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Intergenerational Transmission of Disadvantage: Negative parental selection, economic upheaval, and smoking

Kristin J. Kleinjans[1] and Andrew Gill (California State University, Fullerton)

Abstract

Recessions negatively impact the health of individuals experiencing hardship. In this paper, we investigate whether there are also long-term effects for those born during difficult economic times through the effects on their health behavior. Based on a theoretical model of parental socialization against smoking and using data from the German Socioeconomic Panel, we assess smoking behavior of children born in the years immediately after the fall of the Berlin Wall in the East. Using a difference-in-differences specification with West Germans as a control group, we find that men born during this time are 40% more likely to smoke in young adulthood than men born during the years before or afterwards. The fall of the Berlin Wall led to enormous social and economic upheaval and resulted in a stark drop in incomes and fertility in East Germany. Fertility, however, dropped least among the lower educated and younger mothers. The resulting negative parental selection, as measured by parental education and childhood family environment, explains about one fifth of the higher incidence of smoking of those born during this time. We posit that the effect of negatively selected parents was amplified by the compounding effect of disadvantage in childhood caused by the economic upheaval, which likely reduced both the amount and quality of parental socialization against smoking, leading to the increased smoking rates that we observe.

Keywords: Smoking, Parental Selection, Recession, Economic Upheaval, Fall of the Berlin Wall, German Socioeconomic Panel

JEL: I12, I14, J13, P30

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Introduction

Smoking imposes substantial disease burden and costs on society (see, e.g., Lillard, 2020). In the United States alone, smoking is estimated to cost over $300 billion in annual medical care and lost productivity (Centers for Disease Control and Prevention (CDC), 2020a). In Germany, the country whose population we study in the current paper, smoking prevalence is higher than in the United States and other European countries, killing over 120,000 people per year (DKFZ, 2015; WHO, 2019). In this paper, we consider the question of how childhood disadvantage, and specifically negatively selected parents and economic and social upheaval during the first years of life affect smoking behavior in young adulthood.

Most people start smoking in adolescence or young adulthood (Göhlmann et al., 2010; Lillard, 2020), a time when it is especially addictive (CDC, 2020b). Parental socialization against smoking can inform children and increase the salience of the negative effects of smoking, which include the risk of addiction, negative effects on future health, conflict with parents, and the monetary cost of smoking. Parental socialization against smoking may also serve to moderate the benefits of smoking that stem from (perceived) improved self-image and acceptance by peers (Akerlof & Kranton, 2002; Kobus, 2003).

Parental socialization can indeed be effective in reducing smoking in youth (Chassin et al., 1998, 2005; Kobus, 2003; Christopoulou et al., 2013; Stanton et al., 2015; Carver et al., 2017). Yet, the extent and effectiveness of socialization may vary by parental characteristics and is likely to be affected by negative shocks experienced by parents, such as those occurring during economic downturns or periods of social upheaval. It is well known that economic recessions have a negative and permanent impact on the health behaviors of those in the bottom half of the income distribution (see, e.g., Grafova, 2011). In this paper, we are examining whether economic

upheaval also affects the health behaviors of those born during these times by examining whether it affects smoking prevalence in young adulthood. Understanding how the next generation is affected sheds light on the intergenerational effects of recession and the determinants of the transmission of disadvantage across generations.

As a conceptual and empirical strategy, we turn to the unanticipated fall of the Berlin Wall in November 1989 as a natural experiment that radically changed the lives of East Germans in its immediate aftermath. The years immediately following the fall of the Berlin Wall were characterized by a severe economic downturn in East Germany and great uncertainty about the social and economic future of East Germans in a united Germany. This resulted in an unprecedented drop in fertility in East Germany. Chevalier and Marie (2017, 2019) and Gill and Kleinjans (2020) provide evidence that those mothers who did have children during this period of economic and social upheaval were negatively selected: These mothers were younger, less educated, and less likely to be employed. We argue that both bad economic times and negative selection, in turn, are likely to affect parental relationships with children, including socialization efforts against smoking, and thus lead to higher rates of smoking among those born during this period in East Germany.

The consequences of bad economic times, unemployment and its resulting financial strains lead to parental psychological stress, which may in turn affect relationships with children and increase children's mental health problems (Golberstein et al., 2016). Negative parental selection may lead to worse parent-child relationships and worse children's outcomes because of poorer parenting skills (e. g., Golberstein et al., 2016; Kalil & Ryan, 2020; Niever & Luster, 2006). So it is not surprising that those born in the years immediately after the fall of the Berlin Wall had lower cognitive skills and lower educational attainment than children born before

(Chevalier & Marie, 2017), a lower internal locus of control (Kleinjans & Gill, 2018), and lower levels of conscientiousness in the case of women (Gill & Kleinjans, 2020). Finally, negative parental selection may exacerbate the negative effects of bad economic times. Disadvantaged families are less likely to be able to compensate for economic shocks and are more likely to be affected (Garfinkel & Pilkauskas, 2016). Moreover, as noted by Almond et al. (2018), parents may invest in children with the purpose of reducing the consequences of negative shocks. Negatively selected parents may be less able to make these counteracting investments.

Using a difference-in-differences identification strategy with West Germany as a control, we find that men born immediately following the fall of the Berlin Wall, a period that Chevalier and Marie (2017) call the "the period of transition", are 17 percentage points more likely to smoke as adults relative to men born before the fall of the Berlin Wall and after the period of transition, an increase of about 40% compared to the baseline rate of smoking of 39.8%. Parental education can explain one fifth of this effect. Moreover, when we split the sample by whether the individual grew up with both parents during the first 15 years of life, only those who did not are more likely to smoke when they were born during the transition.

Our work contributes to the literature on smoking and its determinants in two ways. First, we further our understanding of the impact of parental socialization on smoking behavior by examining the effects of negative parental selection on offspring's smoking behavior (Chassin et al., 1998, 2005; Kobus, 2003; Christopoulou et al., 2013; Stanton et al., 2015; Carver et al., 2017). Second, our results are also important in the broader context of recessions and their negative effects on a wide range of economic, health, and social outcomes above and beyond the negative effects of reduced income, especially on the more vulnerable parts of the population. Research in the social sciences tends to focus on family-internal explanations for children's

outcomes, and less on the impact of the economic environment (Friedline, Chen, & Morrow, forthcoming).

Studies using data from the US Fragile Families and Child Wellbeing Study have found that unemployment during the great recession led to worse health outcomes for parents and higher rates of smoking and substance abuse, with the strongest effect for mothers from disadvantaged groups (Currie and Duque, 2016; Currie et al., 2015). The great recession also led to worse parent-child relationships and lower child wellbeing (Schneider et al., 2016a and 2016b) and less involvement in children's lives by nonresident fathers (Mincy & De la Cruz Toledo, 2016). Long-term health effects of economic hardship in childhood are well documented (see, e.g., Shuey & Willson, 2014), effects that are likely amplified by the increased parental stress caused by unemployment and uncertainty. If those effects are stronger for children from disadvantaged backgrounds, they may explain some of the persistency of disadvantage. Smoking rates are higher for people from lower socioeconomic backgrounds (see, e.g., Andersson & Maralani, 2015), and we show in this paper that this disadvantage is intensified for children who were born during times of economic and social upheaval.

