting with the entire sample of DOH births in column (1). Column (2) restricts to births where the mothers are clearly matched (or not matched) to the arrest data; column (3) adds the restriction that the birth is the mother’s first child; and column (4) shows the characteristics for our sample of stillbirths, including the restrictions made in (2)-(3). Analogous descriptive statistics with the father as the focal parent are shown in [Table A.2](#).

3 Event study evidence

3.1 Mothers

We start by showing the raw monthly offending rates of mothers in the three years before and after the birth of their first child, using the main analysis sample of 480,111 mothers described above. Importantly, all of the analyses are constructed using the date of the offense, not the date of arrest, which partially addresses the concern that arrest is less likely for visibly pregnant women. In this setup, $t=0$ marks the 30-day period beginning with the date of birth.

[Figure 1\(a\)](#) shows these offending rates for mothers for four different categories of crimes. The plots show three consistent patterns: flat or slight positive pre-trends leading up to the approximate date of the pregnancy, large declines during pregnancy and especially in the first few months, and a sharp rebound in offending following the birth. Property and non-DUI drug offenses are lower than the pre-pregnancy averages three years after the birth, while DUI and property destruction offenses show less of a long-term decline.

To remove the important confound of age, we present similar plots displaying the event-time coefficients from regressions of the following form:

$$\mathbb{1}(arrest)_{it} = \alpha_i + \sum_{k \in S} \delta_k \mathbb{1}(t = k) + \mathbf{X}'_{it} \beta + \epsilon_{it} \quad (1)$$

where α_i denotes person fixed effects and \mathbf{X}'_{it} includes a 4th-order polynomial in age and dummies for being above age 18 and 21. The set S runs three years in either direction from the birth, or -36 to 36, with endpoint bins for the remaining two years of data in order to identify the age effects. Standard errors are clustered at the person level, and in some specifications, we group event time indicators at the quarterly level to smooth out the offending patterns.

In this event study setup, the effects of childbirth δ_k are identified by changes in offending controlling for time-varying covariates. Effectively, the specification compares two women of the same age who have children at different times. Differences in their offending rates are measured by the event-time indicators. These differences will capture the causal effects of pregnancy and childbirth if the onset of pregnancy does not coincide with other time varying-shocks (e.g., the beginning of a romantic relationship) that also affect crime.

As we show below, we find limited evidence that pregnancy coincides with other crime-reducing life changes for the mothers and fathers in our sample. Most importantly, there is no anticipation of the pregnancy. Any anticipation might reflect the impact of mothers meeting potential fathers and reducing their offending as a result. Instead, decreases in crime coincide exactly with the onset of pregnancy.

This implies that it is also unlikely that the patterns reflect the *decision* to try to become pregnant rather than pregnancy itself. If decisions were playing a role, we would expect at least some couples to fail to become pregnant quickly, generating dips in offending before $t=-9$. Moreover, survey evidence suggests that the majority of births to unwed mothers, who drive our results, are unplanned (Mosher et al., 2012). Similarly, below we obtain very similar results among teen mothers, for whom 78% of pregnancies are unintended (Mosher et al., 2012).

We present results for the event study specification with the outcome, $\mathbb{1}(arrest)_{it}$, equal to one in any month that the mother was arrested for any of the four crime categories. These estimates, shown in Figure 1(b), closely match the simple averages given in the raw figure, suggesting a sustained 50 percent decrease in offending rates. We report a subset of the event-time coefficients

in Table 3.

As noted above, these event study specifications similarly show no evidence of any anticipation. There are small declines in $t=-8$, when many mothers learn they are pregnant, and the largest decline in $t=-7$, by which time almost all mothers know (Branum and Ahrens, 2017). While surprising, this is consistent with evidence, based on self-report, that pregnancy intention does not predict alcohol cessation (Terplan et al., 2014).

3.1.1 Alcohol offenses

Contrary to the other three categories, the raw averages of DUI offenses in Figure 1(a) show an eventual increase after birth. This appears to due to the fact that women are more likely to be driving. Partial evidence for this is that more innocuous offenses related to driving, such as driving without a license, are increasing over the sample period (Figure A.1).

For more insight into drinking behavior, we turn to two common alcohol-related offenses for people under the age of 21: alcohol possession and furnishing liquor to minors. We perform this analysis for women who become mothers at or before the age of 20 or younger and plot results until age 21 in order to remove the confounding effect of reaching the legal drinking age, which brings the sample size down to 67,899 mothers. The plot of these alcohol offenses is given in Figure A.2. Similar to the non-alcohol drug offenses in the previous plot, the figure suggests a sharp, largely sustained desistance at the beginning of pregnancy.

3.1.2 Teen mothers

Economists still debate the consequences of teen pregnancy: influential research using miscarriages as a control finds minor negative and even some positive effects of teen childbearing (Hotz et al., 2005, 1997).⁵ However, Fletcher and Wolfe (2009) use a similar design with different data and find strictly negative effects on education and income, leading to a recent summary that the “[n]egative consequences of teen childbearing are well documented” (Yakusheva and Fletcher, 2015).

⁵For an overview of the causal effects of teen childbearing, see Kearney and Levine (2012), who conclude that “most rigorous studies on the topic find that teen childbearing has very little, if any, direct negative economic consequence.”

We next turn our attention to these mothers, women who give birth before turning 20. We plot the coefficients from the event study specification for the four main crime categories in [Figure A.3](#), where the coefficients are normalized by the pre-pregnancy average to give the fractional change in offenses. Motherhood remains a large driver of desistance for this subgroup. As in the full sample, drug and property crimes show a sharp and largely sustained decreases to half of the pre-pregnancy levels. This plots are also meaningful because the 78% of teen mothers report that their births resulted from unintended pregnancies ([Mosher et al., 2012](#)). These results provide perhaps the clearest evidence to date that childbearing is a turning point for even very young women.

3.2 Fathers

We next turn to first-time fathers. [Figure 2\(a\)](#) shows the average monthly offending rate for fathers for the same four crime categories as mothers. While less sharp than the effects for mothers, large drops are visible in these raw averages, especially for drug offending. Between pregnancy and three years after birth, drug crimes fall from 17 to 11 for every 10,000 men.

Some of these decreases could be due to the effects of aging. Similar to the analysis for mothers, we estimate the event study specification combining these four categories of offenses and plot the results in [Figure 2\(b\)](#). The results show clear evidence of a steep decline, stabilizing at 30 percent less than the offending rates at the start of the pregnancy. Point estimates for a subset of the event-time coefficients are reported in [Table 4](#).

The declines in offending compare favorably to the deterrent effects of exceptionally harsh punishments. Under California’s three-strikes law, offenders with two strikes faced almost 20 years of additional prison time and exhibited a decrease in annual felony offenses of 15 to 20 percent ([Helland and Tabarrok, 2007](#)). In Italy, [Drago et al. \(2009\)](#) find that an increase in expected sentences among recently released prisoners by 25 percent would decrease re-offending in 7 months by 18 percent. While our results are not directly comparable to estimates of recidivism for people recently released from prison, we find that among all of the first-time fathers in our sample, the share committing any drug offense goes from 1.7 percent in the year before pregnancy

to 1.2 percent in the year after birth.

A striking feature of these plots is that, as with women, most of the decrease occurs during the pregnancy, despite the fact that men do not directly experience any of the physical effects of pregnancy. While new to the quantitative literature, this response is consistent with qualitative research asking at-risk fathers how they reacted when they learned about a partner’s pregnancy. [Edin and Nelson \(2013\)](#) note that, “Men are drawn in—usually after the fact of conception...[and] usually work hard to forge a stronger bond around the impending birth” ([Edin and Nelson, 2013](#), p. 203). Further, when describing a representative case, they write,

Upon hearing the news that the woman they are “with” is expecting, men such as Byron are suddenly transformed. This part-time cab driver and sometime weed dealer almost immediately secured a city job in the sanitation department ([Edin and Nelson, 2013](#), p. 36).

3.3 Heterogeneity

3.3.1 Second births

Up to this point, we have restricted the sample to first births. In order to better understand the mechanisms behind the observed decreases, we next consider second births. One explanation that would be consistent with the results so far is that the presence of a young child creates a temporary incapacitation effect due to childcare or housework, but that these results fade when children are older. This would imply that the decreases in offending are roughly similar across first and second births.

In [Figure 3](#), we show the same event study coefficients split by birth order. In order to use a consistent sample, the underlying data retains all mothers and fathers whose first and second children are both born in the fully-balanced sample period. Controls for age are especially important for this comparison given that parents are mechanically older at their second birth.

The plots show that, for both mothers and fathers, the bulk of the desistance happens at the first birth. Three years after their second birth, mothers are offending at levels similar to before the pregnancy. Fathers experience a 10 percent decrease in offending compared to 30 percent for

the first birth. That second births could still spur a sustained decrease for fathers is consistent with the fact that some men only start investing in children for later births, while this is less common for women (Edin and Nelson, 2013).

3.3.2 Birth effects by marital status

Next we split the fathers and mothers by marital status. Marital status at birth has long been a focal metric of policy makers, and the descriptives in Table 2 show clear differences in the probability of arrest and incarceration across the two samples. Unmarried fathers are twice as likely to have ever been arrested, and seven times as likely to have had an incarceration spell. Since married couples are already less prone to crime, the additional effect of childbirth may have a less stabilizing effect. On the other hand, an unmarried childbirth may present a significant income shock and increase economic offenses.

Figure 4 presents similar event study plots by the mother’s marital status as reported on the birth certificate, showing effects on the monthly arrest rate for any of the four main offenses. In these plots, we add the omitted-period average in order to display the stark level differences in offending between the two groups. Both unmarried and married mothers exhibit a large “incapacitation” effect during the pregnancy. However, childbirth presents less of a permanent change for married mothers. By the end of our sample window, they offend at similar levels to before the pregnancy.

Similar to the main results, there are no signs of anticipation ahead of the pregnancy for either group. This might be expected for unmarried women, where more than half of all births are unintended. However, for married women only 23 percent of births are unintended (Mosher et al., 2012, Table 2), and many couples spend months trying to conceive (Keiding et al., 2002). This could be further evidence that the decision to have a child does not influence offending. However, it could also be that the criminally-active married women who drive the estimates are much more likely to have unintended pregnancies.

Figure 5 plots the same event study estimates for married and unmarried fathers. Similar to mothers, unmarried fathers have much higher rates of offending, but this discrepancy shrinks

somewhat following the birth. Unmarried fathers show some increase in offending leading up to the birth, which could be due an increased level of activity in Washington correlated with the timing of their relationship with the mother. As a robustness check, we show in [Figure A.4](#) that two groups with stronger attachment to the state display flat pre-trends leading up to the pregnancy but similar sharp declines in offending at pregnancy: fathers born in Washington state and fathers with at least one juvenile offense.

4 The role of marriage

4.1 Offenses around marriage

A clear finding of the previous section is that there are large level differences in criminal offending by the parents' marital status at birth. Marriage itself is a prominent feature of the turning points framework. In qualitative studies, formerly delinquent men often attribute considerable weight to marriage: "If I hadn't met my wife at the time I did, I'd probably be dead. It just changed my whole life...that's my turning point right there" ([Sampson and Laub, 2009](#), p. 41). Married men also earn more: in economics, a long literature debates the content of the male marriage wage premium (e.g. [Antonovics and Town, 2004](#)).

To analyze criminal offenses around marriage, we produce plots of the event study coefficients in specifications analogous to [Equation 1](#) in [Figure 6](#). Marriage is preceded by a long decline in offending; for male drug and economic crimes, the decrease amounts to a more than 50 percent decrease from three years before the marriage. The decline continues until the month of marriage, where all crimes either stabilize or increase slightly. These event study plots closely match the raw averages, shown in [Figure A.5](#).

These figures add important nuance to the qualitative literature, which has largely interpreted marriage effect as causal.⁶ For instance, in recent work, [Sampson and Laub \(2009\)](#) write: "Selection into marriage appears to be less systematic than many think...[m]any men cannot articulate why they got married or how they began relationships, which often just seemed to happen by

⁶However, see [Skardhamar et al. \(2015\)](#) for a critical assessment.

chance.” The plots suggest clearly that romantic partnerships are important, demarcating a large decrease in offending, but the association could be either because of the relationship or other exogenous factors decreasing crime and increasing the probability of marriage.

4.2 Good marriages, bad marriages

Economic models going back to [Becker et al. \(1977\)](#) posit that divorces happen in response to negative information about the expected gains from the union (for a more recent example see [Charles and Stephens, 2004](#)), and in sociology a core tenet of turning points theory is that marriage itself does not guarantee desistance—relationships are salutary to the extent that they are characterized by high attachment ([Sampson and Laub, 1992](#)). The turning points theory plainly predicts that desistance should be less pronounced for bad marriages. The model in [Becker et al. \(1977\)](#) implies that divorce should be preceded by some negative surprise.

In order to probe these ideas, we combine our data with statewide divorce data from Washington. We plot descriptive statistics for married and eventually divorced couples in [Table 5](#). This sample includes all births where the parents were married and it was a first birth for either the mother or father. Parents who get divorced are younger, reside in poorer zipcodes, and are more likely to be white or black (and less likely to be Hispanic or Asian). Perhaps most importantly, men and women who are headed for divorce are both about twice as likely to have any arrest.

We show the raw averages in [Figure 7](#), except account for these level differences, we subtract and divide by the pre-pregnancy averages in the raw plots. The outcome is an indicator any of the four main offenses (results look similar for any of these categories separately). Compared to their past levels of offending, women headed for divorce have slightly higher rates of offending post-birth, despite broadly similar pre-trends leading up to the pregnancy. These same effects are present and much more pronounced for men.⁷

These results are consistent with the idea that “spousal attachment” is pivotal to maintaining desistance, although the parallel trends leading up to the birth suggests that preparation for a child can be just as impactful for couples who will eventually divorce ([Laub and Sampson, 2001](#)). The

⁷The results are very similar using marriages as the focal event, and controlling for age effects in the event study specification.

results are also broadly consistent with economic conceptions of marital dissolution as in [Becker et al. \(1977\)](#) that argue that divorce occurs in reaction to unexpected changes to the gains from the union. Of course, unobserved variables—for example, income—related to crime and divorce could be driving these results. Still, the figures give strong evidence that, relative to past levels of offending, increases in crime precede dissolution.

5 Comparison to age 21 discontinuity

Studies in criminology and economics generally focus on discrete changes in enforcement regimes in order to measure elasticities, such as California’s three strikes policy ([Helland and Tabarrok, 2007](#)); the increased punishments associated with turning 18 ([Lee and McCrary, 2005](#)) or having blood alcohol above a certain level ([Hansen, 2015](#)); and the ability to purchase alcohol legally at age 21 ([Carpenter and Dobkin, 2015](#)). We can use our data to replicate the design in [Carpenter and Dobkin \(2015\)](#), which employs a regression discontinuity approach to measure the increase in offenses that occurs when people turn 21. This presents a unique opportunity to compare the effects of parenthood to a widely studied criminal justice lever.⁸

To maintain the same sample, we keep all men and women who are in our parents sample and also have a 21st birthday between the years 1995 and 2012, inclusive. This gives us a balanced panel of arrests in the three years before and after the birthday. Next, we take average offending rates around age 21 in monthly bins.

[Figure 8](#) shows the results with alcohol-related offenses as the outcome variable, with the y-axis scaled by average offending in the post-period. There is clear visual evidence of a discontinuity in offending rates for alcohol-related crimes. However, the plots for all other crimes show no response. [Table 6](#) shows regressions estimated at the daily level including a quadratic in time since 21st birthday interacted with the indicator for being above age 21 and dummies in the week starting on each birthday to capture any birthday-related spikes, as in [Carpenter and Dobkin \(2015\)](#). We also report the average offending levels in the six months after the 21st birthday.

Based on these estimates, the effects are similar in magnitude (although opposite in sign) to

⁸To our knowledge, this is the first large-scale replication of [Carpenter and Dobkin \(2015\)](#).

the childbirth estimates: alcohol offenses before turning 21 are 24 percent lower for men and 32 percent lower for women. However, these offenses are just 6 percent of total charges of the sample window, and the regression discontinuity finds small and insignificant effects on the total amount of offenses.

