ECONOMIC UNCERTAINTY, PARENTAL SELECTION, AND THE EDUCATIONAL OUTCOME OF THE 'CHILDREN OF THE WALL'*

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Abstract: After the fall of the Berlin Wall, East Germany experienced an unprecedented temporary drop in fertility driven by economic uncertainty. We investigate whether children born during this nativity slump were positively or negatively selected. We first demonstrate that mothers who gave birth in that period where not randomly selected, and had worse observed personal characteristics. These children are also less likely to be growing up with both natural parents. Finally, we show using various educational measures that from an early age these children perform worse. Investigation of the underlying mechanisms reveals that parental educational input and emotional attachment play an important role. Finally, results for siblings support the negative parental selection rather than a time effect.

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Note part of the text is similar to an earlier version of this work which was looking at a different outcome. This version supersedes the previous one.

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1. Introduction

In this paper we document how the socio-economic environment affects not only the size but the composition of a cohort, using a natural experiment. In particular, we show how cohorts born during a high economic turmoil period perform worse on various dimensions of education. We then study the possible mechanisms, focusing on family composition and parenting behavior that could lead to negative effects on education.

Becker (1960) and Ben Porah (1973) have long hypothesized that fertility is a pro-cyclical decision, see Lindo [2010] or Schaller [2012] for recent empirical evidence. Gronau (1977)'s model suggests that a depression results in an income effect which reduces the demand for children but also, since children requires a large parental time investment, a substitution effect which pushes the demand for children in the opposite direction. Which effect dominates is a priori ambiguous but since fertility is pro-cyclical, the income effect appears to dominate overall.

However, the relative size of the effects may differ between families, leading to the economic environment affecting the size of a cohort but also its composition. Perry (2004) argues that for completed fertility, the income effect dominates for high wage earners while the substitution effect dominates for low wage earners. If this is also true for short-run variations in income, then, cohort composition would be pro-cyclical. Indeed, Dehejia and Lleras-Muney (2004) shows that white mothers giving birth when unemployment is higher are less educated resulting in worse health outcomes at birth[1].

This paper differs from Dehejia and Lleras-Muney (2004) in three dimensions. First, we rely on much larger variations in the economic environment which were largely unexpected. More precisely, we exploit the collapse of the East German economy following the fall of the Berlin Wall. Over a three-year period the fertility rate in the former East Germany was more than halved, an unprecedented peace-time event, before stabilizing. Throughout the manuscript we refer to the cohorts born in the eastern Länder[2] between 1991 and 1993 as the 'Children of the Wall' (CoW). The natural experiment we exploit led to a very profound but short-lived exogenous fertility shock in former East Germany only, which creates clear pre- and post-cohorts. Moreover, no drop in fertility was observed in the former West Germany, which can then be considered a natural control since those born on either side of the "border" where subject to ever more similar socio-economic environments when

[1] See also Adsera and Menendez (2011) for cross country evidence on the pro-cyclicality of parental selection.
[2] Throughout the paper, we will use interchangeably "Land" or "State" to refer to the 16 constituent states of the Federal Republic of Germany. Note also that the plural of Land is Länder.

growing up in re-unified Germany. This group enables us to credibly account for the potential effect of shared macro shocks, under the assumption that following reunification, the education trends were similar between the two parts of the country, which we show mostly holds. We thus use a difference in differences estimator strategy.

Second, compare to Dehejia and Lleras-Muney (2004) this paper investigates longer run consequences of parental selection. Recent research has highlighted the importance of endowment, early conditions, and parental investments on the accumulation of human capital (Cunha and Heckman, [2007] or Bjorklund and Salvanes [2010] for reviews). In particular, Cunha, Heckman, Lochner and Masterov (2006) show the high returns to early investment. As such, one may expect that changes in parental selection lead to differences in the accumulation of human capital between cohorts. Using four different datasets we are able to document variations in educational attainment from age 12 to 17. Since the cohorts we are interested in are much smaller than usual, we can immediately reject any crowding out effect and in contrast would expect the small cohort size to positively impacts educational outcomes. Consequently, if parental selection is proved to be negative for these children, our results should be interpreted as lower bound estimates of the true effect of parental selection.

Third, the literature on parental selection has been plagued by the inability to comprehensively document the parents' characteristics or the mechanism which may be associated to the children's outcomes. We fill this gap by exploiting very rich individual level data with information on mother and child characteristics, in order to expand the knowledge on the mechanisms through which parental selection affects the educational attainment of future cohorts. This data allows us to consider the previously used maternal characteristics (age, education, marital status, and employment) to establish the direction of the selection into fertility, but we also expand on two previously overlooked sets of characteristics: i) maternal emotional attachment and parenting competence as expressed by the children themselves and ii) parental input in the child's education. As such we document more precisely the parental selection and assess potential mechanisms by which it affects children's outcomes.

A remaining worry, would be that children born during this very uncertain time suffered from the environment. For example, the fetal programming hypothesis asserts that parental stress while in the womb can lead to abnormal emotional control (see van den Bergh et al. [2005] for a review), that itself could lead to negative outcomes even without parental selection (see Aizer, Stroud and Buka [2012] for example). The first test exploit test data and compare children from the same schools born around the cut-off of nine months after the collapse of the wall. These children can be considered to have shared the same economic

environment during their childhood and the same class room environment in the year of the test; as such they only differ by parental selection – the month effect can be accounted for with the West German pupils. All mothers of these children would have experienced some level of stress while pregnant, albeit at different months of the pregnancy, or during the early months of childrearing. Since timing of the stress might be important, we also conduct a second test which relies on comparing CoW with their older siblings. They would be expected to behave similarly as the CoW if the outcomes are driven by parental selection but not if our reduced form evidences are driven by being born in a particular environment.

Our main empirical analysis and the ensuing findings developed in the paper are the following. We first clearly document the unprecedented drop in birth rate observed in East Germany just after the fall of the Berlin Wall[3] and especially the drop in in-wedlock birth. We then give a number of explanations as to why it happened in the context of the historical and institutional background; one of the main reasons appears to be the fear of the economic uncertainty following the German reunification.

In the absence of any national test, we exploit German oversamples at two international tests (Progress in International Reading Literacy Study, 2001 and Program for International Student Assessment, 2006) to assess the performance of CoW at age 11 and 15, compare to their class-mates. Additionally, we use two individual level panels (GSOEP and (Deutche Junge Institute) to assess self-reported educational outcomes at age 12 and 17. The results are consistent across datasets and highlight that the affected cohorts experienced worse educational outcomes at all ages, despite benefiting from smaller class-sizes. These findings are confirmed in a large number of alternative specification and robustness checks which enable us to reject that the results are driven by time specific unobservable characteristics.

Having documented the worse outcomes of the CoW, we investigate the parental selection of the CoW. Using our various sources, we report strong evidence of negative selection of women who chose to give birth in East Germany just after the end of the communist regime. These women were on average younger, less educated, more likely to be single and economically inactive. From the GSOEP and DJI we also document that these children were less likely to grow up with both natural parents and experience less stable family structure. The effect is unlikely to come from poverty as families with children born after the fall are, thanks to the welfare net, not poorer.

[3] Other East-European countries also experienced drops in fertility following the collapse of the communist regimes in place however their magnitudes were substantially smaller than that observed in East Germany (UNECE, [2000]).

The various datasets allow us to further explore the possible mechanisms that could explain the poor educational outcomes of CoW. These parents were less likely to read to their children and more generally provided less educational inputs. Moreover, CoW rate their relationship with their parents much lower. This lower emotional attachment is often put forward in the child development literature or the long-term effect of early rearing conditions (Conti et al. [2012]). We can also reject that these outcomes are driven by material deprivation.

Finally, we reject the possibility that these children have worse outcomes due to being born in bad economic times. First, such an explanation would not involve differences in parenting behavior. Second, the test score analysis involves comparing children in the same class room born only a few months apart. Despite growing up under almost identical economic situations, the CoW performed significantly worse. One could still agree that the timing of the stress while in the womb matters, a la Barker. Thus, we examine outcomes for the CoWs' older siblings, who were born under the vary stable time of the communist regime. Those report a similarly poor relationship with their mothers and worse educational outcomes.

Our findings confirm that the cohort of children born during a period of the very large economic uncertainty was negatively selected. This conclusion has potentially important policy implications. First, provision of public services (school places) should not only be based on the size of an incoming cohort, and more attention should be paid on its composition. Second, since remedial policies are only effective if taking place at an early age (Heckman et al. [2006]) it is important to identify early children at risk. The right target group of children is however difficult to identify since the selection is driven by characteristics, such as parenting skills, emotional attachment that are typically not observed. Policies, improving those skills could thus also have a large impact on negatively selected cohorts.

