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RISKY MOMS, RISKY KIDS? FERTILITY AND CRIME AFTER THE FALL OF THE WALL

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RISKY MOMS, RISKY KIDS?

FERTILITY AND CRIME AFTER THE FALL OF THE WALL *

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Abstract: We study the link between parental selection and child criminality. Following the collapse of the communist regime in 1989, the number of births halved in East Germany. These cohorts became markedly more likely to be arrested as they grew up in reunified Germany. This is observed for both genders and all offence types. We highlight risk attitude as an important reason why certain women did not alter their fertility decisions during this time of economic uncertainty. We also show that this preference for risk was then strongly transmitted to their children which may in turn explain their high criminal propensity.

JEL codes: J13, K42

Keywords: Fertility, crime, parental selection, economic uncertainty, risk attitude

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1. Introduction

Fertility decisions are affected by changes in the economic environment which may result in cohorts of different sizes. Additionally, since different types of individuals may react differently to such environmental stimuli, parents are also selected on distinctive margins along the business cycle. The importance and nature of this parental selection on child outcomes is often difficult to causally identify . In this paper we rely on a large socio-economic shock which dramatically altered fertility decisions quantitatively and qualitatively, the fall of the Berlin Wall, to document a large change in the criminal activity of children conceived during the crisis period in East Germany. Moreover, we investigate a never before explored potential mechanism linking parental selection and the crime propensity of children; risk preference and its transmission across generations.

The most convincing estimates of the effect of parental selection on child outcomes have originated from the alteration of fertility decisions resulting from changes in available birth control technology or large swings in economic environment. Examples of the first mechanism are provided by the introduction of new contraceptive methods and the legalization of abortion in the U.S. during the 1960s and 1970s. Both have been associated with substantially improved economic situations among future cohorts (Levine and Staiger, 1999 and Bailey, Malkova and McLaren, 2019). Bailey et al. (2019) suggest that up to 1/3rd of the increase in the income of the average child following the legalization of the pill is driven by parental selection. Most relevant to this paper is a series of articles by Donohue and Levitt (2001, 2004, 2008 and 2019) arguing that the legalization of abortion reduced crime rate by 20% and was responsible for up to half of the US crime drop observed during, and since, the 1990s[1]. The suggested mechanism is that fewer "unwanted" children – who would have had a greater probability of having negative outcomes due to lack of parental investment – were born. As such the resulting cohorts were positively selected; i.e., the mean characteristics of parents were better after abortion became legal, which led to better outcomes on average. Outside the US, the sudden ban on abortion that took place in Romania in 1966, first studied by Pop-Eleches (2006), follows the same line of argument. However, re-exploring the Romanian ban, and the subsequent re-

[1] The validity of Donohue and Levitt's findings on the effect of abortion on crime, has been hotly debated and seriously questioned in a number of subsequent articles. Rather than using the abortion ratio, Joyce (2004) estimates a reduced form model and, after controlling for State specific trends, reports no significant effect of abortion on future crime. Cook and Laub (2002) question the timing implied by Donohue and Levitt (2001) and note that the crime reduction appears to start too late to be driven by the abortion reform, while Foote and Goetz (2008) and Joyce (2009) are unable to replicate Donohue and Levitt's findings even using the same specification. These concerns were mostly addressed in responses by Donohue and Levitt (2004, 2008 and 2019).

legalization of abortion in 1989, Hjalmarssson et al. (2019) conclude that all the originally observed crime impact "appears to be driven by cohort size effects rather than selection or unwantedness effects."[2]

Becker (1960) and Ben Porath (1973) argue that the business cycle affects fertility decision by altering the opportunity costs of having a child as well as family income; whether the substitution or income effect dominates is an empirical question. A second strand of the literature has thus used variations along the business cycle to identify parental selection[3]. Dehejia and Lleras-Muney (2004) suggest a pro-cyclical parental selection whereby children born during booms have *positively* selected mothers in terms of education and marital status, resulting in better health outcomes at birth. Similarly, Del Bono, Weber and Winter-Ebmer (2012), and Huttunen and Kellokumpu (2016) show that following plant closures, high skilled women delayed their fertility more than less educated ones.

Rather than relying on business cycle variations, we follow Chevalier and Marie (2017) and exploit a natural experiment which generated a large amount of short term uncertainty about the economic and political environment. Following the fall of the Berlin Wall in November 1989, and the subsequent reunification of Germany in 1990, East Germany transited rapidly from a planned economy to a capitalist economy, and experienced a very profound economic shock. Concomitantly, the country experienced a large drop in fertility with the crude birth rate plunging by 50% over a three-year period. We name the cohorts born in East Germany between August 1990 and December 1993 the 'Children of the Wall' (CoW). Since the fall of the Wall was largely unexpected, and generated a large level of economic uncertainty, it determines clear pre- and post-cohorts. Moreover, in terms of fertility decisions West Germany was largely unaffected and can be considered a natural control. Chevalier and Marie (2017) demonstrate that children born after the collapse of the communist regime were negatively selected, their mothers were younger, less educated, in less stable relationships, and invested less in the education and had worse emotional connections to their children.

Following the same identification strategy, we assess how parental selection affected future criminal activity. Importantly, we do not investigate the contemporaneous effect of the

[2] This links to the argument put forward by Ananat et al. (2009) as to why using abortion as an identification strategy is potentially problematic: since abortion reduces the marginal costs of pregnancy, the legalization of abortion also increases the number of conceptions, thus while the change in the availability of legal abortion is potentially exogenous, the abortion ratio is not.

[3] Shaller (2016) provides evidence on the effect of the business cycle on fertility decisions. Using a gender specific shift/share approach of labour demand, she shows that fertility is positively related to improvement in the labor market of men but negatively with improvement in the labor market of women.

economic transition on crime, but arrest rates as the children grew up in re-unified Germany. Compared to Donohue and Levitt (2001, 2004, 2008, 2019) we have detailed measures of arrest for different age-groups by state (Land) [4] and for several periods (1993 to 2014). This allows us to account for unobservable characteristics at the state level, such as policing strategy that would affect the probability of arrest at a given period for all age groups, as well as state-specific time trends. As such, we can clearly separate a cohort effect from time effects. We show that in terms of criminal activities, the pre-trends between the eastern and western part of reunified Germany are very similar, confirming the credibility of using West German cohorts as a control group. We find that individuals in cohorts conceived in the three years following the fall of the wall are 28% more likely to have been arrested. These effects are observed for most crime types and, interestingly as strong for women than men. These results are not sensitive to a battery of robustness checks and in a placebo test we detect no impact for the cohorts born just before the fall of the Wall who were exposed to this socio-economic shock at a very young age. These large and specific state-cohort findings of increased criminal activity are in line with the strong negative parental selection documented in Chevalier and Marie (2017). We cross-validate these estimates with a youth survey were we similarly find that the children born in East Germany after August 1990 were 40% more likely to self-report having been in contact with the police. Note that we investigate the criminal activities several years after the fall of the Wall, for cohorts whom, for most of their lives, lived in the newly unified Germany, and not the immediate criminal response of moving from a communist to a capitalist regime. We do not estimate the effect of the economic transition on contemporary crime but the effect it had, via parental selection on future crime[5]. Moreover, since the affected cohort was smaller our estimates can be considered as lower bounds of the effect of parental selection, since small cohorts usually have more positive outcomes.

While a few papers have investigated intergenerational correlation in criminal activity (Hjalmarsson and Lindquist, 2012; Eriksson et al., 2016; Bhuller et al, 2018), a neglected transmission mechanism is risk preference[6]. Kimball et al. (2009) show that in the PSID the correlation in risk preferences between child and mothers, and siblings are about 0.2, and 0.5 respectively. Similar intergenerational correlation is reported in Dohmen et al. (2012) for

[4] We exclude Berlin from most of the analyses as data available to us do not usually distinguish between East and West Berlin.
[5] Dusek (2012) for example estimates that the collapse of the communist regime in the Czech Republic was followed to a sharp rise in crime, due to reduction in policing.
[6] Hjalmarsson and Lindquist (2012) estimate the correlation between paternal and child sentencing. They stress the importance of the quality of the relationship as a mechanism, but do not look at risk preferences.

Germany[7]. Of particular interest in the context of fertility decisions taken in time of high economic uncertainty, and criminal activity, is that the correlation in risk preference between parents and children is especially strong at the tails of the risk preference distribution (Charles and Hurst, 2003). Using the German Socio Economic Panel, we show that risk preference affects fertility decisions in periods of high economic uncertainty, which led to the mothers of CoW being selected along their risk preferences. Strikingly, the effect remains as strong when controlling for other important predictors of parental skills such as age at birth and education level. The intergenerational transmission was especially strong, notably for risk loving individuals, resulting in CoWs being 14 percentage points more likely than their peers to be risk-lovers. Finally, we confirm that this result is due to selection and not due to environmental factors at the time of birth by observing similar increased preference for risk among the *siblings* of the Children of the Wall. We conclude that risk attitude is a very strong predictor of fertility decisions in economic uncertain times that strongly transmits to children who on average have much higher propensity to commit crimes.

Our findings are the first to show that fertility behavior decisions driven by economic environmental factors – and not only availability of birth control technology – can have a very important impact on criminal behavior of future cohorts via parental selection. We also contribute to the recent discussion on whether parental selection or cohort size drive the fertility-crime relationship. In our case, we have negative parental selection and small cohort size, which allow us to confirm that, as originally conjectured by Donohue and Levitt (2001), parental selection, not cohort size, may be one of the best predictors of the future criminality of a cohort. Another important contribution we make is to highlight the central role that the risk preferences play in explaining why certain mothers still have children in very uncertain economic times and how its intergenerational transmission may explain why their children may consequently be more crime prone.

The rest of the paper is structured as follows. The next section presents the institutional background surrounding the collapse of Communism in East Germany and how it affected fertility behavior. Section 3 describes our identification strategies and the various data sources used. Section 4 reports our findings on criminal participation of the Children of the Wall.

[7] Cesarini et al. (2010) compares monozygotic and dizygotic twins to provide evidence that genetic differences explain about 20% of the variation in risk preferences, while Black et al. (2017) comparing the portfolio choices of adoptees and biological children find a greater role for nurture effects.

Section 5 investigates the importance of risk attitude and its transmission as an underlying mechanism. In the final section we give some concluding remarks.

2. Institutional Background and the Fertility Drop

2.1 East Germany and German re-unification

At the Potsdam conference, the allied forces partitioned Germany into what eventually became two separate countries; the soviet administered zone becoming the German Democratic Republic, or "East Germany" (7th October 1949) and the other three zones merging into the Federal Republic of Germany, or West Germany (23rd May 1949). From there on the two countries became physically separated with little exchange between them. This was epitomized with the building of the Berlin Wall around the Western part of the city. In the summer of 1989, the East German regimes restricted travel within the communist bloc, leading to mass protests. On 9th November 1989, following an error by a central committee spokesman, the borders between East and West Germany were declared immediately opened, leading to the dismantling of the Berlin Wall. On 16th November, the new East German head of state reaffirmed that re-unification of both countries was not on the agenda. However, by 28th November, the West German parliament passed a 10-point plan to reunification of Germany within 10 years. After, the electoral defeat of the communist party in March 1990, the two countries established a treaty of monetary, economic and social union. By July 1990, the GDR adopted the Deutschmark and in August 1990, the East German parliament declared the integration of East Germany to West Germany, which became effective on the 3rd October 1990[8]. Within less than 12 months, East Germany unexpectedly transited from communism and isolation from the Western world to capitalism and integration with West Germany.