6 Domestic violence

The previous analyses on turning points leave out a critical caveat that, to our knowledge, has not received any explicit mention in the host of quantitative studies on crime and family formation. The results for men around marriage and childbirth are clouded by an enormous increase in domestic violence offenses. [Figure 9\(a\)](#) shows raw averages for domestic violence offenses in the full first birth sample. Domestic violence offenses increase up until the start of the pregnancy, decrease sharply, and then markedly spike on the month of the birth. This effect might help explain why recent studies found ambiguous effects on overall arrest rates (e.g. [Mitchell et al., 2018](#)). In [Figure 9\(b\)](#), we show, also using the raw averages, that a similar spike is visible around marriage.

Our data measure arrests with a high degree of accuracy, but the connection between arrests and violent behavior over the sample period is less certain if the propensity to report domestic violence changes around childbirth. Victimization surveys, which may be more accurate compared to measures based on police involvement, confirm the qualitative finding that domestic violence is more likely after the pregnancy than during: in a nationally representative survey, 1.7 percent of mothers reported physical violence during the pregnancy compared to 3.1 percent in the first post-partum year ([Charles and Perreira, 2007](#)).⁹ Thus, while the increase before $t=-9$ likely reflects the forming of relationships, the decrease during pregnancy and subsequent spike likely represents real behavior.

Domestic violence also gives a strong indication of the likelihood of divorce. [Figure 10\(a\)](#) shows father's domestic violence offenses split by divorce status five years later, normalized by

⁹Further, in an interview, a Seattle police officer said that the presence of children would not affect the likelihood of an arrest due to Washington's strict mandatory arrest law.

pre-pregnancy means to account for large level differences between the two groups. Despite similar pre-trends, men destined for divorce show a much larger spike in domestic violence following the birth. [Figure 10\(b\)](#) focuses on these divorced men, grouping them based on whether they divorced 1, 2, 3 or 4 years after the birth. (Importantly, this uses the date that the divorce was finalized, which is at least 90 days after the date of filing.) The plot shows clearly that domestic violence spikes ahead of the divorce decree.

7 Robustness

The previous sections highlight several qualitative in criminal offending around family formation events. Here we address potential aspects of our design that could cause us to mismeasure the effects.

7.1 Outmigration

The biggest potential confound in our setting is outmigration. Defining our sample around birth imposes selection: men are most likely to be physically present in Washington at the time of conception. Since our data only cover arrests in Washington, it's possible that the crime patterns reflect migrations out of the state—and therefore unobservable attrition—following pregnancy or birth.¹⁰ The most immediate argument against this threat is the clear increase in domestic violence following the birth. For migration to explain the decrease in drug offending, the men accounting for the spike in domestic violence would need to have a much lower propensity to commit drug crimes. However, crime is correlated across offense types: men with more drug arrests tend to have more domestic violence arrests.

To have a proxy of residence less correlated with drug use and criminal propensity, we look at the most innocuous offense in our data: traffic offenses, consisting primarily of driving with a suspended license and not displaying a license on command. [Figure A.6](#) shows, in both the raw averages and event study specification controlling for age, that men do not exhibit a decreased

¹⁰Incarceration poses an analogous attrition problem as men in our sample are least likely to be in prison ten months before the birth; results using only never-incarcerated fathers are identical.

risk of committing these offenses after the pregnancy or birth, so any explanation centered on outmigration would hinge on higher-risk men selectively leaving the state.

Finally, we focus on men with greater attachment to the state in the post-birth period by restricting the sample to the 69,900 fathers who commit a DUI or traffic offense in the endpoints of our sample, i.e., 4-5 years after the birth. In [Figure A.7](#), we show that this sample, which should be much less contaminated by migration attrition, shows a similar 25 percent decrease in drug offenses. If migration were affecting the results and fathers physically present in Washington had stable levels of offending, we would expect the decrease for this group to be much smaller.

These findings are reassuring that migration is not impacting the analyses around pregnancy and birth. As for the marriage findings, migration-based attrition would bias the results in the opposite direction: marriage applicants typically need to be physically present to attain a marriage license. The results, therefore, may even understate the marriage decline if people are less likely to be in Washington in the years preceding.

7.2 Stillbirths

The preceding sections provide evidence on the causal impact of a pregnancy assuming the onset of pregnancy does not coincide with other time-varying confounds. In this section we construct a sample of couples who experience a pregnancy that ends in a late-stage miscarriage. If the outcome of the pregnancy has a causal effect on offending in line with the previous results, parents to stillborn infants should show higher rates of offending post-pregnancy.

A stillbirth is the delivery, at some point after the 20th week of pregnancy, of a baby who has died. Hospitals are legally required to report stillbirths if the gestation period is 20 weeks or more. Importantly for our purposes, there is still comparable coverage of the fathers' name and date of birth, which are only missing from 9 percent of the stillbirths.

Existing work using miscarriages as an instrument (e.g. [Hotz et al., 2005](#)) includes all reported miscarriages, not just those occurring after 20 weeks of gestation. This could bias estimates if some of the early miscarriage sample would have gotten an abortions, and since among pregnancy teens those who receive abortions are positively selected with respect to economic outcomes (see

Hoffman, 2008). An advantage of our sample is that it does not have this censoring issue since over 90 percent of abortions occur before the 13th week of gestation (Jatlaoui et al., 2018).

On the other hand, stillbirths are less commonplace than miscarriages and often have distinct causes affecting the health of the mother such as pre-eclampsia, bacterial and viral infections, other medical conditions, and possibly domestic violence (Lawn et al., 2016). Further, the experience of a stillbirth is often followed by a pronounced period of bereavement (Heazell et al., 2016). As a check on the influence of these physical or psychological consequences, we find similar effects looking at periods 6 months or more beyond birth, rather than immediately afterwards.

The last column in Table 1 shows descriptive statistics for the stillbirths in our sample, restricting to having a clear match in the arrest data and being the mother’s first birth. Mothers to stillborn babies are 10 percentage points less likely to be married but are otherwise positively selected based on receipt of WIC and arrest probabilities. Also, mothers in our data who experience stillbirths exhibit greater variance in age than mothers to liveborn children, and the infants are likely to be male and twins, in line with medical studies on risk factors (Lawn et al., 2016).

Since crime is a rare occurrence and our stillbirths sample is relatively small, we shift to a simple difference-in-differences specification to reduce noise. The specification includes person fixed effects and an indicator for post-birth interacted with an indicator for stillbirth:

$$y_{it} = \alpha_i + \gamma * preg_{it} + \delta_1 * after_birth_{it} + \delta_2 * after_birth_{it} * still_i + x'_{it}\beta + \epsilon_{it} \quad (2)$$

where $preg_{it}$ is equal to one for $t \in \{-9, -1\}$ and $after_birth_{it}$ is an indicator for $t \geq 0$. The pregnancy indicator is included to remove the decline in crime observed in the earlier results from the implicit pre-period estimates. We obtain similar results interacting the pregnancy and still indicators.

The results, shown in Table 7 for men and Table 8 for women echo the main results. Column (1) shows the results for the four main crime categories from the event study analysis, split out separately in columns (3)-(6); column (2) shows the effects on domestic violence. Fathers to stillborn children commit less domestic violence following the birth, but more of the four main offenses. Columns (4) and (5) suggest that this is driven by drug and economic offenses, although

the latter result is not significant. Mothers similarly show an elevated rate of drug offending following the birth, with significantly more drug and property destruction offenses.

8 A model of habit formation

The previous findings show large effects on drug offenses. How much of these responses are consistent with potentially addicted users rationally adjusting behavior in anticipation of a large change to their environment?

Economists have often employed habit-formation models in the style of [Becker and Murphy \(1988\)](#) in order to study addictive behavior, but most studies focus on one-time decisions or annual panels. Our context has the advantage of having a proxy for drug use at the monthly level, and is built around a clear and powerful utility shock to drug use. Building off of [O’Donoghue and Rabin \(1999\)](#) and [Becker and Murphy \(1988\)](#), we use this setting to study the implications of a dynamic discrete choice model of rational addiction. We focus on mothers because the distinct changes during pregnancy and after birth provide greater latitude for identification of the model parameters.

8.1 Setup

Following [O’Donoghue and Rabin \(1999\)](#), we consider a dynamic discrete choice model where addiction is based on use in the previous period. Finitely-lived agents maximize a discounted stream of utility stemming from their choices of whether to use each period $a_t \in \{0, 1\}$, and enter each period either clean or addicted $k_t \in \{0, 1\}$. Addiction is simply whether or not the agent used last period, $k_t = a_{t-1}$. When clean, the utility from using is f_t , and the utility from refraining is normalized to 0. When addicted, agents get $f_t - \rho$ from hitting and $-\rho - \sigma$ from refraining. These payoffs are illustrated below.

	$U_t(1, k_t)$	$U_t(0, k_t)$
Clean ($k_t = 0$)	f_t	0
Addicted ($k_t = 1$)	$f_t - \rho$	$-\rho - \sigma$

The following assumptions to capture two key features of drug addiction:

- (1) **Internalities:** utility from any action is higher when clean ($\rho > 0$)
- (2) **Habit formation:** the utility gain from hitting is higher when hooked ($\sigma > 0$)

The addiction parameters σ and ρ are static, but f_t is allowed to change after childbirth:

$$f_t = \begin{cases} f & \text{for } t < 0 \\ f - \Delta f & \text{for } t \geq 0 \end{cases}$$

Finally, agents maximize the discounted stream of utility payoffs:

$$U = \sum_{t \in S} \delta^{t+36} U_t \tag{3}$$

where t indexes months since childbirth and S includes all periods between -36 and 36 months around birth. We assume that the errors are distributed generalized extreme value, which allows for analytic solutions for the probability of using drugs in any given period. These are given by

$$P(t, k_t) = \frac{e^{U(1, k_t) + \delta V_{t+1}(1)}}{e^{U(1, k_t) + \delta V_{t+1}(1)} + e^{U(0, k_t) + \delta V_{t+1}(0)}} \tag{4}$$

where $V_t(k_t)$ is the value of entering into period t in state k_t and $P(t, k_t)$ is the probability of using in period t in state k_t . Under these assumptions, the optimal path of discrete choice probabilities can be solved using backward recursion.

8.2 Illustrative examples

Figure A.8 plots the choice probabilities around birth for a fully forward-looking agent with $\delta = 1$, high degree of habit formation, and a large decrease in use utility starting at $t = 0$. At news of the shock at $t = -9$, the agent decreases her probability of use immediately, then spreads her adjustment to the new steady state levels into the first 12 months after birth.

In the data, mothers' offending shows a considerable rebound following the low levels reached during childbirth. In order to fit this pattern, we assume that mothers experience an additional

shock to hitting utility during pregnancy,

$$f_t = \begin{cases} f & \text{for } t < p \\ f - \Delta_1 f & \text{for } t \in \{p, 0\} \\ f - \Delta_2 f & \text{for } t \geq 0 \end{cases} \quad , \quad (5)$$

where $p \in \{-10, \dots, -1\}$. In this parsimonious setup, the data are best fit with $p = -2$, since the presence of habit formation and some degree of patience creates an incentive for mothers to begin desisting in anticipation.

Figure A.9 illustrates the choice probabilities of the model with the added shock. Without habit formation, both adjustments are made instantaneously (Panel (a)). With large σ , myopic agents make sudden adjustments in the later part of pregnancy, but still ease into the new steady state (Panel (b)). Finally, as agents become more future-regarding, reaction to the news of pregnancy becomes sharper (Panels (c) and (d)).

Identification of the f and two Δf terms comes from the initial level and the two level changes during the pregnancy and after. As illustrated in Figure A.9, δ and σ are identified off of the two the transition paths during pregnancy and after: The transition from pregnancy to $t - 2$ identifies δ , since this captures the immediacy of the response to a future shock. The slope into the new steady state following birth identifies σ , since non-myopic agents will only ease into a new steady state given some degree of habit formation.

8.3 Estimation

We fit the model to the data using a minimum distance estimator. The estimator minimizes the distance between the moments predicted by the model and the observed moments, where the observed moments are the raw observed hitting rates in the data.¹¹ The predicted moments are direct outputs of the logit framework given above. Since σ and ρ are not separately identified, we fix $\rho = 1$ and estimate four parameters: σ , the degree of habit formation; f , the utility of using;

¹¹In order to better approximate actual offending rates, and following Lee and McCrary (2005), we scale the empirical moments by 10 in accordance with estimated clearance rates around 10 percent.

Δf , the change in f ; and δ , the discount rate.

The results of this exercise are shown for unmarried and married mothers in [Table 9](#), with the corresponding figure showing the raw data along with the simulated vector the probabilities of using in [Figure 11](#). The point estimates suggest that mothers in either group are not fully myopic. Although the standard errors cannot reject high levels of discounting, the steep slope leading up to birth is consistent with strongly forward-looking behavior.

Both groups experience similar utility shocks during pregnancy, but the long-run change for married mothers, as foreshadowed in the empirical section, is almost zero. Most interestingly, the estimates suggest a higher level of habit formation for married mothers due to their slow adjustment into the new steady state. The higher levels of habit formation in turn imply that in their clean state, married mothers get a greater level of utility from hitting than unmarried mothers.

The results are thus broadly consistent with a habit formation framework in the style of [Becker and Murphy \(1988\)](#) allowing for utility shocks marking key moments in childbearing. In particular, the habit formation framework helps explain the slow transition into the steady state levels of offending in the years following the birth. Interestingly, and as partial support for the habit formation approach, these patterns are unique to drug offenses: economic offenses for mothers show a much sharper rebound into the post-birth steady state, as shown in [Figure 1](#).

9 Conclusion

How does someone change when they wed or become a parent? The previous sections uncover several novel patterns in criminal offending around childbirth and marriage, leveraging a detailed administrative sample and providing clear evidence on the size and nature of “turning points.” For mothers, childbirth is transformative, even with the large rebound in offending that occurs after pregnancy. For fathers, a smaller but still significant decrease occurs in drug and economic offenses. Marriage, in the words of [Edin and Kefalas \(2011\)](#), is reserved for couples who have made it. However, the increase in domestic violence around both births and marriage is a significant qualifier.

Parenthood is not a policy, although governments take a wide range of actions in order to prevent teen pregnancy, support marriage, and encourage father involvement. Our findings on teen mothers provide some of the strongest evidence to date against the conventional wisdom around its consequences. Further, the novel findings on the timing of desistance for fathers suggest that pregnancy could be a uniquely potent time for interventions promoting family formation. Finally, the stark patterns in domestic violence offenses may argue for expanding the purview of home visitation programs in the prenatal period, typically directed at child welfare (Bilukha et al., 2005).

The findings on drug offenses in particular have two implications about incentive-based approaches to treatment: first, that drug use can respond to incentives; second, that incentives built around social bonds could be powerful. The first point challenges definitions of addiction which assert that drug use is the outcome of involuntary impulses.¹² And while the experience of childbearing cannot be synthesized in an intervention, addiction experts observe that some successful treatments, such as Alcoholics Anonymous, are based on promoting social cohesion and interdependence (Heyman, 2009).