The rest of the paper is structured as follows. Section 2 goes over the institutional background surrounding the period of the fertility drop we exploit as a natural experiment and considers various possible explanations on why the fertility dropped. Section 3 describes the various datasets used and specifies the differences-in-differences strategy we adopt throughout. Section 4 presents evidence on the differences in educational outcomes for the 'Children of the Wall' compare to other cohorts. Section 5 investigates potential mechanisms at work focusing on family structure and parenting. Section 6 offers concluding remarks.

2. Documenting the Fertility Drop

2.1 East Germany and the German re-unification

In the aftermath of World War II, Germany was split along the positions of the occupying armies with the Federal Republic of Germany (FRG or West Germany) and the German Democratic Republic (GDR or East Germany) being officially founded in 1949. The GDR developed as one of the most orthodox of the former European Communist regimes. As the two countries' economic and political performances 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 rapid collapse of the communist regimes in most of Eastern Europe. In the GDR large demonstrations against the regime started in September 1989 and 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 quickly re-unite the two countries. By July 1990, a common currency was introduced and re-unification was completed less than a year later in October 1990 (see for example, Judt [2005] for details). The very abrupt end of almost half a century of communist rule and the express re-unification that followed was a huge unexpected shock and led to a period of great socio-economic uncertainties for the citizen of the new East-German Länder[4]. 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

The upper panel of Figure 1 documents the yearly crude fertility rate in East and West Germany from 1950 to 2008. The first thing to note is that, while at a somewhat lower level in the East, the trends in fertility up to 1989 were very similar in both countries: a post-war baby boom until the mid-1960s, a rapid decrease (readjustment) in the following decade, and a relative stabilization between 1970 and 1990. The somewhat larger increase in fertility in East Germany starting in 1974 was the result of the adoption of pro-natal policies, providing a

[4] 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 [2012]) 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.

range of welfare benefits to parents (see Reinheckel et al. [1998] for details). However these policies only had a temporary effect so that by the mid-Eighties, fertility trends in both countries were similar[5]. What stands out in Figure 1 is the massive and temporary collapse in birth rates in the East, but not in the West, following the fall of the Berlin Wall (vertical read line). It has been defined by demographers as the "most substantial fall in birth rates that ever occurred in peacetime" (Conrad, Lechner and Werner [1996], p.331). Within a year, the birth rate dropped by 40 percent and reached an all-time low in 1993, when it was only half of its 1989 level. This fertility drop was relatively short lived, and a strong recovery started in 1994.

[Figure 1 about here]

All family formation were affected by the regime change. The lower panel shows the yearly marriage rate (per 1,000 inhabitants) in East and West Germany over the same period. In the 1950s and 1960s, the rates are remarkably similar in the two countries, declining from 10/1,000 to 7.5/1,000. However, pro-natal policies introduced in East Germany in the early Seventies (see Reinheckel et al. [1998] for details) temporarily pushed the marriage rate up, so that the marriage rate in East Germany was constantly 2 points above the West German one. Following the fall of the Wall in late 1989, the marriage rate drops abruptly in 1990 in East Germany (-70%), and then stabilizes at around 4/1,000, so that by the end of the period, the rate is similar in both regions of re-unified Germany.

As such, and this is the first indication that the cohorts born in the aftermath of the fall of the Wall were selected, Figure 2 displays the difference in the yearly change in crude birth rate (per 1,000 women) between 1950 and 2008 for in and out-of wedlock birth between West and East Germany. For most of the period, the series do not diverge by more than 10 percentage points. What stands out, is that the collapse in birth rate, is entirely driven by in-wedlock birth, which dropped by more than 60 percent in 1990, while those out-of wedlock increased slightly. This strongly suggests that the cohort born in East Germany between 1990 and 1993 was not only dramatically smaller but also strongly negatively selected.

[Figure 2 about here]

[5] Note that the cohort of women coming to their peak fertility age after 1989 was relatively smaller - born during the fertility ebb of the early Seventies. This natural cohort size effect contributes to at the most 10 percent of the drop in the number of birth observed (Eberstadt [1994]).

Finally, to more precisely link the timing of the fertility drop to the regime change in East Germany, we consider, in Figure 3, the monthly number of births for the two regions. The data for both countries is only available from January 1990 onwards but we observe that the number of births only started to sharply fall in August of that year, that the number of births in East Germany stops falling in early 1994[6], and that the number of births in West Germany remains remarkably consistent throughout. The exact timing of the onset of the fall in births numbers in the East is very interesting since it occurs exactly nine months after the fall of the Berlin Wall; i.e. by August 1990. This is a first piece of evidence that the collapse of the regime was not foreseen and that the drop is not driven by immediate use of abortion (more below). As such; it was a change in the decisions to conceive that drove the reduction in fertility. Note also that the drop in births in the East is not solely due to displacement of mothers-to-be to the West (more below), since the numbers of births in the West remains on trend.

[Figure 3 about here]

These figures clearly illustrates three important points that are relevant to our identification: i) pre-1990, fertility trends were consistently similar between East and West ii) the fertility drop affecting East Germany after the fall of the Wall was short-lived and fertility started recovering within three and half years. As such, we define as 'Children of the Wall', the cohorts of individuals born between August 1990 and December 1993 in the Eastern Länder, iii) the children of the Wall originate from a very different type of family.

2.3 Explaining the Fertility Drop

We consider three potential reasons why fertility fell so sharply in East Germany after the fall of the Berlin Wall: change in birth control provision, East to West migration, and economic uncertainty. Although it is difficult to exactly measure the relative importance of these factors, we provide evidence here that the decrease in the number of births was mostly driven by economic considerations. The issue of whether women postponed, reduced their family size or whether more women remained childless is of interest but outside the scope of

[6] Since birth rate in the Eastern Länder started dropping from August 1990 onwards, the 1990 cohort can be considered partially treated. However, in the absence of data on month of birth we cannot use the discontinuity. Similarly, the 1994 cohort can be considered partially treated. We therefore also consider whether our main results are robust to slight changes to the definition of the 'Children of the Wall'.

this paper, since our aim is to understand changes to the composition of the cohort of children born between 1991 and 1993[7].

2.3.1 Access to birth control methods

Most of the previous literature on fertility decisions and child outcomes has exploited policies which changed access to birth control, predominantly access to abortion. Here instead, we argue that access to birth control is unlikely to be an important factor in the sudden drop in the number of births. First, access to birth control methods was very liberal in East Germany and the right to on-demand abortion was not modified before 1993, after which it became more restricted. Second, one could have expected that faced with the immediate uncertainty of a new environment, potential mothers would have terminated pregnancies in greater numbers. We have already argued that the exact timing of the fertility drop (Figure 3) does not appear to support this idea in the very short run. Additionally, the number of terminations in the five East German Länder (excluding Berlin) dropped from 72,774 in 1988 to 26,207 in 1994 (-63 percent). This more than matches the drop in the number of births observed over this period (-57 percent) which translates into a small decrease in the abortion to birth ratio. We can thus safely say that the fall in fertility is mostly due to a fall in conceptions. This is important for two reasons. First, it implies that our 'pre-treatment' groups (of mothers and children) are not selected post-conception. Second, we can assume that the children eventually born must have been 'wanted' by their mothers at the time, which makes it a very different selection mechanism than when a drop in fertility is driven by the legalization of abortion, and the fewer 'unwanted' children in a cohort it implies.

2.3.2 Internal migration

One of the most important changes in the life of East Germans after the fall of the Berlin Wall was that direct migration to the more opulent West became possible again. A substantial number of individuals made use of this newfound freedom with almost 800,000 individuals migrating from East to West, representing 5 percent of the pre-1991 population. This internal migration flow quickly died down, and by 1993 almost as many Germans were making the move in the opposite direction. Hunt (2006) demonstrates that improvements in relative wages were responsible for the ebbing of eastern migration. Movers were on average younger and more likely to be female (Fuchs-Schündeln and Schündeln [2009]), and thus

[7] As these delayed fertility issues could have changed the composition of individuals born after 1993, we will consider the robustness of our results to specifications which exclude these post treatment cohorts.

internal migration did have an impact on the reduction in the number of births in the East. Eberstadt (1994) estimates that internal migration accounted for about 10 percent of the total drop in birth numbers. This however does not really put in doubt the magnitude of the fertility drop since the crude birth rate used to illustrate it in Figures 1 and 2 uses number of women in the population as a denominator.