Institutional Background

The fall of the Berlin Wall in November 1989 led to instant social and economic upheaval. With borders between East and West Germany opened, everything changed for East Germans. Basic human rights, such as freedom of expression, and the rights to travel and education were restored. With this newfound freedom, East Germans who previously saw consumption products made in the West mostly when illegally watching West German television chose to buy what was previously not accessible to them. The resulting stark fall in demand for goods made in East Germany, combined with low productivity and uncertainty about property

rights, led to the sharpest economic downturn in East Germany since World War II - within twelve months, production of goods fell by over 50% (Akerlof et al., 1991; Wiegrefe, 2018). Unemployment shot up from an official 0% before November 1989 to over 10% in 1991 and 19% in 1997, and many more worked in temporary and part-time positions (Bundesagentur für Arbeit, 2019; Collier, 1991). As a result of this uncertainty, fertility in East Germany dropped sharply: between 1989 and 1994, total fertility rates dropped by 51% (see Figure 1). As previously discussed, the mothers who gave birth during this time were negatively selected as measured by a variety of characteristics, including education and age at first birth.

FIGURE 1 ABOUT HERE

Despite the decades-long separation of East and West Germany, smoking rates of men were rather similar and exhibited similar (declining) trends before and after the fall of the Berlin Wall (Lillard, 2015; Vogt et al. 2017; Westphal & Doblhammer, 2012) - with the exception of those born during the period of transition in the East, as we will show later. For women, this was not the case. While for men in East and West Germany as well as for West German women smoking rates and the number of cumulative years smoked have decreased for cohorts born after about 1960, East German women's smoking rates increased rather drastically in the decade after 1989. This has been linked to changing social norms in East Germany and advertising targeted at East German women after the fall of the Berlin Wall (Lillard, 2015; Westphal & Doblhammer, 2012). Since then, East German women's smoking rates have declined, but less so than those of men (Lillard, 2015; Statistische Ämter des Bundes und der Länder, 2015; Vogt et al., 2017; Westphal & Doblhammer, 2012). Since these differing trends for women invalidate our identification strategy, we restrict our analysis to men. We discuss the rationale for this decision in more detail in the Results section.

Negative Parental Selection and Smoking

Why might a child born to negatively selected or disadvantaged parents during times of economic and social upheaval be more likely to become a smoker? In this section we set out theoretical considerations relevant to this question with the goal of guiding the empirical work that follows. We begin by laying out the parent's decision to invest resources to discourage her child from smoking. We call this discouragement parental socialization against smoking. We discuss this parental decision in the context of a model of intergenerational transmission of cultural traits developed by Christopoulou et al. (2013), adopting the authors' notation. We then use the model to discuss some predictions of the effects of negative parental selection and social and economic upheaval on a parent's investments in discouraging smoking behavior.

Parental Decisions and Behavior

Parents who care about their children's health will prefer that they do not smoke, independent of their own smoking behavior. However, the cost and benefits from trying to keep their children from smoking, that is parental socialization and intervention, depend on parental characteristics. Following Christopoulou et al. (2013), we can think about the parental decisions as follows.

A parent's optimization problem centers on how much she should invest in socializing her children against smoking. Using the subscript i to index mothers, let the investment or effort to socialize a child be represented by λ_i, and let $v(\lambda_i)$ be the probability that the child becomes a non-smoker as a function of investment and $c(\lambda_i)$ be the cost of socialization. For our purposes, it is instructive to think of $v(\lambda_i)$ as a socialization production function with positive and diminishing marginal product, $v'(\lambda_i) > 0$ and $v''(\lambda_i) < 0$. Further, let the cost function be governed by positive and increasing marginal cost of socialization, $c'(\lambda_i) > 0$ and $c''(\lambda_i) > 0$.

Finally, let H represent the parent's perception of the health costs of smoking.

The parent's utility function is given by Equation (1), which Christopoulou et al. (2013) normalize to 0 for the non-smoking outcome for the child.

$$U(\lambda_i; q, H) = (1 - v(\lambda_i))S(q)u_i(H) - c(\lambda_i)\,, \quad (1)$$

where S is the probability that a child smokes without any active intervention by a parent, q is the share of peers who smoke, and $u_i(H)$ the disutility of a parent if the child becomes a smoker.

Note that the product of the first two terms in the utility function gives the probability that a child will smoke based on the parent's investments in socialization $(1 - v(\lambda_i)S(q))$, which is multiplied by the parent's disutility from seeing her child become a smoker. The corresponding first order condition for this maximization problem can be written as

$$-v'(\lambda)S(q_t)u_i(H) = c'(\lambda). \quad (2)$$

Equation (2) indicates the familiar result that the optimal investment in socialization is one where the marginal benefit of socialization is equal to its marginal cost. Note in particular that the marginal benefit of investments in socialization is determined in part by the marginal product of those investments, $v'(\lambda)$. If it is low, parents will provide less socialization. If parents perceive a larger health cost to smoking, this raises the marginal benefit of investments in socialization and socialization increases. Furthermore, the marginal benefit increases in the marginal productivity of investments, and optimal investments in socialization decrease with increases in marginal cost, $c'(\lambda)$.

Negative Parental Selection and Social and Economic Upheaval

Negative parental selection and economic and social upheaval might affect optimal investments in socialization through four channels: the effectiveness or marginal productivity of socialization $v'(\lambda)$; the extent of a parent's disutility if the child smokes $u_i(H)$; the parent's

perceptions of the health consequences of smoking H; and the parent's marginal cost of socialization. We elaborate on the productivity and parental disutility channels below.

Turning first to the marginal productivity of socialization efforts, we draw on work by Cunha and Heckman (2007) and Francesconi and Heckman (2016) who discuss that parental skills affect the productivity of investments in promoting cognitive and noncognitive skills in children. We extend this insight to the productivity of the socialization efforts made by negatively selected parents. As mentioned earlier, the mothers of children born during the period of transition in East Germany were younger and less educated. They may thus have had a lower productivity of their socialization efforts. Parenting practices vary substantially by socioeconomic status (SES), with higher SES parents spending more time with their children in enrichment activities, and also providing more positive socioemotional interactions, such as parental warmth and consistency, which have been linked to higher levels of self-regulation and social functioning in their children (Kalil & Ryan, 2020).

At the same time, the economic and social upheaval, in conjunction with the economic uncertainty and high unemployment rates caused by the fall of the Berlin Wall that lasted for almost a decade, increased the stress experienced by East Germans (Lenhart, 2017). For example, Gill and Kleinjans (2020) find that mothers who gave birth during the period of transition in East Germany were more likely to be worried about their own economic situation during the ten years following the fall of the Berlin Wall. Parental stress has been linked to lower levels of socioemotional interactions of parents with their children (see Kalil & Ryan, 2020), and thus influences both the quantity and quality of parents' socialization efforts. This link between economic hardship, parental stress, and worse parental relationships with children

is well established in the literature (see, e.g., McLoyd, 1990; Niever & Luster, 2006; Golberstein et al., 2016).

This stress is likely to have been more pronounced for negatively selected parents who were less educated and suffered from higher unemployment rates and employment uncertainty as well as greater social displacement (Lenhart, 2017; Kalil & Ryan, 2020). Indeed, Aizer et al. (2016) showed that stress experienced while pregnant affected children of less educated mothers more. Moreover, Mullainathan and Shafir (2013) show that scarcity leads to worse decision-making and myopia because the associated worry and need for problem-solving reduces the mental capacity for good decision-making. As a result, during social and economic upheaval, parental socialization efforts are likely to be less effective and lower, especially those of negatively selected parents.