¹²For example, the National Institute on Alcohol Abuse and Alcoholism (NIAAA), defines drug abuse as a disease: “Addiction is a chronic, often relapsing brain disease...[s]imilar to other chronic, relapsing diseases, such as diabetes, asthma, or heart disease”

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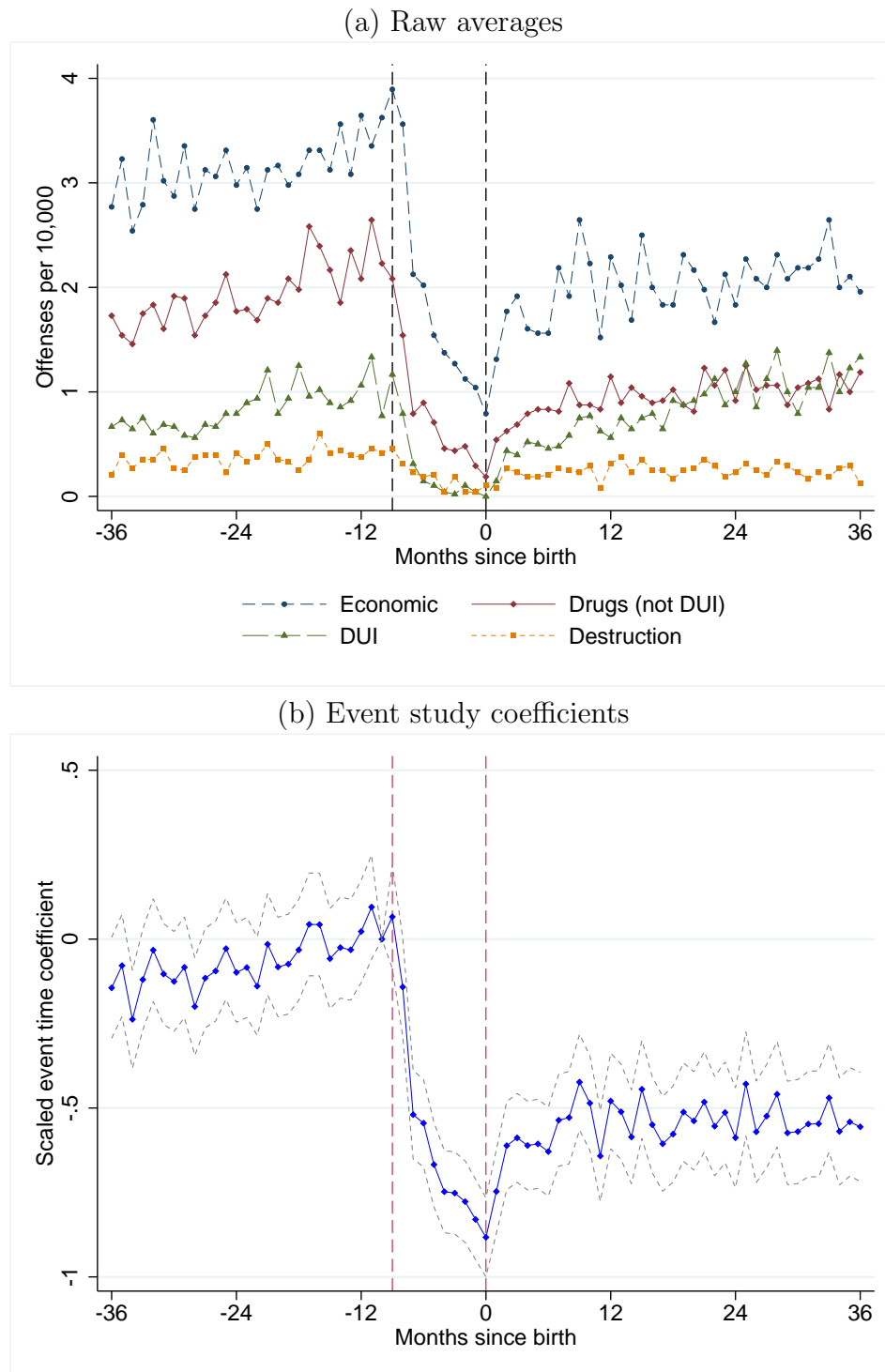
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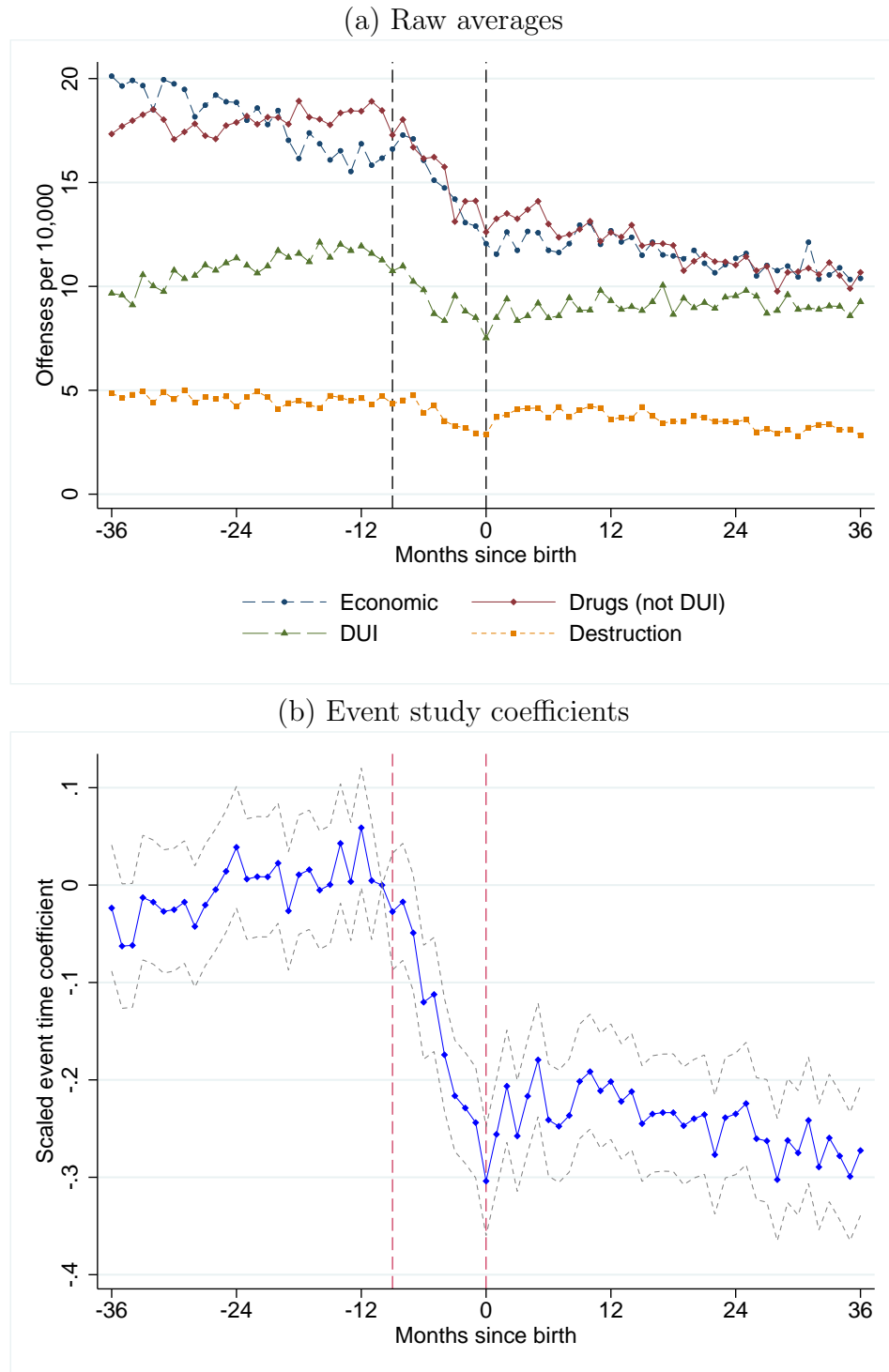
10 Figures

Figure 1: Monthly arrest rate around first birth, All mothers



Includes fully-balanced arrest data for 480,111 first-time mothers. DUI stands for driving under the influence. In panel (b), the dots show point estimates and dashed lines show 95% confidence intervals of the coefficients δ_k from the event study specification shown in Equation 1, with an indicator for any arrest in the four crime categories from panel (a) as the dependent variable. The coefficients are divided by the average arrest rate in the omitted period, 10 months before birth. The vertical dashed lines mark 9 months before the birth and the month of birth.

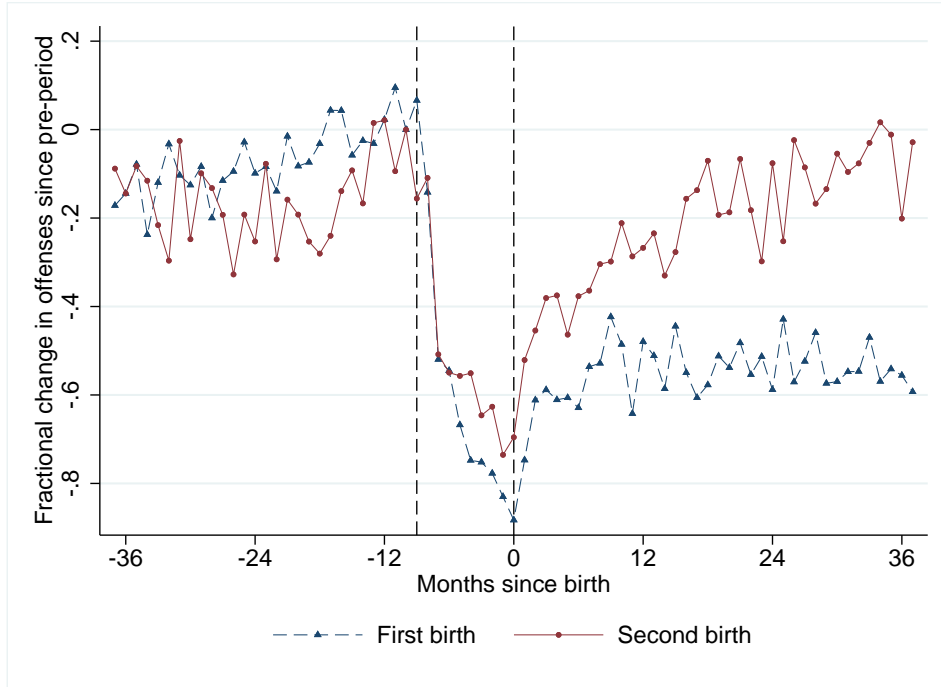
Figure 2: Monthly arrest rate around childbirth, All fathers



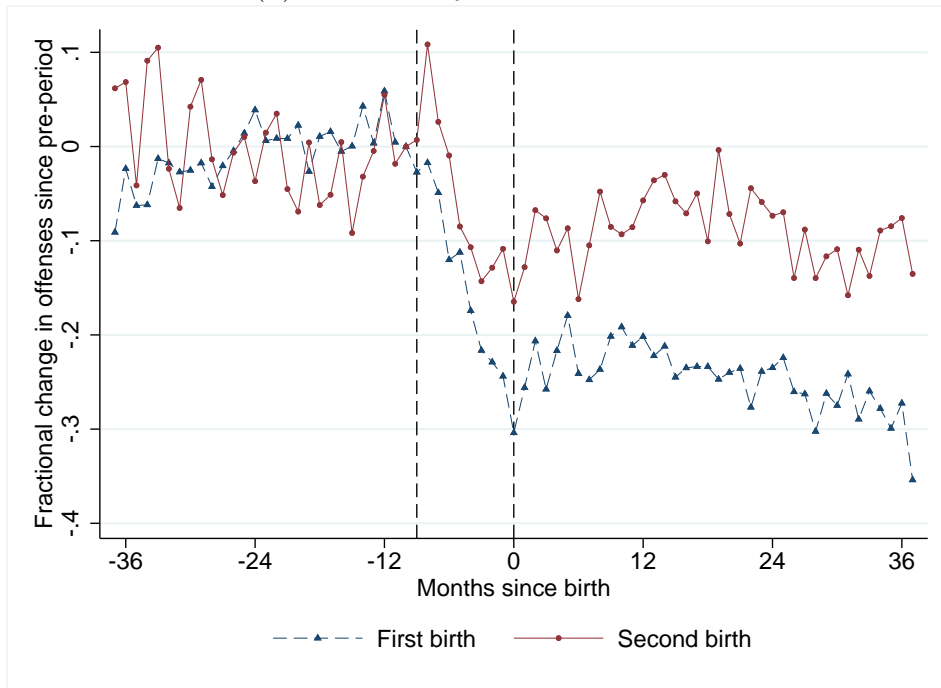
Includes fully-balanced arrest data for 545,166 first-time fathers. In panel (b), the dots show point estimates and dashed lines show 95% confidence intervals of the coefficients δ_k from the event study specification shown in Equation 1, with an indicator for any arrest in the four crime categories from panel (a) as the dependent variable. The coefficients are divided by the average arrest rate in the omitted period, 10 months before birth. The vertical dashed lines mark 9 months before the birth and the month of birth.

