Formation of College Plans: Expected Returns, Preferences and Adjustment Process

Ghazala Azmat, Katja Maria Kaufmann

Formation of College Plans: Expected Returns, Preferences and Adjustment Process*

Ghazala Azmat and Katja Maria Kaufmann

January 30, 2023

Abstract

We exploit a large exogenous shock to study the formation, and updating, of educational plans, and to examine how these plans ultimately impact later educational attainment. Using novel, longitudinal, microdata on cohorts of East German adolescents before and after the German Reunification (a change for the East from state socialism to capitalist democracy), and using differences across cohorts induced by the timing of Reunification, we show that shortly after relative to before that time, college plans among high-school students increased substantially, which was followed by sizable increases in the completion of the college entrance certificate five years later. To shed light on the underlying mechanisms, we analyze the elasticity of youths' beliefs and preferences with respect to the large shock. Perceived educational returns and risk, economic preferences ("consumerism") and social preferences ("individualism") adapt quickly and are directly linked to changes in plans and outcomes. Cohorts closer to critical educational junctions at the time of Reunification, however, adjusted their plans to a much lesser extent. While they similarly updated the expected returns to education, they exhibited a slower adjustment in their preferences relative to younger cohorts.

JEL Classification: Z1, I21, D72, D91

Keywords: college plans; perceived returns; economic and social preferences

*Ghazala Azmat, Department of Economics, Sciences Po, CEP (LSE), CEPR, CESifo, IZA; e-mail: ghazala.azmat@sciencespo.fr. Katja Maria Kaufmann, Department of Economics, University of Bayreuth, briq, CESifo, HCEO and IZA; e-mail: katja.kaufmann@uni-bayreuth.de. Ghazala Azmat gratefully acknowledges funding from the Agence Nationale de la Recherche (ANR). Katja Kaufmann gratefully acknowledges funding from the German Research Foundation (DFG) through CRC TR 224 (project C01).

1 Introduction

Young people make plans about their educational attainment, such as whether or not to attend college. Educational plans provide students with internal consistency, and a form of commitment, to go to college. However, at the same time, plans are malleable, and they can be updated, at least up to a certain age. Economists and scientists from other disciplines, as well as policymakers, have long been interested in the determinants of college attendance and the role played by one's environment. Understanding educational planning is, however, challenging. It is so not only due to the lack of necessary data but also, importantly, because the environment in which individuals' educational plans are formed, and to which they adjust, is typically endogenous to individuals' characteristics, making it difficult to disentangle its effect on outcomes. In this paper, we exploit a shock to one's environment, and its timing over the educational lifecycle, to causally estimate the impact on individuals' educational plans, the components that drive the adjustment, and, ultimately, how changes in early plans factor into later educational outcomes.

Given the fundamental long-run implications of higher educational attainment in later economic success and general wellbeing, it is critical to understand the process of educational decision-making as a means to understanding the emergence, development and persistence of inequality. We focus on the role played by the educational plans made by adolescents, which we observe for different cohorts repeatedly over their educational lifecycle and, in particular, before and after a large "real-life" shock. We then track individuals over several years to measure the impact on the actual college decision. To understand how these plans are formed, how they adjust, and which determinants adjust more or less rapidly, we formally investigate the main factors determining educational decisions: expected returns to education and perceived uncertainty, preferences and supply-side constraints. Thereby, our analysis sheds light on the elasticity of educational plans, as well as of beliefs and (economic and social) preferences of different cohorts of youths to a large shock.

We use the quasi-experiment of German Reunification in October 1990 to study the effect of a large macro shock to the environment of East German youths on their educational plans and, ultimately, their decisions regarding their educational career. Through Reunification, East Germany transitioned from a socialist system with a planned economy to the capitalistic and democratic system of West Germany. The changes in youths' educational attainment in the wake of Reunification were substantial, as documented in Figure 1. While there was a persistent, and stable, gap in obtaining the "Abitur" (the entrance certificate to college) between East and West Germans for cohorts graduating prior to Reunification (almost a 50 percent difference), this gap closed completely soon after Reunification for younger cohorts. Intermediate cohorts that, in principle, would have had the chance to start the Abitur track at the time of Reunification, did not fully adjust, and so a

part of the gap remained for them.[1]

Using novel, longitudinal, microdata on two cohorts of adolescents in East Germany over a ten-year period –before and after Reunification– when the individuals were aged 9 to 20, we causally estimate the influence of regime change on their plans to obtain the college entrance certificate "Abitur" and subsequent educational outcomes. We apply a difference-in-differences (DID) framework that uses variation in the timing of Reunification for the two cohorts of students, who have a three-year age gap, to identify its effect on plans to pursue the Abitur in the future. In particular, we analyze the change in the plans of the younger cohort between January 1990 and January 1991 (just before and after Reunification), when the cohort was in grades 7 and 8, using as control for the counterfactual trend, the evolution of the older cohort's plans between the same grades (before Reunification). We then link early educational plans to the actual pursuit of the Abitur.

We show that Reunification had large, and long-lasting, effects on the educational plans made by adolescents five years prior to the actual decision. These adjustments happened relatively quickly. Shortly after Reunification (compared with just before), the likelihood of a student planning to obtain the Abitur increased by 22 percentage points. Importantly, we show that educational plans are highly predictive of the ultimate attainment, and the increase in the intention to pursue the Abitur, did in fact lead to a strong increase in the likelihood of completing the Abitur five years later. We confirm these findings using data on completed educational degrees of several cohorts of East and West German youths from the well-known and widely used German Socio-Economic Panel and employing a difference-in-differences analysis with West Germany as the control group.

What drives the changes in educational plans? To understand this, we introduce a simple theoretical framework based on a standard (and extended) utility maximizing model of educational planning. A standard education model includes three main factors determining educational decisions: expected returns to education, preferences, and constraints. These factors are likely to play an important role in influencing not only the ultimate educational attainment, but also the educational plans that adolescents make several years before the actual decision. In addition, we allow for two relevant extensions to the standard model by investigating the role of perceived uncertainty due to economic and social instability,[2] and, social preferences.[3]

Typically, data on each component is not readily available, which makes it difficult to under-

[1] Youths can either stop school after grade 10 or continue on the path to Abitur with grades 11 and 12.

[2] While it used to be uncommon to include perceived risk (uncertainty) in standard educational choice models (see, for example, Cameron and Taber, 2004, and Carneiro, Heckman, and Vytlacil, 2005), several recent papers, such as Oreoupoulus and Salvanes (2011), Stange (2012) and Attanasio and Kaufmann (2014), show that education decreases (perceived) uncertainty and that (perceived) uncertainty is linked to educational choices.

[3] Social preferences have been included in some recent papers in education. For example, Oreopoulos and Salvanes (2011) show that social status increases with higher educational degrees. Wiswall and Zafar (2018) and Delavande and Zafar (2019) show that students care about several types of non-pecuniary returns to college majors and to different types of colleges.

stand the importance of these different components. In our study, we take advantage of unique data on a number of potentially important determinants, as derived from the theoretical framework on educational planning, elicited several years prior to and several years post Reunification. These data allow us to shed light on the elasticity of beliefs and preferences and, therefore, on the likely mechanisms behind our main findings. Specifically, we analyze the impact of Reunification on the three potential drivers of educational plans stemming from the standard education model: expected returns to education, economic preferences, and supply side constraints. These are conceptualized using measures of adolescents' perceived returns to education, preferences for consumption and luxury, and the main (standard) constraints that the literature has identified (resource and access constraints, and the supply of particular college majors), as well as political constraints to accessing college, which might be relevant in the given context. In addition, we allow for two relevant extensions to the standard model and proxy for youths' perceived uncertainty due to economic and social instability using a measure of youths' anxiety towards the unknown, while we conceptualize social preferences using an indicator based on measures such as the importance of the collective and of doing good deeds. In a second step, we analyze directly the (within-person) link between the changes in these factors and changes in educational plans.

While German Reunification implied a sizable increase in the returns to education for East Germans (see, for example, Burda and Hunt, 2001), it is not clear whether this new information is salient to young people and if, and when, it affects educational *plans*. We show that Reunification did, in fact, increase students' *perceived* returns to education, and this change occurred soon after Reunification. In particular, the stated importance of education for future earnings increased substantially (by 0.50 of a standard deviation). Moreover, when we link this to changes in educational plans, we observe that the planning to obtain the college entrance certificate increased more among those whose perceived educational returns increased more strongly. The results highlight that rapid changes in expected returns were an important driver for individuals updating positively their educational plans soon after Reunification, with important long-term implications.

Turning to economic preferences, we observe important changes in response to Reunification. When asked about, for instance, their desire for luxury, we see that Reunification led to an important increase in their consumption and economic preferences (by 0.31 of a standard deviation).

We next extend our investigation to a larger set of beliefs and preferences than those presented in the standard education model. First, we look at the role of social preferences in adolescents' educational plans. Second, we extend our analysis to investigate the relevance of risk perceptions. We show that both factors are relevant. In terms of social preferences, we find a substantial decrease in the social preference indicator by 0.36 of a standard deviation. Our results thus strongly point to a move towards more "individualism," suggesting that these adolescents internalize norms of the West after Reunification. Importantly, the change in these social preferences is highly related

to changes in educational plans.[4] Finally, we find that Reunification led to a substantial increase in the level of perceived uncertainty (0.40 of a standard deviation) and that increased (perceived) uncertainty is directly linked to increases in educational plans. This is consistent with the theory that educational investments can be used to insure against uncertainty (see, e.g., Heckman, Lochner and Todd, 2006).

When turning to supply side constraints, we do not find evidence to suggest that constraints (or the relaxation thereof) explain changes in educational plans resulting from Reunification. First, we examine the role of changes in access to higher education (overall, and for certain groups that might have been facing constraints under the socialist regime based on closeness to the regime, previous school performance and parental education). Second, we analyze the relevance of potential changes in access to certain study fields (due to a relative focus on STEM fields under the previous regime). Third, we investigate changes in educational quality or content. We find little evidence that these factors explain increases in educational plans in the short run. We show instead that the groups that were likely previously constrained increased their educational plans to an extent very similar to that of previously less constrained groups.

Finally, another relevant question is whether the age (or educational stage) at which individuals are affected by a macro shock is relevant for educational decisions. To address this, we analyze whether the younger and the older cohort were impacted differentially by Reunification, comparing their evolution in terms of educational plans (as well as their beliefs and preferences) over the same years (i.e., shortly before Reunification in October 1990 compared to shortly after). Applying a difference-in-differences (DID) framework by *years*, we can investigate the adjustment process of the young cohort relative to the old around the time of Reunification.[5] We find that the older cohort adjusted their educational plans very little relative to the younger cohort. Interestingly, the expectations about the returns to schooling increase similarly for both cohort. However, the economic and social preferences of the older cohort adjust substantially less, suggesting that, for the younger cohort, the values and preferences converged much more towards "individualism" and social norms from the West relative to the older cohort. The fact that the older cohort adjusted more slowly to the regime change in terms of several important determinants of educational decisions is consistent with the slower adjustment in terms of that cohort's educational attainment.

[4] Arguably, some preferences, especially social preferences, elicited prior to Reunification might overstate favoring values (or norms) related to socialism. We, however, are concerned with the heterogeneity among adolescents in terms of the change in stated preferences in response to Reunification, and how these are linked to their educational plans, as discussed below.

[5] Methodologically, to analyze the causal effect of Reunification on the younger cohort, we use, as the counterfactual, the change in outcomes of the older cohort when in the same *grades*, all of which were before Reunification. In a difference-in-differences framework by *years*, both cohorts are potentially affected by Reunification. The latter therefore enables us to understand the extent to which the older cohort could adjust to Reunification relative to the younger cohort.

Our study sheds new light on the question of whether, to what extent, and how shocks to the economic and societal landscape influence adolescents' educational plans and ultimate long-term educational success. One of our key contributions to the literature is to explore the formation and updating of educational plans – their malleability and how this malleability changes at different ages during adolescence – and to link it to actual investment. We show that educational plans are important – they are strongly linked to actual educational attainment and changes to the environment lead to an updating of plans (especially among younger adolescents). This is novel to the existing literature and is immensely important from an academic and policy perspective. Moreover, the uniqueness and richness of the historic panel data on two cohorts of East German youths before and after the lifting of the "Iron Curtain," and the quasi-experiment of Reunification allow us to, not only better understand what factors play an important role in educational planning (subjective beliefs, preferences and constraints), but also understand their relative importance when directly linking them to educational plans.

The study contributes to several strands of research. First, we add to the growing body of literature showing that culture and one's environment shape economic decisions and analyzing the extent to which these factors, and their determinants, adjust to shocks (Fernandez and Fogli, 2006, 2009; Fernandez, 2007; Guiliano and Nunn, 2021; Figlio et al, 2019; Kosse et al, 2020). In a related study, Alesina and Fuchs-Schündeln (2007), also using the German Reunification as a quasi-experiment, show–for different cohorts of adults–that political regime change influences preferences for redistribution.[6] [7] Our research allows for a joint analysis of adjustment processes of economic decisions and their determinants. With longitudinal data across different cohorts on plans, beliefs and preferences, we provide insight into the timing and the process of adjustment. Moreover, the focus of our study is on adolescents – a previously understudied group in this context – for whom it is particularly important to understand the formation and the speed of adjustments of plans and preferences due to their consequences for inequality and social mobility.

Second, we explore the mechanisms underlying the effect of Reunification on educational plans and, consequently, on long-run educational decisions. While there is growing interest in the relationship between individuals' subjective expectations/beliefs and educational choices, the focus in the literature has mostly been on the link between beliefs about returns to schooling and educational

[6]Other papers have also used German Reunification as a natural experiment to investigate issues such as saving behavior (Fuchs-Schündeln, and Schündeln, 2005; Fuchs-Schündeln, 2008), consumption behavior (Bursztyn and Cantoni, 2012), the economic impact of market access and networks (Redding and Sturm, 2008; Burchardi and Hassan, 2013) and the effect on fertility decisions (Chevalier and Marie, 2017).

[7]Our findings are also related to recent evidence by Jha and Shayo (2019) demonstrating the role of exposure to markets in shaping social values and political preferences. We show that following Reunification and the resulting regime change to capitalism, preferences for consumption increased, converging to the tastes of the more capitalist society. Similarly, social values shifted towards being more individualistic and away from placing importance on "the collective".

decisions (see, for instance, Jensen, 2010; Zafar, 2013; Attanasio and Kaufmann, 2014; Kaufmann, 2014; Wiswall and Zafar, 2015). However, little is known about when, and how, educational plans are being formed (which might be several years before the actual decision) and whether, and to what extent, individuals' educational plans and subjective beliefs update in response to shocks to the environment. The key challenge to addressing these questions is the availability of longitudinal data on individuals' plans and perceived returns (among other beliefs/expectations), before and after a "shock" to individuals' environment. A different stream of literature studies the role of preferences in (educational) decisions (see, for recent evidence, Sutter et al., 2013 and Falk et al., 2018). There is, however, relatively little overlap in terms of data sources that permit the exploration of both expected returns and preferences, as well as other potential drivers (recent notable exceptions are Delavande and Zafar, 2019, who study the role of expected monetary returns, nonpecuniary factors and financial constraints, in the decision on the type of college to enroll in, and Boneva and Rauh, 2019, who examine the role of pecuniary and nonpecuniary factor in explaining the socioeconomic gap in college attendance). In our study, we make use of unique historic data around the time of Reunification to relate changes in (perceived) returns to education and in preferences to changes in students' educational plans. Beyond expected returns, our data allow us to study the role of perceived uncertainty in educational plans due to economic and social turmoil, and beyond economic preferences, we study whether changes in social preferences that might reflect a convergence to the West German culture (e.g., being more individualistic and placing less importance on the collective) play a role.

