

Crime after a Fertility Shock: Offending Behaviour of the ‘Children of the Wall’

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Abstract: Birth selectivity has a large impact on children’s future outcomes. This paper uses the fall of the Berlin Wall as an exogenous fertility shock: the number of births in East Germany dropped by more than 50 percent over a three years period after reunification of the two countries. Using a difference in difference strategy, we estimate that individuals from this cohort commit more crimes per head than both younger/older cohorts and their West German peers. This higher criminal propensity can be explained by negative selection whereby parents who gave birth to children during this period of great uncertainty have on average lower observable characteristics. We explore underlying mechanisms and find that emotional attachment and intergenerational transmission of risk attitudes appear to play an important role in the fertility-crime relationship.

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1. Introduction

Families have a strong influence on the development of their children (see Almond and Currie (2011) and Black and Devereux (2011) for recent reviews) but the influence of parents start even earlier with the decision to have, or not, children. Socio-economic circumstances affect fertility decisions (Sobotka et al, 2011) however, the effect may be heterogeneous. A labour income shock leads to income and substitution effects working in opposite directions leading to positive or negative parental selection depending on parental income. This parental selection may have large effects on the subsequent outcomes of the cohort of children. Donohue and Levitt (2001) demonstrated the importance of parental selection on offending behaviour. In their seminal paper, they advocate that the legalisation of abortion in the U.S. in the Seventies was responsible for up to 50% of the drop in crime rates observed in the 1990s. Positive selection is associated with the parents of the marginal children being born having better characteristics or as Donohue and Levitt (2001) put it, the “unwanted children” not being born. Alternatively, Pop-Eleches (2006) demonstrates that an abortion ban in Romania in the 1960s lead to an improvement in children’s outcome. This negative selection was due to more educated women being more likely to rely on abortion as a birth control method. As shown by Donohue and Levitt (2001), the issue of parental selection is potentially particularly stringent for crime committed by the second generation since family characteristics is highly correlated with criminal activity (Sampson and Laub, 1993; Hjalmarsson and Lindquist, 2012) and since a small number of individuals commit the majority of crimes (Tracy, Wolfgang and Figlio, 1990).

Most of the literature on parental selection in developed countries has relied on change to the availability or costs of birth control methods, principally abortion. Abortion tends to be a highly controversial policy, and only a fraction of potential mothers use it as a birth control

method. As such, the estimated effects pertain to mothers who have (at the time) a strong preference for not having a child and may not be informative about the impact of parental selection in the general population. Moreover, the above mentioned papers rely on discrete legislation change to identify the consequences of selection but since the policy changes happen at a point in time and are thereafter permanent, it is difficult to separate the effects of the change in the abortion law from secular trends. Indeed Donohue and Levitt's findings have been plagued by controversies¹.

This paper attempts to further our understanding of the link between fertility decision, selection and future child's outcomes. Rather than relying on changes to the abortion legislation, which affects selected group of potential parents, this paper relies on a large political and social shock which affected fertility decisions of all adults over a short period of time; after which fertility decision reverted to normal². As such the consequences of fertility selection can be estimated for a precisely defined cohort of the overall population, and we can exclude that they are driven by any secular trend.

More precisely, following the collapse of the Berlin Wall in late 1989, the number of births, in what used to be the Democratic Republic of Germany (East Germany), dropped by almost 50% over a three-year period; an unprecedented peace time event. The unanticipated sudden collapse of the communist regime in East Germany created uncertainties, large upheavals in the economic conditions, as well as possibilities to migrate. Nine months after the fall of the wall, the number of monthly birth in East Germany plummeted by 40% and continued falling until 1994. Thereafter, the birth rate went back to trend. This event allows us

¹ Controlling for trends, Cook and Laub (2002), Foote and Goetz (2003), Joyce (2004) and Lott and Whitley (2007) refute that the change in abortion law lead to a significant drop in crime for the subsequent generation. All those arguments have been refuted by Donohue and Levitt (2004, 2008).

² An early example of the impact of social change on fertility is provided in Rindfuss et al (1978) who document the effect of Brown vs Board of Education in 1954 which declared school segregation illegal. This Supreme Court decision would have affected children being schooled in States still practicing discrimination; i.e. Southern States. This social change led to a drop in the number of white birth in the South of 0.7% in 1955 while birth numbers were increasing by close to 2 % nationally.

to observe a much larger fertility drop than in previous studies, over a precisely defined location and short period of time. We also observe outcomes for cohorts born in the same years in former West Germany which due to the subsequent reunification of Germany were subject to the same policy environment when growing up but were not affected by this fertility shock. This homogenous control group enables us to set our analysis in a difference-in-difference setting, and as such, this is the first paper that can properly account for various trends that could have affected fertility decisions and later outcomes.

The empirical section relies on a combination of Lander level (i.e. German States) and micro level datasets (the German Socioeconomic Panel or GSOEP) available for the whole country since re-unification in 1990. This enables us to not only look at the aggregate effects of the fertility drop on children criminal outcomes but also to carefully consider the impact of never before observed individual characteristics of both mothers and their children. The richness of our data and the specificities of the natural experiment we exploit make it possible to shed some much needed light on the ‘black box’ of the underlying mechanisms behind the fertility-crime relationship.

We first clearly document the massive drop in birth rate observed in East Germany just after the fall of the Berlin Wall and give a number of explanations of why it happened in the context of the historical and institutional background. Analysis of individual data points to strong evidence of negative selection into motherhood. Women who gave birth during this period of economic and political uncertainties were on average younger, less educated, and more likely to be unmarried mothers. These are typical traits associated with lower “parental skills” which lead their children to display worse outcomes on various socio-economic measures, including criminal participation.

Using Lander level panel data on arrests by age groups, we show that the offending behaviour of the ‘Children of the Wall’ (i.e. born in East Germany between 1991 and 1993) is

much worse than could be expected. We estimate that from age eight onwards, they exhibit arrest rates at least 50 percent higher than comparable peers and they are over-represented by more than two-thirds in the arrestee population given their cohort size. These findings from our difference-in-differences strategy are robust to the inclusion of relevant time varying controls as well as to the addition of Lander specific time trends. Our results seem to confirm that parental selection may be perhaps the best predictor of future criminal participation of children. The large coefficients obtained may even be underestimates considering that the impact of this negative fertility selection should have been partly mediated by the smaller cohort size.

We investigate how different the ‘treated’ children are in terms of their individual characteristics with the micro data. By age 17 they are surprisingly similar to their peers in terms of broad educational attainment measures. They however appear to have worse emotional relationships with their parents with a significant lower proportion reporting that their mother and father ‘loves them’. We interpret this as indicating that child misbehaviour is most strongly influenced by a lack of parental emotional attachment and argue that it corroborates the ‘unwantedness’ explanation which is often put forward in the abortion-crime literature. To further investigate underlying mechanisms, we consider the risk attitude of mothers and children which may have a strong impact on both fertility and offending decisions. We find that the women who gave birth just after the end of Communism in East Germany are much more willing to take risk and this is also true for their children. This fits well with recent evidence on inter-generational risk attitude transmission (Dohmen et al., 2012) and is perhaps one of the crucial missing pieces in understanding the fertility-crime relationship puzzle.

Compared to the previous research we believe that this paper uses a cleaner identification strategy to estimate the impact of fertility decision on the criminal behaviour of

future generations. This is because the natural experiment we exploit is unique as it led to very profound but short lived fertility shock which creates innate pre and post control groups. The re-unification also makes West Germany a natural control which enables us to account for the potential effect of common trends as never before since children on both side of the “border” were subject to similar educational and social environment when growing up. We confirm that fertility decision appears to have an extremely large impact on the crime rate of future generations. The data we have access to also makes it possible for the first time to look at the actual underlying mechanisms behind this relationship. Parental emotional attachment and risk attitude transmission come out as the strongest explanatory factors further suggesting the importance of considering non-traditional economic personality traits to understand human behaviour.