Migration remains a worry for the validity of our identification, even if it does not directly explain the drop in fertility, since it could still distort the composition of the cohorts of individuals we observe in West Germany. This would be the case if mothers of young children migrated in substantial numbers or if many of the women who moved to the West subsequently gave birth there, but this is not observed in the raw data presented as West Germany birth numbers remain on trend. Note, that for our micro-level analysis using GSOEP data, western migration is not an issue since we allocate the treatment status based on place of residence of the mother in 1989, not on current location.

2.3.3 Economic Uncertainty

During the half-century of communist rule, there was no uncertainty concerning employment and wages, and women were very integrated into the labor force. The costs of having children were kept low due to the public provision of childcare, health and educational services. In the months immediately following the fall of the Berlin Wall, full employment policies were abandoned, and by the end of 1994 almost a third of the pre-unification jobs had been eliminated and 65 percent of those unemployed were women. The generous and universal benefits linked to having a child were quickly curtailed to match Western levels, while the availability of childcare shrank and housing costs surged (Rheinheckel et al. [1998]). This negative economic picture was mitigated by the aforementioned rapid catch up of Eastern wages, which were negotiated to reach parity with the West by 1994, large financial transfers from the West, and a generous one to one conversion of the OstMark to the DeutscheMark in July 1990. In fact, by some measures individuals in the new Länder were economically 'better off' with disposable income and consumption on average already higher just three years after the fall of the Wall (Dornbusch and Wolf [1992]). Considering this, can we still argue that it is economic uncertainty that explains the drastic fall in the number of children being born? We believe so for two reasons.

[Figure 4 about here]

First, the economic situation and the associated uncertainties are likely to be important determinant of the timing of fertility decisions. The 1992 Population Policy Acceptance Study (PPAS)

allows us to link the perception of economic uncertainty to fertility decisions[8]. When asked in this survey what were the reasons for not wanting a(nother) child, the most common reason given by 78 percent of East Germans was poor economic circumstances. The next two most common answers were also related to the perception of the economic situation: costs of raising children (60 percent) and fear of the future (49 percent). Additionally, the GSOEP allow us to track the evolution of the perception of economic situation and childcare provision over time. Figure 4 reports the difference between East and West Germany in the fraction of individuals worried about the economic situation. Following reunification, East Germans are 20 percentage points more likely to be very worried about the economy. This difference increases up to 30 percentage points in 1991 – before the views on the economy converged by 1993 and remain close thereafter. Amazingly, this is precisely when we start observing a rebound in birth rates in the East, which is consistent with our assumption that economic uncertainty was one of the main factors behind the drop in fertility in the east. Moreover, in 1991 45% of East German workers asked about their probability of losing their jobs within the next 12 months reported that they would definitely or probably lose it. This probability is only 5% in West Germany. For East Germans, this perceived probability of job lost felt to 21% and 16% by 1993 and 1996 respectively; while still higher than in the West, which remains around 8% in that period, this shows a remarkable convergence of perceptions within the three years following re-unification. Note also, that perception of unemployment risks in the West were stable which is also consistent with the fertility trends that we observe for this region.

Since the PPAS indicates that childcare was also an important concern, we also assess with the GSOEP the differences in the perception of childcare availability between East and West over time. Again we observe that East German parents are more worried about childcare but that they converge towards the West perception rapidly. These measures thus validate the definition of the CoW since by 1993, the expectations about the economy and childcare of both East and West Germans have broadly converged.

[Figure 4: here]

3. Data Sources and Empirical Strategy

3.1 The Data

3.1.1 Individual level cross sectional data IGLU 2001 and PISA 2006

[8] The Population Policy Acceptance Study (PPAS) is a comparative survey of European attitudes and opinions concerning demographic changes, demographic behaviours and population related policies. In Germany, the first survey was conducted in 1992. About 10,000 men and women in East and West Germany between the ages of 20 and 39 years were asked about family policy, its impact and expectations on future family policies. For more on this survey see: http://www.bib-demografie.de/EN/Research/Surveys/PPAS/ppas_node.html

No administrative test score data is available across states in Germany. However, the cohort of interest straddles the sampling design of two international testing exercises, the Progress in International Reading Literacy Study (PIRLS) 2001 and the Program for International Student Assessment (PISA) 2006. IGLU 2001 is an over-sample for Germany of 10,000 pupils of the PIRLS 2001. The questionnaire and testing are identical to the PIRLS 2001 and the representative sample is drowned from 6 states: Baden-Württemberg, Bavaria, Brandenburg, Bremen, Hessen, and North Rhine-Westphalia. The data provider (IQB) has identified for us respondent from Brandenburg, the other states are all in the former West Germany, and created a dummy variable for children attending schools in East-Germany. Through the use of school fixed effects, we can eliminate any state specific effects. IGLU 2001 contains a test assessing 4^{th} grade students reading ability, as well as questionnaires completed by the pupils, parents and teachers. As well as test results (Plausible values), the survey contains an Index of Early Home Literacy Activities, an Index of Home Educational Resources and an Index of Parents' Attitudes toward Reading which allow us to assess the home environment of the pupils.

The sampling included 4^{th} grade children in 2001, 25% of which were born before August 1990. Limiting ourselves to children born in Germany between July 1989 and June 1991, leads to 20% of pupils being defined as CoW. The test took place in May 2001 in all schools and is designed to assess the reading competences of 4^{th} graders in reading, comprehension and literacy. For each competency, five plausible values reflecting the child ability are recorded, we take the average plausible value as our measure of competence, and normalised it to a mean of 0 and a standard deviation of 1.

Similarly, PISA is an international testing exercise of 15 year old students (typically in grade 7) across the world. The PISA assesses reading, math and science and survey students, parents and teachers. Typically the testing across the three domains last for about 2 hours per students through a combination of multiple choice questionnaires and open ended questions. Germany over-sampled the 2006 PISA and IQB has identified for us, schools located in the former East-Germany, excluding Berlin, and we rely on school fixed effect models to eliminate any state specific effects. The German sample contains 34,516 children, we keep those born in 1990 in Germany (30,650) 10% of which are CoW (born in or after August 1990 and currently leaving in East Germany). As well as the test results, both studies include surveys of the pupil, her parents and teachers.

3.1.3 Individual Level Data: DJI and GSOEP

The DJI 2003 Youth Survey is a representative survey of 12 to 15 year old which started in 2003. The panel contains 2,154 youth born between 1988 and 1991, 5% of which are born after August 1990 and living in East Germany. .

The German Socioeconomic Panel (GSOEP) is a large longitudinal survey of private households first established in West Germany in 1984, carried out annually. Since 1990, it also includes individuals from the former East German Länder. We thus use data from 1990 to 2011 comprising of more than 50,000 unique individuals, a quarter of whom live in the East. The GSOEP 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 and young adult (aged 17) when children of the relevant cohorts are interviewed for the first time. The GSOEP and DJI contain self-reported measures of education[9] as well as information on family composition and parenting behavior.

3.2 Empirical Strategy

For all outcomes our empirical strategy relies on a difference in differences approach whereby we compare the characteristics or educational outcome of pupils born (conceived) before August 1990 (November 1989) to those born earlier. The counterfactual, or second difference, is provided by the non-treated individuals (or cohorts) from West German Länder which enable us to naturally control for common macro shocks and time trends. A necessary condition for this difference in differences identification approach to be valid is that the common trend hypothesis holds. We later carefully check that it does, providing graphical and econometric evidence. The specification is the following:

$$Y_{is} = \alpha + \beta CoW_{ist} + \gamma East_s + \rho X_{is} + f(MoB, YoB) + \gamma_s + \varepsilon_{is} \qquad (1)$$

The subscript *s* denotes either a state or a school, depending on the dataset being used, when available a school or state fixed effect is introduced. $East$ is a dummy for living in East Germany, *MoB* and *YoB* are indicator of the month and year of birth. *X* is a vector of individual level characteristics which varies between datasets. ε_{is} is an error term assumed to be independent and normally distributed across individuals i. All regressions are re-weighted

[9] More information on the DJO and GSOEP is available at: http://surveys.dji.de/index.php?m=msw,0&sID=46 and http://panel.gsoep.de/

to account for survey design and standard errors are clustered at the school level (UGLU and PISA) or by region and birth year (DJI and GSOEP).

