

Long-Lasting Effects of Socialist Education*

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Abstract

Political regimes influence the contents of teaching and the criteria used to select and evaluate students. We study the impact of a socialist education on the likelihood of obtaining a college degree, as well as on several labor market outcomes, by exploiting the reorganization of the school system in East Germany after reunification. Our identification strategy relies on the following consideration: within the same cohort of individuals from the East who were still in education at reunification, the ones born earlier in the year started school at a younger age and had thus received one more year of socialist education at reunification. We find that an additional year of socialist education substantially decreases the probability of obtaining a college degree. We also provide evidence that, among male respondents, (i) the abolishment of non meritocratic restrictions to access to college allowed

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students to invest more in their human capital and therefore achieve a better occupational status (ii) the elimination of any part of the curricula directed towards the transmission of socialist values encouraged participation in the labor market and effort in the workplace.

1 Introduction

Schooling affects individual well being. Educational achievements and college enrollment have an impact on an individual's earnings profile (Angrist and Krueger (2001), and Oreopoulos (2006)), health outcomes (Lleras-Muney (2005)), participation in criminal activities (Lochner and Moretti (2004)), social interactions (Helliwell and Putnam (1999)) and, it has been argued, even on the stability of democratic institutions (Glaeser et al. (2005)). Not only the length of time spent in schools matters, but also the quality and contents of teaching: class size and teacher quality, for instance, are likely to shape students' performance and future labor market outcomes.

Educational systems and teaching practices differ tremendously across countries (Algan et al. (2011)). For instance, there is a strong heterogeneity in the emphasis given to vocational versus general education (Malamud and Pop-Eleches (2005)). The type of political regime is also likely to intervene in the contents of teaching and in the criteria used to select and evaluate students. Bowles and Gintis (1976) argue that norms and values within schools tend to reproduce the internal organization of societies and their labor market structure. Education within socialist economies was often instrumental to the consolidation and perpetuation of the political regimes and their elites. The design of the curricula was systematically aimed at creating a socialist personality, and access to higher education was granted on the base of political involvement rather than academic credentials alone. For example, the children of the current president of Germany, Joachim Gauck, who was a pastor and civil rights activist in the GDR, were not allowed to

attend university in the GDR in the 1980s.

We study the effect of socialist education on the likelihood of obtaining a college degree and on several labor market outcomes by exploiting the reorganization of the school system in East Germany towards West German standards after reunification. The educational system in the GDR was transformed very rapidly after the fall of the Berlin Wall. Any elements in the curricula directed towards the creation of a socialist personality were deleted, and restrictions in access to college not based on academic merit were quickly eliminated, as were similar restrictions in the choice of apprenticeship.

We analyze the labor market success of individuals belonging to the birth cohorts 1971 to 1977, i.e. cohorts who were still in education at reunification, at the age of 31 or older, i.e. at an age when they are already settled in the labor market to some degree.¹ Our identification strategy relies on the following consideration: within the same birth cohort, individuals born earlier in the year started school at a younger age and had received one more year of socialist education at reunification. In the GDR, children turning six on or before May 31 of a given year were per decree enrolled in the first grade by September 1 of the same year. We consider as treated individuals born on or after the first of June; individuals born on May 31 or before are instead part of our control group. Within the same birth cohort, treated individuals belonging to cohorts 1971-1973 were less affected by restrictions to access to college education or a favored apprenticeship than non treated ones, while treated individuals belonging to cohorts 1974-1977 were exposed to a lower number of years of socialist teaching. Since the educational system in West Germany did not experience any relevant change in the 80s and early 90s, treated respondents born between 1971 and 1977 and educated in the West received instead the same type of education as non treated respondents. By analyzing the difference of treatment between East and West we are able to

¹We do not observe individuals born after 1977 in the data yet at age 31 or older. Therefore, we cannot analyze the effects of socialist education for younger birth cohorts, who experienced reunification at a younger age.

control for any effects that might arise simply due to entering school at a slightly older age (see Angrist and Krueger (1991), and Puhani and Weber (2006) or Fertig and Kluve (2005) for evidence from Germany).

By comparing respondents in the treatment group with those in the control group in both East and West Germany in a standard difference-in-differences specification, we identify the effect of socialist schooling on college attendance and labor market outcomes of respondents educated under the socialist regime and affected by the reorganization at reunification at different stages of their schooling. We then split the sample into two separate cohort groups, namely the cohorts born 1971 to 1973, and those born 1974 to 1977, in order to distinguish between the effects driven by restrictions to access to college or apprenticeships, affecting only the first cohort group, and the ones purely related to the contents of teaching, affecting both cohort groups.