The rest of the paper is structured as follows. The next section describes the institutional background and illustrates the drop in fertility. Section 3 describes the different data sources we make use of in this paper. Section 4 presents our difference in differences empirical strategy. Section 5 reports and discusses our findings on mother selection, cohort criminal participation, and children characteristics. Section 6 checks for the impact of migration on the interpretation of our results. Section 7 concludes.

2. Institutional Background and the Fertility Drop

2.1 The GDR and Reunification

In the aftermath of World War II, Germany was split into four zones each administered by one of the allied forces. In 1949, the Federal Republic of Germany (FRG or West Germany) and the German Democratic Republic (GDR or East Germany) were officially founded following these partitions. The GDR developed as one of the most rigid of

the former Communist regimes. As the countries' economic and political performance diverged, more and more citizens from East Germany migrated by crossing the border into West Berlin. To stop this exodus, a wall was built around the western part of the city in 1961. The Berlin Wall became the symbol of the forty year physical and socio-economic separation of a people which had previously shared a common destiny.

By the end of the 1980s, a series of sudden and radical political changes led to the collapse of Communism in most of the Soviet controlled countries of Eastern Europe. This emblematically culminated with the televised destruction of the Berlin Wall on the evening of the 9th November 1989 as the borders between East and West Germany were declared opened. There was a strong political will to reunite the two countries and this was completed less than a year later in October 1990, see Judt (2005) for details. The very abrupt end of half a century of Communist rule and the express reunification that followed led to a period of great socio-economic uncertainties for the population in the new East-German Landers. This was perhaps best reflected by the massive fall in the number of births that occurred there in the years just after the fall of the Berlin Wall.

2.2 The Fertility Drop

Figure 1 reports the crude birth rate (per 1,000 population) between 1950 and 2008 for East and West Germany. What we first note is that up to reunification, the trends in both countries were very similar with: a post-war baby boom up to the early 1960s, a rapid decrease (readjustment) of fertility in the following decade, and a relative stabilisation between 1970 and 1990³. The fall of the Berlin Wall triggered a rapid and unprecedented collapse in birth rates in the East that was not observed in West Germany. Within a year, birth

³ The slight increase in fertility in East Germany from 1974 onwards, is the result of the adoption of pro-natalist policies, providing a range of welfare benefits to parents (see Reinheckel et al. (1998) for details). However these policies were only relatively successful as they only managed to make the countries crude fertility rate catch up with the Western trend.

rate dropped by 40% and reached an all-time low in 1993, 50% lower than its 1989 level⁴. This is clearly a drastic decline in fertility and demographers who have documented the phenomenon have even qualified it as the “most substantial fall in birth rates that ever occurred in peacetime” (Conrad et al., 1996, p.331) and gone as far as suggesting that “East German adults appear to have come as close to a temporary suspension of childbearing as any such population in the human experience” (Eberstadt, 1994, p139). We are not interested in whether women postponed, reduced the number of children or whether the drop is due to an increasing fraction of women remaining childless, since our interest is only in the composition of the cohort of children born between 1991 and 1993.

What is also interesting about this fertility drop, and is important for our identification strategy, is that it seems to have been relatively short lived in nature. We note that the number of births seems to have strongly recovered from 1994 onwards in East Germany while it was continuing to gradually decline in the West. Perhaps the most efficient way to illustrate deviation in trends is to plot the year on year difference in difference coefficients of the crude birth rate between East and West Germany. This is depicted in Figure 2 with the horizontal line marking no difference in change in year on year fertility and the vertical line the fall of the Berlin Wall. In the forty years up to 1990, the gap between the trends in the two countries had never exceeded + or – 10 percent. It then becomes almost – 50 percent in the year following the end of communism before returning to a positive value in 1994. Figure 2 clearly illustrate the extent and temporary nature of the fertility drop and it also designates the cohorts of children we should consider as ‘treated’ as those born from 1991 to 1993.

2.3 Explaining the Fertility Drop

⁴ Large drop in fertility were also observed in other countries following the end of communist regimes but the size of the fertility drop does not appear to be related to the harshness of the economic transition (Sobotka et al., 2011).

It is quite obvious that there was an unprecedented drop in the number of births in East Germany after the fall of the Berlin Wall. Perhaps more complex is pin-pointing the exact factors which may have been responsible for this fertility drop. We discuss below three potential explanations: access to birth control; socio-economic uncertainty; and internal migration; and

Access to birth control methods

Most of the previous literature on fertility decision and child outcome has exploited policies which changed access to birth control, mostly access to abortion. We argue here that this is not a factor which can explain the drop in births we observe. First, access to birth control methods was very liberal in East Germany and the right to on-demand abortion was not changed before 1993 when it became quite restricted⁵. One might therefore expect that the drop in fertility was the result of an increased use of birth terminations. However, abortion figures do not back this up, since the number of abortions dropped by 40% between 1989 and 1992 (Eberstadt, 1994); less than the drop in birth numbers over the period. Hence the fall in birth is mostly due to a fall in conceptions.

This is also very consistent with what we can see on Figure 3 which plots the monthly number of births in East and West Germany from January 1990 to December 2000. The marked drop in children born in the East clearly starts in August 1990 (vertical line) which is exactly nine months after the fall of the Berlin Wall in October 1989. This evidence strongly indicates that conception decisions were only halted in the months after the end of Communism and that most women who had already conceived did not terminate their pregnancy. This is important for two reasons. First it means that our ‘control’ groups (of mothers and children) for our analysis will include individuals exposed to the same socio-

⁵ Sterilisation became then available, however this contraception method was used by less than three percent of women (Rheinheckel et al 1998)

economic situation in East Germany as those ‘treated’ by the fertility shock of 1991-1993. Second, we will not face the problem of abortion availability on longer run effects selection which Ananat et al (2009) argue has the perverse effect of greatly reducing the cost of the marginal pregnancy. This nine month gap between the fall of the wall and the drop in birth number also indicates that the latter is not solely driven by out-migration of potential mothers since freedom of movement became possible from November 1989 (more on migration below).

Internal migration

After the fall of the Berlin Wall, migration to the more opulent West became possible again and was unrestricted for citizens of the former GDR. A substantial number of individuals opted for this option and the population of East Germany had dropped from 16.5 to 15.5 million between 1989 and 1994. Although this represents only 6 percent of the total population, since movers were disproportionally of childbearing age, this migration has been calculated to responsible for up to 10 percent of the birth reduction observed (Eberstadt, 1994). This nevertheless leaves over 90 percent of the drop in childbirth due to changes in conception behaviours. Note also that between 1989 and 1994, the number of birth fell by 120,000 in East Germany but increased by only 9,400 in West Germany (Conrad et al, 1996), so clearly migration alone cannot explain the fertility drop in the East, nor would it invalidate our econometric approach since the impact on the control group appears limited (no change to the trend in birth rate in West Germany).

Still, since migration is highly selective, this may remain a worry for the validity of our results and the fertility decision mechanism that we argue is behind it. We propose two ways of dealing with this issue. Our first approach is to exploit individual data (GSOEP described in detail in the following section) to consider jointly individual migration and

fertility decisions. We show in Appendix Table A1 that individuals who moved to West Germany were indeed positively selected on most socio-economic characteristics. More interestingly, in Table A2, we report the difference in probability of migration if a child was born (East or West) between 1991 and 1993. This difference becomes reassuringly insignificant when compared to all women who had children three years before or after this period. Our second approach is to collect Lander to Lander population movements from 1991 to 2010 to examine the effect of female migration on our main outcome results for their children. By including a measure of the proportion of potential mothers who moved West we should be able to see the importance of migration on our findings. We do this as a robustness check when we present our crime results in Section 6.2.

Other societal change

The cohort of women coming to their peak fertility age in 1989 were born in the early Seventies, a period that had been characterised by a sudden drop in fertility. Without any change in environment or reproductivity behaviour, we would thus have expected the number of birth to decrease in East Germany at the beginning of the Nineties. This cohort effect contributes about 10% of the drop in the number of birth observed (Eberstadt, 1994).

