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ABSTRACT

Long-Lasting Effects of Communist Indoctrination in School: Evidence from Poland*

Education can serve skill formation and socialisation goals both of which are conducive to desirable economic outcomes. However, the political manipulation of the school curricula can give rise to indoctrination effects with counterproductive welfare consequences on its pupils. This paper studies the effects of communist indoctrination on human capital accumulation and labour market outcomes in Poland. We document that the reduction of Marxist-Leninist indoctrination in school curriculum after 1954 exerted long-lasting beneficial effects. Unlike in East Germany, the school reform after the fall of communism in Poland had negligible effects on human capital and labour market outcomes. Our results are in contrast, explained by the ideological content of the school curriculum in the Polish education system.

JEL Classification: I28

Keywords: education systems, communist education, education reforms, school curriculum, later life outcomes, human capital attainment, labour market participation

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1 Introduction

Education is a key determinant for long term growth and productivity (Barro, 2001), and plays a role in passing on values conducive to desirable economic outcomes (Sianesi and Reenen, 2003; Acemoglu and Angrist, 1999). However, schools can also exert long-term indoctrination effects that serve political motivations. Defined as the process of teaching a group to accept a set of beliefs uncritically, indoctrination in school is a common practice in autocratic regimes as schools can instil values, reduce political dissidence and nurture regime loyalty. While indoctrination can serve as a tool to improve trust in government (Cantoni et al., 2017), the set of values instilled may have adverse impacts on human capital accumulation and labour market outcomes of individuals living in autocratic regimes, which accounts for more than 1.7 billion people worldwide.[1] This study addresses this question through documenting the negative effects that one form of indoctrination in school, namely Marxism-Leninism, has on human capital accumulation and labour market outcomes in Poland.

The design of the school curricula is a central tenet of education systems to mould both social identities (Lipset, 1959; Aspachs-Bracons et al., 2008), as well as economic incentives (Bowles and Gintis, 2011). Cantoni et al. (2017) document how the introduction of a new curriculum in China gave rise to an increased government trust and the democratic identity of political regime. In a similar fashion, education played a crucial role in the Soviet regime, in stimulating the transmission of the socialist values and the construction of the "new Soviet man" (Anderson, 1994; Gerovitch, 2007). Fuchs-Schündeln and Masella (2016) document a negative effect of exposure to communist education on labour market and educational outcomes in East Germany. However, are the detrimental effects of communism education the result of school indoctrination?

Although early indoctrination was one of the explicit goals of the education system in

[1]Information gathered from Our World in Data database, publicly available in the following link: https://ourworldindata.org/democracy

Soviet countries (Lott, 1990; Zajda, 1988; Glenn, 1995; Lottich, 1963; Counts, 1961)[2], it is an empirical question whether indoctrination exerted a long lasting impact on labour market outcomes and opportunities. This paper examines the long-term effects of school indoctrination to Marxism-Leninism. More specifically, we assess the effects of two reforms in Poland. Firstly, we evaluate the impact of a school reform that reduced substantially the Marxism-Leninist contents from the curricula starting from the school year 1954/55, following the death of Stalin in 1953. Secondly, we explore the effects of the school reform that followed the end of the communist regime in Poland implemented from the school year 1989/1990.

To identify the causal effects of these reforms, we examine individuals that were born a few weeks before or after the cut-off date to start school in a given calendar year. Within school cohorts that were already in school when the reform was implemented, individuals born just after the cut-off date to start school (January to March) were exposed to one additional year of post-reform education relative to individuals that were born in the last weeks of the previous year (October to December), despite being only a few weeks older. To net out the effect of exposure to one additional year of post-reform education from the effect of starting school at an older age or seasonality in the month of birth, we use a difference-in-difference strategy comparing individuals born just before and after the cut-off date in school cohorts affected by the reform (already enrolled in school when the reform was implemented) and in school cohorts unaffected by the reform. The cohorts unaffected by the reform are those that initiated their formal education after the reform was introduced. For individuals that belong to unaffected cohorts the level of exposure to the reform is the same regardless of whether they are born in the last or in the first quarter of the year.