We find that an additional year of socialist education substantially decreases the probability of obtaining a college degree. This is true for both males and females and for respondents belonging to both sets of cohorts. While this effect translates into lower wages and a lower likelihood of obtaining a managerial or professional job for male respondents belonging to cohorts 1971-1973, lower educational achievements for respondents in cohorts 1974-1977 are accompanied by a decrease in their weekly number of working hours and by a lower probability of being employed. On the one hand, the abolishment of non meritocratic restrictions to access to college and choice of apprenticeship allowed students in the birth cohorts 1971 to 1973 to invest more in their human capital and therefore achieve a better occupational status; on the other hand, we conjecture that the elimination of any part of the curricula directed to the transmission of socialist values, and the introduction instead of elements that stimulated individual initiative and motivation, encouraged participation in the labor market and effort in the workplace for the younger cohort group. The performance of women in the labor market, however, is not positively affected by the reorganization of the school system

in East Germany at reunification. This is likely due to their lower attachment to the labor market, but it may also be explained by the transmission of a female role model that is less attached to the work force in the new “Western” educational system.

This work contributes to the literature that studies the long lasting effects of communism on economic outcomes and individual preferences. Acemoglu, Johnson and Robinson (2004) attribute the divergent economic paths experienced by North and South Korea in the second half of the twentieth century to their different institutions. Alesina and Fuchs-Schündeln (2007) find evidence that communism affected not only outcomes but also preferences: they show that, after reunification, East Germans are more in favor of redistribution and state intervention than West Germans. Barro and McCleary (2005) investigate the effect of Communism on religious beliefs. Ockenfels and Weimann (1999) provide experimental evidence that Eastern Germans contribute less to public goods and exhibit less solidarity than West German subjects. In this paper, we try to isolate one channel through which communist institutions have had an impact on outcomes and preferences: the educational system and, in particular, the contents of its curricula and the criteria adopted to select which students have access to college education, as well as the rules of apprenticeship choice.

We also make a more general contribution to the literature that discusses the interactions between political regimes and education. Recent works have studied the role of education in promoting democratic institutions (Acemoglu et al. (2005), Barro (1999), Glaeser et al. (2007), Papaioannou and Siourounis (2005)). We provide complementary evidence that relies on the reverse channel; we show how the transition from a socialist to a democratic regime affects labor market outcomes of individuals through changes in education.

Finally, we relate to the recent research on the effects of quality and contents of teaching. Hoffmann and Oreopoulos (2006) discuss the importance of the quality of instructors in shaping students’ performance. Malamud and

Pop-Eleches (2006) compare the effect of vocational and general education on labor market outcomes using exogenous variation provided by an educational reform in Romania. The language of instruction also has been proved to be important in determining not only standard labor market outcomes such as wages and likelihood to be employed (Angrist and Lavy (1997)), but also individual identity and political behavior (Clots and Masella (2010)).

The structure of the paper is as follows: Section 2 provides a brief description of the educational system in East Germany before and after reunification. The data and the empirical strategy employed are discussed in Section 3. Section 4 presents the basic empirical evidence and Section 5 provides several robustness checks. Finally, Section 6 concludes.

2 Schooling and Apprenticeship in the GDR

In this section, we give a short overview of the education system of the GDR and the socialist teaching in schools and vocational training. We then describe the process of admission into the *Erweiterte Oberschule*, the high school that granted the university-entrance diploma, or into a certain apprenticeship. Last, we quickly describe the reforms related to schooling and apprenticeship after reunification.

Students in the GDR were expected to attend school for 10 years (*Polylechnische Oberschule, POS*). After finishing 10th grade, only a certain fraction of students was allowed to add an additional two years of schooling in high school (*Erweiterte Oberschule, EOS*), which granted the university-entrance diploma. The majority of students started an apprenticeship. Of the apprenticeships, 78 per cent had a duration of two years, 11 per cent of 2.5 years, and a further 11 percent of 3 years.² A third option was to combine

²The distinction between 2 and 2.5 years depended on the subject matter of the apprenticeship. These percentages were calculated based on information from the Statistical Yearbook GDR (1987), which indicates numbers of students starting a certain apprenticeship, and the *Gesetzesblatt der Deutschen Demokratischen Republik* (1985), which

a three-year apprenticeship with schooling to attain something resembling a high school equivalent diploma, which also gave permission to attend university. Last, students could attend a *Fachschule*. There existed two types of *Fachschulen*. One type provided education resembling an apprenticeship and could be attended right after finishing 10th grade. The second type can be considered applied universities and could only be attended after finishing an apprenticeship.³ This second type covered 57 per cent of students in *Fachschulen* in 1988 (Köhler, 2008). Taking as a base everyone starting at a university, *Fachschule*, or in an apprenticeship in 1987, 12 per cent attended university, 18 per cent attended a *Fachschule*, and 70 per cent started an apprenticeship.

2.1 Socialist Content of Education

Socialist teaching was an integral and official part of the GDR curriculum. Social studies was an official school subject from seventh grade on, including the *Erweiterte Oberschule* as well as the vocational training schools. It aimed at providing a deep knowledge of Marxism-Leninism, and of the socialist system of the GDR. Also beyond this specific subject area, a general socialist education was an official aim of the general curriculum. As discussed by Block and Fuchs (1993), the main goal of socialist education was to create a socialist personality; critical thinking was not incentivized and divergent opinions were suppressed. Theorems and theories were never the subject of discussion, but rather dogmas to be memorized. The most important foreign language taught in schools was Russian; its learning was compulsory in every schools in East Germany.

An important step in the socialist education was the *Jugendweihe* (youth oath), which took place in 8th grade. *Jugendweihe* was a festive act in

regulates the duration of apprenticeships in different sectors.