Figure 3: Second births

(a) Event study coefficients, women

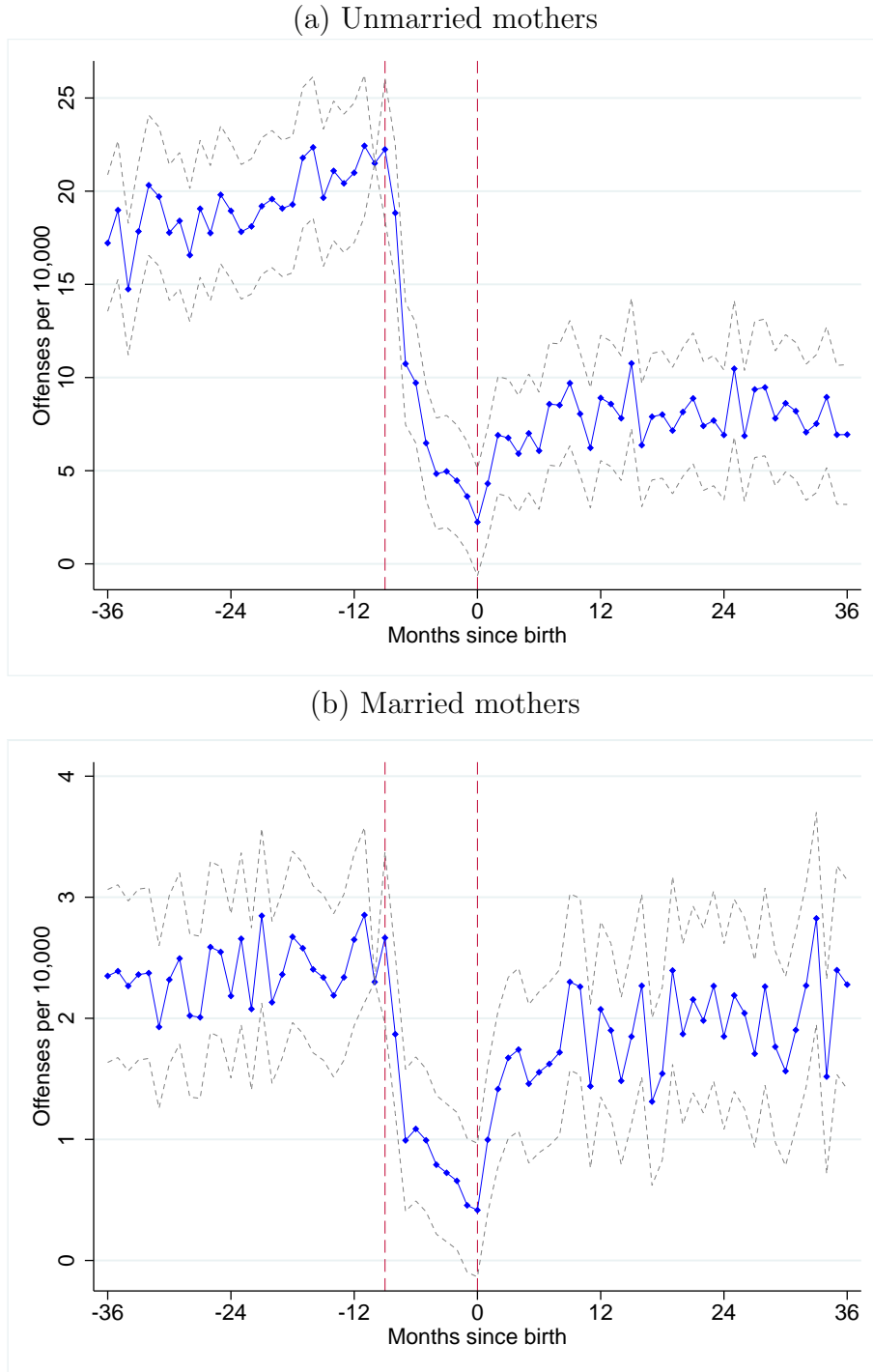


(b) Event study coefficients, men



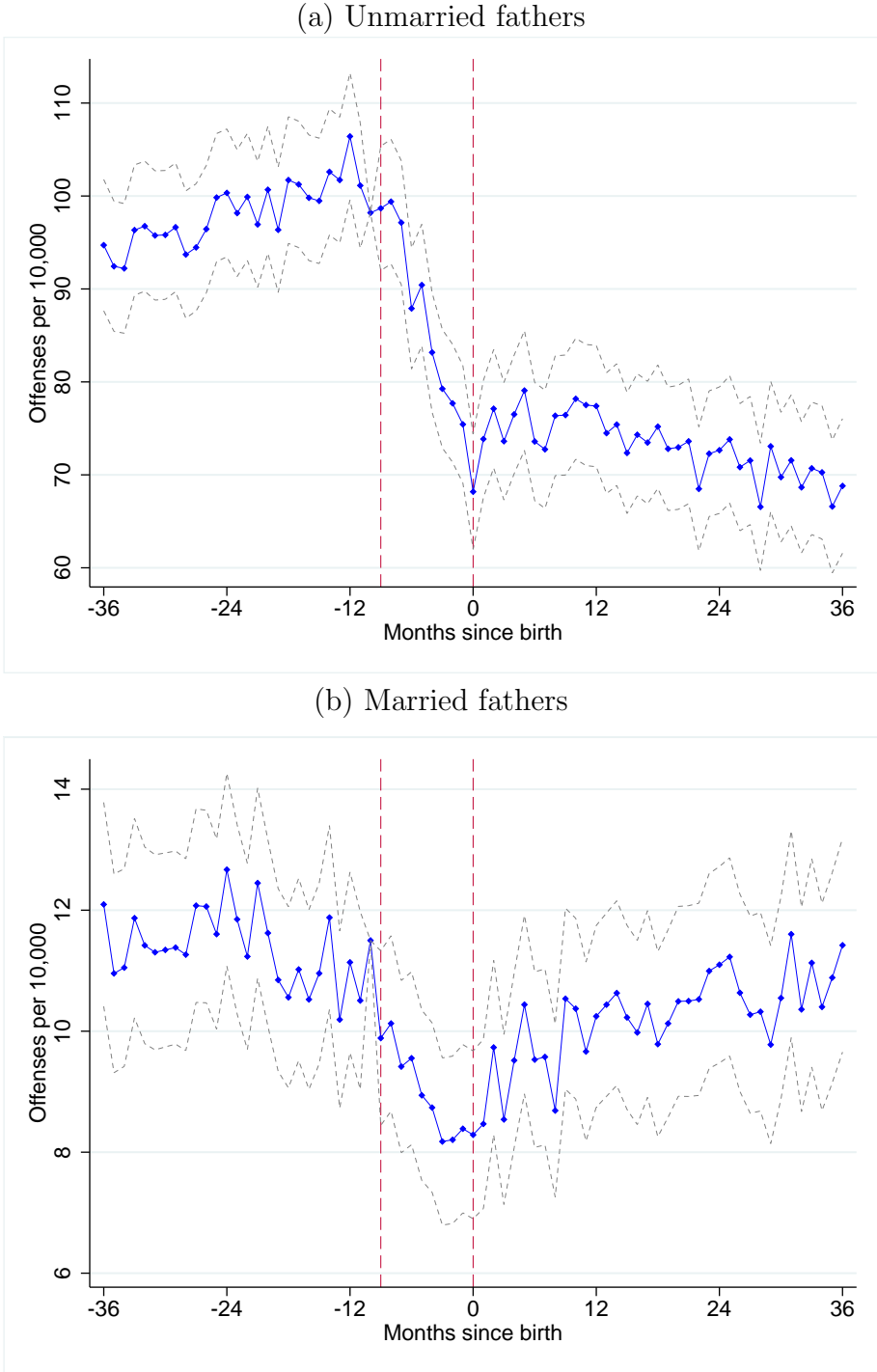
Plots show coefficients δ_k from the event study specification show in [Equation 1](#) with an indicator for any drug, DUI, economic, or property destruction offense as the dependent variable. Each line represents a separate regression run using fully-balanced arrest data on the women (panel (a), $N=160,360$) and men (panel (b), $N=180,557$) with two births in the sample window. The vertical dashed lines mark 9 months before the birth and the month of birth.

Figure 4: Mother heterogeneity by marital status, event study coefficients



Includes fully-balanced arrest data on 112,016 unmarried and 368,095 married first-time mothers. Dots show point estimates and dashed lines show 95% confidence intervals of the coefficients δ_k from the event study specification shown in Equation 1, with an indicator for a drug, DUI, economic, or property destruction offense as the dependent variable. The omitted period is 10 months before birth and the arrest rate in the omitted period is added to the coefficients to show average offending rates net of age effects. The vertical dashed lines mark 9 months before the birth and the month of birth.

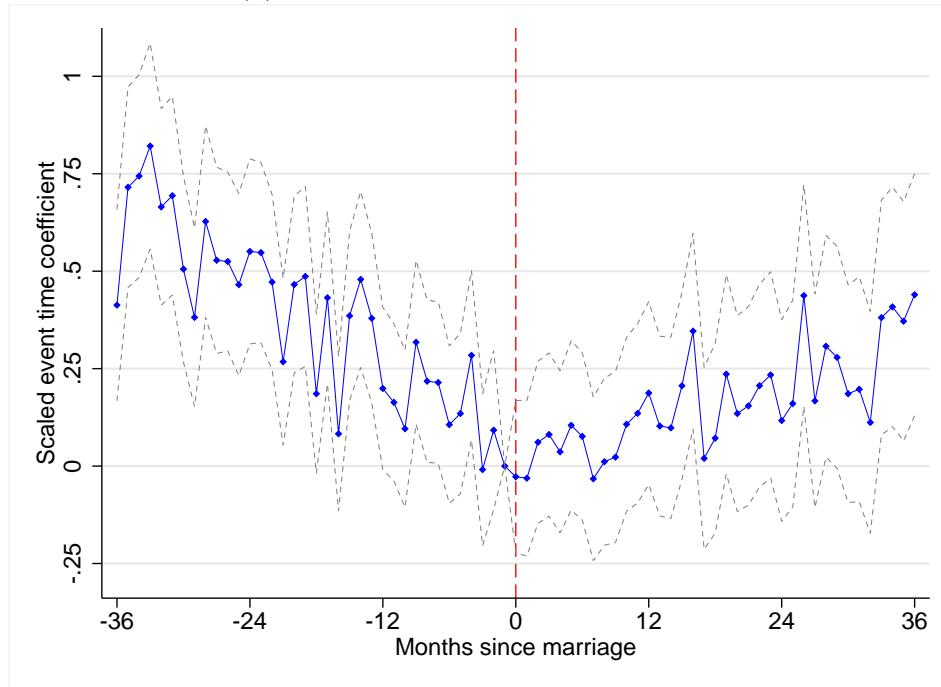
Figure 5: Father heterogeneity by marital status, event study coefficients



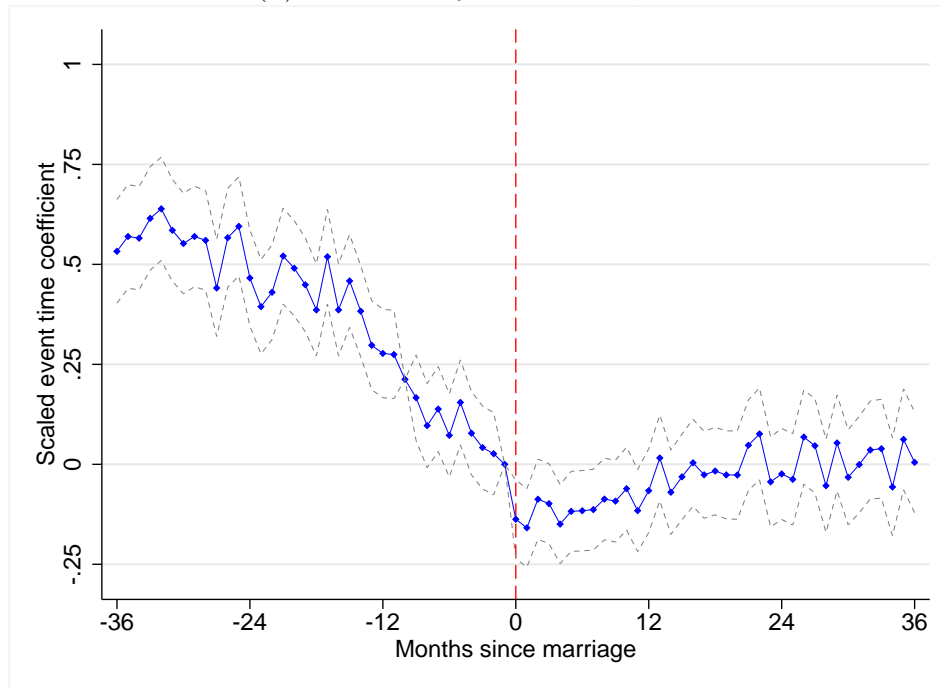
Includes fully-balanced arrest data on 160,052 unmarried and 385,114 married first-time fathers. Dots show point estimates and dashed lines show 95% confidence intervals of the coefficients δ_k from the event study specification shown in Equation 1, with an indicator for a drug, DUI, economic, or property destruction arrest as the dependent variable. The omitted period is 10 months before birth and the arrest rate in the omitted period is added to the coefficients to show average offending rates net of age effects. The vertical dashed lines mark 9 months before the birth and the month of birth.

Figure 6: Plots of arrests around marriage

(a) Event study coefficients, women

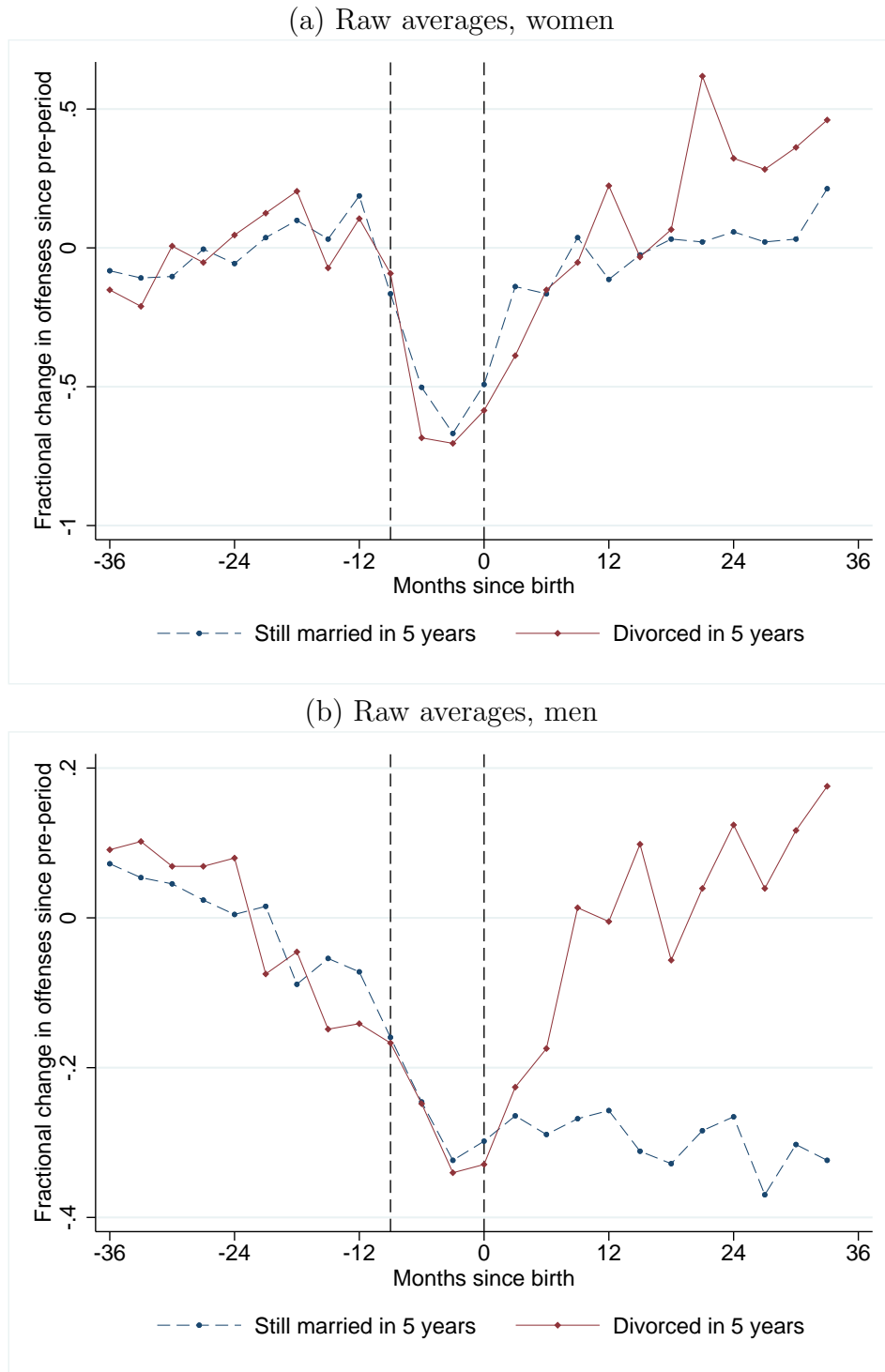


(b) Event study coefficients, men



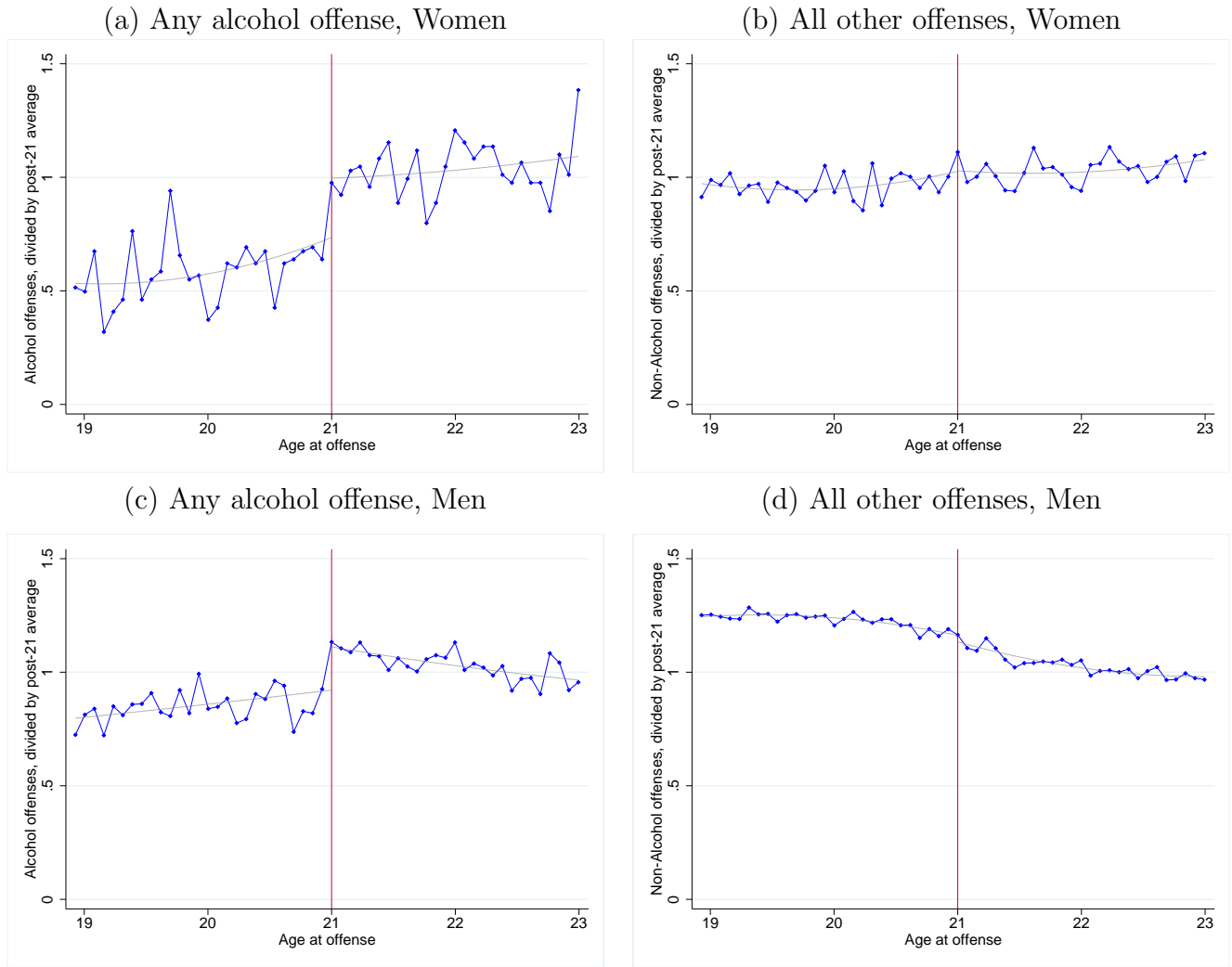
Includes all fathers (N=245,756) and mothers (N=222,392) from the birth data who are visible in the arrest data 3 years after and 3 years before their marriage. Dots show point estimates and dashed lines show 95% confidence intervals of the coefficients δ_k from the event study specification shown in Equation 1, with an indicator for a drug, DUI, economic, or property destruction arrest as the dependent variable. The omitted period is one month before birth. The vertical dashed line marks the month of marriage.