4. Empirical Evidence

4.1 Test score results

The TIMMS international test assesses the reading ability of pupils in Grade 4. We rely on the difference in difference framework explained above whereby we compare children from the same class room born before and after August 1990 in East and West Germany. Since all children are tested on the same day it is important to control for age at test, via month of birth. We assume that any month of birth effect is similar between West and East German schools. We additionally control for month of birth, gender, number of children in the household and dummies for whether the parents were born abroad. The coefficient of interest is the interaction between born after August 1990 and living in the East which identify any difference in performance for the cohort of East German children conceived after the Fall of the Wall. To ease the interpretation, we normalize test scores to a mean of zero and a standard deviation of one. The upper panel of Table 1 reports the estimate of the interaction term on three outcomes: normalized test score, an indicator of being respectively in the top or bottom of the test score distribution. CoW score 0.15 of a standard distribution lower than their class room peers conceived before the Fall of the Wall. This is mostly driven by the distribution of test scores for the CoW having a larger tail of low achievers. As such, there is no effect of CoW on the probability of being in the top 10 of the distribution but being a COW increases the probability of being in the bottom 10% by 66%. A similar size effect is observed for the other component of the reading tests – comprehension and literacy. An effect on test score at an early age is likely to have a large impact on educational attainment since Germany is characterized by an early tracking system whereby pupils are streamed in Grade 5 or 6 depending on which State they reside.

[Table 1 around here]

We similarly analyse results of the PISA test which took place when the child was 15. The identification is again a difference in differences whereby we compare the grade of children born before and after August 1990 in the same class room, in East and West Germany. The base specification controls for gender and whether parents were born abroad. The mean normalized math test score is 0.063 of a standard deviation lower for COW. This drops to

0.051 and 0.048 if controls for grade and track respectively are added[10]. Effects for reading are similar but larger: 0.078 of a standard deviation with the base specification, 0.069 when controlling for grade and 0.064 when controlling for track. However, for science the effects are much smaller and never significant. As a further robustness check, we also add controls for number of siblings, age of mother, marital status and maternal education but this reduces the sample size to 23,393 observations as not all parents respondent to the survey. The results are not very sensitive to the sample restriction nor the addition of controls. CoW are 20% to 25% more likely to be in the bottom 10% of the grade distribution while no effect is observed at the top of the distribution.

Finally as a robustness check of our specification and the assumption that month of birth effects are similar in East and West Germany, we conduct a placebo regression using the PISA 2003 where we consider the treated as pupils born from August 1987 in East Germany. Reassuringly, we do not find any effect of the placebo treatment, comforting us that our results are not driven by region specific month of birth effects.

Finally note that since we control for school specific fixed effects and compare children in the same class room, these results are not driven by changes to the curriculum or other institutional differences that would affect only children East German children born after August 1990.

4.2: Other Educational Attainment measures

As well as those objective measures of educational performance the DJI youth panel and GSOEP provide self-reported measure of education. In particular the DJI youth panel offers a unique opportunity to observe educational attainment just after tracking took place. The East dummy is in general significant for most of the outcomes that we investigate, reflecting that since education is the responsibility of each individual state, institutional differences matter. Focusing on the interaction between being born post August 1990 and being educated in the East, we find that the COW are 4.4 percentage point more likely to be in a lower school track, and 5.8 percentage points more likely to already have repeated. In terms of mean size effect, these effects are large, CoW 9% more likely to be in a lower track and 34% more likely to have repeated. They are also 33% more likely to report that learning is easy and 19% less likely to say that they get on well with their peers, maybe reporting a lower taste for schooling.

[10] In order to save space, none of the additional results are presented in the Table but they are available upon request

[Table 2 around here]

Similarly at age 17, we observe that CoW are 2 percentage points more likely to have dropped out of education. Dropping out is a relatively rare outcome and this represents a mean size effect of 53%. Conditional on having not dropped out, CoW are still 36% more likely to be in a lower track or 8% more likely to report that the score below average. No effect is found on repeating, but this outcome is reported only conditional on still being in education, and is thus a lower bound effect.

Overall, we have consistently found that the CoW have much worse educational outcomes from an early age onwards. We know explore whether this is consistent with negative parental selection.

5. Who gave birth in 1991/93 in East Germany?

5.1 Parental Selection

As already discussed, the large fertility drop we study is certainly not random across women and is likely to be driven by parental selection. Our prior, after reviewing the evidence on the educational attainment of the 'Children of the Wall', is that they were the product of important *negative* selection into motherhood. Faced with a high level of uncertainty about the future and a new set of (unknown) constraints regarding the costs of child rearing, women with relatively lower parenting skills were relatively more likely to conceive and give birth in the years following the collapse of the Communist regime.

To test this hypothesis we turn to the GSOEP data and focus on the sub-sample of women who gave birth in East or West Germany between 1982 and 1995. Note that the GSOEP 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[11].

We compare the mothers of the 'Children of the Wall' on a number of 'positive' socio-economic characteristics to those of other mothers, and report the results in Table 3. First, we note that East German mothers over this period are on average quite different to their Western peers; this is captured by the strongly significant coefficients on the 'Birth East' dummy. The mothers of CoW are on average over 10 months younger, are almost 60% more likely to be teenage mothers, have nine month less education, and are 8 percentage points less likely to have completed high school. At the time of survey completion, they are also less likely to be in a stable relationship. More precisely, they are 5% less likely to be married, 11%

[11] The German micro-census unfortunately does not provide any information on past residency and can thus not be used for this analysis.

less likely to be still living with the father of the child and 80% more likely to have never been married.

[Table 3 about here]

Neal (2004) stressed the importance of family formation. The DJI and GSOEP allow us to assess this more thoroughly. From both surveys, we can conclude that the CoW experienced less stable relationships during their childhood. In particular, at age 12, were 10% less likely to live with their natural father, 33% more likely have experienced a divorce and 60% more likely to have experience a new partnership. A similar picture of less stable relationship emerges at age 17, with mothers of CoW being 8% less likely to be currently married, 11% less likely to live with the father of the child and a staggering 56% less likely to have ever been married.

[Table 4 around here]

These results clearly indicate that our prior was correct and women who had children during the very uncertain times following the fall of the Berlin Wall were negatively selected on all the standard socio-economic characteristics which are associated with relatively lower educational attainment for children. While those differences are likely to be important, we investigate the negative parental selection issue more directly, and arguably more objectively, by relying on information on parental skills and maternal relationship, as well as parental educational input.

The DJI youth survey and the GSOEP provide a unique opportunity to test the quality of parental skills with a a battery of questions about parenting skills and emotional perception, such as listing people who have been important persons in the child's life[12]. Table 4 reports various measures of the quality of the relationship, as assessed by the child, at age 12 (DJI) and 17 (GSOEP). The DJI allows us to build a score on parental relationship quality based on the sum of answers to the following questions: "How satisfied are you currently with your maternal/paternal relationship", "Do you have a good relationship with maternal/paternal figure?", "Does your maternal/paternal figure support you when you need it?" "How

[12] The original question is a 4-points scale answer which we dichotomize by grouping 'important' and 'very important' categories and the 'less important' and 'not important at all' ones together.

important is your maternal/paternal figure?". This score is normalized to a mean of 0 and a standard deviation of one and is scaled so that a higher value means a better quality relationship. For both parents, COW rate their relationship 0.1 of a standard deviation lower. Similarly "Argument with mother/father" is a normalized score based on the sum of answers to questions about "How often do you have arguments about…" the following issues: manners, appearances, untidiness, going out, music, political views, friends, girl/boy friends, help with house. A positive value indicates a greater frequency of arguments. CoW report a higher level of argument with the father (0.16 of a standard deviation) but not with their mothers. Finally, the DJI allows us to construct another measure of the quality of the household, as reported in the difficult family score. Again, CoW finds their household to be significantly worse (0.2 of a standard deviation).

Similarly, at age 17, the GSOEP includes a battery of questions regarding quality of the relationship with parents. We focus on three: "Fight with Mother" which is derived from the answer to a 4-points scale question "Argue Or Fight With Mother" from which we create a dummy variable which takes the value 1 when the answer is 'very often' and 0 otherwise; "Mother Loves Me" which comes from the question "Mother Shows that she Loves You" from which we generate a dummy variable which takes the value 1 answer is 'very often' or 'often' and 0 otherwise and "Supportive Parenting" which is derived from a multi-item scale of 9 questions as described in Weinhardt and Schupp (2011).

[Table 5 around here]

The first indicator of the quality of the parental relationship is the occurrence of fights with mothers. This is a relatively rare event, with only 4% of children have regular fights with their mothers but for CoW this probability increases by 150%. Another strong indicator of maternal attachment is whether these teenagers feel loved by their mothers[13]. Our estimate suggests that the CoW are 17 percentage points less likely to be in this category suggesting much lower lever of maternal attachment. Finally, we use an overall measure of 'supportive parenting' to gauge parental participation in a child's life and how much the parent involves the child in

[13] They are asked if their "Mother Shows that she Loves you" and have five possible answers going from 'very often' (45 percent) to 'never' (1 percent). We generate a dummy variable which is one if the youths respond 'very often' and zero otherwise.

decision making. This exercise reveals that the 'Children of the Wall' reports a level of support 0.3 of a standard deviation lower.