This generated a large shock to the East German economy, see Hunt (2006) and references therein. Unemployment rose from 0 to 20% and GDP dropped by over a third in two years, before starting a slow recovery from 1992 onwards. At the same time, wages rose rapidly to converge toward West German levels, the generous West German welfare system was rolled in, and transfers, representing more than 50% of GPD flooded in, so that disposable income rose rapidly. "[..] *The transition brought an immediate increase in both political freedom and*

[8] We are not the first to use German re-unification as a natural experiment to investigate the occupational effect on precautionary (Fuchs-Schündeln and Schündeln [2005]) and household saving (Fuchs-Schündel [2008]), preference for redistribution (Alesina and Fuchs-Schündeln [2007]), consumption behaviour (Bursztyn and Cantoni [2016]) or the economic impact of networks (Burchardi and Hassan [2013]). No study has however previously focused on the outcome of the children born during this period as we do in this paper.

living standards, yet also a large rise in economic uncertainty, manifested not least through the sudden emergence of high unemployment (Hunt, 2006)". This uncertainty was perhaps best reflected by two demographic events; within a year, 5% of the East German population migrated west, and the number of births fell by 50%.

2.2 The Fertility Drop

Figure 1 shows the total fertility rate (TFR) between 1980 and 2005 for East and West Germany[9]. In West Germany the TFR remains quite stable throughout the period. TFR in East Germany was relatively stable, if somewhat slowly declining, but in 1990 fell precipitously from 1.57 to 0.78. They remained at this slow level in 1994. This drop in fertility has been described by demographers as the "most substantial fall in birth rates that ever occurred in peacetime" (Conrad, Lechner and Werner [1996], p.331). Since then, the birth rate in East Germany has recovered and is presently at West German level (Federal Institute for Demography Research, 2017).

[Figure 1 about here]

Since our identification relies on a difference in difference strategy, we first document that, trends in fertility decisions between the two regions were similar until 1990 and differed sharply thereafter. In Figure 2, we illustrate this by taking a longer view and plotting fifty yearly difference-in-difference coefficients (+/- 2 standard errors) for the TFR of East Vs West Germany from 1949 to 2009. The results clearly show that at no moment before nor after the few years of divergence we focus on after the fall of the Berlin wall did women in either region have significantly different probability of having children. This clearly confirms that this was an exceptional time when an unusually large number of women chose not to select to become mothers in the ex-GDR.

[Figure 2 about here]

The determinants of the fall in birth numbers are extensively discussed in Chevalier and Marie (2017) who conclude that the huge drop in births is mostly driven by economic uncertainty with

[9] The total fertility rate is the hypothetical numbers of children for a woman whose fertility is computed as the sum of all age specific fertility rates. $TFR = \sum_{i=15}^{49} ASFR_i$

a minor effect from migration to the West[10] and almost no role played by changes in birth termination via abortion, the main birth control in the Eastern Land of Germany at the time[11], So fertility decisions appear to have been altered at time of conception which means that, unlike in the case of Donohue and Levitt (2001), the children born in the aftermath of the fall of the Wall were 'wanted'. However, Chevalier and Marie (2017) document that mothers who gave birth in this period were negatively selected on a number of characteristics linked to parental skills. This includes the typically observed one such as mothers being younger, less educated, and in less stable relationships. They also document that selection also strong on often unobserved characteristics that may be crucial to child development such as the amount of parental investment in educational inputs and having poor emotional relationships with their children. As well as the adverse effect on the child's educational attainment Chevalier and Marie (2017) highlighted this negative selection might also have impacted on the criminal activity of this cohort which is our focus in this paper. Furthermore, we investigate risk preferences as a new mechanism that may have explain selection into motherhood during these highly uncertain economic times and whether this personality trait was transmitted to the child who may as a result have themselves been more risky and consequently have been more likely to participate in crime.

3. Empirical Strategies and Data Sources

3.1 The Data

3.1.1 State Level Data

We obtained administrative crime data at the Land level on an annual basis from the Federal Criminal Police Office (BKA)[12]. To separately identify cohort and time effects we collect data

[10] From November 1989 to December 1990, almost 800,000 East Germans moved to the West. The flow was reduced to about 220,000 in 1991 and 1992 and by 1993, the net migration between East and West was below 100,000 (German Federal Statistical Office). While large this flow could not have generated the drop in fertility observed. Eberstadt (1994) for example estimates that the migration flow is responsible for about 10% of the drop in total birth. We still provide evidence later on that all our results are robust to taking into account this potential additional migration effect on parental selection.

[11] To test whether this fertility drop is driven by abortion, we regressed the Land level abortion ratio (number of reported abortion per number of live births) on simple pre-and post 1990 trend variables. Apart from a slightly significant rise in in East Germany in 1991, we otherwise reject that abortion had much of a role to play in explaining the fertility drop observed.

[12] We are grateful to Daniel Focke from the Bundeskriminalamt (www.bka.de) for providing us with this data.

on number of arrests by age, gender and per crime category[13] from 1993 to 2014 for 5 Eastern and 10 Western Länder (we exclude Berlin, the only state which straddles the old East/West border). This information is not available by discrete ages but only for the following – mostly two-year – age groups: 10-11, 12-13, 14-15, 16-17, 18-20, 21-22, 23-24, 25-29, 30-39, 40-49, 50-59, 60+[14]. This slightly complicates our definition of 'Children of the Wall' cohorts for the analysis as the CoW can straddle an age group in a specific year. For each period, we therefore compute an indicator of the proportion of each age-group that is treated (born between 1991 and 1993 in East Germany). This indicator is 0 when the CoW is either too young or too old for the age group of interest. Since most of the age groups include two birth cohorts, we mostly have that for a given age group, half the individuals are treated when the CoW cohorts enters it, the full age group is considered treated the following two years, and half again three years later, as the CoW cohorts exit it. The values this indicator takes across years for the different age groups are reported in Table A1. This indicator is a simple weight of the proportion of an age group considered treated in each year[15]. With this cohort/state level panel, we can follow cohorts as they age and observe their criminal activity over time in each state. The BKA also provided us with the number of active police personnel by year and Land for this period which, if changing, may affect the probability of arrest.

We gathered a number of additional variables from the Federal Statistics Office to complete our State level panel dataset: population size by age, gender and nationality (to create our cohort size denominator and control for the influence that foreign migration could have on crime); and the overall and youth unemployment rates (to control for local economic conditions). Altogether the panel dataset we generate covers 12 age groups aged 10 and over in 15 Länder over 22 years and as such is made up of 3,960 age-state-year cells. In some of the analysis presented we further reduce the age groups to focus on cohorts who are the most crime-active. We create similar arrest datasets separately by gender and for different crime categories.

[13] We follow the standard BKA classification the 2010 Police Crime Statistics Yearbook – List of Offences (http://www.bka.de/nn_195196/SharedDocs/Downloads/EN/Publications/PoliceCrimeStatistics/pks2010ListOfOffenses,templateId=raw,property=publicationFile.pdf/pks2010ListOfOffenses.pdf) to aggregate the more than 400 sub-categories into five broad crime groups which together represent 85 percent of all arrests: violent and sexual; thefts and burglaries, fraud and forgery, criminal damage, and drug offences.

[14] Before the age of 14, the data refers to recorded incidents of 'contact with the police' rather than arrest, which are not legal before this age in Germany

[15] These proportions do not take into account that the CoW cohorts were smaller and thus are likely to under-estimate the treatment effect, nor that criminal propensity differs by age, within an age group. To solve this problem, we weight all regressions by Land/year age-group population. Note also that a Breutsch-Pagan test detected heteroscedasticity in the residuals of the un-weighted regression, the procedure recommended by Solon, Haider, and Wooldridge (2013) to empirically justify the use of group sample size weights to improve the precision of estimation.

3.1.2 Individual Level Data: The DJI

To complement the state level crime panel described above, we also analyse the "Deutsches Jugend Institut", a nationally representative survey of children conducted in 2003. We limit ourselves to children aged 12 to 14 whose birth most closely straddle the fall of the Wall. This dataset is the only individual level data that includes self-reported information on "contact with the police" and "involved in a fight". While limited in scale and quality of its crime measure, the DJI has also several advantages over the cohort level data. First, CoW is more precisely defined since we know month of birth, not just year. Second, we can control for individual level characteristics that might be correlated with the propensity to commit crime. Third, we can deal with selection issues related to migration by keeping children still living in the state of their birth.

3.1.3 Individual Level Data: The SOEP

The German Socio-Economic Panel (SOEP) is a large longitudinal survey of private households carried out annually in West Germany since 1984, and the former East Germany since 1990. We use data from 1990 to 2014 comprising of more than 50,000 unique individuals, a quarter of whom lived in the East. The SOEP includes detailed personal characteristics and extensive questionnaires for all members of the households, including retrospective information when necessary. The main survey is augmented by topic specific modules, and we make extensive use of the ones with survey questions focusing on mothers, young adult (aged 17), and risk preferences[16].

3.2 Empirical Strategy

For all outcomes our empirical strategy relies on a difference in differences approach which exploits the natural experiment provided by the post-Berlin Wall drop in birth rates. We compare the outcomes of children who were conceived in the aftermath of the Fall of the Berlin Wall, i.e. born in East Germany in 1991, 1992, and 1993, to individuals born before 1991 (and after 1994 in a few cases). The counterfactual, or second difference, is provided by the non-treated individuals from West German Länder, which enable us to naturally control for common macro shocks and time trends, since by the time we observe outcomes Germany has been reunified. A necessary condition for this difference in differences identification approach to be

[16] The SOEP unfortunately does not contain a single question on self-reported criminal participation A detailed description of the dataset is available in Wagner, Frick, and Schupp (2007) and at http://panel.gsoep.de/.

valid is that the common trend hypothesis holds. We later carefully check that it does, providing graphical and econometric evidence. However, because of the nature and structure of our individual and cohort level data, we must define three different modeling strategies that depict our general differences in differences approach.

3.1.1 Cohort Level Analysis – Arrest Rate

Our main outcome for measuring criminal participation is the arrest per 1,000 inhabitants in a given age (a) in Land (s) at time (t): Y_{ast} defined as:

$$Y_{ast} = \ln\left(A_{ast} / \frac{N_{ast}}{1000} \right)$$

where the numerator A is the number of arrestees, and the denominator N is the relevant population size. We then take the natural logarithm of this fraction and estimate the (log) arrest rate in a difference-in-differences specification where β is the estimate of the criminal propensity of the 'Children of the Wall':

$$Y_{ast} = \beta PropCoW_{ast} + \delta Z_{st} + \gamma_t Yr_t + \rho_a Age_a + \alpha_s + \mu_a Yr_s + \varepsilon_{ast} \qquad (1)$$

$PropCoW$ is an interaction between an ex-GDR Land indicator and the proportion of the population in a specific age-group that is born between 1991 and 1993. The estimated coefficient β is interpreted as the elasticity in the arrest rate. *Age, Yr*, and α_s are sets of dummies for age-group, year and Land respectively. We also include Z which is a set of time varying Land specific controls to account for local factors which may impact on criminal participation. These are specifically: overall and youth unemployment, proportion of foreign born per age group, and number of police personnel per 10,000 inhabitants. In our favored specification we relax the assumption of common trends between states and instead include state-specific fixed effects (Yr_s). Each cell is weighted by the population size of the age-group, in the state for the year, and standard errors are then clustered at the Land-year level.