A related explanation for the drop in fertility would be a deterioration of the health conditions following the collapse of the free-care system available under communist regimes. Eberstadt (1994) does indeed report an increase in mortality following the collapse of the wall which mostly affected men aged 15-44 whose mortality rate increased by 30% over 1989 values. Female health for the same age group also deteriorated with mortality rate increasing by about 10%. However, infant mortality dropped by 20% over the same period.

The communist regime of East Germany also promoted pro-natalist policies from 1972 onwards following a drop in the fertility rate below replacement rate in the previous

years. These policies, nicknamed the Honecker Berg led to a short lived fertility boom, before fertility rate returns on trend with the West German one. The policies included financial incentives for birth (and marriage) worth about one month of the average net-salary for each birth, possibility of interest free loans for parents and provision of apartments⁶. The key policies were the provision of free childcare for children aged one and above and from 1976 onwards a one-year maternity leave on full salary⁷. By the end of the Eighties, up to 85% of under 3 year olds in East Germany were in state provided nursery compared to only 5% in the West (Reinheckel et al (1998). These policies allowed the full employment of mothers; more than 70% of married mothers were fully employed in the East in 1988, this compares with less than 20% in West Germany (Reinheckel et al, 1998).

Since childcare was often provided by employers, the turmoil of reunification and the plunge in the number of children led to a dramatic fall in the provision of childcare after 1990, substantially increasing the direct costs of children post-reunification. Rheinheckel et al. (1998) also report that in 1990, 45 percent of women on maternity leave lost their jobs.

Socio-Economic Uncertainty

In the communist economy there was no uncertainty concerning jobs and wages, so that couples could planned from a young age to have children.

In the months immediately following the fall of the Berlin Wall, full employment was artificially maintained in the East. However, by Autumn 1991 the East German economy had lost an estimated 2.4 million jobs, close to a quarter of all jobs at the end of summer 1989. By the end of 1992, the total decline in employment exceeded 35 percent of the pre-unification labour force (Biichtemann and Schupp 1992). (witte and wagner). Add to this the removal of most of the welfare benefits linked to children, the disappearance of childcare and a large increase in

⁶ See Rheinheckel et al. (1998) and Conrad et al (1996) for further details.

⁷ The policies targeted achieving equal opportunity for men and women in a communist society, but may also have had to do with chronic shortage of labour, and low wages, making women participation to the labour force a necessity (Conrad et al, 1996).

housing costs, this made the future very uncertain and children unaffordable to most families, at least in the short-run. The change to a market economy may have also altered the trade-off quantity/quality of children a la Becker (1991). Post-unification, east German parents may have decided to have less children but invest substantially more in them in order to give them the best chances of success in a competitive economy.

This negative economic environment was mitigated by large transfers from the West and a generous one to one conversion of the OstMark to the DeutscheMark (July 1990), so much so that by 1992 disposable income in East Germany had doubled over its 1989 level. Nonetheless in the 1992 European Comparative Population Policy Acceptance Survey, 78% of East Germans aged 25-39 cited economic circumstances as one of the main reasons for the drop in fertility. The other reasons were costs of raising children (60%) and fear of the future (49%).

Economic uncertainty may have ambiguous impact on fertility with the income effect leading to a reduction in fertility and the substitution effect pushing the other way as the opportunity costs of children decreases. Indeed Kreyenfeld (2010) and Bhaumik and Nugent (2005) report heterogeneity in responses to unemployment risk with more educated women postponing fertility and less educated women increasing fertility during periods of economic uncertainties. Other groups did not change their fertility decisions: teenage mothers, women aged 40 and above, or reduced their birth rate less than average, such as single mothers. As such, the proportion of children born from unmarried mothers rose from 34% in 1989 to 42 in 1992⁸ (Eberstadt, 1994).

Children born out of less educated, younger or single mothers are in general more at risk of being involved in criminal activity, as such the trends in these factors are consistent with a worsening of outcomes for the children born in the aftermath of the German reunification.

2. Data Sources

⁸ This increase in single motherhood is partly due to the drop in marriages, which also dropped by 60% over the period 1989-1994 (Conrad et al. 1996).

Individual Level Data: The GSOEP

The German Socioeconomic Panel (GSOEP) is a longitudinal survey of private households, established in West Germany in 1984 and carried out annually. Since 1990, it has also covered the territory of the former GDR. It is updated annually to collect any new information on all household members and we use the latest available version which is available for all individual from 1990 to 2010. This gives us an initial sample of almost 50,000 unique individuals with about a quarter living in East Germany for which we have a very wide range of socio-economic information. This includes detailed personal characteristics and answers to extensive questionnaire for all members of households ever surveyed, including retrospective information when necessary. It is also split by special topic modules and we make specific use of the motherhood, young adult (aged 17), and risk preferences modules in this paper. GSOEP unfortunately does not contain a single question on self-reported criminal participation. More information on the GSOEP is available at <http://panel.gsoep.de/>.

Lander Level Data

Crime data is available at the Lander level on a yearly basis from the Polizeiliche Kriminalstatistik (PKS). We use information on number of arrests of German citizen from 1993 to 2010 for 5 Eastern and 10 Western states (we exclude Berlin, the only Lander which straddles the old East/West border). The data reports the age of the arrested individuals, however it is grouped into the following age categories: 8-13; 14-17; 18-20; 21-24; 25+. This slightly complicates the definition of our treatment indicator and we explain how we solve this issue when we present our empirical strategy in the next section. From the same source, we also obtain the number police personnel active by year and Lander. We combine this state

level panel data on: population size by age, nationality and gender and overall and youth unemployment rates which all come from the Statistisches Bundesamt (www.destatis.de). Staff at this statistical agency was also able to provide us with Lander to Lander registered migration flows from 1991 to 2010⁹. Altogether the panel dataset we generate covers 5 age groups in 15 states over 18 years and as such is composed of 1,350 observations.

4. Empirical Strategy

In all cases our empirical strategy relies on a straightforward difference in differences approach which exploits the natural experiment provided by the post-Berlin Wall drop in birth rates. We always compare the characteristics or outcomes of women who gave birth and of their children who were born in East Germany in 1991, 1992, and 1993 to both comparable individuals born before or after (when possible) in the ex-GDR. All specifications also include the non-treated control individuals or Landers from West Germany enabling us to obtain estimates cleaned of common-trends. However, because of the nature and structure of our individual and Lander level data, we must define two different modeling strategies that depict our general difference in differences approach.

Individual Level Data

We rely on GSOEP to first highlight selection into motherhood and later investigate deviations in children characteristics to assess whether their criminality stems from low educational attainment or other family characteristics. These estimates are all based on the following difference in differences set up, where Y is a set of various outcomes:

⁹ We are very grateful to Anna-Lena Lobov from Statistisches Bundesamt for providing this data.

$$Y_i = \alpha + \beta CoW_i + East_i + Yr_i + \varepsilon_i \quad (1)$$

where i denoted individuals and CoW is dummy for ‘Children of the Wall’ which is 1 if gave birth (or born) East between 1991 and 1993 and 0 otherwise. $East$ is a dummy for being in East Germany at birth, and Yr is a year of last survey dummy. All specifications will be weighted by cohort size to take into account the smaller proportion of CoWs.

Lander Level Crime Data

As before, we would want to define a ‘Children of the Wall’ (CoW) dummy as the cohorts of individuals in Eastern Landers born in 1991, 1992, or 1993. A difficulty with the arrest data is that it is only available by age-group and we compute the proportion of grouped cohort that is treated: E.g. Arrest age-group 8-13 is 1/6th treated in 1999 (8 year old born in 1991); 2/6th in 2000 (8 year old born in 1992 and 9 year old born in 1992), and so on. Table 1 reports the fraction of the population treated for the various crime age group and crime years. The suggestion is therefore that age-groups which include ‘Children of the Wall’ will vary in intensity of treatment over the years. Our proportion of CoW in age group indicator should easily take this into account¹⁰.