Third, our analysis also highlights that the timing of macro events can be crucial to one's lifetime outcomes. This has been shown in other contexts – for example, graduating during a recession has strong and persistent effects on individuals' earnings (see, e.g. Baker, Gibbs, and Holmstrom, 1994; Oyer, 2008; Oreopoulos et al., 2012; and Kahn, 2009). In our analysis, the fact that East German cohorts that experienced Reunification towards the end of high school, but before the decision to obtain the Abitur, did not fully adjust their educational decisions to the new economic environment, suggests that students with the possibility of adjusting their Abitur take-up to the new economic conditions do not do so,"sticking" to their prior plans.

Finally, several studies (see, for instance, the seminal papers by Cunha and Heckman, 2008, and Cunha, Heckman and Schennach, 2010) have focused on early childhood investments and have shown that it is critical to improve skills early on (due, for example, to dynamic complementarities). Other studies have focused on the role of information and updating in individuals' investment decisions while they are in college (see, for example, Wiswall and Zafar, 2015, 2018). Our analysis contributes to this strand of the literature by shedding light on whether, when, and how individuals form and update their educational plans during the critical period of childhood and adolescence. From a policy perspective, our results suggest that information interventions, such as

on the returns to education, fellowships and so forth, are likely to be substantially more effective if they are provided to youths several years before the actual educational decision has to be taken. This can be highly relevant too for helping to reduce educational inequality. Understanding how educational plans are formed and how they depend on family background, skills, beliefs, preferences and constraints help us understand their role in the creation and persistence of various types of inequality. Overall, our study helps to inform on the links between early educational planning and later educational decisions and outcomes, offering insight into this black box of the educational decision process.

2 Background

Historic events

Until 1945, East and West Germany were united and a single country. When separation occurred after Germany's defeat in the Second World War, it was exogenously imposed by the winning Allies. In the fall of 1989, change swept through Eastern Europe and led to the fall of the Berlin Wall in November 1989. Importantly, East Germany, formerly called German Democratic Republic (GDR), instead of experiencing a change of government within its borders or a newfound independence as did other countries in this area, ceased to exist as a separate state. On October 3, 1990, East Germany joined the Federal Republic of Germany (FRG), creating a sovereign unified German state (in the event referred to as the "Reunification"). In this process, East Germany changed from state socialism to liberal-democratic capitalism in a short period of time and without a gradual transition (as detailed below).[8]

In the period prior to Reunification, a series of protests by East Germans ("The Peaceful Revolution"), led to the removal of the Berlin Wall in November 1989. A few weeks after the fall of the Wall, West German Chancellor Helmut Kohl announced a 10-point program calling for the two Germanies to expand their cooperation. However, the Socialist Unity Party was still in place in the German Democratic Republic, and there was a great deal of uncertainty until late in the process as to whether Reunification would ultimately occur, as well as regarding its meaning, due to a strong international opposition, in particular, among the Four Powers that had imposed separation on Germany after World War II and that had a direct say in whether Germany would be allowed to reunify. For example, briefly before the fall of the Berlin Wall, British Prime Minister Margaret Thatcher told Soviet General Secretary Mikhail Gorbachev that neither the United Kingdom nor

[8] In our analysis, we use this sudden change in regime in East Germany to compare different cohorts of East German youths affected by Reunification at different times. This allows us to evade the concern that East and West Germany were already characterized by important social, cultural and political differences at the time of separation, as discussed by Becker, Mergele and Woessmann (2020).

Western Europe desired Reunification of Germany. Thatcher also clarified that she wanted the Soviet leader to do what he could to stop it, telling Gorbachev "We do not want a united Germany". Although she gradually softened her opposition, as late as March 1990, Thatcher summoned historians and diplomats to a seminar at Chequers to ask "How dangerous are the Germans?".[9]

During the election in the GDR in March 1990, the former Socialist Unity Party of Germany was heavily defeated. A grand coalition was formed under Lothar de Maizière, leader of the East German wing of Kohl's Christian Democratic Union. On August 31, 1990, the "German Reunification Treaty" (Einigungsvertrag), declaring the accession (Beitritt) of the German Democratic Republic to the Federal Republic of Germany, was signed by representatives of the two Governments to be effective as of October 3, 1990. Following the "Two Plus Four Talks" (between the Federal Republic of Germany, the German Democratic Republic, and the Four Powers, namely France, the Soviet Union, the United Kingdom, and the United States), the "Treaty on the Final Settlement with Respect to Germany" was signed in Moscow, Soviet Union, on 12 September 1990, and paved the way for the German Reunification on 3 October 1990.

Education structure before and after Reunification

The East and West German educational systems grew from the same educational roots and shared a common language. During the forty years (1949-1990) of separation, they were characterized by different educational and political philosophies; however, similar elements always remained or came to the fore in various periods of reform. One key feature of the secondary school system that remained the same in West and East Germany was selective college-preparatory education and the "Abitur" degree as the certificate necessary to enter college. This degree, therefore, is the ideal outcome for our analysis since it remained in place and unchanged throughout, before and after Reunification, in both parts of Germany.[10]

East Germany had a unified school system in which there was one common school, which almost every East German student attended from grades one through ten, called the polytechnical school ("Polytechnische Oberschule", POS). Students were taught in heterogeneous core groups; tracking was not permitted, and electives were few. After the tenth grade, most students continued

[9]Michael Binyon (11 September 2009). "Thatcher told Gorbachev Britain did not want German reunification". The Times. London. Also see Kundnani, Hans (28 October 2009). "Margaret Thatcher's German war". The Times. See also Volkery, Carsten (9 November 2009). "The Iron Lady's Views on German Reunification/'The Germans Are Back!'". Der Spiegel. The pace of events also surprised the French, whose Foreign Ministry had concluded in October 1989 that reunification "does not appear realistic at this moment"; see Knight, Ben (8 November 2009). The headline "Germany's neighbors try to redeem their 1989 negativity" appeared on Deutsche Welle. Ultimately, the key ally was the United States. Although several top American officials opposed rapid unification, Secretary of State James A. Baker and President George H. W. Bush provided strong and decisive support for Kohl's proposals.

[10]See the survey on the development of the East and West German education systems before and after Reunification by Mintrop and Weiler (1994) and the comparison of the education systems of the FRG and GDR by Anweiler et al. (1990).

with vocational training, implying three years of apprenticeship in a business and part-time study in vocational schools. A minority of students entered the academic track, spending two additional years in extended secondary schools ("Erweiterte Oberschule", EOS) to obtain the Abitur, allowing them access to universities. These students were selected on the basis of grades (GPA) and political attitudes (see Baske, 1990). In Section 6.2.3, we investigate whether the relaxation of such constraints led (or contributed) to the change in educational plans and attainment.

East Germany's unified school system only began to align with the West German three-track system starting with the 1991/92 school year. The three-track system consisted of a college-preparatory Gymnasium (grammar school), a technically- and clerically-oriented Realschule and a manual labor-oriented Hauptschule (vocational secondary schools). Despite these changes within a short period, the transition was marked by relatively high continuity (see Weishaupt and Zedler, 1994; and Mintrop and Weiler, 1994). Schools retained most of their personnel (only approximately 10 percent of teachers lost their jobs in the years after Reunification) and proceeded to operate without much interruption. Moreover, there was complete continuity in the secondary school system with respect to the selective university-preparatory education and the "Abitur" degree (which was already the same in both East and West Germany).[11]

As shown in Figure 1, until shortly before Reunification, there were sizable differences in educational attainment between East and West Germany. In the West, approximately 30 percent of school-aged students completed the Abitur; in the East, less than 20 percent did so (see also Below et al., 2013). However, after Reunification, East German Abitur completion rates quickly converged to West German rates.

3 Data Description and Descriptive Statistics

3.1 Description of Main Data Source: Longitudinal Study of Students

The data originate from the Longitudinal Study of Students 1986-1995.[12] The study is unique in that it follows students (in two parallel cohorts) in East Germany from 1986 to 1995 (i.e, for several years prior to, and several years after Reunification). Students in the younger cohort were surveyed between grade 3 in the academic year 1985/86 and grade 12 at the end of the academic year 1994/95 (i.e., between ages 9 and 18), while students in the older cohort were surveyed between grade 6 (in the academic year 1985/86) and up to three years after grade 12 in 1995 (i.e., between ages 12 and

[11] Our data also allow us to investigate the short-run effects of Reunification *before* the changes in the school system took place since in our analysis we compare outcomes before Reunification (in January 1990) to those after Reunification (in January 1991)

[12] The original German name of the data is *Schülerintervallstudie Fähigkeiten/Risiko 1986-1995*.

21).[13]

The objective of the study was to understand the lives and development of individuals during (late) childhood and adolescence, with a specific focus on abilities – as measured by grades, teacher evaluations, and self-evaluations – and on values, attitudes and risky behavior. The data are ideal for the purpose of our study since the survey followed the same individuals from before to after Reunification, covering a wide range of topics, including educational achievement and attainment, preferences, family development, social relations and psychological wellbeing. Importantly, the survey asks students about their educational (Abitur) plans at several points in time and follows them over time, allowing us to relate educational plans to actual outcomes.[14]

With respect to sampling, a multi-stage sampling procedure was applied, whereby first regions and then schools were randomly selected and then the students in the relevant grades of these schools were surveyed. Standard errors are adjusted for clustering at the school level.[15] The survey was conducted via a self-administered questionnaire. Youths completed a written anonymous questionnaires, such that responses were separate from personally identifiable information.[16] Nonetheless, we might be concerned that even if anonymous, students who felt critical of the system might have been fearful to respond truthfully to socially or politically sensitive question. This could cause problems in interpreting means/levels of such variables prior to Reunification – for example, interpreting what fraction of youths believe it is important to support (and be part of) the collective under the GDR regime (which is very high). However, the means/levels of variables (and, in particular, those prior to Reunification) are less relevant for our analysis, since we are interested in the (within person) change of the response to such questions from before to after Reunification, and how this change is linked to how individuals updates their Abitur plans (i.e., we are interested in the elasticity of educational plans with respect to these preferences). We discuss the main sensitive question on social preferences in Section 3.3 below. For the main body of analysis, the variables of interest are not particularly sensitive – most importantly, Abitur plans

[13]The study was started by the Central Institute for Youth Research, Leipzig (*Zentralinstitut für Jugendforschung (ZIJ)*) and continued by the German Youth Institute Munich, Regional Office Leipzig (*Deutsches Jugendinstitut München, Regionale Arbeitsstelle Leipzig*). The data are available at the GESIS Data Archive, Cologne, at the Leibniz Institute for the Social Sciences. A description of the study can be found at `https://search.gesis.org/research_data/ZA6117` and in the survey on "Youth studies in the East" (*Jugend im Osten*) (see Kuhnke, 1997). As an exception, the "older" cohort was not surveyed in 1991, and neither cohort was surveyed in 1994. Additionally, not all questions are asked in each wave.

[14]Other broad categories of questions included, family background (only in early waves), such as parents' education; objective and subjective abilities in all subjects (in our analysis, we use German and math grades as these are compulsory subjects taken by all student); leisure and cultural activities; likes/dislikes/what is important (mostly asked post Reunification); plans for the future (such as, educational plans and migration plans); and, risky behavior (for example, alcohol use; only asked for older youths).

[15]A good overview of the methodology and implementation of sociological analysis concerning the education system in the East can be found in the survey on "Youth in the East" by Brislinger et al. (1997).

[16]For example, answers had to be checked, so that students were not identifiable based on their handwriting.

and Abitur completion, but also the variables that we include in the mechanism section, such as perceived returns, parents' education, youths' academic performance and interest in verbal versus quantitative subjects. Moreover, we also validate our findings with the German Socio-Economic Panel (GSOEP) data on Abitur completion rates (as discussed below).

3.2 Description of Supplementary Data: German Socio-Economic Panel

We supplement our analysis by using data from the well-known, and widely used, German Socio-Economic Panel (GSOEP). The GSOEP is an annual household panel, started in West Germany in 1984. From 1990 onwards, it also covered the territory of the former German Democratic Republic. We use the original sample established in 1984, and the subsample covering the territory of the former GDR that began in 1990.[17] For the purpose of our study, the GSOEP data allow us to supplement and validate our main results by using more cohorts and a representative sample of East and West Germans. The GSOEP does not have information on Abitur plans nor information on East Germans prior to Reunification, but it does allow us to measure long-run Abitur completion and allows for an alternative comparison group, namely West Germany, and to analyze effects on additional cohorts.

Our analysis is based on individuals born between 1969 and 1980 (i.e., those who were between 10 and 21 years old at the time of Reunification), and thus at different educational stages at the time of Reunification. While these data do not contain information on youths' Abitur plans, they do allow us to analyze the convergence process in terms of educational attainment between different cohorts of East and West German youths. In particular, we make use of information on individuals' highest obtained educational degree and where it was obtained to classify them into those that obtained the college entrance certificate, the Abitur, or not (either in East or West Germany). We split the individuals according to their age at Reunification, in particular into individuals who had already completed the Abitur at the time of Reunification, namely those aged 19 to 21 at Reunification, and those who had not yet completed the Abitur in 1990, namely youths aged 16 to 18, youths aged 13 to 15 and those aged 10 to 12, for a more complete picture of the convergence process between different cohorts of East and West German youths.

3.3 Descriptive Statistics

The focus of our main analysis is on students in grades 7 and 8, which coincide with the year prior and post Reunification for the young "treated" cohort. In Table 1, we present summary statistics

[17] The GSOEP is one of the main tools for social science and economic research in Germany. An overview of data, sampling, topics, etc. is provided by, e.g., Goebel et al (2018).

for the main variables of interest used in our analysis – most importantly educational plans.[18] Specifically, the survey question asks about students' plan to obtain the "Abitur", which is the college entrance certificate necessary for admission to college.[19] We observe 1,492 individuals from the younger cohort and 1,117 individuals from the older one.[20]

After analyzing the effect of Reunification on educational plans and its longrun implications, we investigate the underlying mechanisms behind changes in educational plans. In Section 6.1, we outline a theoretical framework of educational plans, which builds on a standard (and extended) utility maximizing model in the context of educational decision-making to derive the main potential determinants of the changes in educational plans we observe upon Reunification. In particular, we explore the role of perceived returns to education, perceived uncertainty, economic (consumption) preferences, social preferences, and supply-side constraints (including resource and access constraints as well as political constraints). Below we briefly describe the survey questions that relate to these factors and in Table 1, we present the main descriptive statistics.