We conduct additional robustness checks of estimates from this basic specification, i) variations in the definition of the cohorts of interest and ii) assess the impact of internal migration. For the latter, we obtained yearly Land to Land population movement data by gender and age[17] and generate an indicator of 'potential maternal migration' which is the net number

[17] We are very indebted to the Federal Statistics Office (www.destatis.de) for providing us with this administrative dataset. Unfortunately this information only starts in 1991 for the Easter Länder which is admittedly just after the largest outflow had taken place. We still think that we can accurately capture which were the relatively highest sender and receiver Länder from this internal migration using this data.

of women of reproductive age which moved out of state relative to its population relative to the number of women in the local population which we add as a control. We also estimate the model separately by gender and by type of crimes.

3.1.2 Individual Level Analysis – Self Reported Police Contact or Fight

To assess contact with the police or involvement in fights at the individual level, we modify (1) and include a dummy for being born from August 1990 onwards (*born90*), the first cohort being conceived after the fall of the wall. The treatment (*CoW*) is the interaction of this dummy with a dummy for living in one of the East German states, and current state of residence fixed effects (S_i). To account for age effects in the propensity to commit crime, we include a quadratic in month of birth. We also include household characteristics, number of siblings, whether parents were born in Germany, district population. The base specification is thus:

$$Police/Fight_i = \alpha + \beta CoW_i + \delta Born90_i + \sum \gamma_i S_i + f(MoB_i) + \rho X_i + \varepsilon_i \qquad (2)$$

The standard errors are clustered at the year of birth and State level.

3.1.3 Individual Level Analysis – Risk Preference

One potential mechanism linking parental selection to child's criminal activity is risk preference. We assessed 1) whether mothers who gave birth following the fall of the wall were selected along their risk preference dimension, and 2) whether they transmitted this preference to their child. For this section we rely on individual level data from the Socio Economic Panel and estimate a slightly modified specification of (2):

$$Risk_i = \alpha + \beta CoW_i + \gamma East_i + \delta B91\_3_i + \theta YoB_i + \rho X_i + \varepsilon_i \qquad (3)$$

This specification is thus run for mothers and children. Since the SOEP does not provide information on the month of birth, 'Children of the Wall' (*CoW*) now takes the value 1 if gave birth (or born) in the East between 1991 and 1993 and 0 otherwise. $East$ is a dummy for being in East Germany at birth or in 1991, *B91_3* is a dummy for being born (having given birth) between 1991 and 1993, and *YoB* is a set of year of birth dummies to account for potential cohort effects. *X* is a vector of individual level characteristics which include, depending on the specification, for mothers: number of children, age, and years of education; for children the characteristics included are, depending on the model estimated: gender, number of siblings,

years living in single mother household, and years of education. ε_i is an error term assumed to be independent and normally distributed across individuals *i*. All regressions are weighted by cohort size to account for the large changes in cohort sizes during the period and standard errors are always clustered by state-cohort interactions[18].

4. Criminal Participation of the 'Children of the Wall'

4.1 Graphical Illustration

Before turning to our statistical analysis, we first illustrate graphically the evolution of criminal participation from 1993 to 2014 in East and West Germany using arrest rates for four distinctive age-groups. Figures 3 reports the arrest rates for individuals aged 10 to 11 (top left), aged 14 to 15 (top right), aged 18 to 20 (bottom left) and aged 25 to 29 (bottom right)[19]. The plain/dotted lines are for East/West Germany, respectively and the vertical lines mark the year of arrival and departure of the 'Children of the Wall' cohorts from each specific age-group. As such they denote the period during which the proportion of cohort treated, as reported in Table A1, is positive.

[Figure 3 about here]

Figure 3 therefore clearly illustrates three things. First that the criminal propensity of the 'Children of the Wall' appears much higher than that of cohorts born before, a phenomena that we do not observe for their Western peers. The figures are quite striking and all reveal very marked 'peaks' in the arrest rate of East German cohorts when the cohorts born between 1991 and 1993 enter an age group; such peaks are not observed in West Germany. When the CoW cohort leaves an age group, the East German arrest rate returns to trend. This pattern becomes

[18] Clustering is a crucial issue here since the results from Donohue and Levitt (2001) were criticized by Joyce (2004) and Foote and Goetz (2008) for only being significant because of artificially low standard errors as a result of inappropriately clustering at the state*cohort level rather than just state. The argument is that a wider cluster better account for potential correlation between cohorts. Foote and Goetz (2008) indeed show that using state only generates much larger standard errors. Here we tried both State and State*year of birth (as well as East*year of birth) as clusters. The former was constantly giving us larger standard errors indicating that serial correlation is potentially not an important issue here. To be conservative we therefore decided to report those throughout.

[19] Similar patterns are observed for the other age groups.

increasingly pronounced as the cohorts become older and much larger arrest rates per population improve the precision of the graphs.

Second, all graphs in Figure 3 indicate that youth arrest rates are higher in East German Länder than in Western ones. This is well documented and perhaps not surprising considering the important differences in relative economic deprivation between the two parts of the country. It is however not a problem for our identification approach since it is easy to account for this baseline crime gap by including Land-specific fixed effects. What is crucial is that we have similar trends in arrests between East and West Germany for the cohorts conceived before the fall of the Wall. Indeed, for each age group, the arrests rates have similar evolutions in both regions for pre-treatment cohorts; especially for older age groups as arrest becomes more common, indicating that the common trend hypothesis is met. We indeed find that this is statistically the case when we test for the significance of a coefficient on differences in pre-trends which is small and non-significant[20].

Third, the increase in arrest observed for the CoW cohort is unlikely to be driven by unobserved time effects like changes in policing activity, since the effect is observed at different dates for the different age groups but always when the fraction of CoW in an age group is positive. We also want to stress that these patterns are not driven by changes in police activity following reunification since we only look at the criminal activity of the CoW cohort, i.e. at least 10 years after reunification. In our favored specification, we will nonetheless include Land-specific time fixed effects to capture the effect of any state specific policy change.

4.2 Statistical Results

4.2.1 Baseline Crime Results

We now move to our econometric analysis and Table 1 reports results from estimating various specifications of equation (1). The coefficients represent the elasticities of arrest rate to the fraction of 'Children of the Wall' in the cohort. They are presented to include sequentially: only age group, Land, and year dummies in column (1); time varying state controls in column (2); and Land-specific time fixed effects in column (3). The last two columns present the results of this most expansive specification by gender. Finally, the results are reported alternatively for all age groups in row (i), only for individuals under 24 in row (ii), as older adults may not be a good control for youth offending behavior; indeed since peak criminal activity increases sharply

[20] We do this by regressing an interaction of East and being born before 1991 on arrest rates and this gives us a coefficient of -0.004 with an associated standard error of 0.007.

up to age 19 and decreases thereafter, including older adults would likely over-estimate the effect, (iii) excluding the children who are below the age of criminal responsibility: 14[21].
The estimated coefficients are all large, very significant, and not significantly different from one another across specifications (when using the same sample of individuals). These results confirm that the 'Children of the Wall' engaged disproportionally more in criminal activity. Looking at the most conservative estimates, the fullest specifications for the age group 14 to 24 only (i.e. column (3) of row (iii)), we can conclude that the arrest rate for 'Children of the Wall' is 28.5 percent greater than their older/younger and Western peers. The high criminality of the CoW is consistent with the negative parental selection hypothesis, and despite its small size, the cohort conceived in the aftermath of the fall of the Wall committed a disproportionally high amount of crime. We compare our results to the literature in a subsequent section.

[Table 1 about here]

Surprisingly, the effect is also remarkably similar for both men and women, the latter, a group for which criminality has been under-studied. Here, maybe because parental selection is a priori identical for boys and girls, its effects on criminal activities are indistinguishable by gender. This finding has potentially important implications in terms of what we can learn from this natural experiment since economists have found it difficult to explain the drivers behind female crime participation. While at comparatively low level, female criminality is on the rise and remains difficult to explained (Campaniello and Gavrilova, 2018), with some of the factors shown to be behind male criminality often being ineffective at explaining female criminality[22].

4.2.2 Results by Crime Category

Could the results be driven by specific police policies? It seems unlikely that police could clearly identify a CoW cohort member compared to somebody born slightly before or slightly after. However, the police in East German states might have targeted specific crimes, in which the cohort of interest has also specialized. To test, this mechanism, we report the results for our preferred specification by crime category for all individuals (aged 14 to 24) and separately for men and women (Figure 4). These results are based on our favored specification and include

[21] Minors between 14 and 18 years are sentenced by juvenile justice.
[22] One good illustration here is how increased education has been shown to have a strong negative impact on crime for males but little to no effect for females (Lochner and Moretti [2004] and Machin et al [2011]).

state-specific time fixed effects. The numbers in square brackets are the average arrest rates per 1,000 population at base line (East German pre-CoW cohorts) for each crime type and by gender (i.e. [male | women]). We note that most arrests are for three crime categories (theft and burglary, violent and sexual offences, and criminal damage), with the first category alone representing almost 50 percent of the total. Men are on average arrested much more than women (three times more for theft and burglary and nine times more for Criminal Damage).

[Figure 4 about here]

The estimated coefficients of the effect of being born as part of the CoW cohort are large and quite precisely estimated for all crimes. We find significant effects for all types of crime but their sizes differ significantly. The smallest effects are for fraud and drug crimes for which arrest rates increase by 11% and 17% respectively, while for damage the typical CoW is 40% more likely to be arrested than an individual from a control cohort. For the three main crime categories, arrests increase by 33 to 40% in an age group when it includes children born in the East in the aftermath of the fall of the Wall. This suggests that our results are not driven by a specific crime type which may have been targeted by the police force and that the CoW cohort would have been disproportionally engaged in. Interestingly, the crime-specific estimates are very similar for women and men, apart for violent offences. Since women commit a small fraction of crimes this again confirms that our results are unlikely to be driven by police force strategies specifically targeting the CoW cohort.

4.2.3 Robustness of Crime Results

Before we investigate the mechanisms behind this sharp rise in arrest for the CoW cohort, we report in Figure 5 the results from a series of robustness checks that extend beyond our preferred specification. The coefficients for each regression is displayed as a black circle with a line representing +/- 2 standard errors on either side of it and can be easily compared to the value of our basic estimate and its confidence interval that are depicted with vertical dotted lines.

The first robustness specification, R1, accounts for internal migration by including for each year and age group a measure of the net proportion of potential mothers who migrated to another state[23]. Once included in our preferred specification, we find that, while significant by itself,

[23] We calculate this by taking the net number of fertility age women (aged 15 to 40) who migrated into - or out of - a certain Land in a specific year relative to the number of same age women already residing in that Land. We

maternal migration only very marginally affects our estimate. We take this as further evidence that internal migration is not the driving mechanism behind our results.

[Figure 5 about here]

The next two specifications, R2 and R3, use alternative definitions of who is considered a Child of the Wall. Children born from August 1990 were conceived after the collapse of the Wall and as such the 1990 cohort is partially treated, in R2 we include all children born in 1990 as treated. Including them reduces our estimate, since CoW now includes children who were not self-selected, but it remains strongly positive and in the range of our main coefficient. In R3, we expand our base definition of CoW to include children born in 1994, the year by which birth rates rebounded in the eastern states. Including these children does not alter our original results. The birth rate in East Germany started to recover from 1994 onwards, as the expectations about the future of the economy picked up. Cohorts from 1994 onwards are thus potentially positively selected as potential parents who had delayed fertility decisions during the immediate aftermath of the fall of the wall and the early stage of re-unification might by then decide to have children. In R4, we exclude all post-1994 cohorts from the analysis. The point estimate is slightly reduced but remains within the confidence interval of the base specification. In R5, we further tighten the window of cohorts used as controls and only keep those born at most three years before and after the fall of the Wall. This is akin to framing our estimates into a regression discontinuity design to ensure that treated and control individuals are as similar as possible which entails here that they mostly faced the same environment when growing up in reunified Germany. The point estimate is only about 0.2 but not significantly different from the baseline one.