A second term in the marginal benefit of socialization is the disutility a parent receives from her child smoking. This term depends on both the preferences of the parent and her perception of the health consequences of smoking. Factors that might lead a parent to be more tolerant of having a child who smokes are complex, but it seems likely that risk attitudes play a role. In this regard, work by Chevalier and Marie (2019) is illustrative. They found that East German mothers who had children during the period of transition were more risk loving. This may lower mothers' marginal benefit from socializing their children. Lastly, younger and less educated mothers may be more likely to have higher discount rates or be present-biased (see Kalil and Ryan, 2020), reducing the present value of the negative health consequences of smoking.

Based on the above considerations, negatively selected parents are likely to have lower and less productive investments in socializing their children against smoking. Less parental

socialization, in turn, can lead to a higher probability of smoking when the child is an adolescent or teen. The literature supports this conjecture. For example, a mother's smoking-specific socialization has been linked to lower adolescent smoking (Chassin et al., 1998), as have smoking-related discussions with nonsmoking parents (Chassin et al., 2005). Stanton et al. (2015) find a negative association between parental anti-smoking strategies and smoking in low-income youth, and Christopoulou et al. (2013) find that parental socialization reduces the probability that a child ever smoked. Carver et al. (2017), in a comprehensive review of literature, report that high quality and reciprocal conversations between parents and children about smoking are associated with lower smoking of adolescents.

In circumstances where smoking-specific socialization is low or general parenting skills and parent-child relationships are poor, children are likely to rely on messages from the peers. Wills and Vaughan (1989), for example, found that peer effects on behaviors were stronger for teenagers with low adult support, which we argue may be the case for negatively selected or disadvantaged parents. The importance of socialization in this context is reinforced by Chassin et al. (1998), who found that a mother's smoking-specific socialization can reduce affiliations with smoking peers. Moreover, socio-emotive support by parents has been shown to provide a buffer against peer influence and pressure to smoke (see Kobus, 2003).

Data

We use data from the German Socio-Economic Panel (SOEP), which is an annual nationally representative survey of about 11,000 German households (Wagner et al., 2007). We use the 95% sample of Version 34 that is available to international researchers. We use two samples. The first sample consists of men born between roughly five years before the fall of the Berlin Wall and five years after the period of transition (Main Sample). The second sample

consists of mothers who had children during this time and lived in East Germany in 1989 (Mother Sample).

The Main Sample includes German-born men age 18 and up who live in private households and were born between 1984-1998, who were not abroad and whose mothers were not living abroad in 1989, and who answered at least once the question about current smoking in the even survey years between 2002 and 2016 which included this question. We dropped 96 person-year observations with missing location information in 1989 and 2 whose birth cohort could not be uniquely assigned, resulting in 7,242 pooled observations of 3,210 unique men, of an average age of about 22 years. Our outcome variable is whether the respondent reported to be smoking at the time of the survey. Our main explanatory variables are the region of birth (East or West) and the birth cohort. We define someone as being born in East Germany if their mother lived in East Germany in 1989 (where East Germany, or simply East, is short for being born in what was until 1990 the German Democratic Republic and what is now known as the "Neue Bundesländer"). If this information was missing, we used own location in 1989 or current location if the respondent had not moved since childhood when available.

As in Gill and Kleinjans (2020), we separate individuals into three groups. The first group includes individuals born between 1984 and October 1989 (right before the fall of the Berlin Wall) or between 1994 and 1998. The second group, which we label the *Crossing* cohort, includes those born between November 1989 and July 1990, that is, during the nine months immediately following the fall of the Berlin Wall. These individuals were born to mothers who were already pregnant in November 1989. Individuals in our third group were born to mothers who became pregnant after the fall of the Berlin Wall and who had given birth by the end of 1993. These children were born between August 1990 and the end of December 1993. We label

the individuals in this group as the *Transition* cohort. This transition period is the time of negative parental selection as identified by Chevalier and Marie (2017). We restrict our analyses to using birth cohorts rather than year of birth dummies because of the small sample sizes of the *Transition* cohort and, perhaps even more importantly, the *Crossing* cohort.

In order to assess potential mechanisms by which the birth cohort and region might affect smoking behavior, in some specifications we also include measures of parental education and childhood environment (growing up with both biological parents). We also use a specification in which we control for own education. The means and standard deviations (if applicable) of variables used as well as further details about variable construction are shown in Table A1 in the appendix.

The Mother Sample includes German-born mothers without migration background who live in private households, had at least one child between 1984 and 1998, answered at least once in the survey years 1990-2017, and lived in East Germany in 1989. We dropped 12 observations of mothers who reported to have given birth before age 15, resulting in a final sample of 19,764 pooled observations of 1,967 unique mothers. The main variable of interest refers to the timing of their childbirth(s).

We distinguish three types of mothers: Mothers who had any child during the period of *Transition* as defined above; mothers who had a child during the period of *Crossing* (that is, mothers who were pregnant at the time of the fall of the Berlin Wall) and no child during the period of *Transition*; and mothers who had a child during neither the *Crossing* nor the *Transition* period but at any other time between 1984 and 1998. In some of our specifications, we also use variables to assess maternal characteristics (age at first birth, whether she was a teenage mother, whether she was married when she had her first child); individual characteristics (education,

work status, income); risk taking behavior; self-reported health status; and whether she had started to smoke by age 18 and whether she currently smokes. We also use two variables for the ten years immediately following the fall of the Berlin Wall that assess worry on the part of these mothers– one regarding worry about the general economic development, and one regarding worry about her own economic situation. The means and standard deviations (if applicable), more information on the variable definitions, as well as the survey years for which this information is available (or used in the case of the worry variables) are shown in Table A2 in the appendix.

Identification

Our empirical strategy is to compare adult smoking prevalence for those East Germans born during the period of *Transition* to adult smoking prevalence for East Germans born before the fall of the Berlin Wall or after the period of *Transition*. Our hypothesis is that the negative parental selection and social and economic upheaval experienced by East Germans during the period of *Transition* will lead to a higher smoking prevalence among those born during the *Transition* period. We assess whether the upheaval by itself affected smoking in young adulthood using the *Crossing* cohort. Individuals born during these months immediately after the fall of the Berlin Wall were conceived before this event but born at a time of upheaval. They are, thus, not affected by negative parental selection but by upheaval only. In contrast, those born during the period of *Transition* are affected by both, which allows us to study their interaction effects as well.

Ascribing a causal interpretation to such a comparison requires that we have a prediction of smoking prevalence for these cohorts had East Germany not experienced the sharp drop in fertility and economic downturn that actually occurred. Using West Germans as a control or

counterfactual experiment, we use a difference-in-differences strategy to identify this causal effect. Support for using West Germans as the counterfactual experiment is evidenced, in part, by looking at birth rates. As discussed by Chevalier and Marie (2017), and as we show in Figure 1, West Germany did not experience the same sharp drop in fertility observed during the period of transition in East Germany. Instead, birth rates in West Germany exhibit a smooth downward trend that started before the period of transition and continued after that period. A second justification for using West Germany as a control is that macroeconomic conditions became more similar in East and West Germany after the period of transition (Chevalier & Marie 2017).