One of the dimensions in which the historic data used in this paper is quite unique is that it contains information on youths' *perceived returns*. In particular, students are asked to rate, on a scale from one to four, the importance of education for later earnings (where 1 is "not very important" and 4 is "very important"). The same scale is used in the questions for all other measures discussed below. Since these measures do not have a natural unit, we standardize them (i.e., subtract the mean and divide by the standard deviation) to be able to interpret regression coefficients in terms of standard deviation changes. The survey also includes information on youths' *perceptions of uncertainty* (due to the economic and social turmoil) via a question on their level of anxiety towards the unknown (on a scale from one to four, as above). We proxy for *economic preferences* using questions that ask students about how important it is to consume "luxury goods" and to "enjoy life" (on a scale from one to four, as above). We collapse the different questions into one indicator for economic preferences based on the principal component analysis. Tracking students over time, allows us to measure changes in their preferences and beliefs before and after

[18] In addition to presenting descriptive statistics for the pooled sample, we also show them separately for the younger and older cohort while in grade 7 (see Appendix table A.1).

[19] Note that we analyze the formation and updating of Abitur plans of youths themselves. Parents were also surveyed about the educational plans for their child, but only for the young cohort and only in one wave. Given the data availability, we only focus on the evolution of youths' own plans and how they are updated upon Reunification. However, given the age of the youths, this seems appropriate. While parents might well be highly involved in deciding about the education of their children when they are young, for older youths, their own plans and expectations are the most relevant (Attanasio and Kaufmann, 2014).

[20] There is some attrition in the sample of students over time. Between grade 7 and 8, 331 individuals of the young cohort attrit (out of 1492), and among the older cohort 134 attrit (out of 1117). While the level of attrition is somewhat larger for the younger cohort, the differential attrition is not linked to academic performance. Moreover, for robustness, in the online appendix, we re-do the analysis using the balanced longrun panel (i.e., including only individuals that remain in the sample until the end of grade 12). The results remain virtually unchanged, suggesting that selective attrition is not a problem.

Reunification.

We extend our analysis on preferences by looking at youths' *social preferences*. To do this, we consider questions on the importance of doing "good deeds," "being valued by peers", and the feeling that it is a "duty of a student to study" (all measured on a scale from one to four, as above). We complement the analysis with another direct question reflecting individualism versus collectivism, eliciting the importance of "supporting the collective". These measures allow us to capture the extent to which youths' norms converged to the norms of the West. Again, the different questions are collapsed into one indicator for social preferences based on the principal component analysis. Arguably, questions eliciting social preferences under the socialist regime prior to Reunification, such as the question on the importance of "supporting the collective", might overstate favoring norms that were imposed by the regime. However, as we discuss in Section 6.2.2, we are only concerned with the heterogeneity among adolescents in the *change* in preferences (from before to after Reunification) and how these changes are *linked* to other outcomes, such as educational plans. Thus, if all individuals were to overstate (prior to Reunification) the extent to which they were in favor of the collective, for example, this would not affect these correlations.We discuss this point further in Section 6.2.2.

Finally, in Table 1, we also present survey questions and summary statistics of the variables used in the heterogeneity analysis to shed light on the importance of different types of constraints. To examine the importance of *ability-based constraints* in access to college studies, we measure youths' academic performance in school by their GPA (the grading scale is from one to five, where one is the best grade). For *access constraints* to certain fields/majors, we measure whether an individual's relative strength or interest is in the mathematical (technical) area or in the non-mathematical (verbal) area.[21] We measure "relative objective performance" in terms of relative grades in German versus mathematics. "Relative subjective performance" is measured in terms of the ratio of one's own evaluation of one's performance in German and mathematics (on the scale for absolute measures, 1 is "very good" and 4 is "bad"). "Relative academic interest" is the ratio of measures of interest in topics related to German and the respective measures for mathematics (with the scale of absolute measures ranging from 1 for "strongly interested" to 4 for "not at all interested"). The *regime-relevant variables* indicate whether an individual was a member of the communist youth organization "Free German Youth (FDJ)" ("Freie Deutsche Jugend (FDJ)"), a question asked under the socialist regime (before Reunification), and whether the individual was an "FDJ member with a function" (i.e., a member of the communist youth organization with a leading role, such as, the "FDJ secretary" of the group or the school, or at the municipal or higher level). While the former question is the only other potentially sensitive question, we are not using

[21] Before Reunification, East Germany, had a strong focus on STEM fields, in particular engineering. Access to more verbal (or less mathematically oriented) fields might have been relatively more constrained.

it in our analysis, but focus on membership with and without function. At the same time, membership (and type of membership) in the FDJ would have been known by the school anyway and so this would not reveal as new information, even if the survey was not anonymous.[22] Finally, to examine the importance of *resource constraints* we make use of information on whether the youths' mother obtained the Abitur degree. This variable is –at the same time– a regime-relevant variable, in that the mother being able to obtain the Abitur indicates that the family was not subjected to political constraints related to educational attainment.

4 Short-Run: Effects of Reunification on Educational Plans

4.1 Short-Run: Methodology

Students' cohort of birth and the timing of Reunification jointly determine the exposure to the change in regime. We use this variation to identify the effect of regime change on various outcomes, starting with educational plans. The students are asked repeatedly–in most grades–about their educational plans. In particular, they are asked whether they are planning to pursue the Abitur (the entrance certificate to college studies). The data allow us to observe how students' Abitur plans evolve over their "educational" lifecycle (i.e., across grades). We exploit the structure of the data and comparability across cohorts, one being three years older than the other, to identify the effect of regime change on students' educational plans, ultimate educational attainment and potential determinants. In particular, we analyze changes in the plan to obtain the Abitur for the younger cohort, before and after Reunification, using as the counterfactual trend the evolution of the older cohort's plans between the same academic grades, which – for the older cohort – fall into the period prior to Reunification.

The "treatment" of interest is that of regime change on the Abitur plans of the younger cohort following Reunification in October 1990. The older cohort serves as the "control" group for the (counterfactual) trend across grades for the younger cohort. This group captures how plans would have evolved if there had been no Reunification. For instance, the older cohort in grade 8 (in 1988, aged 14) was in the pre-Reunification period, while the younger cohort in grade 8 (in 1991, aged 14) was in the post-Reunification period. The empirical design is such that we focus on the grades directly pre- and post-Reunification for the younger cohort (i.e., grades 7 and 8), which allows us to identify the short-run effects of Reunification and helps compute the correct standard errors (Bertrand, Duflo, Mullainathan, 2003). More generally, we estimate the following equations:

[22] Shortly before Reunification, more than 90 percent of youths were member of the communist youth organization, with an even larger fraction among younger adolescents (according to the public German broadcasting company NDR reporting on "the rise and fall of the FDJ" on March 7, 2021; https://www.ndr.de/geschichte/chronologie/FDJ-Aufstieg-und-Fall-der-DDR-Jugendorganisation,fdj126.html). This can be seen in our sample too.

$$EP_{icg} = \beta_0 + \beta_1 T_{ic} + \beta_2 P_{ig} + \beta_3 (T_{ic} P_{ig}) + X_{ic}\delta + \epsilon_{icg} \quad (1)$$

$$EP_{icg} = \beta_0 + \beta_2 P_{ig} + \beta_3 (T_{ic} P_{ig}) + D_i + \epsilon_{icg} \quad (2)$$

where EP_{icg} is the Abitur plan of student i in cohort c in grade g. T_{ic} is a dummy variable indicating the "treated cohort" (i.e., takes the value of 1 if the individual belongs to the younger cohort and 0 otherwise). P_{ig} indicates the "post" period, more generally reflecting the student's academic grade. Since we restrict the main analysis to grades 7 and 8 (i.e., the grade the treated cohort is in shortly before and the one shortly after Reunification), P_{ic} is a dummy variable that has the value of 1 if the academic grade is 8 and 0 if the grade is 7. The variable of interest is $(T_{ic} P_{ig})$, which interacts the "treated cohort" and the "post"-period indicator and has the value of one if a student is from the younger cohort and is in grade 8, which was in the post-Reunification period for the younger cohort. X_{ic} is a vector of predetermined individual-specific characteristics. Alternatively, we include individual fixed effects D_i (see equation (2)). We estimate equations (1) and (2) using ordinary least squares. Standard errors are adjusted for clustering at the school level.

In our application of the difference-in-differences (DID) approach, we compare the younger and older cohorts in the same *grades* (but in different years). We thereby control for the counterfactual trend by making use of the change in outcomes of the older cohort when its students were in the same grades (all of which were before Reunification for this older cohort). This is important since, if we used the same years around Reunification, the older cohort would also be affected by Reunification, making it an unsuitable control group to estimate the causal effect of regime change. Instead, using the change in the educational plans of the control group over the same grades, we can control for how the younger cohort's outcomes would have changed without Reunification. Moreover, as we show in the next section, the key outcome variable "Abitur plans" is very similar in levels across cohorts in the pre-treatment period, such that we de facto utilize a "matched" DID design. While this is not a necessary condition for using a DID approach since time-constant differences across cohorts are "differenced out", it supports the necessary "parallel trends" assumption.[23] We explicitly test for the "parallel trends" assumption in Section 4.2, showing that the pre-Reunification trends ("pre-trends") of the two cohorts are indeed very similar.

4.2 Short-Run: Results

[23]The matched DID approach is often used when examining variables that are bounded from above or below because the pre-trends in such variables are unlikely to be the same if the pre-treatment outcome levels are very different.

4.2.1 Graphical Representations

We begin by graphically exploring the effect of Reunification on youths' Abitur plans. Students were asked repeatedly about their educational plans, and in particular, whether they planned to undertake the Abitur. Figure 2 plots–across different academic grades–the means and confidence intervals of Abitur plans of the older and younger cohorts, thereby providing insight into the identification strategy we use for the later regression analysis and supporting the necessary parallel trends assumption.

In particular, we plot the evolution of educational plans for the older cohort between grades 6 and 10. By grade 11, students would have entered the Abitur track if they had decided to pursue the Abitur. From the figure, we see that the fraction of individuals planning to obtain the Abitur declines–and does so at an increasing rate–as the time to choose approaches. One likely explanation for this pattern is that as students progress through the grades, they learn about their skills and update their beliefs with respect to their match with the Abitur track (see Stinebrickner and Stinebrickner, 2014, on learning about one's ability and college dropout).

Figure 2 also displays the Abitur plans of the younger cohort. For this cohort, we observe the evolution of educational plans across grades before and after Reunification. More specifically, we examine the younger cohort in grade 7 (just before Reunification in January 1990) and when its students were in grade 8 (just after Reunification in January 1991). Similarly to the case of the older cohort, we note a decline in this cohort's plan as its students progress through academic grades (prior to the regime change). However, in the post-regime-change period, there is a striking break in this trend, and the fraction of individuals planning to pursue the Abitur increases substantially.

Superimposing, by academic grade, the educational plans of the older cohort on those of the younger cohort shows that in the pre-Reunification period, there was no significant difference in Abitur plans. The likelihoods that an individual in grade 7 (pre-Reunification for both cohorts) planned to obtain the Abitur degree were almost identical (at approximately 38%). However, in grade 8 (pre-Reunification for the older cohort and post-Reunification for the younger cohort), the plans of younger and older cohorts were sizably and significantly different. The likelihood of planning to obtain the Abitur was 55% for the younger cohort (that had just experienced Reunification) versus only 35% for the older cohort in grade 8 (that had not experienced Reunification at that point).

Supporting the parallel trends assumption, Figure 2 shows that the pre-trends were not only close to parallel but also nearly overlapping, suggesting that the cohorts were closely "matched" in the pre-period.[24] We will test this formally in the following subsection.

[24] Since prior to grade 7 we have data on the Abitur plans for the younger cohort in grade 3 and for the older in grade 6, we interpolate until grade 7 and show that the pre-trends are highly parallel, overlapping and relatively flat.

4.2.2 Regression Analysis

We now proceed to quantify the effect of Reunification on Abitur plans. We begin with a difference-in-differences estimation strategy, as described in Section 4.1, in which we compare the evolution of educational plans of different cohorts across grades. We then combine this with a fixed effects model.

We estimate the effect of regime change, focusing only on the grade before (grade 7) and the grade after (grade 8) Reunification for the young cohort. The older cohort, considered in the same grades, controls for the (counterfactual) trend, i.e., how the plans of the younger cohort would have evolved between grades 7 and 8 had Reunification not taken place.

In Table 2, column (1) and columns (2) and (3), we report the results of this estimation using two different specifications: differences-in-differences and fixed effects (FE), respectively. In column (2), we cluster at the individual-level, and in column (3), at the school-level. All specifications suggest similar effects. In particular, comparing Abitur plans prior to Reunification (January 1990) with those shortly afterwards (January 1991), we observe a substantial increase by 18 percentage points without fixed effects and an increase by 22 percentage points if fixed effects are included.[25]

In Table 2, columns (4) to (6), we test whether the pre-trends in Abitur plans were similar for the two cohorts. We estimate a differences-in-differences specification (without and with fixed effects and with different levels of clustering standard errors), comparing the evolution of youths' plans before grade 7. Our estimates support the parallel trends assumption in that pre-trends are not significantly different and, in fact, are extremely similar (the estimated coefficient is close to zero).

We have shown that Reunification had a sizable effect on youths' Abitur plans. We find that these plans adapted very quickly to a large shock (the post-period was within a few months after Reunification). In the following Section 5, we show that the adaptation of one's educational plans has significant implications for long-run educational decisions. This highlights the importance of the economic and social environment in which one forms one's educational plans and then subsequently decides on educational investments and attainment.

The regime change implied a move to a system in which educational investments were more highly rewarded, which could have prompted students to raise their educational plans. However, beyond the changes in returns, educational decisions could have changed because of uncertainty, changes in economic or social preferences or changes in constraints after Reunification. In Sec-

[25] As discussed in Section 2, the fall of the Wall took place in November 1989, which culminated in the collapse of the communist regime when the Socialist Unity Party lost the elections in the GDR in March 1990. If people already started expecting an increase in economic freedom in November 1989 (while the socialist regime was still in place and Reunification was highly uncertain), i.e., a few weeks before our pre-Reunification survey in January 1990, this would lead us to underestimate the full extent of the effect of the regime change on plans. Thus, our estimates are conservative and–if anything–a lower bound for the full effect of the regime change.

tion 6, we provide an extensive analysis of possible mechanisms using information on students' perceived returns, uncertainty and their economic and social preferences, and test for the relevance of constraints. All of these factors are then linked directly to the students' change in educational plans.