Figure 7: Heterogeneity in the effect of childbirth between good marriages and bad marriages



Panel (a) includes fully-balanced arrest data on 349,779 still-married women and 18,316 divorced women. Panel (b) includes fully-balanced arrest data on 364,076 still-married men and 21,038 divorced men. The outcome is any drug, DUI, economic, or property destruction offense. Divorce classification is derived from a fuzzy match between the Washington state marriage and divorce indexes. The vertical dashed lines mark 9 months before the birth and the month of birth.

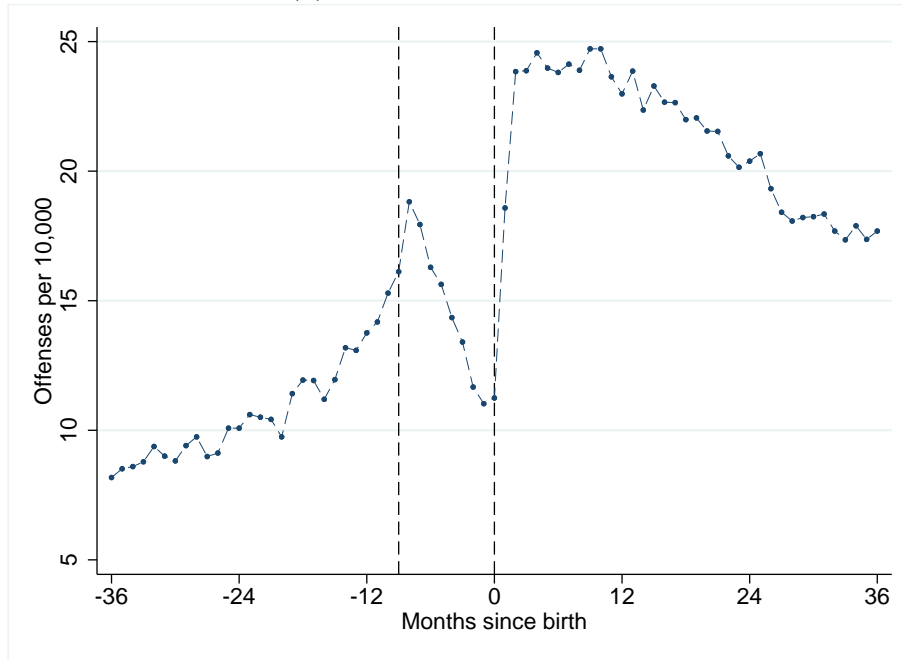
Figure 8: Regression discontinuity evidence using the minimum legal drinking age



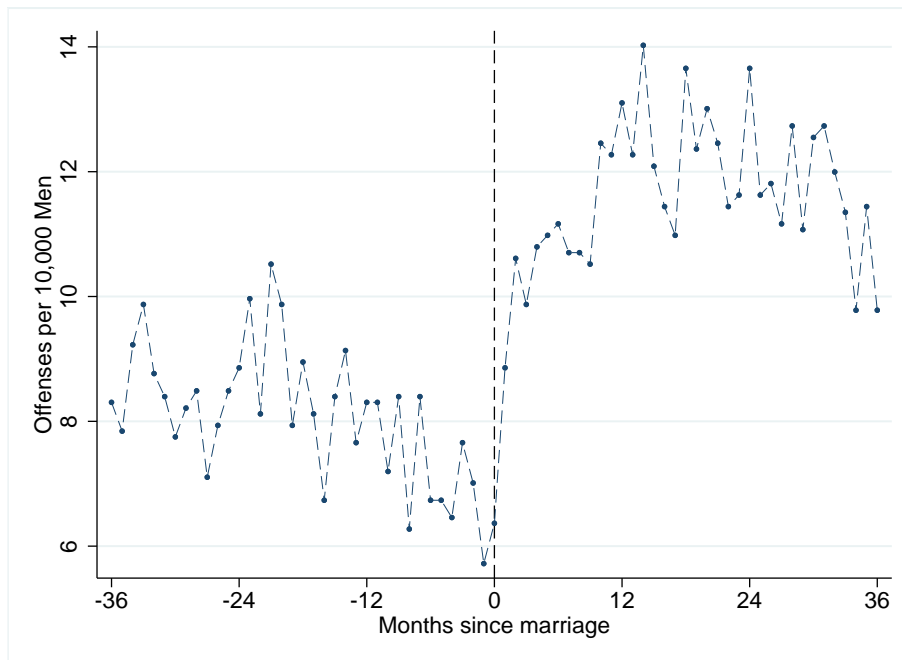
Includes fully-balanced arrest data on 422,910 men and 347,324 women with 21st birthdays within 3 years of the arrest data. Data points are scaled to give offenses relative to the post-21 average. The light grey lines show quadratic fits fully interacted with an indicator for being above 21.

Figure 9: Domestic violence

(a) Offenses around birth



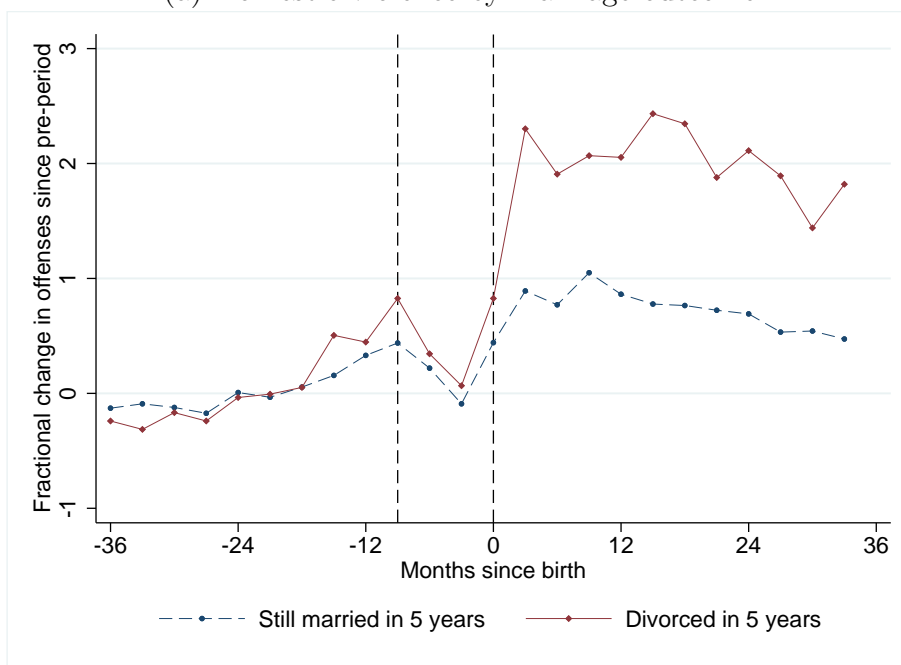
(b) Offenses around marriage



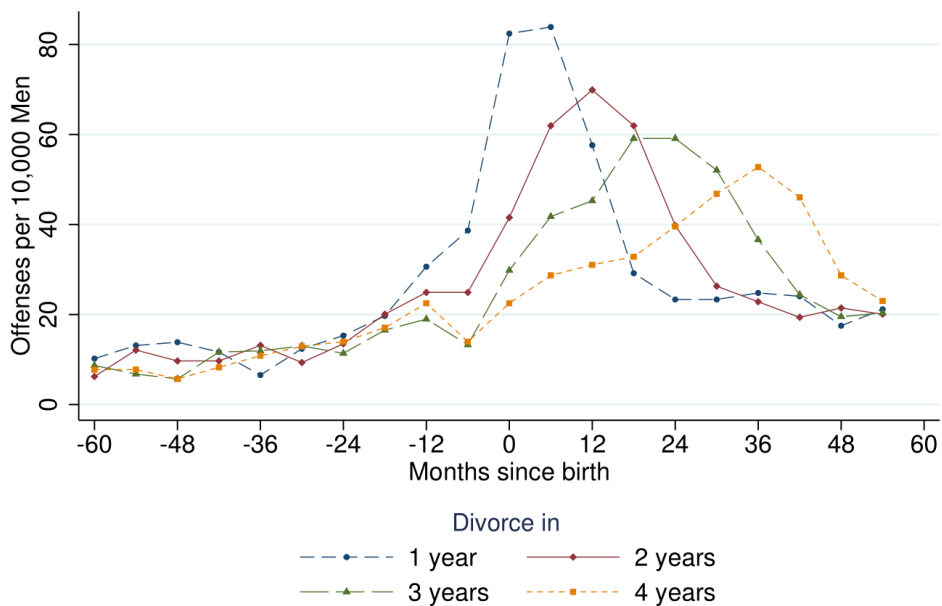
Panel (a) includes fully-balanced arrest data for 545,166 first-time fathers and the vertical dashed lines mark 9 months before the birth and the month of birth. Panel (b) includes fully-balanced arrest data for 245,756 married men and the vertical dashed line indicates the month of marriage.

Figure 10: Domestic violence vs. divorce

(a) Domestic violence by marriage outcome

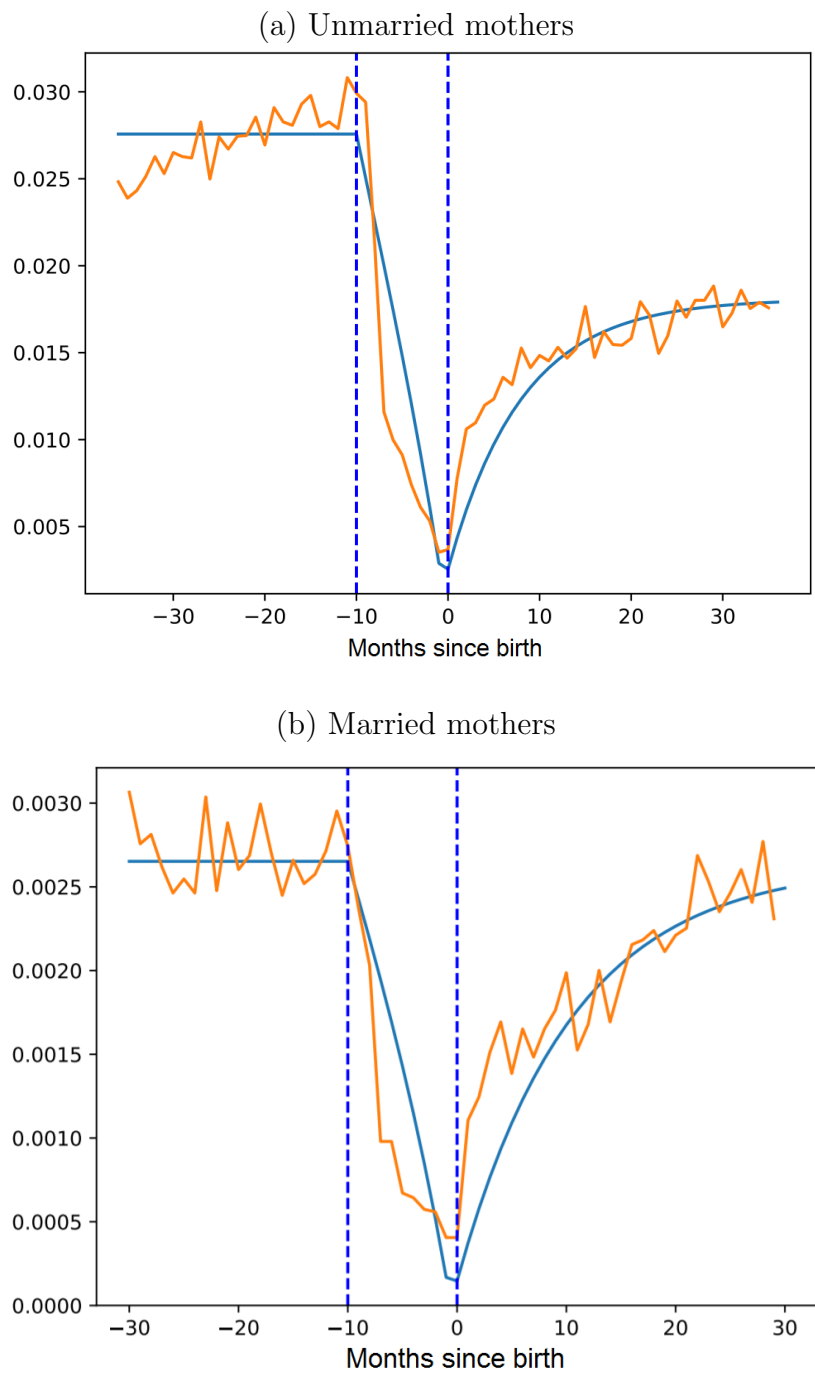


(b) Domestic violence by divorce timing



Panel (a) includes 364,076 still-married men and 21,038 divorced men. Panel (b) includes all men who were married for their first birth and then divorced 1-4 years after. Grouping is based on the rounded time in years between the child's birth date and date of the divorce decree (when the divorce is finalized). Sample sizes for the four groups are 2,285 (1 year), 4,816 (2 years), 6,147 (3 years), and 6,444 (4 years)

Figure 11: Estimates from a dynamic model of addiction, mothers



These plots show the parameter estimates from the model of habit formation described in Section 8 and estimated using minimum distance. The blue line gives the logit choice probabilities and the orange line gives the observed offense rate.

11 Tables

Table 1: Descriptive statistics, Mother sample

Variable	(1) All births	(2) + Clear match	(3) +Mother's first	(4) Stillbirths
Mother age	27.91 (6.01)	28.50 (5.91)	27.55 (6.05)	28.04 (6.66)
Father age	30.40 (6.83)	30.97 (6.72)	30.05 (6.87)	30.45 (7.47)
Mother married at birth	0.73 (0.44)	0.81 (0.39)	0.77 (0.42)	0.67 (0.47)
Mother on Medicaid	0.36 (0.48)	0.31 (0.46)	0.32 (0.47)	
WIC	0.34 (0.47)	0.30 (0.46)	0.31 (0.46)	0.23 (0.42)
Twins+	0.02 (0.12)	0.02 (0.13)	0.02 (0.13)	0.05 (0.22)
Male infant	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)	0.52 (0.50)
Mother White	0.71 (0.45)	0.71 (0.45)	0.69 (0.46)	
Mother Black	0.04 (0.20)	0.03 (0.18)	0.04 (0.19)	
Mother Hispanic	0.11 (0.32)	0.12 (0.32)	0.13 (0.33)	
Mother Asian	0.09 (0.29)	0.10 (0.30)	0.11 (0.32)	
Mother other or missing	0.04 (0.21)	0.04 (0.19)	0.04 (0.19)	
Low birth weight (<2500g)	0.05 (0.22)	0.05 (0.21)	0.06 (0.23)	0.60 (0.49)
Any father arrest	0.41 (0.49)	0.35 (0.48)	0.34 (0.47)	0.31 (0.46)
Any mother arrest	0.25 (0.43)	0.09 (0.28)	0.07 (0.26)	0.04 (0.18)
Median zipcode income	59834.99 (18187.96)	60739.80 (18542.80)	60599.29 (18396.08)	58650.58 (18073.86)
Midpregnancy marriage	0.03 (0.18)	0.03 (0.18)	0.04 (0.21)	0.05 (0.21)
Divorce	0.22 (0.42)	0.21 (0.41)	0.21 (0.41)	0.36 (0.48)
Father ever incarcerated	0.04 (0.20)	0.03 (0.16)	0.02 (0.15)	0.04 (0.19)
Father ever on probation	0.09 (0.28)	0.06 (0.23)	0.05 (0.22)	0.07 (0.25)
Observations	983,687	809,451	480,111	3,502

Standard deviations shown in parentheses. Insurance and ethnicity not recorded for stillbirths. Median zipcode income is for the years 2006-2010 from the American Community Survey via [Michigan's Population Studies Center](#).