We further investigate the behavior of the mothers of CoW, especially regarding educational inputs. We rely here on the child survey from the IGLU (age 11), DJI (age 12) and PISA (age 15). CoW reports that their parents read less, care less about their schoolings and provided less educational inputs.

[Table 6 about here]

These results generally hint to the important role potentially played by a poor maternal relationship in explaining low educational attainment. This is perhaps not surprising as low level of parental support or even parental rejection have been associated to worse outcome for the child.

5.2 'Worse' Mothers or 'Bad' Times?

5.2.1 Are CoW living in poorer households?

A possible factor explaining these negative outcomes is that parents of CoW are disproportionally poorer, which would be correlated with the worse observational characteristics of CoW households and potentially with parenting style. We can reject that poverty is a driver of this relationship. First, from the various datasets, CoW household are not poorer or have lower wealth. Note that due to their observable characteristics, CoW households have worse gross income but due to the relative generosity of the welfare system they are not worse off when considering net income or measures of wealth based on indices of belongings.

[Table 7 around here]

Another test to show that worse outcomes are not driven by income is to include it- or other observable characteristics associated with it as additional control. Using only evidence from the largest surveys (PISA and GSOEP) we mostly report only small variations in the estimated coefficients when those additional controls are included, as such we do not believe that poverty or indeed observable characteristics of the CoW parents can explain the worse outcome of their children.

[Table 8 around here]

5.2.2 Sibling Evidence

Finally despite the evidence of parental selection, the differences in the characteristics and behavior of the 'Children of the Wall' could also be consistent with the fetal programming (Barker [1995]) and early life adversity (Conti et al. [2012]) hypotheses. Aizer, Stroud, and Buka (2009), for example, show that maternal stress in utero has long term negative consequences for children, and that this effect is stronger for low socio-economic status mothers. Due to the high level of uncertainty faced by the mothers after the collapse of the Wall, these children would have experienced heightened levels of stress in the womb and in their very early years. This could have shaped their preferences and behaviour in a way to cope with such a world. As such, we could expect higher risk preference, lower emotional attachment and potentially worse educational attainment.

While some of our previous results that the mothers of CoW have worse observable and parental skills or that CoW do worse than their class-room peers could be hard to reconcile with this theory alone, we carry out another test of the early life adversity hypothesis. To do so we select all children born between 1987 and 1989 and identify those who have siblings born between 1991 and 1993 in East Germany. These older siblings could not have been "programmed" since they were born before the collapse of the Berlin Wall and, in the absence of negative parental selection, they should not report different outcomes to other children. For this sample, we conduct a similar estimation as the one presented in (1) but where the interaction term is being a sibling of a CoW rather than a CoW. Siblings are also informative for the causal interpretation of the evidence on the selection mechanism that we have presented so far. One could argue that the lower maternal involvement on the CoW is due to reverse causality whereby mothers of CoW lower their inputs and emothional attachment as they realise the low educational outcome of their child.

[Table 9 about here]

Indeed, Table 9 reports that the older siblings of CoW have also poor educational attainment and poor maternal relationship as their younger siblings. This strongly supports that the observed effects for the CoW are due to negative parental selection and not to fetal programming, which we reject as the underlying mechanism behind our findings.

6. Discussion

We have provided a wealth of evidence that children conceived in the aftermath of the Fall of the Wall where negatively selected, and a main factor for this selection is the high level of economic uncertainty. To further investigate this issue on how economic uncertainty could lead to negative parental selection we consider whether there is heterogeneity by education in women's fertility response to the negative perception of the economic situation. Practically, we regress the probability of having a child in the period 1991/93 , for all women aged 17 to 47 interviewed in the GSOEP , on a measure of economic uncertainty in year *t-1* (i.e. dummy for being 'very worried' about 'the general economic development')[14]. We find that uncertainty is negatively related to fertility, as might have been expected. We then include an interaction of years of education and economic uncertainty in the probability model we estimate. This interaction is negative and significant. Figure 5, reports the estimated probability of giving birth and the associated confidence interval, by education level and level of worry about the economy. More worried women (solid line) and more educated women are less likely to give birth. What Figure 5 clearly shows is that the fertility decision of less educated women is not significantly affected by economic uncertainty. On the contrary, highly educated women's fertility drops when worried about the economy. For the most educated, very worried women are 2.5 times less likely to have a child than less worried one. This evidence reinforces our argument that economic uncertainty affected not only the fertility of mothers but also their selections; those with disproportionally unfavorable characteristics being less responsive to socio-economic shocks[15].

[Figure 5 about here]

7. Conclusion

This paper highlights the effects of parental selection on the subsequent educational attainment of children. 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 composition of the cohort. Since the fertility shock is local and temporary, we can exclude that the changes in educational attainment is not due to the parental selection associated with

[14] The model also includes education, age and year dummies and the standard errors are clustered at East level to account for important common age shocks on fertility which are likely to be different between East and West Germany.

[15] The welfare system may also encourage less educated women to have more children, the child allowance being relatively more generous for poorer families.

the fertility shock. 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. This large decrease in educational attainment is consistent with either negative parental selection or some kind of cohort specific shock (maybe fetal programming). We find consistent evidence supporting negative parental selection, importantly we improve on the literature by demonstrating that mothers of CoW worse emotional attachment to their children and provide lower level of educational input. We also note that the older siblings of CoW also rate the emotional attachment of their parents poorly and also worse educational outcome, consistently with negative parental selection, but not with a cohort specific effect.

Our findings on the large effects of parental selections have important implications for policy planners. Rather than base the decisions regarding public investment on cohort size only, there is scope for adjusting these investments for cohort quality. In this case, despite its small size, this cohort would have benefited from additional investment to compensate for the lower average quality of their parents. However, divergence in educational outcome starts early, as such, any interventions to compensate for the "bad" parental skills would have to be very early in childhood; consistent with the suggestions of Cunha and Heckman (2007) or Heckman et al (2010). However, identifying the children at risk is potentially difficult since the selection effects are mostly driven by typically unobservable characteristics like emotional attachment and parental educational input, which would make targeting challenging. Recent experimental evidence on the impact of home visiting programs aimed at risk mothers and their family which start even before the birth of the child, such as Preparing for Live in Dublin (Doyle et al [2013]) and Pro Kind in Germany (Sandner [2012]), are promising. The real challenge remains to find a way to target efficiently such interventions at the right mothers/children and, in that respect, we believe the findings from this research can be useful.

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Table 1: Test scores and related outcomes at age 11 and 16

	CoW	Mean	Effect size	Obs,
At age 11- IGLU 2001				
Normalised reading score	-0.150** (0.074)	n.a.	n.a.	5,036
Overall reading score <p(10)	0.056** (0.024)	0.085	0.66	5,036
Overall reading score > p(90)	0.002 (0.021)	0.104	0.00	5,036
At age 16- PISA 2006				
Norm. Math score	-0.064*** (0.022)	n.a.	n.a.	28,008
Norm. Reading score	-0.078*** (0.020)	n.a.	n.a.	28,008
Norm Science score	-0.029 (0.023)	n.a	n.a	28,008
Math score <p(10)	0.023*** (0.009)	0.083	0.28	28,008
Math score > p(90)	0.008 (0.010)	0.105	0.07	28,008
Read score <p(10)	0.017** (0.008)	0.075	0.224	28,008
Read score > p(90)	0.002 (0.010)	0.105	0.022	28,008
Science score <p(10)	0.007 (0.008)	0.082	0.087	28,008
Science score> p(90)	0.001 (0.010)	0.105	0.055	28,008

Note: COW is defined as respondent born from August 1990 to December 1990 in East Germany. Estimates are weighted to account for sample design and non-response. Standard errors are clustered at the school level
IGLU Control: Gender, mother born abroad, father born abroad, number of children in household. Month & year of birth dummies, post August 1990 birth, and a school-class fixed effect.
PISA Control: Gender, mother born abroad, father born abroad. Month of birth dummies (all children are born in 1990), post August 1990 birth, and a school fixed effect.