Finally, in the final specification, R6, we present a placebo test where we assume that the treated cohorts were those born between 1987 and 1989 and drop all the subsequent cohorts. If the environment young children were exposed to after the collapse of the Berlin Wall had an effect on crime, we should find also some effect on arrest later in life for these cohorts born just before the collapse of the communist regime. We reject this assumption as the placebo coefficient is not statistically significant and, importantly, it is a precisely estimated zero indicating no detectable crime increase for this cohort. All these robustness checks are very reassuring about the stability of the estimated CoW effects.

believe that this measure of 'migration of potential mothers' is best suited to capture the possible distortion that movement of women across Lander could have on our estimates.

4.2.4 Corroborative Micro Evidence

We now turn to individual level data to provide corroborative micro evidence that children conceived after the fall of the Berlin Wall did experience more crime related events in their youth. We use self-reported information from the DJI survey of youths aged 12 to 14 who were asked about having ever had any "contact with the police" and about having been "involved in fights". In this survey we can more precisely define the Children of the Wall as those born after August 1990 in one of the Eastern State. For this population, the average self-reported experience of contact with the police and involvement in fight both stand at 4.4%. The results from regressions following equation (2) presented in our Empirical Strategy section above are reported in Table 2.

In our base specification, column (1), we find that CoW are 1.7 percentage point more likely to admit having had contact with the police, which translates into a 39% increase from the baseline. The size of this estimate is very much in line with the results that we obtained for the population aged 14 to 24 in our cohort-state level arrest data analysis, and give us confidence that the individual level data, despite its limitations (small size, self-reported crime) can be informative to test some of the mechanisms that could link fertility decisions to the child criminal activity. The estimated impact of being involved in fights, column (3), is much larger and suggests an almost doubling frequency of fights for the CoW cohort. If this might at first seem like an unrealistically large estimate, one must remember that the question relates to any sort of involvement in a fight and the respondent may be a victim or a perpetrator.

[Table 2 about here]

In column (2) and (4), we test whether our results are sensitive to internal migration in a more direct way than was possible at the cohort level by restricting the sample to children currently living in the state in which they were born. This does not affect the estimate for the results. In both instance the estimates for the non-mover populations are not statistically different than the one we found for the full population. We take this as further evidence that internal migration is unlikely to be an important source of bias for our estimates and thus not an important underlying mechanism at play here.

4.2.4 Our Crime Results in Perspective

Our results confirm the Donohue and Levitt (2001) hypothesis that fertility decisions can have a large effect on the subsequent criminal activity of children. We find that the cohorts of

children born in East Germany between 1991 and 1993 commit a much greater fraction of crime than would be expected, which is consistent with the interpretation of negative parental selection. This is despite being part of much smaller cohorts, which in theory should have a positive effect on outcomes (e.g., via smaller class sizes and lower competition on the labor market)[24]. Legalization of abortion in the U.S. resulted in fewer children being born from mothers with relatively worse parental characteristics, as such Donohue and Levitt did not distinguish the potential positive effect on child outcomes of smaller cohort size from the effect of positive selection into fertility, and the abortion effects were potentially an over-estimate.

The bias may indeed be large, and for Romania, Pop-Eleches (2006) estimated that 50% of the effect of abortion may be due to cohort size[25] and the effect of abortion on crime fully disappears when the cohort effect is appropriately taken into account as Hjalmarsson et al. (2019) have shown. In our analysis, we are unable to separate the cohort size from parental selection effects but since the two effects operate in opposite directions, we can argue that, our estimates on criminal activity presented above represent a lower bound of the true impact of fertility selection on the offending behavior of the child generation.

Our most conservative estimates state that the arrest rate of this cohort is almost 30 percent higher than expected. These are large effects, but they are actually consistent with Donohue and Levitt (2001, 2004, 2008, 2019) who concluded that the legalization of abortion reduced crime rates by about 20% and was responsible for 50 percent of the drop in crime observed in the U.S. in the 1990s. By comparison, early childhood interventions such as the Abecedarian project (ABC) and Carolina Approach to Responsive Education (CARE), programs that engaged participants from birth to the age of 5, decreased male arrest rate by 25% to 50% for misdemeanor and have no significant effects on felony (Garcia et al., 2019).

Our results do not however entail that overall crime will increase in East Germany. 'Children of the Wall' represent a small fraction of the total number of arrests, being only three birth-year cohorts and being 50 percent smaller than usual birth year cohorts. Indeed, since the increase in arrest almost matches the reduction in cohort size the overall arrest rates fell from 8.6 in 2005 to 7.7 in 2011 in East Germany. Since it did not lead to the same aggregate changes in crime as in the US, the very high propensity of the 'Children of the Wall' to commit offences has until

[24] Smaller cohorts could also have opened opportunities in the crime market. However, we think this is unlikely since the CoW represent only three birth cohorts and thus a small fraction of all potential criminals.

[25] The Romanian abortion ban studied by Pop-Eleches (2006) resulted in larger cohorts of positively selected children and could have naturally led to underestimates of the fertility selection effect. The author however prefers to control for socio-economic composition of mothers to show that the ban led to worse outcomes for children. He therefore shows that the larger cohort size effect (or crowding out effect as it is called in this paper) goes in the same direction as the treatment effect and therefore attempts to measure its importance.

now remained unnoticed and has yet to enter the policy debate. This does not change the value of our findings which are perhaps the most robust evidence to date that parental selection has a very strong effect on child offending behavior.

In the next section we turn to micro level data to explore a potential underlying mechanism that may explain why the 'Children of the Wall' are so prone to committing crimes; maternal selection along risk preference characteristics and transmission of this risk preference across generations.

5. The Fertility-Crime Relationship: Risky Mom, Risky Kids?

5.1 Mother/Child Risk Attitude and its Transmission

As already discussed, the large fertility drop we study is certainly not random across women. Chevalier and Marie (2017) document that the mothers of CoW were *negative* selected on a number of observed characteristics: younger, less educated, and in less stable relationships. Moreover, these mothers differed in the investments towards the education of their children, and in the quality of the emotional relationship. We extend this analysis by investigating the role played by risk attitude as an underlying mechanism. This is an important dimension that could link the fertility decision of mothers, and thus their selection, and child criminal behavior. A preference for risky behavior has long been associated with most unsafe youth activities (Gruber, 2001); indeed, teen birth and crime rates trends have been shown to move contemporaneously (Colen et al. 2016). Since crime is inherently a risky activity, if more risk loving mothers transmit this preference to their children, this would be another mechanism by which parental selection could affect crime. In this section, we formally test the importance of risk preferences in explaining fertility decisions, and how it transmits across generations using the unique setting of our natural experiment combined with actual individual data on stated preference for risk.

5.1.1. Are Mother and Children of the Wall More Risk Lovers?

We rely on the GSOEP data and focus on the sub-sample of women (children) who gave birth (were born) in East or West Germany between 1980 and 2014. Note that the SOEP provides retrospective information on location in 1990, which we use to allocate the CoW status so that these estimates are not affected by subsequent migration decisions. The SOEP contains the following question "*On scale 1-10, how likely are you to take risk in your life?"* which we use as our main measure of risk attitude. This question has been extensively validated a good

approximation of risk preference and correlates with risky behaviour in the lab and the field (Dohmen et al., 2011). From this, we construct a 'risk lover' indicator equal to one for individuals with risk preference above the group (mother or children) median. We concentrate on risk lover since Charles and Hurst (2003) noted that the "risk transmission is stronger in the tails of the distribution".

[Figure 6 about here]

We define 3-year birth cohorts, and report in Figure 6 the proportion of risk lovers by cohort, separately for mothers (Panel A) and children (panel B). East German mothers are on average more likely to be risk lovers than their West German counterparts. Moreover, East German mothers, who conceived in the aftermath of the fall of the wall and gave birth between 1991 and 1993, are 10 percentage points more likely to be risk lovers than previous cohorts, and only for the cohort is the gap in risk preferences between East and West German mothers statistically significant.

At the child generation, the risk preferences have converged and for cohorts born before the fall of the Berlin wall, we observe no detectable difference in risk preferences between West and East Germans[26]. The fraction of risk lover is increasing over time but jumps by more than 10 percentage points for the "children of the wall" cohort, which is the only cohort significantly more risk loving than its West German counterparts. For subsequent cohorts, no gap in risk preferences is observed.

For both mothers and children, Figure 6 demonstrates very similar pre- trends and for both the mothers of CoW and their children a temporary increase in risk preference. This pattern appears consistent with "Children of the wall" mothers being selected along their risk preferences and having transmitted this preference to their children.

[Table 3 about here]

We statistically test this hypothesis by running the difference and difference specification of equation (3) using "risk lover" as the outcome of interest and present the results in Table 3 below. We first include a number of controls for general individual characteristics (age, family composition, etc.) in our basic specifications and find that the probability of having a risk level

above the cohort median increases by almost exactly the same amount +14 percentage points, for both mothers (column (1)) and children (column (3)) of the Wall. Risk preference might be correlated with educational choice, in column (2) we include maternal years of schooling to assess whether the difference in risk preference is driven by educational attainment. While lower educational attainment is associated with increased probability of being risk lover, this is not the driver of the gap in risk preference. Similarly, at the child generation adding the educational track level attended[27], column (4), does not alter the conclusion that children of the wall have a greater probability of being risk lovers

In the last column of Table 3, we conduct a first simple exercise to explore the importance of intergenerational risk transmission by including a dummy for own mother being a risk lover in the child specification. This should capture the normal amount of risk that mothers transmit to their children which Dohmen et al (2012) have shown to be strong and significant using the same survey data. We also find that this 'natural' mother-child risk transmission is large with a child being 11 percentage points more likely to be a risk lover if their mother was herself a risk lover. Including maternal risk preferences barely affects the size of the CoW coefficient indicating that women who had children during the post-Wall years in East Germany, as well as being more risk lover themselves, seem to have transmitted more risk than normal to their offspring.

5.1.2. Environment Explains Higher Risk Transmission?

The higher than expected intergenerational risk transmission for CoW might result from the specific environment in which these children were conceived. Even by comparing those born just before and after the fall of the Wall – i.e. who grew up in mostly the same environment – we may still not be able to rule out environmental concerns linked to antenatal or post-birth stress which has been shown to have long term consequences on various life outcomes (Barker, 1995; Conti et al. 2012).

[Figure 7 about here]

To first address this issue, we split mothers by their risk preference type, and assess the transmission of risk preferences of each 3-year birth cohorts. We present this graphically in

[27] We cannot use completed years of schooling for the children in our sample as this is right censored for younger cohorts where many are still enrolled in education. Tracking occurs at an early age in Germany (between 11 and 12) and being enrolled in what is considered a lowest track of secondary school (i.e.Hauptschule) is a good proxy for low educational outcome.