The baseline empirical model used is given by this linear probability model:

$$Smokes_{it} = \beta_0 + \beta_1 East_i + \beta_2 Born\ during\ Crossing_i + \beta_3 East_i * Born\ during\ Crossing_i + \beta_4 Born\ during\ Transition_i + \beta_5 East_i * Born\ during\ Transition_i + \beta_6 BirthYr_i + \beta_7 Age + \mu_{it}. \quad (3)$$

The dependent variables $Smokes_{it}$ is a binary indicator for whether an individual *i* currently smokes at time *t*. The variable $East_i$ indicates whether an individual was born in East Germany. We use binary indicators for the cohorts $Born\ during\ Crossing_i$ and $Born\ during\ Transition_i$. Age and birth year are included as additional controls. The key coefficient of interest in the baseline model is the coefficient for the variable indicating that an individual was born in East Germany during the period of transition, which is given by the interaction term $East_i$*Born during Transition*.

We include a dummy variable for being born in the *Crossing* period and its interaction with being born in East Germany to isolate the earlier described effect of social and economic upheaval on smoking without the additional effect of negative parental selection. The reference category for all regressions is the individuals born before the fall of the Berlin Wall or after the period of transition.

The SOEP data have a panel data structure. To increase our sample sizes of men and women we pool the repeated observations of individuals and control for age and year of birth. Since we include repeated observations in the sample, we cluster our standard errors at the individual level to account for serial correlation. While we report results from linear probability models throughout, using probit models instead yielded very similar and, if anything, slightly bigger marginal effects. We also report below on the results of a placebo analysis and a variety of sensitivity checks, none of which alters our conclusions.

Results

This section reports our empirical results, starting with our investigation of the identifying parallel trends assumption, followed by the results from difference-in-differences estimations using the Main sample. Finally, to shed light on the mechanisms underlying our findings for smoking prevalence, we examine differences in salient characteristics of mothers who had children between 1984 and 1998.

Parallel Trends

In the current context, the parallel trends assumption refers to the case that smoking prevalence as a function of birth year shows the same year-to-year changes for East and West Germans as we move from older to younger cohorts for those individuals born prior to the fall of the Berlin Wall. Figure 2 shows average smoking rates with 95% confidence intervals by region for each year of birth for our Main sample.[2] Smoking rates are remarkably similar between East and West Germany for the years preceding the fall of the Berlin Wall. To investigate more formally whether the parallel trends assumption holds, we also show the results from linear

[2] Thanks to Nick Cox for writing the statsby command for Stata that we used to make this graph (Cox, 2010).

probability difference-in-differences estimates for smoking for those men born in the period before the fall of the Berlin Wall for our Main sample (see Appendix Table A3). We find no differences in cohort trends between East and West German men, confirming results from the prior literature.

FIGURES 2 AND 3 ABOUT HERE

As mentioned previously, the parallel trends for women are much less convincing, and most importantly show a trend difference in 1989, before the fall of the Berlin Wall (see Appendix Table A3 and Figure 3). This, plus previously cited literature discussing diverging smoking trends for East and West German women, led us to restrict our analysis to men though we show the baseline results for women in the appendix for completeness.

Difference-in-Differences Estimates for Smoking Prevalence

Table 1, Column 1 reports the baseline linear probability estimates for smoking prevalence. East German men born during the period of *Transition* relative to those born before and after this period are 16.7 percentage points more likely to smoke as adults.[3] This is a large effect – a 42 percent increase compared to the 39.8 percent smoking prevalence amongst East German men in our sample (0.167/0.398). There is no effect of being born during the *Crossing* period for East German men, and the interaction coefficient is statistically different from the interaction coefficient for those born during the *Transition* (with a p-value of 0.04), which suggests that the increased smoking prevalence of those born during the *Transition* is not driven solely by the economic and social upheaval itself that followed the fall of the Berlin Wall in East

[3] For completeness, we provide the results for women in the appendix Table A5. The results for women show an effect of being born during the period of *Transition* that is about one third smaller than the results for men and at a lower level of statistical significance. However, we ask the reader to keep in mind that the identification assumption of parallel trends is violated for women.

Germany. If upheaval had been the sole driving force leading to higher smoking prevalence, we would also expect to see children born during the *Crossing* period to have a higher probability of smoking. The fact that we do not see this strongly suggests that it is negative parental selection, and, as we argue below, negative parental selection combined with economic and social upheaval, that is leading to higher smoking prevalence for those born during the period of *Transition* in East Germany.

TABLE 1 ABOUT HERE

Recall that negative parental selection, in particular, is a statement about the characteristics of parents who had children during the period of *Transition*. In Column 2 of Table 1, we show the results of our baseline model augmented with parental education as a measure of parental selection. Parental education is significantly negatively correlated with current smoking behavior. Including parental education reduces our point estimate of the interaction between East and Born in *Transition* by 19 percent (0.167 – 0.135)/0.167). A formal test shows that the interaction terms across the two estimated models are statistically different from each other at the 99%-level.

As a final matter in Table 1, we further add the individual's education to investigate whether the linkage between smoking and negative selection as measured by parental education is driven by intergenerational transmission of education. We do not find a confirmation of this linkage. While there is a negative association between education and smoking, the difference-in-differences estimate for *Born during Transition* is not different from Column 2.

To explore a different measure of parental selection, in Table 2, we add a measure of whether the individual lived with his biological parents during the first 15 years of life, as this likely affected the extent and quality of socialization against smoking. Parental separation has

been shown to increase a teenager's likelihood to smoke as well as offspring's smoking in the medium and long run (Gustavsen et al., 2016; Hussey et al., 2016). Parental separation reduces the time children spent with their fathers, and single mothers not only work more and spend less time in home production, but are also more stressed and unhappier with their lives (Hamermesh, 2021). Divorce also reduces financial resources (Amato, 2005). As a result, children who did not spent their childhood with both biological parents likely faced less and lower-quality parental socialization. Indeed, in our sample those who grew up without both biological parents are much more likely to smoke in adulthood, with statistically different smoking rates of 44.6% compared to 30.7% for those who did.

In Column 1 of Table 2, we include this measure as a dummy in the baseline model. The coefficient indicates that not living with one's biological parents for the first 15 years is associated with a 13.1 percentage increase in smoking as an adult, but the coefficient for the interaction between East and *Born in Transition* remains basically unchanged from when we included parental education. In Columns 2 and 3 of Table 2, we show the results when we estimate the difference-in-differences model by splitting the sample by whether one lived with one's biological parents to assess whether being born during the *Transition* has a differential effect on smoking for these two groups. As shown in Column 3, there is a large 24.3 percentage point increase in smoking for those East Germans who did not live with their biological parents and who were born during the period of *Transition*, a strong and statistically significant result despite the somewhat small sample size. For those who did live with their biological parents, being born during the Transition is no longer associated with an increased probability of smoking, although a formal test shows that the coefficients are not statistically significantly different from each other.

TABLE 2 ABOUT HERE

As in the baseline result, we find no difference for the *Crossing* cohort, and thus no evidence that it is the economic and social upheaval alone that resulted in greater smoking prevalence. Those who were born in East Germany during the period of the *Transition* and who grew up without both biological parents were exposed to negative parental selection at a time of economic and social upheaval. It is likely that family formation for this cohort was the result of parental selection through endogenous family formation but also of the social and economic upheaval that directly affected family formation and fertility choices. We thus interpret our findings as evidence suggesting that it is the compounding effect of disadvantage that caused the *Transition* cohort in East Germany to be that much more likely to smoke than other cohorts born immediately before and after.