We will consider two main outcomes for criminal participation which are: i – $\log(\text{arrest rate per 1,000 population})$ and ii – the ratio of proportion of arrestees/proportion of the population for age group a in Lander s in year t . We can write these as outcome Y_{ast} in the following linear relation:

¹⁰ These proportions do not take into account that the CoW cohorts were smaller and thus over-estimate the treated population, which would bias our estimates downward. Still, the weighting of all cells by relative age group size should minimize this issue.

$$Y_{ast} = \beta PropCoW_{ast} + \delta Z_{st} + Yr_t + Age_{st} + \alpha_a + \varepsilon_{ast} \quad (2)$$

Where *PropCoW* is an interaction between an ex-GDR Lander indicator and the proportion in a specific age-group cohort that are born in 1991-1993. α_a , *Yr* and *Age* are sets of dummies for Lander, year and age-group respectively. *Z* is a set of time varying Lander specific controls; specifically: number of police personnel per 10,000 population, proportion of foreign born per age group, and overall and youth unemployment. We will also estimate specifications which include Lander specific time trends. To test the impact of internal migration, we will also carry out a robustness check by including the proportion of potential mothers who have migrated from Eastern to Western Landers in a final specification.

6. Results

6.1 Parental selection

As already discussed, the large fertility drop we study is certainly not random across women and is likely to be driven by selection into motherhood. Our prior is that, faced with a high level of uncertainty for the future, it is women with relatively higher socio-economic status which will choose not to have children. This is the hypothesis we statistically assess now with regressions based on equation (2) and using the GSOEP data. Table 2 presents estimates of how the mothers of ‘Children of the Wall’ differ from other mothers on a number of characteristics. We find that on average they are younger by about a year, have fewer years of education, and are statistically less likely to be married (or cohabiting). The results also indicate that mothers of CoWs are slightly less attached to the labour market and gave lower incomes but the coefficients are here only marginally significant. Overall these are classic indicators of mothers who usually possess relatively lower parental skills and confirms that the fertility shock was a result of positive selection *out* of motherhood.

The Children of the Wall cohorts will have an over-representation of individuals with mothers one might describe as ‘reckless’ in that they did not respond to environmental factors which pushed a large number of women to postpone fertility. A smaller cohort of children resulting from a negative selection *into* motherhood is unique to our natural experiment and should help interpretation of our results. Legalization of abortion in the US resulted in less children being born from mothers with relatively worse parental characteristics. Research using this policy has therefore been unable to distinguish the potential positive effect of smaller cohort size from the effect of positive selection into fertility on child outcomes it seeks to estimate. The estimates from Romanian abortion ban studied by Pop-Eleches (2006) suffers from the opposite problem of larger cohort size coupled with negative fertility selection. Here we will also not be able to disentangle these two effects but we can argue that, if anything, the smaller cohort size should be beneficial for the Children of the Wall’s outcome. Our estimates will therefore be lower bounds of the true impact of fertility selection on the offending behaviour of the following generation.

6.2 Criminal Participation

Before turning to our statistical analysis, we illustrate graphically the evolution from 1993 to 2010 of our two main crime outcomes of interest for each East and West German cohorts by age group. Figures 4a to 4e depicts the arrest rate per 1,000 population (top graphs) and the arrestee to population ratio¹¹ (bottom graphs) for the five age groups we have available. The vertical lines mark the beginning and the end (when possible) of the inclusion of treated individuals in the cohort. Figures 4a (8 to 13 years old) and 4b (14 to 17 years old) reveal a

¹¹ To be clear, the ‘arrestee to population ratio’ is constructed as the proportion of arrests age group a represents among all arrests divided by the proportion of population age group a represents among all the population. We believe this measure of criminal activity should capture better the fast changing size of the CoW than when using the arrest rate where population is the denominator,

strikingly similar pattern with the criminality of Eastern cohorts of youths markedly increasing, and diverging from that of their Western peers, as the proportion of Children of the Wall increases. What is also noticeable is the drop in this difference as the cohorts of East Germans is no longer composed of treated individuals. In Figure 4c (18 to 20 year olds), only 2009 and 2010 include Children of the Wall but the divergence with West German trend is also clearly apparent, especially when looking at the arrestee to population ratio graph. Figures 4d (21 to 24 year olds) and 4e (25 years and older) do not show any important deviation between East and West German arrest trends which is what we would have expected with none of these cohorts yet including the treated individuals. These patterns are consistent with negative selection whereby parents who gave birth in East Germany between 1991 and 1993 had characteristics that made their children much more crime prone. Also, the great similarity in pre-treatment trends in all figures is very reassuring for the validity of the difference-in-difference approach we adopt and turn to now.

Table 3 reports the estimates of OLS estimates following equation (1) and using state level panel data we have created. The results are presented for our two measures of criminality (log arrest rate and arrests to population ratio) and the specification include sequentially: only age group, Lander, and year dummies columns (1) and (4); time varying Lander controls in columns (2) and (5); and Lander specific time trends in columns (3) and (6). Finally, the estimates are alternatively for all age groups in row (i); under 25s only in row (ii); and only cohorts including treated individuals or under 21s in row (iii). These results all confirm that Children of the Wall engaged disproportionally more in criminal activity. Looking at the most conservative estimates, the fullest specifications for under 21s only, we estimate that they represent more than $2/3^{\text{rd}}$ as many arrestees than their cohort size would suggest and have arrest rates over 50 percent above expectations.

Before we interpret these results, we want to make sure that they are not driven by a potential alternative selection mechanism other than fertility selection: internal migration. We have created for each year and age group a measure of the net proportion of potential mothers who moved out of each Lander. We include this variable in specifications with and without Lander specific time trends for our preferred groups of young individuals in Table 4. The coefficients on the migration of potential measure is often revealed to be relatively large but never significant. Most reassuringly we do not find that its inclusion changes any of our results significantly: 50 percent higher arrest rate and 70 percent arrest to population ratio for the Children of the Wall.

These are very large effects but they are actually very much in line with Donohue and Levitt (2001, 2004, 2009) who concluded that abortion repeal is responsible 50 percent of the drop in crime observed in the US in the 1990s. We must also remember that we had argued that our estimates were lower bound and our results are therefore suggestive of an extremely strong impact of parental selection on criminal participation of children. The next section attempts to explore some mechanisms that may explain why this happens.

6.3 Child Characteristics and Parental Relationship

To explore underlying mechanism that may account for the high offending probability we consider how they compare to peers on a large number of characteristics. We do this by using GSOEP information collected when individuals are aged 17¹² and implementing the model described in equation (1). We focus on a two main sets of characteristics which are likely to be associated with criminal activity: educational achievement and parental

¹² The last GSOEP survey available is from 2010 which means that the last individuals who completed this special module were born in 1993. Consequently we do not yet have in our control group children born after the fertility shock subsided but only the ones born before.

relationship. The results are reported in Table 5. Surprisingly we do not find that any of the measures of educational performance (dropping out of school, repeated grade, and having test scores in math and German above average) are significant. Worse school outcomes and the associated poor labour market expectations do not seem to be able to explain the offending behaviour of the Children of the Wall. Looking at parental relationship, we do not find that they are significantly more likely to fight or argue with their mother or father. However, we estimate that these children are 13 to 15 percentage points less likely to report feeling loved by their parents. This indicates that parents who decided to have children at time of great economic uncertainties may have been worse parents who did not develop the appropriate emotional connection with their children. It is an important finding and a surprising one considering that there were no real barrier to birth termination at the time and therefore the unwanted argument is hard to defend. If anything these children must have been really wanted to have them when the future was so blurry.