Table 2 – School Outcomes of the *Children of the Wall at Age 12-13* and 17

Panel A: Age 12/13 (DJI)	Low Track	Repeated Grade	Learning Easy	Get on Well with Peers
Child of the Wall (i.e. East * 1991-93)	0.048*	0.048**	-0.050*	-0.123*
	(0.022)	(0.020)	(0.024)	(0.051)
Born East	-0.061**	-0.013	-0.007	0.017
	(0.019)	(0.012)	(0.011)	(0.035)
Born 1991-1993	0.008	0.004	0.005	0.139***
	(0.043)	(0.016)	(0.014)	(0.027)
Track		yes	yes	yes
Mean value of outcome	0.530	0.143	0.154	0.654
Effect size at mean	0.090	0.339	-0.326	-0.188
Sample Size	1,424	1,423	1,424	1,424

Panel B: Age 17 (GSOEP)	Low Track	Repeated Grade	Scores Above Average	School Drop-Out
Child of the Wall (i.e. East * 1991-93)	0.030**	0.020	-0.037**	0.019***
	(0.014)	(0.023)	(0.018)	(0.005)
Born East	-0.032***	-0.025**	-0.057**	-0.001
	(0.009)	(0.012)	(0.016)	(0.004)
Born 1991-1993	-0.021***	-0.052	0.064 ***	0.051***
	(0.009)	(0.035)	(0.010)	(0.003)
Mean value of outcome	0.084	0.211	0.459	0.036
Effect size at mean	0.359	0.096	-0.080	-0.533
Sample Size	3,506	3,497	3,506	3,636

Note: CoW is the interaction of being born between August 1990 and 1991 (DJI) or born between 1991 and 1993 (GSOEP), and living in East Germany. Robust standard errors clustered by child year of birth and East/West reported in parenthesis. *, **, and *** denote respectively significance at the 1, 5, and 10 percent level.

DJI:

GSOEP: All information is taken from survey questions asked at age 17 in the GSOEP between 1990 and 2011. Below Average Scores indicates that the individual reported scores in math and German below the mean in his cohort.

Table 3 – Positive or Negative Selection of Fertility?

Decision Differences in Characteristics of *Mothers* of the 'Children of the Wall'

GSOEP	Age Mother	Teenage Mother	Years of Education	High School	Married	Still with Father	Never Married
Child of the Wall (East * 1991-93)	-0.638*** (0.218)	0.034** (0.015)	-0.715*** (0.125)	-0.078*** (0.019)	-0.033** (0.013)	-0.067*** (0.017)	0.046*** (0.011)
Birth East	-2.858*** (0.063)	0.064*** (0.008)	0.886*** (0.055)	0.135*** (0.010)	-0.058*** (0.011)	0.011 (0.025)	-0.015** (0.006)
Birth 1991-93	1.257*** (0.088)	-0.040*** (0.013)	0.335*** (0.036)	0.015 (0.012)	-0.013** (0.005)	-0.159*** (0.007)	-0.037*** (0.010)
Age of mothers	No	No	Yes	Yes	Yes	Yes	Yes
All other controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean value of outcome	26.47	0.058	12.258	0.872	0.721	0.618	0.059
Effect size at mean	-0.024	0.586	-0.058	-0.088	-0.046	-0.109	0.792

Note: Robust standard errors clustered by child year of birth and East/West reported in parenthesis. *, **, and *** denote respectively significance at the 1, 5, and 10 percent level. All specifications include controls number of children and year of birth (quadratic). Source: GSOEP 1990 to 2012.

Table 4 – Family Composition *at Age 12-13* (DJI) and *at Age* 17 (GSOEP)

	At age 12/13 (DJI)			At age 17 (GSOEP)		
	Live with natural father (k618)	**Experienced Divorce/Separation (k639d)**	**Experienced New Partnership (k639e)**	**Married Today**	**Still with Father**	**Never Married**
Child of the Wall (i.e. East * 1991-93)	-0.100*** (0.008)	0.064** (0.020)	0.090* (0.040)	-0.055* (0.032)	-0.064* (0.034)	0.048*** (0.018)
Born East	-0.106*** (0.010)	0.059*** (0.008)	0.057*** (0.006)	-0.077*** (0.012)	-0.028* (0.016)	-0.006 (0.006)
Born 1991-1993	0.035 (0.030)	-0.084* (0.040)	-0.061 (0.018)	0.007 (0.015)	0.006 (0.023)	-0.013 (0.009)
Mean value of outcome	0.780	0.191	0.153	0.680	0.597	0.086
Effect size at mean	-0.129	0.334	0.589	-0.080	-0.107	0.561
Sample Size	1,445	1,441	1,441	6,722	6,722	6,722

Note: CoW is the interaction of being born between August 1990 and 1991 (DJI) or born between 1991 and 1993 (GSOEP), and living in East Germany. Robust standard errors clustered by child year of birth and East/West reported in parenthesis. *, **, and *** denote respectively significance at the 1, 5, and 10 percent level. Effect size is measured as the effect of COW at the mean value for the variable – this is not reported for normalized scores
DJI Additional controls include year and month of birth, gender, number of siblings and whether at least one parent is foreign born.
GSOEP Additional controls include
The variables of interest are defined as follow:
Experienced data: Positive answer to "Have you experienced the following event …?"
Difficult family, normalized score from the sum of answers to the following questions "I'm happy with my family", "our family argues", "we can speak about anything", "Everyone can do what they want", "we have fun together"

Table 5 – Family life *at Age 12-13* (DJI) and *at Age* 17 (GSOEP)

	Age 12-13 (DJI)					Age 17 (GSOEP)		
	Relationship with mother (composite score)	**Argument with mother (composite score)**	**Relationship with father (composite score)**	**Argument with father (composite score)**	**Difficult Family (composite score)**	**Fight with Mother**	**Mother Loves Me**	**Supportive Parenting**
Child of the Wall (i.e. East * 1991-93)	-0.110*** (0.015)	0.039 (0.032)	-0.102* (0.052)	0.161*** (0.045)	0.206*** (0.036)	0.053*** (0.016)	-0.170*** (0.061)	0.304*** (0.091)
Born East	0.120*** (0.007)	-0.167*** (0.024)	0.017 (0.066)	-0.154*** (0.032)	-0.062 (0.037)	-0.034*** (0.003)	0.022 (0.014)	-0.059 (0.059)
Born 1991-1993	0.222*** (0.025)	-0.076 (0.110)	0.323*** (0.070)	-0.067 (0.075)	-0.263*** (0.028)	-0.019 (0.016)	0.006 (0.033)	0.341*** (0.140)
Mean value of outcome	n.a.	n.a.	n.a.	n.a.	n.a.	0.036	0.460	n.a.
Effect size at mean	n.a.	n.a.	n.a.	n.a.	n.a.	1.448	-0.368	n.a.
Sample Size	1,402	1,404	1,243	1,260	1,427	3,496	3,477	3,413

Note: CoW is the interaction of being born between August 1990 and 1991 (DJI) or born between 1991 and 1993 (GSOEP), and living in East Germany. Robust standard errors clustered by child year of birth and East/West reported in parenthesis. *, **, and *** denote respectively significance at the 1, 5, and 10 percent level. Effect size is measured as the effect of COW at the mean value for the variable – this is not reported for normalized scores

DJI Additional controls include year and month of birth, gender, number of siblings and whether at least one parent is foreign born.

GSOEP Additional controls include

The variables of interest are defined as follow: Relationship with mother/father: normalized score based on the sum of answers to the following questions: "How satisfied are you currently with your maternal/paternal relationship", "Do you have a good relationship with maternal/paternal figure?", "Does your maternal/paternal figure support you when you need it?" "How important is your maternal/paternal figure?" Argument with mother/father: normalized score based on the sum of answers to questions about "How often do you have arguments about…" manners, appearances, untidiness, going out, music, political views, friends, girl/boy friends, help with house.

Fight with Mother derives from the answer to a 4-points scale question "Argue Or Fight With Mother" from which we create a dummy variable which takes the value 1 when the answer is 'very often' and 0 otherwise. Mother Loves Me comes from the question "Mother Shows that she Loves You" from which we generate a dummy variable which takes the value 1 answer is 'very often' or 'often' and 0 otherwise. Supportive Parenting is derived from a multi-item scale of 9 questions as described in Weinhardt and Schupp (2011).

Table 6: Parental and Education Inputs at age 11, 12 and 16.

	CoW	Mean	Effect size	Obs,	Cond. Track
At age 11 IGLU					
Parent: hrs reading/week	-0.533** (0.230)	6.16	-0.09	5,292	no
Parent: reading score	-0.123* (0.072)	n.a	n.a.	5,013	no
At age 12/13: DJI					
Parents care about schooling (composite score) k407	-0.150*** (0.031)	n.a	n.a.	1,419	No
Possession score k817	0.087 (0.119)	n.a	n.a.	1,448	No
At age 16: PISA					
Homework hours	-0.298* (0.167)	8.134	-0.04	27,126	Yes
Courses outside school	-0.068*** (0.016)	0.352	-0.194	28,008	Yes
Cultural Possession (score)	-0.042 (0.031)	n.a	n.a.	27,524	Yes
Education Resources	-0.066** (0.031)	n.a	n.a.	27,968	Yes
Wealth	0.005 (0.031)	n.a	n.a.	27,997	Yes

Note: COW is defined as respondent born from August 1990 to December 1990 in East Germany. Estimates are weighted to account for sample design and non-response. Standard errors are clustered at the month/year * region level
Control: Gender, mother born abroad, father born abroad. Month of birth dummies (all children are born in 1990), post August 1990 birth, and a school fixed effect.