While our measures of negative selection and disadvantage are necessarily incomplete because of data limitations, our findings show three things. First, there is no effect of economic and social upheaval in and of itself on the probability of smoking later in life since we do not find any differences in smoking behavior between the *Crossing* cohort and those born before the *Crossing* cohort and after the *Transition*. Second, children who grew up in stable two-parent families were not more likely to smoke because they grew up in a time of economic and social upheaval once we control for the negative selection of their parents as measured by parents' education. Third, among the children who did not grow up in stable two-parent families, those born during the period of *Transition* are much more likely to smoke. The size of this effect suggests that it is the interaction of upheaval and negative selection that explains the increase in smoking in adulthood.

Placebo and Sensitivity Analyses

In this section, we provide additional support for our identification strategy and report on a variety of sensitivity analyses. All of these provide support for our findings.

To further assess the validity of our identification strategy, we conducted placebo analyses using redefined cohorts, generated by subtracting four to eight years from their calculation. So, for example, for the first placebo analysis the *Transition* cohort includes everyone who is born between August 1986 and the end of December 1989. As shown in Table A4 in the appendix, we find no evidence that the cohort effect that we find is repeated.

There are three potential threats to our identification, which we address in this section by reestimating our baseline model with a sample with fewer birth cohorts (all results are available upon request). First, there was a sharp increase in cigarette prices in 2002 (Heinrich, 2020; Lillard, 2015). Since the three cohorts we consider in our analysis were of different ages in 2002, their smoking uptake might have differed not because of the effects of the fall of the Berlin Wall on parental selection and socialization, but because cigarette prices differed at the time at which they would have been exposed to the hazard of starting to smoke. Since those born during the earlier years in our sample would have been less affected by this price increase, we reestimate our models excluding the oldest age group, those born between 1984 and 1987. The remaining individuals in our sample are age 14 and younger in 2002, and as such should have been similarly affected by the price increase. Our results do not change.

Second, starting in 2007, German states imposed smoking restrictions in public places. While enforcement has been uneven, it is nevertheless possible that this affected the take-up rates of smoking and did so differently for different age groups. This would have affected our younger cohorts more than our older cohorts. We investigate this possibility by estimating our

model with only those born during the *Crossing* period and after. While this substantially reduces our sample (by over half), leading to small cell sizes for those born in East Germany during the time of the lowest fertility, the period of *Transition*, results are remarkably similar, though with lower statistical significance and smaller coefficients.

Third, after the fall of the Berlin Wall, there was a wave of migration from East to West Germany, which could have differentially affected those who moved to the West through, for example, increased economic opportunities for parents. To assess this, we limit our sample to those men who at the time of the survey lived in the same region as their mother did in 1989. This reduced our East German sample by 17% and our West German sample by 1.5%. In our baseline results, we find a 16% (though not statistically different) decrease in the effect on smoking prevalence of being born during the *Transition* in East Germany.

Moreover, in case there are East-West differences between the cohorts born before the period of *Crossing* and after the period of *Transition*, we estimated all of our models with four birth cohorts: those born before *Crossing*, during *Crossing*, during the *Transition*, and after the *Transition*. The results for those born in East Germany during the period of *Crossing* and the *Transition* are unchanged.

In case the *Crossing* cohort includes children who were conceived after the fall of the Berlin Wall but were born prematurely, we assess the sensitivity of our findings for the *Transition* cohort when we drop children from the *Crossing* cohort who were born after May 1990. In results available upon request, we find no difference in the effect of being born during the period of *Transition* on smoking prevalence when making this sample restriction.

Similarly, our results do not depend on whether we include or exclude month of birth dummies, age, or survey year dummies.

Characteristics of Mothers

We turn next to an analysis of characteristics of mothers who gave birth during the years 1984 to 1998. Our goal is to shed light on possible mechanisms underlying our finding of increased smoking of East German men born during the period of *Transition*. Recall from the theoretical section that less skilled parents may see lower marginal benefits from socializing against smoking because their efforts at socializing are less productive at the margin. In addition, parents with a higher risk tolerance may receive lower marginal benefits from socialization. Finally, parental stress affects socialization as it acts as a mediator between economic hardship and relationships with children. To shed light on these issues, Tables 3-6 report results from event study analyses of maternal characteristics. Our particular interest is in mothers who had any child during the period of *Transition* relative to mothers who had any child before the fall of the Berlin Wall and/or after the period of *Transition* but no child during the *Crossing* period or the period of *Transition*.

TABLES 3-6 ABOUT HERE

As shown in Table 3, mothers who had any child during the period of *Transition* were more likely to have been a mother by age 18 and less likely to be married when they had their first child. Table 4 shows that these mothers are less educated, less likely to be working, and have lower income. They were not, however, more likely to have started to smoke by age 18. Taken together, these results support the hypothesis that smoking prevalence increased for East Germans born during the period of *Transition* because mothers who had any child during this period were less skilled and, therefore, less likely to socialize against smoking. Tables 5 and 6 give results addressing risk taking and stress, respectively. As shown in Column 1 of Table 5, mothers who had any child during the period of *Transition* report being more risk-taking. Table

5 also provides results for whether a mother reported being in bad health and whether she currently smokes. We find no correlation between having a child during the period of *Transition* and these characteristics. Finally, Table 6 shows that women who had any child during the period of *Transition* were about 6 percentage points more likely to report being worried about their own economic situation during the years following the fall of the Berlin Wall, thus supporting the conclusion that these mothers may have experienced more stress.

Additional Discussion

The distinction between the effects of economic upheaval and negative parental selection relies on the differences in being born during the *Crossing* period and the *Transition* period. Unfortunately, the sample size of especially the *Crossing* cohort is rather small. As a result, a lack of statistical difference in the coefficients of the respective interaction terms with East cannot be interpreted as an absence of such. We are, nevertheless, reassured by the fact that the interaction terms differ not only in magnitude but also in sign. Our interpretation of the results as supporting the hypothesis that it is family characteristics in conjunction with the economic upheaval that can explain the higher smoking rates of those born during the *Transition* is only suggestive since we only have a few variables available with sufficient sample sizes to investigate family background. It is quite possible and maybe even likely that a richer set of family characteristics would have shown a greater importance of upbringing for smoking rates in young adulthood, including among those born during the time of *Transition* in East Germany. In spite of this, our interpretation seems reasonable given that we only find a small of effect of the inclusion of arguably important parental characteristics and family upbringing in our estimated models, and given the results from the previous literature that disadvantaged families were more

likely to be affected by the great recession not only in terms of loss of income and increased stress, but also in terms of parental-child relationships.

Conclusions

Using a theoretical model of parental socialization against smoking, we argue that negatively selected parents may differ in the extent and effectiveness of their socialization efforts, a difference that increases during times of economic and social upheaval. We see these differences in socialization arising at two key margins. Negatively selected parents may be less skilled, thereby reducing the marginal productivity of socialization, and more tolerant of risk, thereby reducing the disutility from seeing their children smoke. We investigate this by implementing a difference-in-difference strategy to assess whether East German men born in the immediate aftermath of the fall of the Berlin Wall, a time of economic upheaval and negative parental selection, are more likely to smoke than those born before this time and after, controlling for trends using West German men as a comparison group.