³The first type of *Fachschulen* covered mostly the areas of medicine and pedagogy, and the second type mostly different fields of engineering, agriculture, and economics.

which the students pledged allegiance to the GDR and the socialist idea, and was preceded by a year of intensive preparation in special classes. The *Jugendweihe* was typically followed by joining the official youth organization FDJ. The *Freie Deutsche Jugend* (Free German Youth, FDJ) was the only official and subsidized youth organization in the GDR, and thus de facto the youth organization of the official party (*Sozialistische Einheitspartei Deutschlands, SED*).

The apprenticeship system was a dual system with a practical component taught in firms and a theoretical component taught in vocational schools. The majority of these schools were directly associated with one of the large socialist companies which accepted the majority of apprentices (Wehrmeister, 2005). Around one third of the apprentices lived in dormitories, run and organized partly by the FDJ (Waterkamp, 1987). The political and ideological goals of the GDR were an integral part of both the practical and the theoretical education during the apprenticeship, among others through the intense involvement of the FDJ.

The socialist ideal was that women as well as men should be contributing members of the workforce. The vast majority of adult females, including mothers, participated in the workforce, contrary to the West German experience. While equality in the work place was not achieved, schools sent clear messages that women, including mothers, were expected to work. Rust and Rust (1995) e.g. report that in analyses of school books used in East and West Germany in 1970, only 10 percent of women depicted in West German school books were in the work force, with few changes in later years, while virtually all depicted women were working in the East German school books.

2.2 Allocation of High School Slots and Apprenticeships

In the decision about who was allowed to attend the *Erweiterte Oberschule*, political criteria played an important role besides academic credentials. Of-

ficial selection criteria were the grades in 10th grade, as well as a statement about the personality of the student. This statement was issued by the director of the *POS*; both the class teacher of the student as well as the *FDJ-Gruppenrat* (the local branch of the FDJ) were officially involved in the drafting of the statement (Waterkamp 1987). It was supposed to describe the political and social involvement of the student, his identification with the GDR - documented through words and actions - as well as his social background. Children of workers were more likely to be accepted into the *EOS* than children coming from an academic background.⁴ Unofficial selection criteria included the intention of a military career, political position and personal contacts of the parents, as well as a desired career path that was in line with the official planning numbers (Fischer, 1992). Summarizing, there were important criteria in addition to academic merit which affected the acceptance into the *EOS*, and it is thus likely that a significant number of students who possessed the academic merits were not allowed to attend *EOS*.

The constitution of the GDR stated that each student had the right (as well as the obligation) to an apprenticeship (Köhler 2008). The number of apprenticeships in each firm was determined by central planning. Already in the *POS*, students were brought in contact with firms which were deemed to be a good fit for them in order to influence the students' apprenticeship decision according to the central plan. The application and allocation process was done centrally, but students could express wishes for a certain apprenticeship in their application. Firms were obliged to offer apprentices a fix position after the end of their vocational training (Wehrmeister, 2005). Students who were not allowed to attend the *EOS* for political reasons sometimes managed to start a three year apprenticeship that led to a high school equivalent diploma. The main criterion for admission into these programs was

⁴Each county school council was supposed to assure that the distribution of *EOS* students across social classes resembled the distribution in the overall population of the county (Baske, 1998).

the intended career in certain desirable sectors (Köhler 2008). Similarly to the central planning of apprenticeship positions, the number of students allowed to start studying a certain subject at the university level was centrally determined each year.

2.3 The Situation after Reunification

The educational system in the GDR was transformed very rapidly after the fall of the Berlin Wall. All school reform acts implemented in the Länder in East Germany required the elimination of any elements in the curricula which were directed towards the creation of a socialist personality. Instead, they fostered the development of an education system which supports students to act independently within the framework of the new society. Individual initiative, motivation, and creativity became crucial components of the renewed education system. The socialist content of education was abolished almost immediately, and restrictions in access to the *EOS* which were not based on academic merit fell at the beginning of 1990 (Fischer, 1992). Students were able to choose and learn other important foreign languages such as English and French.

The vocational training schools were disassociated from government firms and brought under communal control. The right to freely apply for any apprenticeship was introduced. However, many firms suffered from the economic transition and were reluctant to accept new apprentices (Wehrmeister, 2005). A law from July 1990 obliged firms to continue the practical education of the current apprentices until the end of their apprenticeships (Wehrmeister, 2005). There were also special funding opportunities and special programs from the government installed over the summer of 1990 to keep current apprenticeships in place (Bundestinstitut für Berufsbildung, 1991).