The fertility choice and the effect on children may perhaps best be explained by certain aspects of individual preferences. Risky behaviour has long been associated with most youth unsafe activities (Gruber, 2001) and recent literature has pointed out the importance of risk attitude in predicting individual economic outcomes (Dohmen et al 2011). We therefore exploit the very detailed risk attitude information contained in GSOEP and equation (1) to test if this may play an important role in the fertility-crime relationship we study. The results for mothers and children (both limited to births between 1980 and 2009) are presented in Table 5. We find strong evidence that both women of a CoW and the children themselves are significantly more willing to take risk. These results holds with the inclusion of individual's age and education level¹³. The pattern of our results also fits very well with new evidence that

¹³ An interesting finding here also stems from the coefficient on the East dummy we report: significant for mothers but not for their children. It appears to confirm the assumption put forward by Alesino and Fuchs-

parents transmit preferences for risk to their children (Dohmen et al 2012). Our estimates therefore suggest that differences in risk preferences may play an important role in explaining why certain women do not respond to environment incentives when making fertility decisions and why their children subsequently end up make poor life decisions such as participating in crime.

7. Conclusion

This paper highlights the effects of parental selection on subsequent criminal activity of the second generation. Rather than relying in changes in abortion law, which affects only part of the population; we use a large social and political shock. The collapse of the Berlin Wall in 1989, led to a 50 percent drop in fertility over a four years period, before fertility went back to trend. As such, the effect of parental selection can be estimated for a precisely defined cohort of children and is such not driven by secular trends. We report that children born in East Germany in the aftermath of the regime changed are 50 percent more likely to be arrested than predicted. We then identify some potential mechanism by which this greater criminal propensity may happen.

Note that the crime estimates are of the same scale as those obtained in the U.S. for the impact of abortion on crime. Since the country, the identification and the population affected are different, this was rather unexpected. In the U.S., the reduction in crime followed the introduction of abortion which reduced the number of children born from (black) single mothers. Here the mechanism is that with the economic uncertainties following the fall of the Berlin Wall, younger and more educated women postponed having children or migrated to the West. As such the CoW are disproportionally made of children with mothers of less

Schündel (2007) of a convergence of preferences between East and West Germans within a generation as individual exposure to Communism decreases.

favourable characteristics. Moreover, parents of CoW have worse parenting skills since their children are 12 percentage points less likely to report being loved by them. We also argue that risk preferences play an important, an previously unnoticed, role in explaining both the fertility choice of parents and the criminal participation of their children.

Our findings suggest two important policy implications. First, even when all birth control options are available, a substantial proportion of women still make poor fertility choices which will negatively impact on their children's future. It is very difficult to see how to prevent this without resorting to policies which would be socially unacceptable. Second, since these births cannot be realistically prevented, the viable option is clearly to opt for early childhood intervention. This is the time when preferences are most likely to be malleable by increasing cognitive ability (Dohmen et al 2010) which would in any case also greatly improve future life opportunities. The real challenge is to find a way to target efficiently such intervention at the right children which could only be achieved by identifying the 'reckless' mothers.

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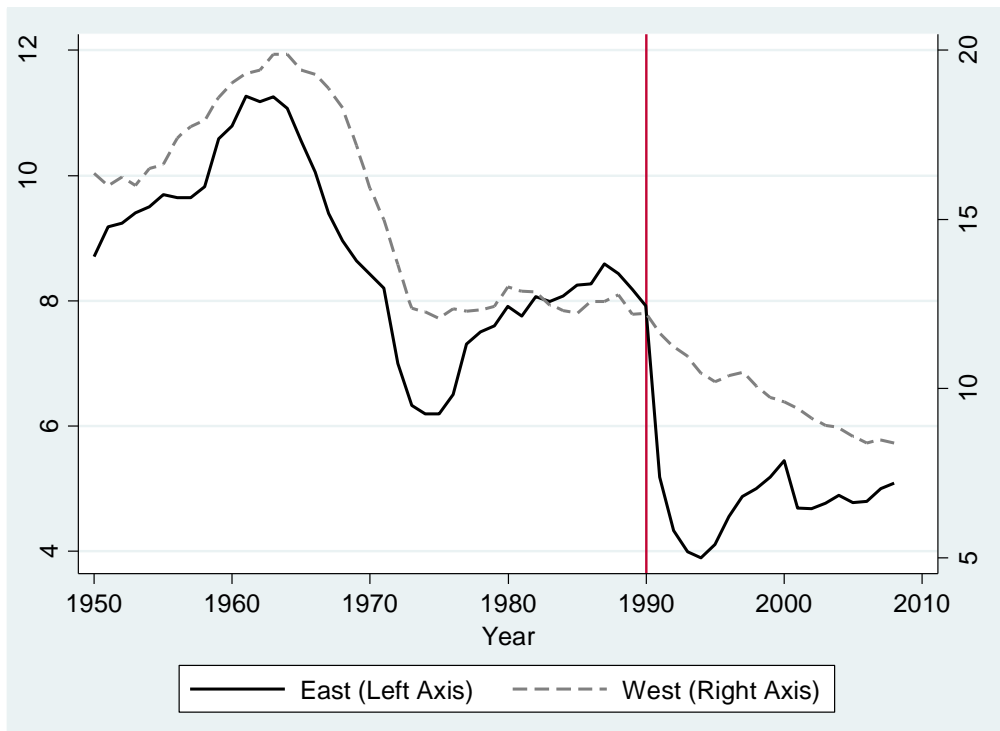
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Figure 1: Annual Crude Birth Rate per 1,000 Population from 1950 and 2008



Source:

Figure 2: Difference in Difference Coefficients of East Vs West Crude Birth Rates per 1,000 Population from 1951 and 2008