We find that East German men born during this transition period are 40% more likely to smoke as young adults. Economic upheaval alone cannot explain the remainder of the difference since men who were born to mothers who were already pregnant at the time of the fall of the Berlin Wall do not exhibit higher rates of smoking. Negative parental selection can explain part of the increased smoking of the cohort born during the transition period. About one fifth of their higher smoking prevalence can be explained by parental education. Furthermore, our finding of increased smoking of this transition cohort is driven by those who grew up without both parents. Among these, those who are born during the transition period are 24% more likely to smoke than other cohorts. We interpret this result as suggesting that the most important explanation of the

increased smoking rates lies in the combined childhood disadvantage resulting from being born to negatively selected parents during a time of economic upheaval.

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APPENDIX

Table A1. Main Sample - Percentages and Means

		Men	
		East	West
Smoking (currently)		39.79%	32.64%
Cohort: Born...	during Crossing	6.40%	5.61%
	during Transition	10.69%	21.92%
	neither	82.91%	72.48%
Year of birth		1988.26	1989.52
		(3.64)	(4.01)
Age		22.55	22.03
		(3.73)	(3.57)
Parental Inputs			
Lived with both biological parents	(for at least 15 years)		
Yes		68.52%	74.33%
No		31.16%	25.24%
N/A		0.32%	0.43%
Father's education	no training	3.82%	10.54%
	training, no college	78.54%	66.80%
	college	17.64%	22.65%
Mother's education	no training	6.01%	19.92%
	training, no college	76.27%	64.46%
	college	17.71%	15.62%
Outcomes: Education			
Low Education		18.99%	18.27%
10-year Degree		30.90%	22.70%
Technical School		3.92%	5.51%
High School		20.85%	22.46%
Still in school		10.42%	15.88%
N/A		14.92%	15.17%
Observations		1,401 - 1,890	3,642 - 5,352

Standard deviations are shown in parentheses except for categorical variables.

Table A2. Mother Sample - Percentages and Means

Variables	East	West	Available Survey Years
Any child during Crossing but not Transition	4.75%	3.22%	1990-2017
Any child during Transition	23.11%	36.06%	1990-2017
Year of birth	1963.74	1962.43	1990-2017
	(6.05)	(6.21)	
Age	41.15	43.58	1990-2017
	(9.49)	(9.29)	
Age at first birth	22.91	26.59	1990-2017
	(3.45)	(4.71)	
Teenage mother (any child by age 18)	5.88%	3.73%	1990-2017
Married when had first child	51.70%	75.52%	
Years of education	12.57	12.27	1990-2017
	(2.23)	(2.57)	
Working (vs. not) (under age 60 only)	79.23%	75.84%	1990-2017
Log(income)	7.04	7.31	1990-2017
	(0.53)	(0.52)	
Risk taking: Discrete (0-10)	4.39	4.26	2004, 2006,
	(2.21)	(2.23)	2008-2017
Smoked by age 18	46.31%	47.97%	1990-2017
Currently smokes	38.44	34.61%	1999, 2001, even years 2002-2016
Bad health (not so good/ bad)	13.93	13.91%	1990-2017
Worry about general economic development: very much (vs. some/ no worries)	39.42%	31.27%	1990-1998 (years used)
Worry about own economic situation: very much (vs. some/ no worries)	33.87%	15.60%	1990-1998 (years used)
Observations	4,872-19,764	7,789-43,241	

Standard deviations are shown in parentheses except for dummy variables. Log(income) is defined as the log of (monthly household net income/ the square root of the number of household members). The risk-taking question asks about preparedness to take risk, with possible answers ranging from 0 “not at all” to 10 “very much”. Smoking by age 18 is based on questions in the years 2002 or 2012 and set equal to this answer for the other years as long as age while surveyed was at least 18.

Table A3. OLS: Parallel Trends

	(1)	(2)	(3)	(4)	(5)	(6)
	Men			Women		
East	0.060	0.091	0.062	0.068	0.072	0.097
	(0.072)	(0.068)	(0.064)	(0.060)	(0.061)	(0.062)
Born in 1985	0.026	0.017	0.001	0.068	0.069	0.071
	(0.058)	(0.055)	(0.050)	(0.049)	(0.047)	(0.045)
Born in 1986	0.020	0.002	-0.028	0.041	0.038	0.060
	(0.053)	(0.050)	(0.046)	(0.049)	(0.046)	(0.044)
Born in 1987	-0.017	-0.023	-0.034	0.086*	0.077	0.075*
	(0.056)	(0.053)	(0.050)	(0.048)	(0.047)	(0.045)
Born in 1988	-0.009	-0.009	-0.035	-0.002	-0.014	0.008
	(0.055)	(0.054)	(0.052)	(0.044)	(0.043)	(0.041)
Born in 1989	-0.062	-0.073	-0.093*	-0.038	-0.033	-0.029
	(0.055)	(0.052)	(0.048)	(0.051)	(0.049)	(0.048)
East *Born in 1985	-0.104	-0.108	-0.090	-0.094	-0.093	-0.112
	(0.099)	(0.095)	(0.088)	(0.088)	(0.086)	(0.085)
East *Born in 1986	-0.039	-0.048	-0.056	-0.003	-0.016	-0.069
	(0.099)	(0.095)	(0.092)	(0.089)	(0.086)	(0.086)
East *Born in 1987	0.059	0.052	0.046	-0.006	0.000	-0.025
	(0.099)	(0.095)	(0.091)	(0.089)	(0.088)	(0.089)
East *Born in 1988	-0.051	-0.082	-0.058	0.053	0.056	0.012
	(0.103)	(0.100)	(0.091)	(0.091)	(0.090)	(0.090)
East *Born in 1989	-0.047	-0.049	-0.054	0.175*	0.169*	0.148
	(0.100)	(0.096)	(0.089)	(0.100)	(0.100)	(0.095)
Parental education		✓	✓		✓	✓
Own Education			✓			✓
R2	0.008	0.050	0.132	0.014	0.054	0.114
Observations	4,114	4,114	4,114	4,464	4,464	4,464

Clustered standard errors are shown in parentheses. Also included are a constant and age. The sample used includes only those born before the *Crossing* period.

* p<0.10, ** p<0.05, and *** p<0.01.

Table A4. Placebo Analysis – Men's Smoking

	(3) t-4	(4) t-5	(5) t-6	(4) t-7	(5) t-8
East	0.064***	0.066***	0.065***	0.068***	0.066***
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Born during Crossing	0.033	-0.094*	-0.053	0.007	-0.019
	(0.050)	(0.052)	(0.048)	(0.046)	(0.047)
Born during Transition	-0.049*	-0.039	-0.038	-0.026	0.003
	(0.028)	(0.026)	(0.026)	(0.025)	(0.024)
East # Born during Crossing	-0.045	-0.003	0.018	-0.088	0.092
	(0.103)	(0.082)	(0.079)	(0.087)	(0.081)
East # Born during Transition	-0.015	-0.039	-0.026	-0.035	-0.050
	(0.045)	(0.041)	(0.040)	(0.040)	(0.040)
R2	0.037	0.037	0.036	0.036	0.036
Observations	28,131	28,133	28,118	28,117	28,122

Clustered standard errors are shown in parentheses. Also included are a constant, age, and year of birth. t-x is showing how cohorts are redefined to conduct the placebo analysis, where x is the number of years subtracted from the original derivation. This is the extended sample with years of birth ranging from 1964 to 1998.