5 Long-Run: Linking Educational Plans to Attainment

5.1 Long-run: Methodology and Results

In this section, we study the link between educational plans and later educational attainment. More specifically, we measure whether Abitur plans –and changes in those plans– impact the students' likelihood of completing the college entrance certification at age 18 (grade 12), several years after they were asked about their educational plans (in grades 7 and 8).

We test four main hypotheses. (H1) We expect educational plans to predict educational attainment. In other words, if these plans measure something meaningful, they should (at least, to some extent) predict long-run educational attainment. (H2) The plans youths have in grade 8 are better predictors of ultimate educational attainment than those in grade 7. The intuition is that as students progress through grades, their plans become better indicators of what they will do – for example, they learn about their own ability and whether their academic performance is sufficient to enter college. (H3) We expect the relationship between educational plans in grade 8 and later attainment to be stronger for the younger cohort. This is because, while for both cohorts the actual Abitur completion decision takes place after Reunification, the younger cohort is exposed to fundamentally new information about the structural break of Reunification by grade 8, while the older cohort learns about it only towards the end of grade 10. (H4) Lastly, we expect that the change in the younger cohort's Abitur plans between grades 7 and 8 will incorporate (at least some of) the new information on the structural break of Reunification and thereby contribute to explaining cross-cohort differences. In other words, if plans incorporate new information that is relevant for educational planning and that can ultimately influence educational decisions in a meaningful way (for example, an increase in expected returns to college), then we would expect educational plans of the young cohort in grade 8 relative to those of the older cohort in grade 8 to explain at least some of the differences in actual Abitur attainment between the two cohorts.

We begin by estimating the following equation:

$$EA_{ic} = \gamma_{0,g} + \gamma_{1,g} EP_{icg} + \gamma_{2,g} T_{ic} + \epsilon_{icg} \tag{3}$$

where EA_{ic} has the value of 1 if individual i in cohort c undertakes a degree that provides college access (i.e., the "Abitur"). We are primarily interested in $\gamma_{1,g}$, which measures the relationship

between educational plans, EP_{icg}, and ultimate educational attainment, and which we allow to differ depending on the grade g the youths are in when reporting their educational plans. We consider both the link to educational plans in grade 7 with the coefficient of interest $\gamma_{1,g7}$ (before Reunification for both cohorts) and, alternatively, to educational plans in grade 8 with the coefficient of interest $\gamma_{1,g8}$ (after Reunification for the younger cohort but still before Reunification for the older cohort). Controlling for cohort, T_{ic} (which takes the value one if the youth is in the treated, i.e. young, cohort and zero otherwise), allows us to determine whether there are important cohort differences in educational attainment after controlling for students' plans and how this depends on whether we use the plans made in grade 7 or grade 8 (by comparing $\gamma_{2,g7}$ with $\gamma_{2,g8}$).

With this specification, we test hypotheses (H1) and (H2): (H1) $\gamma_{1,g7}, \gamma_{1,g8} > 0$ and (H2) $\gamma_{1,g8} > \gamma_{1,g7}$. (H1) predicts a positive relationship between educational plans and later educational achievement. (H2) implies simply that as students advance through their educational trajectories, their educational plans are more closely linked to their actual educational choices (e.g., due to learning/updating).

To test hypotheses (H3) and (H4), we must allow the link between attainment and plans to vary by cohort. We therefore also estimate the following equation:

$$EA_{ic} = \gamma_{0,g} + \gamma_{1,g} EP_{icg} + \gamma_{2,g} T_{ic} + \gamma_{3,g} (EP_{icg} T_{ic}) + \epsilon_{icg} \tag{4}$$

In regression (4), we estimate the differential effect of educational plans by cohort ($EP_{icg}T_{ic}$). In this case, $\gamma_{3,g}$ measures whether the link between educational plans and attainment differs by cohort. We test the following hypotheses: (H3) $\gamma_{3,g8} > 0$ (i.e., plans in grade 8 were more strongly tied to outcomes for the younger cohort, since it had more information about the regime change in grade 8, which is post-Reunification for the young but prior to Reunification for the older cohort), and (H4) $\gamma_{2,g8} < \gamma_{2,g7}$, we expect that the change in the younger cohort's Abitur plan between grades 7 and 8 will likely incorporate (at least some of) the new information on the structural break of Reunification and thereby contribute to explaining cross-cohort differences. A stricter version of this hypothesis is (H4'): $\gamma_{2,g8} = 0$. The latter would imply that the effect of Reunification on educational attainment of the young *relative* to the old cohort is fully captured by its effect on the younger cohort's plans in grade 8 (after Reunification).

In Table 3 we present the results on the link between educational plans and long-run educational attainment, and provide evidence for all four hypotheses. First (H1), planning to obtain the Abitur is a strong predictor of enrolling in the Abitur track and completing it several years later (see columns (1) and (2) estimating equation (3)). Second (H2), grade 8 plans better predict later attainment than do grade 7 plans. The chance of actually obtaining the Abitur for those planning to do so in grade 7 is 47 percentage points higher (columns (1)), while for those planning to do so

in grade 8 it is 61 percentage points higher (columns (2)).[26] The coefficient on the cohort dummy shows that students from the younger cohort are 33 (17) percentage points more likely to obtain the Abitur (see columns (1) and (2)).

In columns (3) and (4), we estimate equation (4) and add interaction terms between educational plans and treated cohort (for grade 7 and grade 8 plans, respectively). As predicted by our third hypothesis (H3), the coefficient on the interaction term is positive and significant, suggesting that plans are more strongly linked to actual educational attainment for the younger cohort. This link is stronger for grade 8 plans, as expected, because for the younger cohort, grade 8 plans were measured soon after Reunification.[27] Fourth (H4), once we allow for heterogeneous effects of grade 8 plans on attainment by cohort, the cohort dummy is no longer significant (see column (4)). In other words, the grade 8 plans of the younger cohort (relative to the older cohort) fully incorporate the information on the structural break of Reunification and explain all cross-cohort differences ((H4'): $\gamma_{2,g8} = 0$). This highlights the relevance of plans such that they absorb the differential effect of the structural changes on long-run outcomes for the young relative to the older cohort.

When we investigate the link between youths' Abitur plans in grades 7 and 8 and the actual Abitur completion five years later, our sample size is reduced due to some attrition from the sample. To ensure robustness against differential attrition potentially driving our results, we show – considering only individuals who remain in the sample between grades 7 and 12 and who have non-missing information on plans (in grades 7 and 8) and actual outcomes – that our main results of the effect of Reunification on plans remain very similar, both in the difference-in-differences specification and in the fixed effects specification (see columns (1) to (4) in Appendix Table A.2). Again, we show that pre-trends are virtually identical (see columns (5) to (8)). We similarly show in Appendix Table A.3 that the results on the link between plans and the final Abitur completion are also very similar.

5.2 Long-Run: Convergence in Long-Run Abitur Attainment and External Validity

In this section, we investigate the impact of Reunification on long-run educational outcomes across several cohorts using the well-known and widely used German Socio-Economic Panel (GSOEP) data. The GSOEP does not contain the relevant information on Abitur plans nor, more generally,

[26] To test the statistical difference between the coefficients on Abitur plans in grade 7 versus grade 8, we estimate a pooled regression with both grades. From Appendix Table A.3, column (3), we see that the coefficient on plans in grade 8 is larger than the one for grade 7 (with a p-value of 0.006).

[27] To test the statistical difference, we estimate a pooled regression including the variables from columns (3) and (4) in Table 3 jointly. In Appendix Table A.3, column (6), we show that the coefficient on the interaction between Abitur plans in grade 8 and treated cohort is significantly larger than for grade 7.

on East Germans prior to Reunification, but covers several cohorts of students in both, East and West Germany, allowing us to examine the aggregate trends in the Abitur take-up before and after Reunification.

The objective of this analysis is to supplement our main analysis, by investigating the speed of convergence, after Reunification, of long-run educational outcomes. We compare, across different cohorts, the Abitur completion rates of East German youths to those of West German youths aged between 10 and 21 at the time of Reunification. This allows for variation in terms of when–during the youths' academic lifecycle–they were impacted by the regime change. As part of these cohorts, we consider our "older" and "younger" cohorts, as well as cohorts that were even older (Abitur completion occurred before Reunification) or even younger (education completion occurred even later, with more exposure to the new regime). The use of West German cohorts allows us to analyze the convergence process and thereby to shed some light on the speed and extent of adjustment to the macro shock of different East German cohorts (see also Section 7). Since the political and economic regime remained unchanged in West Germany, while East Germany adopted the West German regime, it seems plausible that West Germans' educational decisions were (relatively) unaffected by the event of Reunification.[28]

In Figure 1, we separately plot Abitur completion rates of East and West German youths across different cohorts. Comparing such rates of the cohort aged 19-21 with those of the cohort aged 16-18 in East and West Germany, Figure 1 shows that there was a gap in terms of Abitur attainment of 50% for these cohorts and that the trends in educational attainment were relatively parallel up to the cohorts that were aged 16-18 and were just about to decide or had just entered the Abitur track around the time of Reunification. In contrast, for younger cohorts, there were substantial changes in Abitur attainment in the wake of Reunification. In particular, comparing the cohort aged 16-18 years (somewhat older than the "older" cohort in our main analysis) with the cohort aged 13-15 years (similar to our "younger" cohort), we observe a sizable jump in Abitur completion and a clear convergence. While the difference between East and West Germany is 13 percentage points for the older cohort, the difference is only 4 percentage points for the younger cohort and no longer significant. For the youngest cohorts (aged 10-12 at Reunification) the gap between East and West Germany closed completely, i.e., there was complete convergence in the East and West German rates of Abitur completion, which are both approximately 32%.

In Table A.5 in the Appendix, we quantify the convergence results, presenting the coefficients from estimating a difference-in-differences regression comparing two different cohorts of East and West Germans who were affected by Reunification at different points in their educational lifecycle,

[28]Many studies use GSOEP as a tool for social science and economic research in Germany. Among other examples, Alesina and Fuchs-Schündeln (2007) use GSOEP in their analysis of the effect of Reunification on redistribution preferences.

in particular youths aged 13 to 15 (young "treated" cohort) and youths already aged 16 to 18 at the time of Reunification. According to column (1), the coefficient on the interaction of "Treated Cohort x East" is 0.09, suggesting that Reunification increased the likelihood of Abitur completion significantly, by 9 percentage points. Column (2) presents results from a placebo test, making use of the older cohort aged 16 to 18 and an even older cohort aged 19 to 21, and shows that the pre-trends in Abitur completion rates were not statistically different (and indeed were very similar) in East and West Germany.

This section highlights several important findings. First, it demonstrates the robustness of one of our main findings—namely that educational plans and resulting attainment increases sizably among those who have the opportunity, in terms of timing of educational choices, to adjust to a change in regime—and shows that adjustment happens quickly, as even the cohorts that experienced Reunification only shortly before deciding to enter the Abitur track began to adjust. Second, using the data on West Germany, we document that the gap in educational attainment closed completely within a few years of Reunification. Third, most importantly, the analysis highlights that the timing of macro events can be crucial for one's lifetime outcomes. This has been shown in other contexts, such as that of graduating during a recession (see the seminal paper by Baker et al., 1994, and more recent studies, such as, Oyer, 2008; Kahn, 2010; Oreopoulos et al., 2012). Since East German cohorts that experienced Reunification towards the end of high school but before entering the Abitur track did not fully adjust their educational decisions to the new economic environment, it suggests that students with the possibility to adjust their Abitur take-up to the new economic conditions do not do so, "sticking" to their prior plans.

6 Mechanism: Understanding Changes in Educational Plans

6.1 Mechanism: Theoretical Framework

While economists have modeled educational decisions for several decades (see, for example, Becker, 1967), we know little about how adolescents form educational plans several years before the actual decision. In this section, we outline a simple theoretical framework for individuals' educational plans based on existing models of educational choice, including relevant extensions. In our empirical analysis, we have first tested whether, and how, educational plans update in response to Reunification and, in a second step, we will now investigate the specific factors that can explain changes in plans – we look at how each factor is affected by the shock and, then, analyze directly the link between changes in factors (both, separately and jointly) and changes in educational plans.

The most basic framework for individuals' educational plans, in our case the plan to pursue the Abitur ($S = 1$) or not ($S = 0$), is based on maximizing lifetime utility based on the expected

present value of individual lifetime earnings, which in turn, depend on the individual's educational plan ($EPV(S = 1), EPV(S = 0)$), educational costs (C) and economic preferences (Φ) (Carneiro, Heckman, and Vytlacil, 2005). We denote the difference in expected present value of earnings with, and without, the Abitur degree, minus the direct educational costs as the perceived return, ρ ($\rho = EPV(S = 1) - EPV(S = 0) - C$). In addition to budget or resource constraints, typically, other types of constraints that might be important are college access restrictions based on educational performance at school, and constraints in terms of available college majors. In our particular context, political constraints might also play an important role. We investigate the relevance of these different types of constraints in our empirical analysis.

$$\max_{S=0,1} U(\rho, \Phi) \quad \text{s.t. constraints}$$

While it is uncommon to include perceived risk (uncertainty) in standard educational choice models (see, e.g., Cameron and Taber, 2004; Carneiro, Heckman, and Vytlacil, 2005), some recent papers, such as Oreoupoulus and Salvanes (2011), Stange (2012), and Attanasio and Kaufmann (2014), show that education can decrease (perceived) uncertainty (for example in terms of unemployment risk) and can thus play a role in educational choices. Since, in our study, we are interested in the importance of an environmental change on educational plans, it is relevant to consider the relationship between the shock and (perceived) uncertainty. We, therefore, include perceived uncertainty in our framework (σ) and we will empirically investigate the importance of a change in perceived uncertainty for updating individuals' educational plans.

$$\max_{S=0,1} U(\rho, \sigma, \Phi) \quad \text{s.t. constraints}$$

In a second extension, we consider the role of social preferences. There is growing evidence that "non-monetary returns" are relevant for educational decisions, including that social preferences matter for educational decisions. For example, Oreopoulos and Salvanes (2011) show that social status increases with higher educational degrees. Wiswall and Zafar (2018) and Delavande and Zafar (2019) discuss different types of non-pecuniary returns to college majors and different types of colleges. In our context, it seems relevant to study the role played by social preferences and returns. Given that Reunification implied that East Germany changed from being a socialist to democratic system, it is relevant to understand whether changes in social preferences among adolescents reflect a convergence to the West German culture (for example, becoming more individualistic and placing less importance on being part of a collective) and how this relates to educational decision-making. In our framework, we, therefore, include perceived social preferences (Π).

$$\max_{S=0,1} U(\rho, \sigma, \Phi, \Pi) \quad \text{s.t. constraints} \tag{5}$$

In summary, with our analysis on the mechanisms underlying the observed change in educational plans we pursue two main goals. First, to measure whether the environmental shock (Reunification) has a causal effect on each potential determinant of educational plans, as detailed above. Second, to link the changes in potential determinants to the changes in individuals' educational plans as a means to understand the relevance of each factor.