Figure 7. For risk-averse mothers, there is a general increase over time in the probability of their children being risk lovers, but this is similar for East and West German cohorts, and the transmission is very similar between cohorts. For risk loving mothers, the transmission of preferences to their children, jumps up only for the East German cohort born in 1991-93. Since this jump in intergenerational preference for risk is not observed for risk-averse mothers, it is unlikely to be driven by environmental factors[28].

[Table 4 about here]

Additionally, we test whether this high transmission of risk preference is driven by some maternal characteristics rather than the environment. Specifically, we assess whether CoW mothers, independently of the environment, transmit higher risk level than 'usual' to their children. To do so, we first identify in the SOEP all the older brothers and sisters of the Children of the Wall (i.e. born in East Germany during the stable period before the end of Communism). We then run two specifications with risk lover as the dependent variable – akin to the ones in columns (3) and (4) of Table 3 – where the main treatment variable is now the risk preference of a CoW older sibling[29]. The results are presented in Table 4 and show that older siblings of CoW also have a high preference for risk, which is unlikely to be driven by early environment issues since these individuals where born in the stable environment of communist East Germany. Moreover, we find a very similar pattern when mother's own risk level is included. The intergenerational transmission is almost identical (+11.2% Vs 11.9%), and the additional effect of being born in a family including a "Child of the Wall" remains large, and marginally significant. We therefore conclude that mothers who gave birth in the aftermath of the fall of the wall not only have a strong preference for risk but also have a strong ability to transmit this preference to their children. It is this selection and strong intergenerational transmission, not the environment that seem to explain the high incidence of risk lovers among the generation born in East Germany between 1991 and 1993.

5.2. Risk Level and Fertility Decision

[28] Potentially riskier mothers are more sensitive to environmental shocks (i.e. there exists a multiplier effect between own risk and a stressful environment). Investigating this further goes beyond the scope of this paper.
[29] Note that this is now not properly a difference-in-difference specification as CoW siblings are born in different periods and we do not therefore include a specific cohort dummy to capture this first difference (the second difference between East and West remains unchanged). We however do still include year of birth dummies which will mostly capture differences across time that could have affect outcomes for these children.

Since crime is a risky activity, maternal selection in term of risk preference, and the intergenerational transmission of risk could be factors behind the greater proclivity of the CoW to engage in criminal activity. Since no dataset contains both risk preference and criminal activity, we cannot test this further, however in this section we test how maternal risk preference correlates with fertility decisions. First we document that risk loving women react differently to an uncertain economic environment when making fertility decisions. This is important since the fall of the wall was characterized by a high level of uncertainty as the economy was transiting from communism to capitalism.

[Figure 8: About here]

In Figure 8 we report the probability of giving birth by the self-reported level of worry about the economy 12 months ago. Since the risk preference variable is only available from 2004 onwards, we conduct this exercise for all women aged 17 to 47 surveyed in the SOEP during the 2004-2014 period, and not for the period around the fall of the Wall. For women who are not worried about the economy, risk preferences do not alter fertility decisions. However, when economic worry rises, risk averse women become about 25% less likely to give birth, while risk loving women do not significantly alter their fertility decisions. As such, in periods of high worry about the economy, the composition of new mothers is altered towards mothers with a higher preference for risk. The discounting of the economic environment when taking fertility decisions is consistent with the greater risk preference of mothers who gave birth after the fall of the Wall.

Second, we document the association between maternal risk preferences and fertility decisions which are associated with worse child outcomes in the long run: low maternal age at birth (Young Mother), birth planning (Unplanned Pregnancy), and relationship status (Single Mother).

In Figure 9, we report the estimates of the effect of a one standard deviation increase in risk preference on the probability of experiencing each of these outcomes. To reduce concerns about reverse causality of motherhood on risk attitude the analysis is conducted controlling or not for education and for three different subsamples. The first sample: “Birth 1980 to 2014”, includes all women but, for many of them, risk is measured many years after they experienced a birth. In the second sample, “Birth 2005 to 2014”, risk attitude is contemporaneous to the fertility decision but the birth could have happened before or after risk preference was measured. The third sample, “Have Risk before Birth”, only includes women for whom we have a risk measure

before the birth of a child. For all outcomes and samples, we report significantly positive coefficients that are not statistically different if we control for education or not. Importantly, we see that for our third and most restrictive sample where risk is measured before birth, the estimated coefficients are larger for all outcomes, if somewhat less precise, as sample sizes decrease. These results first confirm the existence of a strong correlation between risk preference and precarious fertility decision making but also indicates that this link is even stronger when using risk measures taken before a woman has made that fertility decision; i.e. this cannot be driven by reverse causality. Risk loving mothers are more likely to have children at a young age, have unplanned pregnancy and be single mothers at the time of birth, characteristics that are all associated with lower parental skills which we argue here may in turn lead to a greater probability of the child engaging in criminal activities.

[Figure 9 about here]

7. Conclusion

This paper highlights the effects of parental selection on the subsequent criminal activity of children. While previous literature has relied on changes to the abortion laws as exogenous fertility shocks, we use the collapse of the Berlin Wall in 1989 which led to a 50 percent drop in fertility over a three years period in East Germany and a change in the parental composition of the cohort. We report that children born in East Germany in the aftermath of the regime change are at least 28 percent more likely to be arrested than those from previous cohorts. Since the fertility shock is local and temporary, we can exclude that the changes in arrest rate is driven by other social changes following the German reunification, or police targeting, since it is observed for all crime types. Interestingly, the increase in crime is similar for both boys and girls.

Another advantage of our strategy is that since the cohort size and the parental selection effects go in opposite directions, our estimate of the parental selection effect is a lower bound. Our results are thus in line with Donohue and Levitt's claim (2001, 2019) that parental selection and not cohort size reduction was the factor driving the crime reduction in the US in the Nineties, and contradict Hjalmarson, Mitrut, and Pop-Eleches (2019), which attributes the crime reduction after a change in abortion law in Romania to cohort size effects.

Donohue and Levitt (2001) have argued that the mechanism behind the effect of parental selection on the next generation criminal activity is that abortion prevented "unwanted birth".

We document a different mechanism. In periods of high uncertainty about the economic environment, risk-averse women, but not risk-loving women, reduce their fertility. This difference in reaction to the economic environment led to the selection of mothers who gave birth in the immediate aftermath of the collapse of the communist regime along risk preferences. The mothers of CoW were more risk loving and transmitted this preference, especially so for the high risk loving mothers, to their children. The strong intergenerational correlation for this cohort seems to be driven by mother's preference rather than environmental effects, since it is also observed for the older siblings of the CoW.

Altogether, our findings have important implications for policy planners. The economic environment not only affects birth cohorts' sizes but also their compositions. The cohort composition leads to differentiated outcomes for the affected cohorts. Public policies should be adjusted for cohort quality. In this specific case, despite its small size, the cohort conceived after the fall of the Wall would have benefited from additional investment to compensate for characteristics of their parents.

Strikingly, the rise in contact with the police for the CoW cohort starts at an early age. As such, any interventions to compensate for the "bad" parental skills should come early in childhood. Indeed Garcia et al. (2019) estimate that an early intervention targeting deprived children can substantially reduce future arrest rate. Interventions when preferences are still malleable may break the intergenerational transmission of preferences, such as risk, which have an important role to play in criminal activity. However, the real challenge remains to find a way to target efficiently such interventions at the right mothers/children.

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Table 1 – Change in Overall Arrest Rates of 'Children of the Wall' Cohorts byAge Groups and Gender

	Dependent Variable = Log (Arrest Rate per 1,000 Pop)				
Proportion of Cohort that are Children of the Wall		**All**		**Men**	**Women**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
i – All Age Groups aged 10 and over	0.366***	0.297***	0.329***	0.326***	0.409***
	(0.029)	(0.031)	(0.030)	(0.031)	(0.035)
N = 3,960					
[Mean Arrest Rate]		[52.3]		[78.5]	[23.4]
ii – Aged up to 24 Only	0.351***	0.335***	0.352***	0.344***	0.463***
N = 2,310	(0.022)	(0.031)	(0.030)	(0.030)	(0.039)
[Mean Arrest Rate]		[70.4]		[105.7]	[31.2]
iii – Aged 14 to 24 Only	0.273***	0.242***	0.285***	0.312***	0.311***
N = 1,650	(0.018)	(0.025)	(0.021)	(0.024)	(0.023)
[Mean Arrest Rate]		[84.7]		[128.6]	[35.6]
Age Group, Land, and Year Fixed Effects (FEs)	Yes	Yes	Yes	Yes	Yes
Lander Time Varying Controls (% Unemp, % Foreigners, # Police)	No	Yes	Yes	Yes	Yes
Lander Specific Time FEs	No	No	Yes	Yes	Yes

Note: The time varying controls are annual measures of overall unemployment, youth unemployment rates; proportion foreign born by age groups; and number of police officers per 1,000 population. Robust standard error clustered at the Land and year level in parenthesis. Mean arrest rate per 1,000 population for respective group in square brackets. Estimates are weighted by population size.

Table 2 – Corroborative Micro Evidence on Criminal Participation – DJI Survey (Age 12-14)

Dependent Variable	Contact with Police		Involved in a Fight	
	(1)	(2)	(3)	(4)
Child of the Wall (i.e. East * 1991-93)	0.017*	0.018*	0.043***	0.061***
	(0.006)	(0.005)	(0.004)	(0.009)
Born after Aug 1990	0.002	0.018	-0.018	-0.009
	(0.020)	(0.020)	(0.022)	(0.034)
Individual Controls & State Fixed Effects	Yes	Yes	Yes	Yes
Still Lives in State of Birth	No	Yes	No	Yes
Mean of Dep Variable	0.044	0.041	0.044	0.041
Mean Effect Size	0.388	0.453	0.987	1.511
Sample Size	1,521	1,300	1,521	1,300

Note: Dependent variable are dummies for responding positively to the following question: "Have you already experienced trouble with the police". CoW is the interaction of being born after August 1990 and leaving in an East German Land. Additional controls include a quartic function of year and month of birth, number of siblings, parents born abroad, state of residency, and dummies for district population size. Robust standard errors clustered by child year of birth and State reported in parenthesis. Observations are reweighted for survey design and response rate. Source: DJI – Youth Survey - 2003.