The results of the analysis suggest that while the educational reform that followed the collapse of the communist regime in 1989 had negligible effects on human capital investments

[2]For example, practical algebra solving problems referred to Soviet military power and industrial development, and pupils learning how to sew a hemstitch or build wood sleds discussed the superiority of socialist values, organization of work and production.

and labour market outcomes, the reform that removed Marxism-Leninism from the curricula in the mid 1950's had beneficial effects on the probability of completing secondary education, attending university and labour force participation. Although the result for the 1989/90 post-communist reform seems counter-intuitive, it is important to consider that unlike in other East European countries, the load of ideological indoctrination in the Polish education system in the 1980's was very low. We interpret these results as strong evidence for the negative effects of Marxist-Leninist indoctrination on human capital investments and labour market outcomes. The main conclusions are robust to the use of a difference-in-discontinuity approach, the use of an alternative dataset, and to different placebo checks.

The closer paper to ours is Fuchs-Schündeln and Masella (2016). Using a careful identification strategy based on school entry cut-off date in East Germany, the authors show that exposure to an additional year of education in the post-unification education system has a positive effect on human capital accumulation and income relative to a year of education in the school system of the Democratic Republic of Germany. Our study allows isolating the effect of removing Marxist-Leninist indoctrination from school curricula from other changes that may arise with broader school reforms in the context of a new country, as it was the case of the school reform in East Germany after the collapse of the German Democratic Republic.

More specifically, we contribute to the following strands of the literature. Firstly, this article contributes to the growing literature on the long-term consequences of values and attitudes (Hansen, 2013; Granato et al., 1996). While previous evidence have shown that communist educational systems (and more generally, communist regimes) were successful at instilling certain attitudes and values (Cantoni et al., 2017; Alesina and Fuchs-Schündeln, 2007) and economic rationality (Kim et al., 2018), this paper documents the long-term effects on economic behaviours, in particular on such crucial welfare determinants as labour force participation and human capital accumulation. Secondly, the article adds to the growing literature that investigates which aspects of school curriculum shape the long-term effects of education (Görlitz and Gravert, 2018; Rose and Betts, 2004; Bernheim et al., 2001; Benavot,

1992) through showing that values promoted in the school curriculum are key for understanding the long-term effects of education. Thirdly, several authors have shown that exposure to communist regimes has negative welfare consequences, exploring the role of different mechanism such as trust, mass surveillance or the education system (Abadie et al., 2015; Lichter et al., 2020; Fuchs-Schündeln and Masella, 2016). This paper adds to this literature through evaluating the role of school indoctrination, one of the potential mechanisms that could be contributing to the explanation of the negative effects of exposure to communism on welfare. Finally, unlike the majority of research concerned with the effects of the exposure to Soviet communism exploiting the division of East and West Germany, our study refers to two natural experiments that occurred in Poland.

The structure of the paper is the following. Section 2 reviews the literature on school indoctrination and the effects of education in communist countries. We discuss the institutional setting in section 3. Section 4 introduces the empirical strategy and 5 describes the data. Section 6 presents the results and Section 7 examines the robustness of the results to alternative explanations and identification threats. Section 8 concludes.

2 Related literature

Norms and values within schools mirror the internal organization of societies and their labor market structure (Bowles and Gintis, 1977). Some studies document that education is indeed instrumental to the consolidation of political regimes and elite power. Cantoni et al. (2017) shows that a change in school curriculum in China improved trust in government among college students. Lott (1990) studies the returns to investments in indoctrination measuring how totalitarian governments increase education spending (which includes both indoctrination and human capital formation) to perpetuate and increase the costs of parental involvement. Diwan and Vartanova (2018) use the World Value Survey to examine the association between education and political preferences. Drawing on countries that have undergone

regime change, they find evidence that those educated under a democratic system have a larger political return to education and are less conservative. Brouthers et al. (2008) find that Marxist-educated managers in China and Slovakia are less likely than managers in the United States to engage in competition aimed at harming the competitor and resulting in profit loss. On the other hand, Huang et al. (2020) show evidence of negative long-lasting effects on firms run by chief executive officers (CEOs) exposed to the closure of universities during the cultural revolution in China.