6.2 Mechanism: Estimation Strategy and Results

We now empirically explore the mechanisms underlying the effect of Reunification on educational plans and, consequently, on long-run educational decisions. As outlined in the previous section, a standard model of educational plans includes three (main) components that drive educational plans: expected returns of education, economic preferences, and constraints on the access to (higher) education. We extend this framework to consider two additional components: perceived uncertainty, and social preferences.

Traditionally, due to data limitations, it has been proven difficult to identify the importance of various components. The recent literature has focused on eliciting individuals' subjective expectations about returns of schooling (as discussed in, for example, the seminal papers by Dominitz and Manski, 1997, and Jensen, 2010). A different strand of literature has investigated the role in (educational) decisions of different types of preferences, such as economic and social preferences (for recent evidence, see Sutter et al., 2013, and Falk et al., 2018). Generally, there is relatively little overlap in terms of data sources that permit the exploration of both expected returns and preferences, or other potential drivers. The unique historic panel data on East German youths thirty years ago, however, contains both, information on perceived returns to education, and perceived uncertainty as well as on economic and social preferences.

In a first step, we causally estimate the effect of regime change on each of the potential determinants, as derived from the theoretical framework of educational planning, using the same identification strategy as for the short-run effects of Reunification on plans (as discussed in Section 4.1). We analyze the change in each factor for the younger cohort, using the older cohort's development over the same grades as the counterfactual trend, by estimating the same equations (1) and (2) with the potential determinants as outcome variables.

In a second step, we relate changes in youths' educational plans to changes in youths' (perceived) returns to education, uncertainty and in preferences. More specifically, we employ an individual fixed-effect regression to link the change in an individual's educational plans between grade 7 and 8 to the change in this individual's perceived returns, perceived uncertainty, economic preferences and social preferences, first for each factor separately and lastly including all factors jointly. This helps us shed further light on the main channels behind the updating of educational

plans and, importantly, their relative role.

Lastly, we explore the importance of the relaxation of various forms of constraints (resource constraints, access constraints, availability of verbal versus quantitative college majors and political constraints) and a number of alternative mechanisms (such as changes in educational content and/or quality).

6.2.1 Perceived Returns to Education and Perceived Risk

Perceived Returns: The German Reunification implied a sizable increase in the returns to education for East Germans converging to West German levels (see, for example, Burda and Hunt, 2001). While return expectations have been shown to be an important driver of educational *decisions*, we know less about how quickly new information becomes salient and whether, and when, it affects educational *plans*. Based on the theoretical framework of educational plans discussed in Section 6.1, we investigate whether, and to what extent, perceived returns to education (ρ) changed in response to Reunification; and how changes in perceived returns were linked to changes in educational plans at the individual level (see Section 3 for variable definitions and summary statistics).

In Table 4, Column (1) shows that there are some level differences between the two cohorts in their perceived returns when in grade 7. Focusing on the narrow period before and after Reunification, we see a sizable increase in perceived returns for the young cohort (relative to the old when in the same grades). We show that the importance of schooling for earnings increased substantially by nearly half a standard deviation (0.49). This coefficient remains unchanged when we include fixed effects (see Column (2)).

Individuals' perceived returns to education likely increase due to the expectation that returns to education in the East would converge to the ones in the West, as was indeed the case (Burda and Hunt, 2001). However, an additional mechanism for the increase in perceived returns to education might lie in the possibility to migrate to attend college in the West and thereby benefit directly from higher returns to education in West Germany. We therefore investigate if youths with higher educational plans are also more likely to plan to migrate to the West. We do not find this to be the case (see Appendix table A.7). It, therefore, suggests that the increase in perceived returns is driven by the expectation that returns are converging to West German levels, as mentioned above.[29]

While we have shown that youths' perceived returns to education increase in response to Reunification, suggesting this as one of the underlying mechanisms, we want to analyze the link between changes in perceived returns and changes in educational plans more directly. As we show in Table 5 (and as we discuss further below), the increase in perceived returns was strongly linked

[29] Another channel through which the possibility to migrate might enter as a mechanism is via the easing of supply-side constraints – for example, due to the possibility to study at West German universities. We do not find that the relaxation of such constraints is driving the increase in Abitur plans, as discussed in detail in Section 6.2.3.

to increases in youths' educational plans. Those whose perceived returns to schooling increased the most were those most likely to also update their educational plans. In the regression of the change in Abitur plans between grades 7 and 8 on the change in perceived returns between the same grades, the coefficient on perceived returns is significant at the 5 percent level and remains significant at this level and similar in magnitude when including all four potential determinants of educational plans jointly (which are also all jointly significant at the 1 percent level). This highlights the importance of changes in perceived returns to education in contributing to the increase in educational plans and, ultimately, long-run educational attainment.

Perceived Uncertainty: The first extension to the most simple model of educational plans we consider is that of the relevance of risk perceptions (σ). In Table 4, Columns (3) and (4), we show that Reunification led to a substantial increase in perceived uncertainty of 0.4 of a standard deviation. Did this increase in perceived uncertainty contribute to the increase in educational plans? Table 5 suggests that increased perceived uncertainty is indeed linked directly and significantly to the increase in Abitur plans. This remains significant (at the 5 percent level) when including all four potential determinants jointly. The fact that an increase in (perceived) uncertainty is directly linked to increases in educational investments and plans is consistent with the theory that educational investments can be used to insure against uncertainty (see, e.g., Heckman, Lochner and Todd, 2006).

6.2.2 Economic and Social Preferences

In this section, we present the results on the effects of Reunification on economic preferences (Φ) and on social preferences (Π), as described in the theoretical framework above. As described in Section 3.3, the economic preference indicator includes measures for consumption and luxury. The social preference indicator includes measures such as, the importance of doing good deeds, feeling that it is a duty of a student to study and to what extent being valued by peers depends on education, as well as a variable measuring the support of the collective. Following the identification strategy presented in Section 4.1, we consider the impact of Reunification on students' economic and social preferences.

In Table 4, Columns (5) and (6), we show that there was a dramatic change in economic preferences following Reunification. These results suggest a rapid convergence in terms of individuals' economic preferences to the more capitalist regime.

With respect to social preferences, we find that students reduced the importance they placed on the community and their role with respect to others. The last two columns of Table 4 show that social preferences, decrease as a result of Reunification. It is often discussed whether capitalist societies foster more individualistic traits. Our findings are consistent with the hypothesis that they

do. Arguably, questions eliciting social preferences under the socialist regime prior to Reunification might overstate favoring norms that were imposed by the regime. However, we are only concerned with the heterogeneity among adolescents in the *change* in preferences (from before to after Reunification) and how these changes are *linked* to other outcomes, such as educational plans. Thus, if all individuals were to overstate (prior to Reunification) the extent to which they were in favor of the collective, for example, this would not affect these correlations.[30]

In Table 5, we link the change in Abitur plans to those in perceived returns, perceived risk and in economic and social preferences. We show that perceived returns to schooling and perceived risk are of particular importance in that the educational plans increased more among those individuals for whom these beliefs increased. Similarly, the increase in the planned take-up was higher among those whose social preferences changed more strongly towards individualism – converging more to Western attitudes.[31]

This section highlights that the regime change led to an important adjustment in perceptions of returns, uncertainty and preferences, and for these young individuals, adaptation occurred soon thereafter. Our results are consistent with these changes being a contributing factor for the increased likelihood of planning to undertake the Abitur (later leading to increased attainment). There was a convergence in behavior and tastes to the more capitalist society, which appears to have contributed to a quick convergence in terms of educational plans and actual educational attainment.

6.2.3 Supply-Side Constraints

Beyond changes in economic expectations and preferences, constraints (or the relaxation thereof) might have contributed to changes in educational plans. It might be that some students did not expect to obtain the Abitur, and therefore might not have planned to acquire it. We study the importance of constraints in several ways – for instance, considering changes in access to college or particular college majors, in educational quality, or in educational content. Overall, we find little evidence for these factors.

To understand the importance of this potential mechanism, we focus on potentially "con-

[30] One potential caveat could be if individuals who report particularly high levels of socialism support because of fear of repression were to also report particularly low levels of Abitur plans prior to Reunification, such that when the fear of repression is relaxed after Reunification, support of socialism for these individuals is reported as low and Abitur plans as high. The data, however, show little evidence of such a confound, since Abitur plans are not a sensitive question and also, as we show in the following section, there is little heterogeneity across different groups of potentially constrained versus unconstrained individuals in how they adjust plans in response to Reunification.

[31] Perceived returns and risk are significant at the 5 percent level, social preferences at the 1 percent level. Moreover, the four factors are jointly significant at the one percent level. To test the functional form of the relationship between educational plans and determinants, we add each factor also in its quadratic form (in the separate and joint regressions) and find that the corresponding coefficients are small and insignificant, while the coefficients on the linear factors are basically unchanged.

strained" individuals, i.e. individuals who were more likely to be constrained under the Socialist regime. We might expect a particularly large change in plans among these individuals following a (possibly anticipated) increase in the supply of education, either because of a relaxation of constraints/additional supply in the East or because youths could migrate and attend college in the West. We focus on several forms of constraints in two broad categories: (c1) ability and academic interests and (c2) regime constraints. In Table 6, we report the heterogeneity of the change in Abitur plans following Reunification, depending on whether individuals were likely to be "constrained" or "unconstrained".

Under the GDR, access to university studies was based on academic performance (in addition to political ties, as we will discuss later). We might expect that low-ability students did not plan on going to college, if they anticipated not being able to attend, due to constraints prior to Reunification (even if they truly desired to go). In such a case, we would expect college plans to increase more strongly among these students. We classify individuals as having "high" or "low" ability based on their academic grades (GPA) before the regime change. Similarly, given the focus on more technical subjects at universities under the GDR, we might expect that students with a stronger interest (or better objective or subjective performance) in non-math courses relative to math courses might raise their educational plans with the expectation that more non-math courses would be available.[32] In Columns (1)-(4) of Table 6, we report the heterogeneity analysis and show that there was no differential effect of Reunification on Abitur plans of the potentially "constrained" and "unconstrained".

In Table 6, Columns (5) and (6), we examine whether the relaxation of two other potential regime constraints might have differentially impacted students' Abitur plans. First, colleges gave priority access to those with strong political ties and commitment. A large majority of students (96 percent) were members of the youth organization, however, some had stronger political ties. When we split the sample by those (leading) functions in the youth organization (i.e., "FDJ youth members with a function in the youth organization") and those without functions, we find very similar changes in the plan to obtain the Abitur. According to Column (5) of Table 6, the coefficient on the triple interaction shows that the treatment effect is not significantly different (and in fact very similar) for these individuals (most strongly politically connected) as opposed to the others. Finally, the GDR initially gave priority in university access to individuals from less-educated families, although this practice had been abolished for a while. To assess whether this still rep-

[32]For example, Fuchs-Schündeln and Masella (2016) highlight that the teaching of mathematics was of similar importance in the East and the West. However, GDR schools devoted significantly more time to natural sciences, while FRG schools devoted more time to "softer" subjects, such as foreign languages, arts and music. Ammermueller and Weber (2005) compare the distribution of subjects in tertiary education in East and West Germany and observe that the main difference was in the share of graduates in engineering, which was approximately 30% in the East compared to 22% in the West.

resented a potential constraint, we classify students based on whether their mothers obtained the Abitur. In Column (6), we show that educational plans did not change differentially among these students either.

Finally, educational content or quality might have changed, leading (or contributing) to an increase in educational plans. However, especially in the short period just before and after Reunification, on which we focus in our analysis, there was a great deal of continuity in schools (such as in terms of teaching personnel and teaching material) with respect to the previous year, in particular since at the time of Reunification (in October 1990) the new school year had already started (in August 1990) (also see Section 2).[33] While educational content became less focused on socialism (Fuchs-Schündeln and Masella, 2016; Cantoni et al., 2017), the timing of our analysis shows that–in our context–differences in years under socialism were not responsible for changes in educational plans. In our study, the pre-period that measures educational plans for the younger cohort was in early 1990, i.e., after the fall of the Berlin Wall (but before Reunification). At the time of Reunification (October 1990), Socialist teaching had already been discontinued. One way through which a change educational content might influence educational plans is if the content becomes easier or if teachers start to grade more leniently, such that students receive a seemingly more positive signal about their ability and, therefore, increase their educational plans. To investigate this potential channel, we analyze the effect of Reunification on students' grades relying on a DID approach discussed in Section 4.1. Table A.6 in the Appendix shows that Reunification did not have an effect on short-run GPA (and there were no differential pre-trends for the older and younger cohorts). These results suggest that there were no noticeable improvements in content or changes in grading leniency that could explain the increase in the planned take-up of the Abitur in response to Reunification.

7 Extension: Adjustment Processes across Cohorts

In the analysis so far, we have explored the causal effect of Reunification on educational plans, decisions and on beliefs and preferences of the younger cohort. We have used, as the counterfactual, the change in outcomes of the older cohort when its students were in the same grades (all of which were before Reunification). This is important since the older cohort was likely to be affected by Reunification as well, and using the same years could thus lead to a biased estimate of the effect. At the same time, a difference-in-differences framework using as the counterfactual the older cohort's evolution in the same *years*, before and after Reunification, enables us to understand the extent to which the older cohort could adjust relative to the younger one. More specifically,

[33] Also it was not clear until shortly before Reunification, whether it would take place and in what form (see Section 2).

it can be interpreted as how much less the older cohort adjusted relative to the younger one. For example, if the estimate of the difference-in-differences analysis comparing the same years is zero, this implies that the older cohort could adjust to Reunification to the same extent as did the younger one (while the causal effect on the younger one is given by the difference-in-differences analysis using as the counterfactual the evolution over the same grades, which–for the older cohort–were all before Reunification). A non-zero estimate instead tells us how much more the younger cohort could adjust relative to the older one. More specifically, if the DID analysis using years produces an estimate as large as that of the DID analysis using grades, then the DID analysis using years also estimates the full causal effect of Reunification on the younger cohort, which implies that the older cohort could not adjust at all.[34]

Below, we present the results on the adjustment process by presenting the results on the main outcomes of interest using the difference-in-differences regression by year.

7.1 Adjustment Process: Plans and Attainment

Panel A of Table 7 shows the extent to which the younger cohort adjust their educational plans relative to the older cohort over the same period (i.e., before and after Reunification). We present coefficients based on a regression without and with fixed effects (in Columns (1) and (2), respectively). As before, we use the educational plans in grades 7 and 8 for the younger cohort (since these are the grades just prior and just post Reunification), while for the older cohort we now use the educational plans in grade 10 and 11 (i.e., just prior and post Reunification for them).[35] Column (2) of Table 7 shows a 0.17 standard deviation increase in college plans among the younger cohort (relative to the older one). The magnitude is similar to the difference-in-difference regression by grade (0.22 of a standard deviation – see Table 2, Column (3)). This suggests that the older cohort adjusted their educational plans to a much lesser extent in response to Reunification.