Table 3 – Risk Attitude of Mothers and 'Children of the Wall'

	Dependent Variable = Risk Loving Individual				
	Mother		Children		
	(1)	(2)	(3)	(4)	(5)
Child of the Wall [i.e. East * 91-93]	0.139** (0.054)	0.139** (0.053)	0.140*** (0.043)	0.140*** (0.044)	0.131*** (0.045)
Mother is Risk Lover	-	-	-	-	0.112*** (0.021)
Birth/Born East	0.033 (0.027)	0.022 (0.027)	-0.030 (0.022)	-0.034 (0.022)	-0.042* (0.022)
Birth/Born Aug 90 - 93	-0.029 (0.030)	-0.031 (0.030)	-0.003 (0.029)	0.000 (0.029)	-0.001 (0.027)
Education (Years for Mothers and Tra)	No	Yes	No	Yes	Yes
Age & Year of Birth & # Children/Siblings	Yes	Yes	Yes	Yes	Yes
Male & Birth Order	No	No	Yes	Yes	Yes
Sample Size	4,431		3,735		

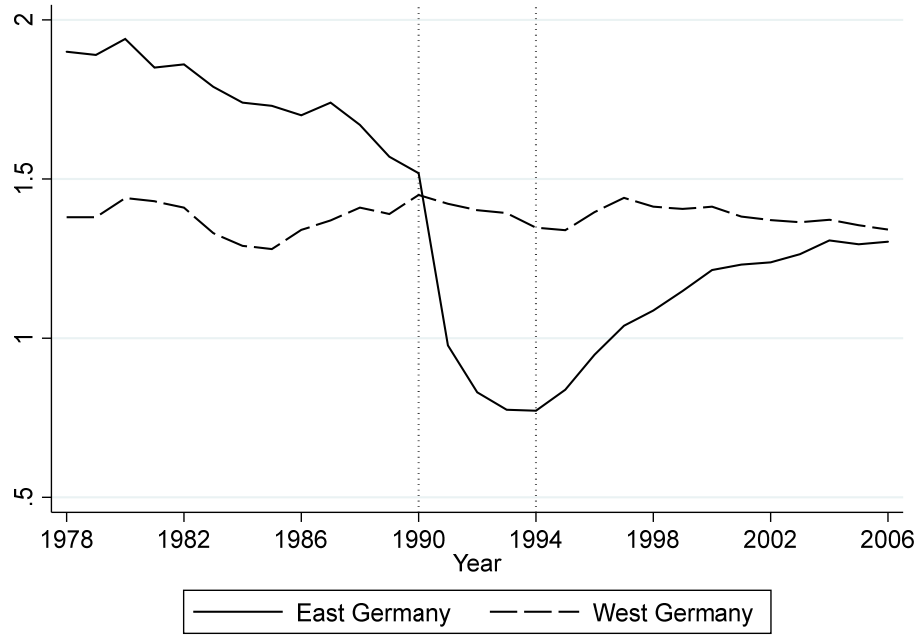
Note: CoW is the interaction of having had a child for mothers and for being born between 1991 and 1993 in East Germany. Robust standard errors clustered by child year of birth and East/West reported in parenthesisSource: GSOEP. Risk attitude measures come from the average of the 2004, 2006, and every year from 2008 to 2014 of questions on the willingness to take risk ranked between 0 (minimum) and 10 (maximum). Risk loving is then defined as a dummy for risk preference above the group median.

Table 4 – Risk Attitude of Siblings and 'Children of the Wall'

	Dependent Variable = Risk Loving Individual	
	Sibling	
Sibling of Child of the Wall [i.e. Sibling born East * 91-93]	0.185** (0.082)	0.158* (0.082)
Mother Risk Lover	-	0.119*** (0.031)
Birth/Born East	-0.042 (0.027)	-0.049* (0.027)
Education (Track)	Yes	Yes
Age & Year of Birth & # Children/Siblings	Yes	Yes
Male & Birth Order	Yes	Yes
Sample Size	1,694	

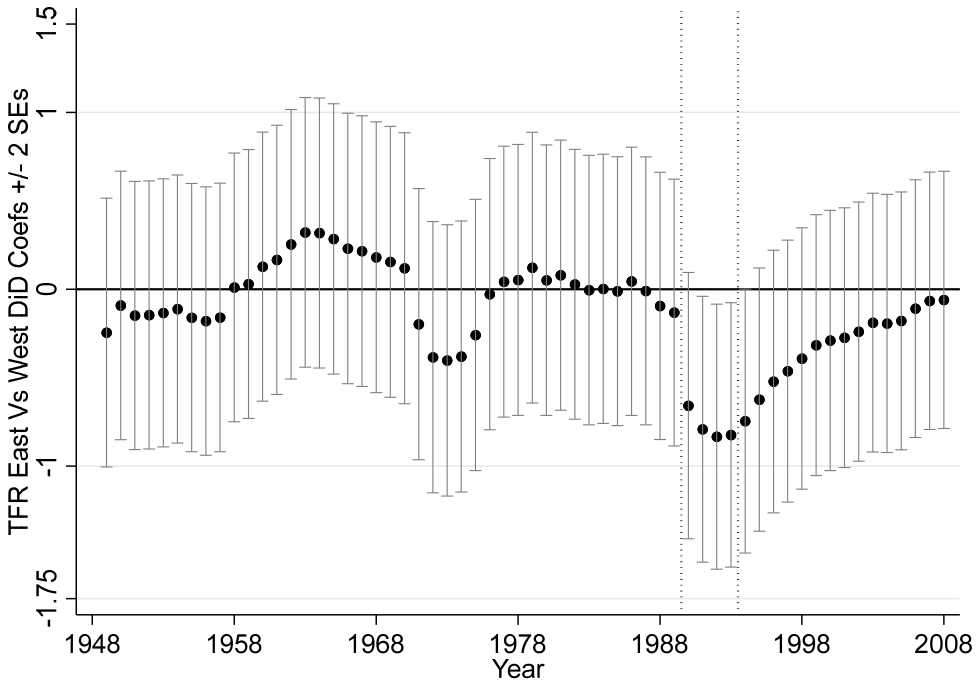
Note: Sibling of CoW is the dummy equal to 1 for all individuals who have a sibling born between 1991 and 1993 in East Germany, zero otherwise. Robust standard errors clustered by child year of birth and East/West reported in parenthesis. Risk attitude measures come from the average of the 2004, 2006, and every year from 2008 to 2014 of questions on the willingness to take risk ranked between 0 (minimum) and 10 (maximum). Risk loving is then defined as a dummy for risk preference above the group median.

Figure 1: Total Fertility Rate in East and West Germany from 1978 to 2006



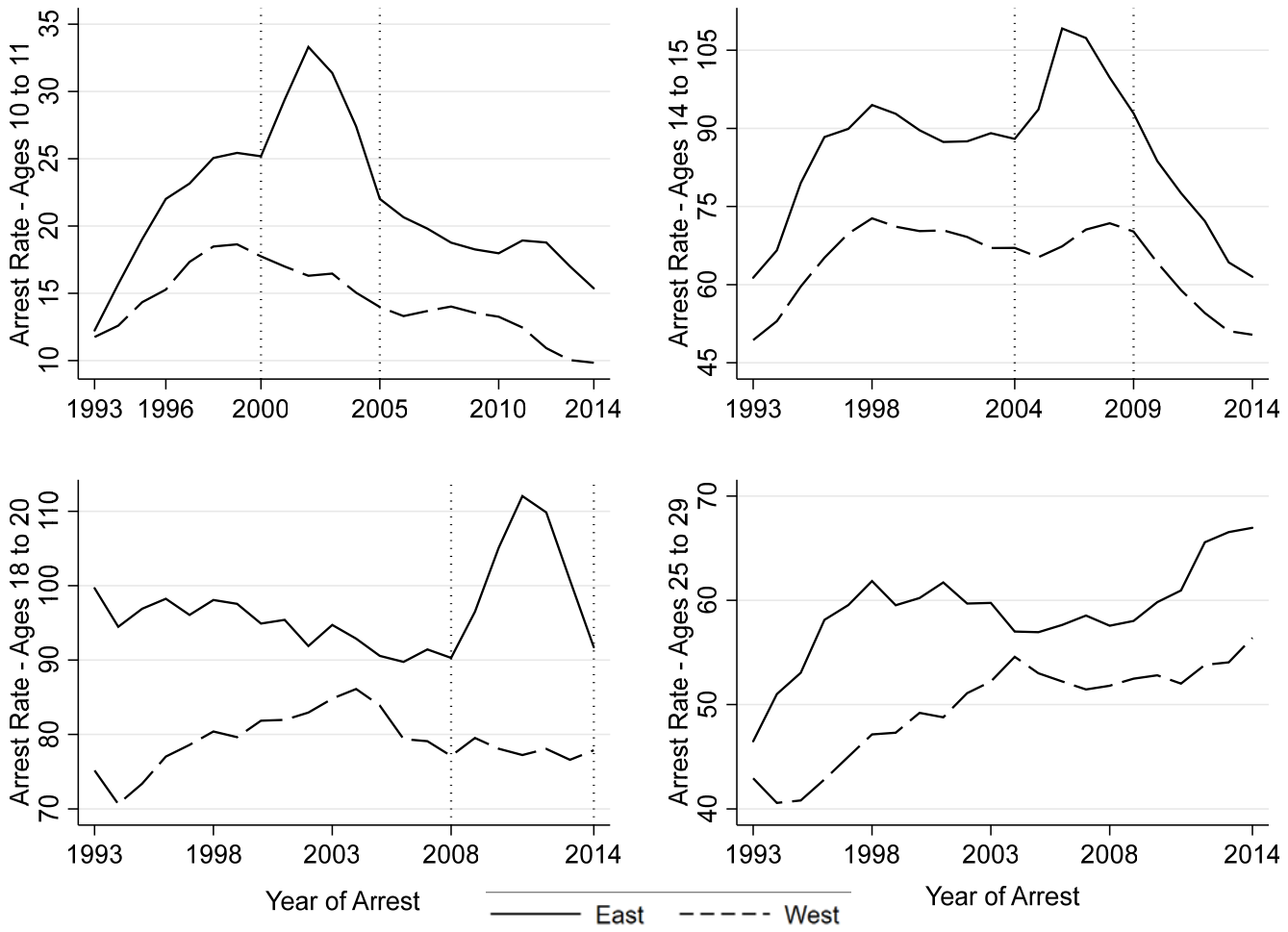
Notes: Authors own calculations based on administrative population data from the Federal Institute for Population Research (http://www.bib-demografie.de)

Figure 2: Difference in Total Fertility Rate in East Vs West Germany - 1948 to 2008



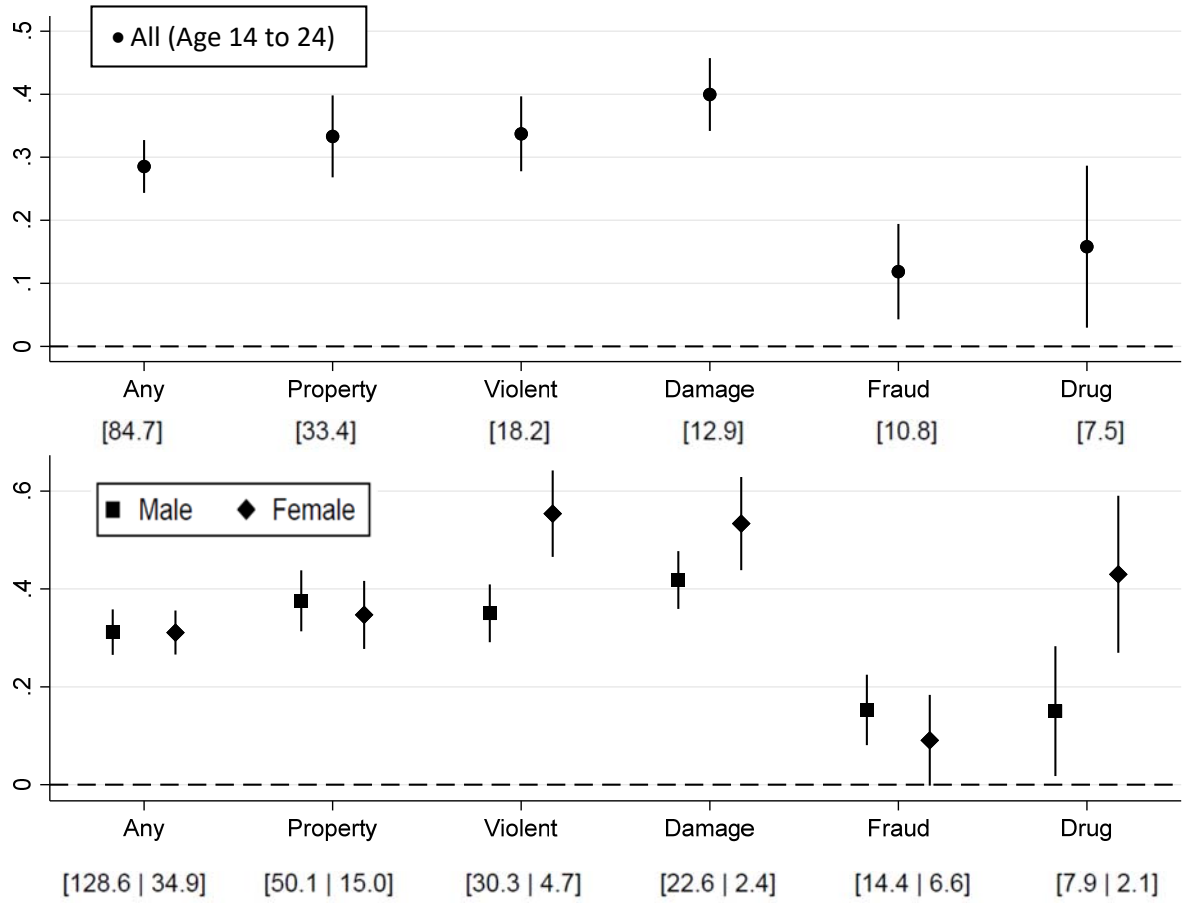
Notes: Circle dots report year on year difference-in-difference estimates of East Vs West total fertility rates with bars indicating the size of the confidence interval. Vertical dotted lines indicate the year of births for cohorts we consider children of the wall. Source: same as Figure 1.