Table 2: Descriptives for married and unmarried parents

Variable	(1)	(2)
	Unmarried	Married
Mother age	23.58 (5.73)	28.60 (5.51)
Father age	25.93 (6.57)	30.78 (6.10)
Mother on Medicaid	0.65 (0.48)	0.22 (0.42)
WIC	0.61 (0.49)	0.23 (0.42)
Twins+	0.01 (0.11)	0.02 (0.13)
Male infant	0.51 (0.50)	0.51 (0.50)
Father White	0.48 (0.50)	0.72 (0.45)
Father Black	0.07 (0.26)	0.04 (0.19)
Father Hispanic	0.19 (0.39)	0.10 (0.30)
Father Asian	0.05 (0.21)	0.10 (0.30)
Father other or missing	0.21 (0.41)	0.04 (0.19)
Low birth weight (<2500g)	0.06 (0.24)	0.05 (0.23)
Any father arrest	0.56 (0.50)	0.24 (0.43)
Any mother arrest	0.46 (0.50)	0.14 (0.35)
Median zipcode income	54753.86 (15006.51)	62025.28 (18820.73)
Father ever incarcerated	0.07 (0.26)	0.01 (0.10)
Father ever on probation	0.14 (0.34)	0.03 (0.16)
Observations	160,052	385,114

Standard deviations shown in parentheses. The samples restrict to clean matches and father's first birth. Median zipcode income is for the years 2006-2010 from the American Community Survey via [Michigan's Population Studies Center](#).

Table 3: Event study coefficients, All mothers

	Economic	Drugs	DUI	Destruction
36 months before birth	-0.133 (0.089)	-0.100 (0.128)	0.027 (0.224)	-0.409 (0.271)
24 months before birth	-0.107 (0.087)	-0.148 (0.125)	0.095 (0.220)	0.031 (0.297)
12 months before birth	0.021 (0.090)	-0.061 (0.128)	0.356 (0.233)	-0.041 (0.290)
9 months before birth	0.060 (0.091)	-0.082 (0.128)	0.494 (0.241)	0.090 (0.300)
6 months before birth	-0.384 (0.080)	-0.634 (0.108)	-0.760 (0.166)	-0.525 (0.250)
3 months before birth	-0.575 (0.074)	-0.838 (0.101)	-0.918 (0.156)	-0.537 (0.251)
Month of birth	-0.694 (0.071)	-0.945 (0.097)	-0.950 (0.156)	-0.736 (0.235)
3 months after birth	-0.450 (0.080)	-0.739 (0.107)	-0.484 (0.192)	-0.471 (0.262)
6 months after birth	-0.542 (0.078)	-0.699 (0.110)	-0.415 (0.199)	-0.533 (0.261)
9 months after birth	-0.303 (0.086)	-0.650 (0.113)	-0.071 (0.222)	-0.502 (0.267)
12 months after birth	-0.406 (0.085)	-0.575 (0.118)	-0.298 (0.213)	-0.332 (0.286)
24 months after birth	-0.576 (0.086)	-0.720 (0.120)	0.221 (0.256)	-0.589 (0.286)
36 months after birth	-0.611 (0.094)	-0.626 (0.133)	0.636 (0.294)	-0.900 (0.289)

Selected point estimates shown for the event study underlying [Figure 1\(b\)](#) using the specification given in [Equation 1](#) controlling for a 4th-order polynomial in age and dummies for being over age 18 and 21, and using cluster-robust standard errors. The omitted period is ten months before birth. Coefficients are divided by the omitted period mean to give the proportional change since before the pregnancy.

Table 4: Event study coefficients, All fathers

	Economic	Drugs	DUI	Destruction
36 months before birth	0.084 (0.031)	-0.111 (0.038)	-0.037 (0.057)	-0.049 (0.079)
24 months before birth	0.076 (0.029)	-0.049 (0.037)	0.085 (0.057)	-0.078 (0.073)
12 months before birth	0.027 (0.028)	0.018 (0.037)	0.059 (0.056)	0.061 (0.074)
9 months before birth	-0.007 (0.027)	-0.039 (0.036)	-0.056 (0.054)	-0.057 (0.071)
6 months before birth	-0.015 (0.027)	-0.127 (0.035)	-0.139 (0.053)	-0.142 (0.069)
3 months before birth	-0.070 (0.027)	-0.230 (0.033)	-0.139 (0.053)	-0.232 (0.067)
Month of birth	-0.157 (0.026)	-0.229 (0.033)	-0.290 (0.051)	-0.287 (0.066)
3 months after birth	-0.161 (0.026)	-0.194 (0.034)	-0.237 (0.052)	-0.088 (0.071)
6 months after birth	-0.141 (0.026)	-0.176 (0.034)	-0.246 (0.053)	-0.115 (0.071)
9 months after birth	-0.112 (0.027)	-0.186 (0.034)	-0.178 (0.054)	-0.080 (0.073)
12 months after birth	-0.113 (0.027)	-0.206 (0.034)	-0.139 (0.055)	-0.131 (0.072)
24 months after birth	-0.160 (0.029)	-0.208 (0.036)	-0.104 (0.059)	-0.152 (0.076)
36 months after birth	-0.239 (0.031)	-0.192 (0.039)	-0.099 (0.063)	-0.243 (0.080)

Selected point estimates shown for the event study underlying [Figure 1\(b\)](#) using the specification given in [Equation 1](#) controlling for a 4th-order polynomial in age and dummies for being over age 18 and 21, and using cluster-robust standard errors. The omitted period is ten months before birth. Coefficients are divided by the omitted period mean to give the proportional change since before the pregnancy.

Table 5: Descriptives of married and divorced couples

Variable	(1) Married	(2) Divorced	(3) Difference
Mother age	28.83 (5.54)	26.92 (5.64)	-1.91*** (0.00)
Father age	31.22 (6.43)	29.48 (6.66)	-1.74*** (0.00)
Mother married at birth	1.00 (0.00)	1.00 (0.00)	
Mother on Medicaid	0.24 (0.42)	0.26 (0.44)	0.02*** (0.00)
WIC	0.24 (0.43)	0.29 (0.46)	0.05*** (0.00)
Twins+	0.02 (0.14)	0.02 (0.12)	-0.00*** (0.00)
Male infant	0.51 (0.50)	0.51 (0.50)	-0.00 (0.91)
Father White	0.71 (0.45)	0.77 (0.42)	0.06*** (0.00)
Father Black	0.04 (0.19)	0.05 (0.22)	0.01*** (0.00)
Father Hispanic	0.11 (0.32)	0.06 (0.24)	-0.05*** (0.00)
Father Asian	0.10 (0.30)	0.07 (0.25)	-0.03*** (0.00)
Father other or missing	0.04 (0.20)	0.05 (0.21)	0.00*** (0.00)
Low birth weight (<2500g)	0.06 (0.23)	0.05 (0.23)	-0.00*** (0.00)
Any father arrest	0.27 (0.45)	0.53 (0.50)	0.26*** (0.00)
Any mother arrest	0.13 (0.34)	0.32 (0.47)	0.19*** (0.00)
Median Zipcode Income (2006-2010)	61839.96 (18851.11)	59445.59 (16933.97)	-2394.37*** (0.00)
Midpregnancy marriage	0.06 (0.23)	0.15 (0.36)	0.09*** (0.00)
Father ever incarcerated	0.01 (0.11)	0.04 (0.21)	0.03*** (0.00)
Father ever on probation	0.03 (0.17)	0.10 (0.30)	0.07*** (0.00)
Observations	405,387	43,115	448,502

Standard deviations shown in parentheses. *** indicates $p < .01$. The samples restrict to clean matches and father or mother's first birth. Median zipcode income is for the years 2006-2010 from the American Community Survey via [Michigan's Population Studies Center](#)

Table 6: Regression discontinuity results

	Women		Men	
	(1) Alcohol	(2) Non-Alcohol	(3) Alcohol	(4) Non-Alcohol
Over 21	5.630** (2.330)	4.789 (11.32)	45.89*** (7.938)	-50.80 (39.19)
Post-mean	17.84	263.19	187.76	2219.60
r-squared	0.070	0.019	0.107	0.455
N	422,910	422,910	347,324	347,324

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This table reports the regression discontinuity estimate using daily offending counts for all individuals in the DOH sample observable for three years before and after their 21st birthday. Birthday indicators are included as controls, as well as a quadratic in days since 21st birthday fully interacted with the indicator.

Table 7: Stillbirth results, men

	(1)	(2)	(3)	(4)	(5)	(6)
	Four main	DV	DUI	Drug arrest	Economic	Destruction
After birth	-5.366*** (0.482)	11.31*** (0.363)	-2.934*** (0.236)	-1.810*** (0.277)	-1.382*** (0.288)	0.399*** (0.145)
Still X After birth	5.955** (2.816)	-2.948* (1.683)	0.888 (1.079)	2.785* (1.466)	2.755 (1.843)	-0.318 (0.948)
Age poly	yes	yes	yes	yes	yes	yes
FEs	yes	yes	yes	yes	yes	yes
Outcome Mean	38.078	9.511	9.881	14.517	12.428	3.509
r ²	0.205	0.157	0.102	0.158	0.179	0.105
N livebirths	545,166	545,166	545,166	545,166	545,166	545,166
N stillbirths	3,831	3,831	3,831	3,831	3,831	3,831

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This table reports estimates from the difference-in-differences specification reported in [Equation 2](#) and including person fixed effects, an indicator for pregnancy, a 4th order polynomial in age, and an indicator for after birth interacted with the stillbirth indicator. Outcome is scaled to give monthly offenses per 10,000. DV stands for domestic violence; DUI stands for driving under the influence.

Table 8: Stillbirth results, women

	(1)	(2)	(3)	(4)	(5)	(6)
	Four main	DV	DUI	Drug arrest	Economic	Destruction
After birth	-3.279*** (0.198)	0.0848 (0.115)	-0.983*** (0.0772)	-1.235*** (0.0996)	-1.124*** (0.145)	-0.111** (0.0445)
Still X After birth	1.823** (0.755)	-0.122 (0.391)	0.173 (0.259)	1.129*** (0.340)	0.374 (0.572)	0.273*** (0.103)
Age poly	yes	yes	yes	yes	yes	yes
FEs	yes	yes	yes	yes	yes	yes
Outcome Mean	6.579	1.144	0.975	2.212	3.236	0.406
r ²	0.161	0.113	0.090	0.128	0.144	0.090
N livebirths	480,111	480,111	480,111	480,111	480,111	480,111
N stillbirths	3,502	3,502	3,502	3,502	3,502	3,502

Clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This table reports estimates from the difference-in-differences specification reported in [Equation 2](#) and including person fixed effects, an indicator for pregnancy, a 4th order polynomial in age, and an indicator for after birth interacted with the stillbirth indicator. Outcome is scaled to give monthly offenses per 10,000. DV stands for domestic violence; DUI stands for driving under the influence.

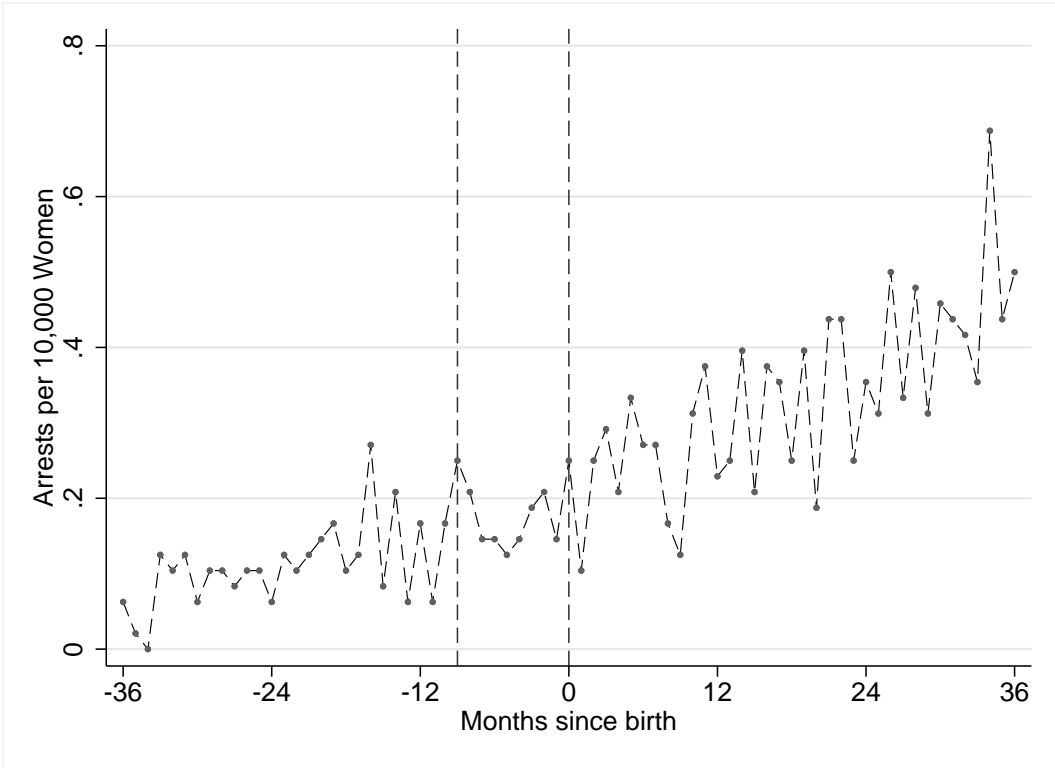
Table 9: Habit formation model, mothers

Parameter	Unmarried mothers	Married mothers
Change in utility of using during pregnancy ($\Delta_1 f$)	1.310 (0.480)	1.777 (2.041)
Permanent change in utility of using after pregnancy ($\Delta_2 f$)	0.026 (0.006)	0.0004 (0.0007)
Habit formation (σ)	8.202 (0.344)	10.643 (0.156)
Utility of using (f)	4.832 (0.652)	8.460 (2.319)
Monthly discount factor (δ)	0.993 (0.062)	0.974 (0.134)

Standard errors shown in parentheses. This table reports the parameter estimates from a model of habit formation matched to the observed offending rates in the data using a minimum distance estimator.