7.2 Adjustment Process: Determinants

Panel B of Table 7 presents the coefficients from estimating the difference-in-differences regression by year for the four main determinants: perceived returns to education, perceived uncertainty, economic preferences and social preferences (in each case based on regressions without and with fixed effects). As shown in panel B, columns (3) and (4) (without and with fixed effects, respectively), the older cohort adjusted its expectations about the returns to schooling as quickly as did the

[34]The DID analysis by year could be interpreted as identifying the treatment effect of "learning about Reunification in time to make a decision to go to college".

[35]Students start the Abitur track with grade 11, while successful completion is at the end of grade 12. They are thus not formally asked in grade 11 about whether they "plan" to obtain the Abitur. Instead, the plan is implicit in having started the track.

younger cohort, since the coefficient estimates are close to zero and insignificant. The estimates obtained using –as counterfactual trend– the development of the older cohort in the same years show that there was no difference in adjustment between the older and younger cohorts. Moreover, we see that the coefficient on "Post" is positive and significant, which suggests that the effect of Reunification and other common trends from before to after Reunification (such as getting older) affects both cohorts to the same extent and led to an increase in perceived returns. In combination with a zero coefficient on the interaction, we learn that Reunification had the same effect on the perceived returns of the younger and the older cohort.

In terms of perceived uncertainty, as displayed in Columns (5) and (6), the young cohort adjusted to a larger extent than the older cohort, since the coefficient on the interaction is positive ($0.23 - 0.26$) and significantly different from zero at the one-percent level. However, the older cohort has also changed in terms of their perceived uncertainty from before to after Reunification since the coefficients in this table are smaller than the coefficients in Columns (3) and (4) of Table 4 ($0.40 - 0.43$).

In terms of economic and social preferences, there are particularly stark differences across cohorts. Results indicate that there has been little to no adjustment on the part of the older cohort, since the adjustment of the young cohort relative to the old over the same years, as shown in Columns (7) to (10) in Table 7, is similar to the causal effect of Reunification, as shown in Table 4. In other words, the fact that a difference-in-difference estimation using the same grades of the older cohort as counterfactual leads to a similar coefficient estimate as a difference-in-differences estimator using the same years, suggests that –in terms of preferences– the older cohort is not contaminated/treated by experiencing Reunification themselves. In other words, economic and social preferences of the older cohort tended to adjust much more slowly in terms of moving towards more "individualism".

The fact that the older cohort adjusted much more slowly to the regime change in terms of economic and social preferences, is consistent with (and suggests a mechanism for) the slower adjustment in terms of that cohort's educational attainment. It highlights that timing for change matters (which has been shown in other contexts, such as that of graduating during a recession, see the seminal paper by Baker et al., 1994) and that in this sense the older cohort felt that they did not have the time to adjust their plans, even if technically they did have the time to make changes.

8 Conclusion

The long-standing educational gap in completion of the Abitur (the certificate prerequisite to entering college) between East and West Germany closed entirely approximately one decade after the German Reunification. We exploit this large macro shock, which saw East Germany, a previously

communist country, reunite with West Germany and converge to the democratic-capitalist regime of the latter, to causally estimate the shock's impact on the educational plans of adolescents in East Germany. Using novel longitudinal microdata on one of the most important changes in recent history, containing information on a sample of individuals (East Germans) for whom we traditionally have little information before change occurred, we show that the switch in regime induced an immediate and sharp increase of 22 percentage points in the adolescents' (aged 13-14) plan to obtain the Abitur. Several years later, to a large extent, this translated into an actual increase in going to college among these youth.

Our analysis allows us to open the black box of whether, when and how youths' form, and adjust, their educational plans, and whether (and how) plans are linked to the updating of beliefs and preferences related to the decision. We explore changes in perceived returns to education, perceived risk, (economic and social) preferences, and changes in constraints. Investigating the motives behind the change in youths' plans, we show that a leading explanation is that, even at this young age (and quite soon after Reunification), adolescents understood that there was a strong increase in returns to college education, to which they reacted. This change in perceived returns was strongly linked to changes in educational plans, which ultimately led to an increase in long-run educational investments. Beyond the changes in returns, we identify changes in educational plans that were linked to changes in perceived uncertainty and changes in social preferences. While it is typically difficult to measure preferences and values, especially in the short periods around a regime change, our paper sheds light on how these evolved and adapted to those of the capitalist and democratic West, as well as on their links to changes in educational plans. Overall, the results highlight the importance of perceived returns and uncertainty as well as of social preferences, thereby shedding light on the process of formation of educational plans as well as their role in educational decision-making.

To explore whether the age (or educational stage) at which individuals are affected by a macro shock is relevant to educational decisions, we examine the extent to which a slightly older cohort adjusted their respective educational attainment to the regime change, and the extent and pace of the determinants' adjustment. We show that cohorts closer to critical educational junctions at the time of Reunification adjusted their plans to a much lesser extent. While they similarly updated their subjective expectations about the returns of education, they exhibited a slower adjustment in their preferences relative to younger cohorts.

From a policy perspective, our study highlights that educational plans are formed and updated several years before the actual educational decision and that they are tightly linked to later decisions with important implications for human capital investments. It is crucial to understand the role played by youths' beliefs with respect to the labor market, as well as their preferences and supply-side constraints, in educational planning. It is similarly important to understand just how malleable

these plans are and whether they can adjust to new circumstances. Overall, our study allows an insight into the educational decision process and–given the critical role of educational attainment for later economic success and general wellbeing–helps further our understanding of the emergence and persistence of inequality.

References

[1] Alesina, A. and Fuchs-Schündeln, N. 2007. "Good-bye Lenin (or Not?): the Effect of Communism on People's Preferences," American Economic Review, 97(4), 1507-1528.

[2] Ammermueller, A. and A. M. Weber. 2005. "Educational Attainment and Returns to Education in Germany - An Analysis by Subject of Degree, Gender and Region." ZEW DP 05-17.

[3] Anweiler, O., Mitter, W., Peisert, H., Schaefer, H.-P., Stratenwerth, W. 1990. "Vergleich von Bildung und Erziehung in der BRD und in der DDR. Verlag Wissenschaft und Politik, Koeln.

[4] Attanasio, O. and Kaufmann, K. M. 2014. " Education Choices and Returns to Schooling: Mothers' and Youths' Subjective Expectations and their Role by Gender." Journal of Development Economics, 109C.

[5] Baker, G., Gibbs, M. and Holmstrom, B. 1994. "The Wage Policy of a Firm." Quarterly Journal of Economics, 109: 881-919.

[6] Baske, Siegfried. 1990. "Die erweiterte Oberschule in der DDR." In Vergleich von Bildung und Erziehung in der BRD und in der DDR, edited by Bundesministerium für innerdeutsche Beziehungen. Cologne, Germany: Verlag Wissenschaft und Politik.

[7] Becker, G. S. 1967. "Human Capital: A Theoretical and Empirical Analysis, With Special Reference to Education." University of Chicago Press, Chicago.

[8] Becker, S. O., Mergele, L. and Woessmann, L. 2020. "The Separation and Reunification of Germany: Rethinking a Natural Experiment Interpretation of the Enduring Effects of Communism," Journal of Economic Perspectives, 34(2), 143-171.

[9] Below, S., Powell, J. and Roberts, L. 2013. " Educational Systems and Rising Inequality: Eastern Germany after Unification," Sociology of Education 86(4), 362-375.

[10] Bertrand, M., Duflo, E., and S. Mullainathan. 2004. "How Much Should We Trust Differences-in-Differences Estimates?" Quarterly Journal of Economics.

[11] Boneva, T., and C. Rauh. 2019. "Socio-Economic Gaps in University Enrollment: The Role of Perceived Pecuniary and Non-pecuniary Returns." HCEO Working Paper.

[12] Burchardi, K. and T. Hassan, 2013. "The Economic Impact of Social Ties: Evidence from German Reunification." Quarterly Journal of Economics, 128 (2013), 1219-1271.

[13] Burda, M. C. and J. Hunt. 2001. "From Reunification to Economic Integration: Productivity and the Labor Market in Eastern Germany." Brookings Papers on Economic Activity, 2001(2), 1-71.

[14] Bursztyn, L. and D. Cantoni, 2016. "A Tear in the Iron Curtain: The Impact of Western Television on Consumption Behavior." Review of Economics and Statistics, 98 (1), 25-41.

[15] Cameron, S. V., and C. Taber. 2004. "Estimation of Educational Borrowing Constraints Using Returns to Schooling." Journal of Political Economy, vol. 112, no. 1, 2004, pp. 132–82.

[16] Cantoni, D., Chen, Y., Yang, D., Yuchtman, N. and Zhang, Y. J. 2017. " Curriculum and Ideology." Journal of Political Economy, 125(2), 338-392.

[17] Carneiro, P., J. J. Heckman, and E. J. Vytlacil. 2011. "Estimating Marginal Returns to Education." American Economic Review, 101 (6): 2754-81.

[18] Chevalier, A. and O. Marie, 2017. "Economic Uncertainty, Parental Selection, and Children's Educational Outcomes", Journal of Political Economy, 125, 393-430.

[19] Cunha, F. and J.J. Heckman. 2008. "Formulating, Identifying, and Estimating the Technology for the Formation of Skills," Journal of Human Resources, 43(4), 738-782.

[20] Cunha, F., J.J. Heckman and S. M. Schennach. 2010. "Estimating the Technology of Cognitive and Non-Cognitive Skill Formation," Econometrica, 78(3), 883-931.

[21] Delavande, A. and B. Zafar. 2019. "University Choice: The Role of Expected earnings, Nonpecuniary Outcomes and Financial Constraints," Journal of Political Economy, 127:5, 2343-2393

[22] Dominitz, J., and Manski, C. 1996. "Eliciting Student Expectations of the Returns to Schooling." Journal of Human Resources, 31(1): 1–26.

[23] Falk, A., Becker, A., Dohmen, T., Enke, D., Huffman, D. and U. Sunde. 2018."Global Evidence on Economic Preferences", The Quarterly Journal of Economics, 133 (4), 1645-1692.

[24] Fernández, R. 2007. "Women, Work and Culture." Journal of the European Economic Association 24(4), 329-30.

[25] Fernández, R. and Fogli, A. 2006. "Fertility: The Role of Culture and Family Experience." Journal of the European Economic Association 4(2-3): 552-61.

[26] Fernández, R. and Fogli, A. 2009. "Culture: An Empirical Investigation of Beliefs, Work, and Fertility." American Economic Journal: Macroeconomics 1(1), 146-77.

[27] Figlio, D; P. Giuliano; U. Ozek and P. Sapienza, 2019. "Long Term Orientation and Educational Performance." American Economic Journal: Economic Policy.

[28] Friedrich, W. "Zur inhaltlichen und methodischen Forschung am ZIJ Leipzig," In: Jugend im Osten (Youth in the East), edited by Brislinger, Hausstein, Riedel, 1997.

[29] Fuchs-Schündeln, N. and Schündeln, M. 2005. "Precautionary Savings and Self-Selection: Evidence for the German Reunification 'Experiment'," Quarterly Journal of Economics, 120.

[30] Fuchs-Schündeln, N. 2008. "The Response of Household Saving to the Large Shock of German Reunification," American Economic Review, 98, 1798-1828.

[31] Fuchs-Schündeln, N. and Masella, P. 2016. "Long-Lasting Effects of Socialist Education." The Review of Economics and Statistics, 98(3), 428-441

[32] Goebel, J.; M. Grabka, S. Liebig, M. Kroh, D. Richter, C. Schroeder and J. Schupp. 2018. "The German Socio-Economic Panel Study (SOEP)." Journal of Economics and Statistics.

[33] Guiliano, P. and Nunn, N. 2021. "Understanding Cultural Persistence and Change", Review of Economic Studies, 88 (4) : 1541-1581.

[34] Heckman, J. J., L. J. Lochner, and P. E. Todd. 2006. "Earnings Functions, Rates of Return and Treatment Effects: The Mincer Equation and Beyond." In Handbook of the Economics of Education , Vol. 1, ed. Erik Hanushek and Finis Welch, 307-458. Amsterdam: Elsevier.

[35] Jensen, R. 2010. "The (Perceived) Returns to Education and the Demand for Schooling," The Quarterly Journal of Economics, 125(2), 515-548.

[36] Jha, S. and M. Shayo. 2019. "Valuing Peace: The Effects of Financial Market Exposure on Votes and Political Attitudes," Econometrica.

[37] Kahn, L. B. 2010. "The Long-term Labor Market Consequences of Graduating from College in a Bad Economy," Labour Economics, 17(2): 303-316.

[38] Kaufmann, K. M. 2014. "Understanding the Income Gradient in College Attendance in Mexico: The Role of Heterogeneity in Expected Returns." Quantitative Economics, The Econometric Society, 5(3).

[39] Kosse, F., Deckers, T., Pinger, P., Schildberg-Hörisch, H., and A. Falk. 2020. "The Formation of Prosociality: Causal Evidence on the Role of Social Environment," Journal of Political Economy, 128(2), 434–467.

[40] Kuhnke, R. 1997 “Anlage und Weiterfuehrung der dritten Laengsschnittsstudie,” In: Jugend im Osten (Youth in the East) edited by Brislinger, Hausstein, Riedel.

[41] Mintrop, H. and Weiler, H. 1994. “The Relationship between Educational Policy and Practice: The Reconstitution of the College-Preparatory Gymnasium in East Germany,” Harvard Educational Review, 64(3), 247-278.

[42] Oreopoulos, P. and K. G. Salvanes. 2011 “Priceless: The nonpecuniary benefits of schooling.” Journal of Economic Perspectives, 25(1), 159–84.

[43] Oreopoulos, P., von Wachter, T. and Heisz, A. 2012. “The Short- and Long-Term Career Effects of Graduating in a Recession,” American Economic Journal: Applied Economics, 4(1), 1-29.

[44] Oyer, P. 2008. “The Making of an Investment Banker: Stock Market Shocks, Career Choice, and Lifetime Income.” Journal of Finance, 63(6): 2601-2628.

[45] Redding S, Sturm D. 2008. “The Cost of Remoteness: Evidence from German Division and Reunification,” American Economic Review, 98 (5), 1766-1797.

[46] Stange, K. 2012. “An Empirical Examination of the Option Value of College Enrollment.” American Economic Journal: Applied Economics, 4 (1).

[47] Stinebrickner, S and Stinebrickner, T. 2014. “A Major in Science? Initial Beliefs and Final Outcomes for College Major and Dropout,” Review of Economic Studies, 81(1), 426-472.

[48] Sutter, M., Kocher, M.G., Glaetzle-Ruetzler, D. and Trautmann, S.T. 2013. “Impatience and Uncertainty: Experimental Decisions Predict Adolescents’ Field Behavior.” American Economic Review, 103 (1): 510-31.