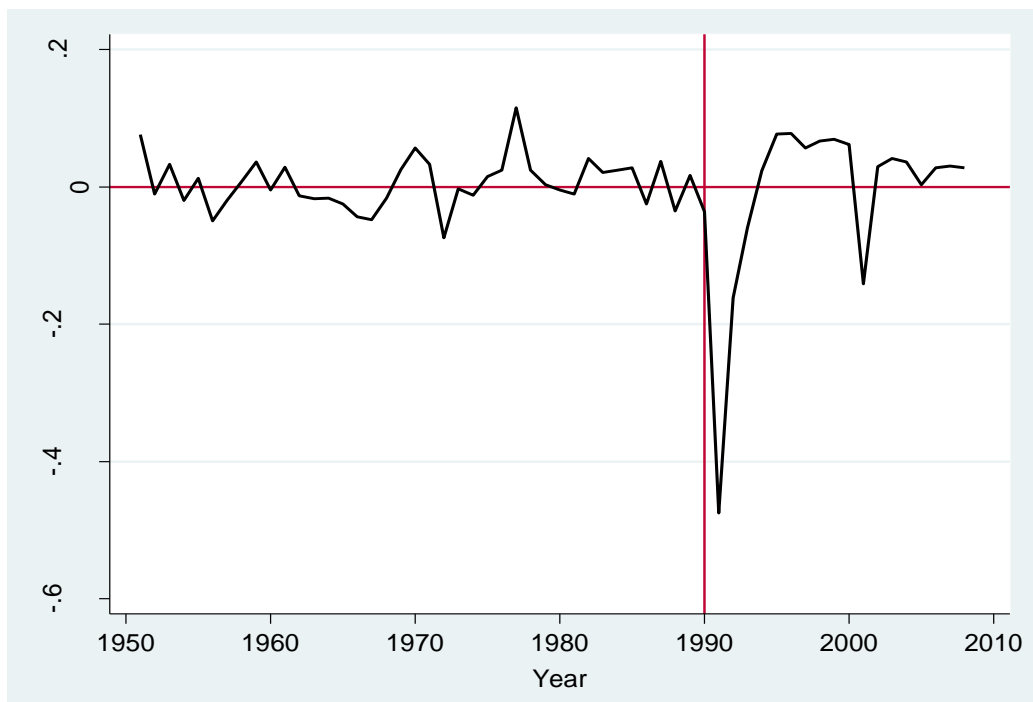
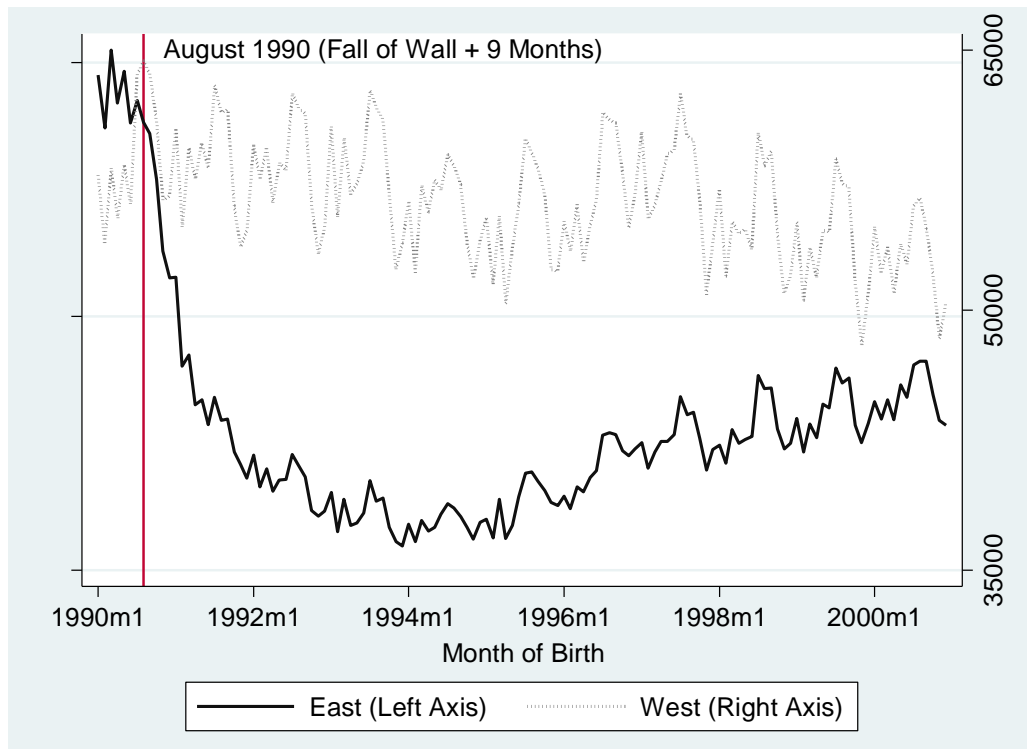
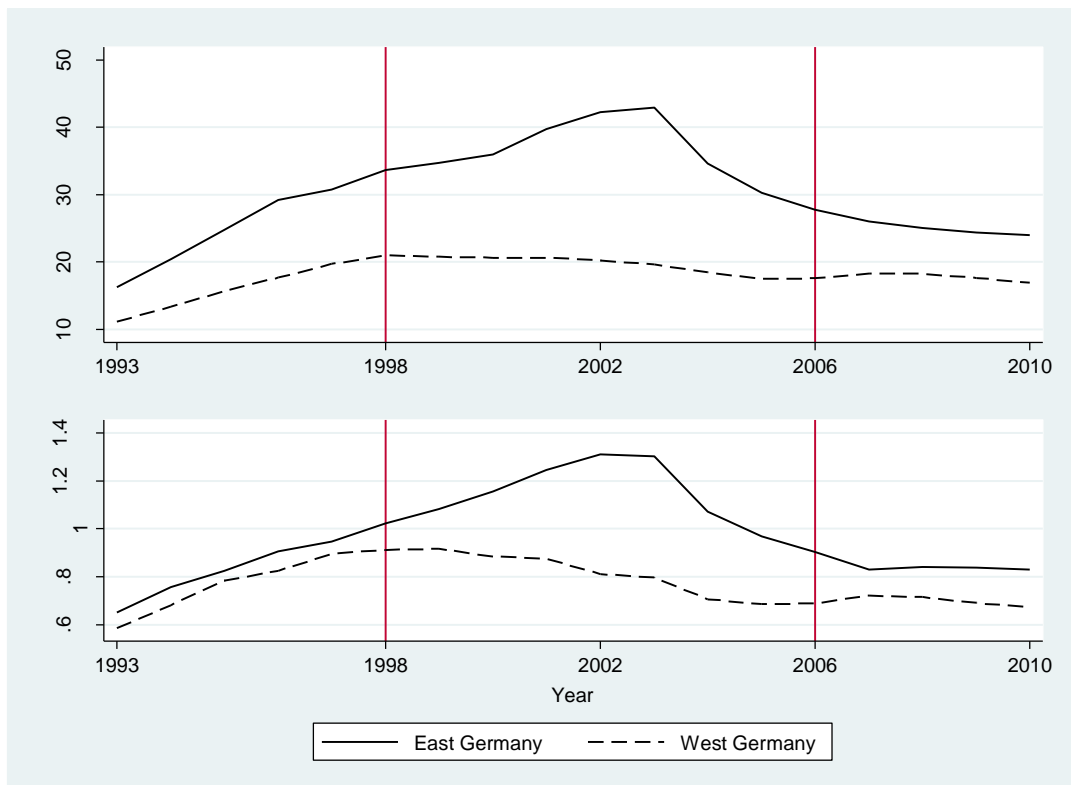


Figure 2: Monthly Number of Birth from 1990 to 2001



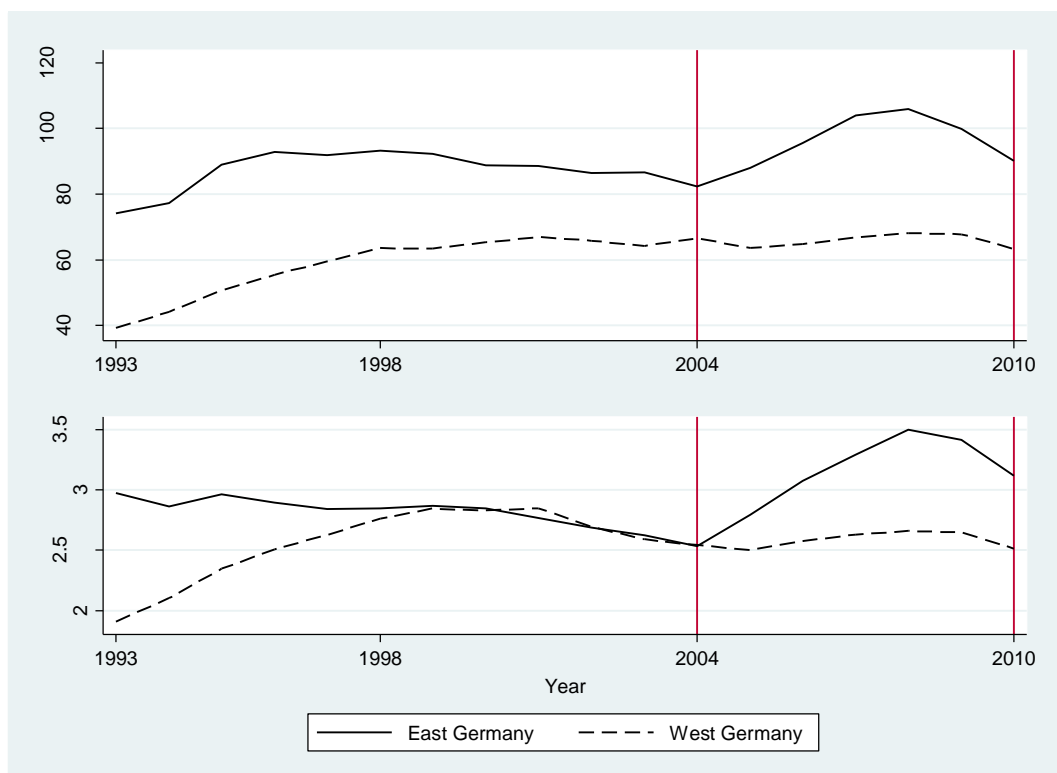
Source:

Figure 4a: Arrest Rates and Arrest/Population Ratio of 8 to 13 Year Olds



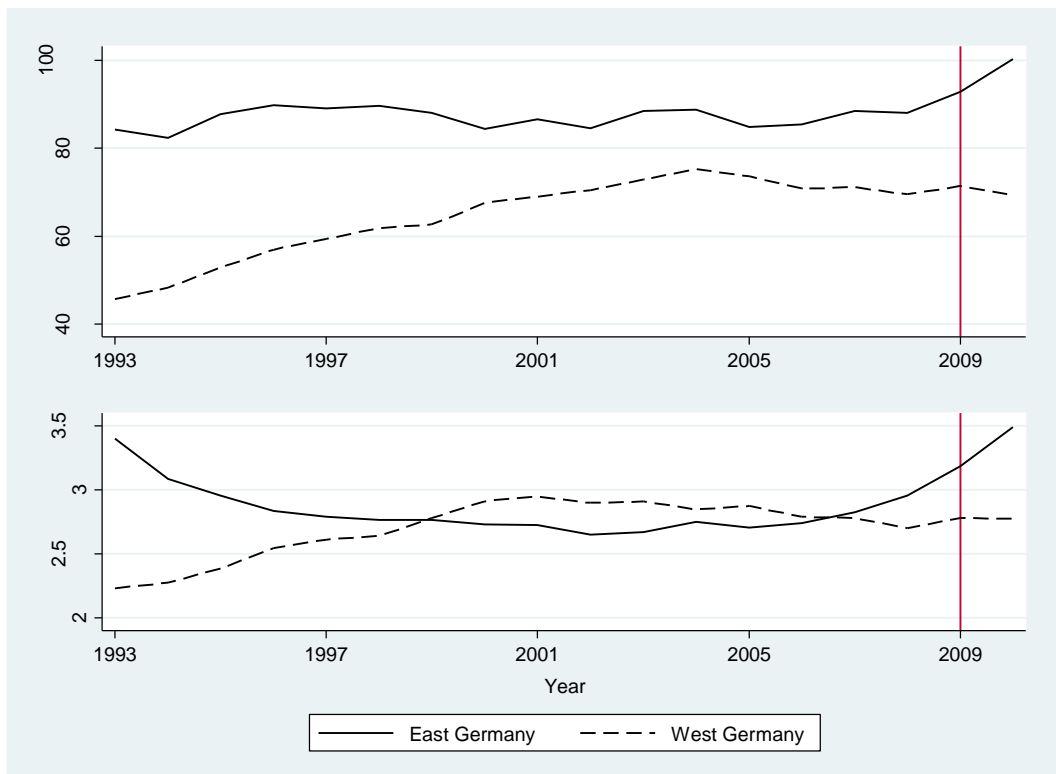
Source: Polizeiliche Kriminalstatistik statistical yearbooks 1993 to 2011

Figure 4b: Arrest Rates and Arrest/Population Ratio of 14 to 17 Year Olds



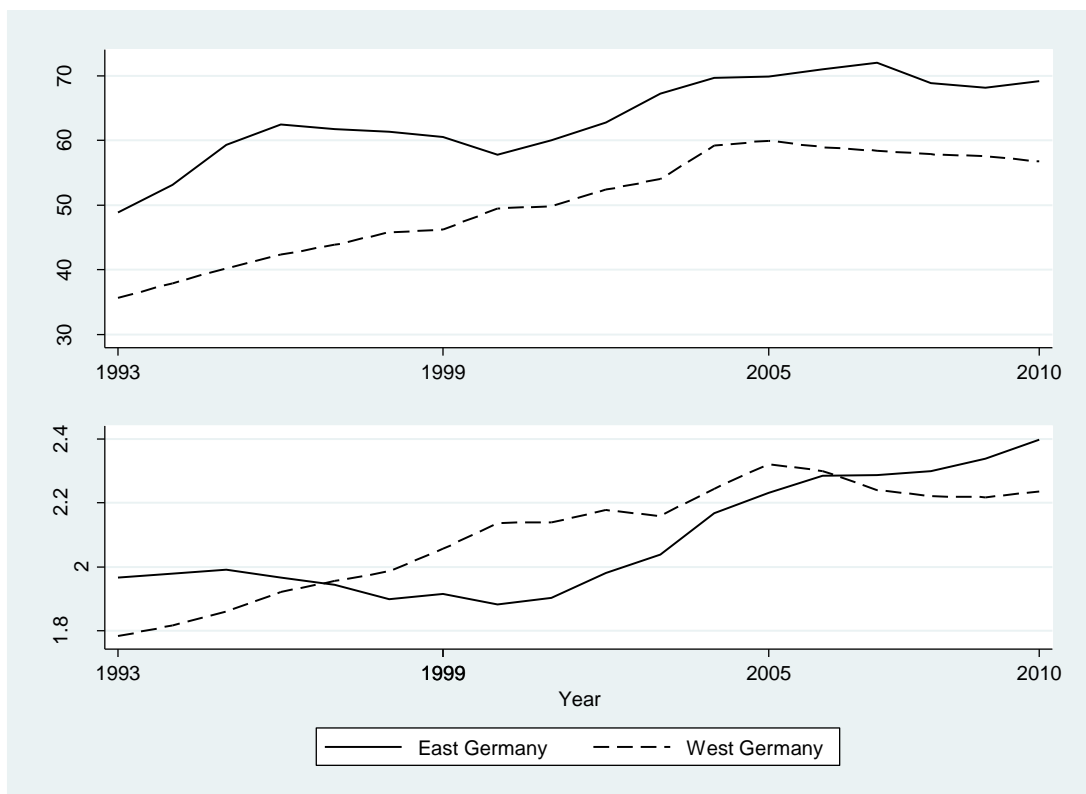
Source: Polizeiliche Kriminalstatistik statistics yearbook 1993 to 2011

Figure 4c: Arrest Rates and Arrest/Population Ratio of 18 to 20 Year Olds



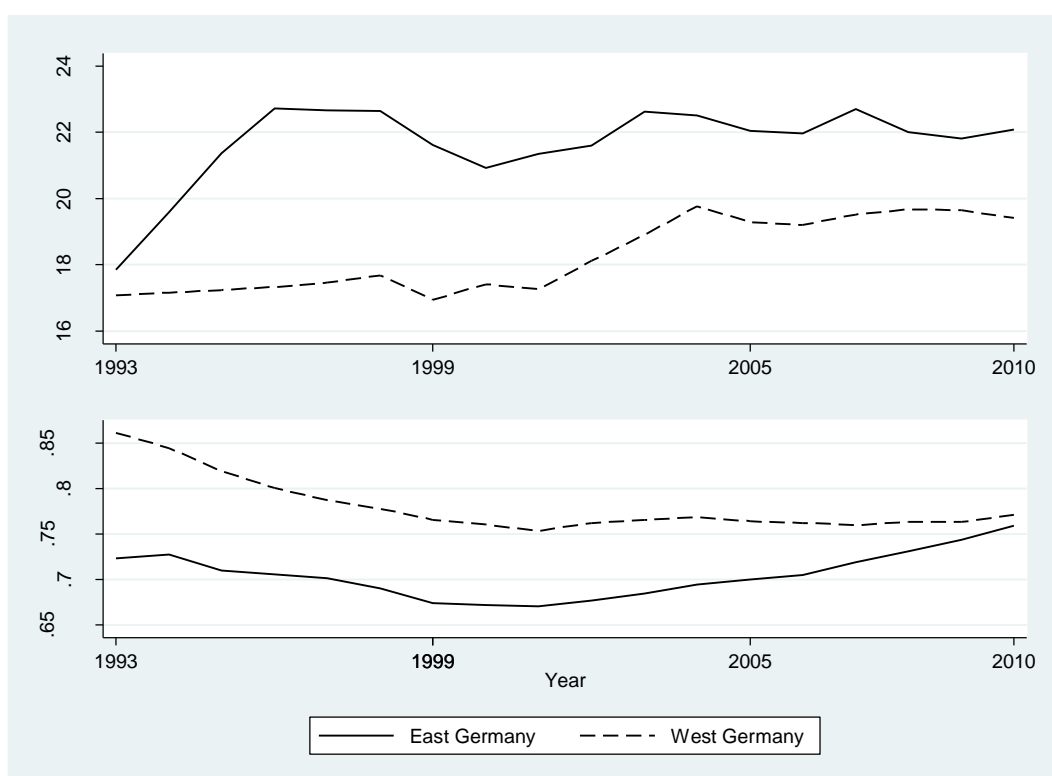
Source: Polizeiliche Kriminalstatistik statistics yearbooks 1993 to 2011