Given the overall economic situation, it might thus have been risky to cancel an existing apprenticeship in order to start a new one in a more desired profession after reunification. There is indeed some evidence that people were

more prone to cancel an existing apprenticeship the less progressed they were in it. Over the period June to September 1990, 18,500 existing apprenticeship contracts were resolved, of which two third would have started in the summer of 1990, 3,500 were in the first year of the apprenticeship, and 2,400 in the second apprenticeship year (Bundestinstitut für Berufsbildung, 1991).⁵

3 Methodology and Data

3.1 Difference-in-Differences

In the GDR, children turning six on or before May 31 of a given year were per decree enrolled in the first grade by September 1 of the same year. Exceptions to this rule were few. According to the official GDR School Statistics, in the school year 1986/87, 2.6 per cent of children deferred school by a year, and 0.14 per cent entered school a year earlier than usual.⁶ Thus, more than 97 per cent of a given cohort followed the official rule. We define the children born June 1 or later as the treated group, and the children born May 31 or before as control group. The difference between treatment and control group is that, for any given birth cohort, at the time of the fall of the Berlin Wall in November 1989, the treatment group is one year less advanced in the socialist education system than the control group.

We then run the following difference-in-differences estimation in order to

⁵In 1988, 164,000 individuals started an apprenticeship in the East, and in 1989 the corresponding number was 126000. Thus, around 1.5% of second year apprentices, 2.8% of first year apprentices, and - under the assumption of the same number of starters 1989 and 1990 - 10% of starting apprentices had their contract dissolved in the four months period June to September 1990 alone (Bundesinstitut für Berufsbildung, 1991).

⁶The corresponding numbers for the school year 1966/67 are 8.1 per cent and 0 per cent.

assess whether labor market outcomes are affected by socialist education:

$$Y_{it} = \beta_0 + \beta_1 East_{it} + \beta_2 Treat_{it} + \beta_3 (East * Treat)_{it} \\ + \beta_4 male_{it} + \beta'_5 (age)_{it} + \beta'_6 (birthyear)_{it} + \beta'_7 (state)_{it} + \varepsilon_{it}$$

where Y_{it} is the relevant labor market outcome variable for individual i in year t , $East$ is a dummy variable indicating whether the individual lives in East Germany, and $Treat$ is a dummy variable being equal to 1 if the individual was born on or after June 1. When we include control variables, these are $male$ for a male dummy, age for a full set of age dummies, $birthyear$ for a full set of birth year dummies, and $state$ for a full set of state of residence dummies.⁷ Standard errors are clustered at the *birthyear-treatment-east* level, i.e. at the group level where groups are built as all possible interactions of the birth year, treatment, and East dummies.

The coefficient β_1 captures the effect of living in the East on labor market outcomes. The coefficient β_2 controls for any potential effects of being enrolled in a school at a slightly older age.⁸ The coefficient of main interest is β_3 , which captures a differential effect of being treated for East and West Germans. If being treated leads to an additional positive labor market effect in East Germany due to experiencing a shorter GDR education, then β_3 should be positive.

⁷We run all specifications also excluding age, cohort, and state dummies, and results are robust. When we include state dummies, the East dummy drops out.

⁸Puhani and Weber (2005), Bedard and Dhuey (2006) and Fredriksson and Öckert (2005) indicate that being enrolled at a younger age can have negative effects on test scores, probability of attending college, and also long-run labor market outcomes (which would be captured by a negative β_2 coefficient). Since the usual cut-off date for enrollment in school used to be June 30 instead of May 31 in West Germany in the 1980s, we also show a robustness check in which treatment is defined as being born on or after July 1 for people in the West (see Section 5).

3.2 Affected Birth Cohorts

We analyze the birth cohorts 1971 to 1977, often splitting them up into two separate cohort groups, namely the cohorts born 1971 to 1973, and those born 1974 to 1977.

When the Berlin Wall fell on November 9, 1989, the cohort group 1974 to 1977 was still in 10th grade or below. For any given cohort in this group, treatment means having received one year less of GDR education than the control group, and thus the length of socialist education is the relevant difference between treatment and control in the cohort group 1974 to 1977.⁹ Our hypothesis is that the longer the exposure to socialist education, the stronger was the transmission of values and knowledge that may not be useful in the unified German labor market and, more in general, in Western societies. The cohort born in 1975 either had already received Jugendweihe in the fall of 1989 (control) or not (treatment), thereby potentially differing most in terms of socialist content of the received education.

The second relevant cohort group consists of the birth cohorts 1971 to 1973. Consider cohort 1973. While treated individuals were about to complete 10th grade and therefore free to choose an educational path that was propaedeutic to college education or an apprenticeship of their choice in the summer of 1990, control individuals may have been forced to participate in apprenticeship programs instead of attending *EOS*. Within cohort 1972, individuals in the control group have attended one year more of the apprenticeship program, therefore increasing the cost of switching to the educational path needed to be able to attend college or to switch the apprenticeship. The cohort 1971 was either in the last year of apprenticeship or *EOS* (treated group), or just done with either and having started to work or attend university (control group). Individuals in the control group thus had

⁹We would like to analyze even younger cohorts than the one from 1977, but do not observe these cohorts yet at the relevant age in the data to investigate labor market outcomes.

already entered the labor market and secured a job, or had started studying a certain subject at the university. Given the high economic uncertainty after reunification, individuals with a job might have feared giving it up and starting a new career. While changing the subject at a university is theoretically possible, it involves reapplying, and right after reunification many universities in the East could not accept all individuals applying for slots, and thus migrating to the West might have been the most realistic option of changing subjects. If switching costs from a degree to another one are sufficiently high, then individuals in the control group may either be less likely to successfully complete college, or once completed they may be more likely to perform a job they do not like or they are not good at and therefore be less productive when compared with individuals in the treatment group. The cost of changing the apprenticeship, going back to high school to earn a university-entrance degree, or switching subjects at a university might also be a purely psychological one based on a resistance to treat sunk costs as such.¹⁰