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

Table A5. Difference-in-Differences Estimates: Women's Smoking

	(1)	(2)	(3)
East	0.073***	0.070***	0.066***
	(0.024)	(0.024)	(0.023)
Born during Crossing	-0.010	-0.000	0.020
	(0.040)	(0.039)	(0.039)
Born during Transition	-0.040*	-0.040**	-0.031
	(0.020)	(0.020)	(0.019)
East *Born during Crossing	0.001	0.004	0.019
	(0.082)	(0.082)	(0.078)
East *Born during Transition	0.116**	0.108**	0.093*
	(0.055)	(0.054)	(0.052)
Parental education		✓	✓
Education Dummies (own)			✓
R2	0.024	0.055	0.113
Observations	7,595	7,595	7,595

Clustered standard errors are shown in parentheses. Also included are a constant, age, and year of birth.

* p<0.10, ** p<0.05, and *** p<0.01.

TABLES

Table 1. Difference-in-Differences Estimates: Men's Smoking

	(1)	(2)	(3)
East	0.038	0.054**	0.030
	(0.025)	(0.024)	(0.023)
Born during Crossing	-0.034	-0.027	-0.030
	(0.043)	(0.043)	(0.043)
Born during Transition	-0.036	-0.032	-0.023
	(0.022)	(0.022)	(0.021)
East *Born during Crossing	-0.034	-0.043	-0.007
	(0.084)	(0.084)	(0.081)
East *Born during Transition	0.167***	0.135**	0.132**
	(0.059)	(0.059)	(0.054)
Year of birth	-0.008***	-0.009***	-0.009***
	(0.002)	(0.002)	(0.002)
Age	0.007***	0.006***	0.008***
	(0.002)	(0.002)	(0.002)
Father: No training		0.078**	0.035
		(0.033)	(0.032)
Father: Some college +		-0.134***	-0.053**
		(0.022)	(0.022)
Mother: No training		0.086***	0.037
		(0.026)	(0.025)
Mother: Some college +		-0.073***	-0.010
		(0.026)	(0.024)
Education Dummies (own)			✓
R2	0.019	0.056	0.127
Observations	7,242	7,242	7,242

Clustered standard errors are shown in parentheses. Also included is a constant as well as dummies for unavailable parental education (columns 2 and 3 only).

* p<0.10, ** p<0.05, and *** p<0.01.

Table 2. Difference-in-Differences Estimates: Men's Smoking

	(1) Full sample	(2) Only if lived with biol. parents	(3) Only if did not live with biol. parents
East	0.043*	0.057*	-0.004
	(0.024)	(0.029)	(0.043)
Born during Crossing	-0.026	-0.073	0.110
	(0.041)	(0.045)	(0.096)
Born during Transition	-0.029	-0.014	-0.069
	(0.022)	(0.025)	(0.043)
East* Born during Crossing	-0.040	-0.089	0.070
	(0.078)	(0.085)	(0.142)
East * Born during Transition	0.133**	0.082	0.243**
	(0.058)	(0.068)	(0.110)
Father: No training	0.079**	0.089**	0.023
	(0.033)	(0.039)	(0.063)
Father: Some college +	-0.127***	-0.112***	-0.207***
	(0.022)	(0.025)	(0.044)
Mother: No training	0.080***	0.098***	0.044
	(0.026)	(0.032)	(0.044)
Mother: Some college +	-0.063**	-0.047	-0.110**
	(0.026)	(0.029)	(0.048)
Did not live w/ biol. parents (first 15 years)	0.131***		
	(0.020)		
Sample Means	0.345	0.307	0.446
R2	0.070	0.056	0.078
Observations	7,242	5,273	1,940

Clustered standard errors are shown in parentheses. Also included are a constant, age, year of birth, dummies for unavailable parental education, and in column 1 a dummy for missing family living arrangements.

* p<0.10, ** p<0.05, and *** p<0.01.

Table 3. OLS Event Study, East German Mothers' Characteristics

	(1) Age at first birth	(2) Mother by age 18	(3) Married when had first child	(4) Smoker by age 18
Any child Crossing but none during the Transition	-0.726	0.047	-0.010	-0.075
	(0.594)	(0.033)	(0.068)	(0.075)
Any Child born during the Transition	-0.367	0.041**	-0.071**	0.002
	(0.227)	(0.018)	(0.035)	(0.046)
Sample Means	22.901	0.059	0.513	0.463
R2	0.040	0.054	0.049	0.027
Observations	19,764	19,764	19,501	14,866

Clustered standard errors are shown in parentheses. Also included are a constant, year of birth, and year of birth squared.

* p<0.10, ** p<0.05, and *** p<0.01.

Table 4. OLS Event Study, East German Mothers' Characteristics

	(1) Years of education	(2) Working	(3) Log(income)
Any child Crossing but none during the Transition	-0.232	-0.009	-0.038
	(0.305)	(0.0303)	(0.045)
Any Child during the Transition	-0.423***	-0.077***	-0.093***
	(0.133)	(0.018)	(0.024)
Age		-0.004***	0.046***
		(0.001)	(0.001)
Sample Means	12.573	0.792	7.043
R2	0.038	0.023	0.284
Observations	18,794	19,171	19,710

Clustered standard errors are shown in parentheses. Also included are a constant, year of birth, year of birth squared, and survey year dummies. Education is set to missing if age < 25. Work is set to missing if age > 59 or the woman is currently in education.

* p<0.10, ** p<0.05, and *** p<0.01.

Table 5. OLS Event Study, East German Mothers' Characteristics

	(1) Risk taking	(2) Bad health	(3) Currently smokes
Any child Crossing but none during the Transition	0.101	-0.013	-0.071
	(0.201)	(0.024)	(0.056)
Any Child during the Transition	0.268**	0.009	-0.019
	(0.120)	(0.013)	(0.034)
Sample Means	4.393	0.139	0.384
R2	0.005	0.030	0.048
Observations	9,204	18,200	6,361

Clustered standard errors are shown in parentheses. Also included are a constant, age, year of birth, year of birth squared, and survey year dummies.

* p<0.10, ** p<0.05, and *** p<0.01.

Table 6. OLS Event Study, East German Mothers' Characteristics, Survey Years 1990-1998

	(1) Worry - general	(2) Worry - own
Any child Crossing but none during the Transition	0.035	-0.030
	(0.057)	(0.056)
Any Child during the Transition	0.017	0.056*
	(0.026)	(0.029)
Sample Means	0.394	0.339
R2	0.037	0.015
Observations	4,878	4,872

Clustered standard errors are shown in parentheses. Also included are a constant, year of birth, year of birth squared, and survey year dummies.

* p<0.10, ** p<0.05, and *** p<0.01.