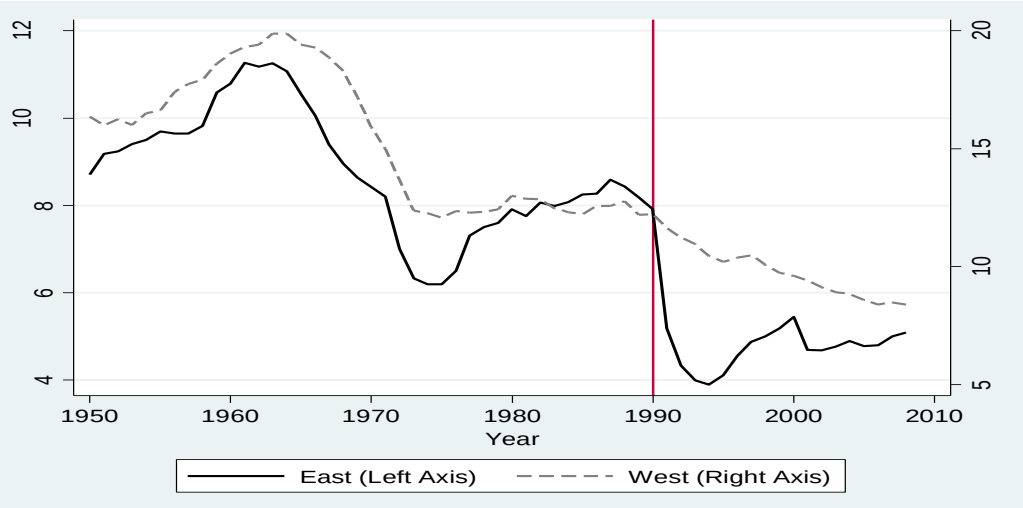
Table 9: Educational Attainment and Maternal Relationship at Age 17 of the 'Children of the Wall' older siblings

	Educational Outcome			Maternal Relationship		
GSOEP – Age 17	**Repeat**	**Low Track**	**Dropout**	**Fight**	**Loves**	**Supportive**
Sibling of a CoW (born East *1987 to 1989)	0.116**	-0.027	0.028***	-0.020	-0.089**	-0.015
	(0.049)	(0.013)	(0.009)	(0.012)	(0.032)	(0.109)
Born East	-0.052**	-0.030**	0.003	-0.033***	0.036*	-0.103
	(0.013)	(0.010)	(0.005)	(0.004)	(0.015)	(0.015)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sample Size	2,091	2,096	2,167	2,031	2,021	

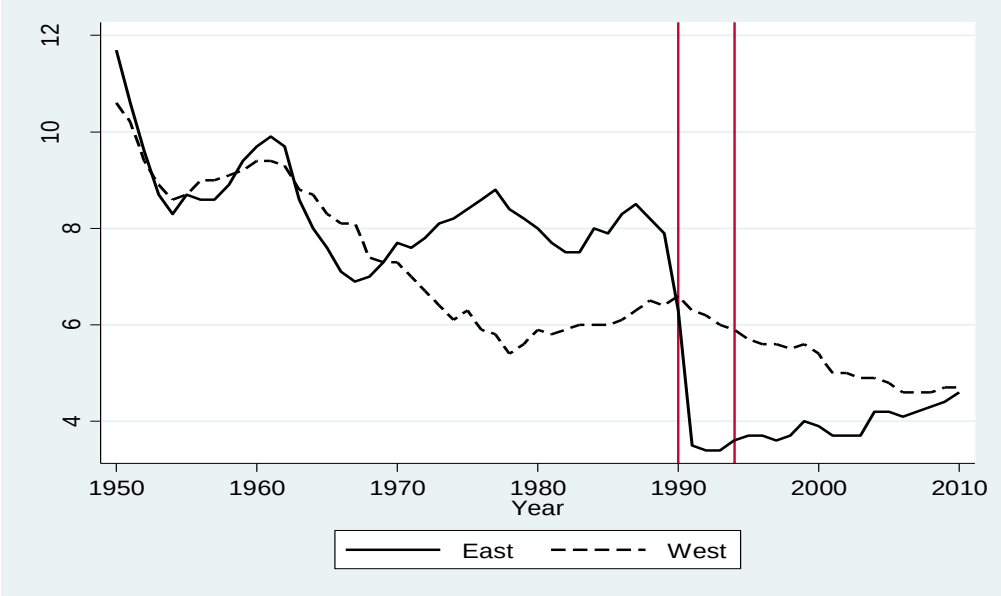
Note: All specification as in Tables 4 and X with the extra inclusion of mother specific fixed effects