For the cohort group 1971 to 1973, treatment thus means to be one year less advanced in terms of apprenticeship or EOS education, while being in the control group means that the initial allocation into EOS or a certain apprenticeship happened before reunification, or even entering the labor market or university had already happened at reunification. The relevant difference in terms of treatment vs. control group lies thus again in the received length of socialist education, but additionally in how far the two groups have been affected by access restrictions to education. We conjecture that for the treatment group it was easier to change schooling or apprenticeship than for the control group, both for practical and psychological reasons.¹¹

¹⁰Of course, a year lost in life-time earnings if one changes tracks and the initial education becomes worthless also matters, but it is doubtful that this loss is so large that it is not off-set by potential future gains in the profession more suitable for the individual.

¹¹In fact, we know that 2,400 contracts of second year of apprenticeships were dissolved over the period June-September 1990, while the corresponding number of first year apprenticeships is 3,500, and for apprenticeships to be started in the summer of 1990 it was

When we analyze the birth cohort groups 1971 to 1973 and 1974 to 1977 separately, we run the following regression:

$$\begin{aligned}
Y_{it} = & \beta_0 + \beta_1 East_{it} + \beta_2 Treat_{it} + \beta_3 (East * cohort_{71-73})_{it} + \beta_4 (East * cohort_{74-77})_{it} \\
& + \beta_5 (Treat * cohort_{71-73})_{it} + \beta_6 (Treat * cohort_{74-77})_{it} \\
& + \beta_7 (East * Treat * cohort_{71-73})_{it} + \beta_8 (East * Treat * cohort_{74-77})_{it} \\
& + \beta_9 male_{it} + \beta'_{10} (age)_{it} + \beta'_{11} (birthyear)_{it} + \beta'_{12} (state)_{it} + \varepsilon_{it}
\end{aligned}$$

Now β_7 and β_8 capture any potential additional effect of treatment in the East compared to the West for the birth cohorts 1971 to 1973 and 1974 to 1977, respectively.¹² β_7 should therefore capture the effects of exposure to the socialist content of education; β_8 additionally the effect of (non meritocratic) restriction to access to college.

3.3 Data and Sample Selection

The German Microcensus is a repeated cross-sectional annual survey on a one percent random sample of the German population. The main variable that we need for our analysis is month of birth, which is only available for the years 2005 onwards. Thus, our main analyses are carried out on the samples 2005 to 2008, in which we define treatment correctly as being born on or after June 1. We refer to this as "Definition 1" of treatment. In the survey years prior to 2005, month of birth was only reported as falling either into January to April or May to December,¹³ thus not coinciding exactly with our treatment/control definition. We will use this less precise definition of treatment (treated individuals in this case are the ones born on or after the 1st of May) when we want to study the outcomes of older cohorts and

18,500 (Bundesinstitut für Berufsbildung, 1991).

¹²Given that we control for a full set of birth cohorts, we do not have to control for both cohort groups separately.

¹³In 2004 the two categories are slightly different: January to March, and April to December.

therefore need data from the earlier survey rounds in order to observe them at the relevant age.¹⁴ We call this less precise definition of treatment "Definition 2". We focus on individuals aged 31 to 35. We only start at age 31 in order to capture labor market outcomes at an age at which individuals are already settled in the labor market. We stop at age 35 such that the age composition of the different cohorts 1971 to 1977 is not too different in our sample 2005 to 2008.

The Microcensus provides the current state of residence, but not whether an individual resided in the GDR or FRG before 1989. Thus, we have to work with the current residence as a proxy for residence before 1989, and we drop respondents from the state of Berlin. In Section 5.4, we rule out the possibility that our results are driven by selection into current residence by analyzing whether the rate of East-West migration is significantly different between our treatment and control groups. We use information on whether each respondent changed his or her residence within the last year, and if yes, from which state he/she moved to the current state of residence. Within the sample of respondents who were in East Germany the year prior the survey, we then generate a dummy variable that is equal to one if the respondent moved from East to West Germany in the previous year.¹⁵

We start by analyzing the impact of reunification on the probability of obtaining a college degree. This is an obvious outcome of interest since, as discussed earlier, access to university education was restricted on non-meritocratic criteria. We then focus on standard labor market variables such as employment, working hours, wages, and the type of profession (in particular whether or not the respondent has a managerial or professional job). The

¹⁴This is the case for Figure 1 and some of the robustness checks. 2002 is the first survey round in which we observe the oldest birth cohort of interest, born 1971, at age 35. In robustness checks, we use also cohorts born in 1961 (or younger); therefore in this case 1992 becomes the first survey round in which we observe the oldest birth cohort of interest at age 35.