Figure 3: Arrest Rate per 1,000 Population in East and West Germany for Selected Age Groups from 1993 to 2014



Notes: Authors own calculation from administrative arrest data by age groups at the Land level (Federal Criminal Police Office: www.bka.de). Vertical dotted lines indicate the year before and after Children of the Wall (i.e. born East between 1990 and 1993) appear among the age groups presented in each of the graphs.

Figure 4: Change in Arrest Rates of 'Children of the Wall' Cohorts by Crime Type and Gender



Notes: The Land time varying controls are yearly measures of overall unemployment, youth unemployment rates; proportion foreign born by age groups; and number of police officers per 1,000 population. All regressions include lander specific time fixed effects and are weighted by Land-age group population size with standard errors clustered at the Land-year level (i.e. similar to specification 3 in Table 1). Average baseline arrest rates per 1,000 population in Eastern Länder when no cohorts are treated are in square brackets [].

Figure 5: Robustness Checks of Cohort Level Crime Results

Description of Robustness Check Specifications R1-R6
Sample size & mean dependent variable for specification

Main Coefficient = 0.285
and 95% CI = [0.213 to 0.357]

R1- Internal migration: control for of *proportion of potential mothers* moving from East to West (i.e. % migration of fertility age women)
Sample Size = 1,650 and Mean of Dependent Variable = 84.6

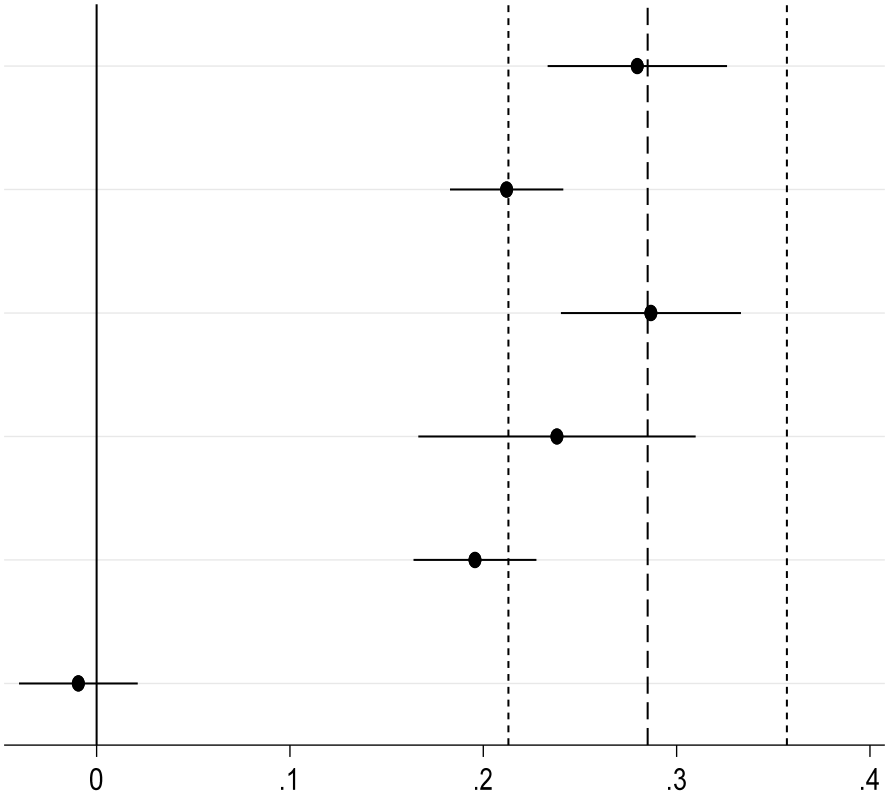
R2- Extending CoW sample to also include children born East in 1990 (i.e. CoW now defined as East * 1990-1993)
Sample Size = 1,650 and Mean of Dependent Variable = 84.5

R3- Extending CoW sample to also include children born East in 1994 (i.e. CoW now defined East * 1991-1994)
Sample Size = 1,650 and Mean of Dependent Variable = 84.4

R4- Exclude all cohorts born after 1993 (i.e. no post-1994 cohorts included in control group)
Sample Size = 1,345 and Mean of Dependent Variable = 84.3

R5- Exclude all Cohorts born after 1993 *and* only include 3 cohorts before 1991 (i.e. pre = 1988-1990 & post = 1991-1993)
Sample Size = 480 and Mean of Dependent Variable = 84.3

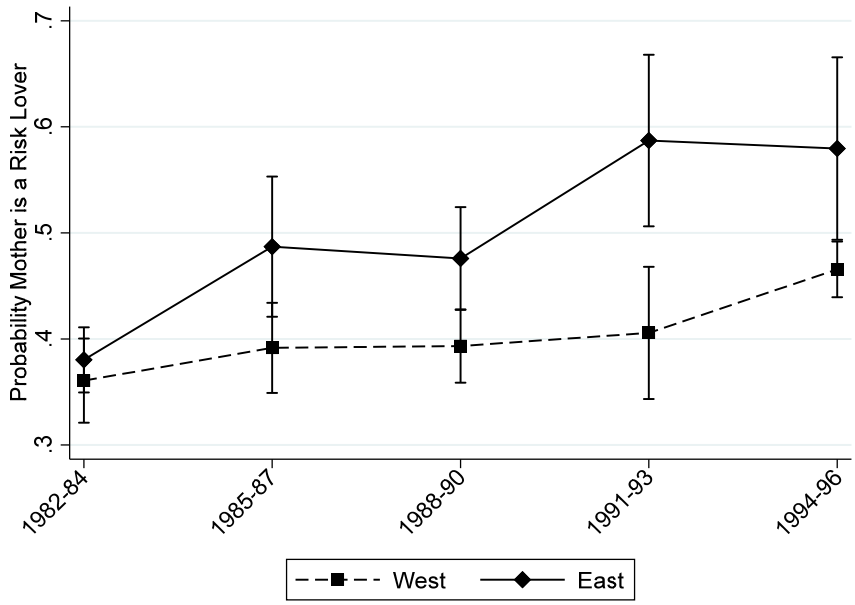
R6- Placebo: Treated Born from 1987 to 1989 (all post-1990 cohorts dropped as treated)
Sample Size = 1,320 and Mean of Dependent Variable = 85.8



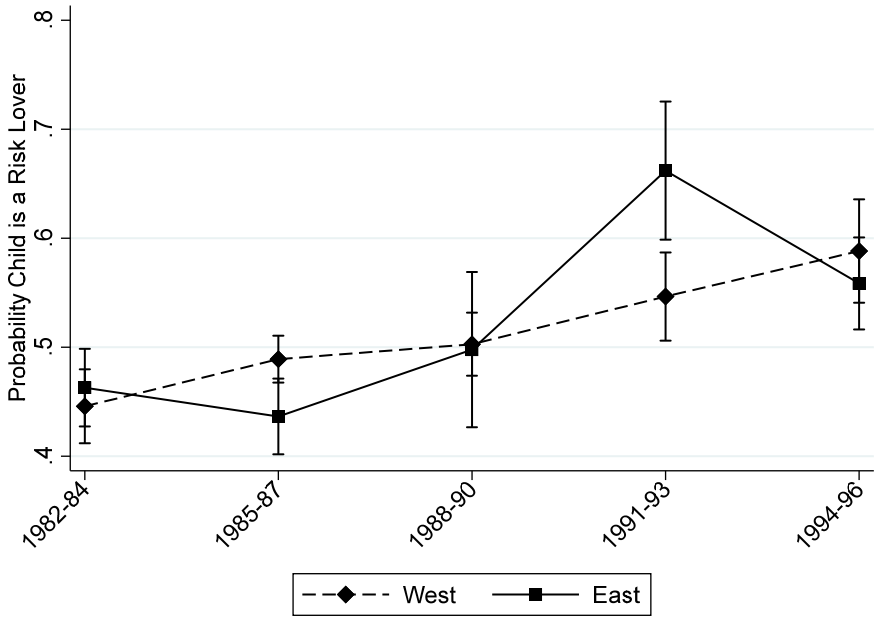
Note: The Main Coefficient is from our preferred specification estimating the impact of being a Child of the Wall on arrest rates as in row (iii), column (3), Table 1. The vertical lines represent respectively: long dash line is the coefficient estimate, dotted lines are lower and upper bound of confidence interval, solid line marks the zero effect. All regressions include Land time varying controls overall unemployment, youth unemployment rate; proportion foreign born by age groups; and number of police officers per 1,000 population, and Land specific fixed effects. Cells are weighted by Land, age group and population size. The coefficients for each regression is displayed as a black circle with a line representing +/- 2 standard errors on either side of it.