Figure 4d: Arrest Rates and Arrest/Population Ratio of 21 to 24 Year Olds



Source: Polizeiliche Kriminalstatistik statistics yearbook 1993 to 2011

Figure 4e: Arrest Rates and Arrest/Population Ratio of 25+ Year Olds



Source: Polizeiliche Kriminalstatistik statistics yearbook 1993 to 2011

Table 1: Fraction of Children of the Wall in different Groups over Time

Age Group/ Year	8-13	14-17	18-20	21-24
1998	0	0	0	0
1999	1/6	0	0	0
2000	2/6	0	0	0
2001	3/6	0	0	0
2002	3/6	0	0	0
2003	3/6	0	0	0
2004	3/6	0	0	0
2005	2/6	1/4	0	0
2006	1/6	2/4	0	0
2007	0	3/4	0	0
2008	0	3/4	0	0
2009	0	2/4	1/3	0
2010	0	1/4	2/3	0
2011	0	0	3/3	0

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

Table 2 – Differences in Characteristics of *Mothers* of the ‘Children of the Wall’

	Age of Mother	Years of Education	Mother Married	Mother Employed	Mother Log(Income)
CoW	-1.062*** (0.354)	-0.454** (0.208)	-0.143*** (0.051)	-0.085* (0.047)	-0.108* (0.062)
East Dummy	-2.649*** (0.148)	0.961*** (0.079)	-0.087*** (0.014)	0.088*** (0.013)	-0.205*** (0.018)
Year Dummies	Yes	Yes	Yes	Yes	Yes
Cohort Size Weight	Yes	Yes	Yes	Yes	Yes
Sample Size	11,971	6,561	6,690	6,690	6,690

Note: Source GSOEP 1990 to 2010. CoW is the interaction of having a child between 1991 and 1993 and in East Germany. Standard errors are clustered at the Lander level.

Table 3 – OLS: Cohort Arrest Rates & Arrest/Population Ratios

	Log Arrest Rate			Arrest to Population Ratio		
Proportion of Cohort Born 1991 to 1993	(1)	(2)	(3)	(4)	(5)	(6)
i - All Age Groups	0.754 (0.097)	0.726 (0.109)	0.763 (0.105)	1.094 (0.092)	0.977 (0.118)	0.979 (0.119)
ii –Under 25s Only	0.436 (0.039)	0.610 (0.089)	0.681 (0.077)	0.745 (0.046)	0.883 (0.096)	0.937 (0.084)
iii –Under 21s Only	0.390 (0.036)	0.509 (0.077)	0.542 (0.063)	0.711 (0.063)	0.671 (0.082)	0.705 (0.059)
Age Group, Lander, and Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Lander Time Varying Controls	No	Yes	Yes	Yes	Yes	Yes
Lander Specific Time Trends	No	No	Yes	Yes	Yes	Yes

Note: The sample sizes are respectively: 1,350 for i; 1,080 for ii; and 810 for iii. The Lander time varying controls are: regular unemployment and youth unemployment rate; proportion foreign born by age groups; and number of police officers per 1,000 population. Robust standard error clustered at Lander level in parenthesis.

Table 4: Robustness - Cohort Arrest Rates & Arrest/Population Ratios
Accounting for Effect of Migration of Potential Mothers

	Log Arrest Rate		Relative Size of Arrests/Population	
	Under 25s Only	Under 21s Only	Under 25s Only	Under 21s Only
Proportion of Cohort Born 1991 to 1993	0.628*** (0.077)	0.506*** (0.073)	0.897*** (0.083)	0.698*** (0.059)
Proportion of Potential Mothers Migrating	1.829 (1.402)	1.402 (1.093)	1.362 (1.907)	0.296 (1.137)
Age Group, Lander, and Year Dummies	Yes	Yes	Yes	Yes
Lander Time Varying Controls	Yes	Yes	Yes	Yes
Lander Specific Time Trends	Yes	Yes	Yes	Yes
Sample Size	1,080	810	1,080	810

Note: The ‘Migration of Potential Mothers’ measure is created as the net migration of women from a Lander divided by the number of prime aged women in the same Lander at the time when the individuals in a cohort would have been born.. The Lander time varying controls are: regular unemployment and youth unemployment rate; proportion foreign born by age groups; and number of police officers per 1,000 population. Robust standard error clustered at Lander level in parenthesis.

Table 5: Differences in Characteristics at Age 17 of the ‘Children of the Wall’

	Educational Attainment			Parental Relationship			
	School Drop-Out	Repeated Grade	Test Score Above Average	Fight with Mother	Fight with Father	Mother Loves Me	Father Loves Me
CoW Dummy (Born East 1991-93)	-0.017 (0.019)	0.062 (0.048)	-0.015 (0.054)	0.090 (0.057)	0.077 (0.062)	-0.126** (0.047)	-0.150*** (0.056)
East Dummy	.001 (.007)	-0.051*** (0.017)	-0.070*** (0.019)	-0.070*** (0.022)	-0.082*** (0.023)	0.038* (0.022)	0.004 (0.021)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Size Weight	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample Size	3,376	3,472	3,256	3,021	3,043	3,007	2,995

Note: Source GSOEP 1990 to 2010. CoW is the interaction of being born between 1991 and 1993 and in East Germany. Standard errors are clustered at the Lander level.

Table 6: Risk Attitude Results: Mothers and Children

Dependent Variable = Proportion Willing to Take Risk (i.e. Risk Attitude > 5 out of 10)						
	Mothers (child 1980 to 2009)			Children (born 1980 to 2009)		
CoW Dummy	0.100** (0.042)	0.082** (0.040)	0.088** (0.041)	0.141*** (0.052)	0.117** (0.053)	0.117** (0.053)
East Dummy	0.106*** (0.011)	0.038*** (0.011)	0.035*** (0.011)	-0.003 (0.016)	0.003 (0.016)	0.004 (0.016)
Age	-	-0.010*** (0.000)	-0.002** (0.001)	-	-0.015*** (0.003)	-0.014*** (0.003)
Education	-	-	0.014*** (0.002)	-	-	-0.001 (0.001)
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Cohort Size Weight	Yes	Yes	Yes	Yes	Yes	Yes
Sample Size		9,183			4,560	

Note: Source GSOEP from 1990 to 2010. CoW is the interaction of having had a child for mothers and for being born between 1991 and 1993 in East Germany. Risk attitude measures come from the average of the 2004, 2006, 2008, 2009, and 2010 of questions on the willingness to take risk ranked between 0 (minimum) and 10 (maximum).

Appendix A: East to West Migration

Table A1: Differences in Characteristics between Stayers and Movers

	Stayed East	Moved West	Difference
Males	0.500	0.465	-0.034**
Age	40.1	39.7	-0.389
Married	0.532	0.424	-0.107**
High School	0.885	0.897	0.012
Years of Education	12.1	12.6	0.461***
Employed	0.509	0.688	0.180***
Yearly Income (€)	30,475	34,886	4,410***
Family with Child Born 1991-93, East or West	0.020	0.009	0.010***
Observations (Max)	12,029	995	-

Note: ** and *** denote significance of the t-test between the average for population of Stayers and Movers at the 5% and 1% confidence level. Source GSOEP 1990 to 2010

Table A2: Probability of Moving West if Born East

	All	Women Only	Mothers 1988-1996
Family with Child Born 1991-93, East or West	-0.021*** (0.004)	-0.020*** (0.006)	-0.008 (0.009)
All Controls	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes
Observations	80,123	43,411	8,889

Note: The controls are all the variables for which the means are reported in Table 5.1.