Figure 1: Fertility and Marriage rate in East and West Germany from 1950 to 2008

A] Annual Crude Birth Rate per 1,000 Women from 1950 and 2008

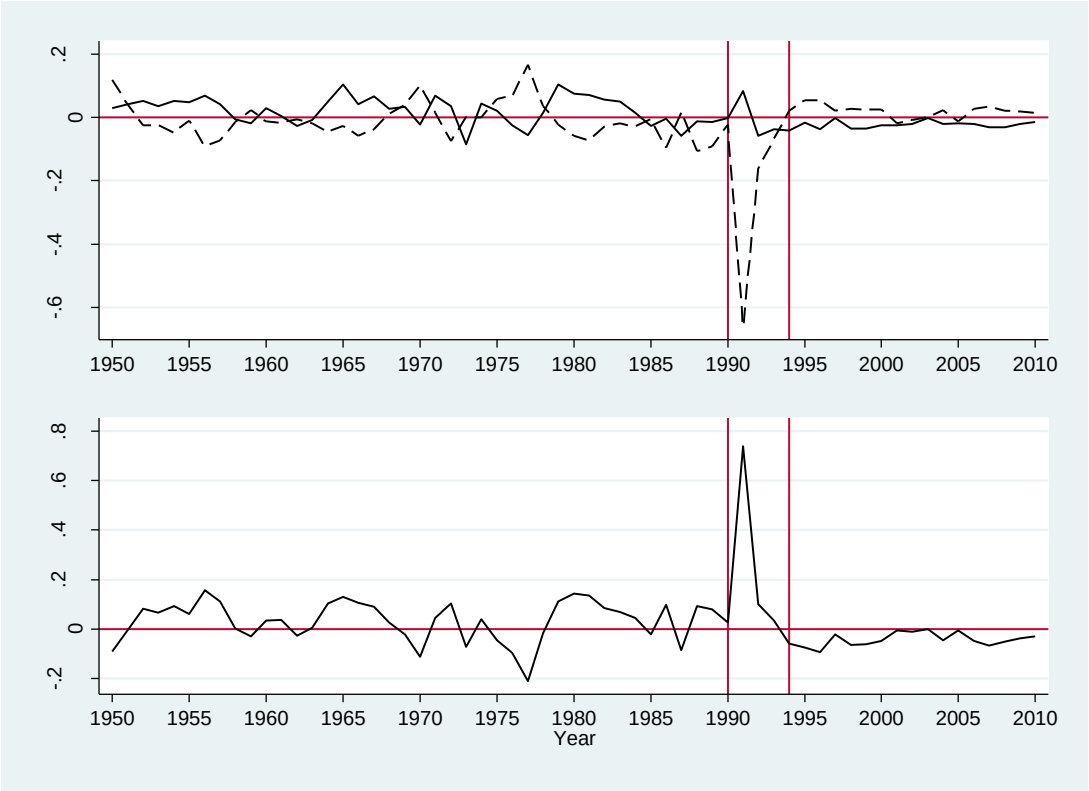


B] Annual Marriage rate per 1,000 inhabitants from 1950 to 2008



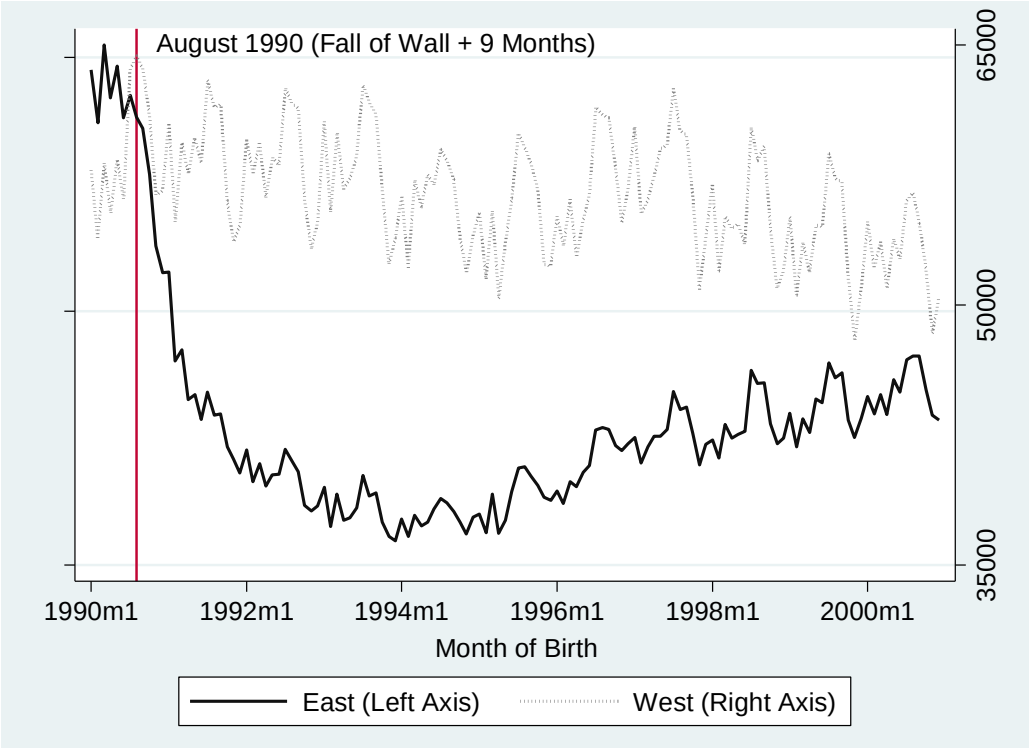
Notes: Authors own calculations based administrative population data from the Federal Institute for Population Research (http://www.bib-demografie.de)
East refers to the former East Germany Landers and West to the territories of the formal Federal Republic. Berlin is omitted.

Figure 2: Crude birth rate by Marital Status, difference between East and West Germany and Year on Year Changes in Fraction of Out-of-Wedlock Birth



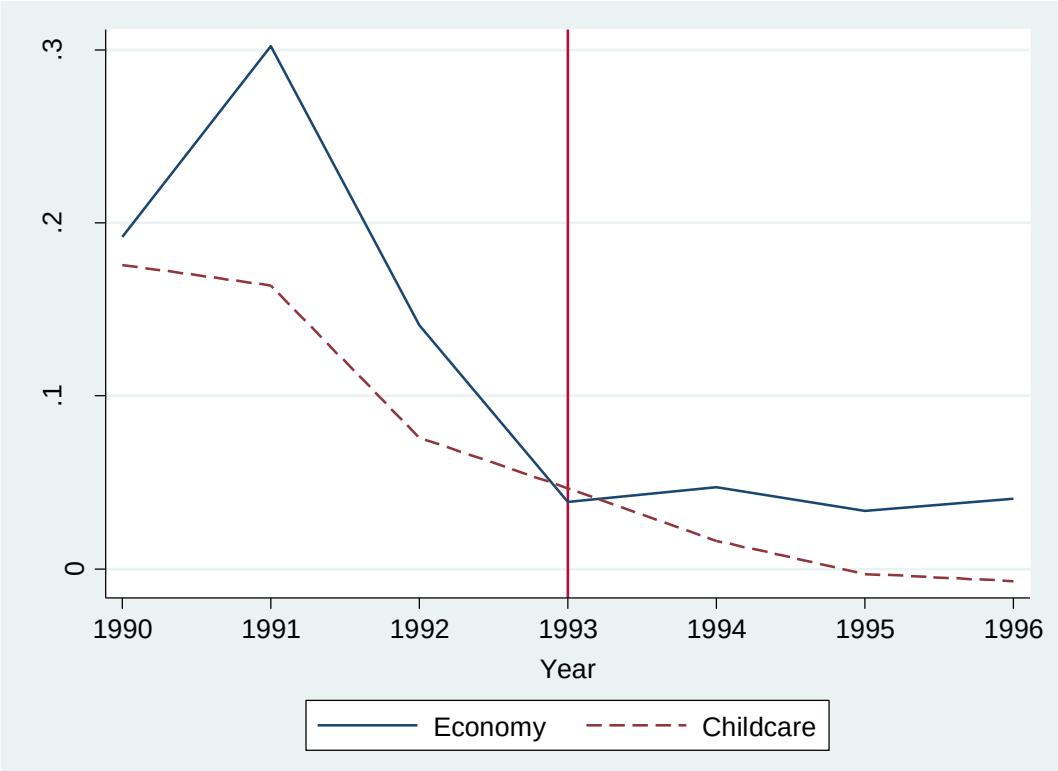
Notes: Graph shows differences-in-differences coefficients year-on-year number of birth between East and West Germany by marital status, and in the lower panel, the difference in these coefficients.

Figure 3: Monthly Number of Births in East and West Germany from 1990 to 2000



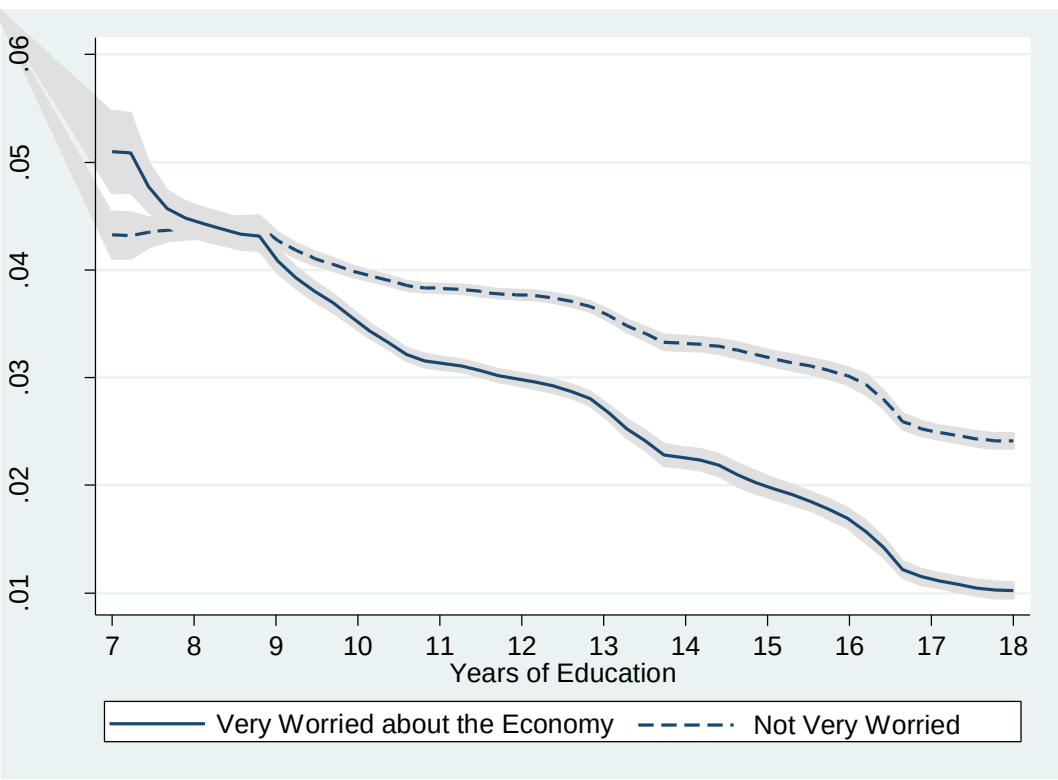
Notes: Administrative birth data from the Federal Institute for Population Research

Figure 4: Difference in the Proportion of East and West Germans who are Very Worried about the Economy or Childcare from 1990 to 1996



Note: The graphs are based on the difference in the proportion of East and West Germans responding 'Very' (other possible answers: 'Somewhat' or 'Not at all') to questions asked yearly in GSOEP about individual level of worry about "the general economic development" and "childcare availability"

Figure 5: Economic Uncertainty and Fertility Decision:
Probability of Having a Child by Economic Worry and Education Level



Note: The graph plots the estimated probability of having a child in the period 1991/93 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 GSOEP during this period. The probit model which generates these coefficients also includes education, age and year dummies. The grey area represents the 95 percent confidence intervals.