More generally, a growing literature investigates the effect of schooling on peoples identity, habits and preferences, and later life choices. Kim et al. (2018) provide experimental evidence of positive and lasting effects of school curricula with additional financial education on individual economic rationality. National history curricula is documented to affect peoples identity (Costa-Font and Cowell, 2015). Aspachs-Bracons et al. (2008) show that the choice of a compulsory language of education alone exerts an influence on peoples social identity, and hence indirectly on a number of political behaviors (Clots Figueras and Masella, 2013), while Billings et al. (2020) document an effect of changes in school racial composition on political affiliation in adulthood. Hence, there is a role for political regimes to invest in public education to ensure that the values of the regime survive over time.

The results of a handful of studies suggest that values, which are affected by school indoctrination, could also have long term welfare consequences. More individualist cultures give rise to higher long-run growth than countries with a more collectivist culture (Gorodnichenko and Roland, 2011). The latter is explained by social status rewards which are conducive to innovation. Individualistic unlike collectivist societies encourage more sophisticated management practices (Van Hoorn, 2014).

There is indeed some evidence suggesting that Soviet education entailed systematically different returns to education. Rocco et al. (2011) examine a number of former communist countries, and find that those individuals educated under communism are more likely than their Western European counterparts to be unemployed, retired or disabled. Fuchs-

Schündeln and Masella (2016) find that, relative to the post-unification school system, exposure to communist education in East Germany affects negatively human capital and labour market outcomes. Consistently, other studies find a change in the returns to human capital investment after transition (Orazem and Vodopivec, 1997), and small returns to communist education (Münich et al., 2005). However, Münich et al. (2005) find no difference between the returns to education obtained during communism and the returns to schooling obtained during the transition. On the other hand, differences in human capital assimilation between cohorts educated before and after transitions to capitalism exhibit lower life satisfaction in older cohorts (Guriev and Zhuravskaya, 2009). Recently, some research documents an effect of lifting communist education on entrepreneurship (Falck et al., 2016). This can explain a rise in inequality in wages that resulted from a change in the composition of the labor force (Ganguli and Terrell, 2005). However, all these studies are at odds with evidence of no changes in socio-economic mobility in many post-communist countries after 1950's (Verashchagina, 2012), which is precisely the period after Stalinism ended.

3 The education system in Poland in the 20th century

The Republic of Poland gained political independence in 1918 and efficiently introduced free compulsory education lasting 7 years throughout the country by 1920 (Kurian, 1988). After 1939 Nazis and Soviets occupying Polish lands introduced own educational settlements. Post-war Poland, as a member of Soviet bloc, adapted communist education model of free compulsory education in secular public co-educational schools tightly controlled by central authorities, but the system suffered from shortage of buildings and teachers.

Marxist-Leninist ideological contents were efficiently introduced to Polish schools starting from the school-year of 1948/49 (Jankowiak, 2001). During Stalinism strong emphasis was put on development of "new Soviet men". Schools served as means of indoctrination aimed at instilling values of communitarianism, anti-religion, atheism, anti-capitalism (Jarosz, 1998)

as well as respect for physical labour, technological development (Dobosiewicz, 1971), and gender equality. Curriculum oriented towards development of technical skills and appreciation of hard work reflected these values also by illustrating school knowledge with examples of communism superiority and capitalistic exploitation.[3] Moreover, the quality of high culture (referred to as bourgeois) was diminished, Western pop culture was absent, while local folklore culture had substantial presence in school curricula (e.g. music in arts classes and dance in physical education). Obligatory reading list (e.g. work of Dickens, Twain, Sienkiewicz, Orzeszkowa) comprised entirely of books that emphasized inequality, poverty and immorality of capitalist relations (Jędrych, 2014).