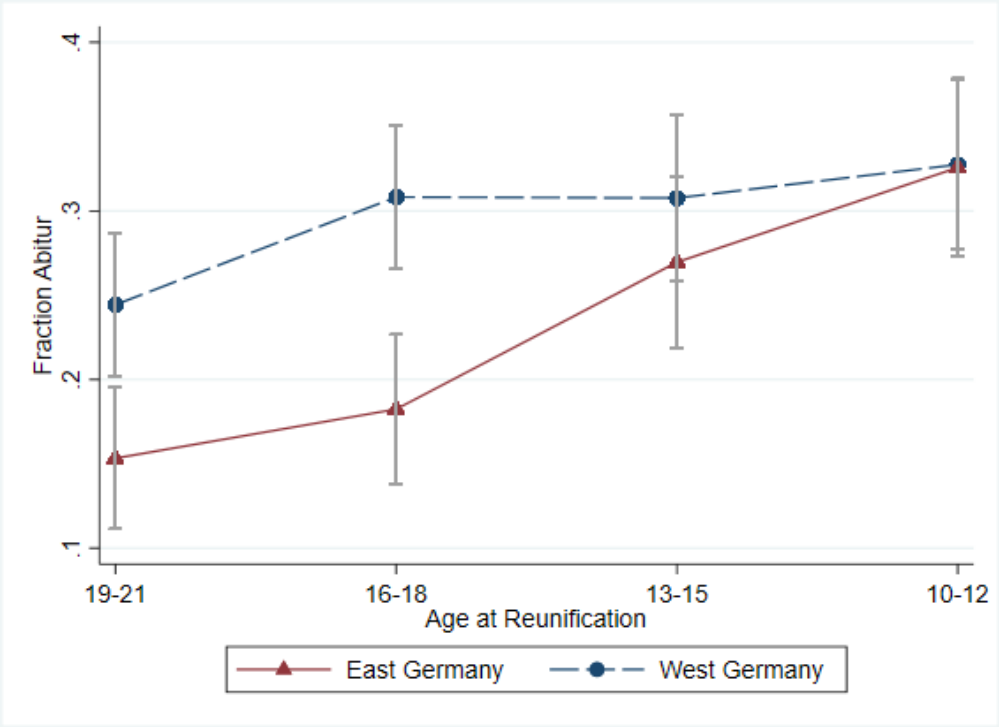
[49] Weishaupt, H.; Zedler, P. 1994 “Aspekte der aktuellen Schulentwicklung in den neuen Laendern” In: Jahrbuch der Schulentwicklung, Weinheim: Juventa.

[50] Wiswall, M., and B. Zafar. 2018. “Preference for theWorkplace, Investment in Human Capital, and Gender.” Quarterly Journal of Economics, 133 (1): 457–507.

[51] Zafar, B. 2013. “College Major Choice and the Gender Gap.” Journal of Human Resources, vol. 48 no. 3 545-595

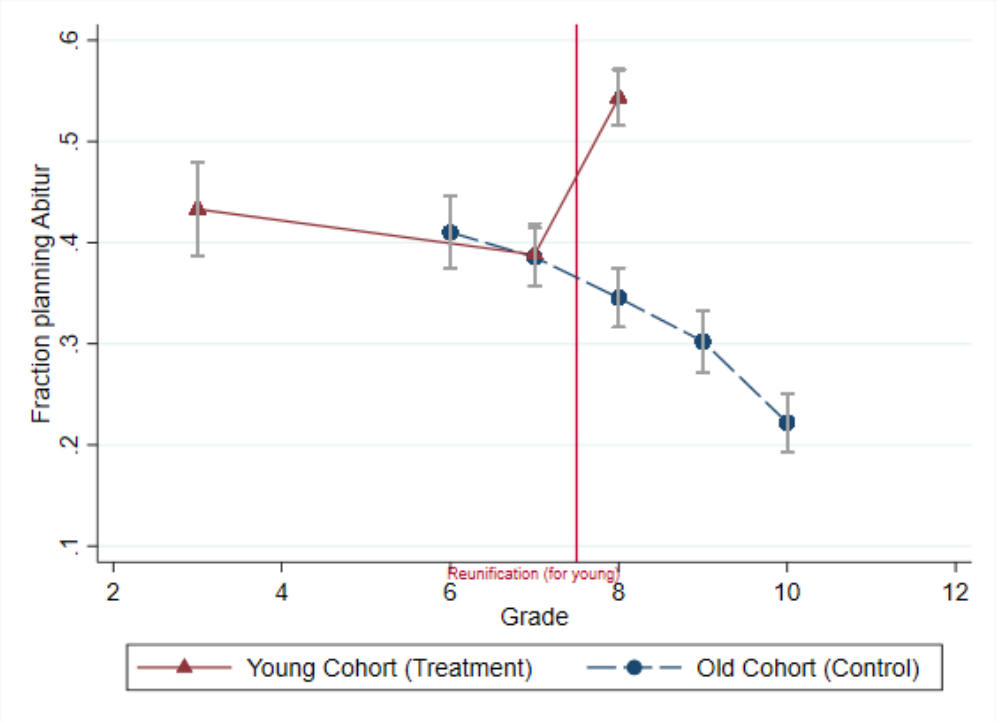
9 Tables and Figures

Figure 1: Long-Run: Abitur Completion Rates by Cohort in East and West Germany



Notes: The figure displays completion rates of the Abitur (college entrance certificate) for different cohorts of youths in East and West Germany. The dots (triangles) represent the average fraction of youths with completed Abitur for four different cohorts (defined by their age at Reunification) for West Germany (East Germany). The grey bars represent the 95% confidence intervals.

Figure 2: Short-Run: The Effect of Reunification on Abitur Plans



Notes: The outcome variable, *Abitur Plans*, refers to the plan to obtain the Abitur (taking values 1 and 0). *Treated Cohort* refers to the younger cohort and *Control Cohort* to the older cohort. The figure displays Abitur plans and how they evolve across grades. The dots (triangles) represent the average fraction of youths planning to obtain the Abitur in the old (young) cohort. The grey bars represent the 95% confidence intervals.

Table 1: Description of Main Variables

	Question	Answers	Mean	Std.Dev.	N.Ind.
Abitur Plans	Do you plan to obtain the Abitur (university entrance certificate)?	0 1	0.4327	0.4955	2609
Perceived Returns	How important is education for later earnings?	1 4	3.1034	0.8094	2609
Perceived Uncertainty	Anxiety towards the unknown.	1 4	1.7988	0.7719	2609
Economic Preferences	Combined Index.		0.0186	0.9972	2609
Afford Luxury	How important is it to be able to afford some luxury?	1 4	3.0597	0.8300	2609
Enjoy life	How important is it to enjoy life as much as possible?	1 4	3.0864	0.8021	2609
Social Preferences	Combined Index.		-0.0188	1.0009	2609
Valued by Peers	Motivation for education: being valued by peers.	1 4	2.4455	0.8114	2609
Duty as Student	Motivation for education: duty as a student.	1 4	2.8241	0.8621	2609
Good Deed	How important is it to do good/important deeds?	1 4	2.9463	0.8035	2609
Collective	How important is it to support/be part of the collective?	1 4	3.2227	0.6696	2609
Academic Ability/Interests					
Acad. Performance	GPA of Math and German.	1 5	3.7549	0.8259	1975
Relative Obj. Performance	Relative grades German vs. Math.		0.9419	0.3487	1842
Relative Subj. Performance	Own evaluation of relative performance German vs. Math.		1.1202	0.4857	1842
Relative Acad. Interest	Relative interest in German vs. Math.		1.3518	0.7171	1842
Regime-Relevant Variables					
FDJ Member	Member of youth organization of communist party.	0 1	0.9651	0.1835	1863
FDJ Member with func.	Member with political function.	0 1	0.4312	0.4953	1863
Abitur Mother	Youth's mother has obtained the Abitur, yes/no.	0 1	0.1730	0.3782	1092

Notes: *Abitur Plans* refers to the plan to obtain the Abitur, where 1 is " yes" and 0 is "no" *Perceived Returns* captures how important the student perceives education to be for future earnings and is measured on a scale from 1 to 4, where 1 is "not very" important" and 4 is "very important". *Perceived Uncertainty* refers to the level of anxiety youths perceive with respect to the unknown. It is measured on a scale from 1 to 4. *Economic Preferences* combines two questions: *Afford luxury* and *Enjoy Life*. Both are asked on a scale from 1 to 4. We collapse the two questions into one indicator for economic preferences based on the principal component analysis. *Social Preferences* combine four questions *Valued by Peers, Duty as Student, Good Deeds,* and *Collective*. All are asked on a scale from 1 to 4. We collapse the four questions into one indicator for social preferences based on the principal component analysis. *Acad. Performance* measures the students' GPA on a scale from 1 to 5, where 1 is the lowest grade and 5 the highest. *Relative Obj. Performance* is the students' relative GPA in German versus mathematics. *Relative Sub. Performance* is the ratio of one's own evaluation of performance in German and mathematics (on the scale for absolute measures, 1 is "very good" and 4 is "bad"). *Relative Acad. Interest* is the ratio of measures of interest in topics related to German and the respective measures for mathematics (with the scale of absolute measures range from 1 for "strongly interested" to 4 for "not at all interested"). *FDJ (Free German Youth) Member* ("Freie Deutsche Jugend (FDJ)") refers to whether the student was a member of the communist youth organization, taking value 1 or 0. *FDJ Member with Func.* refers to a member of the communist youth organization with a leading role. *Abitur Mother* refers to whether the individuals' mother obtained the Abitur or not, taking values 1 or 0.

Table 2: Short-Run: The Effect of Reunification on Educational Plans

	Abitur Plans					
		Main		Placebo Test (Pre-Trend)		
	[1]	[2]	[3]	[4]	[5]	[6]
Treated Cohort x Post Reunification	0.181***	0.219***	0.219***	-0.014	-0.005	-0.005
	[0.031]	[0.023]	[0.028]	[0.039]	[0.033]	[0.035]
Treated Cohort (Young)	0.018			0.032		
	[0.023]			[0.031]		
Post Reunification (Grade 8)	-0.045**	-0.047***	-0.047***	-0.022	0.056***	0.056***
	[0.022]	[0.013]	[0.014]	[0.024]	[0.019]	[0.017]
Constant	0.395***	0.394***	0.394***	0.417***	0.379***	0.379***
	[0.015]	[0.006]	[0.008]	[0.019]	[0.010]	[0.010]
N Individuals	2609	2609	2609	1950	1950	1950
N Observations	3989	3989	3989	2936	2936	2936
Individual FE	NO	YES	YES	NO	YES	YES
Clustering level	None	Indiv.	School	None	Indiv.	School
R-squared	0.025	0.069	0.069	0.001	0.013	0.013

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. In columns [1] and [4], standard errors are not clustered. In columns [2] and [5], standard errors are clustered at the individual level. In columns [3] and [6], standard errors are clustered at the school level. The outcome variable, *Abitur Plans*, refers to the plan to obtain the Abitur (taking values 1 and 0). *Treated Cohort* takes value 1 for the younger cohort and 0 for the older cohort. *Post Reunification* takes the value 1 if the student is in grade 8 (this is pre-Reunification for the older cohort (year 1987) and post-Reunification for the younger cohort (year 1991)) and 0 when in grade 7 (i.e., pre-Reunification for both cohorts). In columns [4] to [6], the placebo test compares the change in outcomes of the two cohorts prior to grade 7.

Table 3: Long-Run: Linking Educational Plans to Educational Attainment

	Abitur Completion			
	[1]	[2]	[3]	[4]
Treated Cohort (Young)	0.331***	0.170***	0.250***	0.019
	[0.034]	[0.027]	[0.040]	[0.026]
Abitur Plan in Grade 7	0.476***		0.394***	
	[0.024]		[0.034]	
Abitur Plan Gr 7 x Treated Cohort			0.169***	
			[0.043]	
Abitur Plan in Grade 8		0.614***		0.445***
		[0.030]		[0.042]
Abitur Plan Gr 8 x Treated Cohort				0.297***
				[0.051]
Constant	0.041*	0.017	0.081***	0.086***
	[0.021]	[0.020]	[0.020]	[0.015]
N Individuals	1027	1220	1027	1220
N Observations	1027	1220	1027	1220
R-squared	0.338	0.454	0.345	0.475

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. The standard errors in all columns are clustered at the school level. The outcome variable, *Abitur Completion*, refers to whether the student has completed the Abitur by age 18 (i.e., in 1992 for the older cohort and 1995 for the younger cohort). *Treated Cohort* takes value 1 for the younger cohort and 0 for the older cohort. *Abitur Plans in Grade 7 (8)* refers to the individuals' educational plans when in grade 7 (8).

Table 4: Mechanisms: The Effect of Reunification on Perceptions and Preferences

	Perceived Returns ρ		**Perc. Uncertainty** σ		**Economic Prefs.** Φ		**Social Prefs.** Π	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Treated Cohort x Post Reunification	0.485***	0.496***	0.433***	0.397***	0.321***	0.312***	-0.270***	-0.360***
	[0.075]	[0.083]	[0.065]	[0.071]	[0.052]	[0.070]	[0.088]	[0.089]
Treated Cohort (Young)	-0.225***		-0.052		-0.227***		-0.137*	
	[0.063]		[0.060]		[0.059]		[0.077]	
Post Reunification (Grade 8)	-0.104*	-0.120**	-0.179***	-0.159***	0.057	0.007	-0.337***	-0.313***
	[0.057]	[0.060]	[0.043]	[0.043]	[0.035]	[0.041]	[0.061]	[0.070]
Constant	0.027	-0.084***	-0.020	-0.047**	0.010	-0.077***	0.311***	0.254***
	[0.045]	[0.023]	[0.034]	[0.020]	[0.044]	[0.020]	[0.051]	[0.024]
N Individuals	2609	2609	2609	2609	2609	2609	2609	2609
N Observations	3776	3776	3776	3776	3776	3776	3776	3776
Individual FE	NO	YES	NO	YES	NO	YES	NO	YES
R-squared	0.020	0.046	0.022	0.034	0.019	0.029	0.087	0.154

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. The standard errors in all columns are clustered at the school level. *Treated Cohort* takes value 1 for the younger cohorts and 0 for the older cohort. *Post Reunification* takes the value of 1 if the student is in grade 8 and 0 otherwise. The main outcomes, *Perceived Returns, Perceived Uncertainty, Economic Preferences* and *Social Preferences*, are normalized. The construction of these measures is described in the notes of Table 1.