¹⁵This information has not been released for the surveys 2004, 2006 and 2007 (although the question was included on the survey).

dummy variable *college* takes on the value of 1 if the highest educational degree comes from a university, an applied university, or a GDR *Fachschule*.¹⁶ Employment is equal to 1 if the individual reports positive hours worked in a usual week.¹⁷ Working hours are reported working hours in a usual week; we consider the logarithm of working hours as main dependent variable. To construct wages, we have to recur to personal net income, since gross income is not available. Personal net income is reported in brackets,¹⁸ and we set personal income equal to the mean point of each bracket in order to calculate net wages by dividing through working hours (following the methodology by Pischke and von Wachter (2008)). Last, *professional* is a dummy variable equal to 1 if the respondent is either a manager or a professional according to the ISCO classification.

We run linear regressions on all dependent variables to ease the interpretation of the coefficients, but results are robust to running probit specifications if the outcome variables *college*, *employment*, or *professional* are used. Descriptive statistics are reported in Table 1.

4 Results

4.1 Results for College Graduation

We first analyze results in detail for completed college education as dependent variable.

Figure 1 shows the college completion rate by birth cohort for four different groups of individuals aged 31-35, separated by residing in East (E) and

¹⁶As discussed in Section 2.2, more than half of *Fachschule*-students got an education comparable to the one at an applied university. However, we also run robustness checks in which we assign *college* = 0 to an individual with the highest educational degree from a *Fachschule* (see Section 5.3).

¹⁷Alternatively, we take the self-reported employment status. Results are robust.

¹⁸As an example, for the years 2002 to 2004 there are 24 brackets, ranging from 150 Euros to 18,000 Euros per month. The exact number of cut-off values for the brackets differ somewhat from year to year.

West (W), and by being born between May and December (T) or January and April (C). Since we use cohorts from 1965 onwards, we need data from surveys earlier than 2005; therefore we have to use the less precise definition of treatment. In the West, individuals in the treatment group, and thus having been enrolled in school at a later age, exhibit slightly higher college completion rates than individuals in the control group for most birth cohorts. However, the differences are generally small. In the East, we observe the same pattern. Yet, differences become quite large, amounting to around one percentage point, starting from birth cohort 1971, which is the oldest cohort we believe may have been affected by the reorganization of the school system in East Germany after reunification. This indicates that treatment might have a larger effect on college graduation in the East than in the West. We test the significance of these results, as well as their robustness to the inclusion of controls, in the following regression.¹⁹

Table 2 shows the results of the main specification, with and without controls (gender dummy, age dummies, birth year dummies, state dummies). The sample used in the regression analysis consists of respondents born between 1971 and 1977 and therefore we can rely on survey years 2005 to 2008 and use the more precise definition of treatment. The coefficient on treatment is insignificant, indicating that enrollment into school at a later age has an insignificant effect on college completion in the West. The coefficient on East is negative and highly significant, reflecting lower college graduation rates in the East than in the West for the birth cohorts 1971 to 1977, as already visible in Figure 1.²⁰ Last, the coefficient of main interest on the interaction term between East and Treatment is positive and significant at the 1 percent significance level, indicating that being enrolled at an older age in the East and thereby receiving one year less of socialist education increases the probability of attaining a college degree by 1.7 (column (i)) to 1.6

¹⁹The decrease in college completion rates in the East between cohorts 1965 and 1970 is mostly driven by females, and mostly by completion of *Fachschule*.

²⁰Due to the inclusion of state dummies in column (ii), the East dummy is omitted.

(column (ii)) percentage points more than being enrolled at an older age in the West. Given a college graduation rate of around 17 percent in the East, this is a large effect.²¹

Table 3 decomposes the cohorts used in the analysis into the two cohort groups 1971 to 1973 and 1974 to 1977, first using the full sample (column i), and then splitting the sample into males (column ii) and females (column iii). Focusing on the coefficients on interest, the interaction term between East and Treatment has a positive coefficient for both cohort groups. However, it is somewhat larger and more significant for the older cohort group born 1971 to 1973. When the sample is split into females and males, only the coefficient for males in the older cohort group remains significant. However, the other three coefficients are of the same order of magnitude, yet with larger standard errors.²² Thus, when it comes to college graduation, we find significant negative effects of the length of socialist education and restricted access to higher education in the GDR.

4.2 Results for Longer-Term Labor Market Outcomes

For the four labor market outcomes employment, working hours, wages, and professional occupation, we directly present results split up into the two birth cohort groups, as well as separately for males and females.

When focusing on males, Table 4 shows that for the younger cohort group, being treated in the East leads to a higher probability of being employed, as well as longer working hours, than being treated in the West. This is in line with a longer exposure to socialist teaching being detrimental for individual initiative and motivation. Socialist values and role models transmitted by Eastern schools may have been harmful in the unified German labor market. We conjecture that the development of an educational system after reunifica-

²¹The effect is larger than the one shown in Figure 1. Note that Figure 1 uses the imprecise definition of treatment (Definition 1), while in the regression we use the precise definition of treatment (Definition 2).

²²p-values vary between 0.22 and 0.37.

tion that aimed at encouraging independent thinking and individual initiative rather than the creation of a “socialist” personality may have stimulated individual participation in the labor market, as well as effort in job searches and in the workplace. The coefficient on employment is borderline significant with a p-value of 0.09, but the coefficient on the logarithm of working hours is significant at the one percent significance level. The sizes of the coefficients are relevant from an economic point of view in both cases: male respondents born between 1974 and 1977 are 1.6 percentage points more likely to be employed and also increase their working hours by 2 per cent when they receive one year less of socialist education, compared to treated individuals in the West.