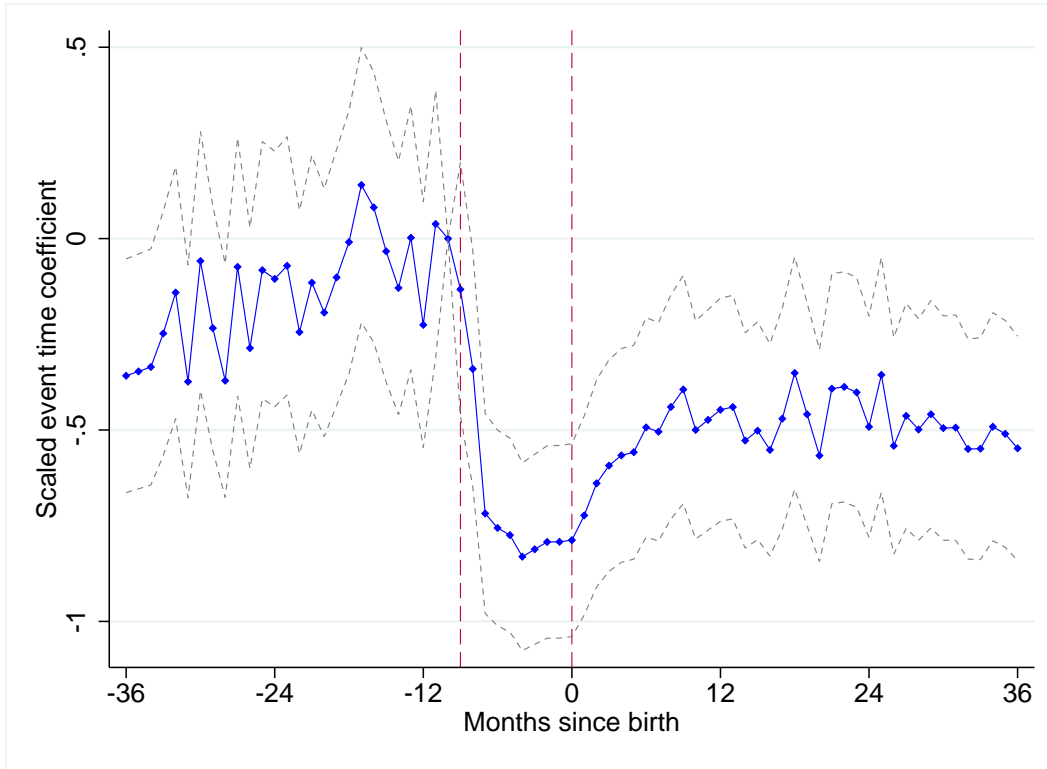
A Appendix figures

Figure A.1: Driving without a license, mothers



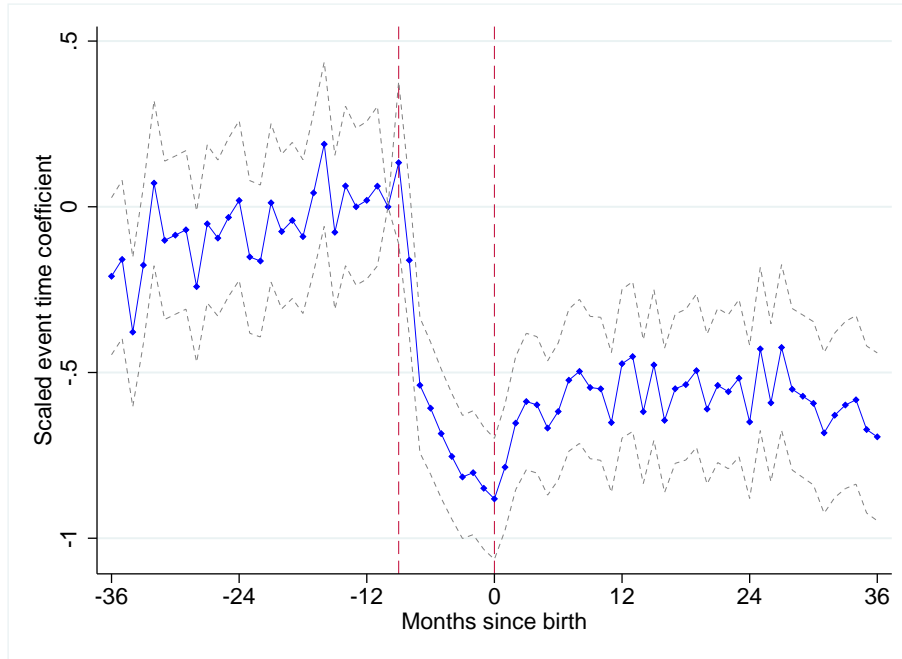
Includes fully-balanced arrest data for 480,111 first-time mothers. The vertical dashed lines mark 9 months before the birth and the month of birth.

Figure A.2: Event study coefficients for alcohol offenses, mothers under 21 years old



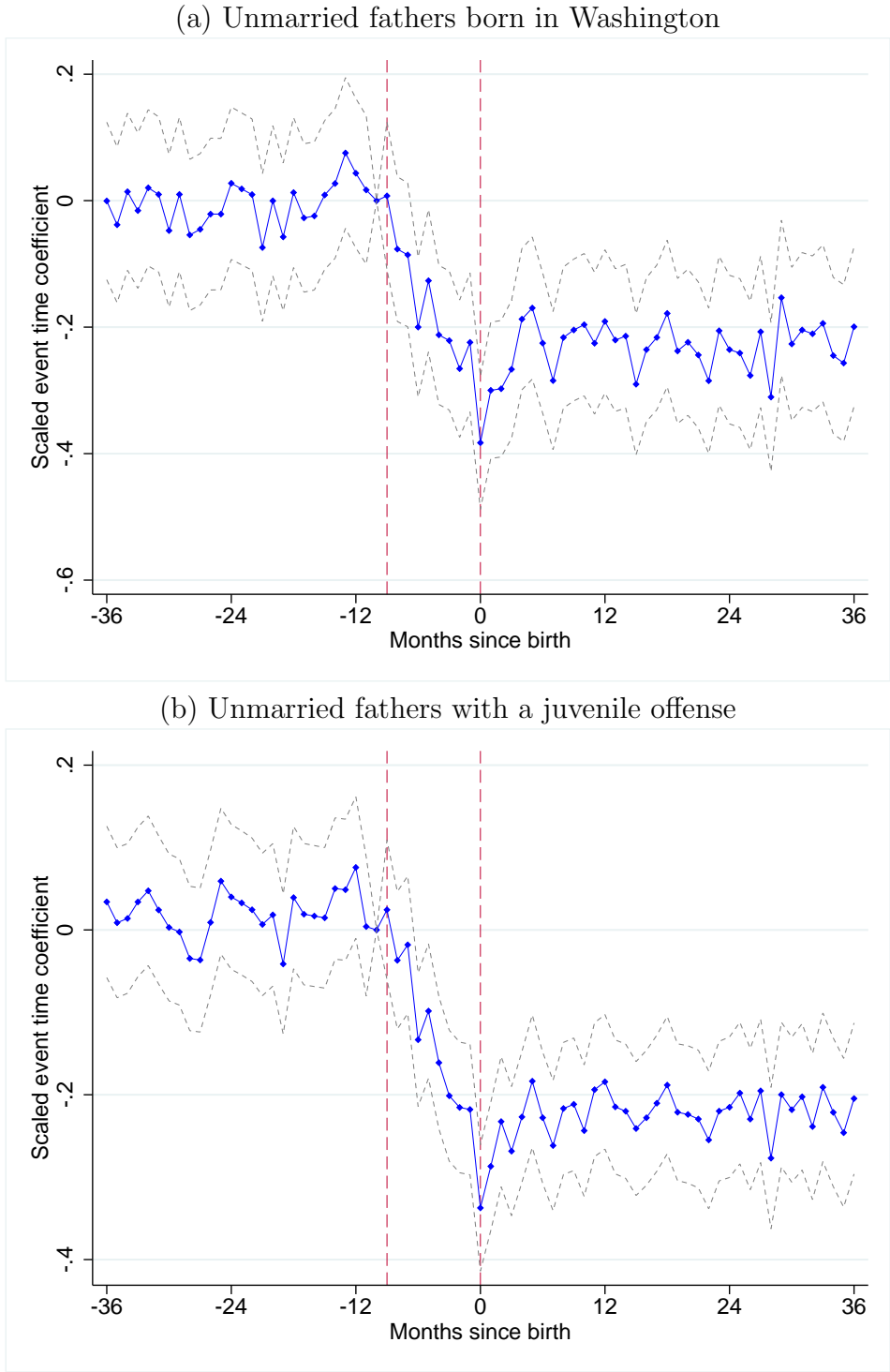
Includes 67,899 births. Dots show point estimates and dashed lines show 95% confidence intervals from an event study around birth shown in Equation 1. The coefficients are scaled by the average arrest rate in the omitted period, 10 months before birth. The dashed lines marks 9 months before the birth and the month of the birth.

Figure A.3: Event study coefficients for teen mothers



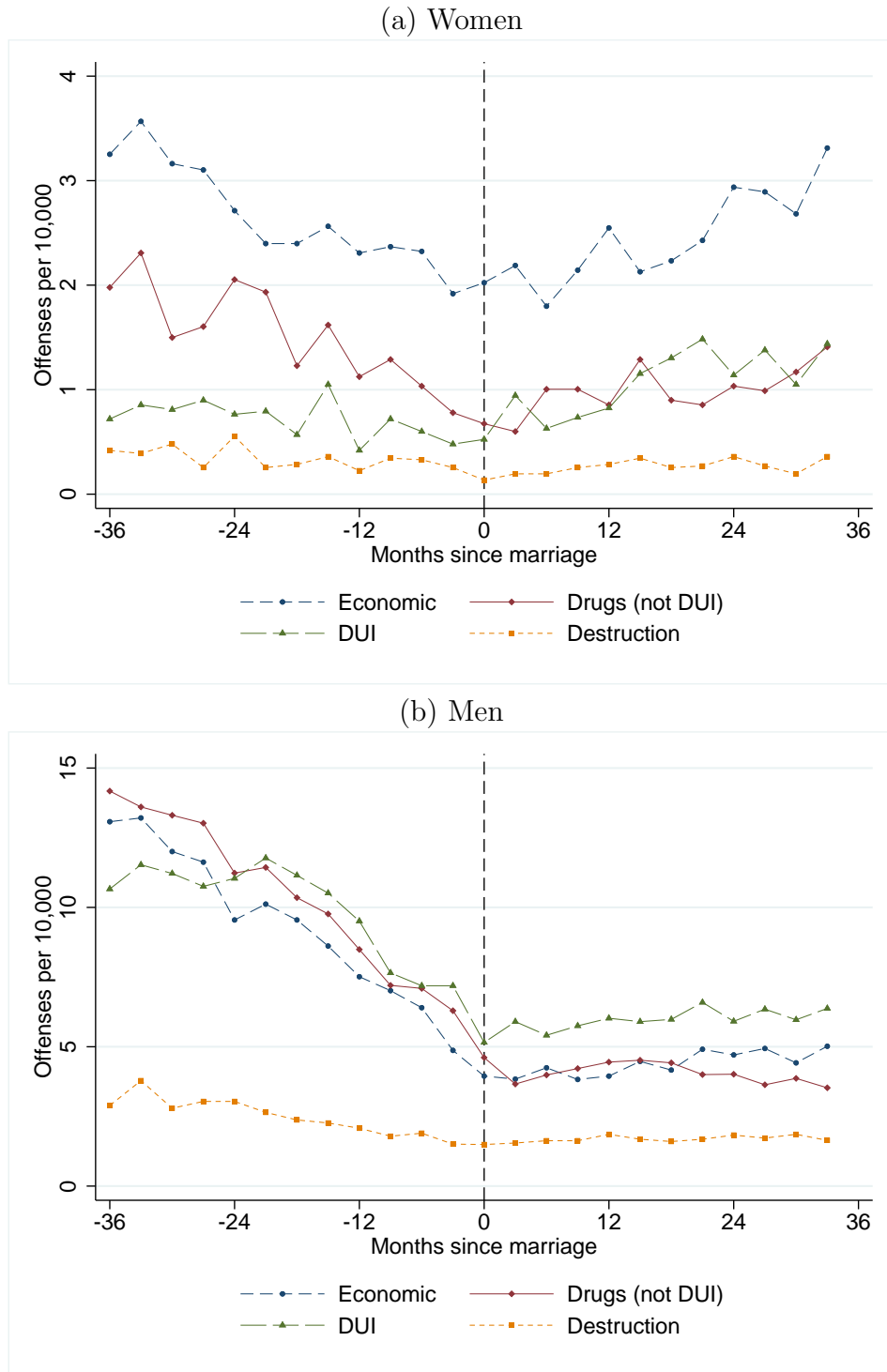
Includes a fully balanced panel of 45,759 first-time mothers who gave birth at age 19 or younger. Dots show point estimates and dashed lines show 95% confidence intervals of the coefficients δ_k from the event study specification shown in Equation 1, with an indicator for any economic, drug, DUI, or property destruction arrest as the dependent variable. The coefficients are divided by the average arrest rate in the omitted period, 10 months before birth. The dashed lines mark 9 months before the birth and the month of birth.

Figure A.4: Event studies around childbirth, unmarried fathers



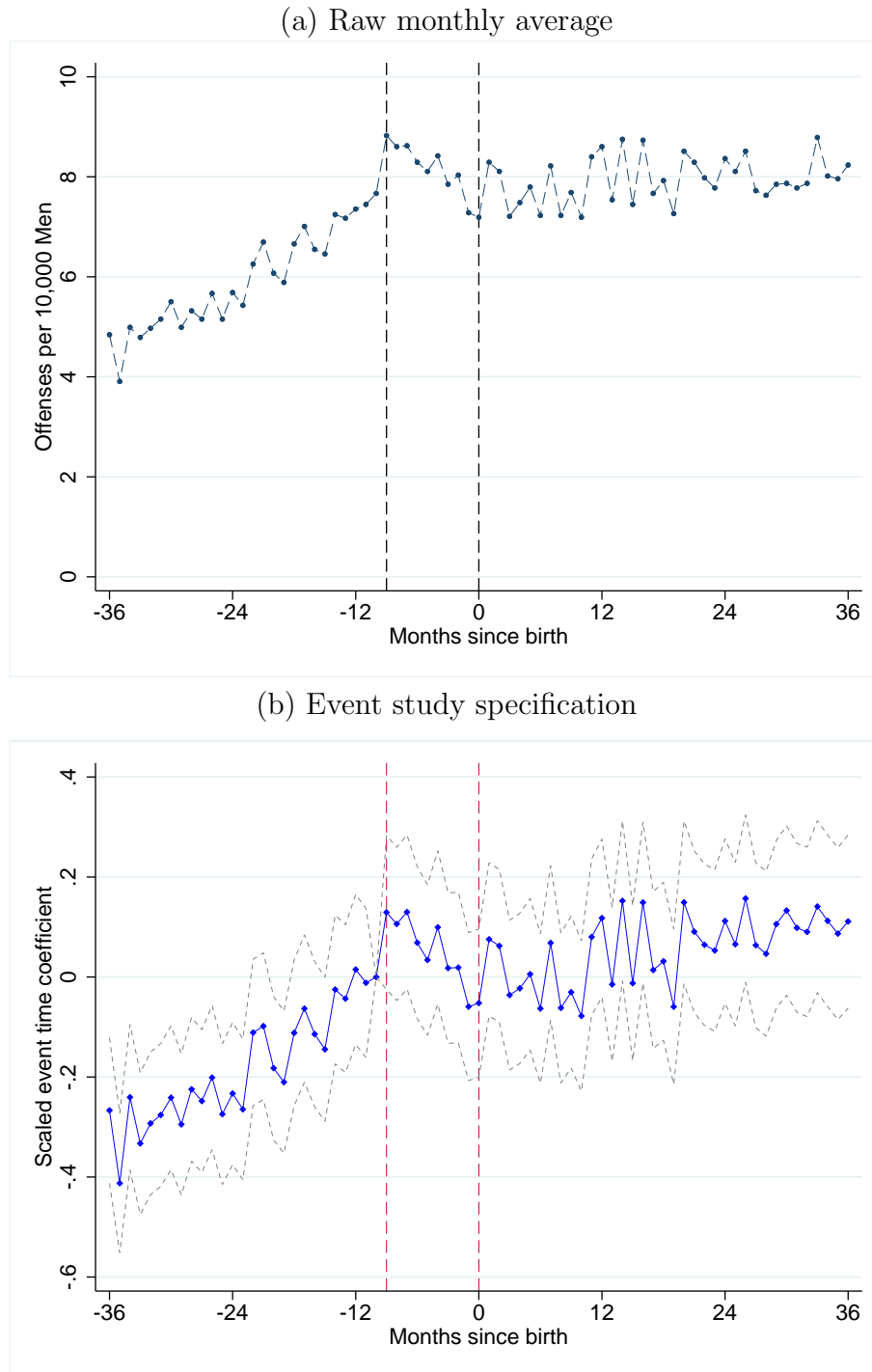
Panel (a) includes 15,600 fathers, panel (b) includes 37,014 fathers. Dots show point estimates and dashed lines show 95% confidence intervals of the coefficients δ_k from the event study specification shown in Equation 1, with an indicator for a drug, DUI, economic, or property destruction offense as the dependent variable. The coefficients are divided by the average arrest rate in the omitted period, 10 months before birth. The vertical dashed lines mark 9 months before the birth and the month of birth.

Figure A.5: Raw averages around marriage



Includes all fathers (N=245,756) and mothers (N=222,392) from the birth data who are visible in the arrest data 3 years after and 3 years before their marriage. The vertical dashed line marks the month of marriage.