Table 5: Mechanisms: Linking Changes to Abitur Plans to Changes in Perceptions and Preferences

	Change in Abitur Plans						
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Link to Change in							
Perceived Returns	0.051**				0.049**	0.045**	0.044**
	[0.021]				[0.021]	[0.020]	[0.020]
Perceived Uncertainty		0.053**			0.051*	0.051*	0.055**
		[0.026]			[0.026]	[0.026]	[0.025]
Economic Prefs.						0.016	0.025
						[0.024]	[0.025]
Social Prefs.			-0.074***	-0.074***			-0.078***
			[0.023]	[0.023]			[0.023]
N Individuals	2609	2609	2609	2609	2609	2609	2609
N Observations	3589	3589	3589	3589	3589	3589	3589
R-squared	0.005	0.004	0.011	0.011	0.008	0.009	0.021
Test for joint signif. (p-val.)	0.016	0.046	0.002	0.002	0.019	0.045	0.001

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. The standard errors in all columns are clustered at the school level. The outcome variable in all columns is the *Change in Abitur Plans* between grades 7 and 8, related to the changes in *Perceived Returns, Perceived Uncertainty, Economic Preferences* and *Social Preferences*, individually (columns [1] to [4]) and jointly (columns [5] to [7]).

Table 6: Constraints: Heterogeneous Effects of Reunification on Educational Plans

	Abitur Plans					
	By Ability/Interest Constraints				**By Regime Constraints**	
	GPA	Relative Performance/ Interest (Verbal vs Math)			FDJ Membership	Mother Abitur
	[1]	[2]	[3]	[4]	[5]	[6]
Treated Cohort x Post Reunification	0.254***	0.154*	0.242***	0.196***	0.250***	0.191***
	[0.038]	[0.091]	[0.047]	[0.047]	[0.048]	[0.048]
x GPA above Median	-0.073					
	[0.053]					
x Relative Obj. Perf. above Median		0.083				
		[0.090]				
x Relative Subj. Perf. above Median			-0.020			
			[0.056]			
x Relative Acad. Interests ab. Median				0.059		
				[0.056]		
x FDJ Member with Function					-0.044	
					[0.063]	
x Abitur Mother						-0.038
						[0.103]
N Individual	2609	1842	1842	1842	1863	1092
N Observations	3589	2792	2792	2792	2824	1672
Individual FE	YES	YES	YES	YES	YES	YES
R-squared	0.076	0.074	0.074	0.075	0.075	0.056

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. The standard errors in all columns are clustered at the school level. *Treated Cohort* takes value 1 for the younger cohort and 0 for the older cohort. *Post Reunification* takes the value of 1 if the student is in grade 8 and 0 when in grade 7. All regressions contain the full set of interactions as controls. We report the triple interactions of *Treated Cohort x Post Reunification* with each measure (for definitions of the variables, see Table 1.).

Table 7: Adjustment Process: Younger versus Older Cohort (Difference-in-Differences by Year)

	Panel A		**Panel B**							
	Abitur Plans		**Perceived Returns**		**Perceived Uncertainty**		**Economic Prefs.**		**Social Prefs.**	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
Young Cohort x Post Reunification	0.075***	0.170***	0.084	-0.009	0.260***	0.226***	0.359***	0.250***	-0.502***	-0.486***
	[0.028]	[0.029]	[0.071]	[0.085]	[0.063]	[0.062]	[0.058]	[0.077]	[0.084]	[0.088]
Treated Cohort (Young)	0.190***		0.001		0.064		-0.342***		0.718***	
	[0.027]		[0.067]		[0.062]		[0.065]		[0.072]	
Post Reunification (Post-1990)	0.065***	0.003	0.296***	0.370***	-0.020	0.002	0.016	0.061	-0.028	-0.121*
	[0.018]	[0.016]	[0.055]	[0.068]	[0.044]	[0.040]	[0.041]	[0.047]	[0.060]	[0.066]
Constant	0.220***	0.339***	-0.181***	-0.181***	-0.131***	-0.087***	0.089*	-0.114***	-0.289***	0.218***
	[0.020]	[0.009]	[0.054]	[0.021]	[0.042]	[0.018]	[0.051]	[0.024]	[0.053]	[0.024]
N Individuals	2241	2241	2241	2241	2241	2241	2241	2241	2241	2241
N Observations	3138	3138	3108	3108	3190	3190	3188	3188	3178	3178
Individual FE	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
R-squared	0.072	0.113	0.034	0.103	0.020	0.028	0.026	0.048	0.087	0.157

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. The standard errors in all columns are clustered at the school level. *Treated Cohort* takes value 1 for the younger cohort and 0 for the older cohort. *Post Reunification (Post-1990)* takes the value of 1 if January 1991 and 0 if January 1990. For definitions of other variables, see Table 1.

Formation of College Plans: Expected Returns, Preferences and Adjustment Process

Ghazala Azmat
Department of Economics, Sciences Po,
CEP (LSE), CEPR, CESifo and IZA

Katja M. Kaufmann
Department of Economics, Bayreuth University,
briq, CESifo, HCEO and IZA

Online Appendix

Table A.1: Description: Main Variables in Grade 7 (by Cohort)

	Question	Answers	Young	Old
Abitur Plans	Do you plan to obtain the Abitur?	0 1	0.4133 [0.4927]	0.3951 [0.4891]
Perceived Returns	How important is education for later earnings?	1 4	2.9530 [0.8417]	3.1065 [0.8596]
Perceived Uncertainty	Anxiety towards the unknown.	1 4	1.7918 [0.8290]	1.8210 [0.7850]
Economic Preferences				
Afford Luxury	How important is it to be able to afford some luxury?	1 4	2.8797 [0.8595]	3.0010 [0.9626]
Enjoy life	How important is it to enjoy life as much as possible?	1 4	2.9658 [0.8289]	3.1089 [0.8679]
Social Preferences				
Valued by Peers	Motivation for education: being valued by peers.	1 4	2.4675 [0.8357]	2.6301 [0.8348]
Duty as Student	Motivation for education: duty as a student.	1 4	2.9055 [0.8687]	3.1158 [0.8473]
Good Deed	How important is it to do good/important deeds?	1 4	3.1204 [0.8076]	3.1014 [0.8491]
Collective	How important is it to support/be part of the collective?	1 4	3.3211 [0.7068]	3.2797 [0.7151]
Academic Ability/Interests				
Acad. Performance	GPA of Math and German.	1 5	3.7889 [0.8157]	3.7361 [0.8315]
Relative Subj. Performance	Ratio German/ Math Grade		0.9253 [0.3440]	0.9506 [0.3511]
Relative Obj. Performance	Own evaluation of relative performance German vs. Math.		1.1274 [0.5019]	1.1165 [0.4773]
Relative Acad. Interest	Rel. interest German/ Math		1.3772 [0.7249]	1.3386 [0.7131]
Regime-Relevant Variables				
FDJ Member	Member of youth organization of communist party	0 1	0.9398 [0.2381]	0.9787 [0.1444]
FDJ Member with func.	Member with function.	0 1	0.4084 [0.4918]	0.4434 [0.4970]
Abitur Mother	Mother has Abitur.	0 1	0.2464 [0.4314]	0.1431 [0.3504]

Notes: For a description of the variables please see Table 1.

Table A.2: Short-Run: The Effect of Reunification on Educational Plans (Balanced Sample)

	Abitur Plans							
	Main				Placebo Test (Pre-Trend)			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Treated Cohort x Post Reunification	0.250***	0.250***	0.250***	0.250***	0.015	0.015	0.015	0.015
	[0.050]	[0.032]	[0.036]	[0.036]	[0.066]	[0.049]	[0.056]	[0.056]
Treated Cohort (Young)	0.035				0.046			
	[0.037]				[0.047]			
Post Reunification (Grade 8)	-0.057*	-0.057***	-0.057***	-0.057***	0.025	0.025	0.025	0.025
	[0.033]	[0.020]	[0.020]	[0.020]	[0.039]	[0.026]	[0.020]	[0.020]
Constant	0.473***	0.487***	0.487***	0.487***	0.483***	0.499***	0.499***	0.499***
	[0.023]	[0.008]	[0.008]	[0.008]	[0.028]	[0.011]	[0.011]	[0.011]
N Individuals	772	772	772	772	497	497	497	497
N Observations	1544	1544	1544	1544	994	994	994	994
Individual FE	NO	YES	YES	YES	NO	YES	YES	YES
Clustering level	None	Indiv.	School	Two-way	None	Indiv.	School	Two-way
R-squared	0.042	0.814	0.814	0.814	0.004	0.749	0.749	0.749

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. In columns [1] and [5], standard errors are not clustered. In columns [2] and [6], standard errors are clustered at the individual level. In columns [3] and [7], standard errors are clustered at the school level. In columns [4] and [8], standard errors are clustered at the individual and school level. In all columns, the sample is restricted to the students who remain in all waves of the data until age 18 (i.e., when measuring the long-run attainment, Abitur completion). For definitions of other variables, see Table 2.

Table A.3: Long-Run: Linking Educational Plans to Educational Attainment (Balanced Sample)

	Abitur Completion					
	[1]	[2]	[3]	[4]	[5]	[6]
Treated Cohort (Young)	0.356***	0.209***	0.242***	0.267***	0.012	0.038
	[0.033]	[0.033]	[0.033]	[0.046]	[0.031]	[0.029]
Abitur plan in Grade 7	0.479***		0.225***	0.405***		0.205***
	[0.030]		[0.038]	[0.036]		[0.055]
Abitur Plan Gr 7 x Treated Cohort				0.181***		0.049
				[0.057]		[0.074]
Abitur plan in Grade 8		0.576***	0.433***		0.452***	0.321***
		[0.038]	[0.051]		[0.046]	[0.070]
Abitur Plan Gr 8 x Treated Cohort					0.332***	0.302***
					[0.058]	[0.088]
Constant	0.044*	0.031	-0.016	0.079***	0.083***	0.040**
	[0.023]	[0.019]	[0.019]	[0.021]	[0.016]	[0.015]
N Individuals	772	772	772	772	772	772
N Observations	772	772	772	772	772	772
R-squared	0.373	0.450	0.483	0.381	0.474	0.507

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. In all columns, the sample is restricted to the students who remain in all waves of the data until age 18 (i.e., when measuring the long-run attainment, Abitur completion). For definitions of other variables, see Table 3.

Table A.4: Mechanisms: Linking Changes to Abitur Plans to Changes in Perceptions and Preferences (Balanced Sample)

	Perceived Returns ρ		**Perc. Uncertainty** σ		**Economic Prefs.** Φ		**Social Prefs.** Π	
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Treated Cohort x Post Reunification	0.468***	0.482***	0.336***	0.321***	0.225**	0.281***	-0.507***	-0.494***
	[0.101]	[0.104]	[0.086]	[0.085]	[0.095]	[0.101]	[0.122]	[0.111]
Treated Cohort (Young)	-0.159*		0.037		-0.223**		-0.011	
	[0.090]		[0.079]		[0.088]		[0.121]	
Post Reunification (Grade 8)	-0.088	-0.079	-0.114**	-0.106**	0.038	-0.021	-0.185**	-0.174**
	[0.070]	[0.073]	[0.048]	[0.052]	[0.066]	[0.066]	[0.075]	[0.077]
Constant	-0.101	-0.175***	-0.113***	-0.098***	-0.003	-0.076***	0.180**	0.167***
	[0.062]	[0.028]	[0.037]	[0.022]	[0.064]	[0.026]	[0.072]	[0.029]
N Individuals	755	755	755	755	755	755	755	755
N Observations	1318	1318	1318	1318	1318	1318	1318	1318
Individual FE	NO	YES	NO	YES	NO	YES	NO	YES
R-squared	0.018	0.051	0.021	0.028	0.010	0.020	0.075	0.141

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. In all columns, the sample is restricted to the students who remain in all waves of the data until age 18 (i.e., when measuring the long-run attainment, Abitur completion). For definitions of other variables, see Table 4.

Table A.5: Long-Run: The Effect of Reunification on Abitur Completion (GSOEP)

	Abitur Completion	
	Main	Placebo Test (Pre-Trend)
	[1]	[2]
Treated Cohort x East (Reunification)	0.088*	-0.035
	[0.048]	[0.044]
Treated Cohort	-0.001	0.064**
	[0.033]	[0.031]
East Germany	-0.126***	-0.091***
	[0.031]	[0.030]
Constant	0.308***	0.244***
	[0.022]	[0.021]
N Individuals	1378	1435
N Observations	1378	1435
R-squared	0.012	0.020

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. The outcome variable, *Abitur Completion*, refers to whether the youth obtained the Abitur (taking values 1 and 0). *Treated Cohort* takes value 1 for the younger cohort (aged 13 to 15 at the time of Reunification) and 0 for the older cohort (aged 16 to 18 at the time of Reunification). *East Germany* takes the value 1 if the youth lived in East Germany and 0 for West Germany. In column [2], the placebo test compares the difference in outcomes between the older cohort (aged 16 to 18) and an even older cohort (aged 19 to 21 at the time of Reunification) in East and West Germany and shows that trends were parallel.

Table A.6: Robustness: The Effect of Reunification on GPA

	GPA (Math and German)			
	Main		Pre-Trend	
	[1]	[2]	[3]	[4]
Treated Cohort x Post Reunification	-0.055	-0.047	0.032	0.025
	[0.048]	[0.053]	[0.035]	[0.033]
Treated Cohort (Young)	0.036		0.035	
	[0.055]		[0.055]	
Post Reunification (Grade 8)	-0.152***	-0.185***	-0.128***	-0.095***
	[0.026]	[0.025]	[0.023]	[0.022]
Constant	0.113***	0.146***	0.089***	0.090***
	[0.032]	[0.014]	[0.031]	[0.008]
N Individuals	2828	2828	2256	2256
N Observations	4521	4521	4332	4332
Individual FE	NO	YES	NO	YES
R-squared	0.008	0.104	0.004	0.029

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are clustered at the school level and displayed in brackets. The outcome variable, *GPA*, refers to youths' grade point average of the two (mandatory) subjects German and Math at the end of grade 10 (last year of mandatory education). *Treated Cohort* takes value 1 for the younger cohort and 0 for the older cohort. *Post Reunification* takes the value 1 if the student is in grade 8 (this is pre-Reunification for the older cohort (year 1987) and post-Reunification for the younger cohort (year 1991)) and 0 when in grade 7 (i.e., pre-Reunification for both cohorts). In columns [3] and [4], the placebo test compares the change in outcomes of the two cohorts prior to grade 7.

Table A.7: Educational Plans and Plans to Migrate

	Abitur	
	[1]	[2]
Migration Plan: yes	0.055	
	[0.048]	
Migration Plan: yes/maybe		0.001
		[0.039]
N Observations	665	665
N Individuals	665	665
R-squared	0.072	0.070

Notes: * denotes significance at the 10% level, ** denotes significance at the 5% level, and *** denotes significance at the 1% level. Standard errors are displayed in brackets. The outcome variable, *Migration Plan*, refers to whether the youth plans to migrate to West Germany. In Column [1] the outcome variable takes the value 1 if the youth plans to migrate and 0 otherwise; and in Column [2] the outcome variable takes the value 1 if the youth plans to migrate or maybe plans to migrate and 0 otherwise. *Abitur* takes value 1 if the youth completed the Abitur degree and 0 otherwise.