For males in the older cohort group, we observe quite different effects. Here, being treated in the East leads to higher wages by 4 per cent and a by 4 percentage points increased probability of having a professional job compared to being treated in the West, both effects significant at the one percent significance level. Thus, for males in the cohort group 1971 to 1973 we observe significant effects of treatment in the two career related variables, wages and professional jobs. This is also the cohort group for which we observe the strongest college effect. Therefore, restrictions in access to education imposed on this cohort group appear to have had significant long-term outcomes on the labor market in terms of making a career. The elimination of non-meritocratic restrictions to access to college and apprenticeship choice allowed students to acquire the human capital they needed to achieve a better occupational status in the labor market. It is interesting that for this older cohort group the detrimental effect of length of socialist education on employment and working hours is missing. This might be due to a decreasing effect of an extra year of socialist education the longer the overall socialist education and the older the individual.

For females, results are different from the ones for males.²³ Specifically,

²³All results for females, as well as for males, are robust to controlling for the number

none of the coefficients on the variables of interest are significant for females, except in the regression of working hours for the younger cohort group. Here, we find a negative effect of being treated in the East; i.e. having been exposed to socialist education for a shorter period leads to lower working hours for females of the cohorts 1974 to 1977.

We believe that the lack of significant results for females, in contrast to males, can be explained by their lower labor market attachment. Women typically experience labor market breaks in their career, and especially at the beginning of their career, through the arrival of children. These breaks often lead to new professional orientations. Therefore, any initial effects of restricted access to education or to the desired apprenticeship might show up less strongly for women over time than for men. It is interesting that for college graduation, which in the majority of cases happens before children are born, we see similar effects for females as for males in terms of the size of the coefficients. One hypothesis for explaining the negative coefficient for hours worked of the birth cohorts 1974 to 1977 is that socialist education emphasized the active role of women as members of the work force.

5 Robustness Checks

5.1 Can Results Be Explained by General Trends?

One worry about the results could be that they might capture differences in trends between East and West residents. Treatment and control individuals are slightly different in terms of age. If there exist systematic trends in either East or West Germany, these could therefore show up as differential effects of treatment in East and West. To make sure that this is not the case, we run regressions on two placebo cohort groups, namely those born 1961 to 1970, or those born 1965 to 1970. All respondents born 1970 or before had already

of children. Results are available from the authors upon request.

completed primary and secondary education when the Berlin Wall fell.

For these robustness checks, we have to use the survey years from 2004 and before in order to observe these cohorts at the same age 31 to 35 as the individuals in our baseline analyses. Thus, we have to recur to the second, less precise definition of treatment (being born on or after May 1).

Table 5 presents the results (columns 1 and 3 for the cohorts 1961 to 1971, columns 2 and 4 for cohorts 1965 to 1970). In Panel A, college degree is the dependent variable, and results are shown for the full sample and for males only. For the other four labor market outcome variables in Panels B and C, we show results only for males, due to the insignificant results for females in the previous section. None of the coefficients of interest on the interaction of East and Treatment are significant, and indeed most are very close to zero. Thus, we are quite sure that we indeed capture effects of socialist education, rather than general East or West German trends.

5.2 Exposure to Socialist Regime

We then try to discard the possibility that our results are driven by general exposure to a socialist regime and life style, rather than specifically to socialist education. Respondents in the treatment group (resident in the East) are younger and therefore they have been less exposed to socialist culture in general. The exercises performed in the previous subsection should already be enough to rule out this possibility unless we do not believe that exposure to socialist culture should have a stronger impact at a younger age and in particular at the age when cohorts 1971 to 1977 experienced reunification.

We perform two additional robustness checks on the college graduation results, as well as the significant labor market results for males. In the first robustness check, we restrict the sample to respondents born between February and September. Thereby, we are comparing individuals whose age difference is very small, and therefore results should be less likely driven by a different exposure to socialist culture in general. The second check intro-

duces a placebo treatment. Here, we consider only individuals born between July and December, defining those born between October and December as the "placebo" treatment group and those born between July and September as "placebo" control group. In this case, we are considering respondents who received the same exposure to socialist education, but, given the age difference, a different exposure to socialist culture.

Results for college graduation are presented in Table 6. As expected, the coefficient of interest stays positive and significant at the 5 per cent level in column (i) but turns insignificant in the placebo treatment of column (ii). In specification (i), which restricts the sample to individuals born between February and September and thus analyzes a more homogeneous age group, the coefficient even increases to 0.023 from 0.016 in the baseline results of Table 2.

We then perform similar exercises on the male sample using labor market outcomes as dependent variables.²⁴ The first two columns of Table 7 report the coefficients on the relevant interaction terms. As in Table 6, all coefficients of interest in specification (i), where the sample is restricted to individuals born between February and September, remain positive and significant, with the exception of the coefficient in the regression of wages for the cohort 1971 to 1973, which decreases from 0.042 in the baseline results to 0.036 in column (i), with a p-value of 0.14. Also, all coefficients of interest in specification (ii), which analyzes the pseudo treatment, are insignificant. Summarizing, the results on labor market outcome variables prove to be robust as well.