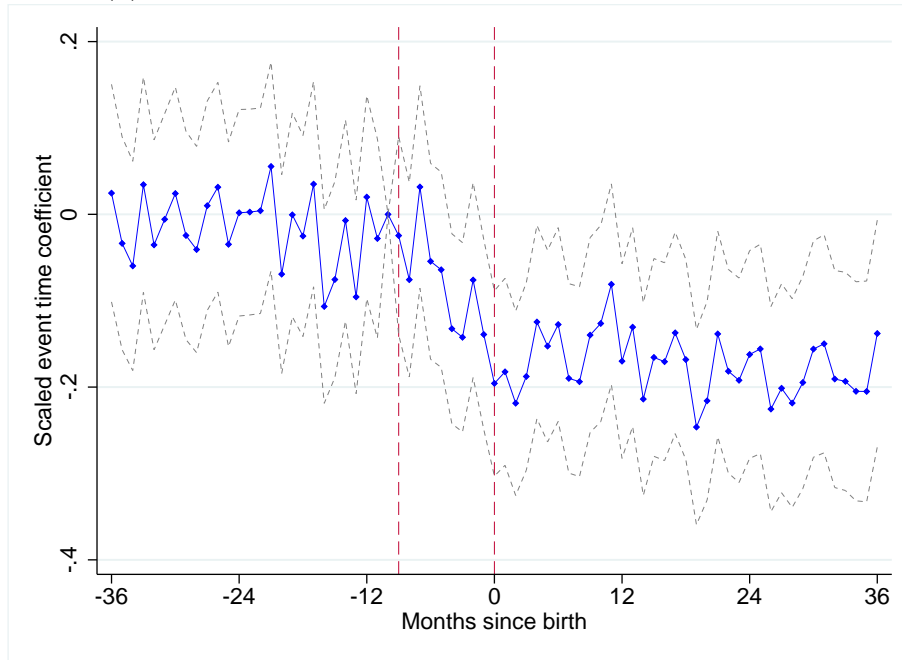
Figure A.6: Fathers traffic offenses



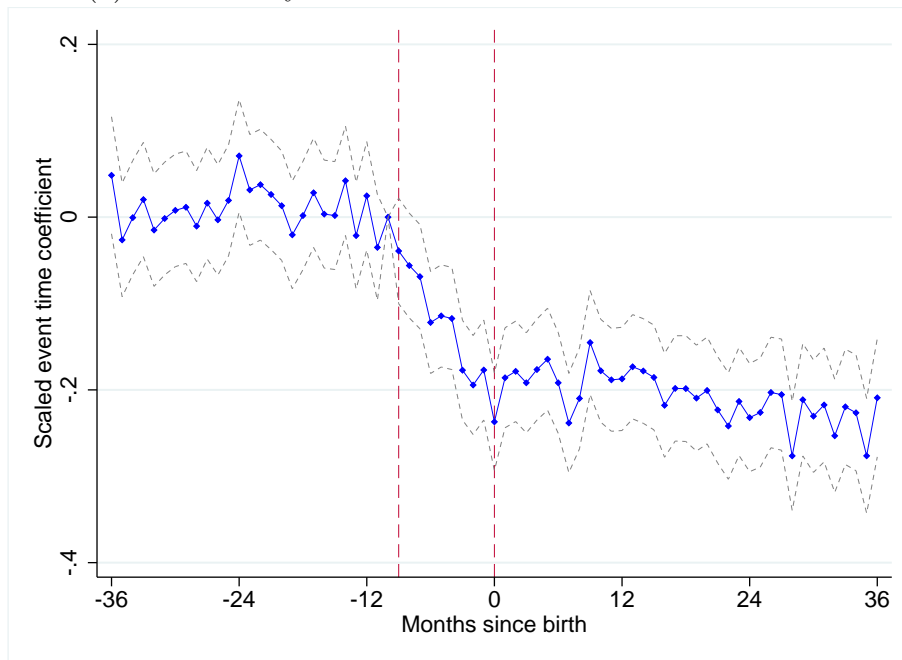
Panels show traffic offenses (reckless driving and driving with an expired license) for 545,166 first-time fathers. In panel (b), dots show point estimates and dashed lines show 95% confidence intervals of the coefficients δ_k from the event study specification shown in Equation 1, with an indicator for a traffic offense as the dependent variable. The coefficients are divided by the average arrest rate in the omitted period, 10 months before birth. The vertical dashed lines mark 9 months before the birth and the month of birth.

Figure A.7: Outmigration

(a) Event study estimates for men with future crime

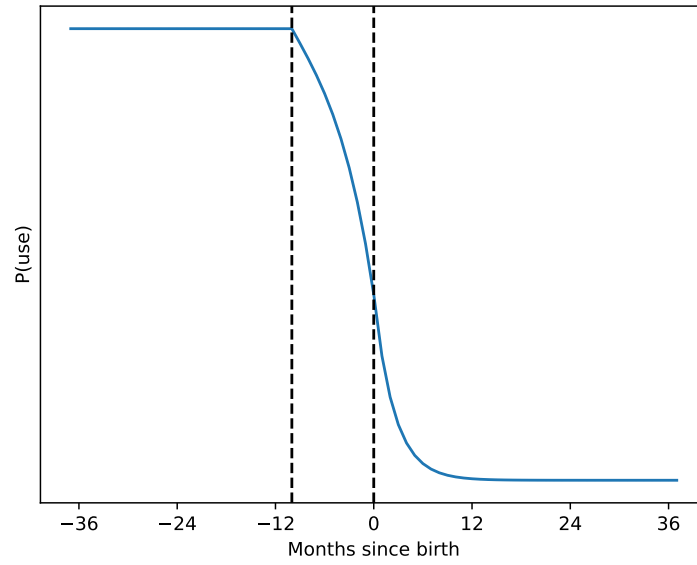


(a) Event study estimates for men with future children



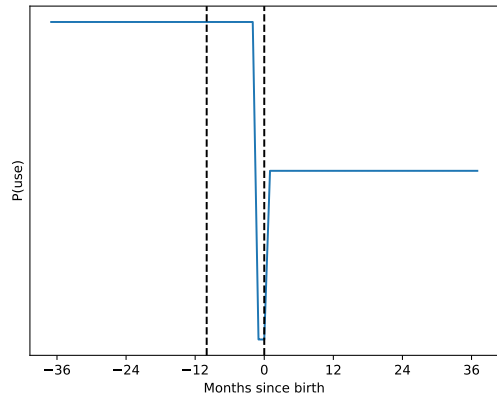
Both panels show point estimates and 95% confidence intervals from the event study specification given in [Equation 1](#) for first-time fathers. Panel (a) restricts to men charged with a driving-related (including DUI) offense 4-5 years after the birth ($N=14,980$). The outcome for the specification underlying panel (a) is an indicator for any economic, drug, or destruction offense. Panel (b) restricts to fathers who at some point have a 2nd child in Washington ($N=116,540$), with an indicator for any economic, drug, DUI, or destruction offense as the outcome.

Figure A.8: Model calibration

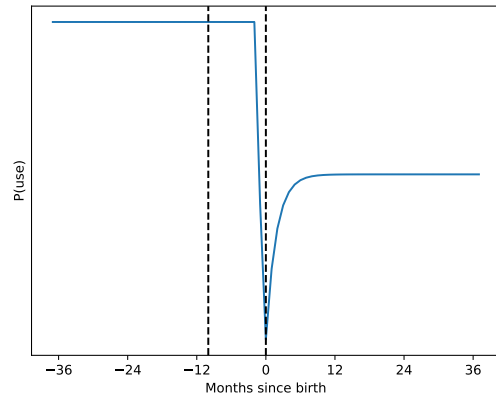


This plots the simulated choice probabilities with f changing from .8 to .2 at birth, with $\delta=1$, $\sigma = 8$, $\rho = 1$

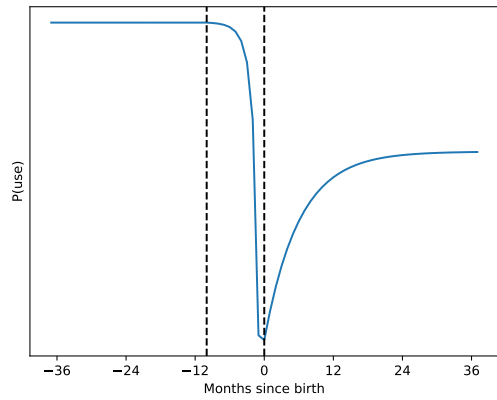
Figure A.9: Model calibration, two shocks



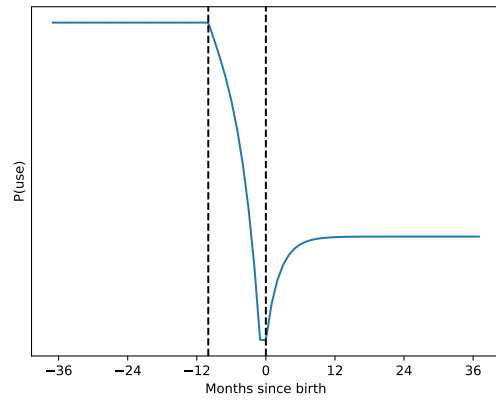
(a) Any δ , no habit formation



(b) Fully myopic, some habit formation



(c) $\delta = .75$, some habit formation



(d) $\delta = 1$, some habit formation

Table A.1: Papers on Crime and Childbearing or Marriage

Authors and Year	Journal	Data and sample size	Main results
Gottlieb & Sugle (2018)	Justice Quarterly	NLSY97, N=8,496	Both cohabitation and marriage are associated with reductions in offending
Mitchell et al (2017)	American Journal of Criminal Justice	NLSY97, N=2,787 non-fathers, 1,772 fathers	Fatherhood is associated with decreased substance use but not the likelihood of any arrest
Pyrooz et al (2017)	American Society of Criminology	NLSY97, N=629	Mothers and residential fathers have decreased likelihoods of gang membership and offending
Tremblay et al (2017)	Journal of Child and Family Studies	Pathways to Desistance Study, N=1,170	Fatherhood is associated with greater risk exposure among serious juvenile offenders
Na (2016)	Journal of Developmental and Life Course Criminology	Pathways to Desistance Study, N=864 adolescents and N=476 young adults	Teen fathers report increased offending following childbirth; older fathers experience a slight decrease
Zoutewelle-Terovan & Skardhamar (2016)	Journal of Quantitative Criminology	Statistics Norway, N=289 & Netherlands' Municipal Population Register and Judicial Documentation, N=279	For at-risk mothers and fathers, decrease leading up to birth; increase to higher levels afterwards
Landers et al (2015)	J Child Fam Stud	NLSY 1997, N=478	Young fathers have decreased drug use controlling for individual fixed effects

Table A.1 – *Continued from previous page*

Authors and Year	Journal	Data and sample size	Main results
Theobald et al (2014)	Australian & New Zealand Journal of Criminology	Australian & New Zealand Journal of Criminology & Cambridge Study in Delinquent Development, N=411	The number of convictions decreases after childbirth for men; this effect is greater if the child is born before or within nine months of marriage
Barnes et al (2014)	Justice Quarterly	Add Health, N=15,701	Marriage is correlated with but does not cause desistance
Zoutewelle-Terovan et al (2014)	Crime & Delinquency	Netherlands Ministry of Justice, N=540	Marriage and parenthood both promote desistance of serious offending for men but not women
Craig & Foster (2013)	Deviant Behavior	Add Health, N=3,082	Marriage decreases delinquent behavior for both males and females
Monsbakken et al (2013)	British Journal of Criminology	Statistics Norway, N=208,296 persons (101,480 women and 106,816 men)	Offending declines permanently before childbirth despite slight rebound after
Barnes & Beaver (2012)	Journal of Marriage and Family	Add Health, N=2,284 sibling pairs	Marriage is associated with desistance; this effect decreases after controlling for genetic influences
Kerr et al (2011)	Journal of Marriage and Family	US - Capaldi and Patterson (1989) Study, N=206	Men desist from crime and use alcohol and tobacco less frequently following childbirth
Giordano et al (2011)	Journal of Criminal Justice	Toledo Adolescent Relationships Study (TARS), N=1,066	Mothers are more likely to desist from crime than fathers; parents from disadvantaged backgrounds have less desistance than those from advantaged ones

Table A.1 – *Continued from previous page*

Authors and Year	Journal	Data and sample size	Main results
Skarhamar & Lynstad (2009)	Statistics Norway Discussion Papers	Norwegian Register (Marriage N=121,207; First birth=175,118)	Men desist from crime leading up to marriage/childbirth; some rebound for serious offenses
Bersani et al (2009)	Journal of Quantitative Criminology	Netherlands CCLS, N=4,615	Marriage is associated with a decrease in the odds of a conviction; the effect for women is less than that for men
Beaver et al (2008)	Social Science Research	Add Health, N=1,555	Being married increases the odds of desisting
Sampson et al (2006)	Criminology	Glueck and Glueck study (1950), N=500 male delinquents and 500 male nondelinquents	Marriage is associated with a 35 percent reduction in the odds of crime for men
Graham & Bowling (1995)	Home Office Research Study	UK household survey, N=2,529	Having children is a strong predictor of desistance for females but not for males

Table A.2: Descriptive statistics, Father sample

Variable	(1) All births	(2) + Clear match	(3) +Father's first	(4) Stillbirths
Mother age	27.84 (5.98)	28.04 (5.95)	27.12 (6.02)	27.50 (6.67)
Father age	30.21 (6.54)	30.40 (6.50)	29.36 (6.62)	29.61 (7.19)
Mother married at birth	0.73 (0.44)	0.75 (0.43)	0.71 (0.46)	0.61 (0.49)
Mother on Medicaid	0.36 (0.48)	0.34 (0.47)	0.36 (0.48)	
WIC	0.34 (0.47)	0.33 (0.47)	0.34 (0.47)	0.26 (0.44)
Twins+	0.02 (0.12)	0.02 (0.13)	0.02 (0.13)	0.06 (0.23)
Male infant	0.51 (0.50)	0.51 (0.50)	0.51 (0.50)	0.53 (0.50)
Father White	0.66 (0.47)	0.67 (0.47)	0.65 (0.48)	
Father Black	0.05 (0.22)	0.05 (0.21)	0.05 (0.21)	
Father Hispanic	0.12 (0.33)	0.11 (0.32)	0.13 (0.33)	
Father Asian	0.08 (0.26)	0.08 (0.27)	0.08 (0.28)	
Father other or missing	0.09 (0.29)	0.09 (0.28)	0.09 (0.29)	
Low birth weight (<2500g)	0.05 (0.22)	0.05 (0.22)	0.06 (0.23)	0.60 (0.49)
Any father arrest	0.41 (0.49)	0.36 (0.48)	0.34 (0.47)	0.26 (0.44)
Any mother arrest	0.25 (0.43)	0.23 (0.42)	0.23 (0.42)	0.21 (0.41)
Median zipcode income	59820.84 (18182.44)	60202.36 (18313.21)	59893.14 (18092.66)	58077.98 (17786.50)
Midpregnancy marriage	0.03 (0.18)	0.03 (0.18)	0.05 (0.21)	0.05 (0.21)
Divorce	0.22 (0.42)	0.22 (0.41)	0.22 (0.41)	0.36 (0.48)
Father ever incarcerated	0.04 (0.20)	0.03 (0.17)	0.03 (0.16)	0.03 (0.18)
Father ever on probation	0.09 (0.28)	0.07 (0.25)	0.06 (0.24)	0.06 (0.24)
Observations	976,581	896,459	545,166	3,831

Standard deviations shown in parentheses. Insurance and ethnicity not recorded for stillbirths. Median zipcode income is for the years 2006-2010 from the American Community Survey via [Michigan's Population Studies Center](#).

Table A.3: Descriptive statistics for mothers

Variable	(1) Unmarried Mothers	(2) Married Mothers
Mother age	23.57 (5.85)	28.77 (5.57)
Father age	26.30 (6.91)	31.19 (6.44)
Mother on Medicaid	0.65 (0.48)	0.22 (0.41)
WIC	0.60 (0.49)	0.22 (0.42)
Twins+	0.01 (0.10)	0.02 (0.13)
Male infant	0.51 (0.50)	0.52 (0.50)
Father White	0.45 (0.50)	0.72 (0.45)
Father Black	0.07 (0.25)	0.04 (0.19)
Father Hispanic	0.22 (0.41)	0.10 (0.30)
Father Asian	0.05 (0.22)	0.11 (0.31)
Father other or missing	0.22 (0.41)	0.04 (0.19)
Low birth weight (<2500g)	0.06 (0.24)	0.05 (0.23)
Any father arrest	0.57 (0.50)	0.27 (0.44)
Any mother arrest	0.14 (0.35)	0.05 (0.22)
Median zipcode income	55061.28 (15203.25)	62281.37 (18943.48)
Father ever incarcerated	0.07 (0.26)	0.01 (0.10)
Father ever on probation	0.13 (0.34)	0.03 (0.17)
Observations	112,016	368,095

Standard deviations shown in parentheses. Insurance information not recorded for stillbirths.