Figure 6: Probability of Being Risk Lover by Cohort, East and West Germany, for Mothers and Children birth/born 1982-1996

A: Mothers – by year gave birth (3-year cohorts)

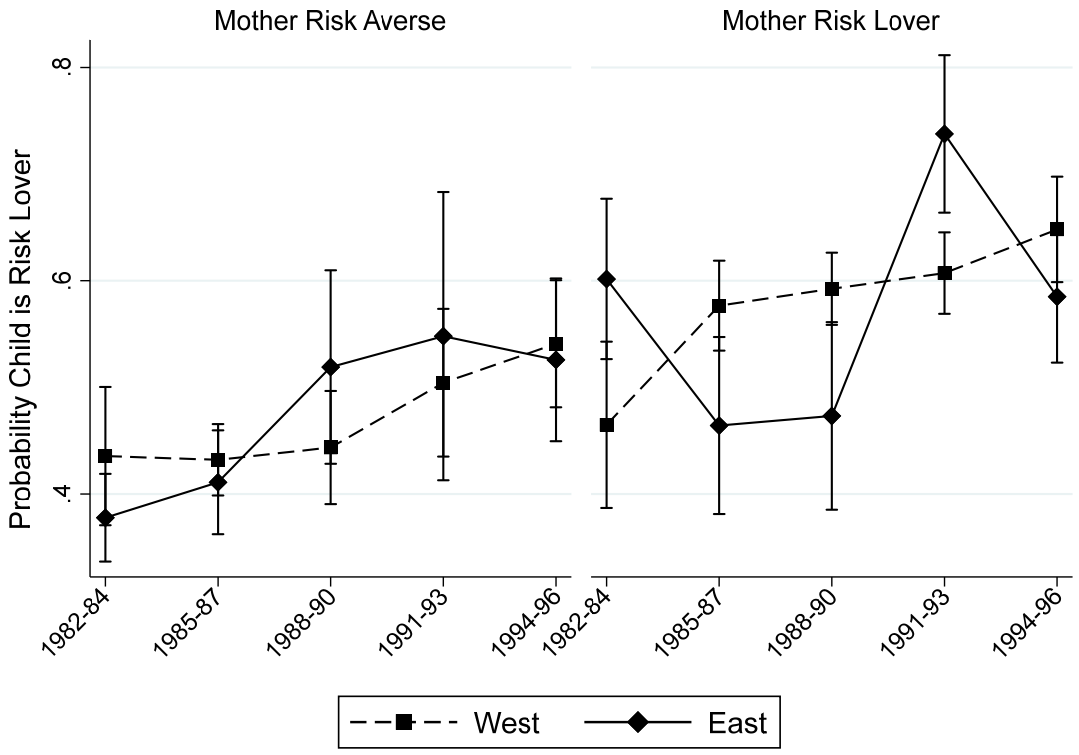


B: Children – by year of birth (3-year cohorts)



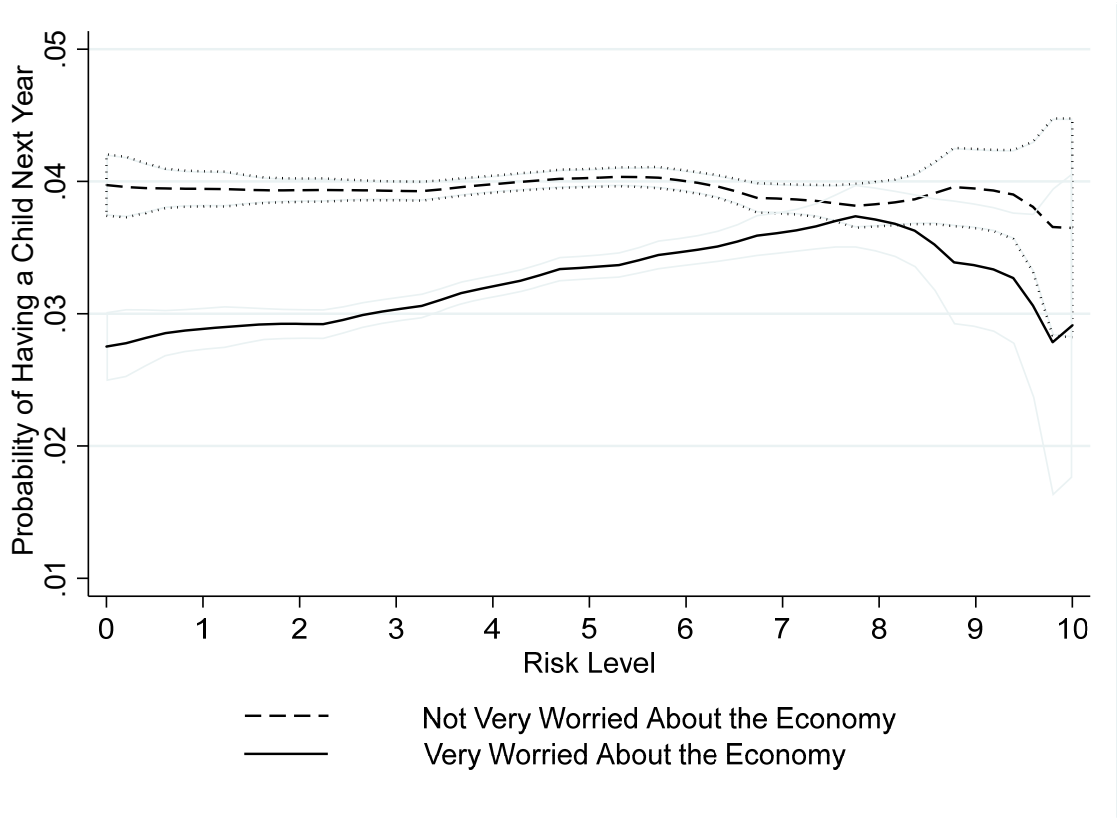
Note: The graphs report estimated coefficients (+/-2 standard errors) from regressing the probability of an individual being a risk lover (i.e. having a risk level above the group median) on the 3-year cohort she belongs to in East or West Germany. For mothers, Panel A, we also control for age, year of birth of the child and total number of children. For the children, Panel B, we also control for gender, number of siblings, and birth order. All regressions are weighted for sample size and the standard errors clustered at the Land level.

Figure 7: Probability of Child Being Risk Lover by Maternal Risk Preference Level



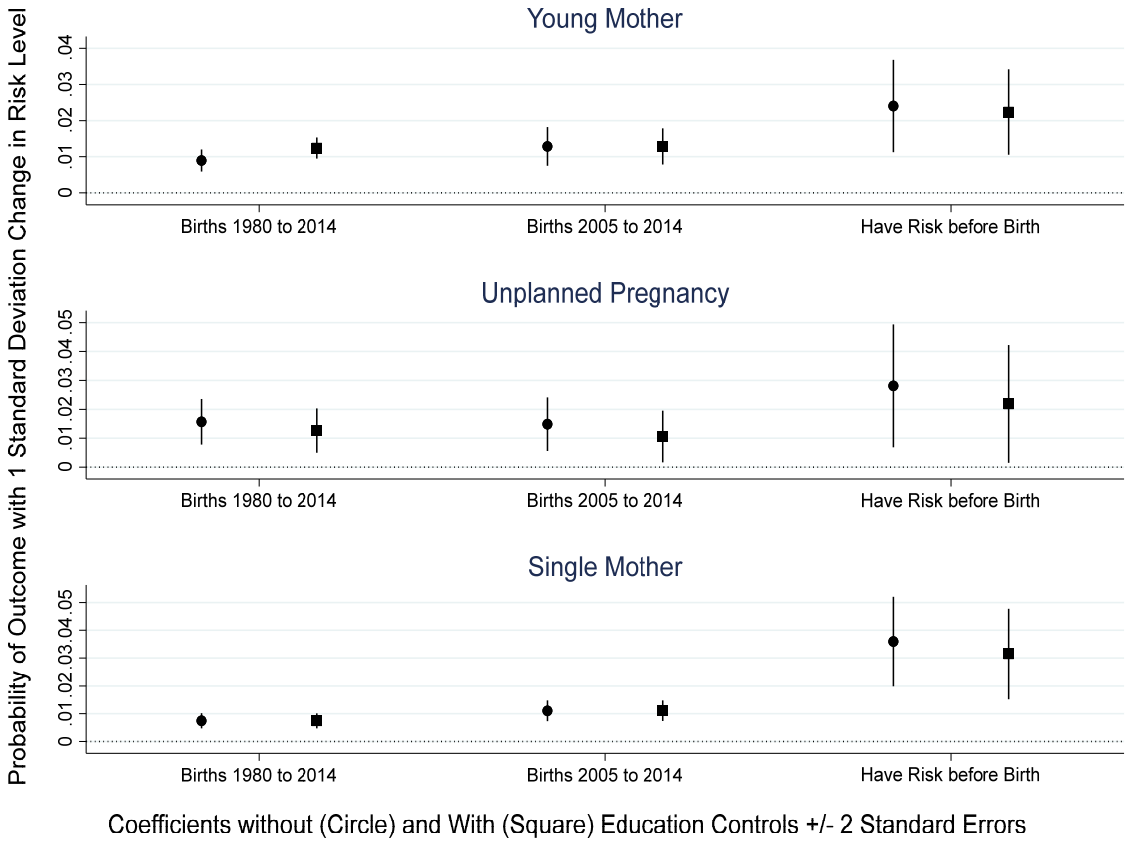
Note: The graphs report estimated coefficients (+/-2 standard errors) from regressing the probability of a child being a risk lover (i.e. having a risk level above the median) on the 3-year cohort she belongs to in East or West Germany. The left-hand graph is for children of risk loving averse mothers and the right and graph is for children of risk loving mothers. In all regressions we also control for child gender, number of siblings, and birth order and they are weighted for sample size and the standard errors clustered at the Land level.

Figure 8: Fertility Decision by Risk and Level of Worry About the Economy



Note: The graph plots the estimated probability of having a child in the period 1990-2000 separately for individuals reported to be very worried about the economy ('very' = 1 and 'somewhat'/'never = 0) or not by years of education for all women aged 17 to 47 surveyed in SOEP during this period. The probit model that generates these coefficients also includes controls for years of education and includes age and year dummies. The thin lines depict the 95 percent confidence intervals

Figure 9: Probability of Fertility Outcome by Risk Level, without and with Education Controls, Various Samples



Note: The figure report coefficient estimates of the impact of a one standard deviation change in risk level for the probability of three different fertility outcomes for women. These are: Young Mother (having a child before age 23), Unplanned Pregnancy (pregnancy was not planned), and Single Mother (was not with father at time of birth). Each coefficient is produced by regressing a dummy of the outcome on a woman's risk level and controls for year of birth of the child. The circles are estimates without education controls and the square ones are from models which also include completed years of education of each mother. The solid lines around both the circles and squares indicate the value of + and – 2 standard errors around these coefficients. All data is for mothers surveyed GSOEP for whom we have risk attitude information. We report results for three distinct samples to show the sensitivity of our findings: for all women who had a child between 1980 and 2014 (Birth 1980 to 2014; N = 14,506), only for women who had a child once the risk question was introduced in GSOEP (Births 2005 to 20014; N = 3,644), and only for women for whom we observe risk before the birth of their child (Have Risk Before; N = 763).

APPENDIX

Table A1 – Proportion of 'Children of the Wall' by Crime Age Groups from Official Arrest Data Available from 1993 and 2014

Year\Age Group	5-6	7-9	10-11	12-13	14-15	16-17	18-20	21-22	23-24
1993	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	0	0
1996	1/2	0	0	0	0	0	0	0	0
1997	1	0	0	0	0	0	0	0	0
1998	1	1/3	0	0	0	0	0	0	0
1999	1/2	2/3	0	0	0	0	0	0	0
2000	0	1	0	0	0	0	0	0	0
2001	0	2/3	1/2	0	0	0	0	0	0
2002	0	1/3	1	0	0	0	0	0	0
2003	0	0	1	1/2	0	0	0	0	0
2004	0	0	1/2	1	0	0	0	0	0
2005	0	0	0	1	1/2	0	0	0	0
2006	0	0	0	1/2	1	0	0	0	0
2007	0	0	0	0	1	1/2	0	0	0
2008	0	0	0	0	1/2	1	0	0	0
2009	0	0	0	0	0	1	1/3	0	0
2010	0	0	0	0	0	1/2	2/3	0	0
2011	0	0	0	0	0	0	1	0	0
2012	0	0	0	0	0	0	2/3	1/2	0
2013	0	0	0	0	0	0	1/3	1	0
2014	0	0	0	0	0	0	0	1	1/2

Note: 'Children of the Wall' are defined as being born in an Eastern Länder between 1991 and 1993.