²⁴As before, we perform these exercises only on the male sample, and only on those cohorts for which Table 4 gave significant results, namely the cohort group 1971 to 1973 when wage or professional status are the dependent variables, and cohort group 1974 to 1977 when employment or working hours are the dependent variables.

5.3 Further Robustness Checks

We also analyze whether our results are robust to different sampling periods, treatment definitions, and definitions of the dependent variable college. In column (iii) of both Tables 6 and 7 we include data from 2004 and before. To do that, we have to use the less precise Definition 2 of treatment, i.e. being born on or after May 1st, given that this is the only available information in the survey from 2004 and before.²⁵ In column (iv), we redefine treatment in the West as being born between July and December, given that the relevant cut-off date for schooling was typically June 30 in the West in the 1980s, not May 31 as in the GDR. In the main analysis, we use the same cut-off date for both East and West. This gives us a cleaner control for an age effect, but a less clean control for an early enrollment effect.

Results for college graduation are presented in Table 6. As expected, the coefficient of interest stays positive and significant at the 5 per cent level in both specifications. The coefficient in the baseline specification was 0.16. In specification (iii), it declines to 0.10, which is expected given the less correct definition of treatment (individuals born in May are incorrectly assigned to the treatment group in specification (iii)). As in Table 6, all coefficients of interest in specifications (iii) and (iv) remain positive and significant when we consider labor market outcomes as dependent variables in Table 7.

In column (v) of Table 6, we redefine the dependent variable by assigning zero to an individual whose highest educational degree is from a *Fachschule*, given that some *Fachschulen* resembled vocational schools more than applied universities. The coefficient on the interaction variable of interest remains positive, significantly different from zero, and also its size is very similar to the one of the coefficient in the main specification.

²⁵To be consistent, in this robustness check we define treatment in this same incorrect way also for the survey rounds 2005 to 2008.

5.4 East-West Migration

One unfortunate feature of the German Microcensus is that it provides information on the current residence of the respondents, but not on their residence before reunification. Therefore, when generating the variable “East”, we are implicitly assuming that respondents currently residing in the East (West) also received their education in the East (West). This assumption needs to be carefully discussed given that migration flows from East to West Germany have been substantial. In particular, this assumption may bias the coefficient of the interaction term between the variables “East” and “Treatment” upwards, if the most talented and hard working respondents in the treatment group were less likely to migrate from the East towards the West than the correspondent most talented and hard working respondents in the control group. In other words, our results would be capturing the effect of the reorganization of the East educational system after reunification on the sample composition if shorter exposure to socialist education would make more able individuals in the East less likely to migrate towards the West.

In order to rule out this possibility we take advantage of the fact that the Microcensus provides information not only on the current residence of the respondent, but also on the residence 12 months before the interview. We have this information for all the survey years starting from 1991, except the survey years 2004, 2006 and 2007. Therefore, while we cannot capture the full migration history of a respondent, we can capture recent migration by the creation of two variables: (i) a dummy variable that is equal to one if the respondent was resident in the East 12 months prior to the survey (ii) a dummy variable equal to one if the respondent moved from East to West within the last 12 months. Using the sample of all respondents (belonging to cohorts 1971 to 1977) resident in East Germany 12 months prior to the interview and all surveys from 1991 onwards, we check whether respondents in the treatment group were more likely to migrate than respondents in the control group. In order to use the full sample size we use the less precise

measurement of treatment.²⁶

Table 8 provides the results of this exercise. Column 1 reports the specification without control variables, while column 2 adds the usual set controls. The coefficient of the Treatment variable is very close to zero and far from being significantly different from zero, suggesting that it is highly unlikely that patterns of migration have been somehow influenced by the reorganization of the educational system after 1989.

6 Conclusions

The event of German reunification and the rapid convergence of the educational system in East Germany towards a Western model provide a unique setting to assess how political regimes influence individual lives through education. We identify two possible channels: authoritarian, and in particular socialist, forms of government often (i) adopt non meritocratic criteria to select students and grant access to higher education, and (ii) shape the contents of curricula to indoctrinate pupils and preserve consensus towards the regime in power. We find that the removal of both these features of the socialist educational system increased the likelihood of obtaining a college degree of respondents resident in East Germany, once the transition towards a capitalist society is completed.

Interestingly, those two channels have quite different effects on labor market outcomes. We find that the elimination of restrictions to access to college allows skilled students to acquire higher human capital and therefore better paid jobs. The change in curricula instead has different consequences. The transition to a system where individual initiative is encouraged leads to a higher participation in the labor market and higher effort in the workplace, expressed in number of working hours. The effects we find in the labor mar-

²⁶Results do not change if we use our favourite measurement of treatment and restrict the sample to the 2005 and 2008 surveys.

ket are, however, limited to the male sample. This can be explained either by the lower attachment of women to the labor market, or by the emphasis in socialist schools in depicting women as a fundamental component of the workforce.

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