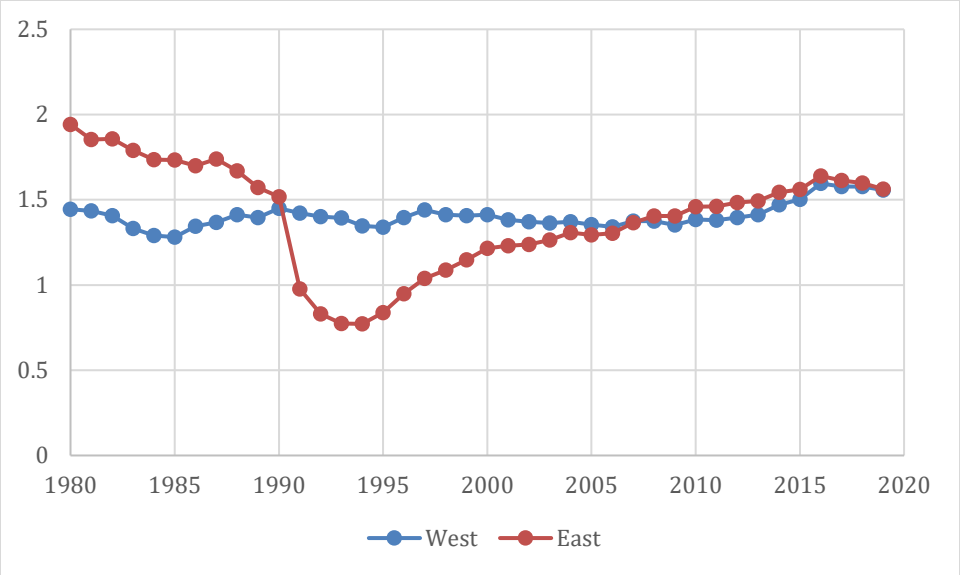

Figure 1. Total Fertility Rate in Germany, by Region

Note: For women aged 15-49. Berlin is excluded starting from 2001.
Data Source: Statistisches Bundesamt (2020), available at https://www.destatis.de/DE/Presse/Pressemitteilungen/2020/07/PD20_282_122.html.

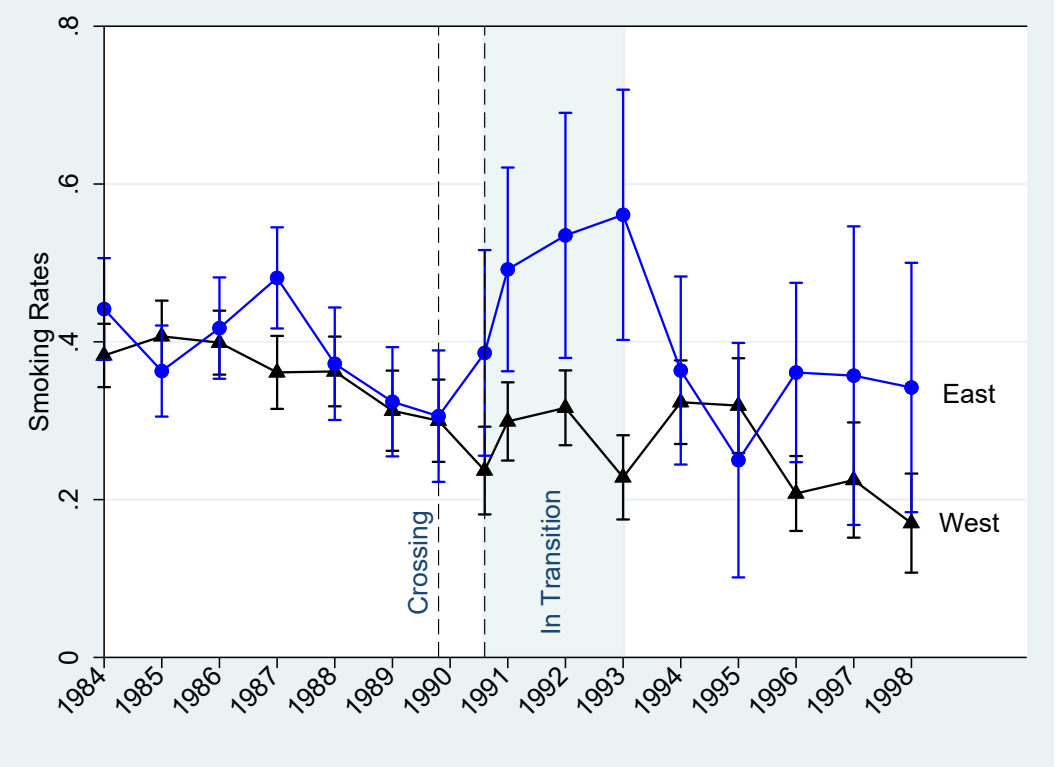

Figure 2. Average Smoking Rates with 95% Confidence Intervals for Men, by Region and Year of Birth

Note: To distinguish the Crossing cohort from the other cohorts, we created a separate year of birth entry for that cohort, shown between 1989 and 1990, that includes the entire Crossing cohort, and an entry between 1990 and 1991 that includes those born in 1990 who are part of the Transition cohort.

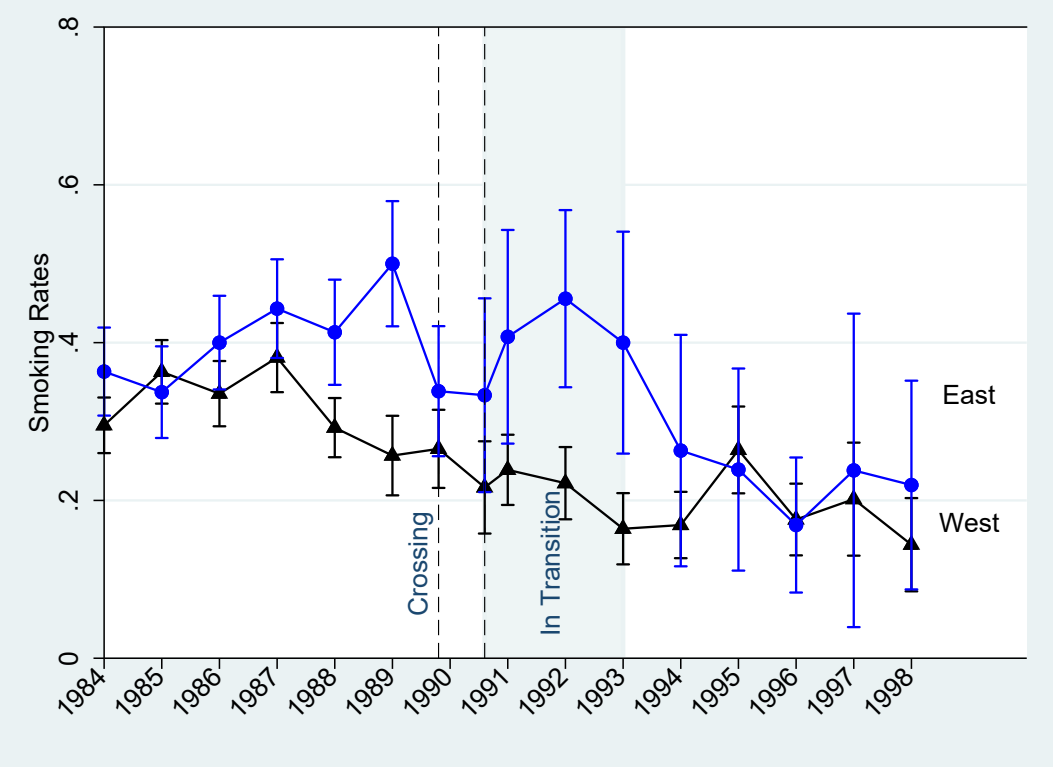

Figure 3. Average Smoking Rates with 95% Confidence Intervals for Women, by Region and Year of Birth

Note: See notes to Figure 2.