The 1954/55 School Reform. The first educational reform examined in this paper drastically reduced Marxism-Leninism indoctrination at school. A critique of the Marxism-Leninism influence on Polish education system, which started in national journals in 1952[4], led to the Ministry of Education announcement of the changes to the curricula in May 1954. As a result, in 1954/55 school year Marxist-Leninist ideology was removed from courses of Polish, Russian, history, constitution, mathematics, chemistry, biology, geography, astronomy, logics, and physical education in all schools. A drop of the overall number of school hours from 29 to 26 per week in an average grade of primary school in 1954/55 resulted entirely from the removal of indoctrination contents and apart from that no other changes were introduced to the school curricula.[5] It also marked the end of compulsory formal indoctrination of teachers. The Minister of Education addressed the pupils as individuals in direct words 'beloved children, dear youth'[6] in his speech opening the 1954/55 school year, while year earlier he had treated them as the members of Soviet organizations and spoken

[3]For example, pupils heard in primary school about an American millionaire who bequeathed his wealth, accumulated by exploitation of workers, to his dog, while many children in his neighbourhood lived in drastically depicted poverty (Wagner, 2018).

[4]*Nowa Kultura* published an article entitled "List Miecia" in a form of fictional letter from a pupil complaining about history class to the Minister of Education and two other influential journals continued the discussion.

[5]In section 4 we discuss and rule out whether the main conclusions of the results could be driven by the reduction in the number of school hours.

[6]Originally '*Kochane dzieci. Droga młodzieży*'; authors' own translation from Polish to English.

in communist jargon[7] (Wagner, 2018). With the end of Stalinism, the education system continued to explicitly promote communist values and criticize capitalist relations, but was free from direct Marxist-Leninist indoctrination, which made education less partisan with respect to religious and Western cultural contents (Dobosiewicz, 1971), and shifted their focus towards knowledge transmission and skills formation than before. This changed the school environment rewarding obedience, passiveness, fearfulness and subordination to a new one, where critical thinking, ambition, curiosity, self-direction and some individualism were allowed.

The 1989/90 School Reform. The second policy examined in this paper was the educational reform that followed the free and democratic parliament elections that took place in June 1989 in Poland. The 1989/90 reform decentralized schooling, opened alternatives to public education (such as religious and private schools) and removed Russian as compulsory foreign language as well as communist civic education from the curricula (Lopez and Marlow-Ferguson, 2002; Szczepanek, 2018; Szebenyi, 1992). Reformed education system prioritized the teaching of foreign languages (especially Western European languages), introduced a new program in civic education (Janowski, 1999), and granted teachers substantial freedom in the choice of curricula contents, allowing for the development of innovative educational programmes (Szczepanek, 2018).

However, already in 1981, the growing power of *Solidarność*[8], an anti-communist social movement, affected the school curricula (Mader, 1988) and increased security of teachers' employment. Many teachers supported or joined *Solidarność* (Bochwic, 2000). The conflict between communist authorities and school pupils supported by their parents was open in the 1980's (Janowski, 1992). The last time the Minister of Education referred to school com-

[7] 'Science leaders, members of the Society of Polish Youth, scouts, pupils of all schools' (originally '*Przodownicy nauki, zetempowcy, harcerze, uczniowie wszystkich szkół*'; authors' own translation from Polish to English).

[8] *Solidarność* was the largest independent trade union in Poland founded in 1980, growing rapidly into a social movement gathering ten million members. It was instrumental in weakening the communist regime in Poland, leading to free parliamentary elections in 1989 and in consequence to the collapse of communism (Goddeeris, 2008).

munities in the inauguration speech as 'comrades'[9] was in 1979 (Wagner, 2018). Abucewicz (2009) argues that the increasing role of liberal values in Polish education system and its management was present throughout the 1980's. The late 1980's in Poland were relatively free from indoctrination (Janowski, 1999)[10]. The courses aimed at instilling communist ideology "were almost unanimously made light of by all concerned, that is, students, teachers and parents. These subjects, introduced in the late 60's, received no respect and were considered to be unnecessary and unimportant" as Janowski (1999) reports. In sum, the education reform of 1989/90 had little impact on the indoctrination at school in Poland.

4 Empirical strategy

In this section we describe the difference-in-differences (DiD) strategy used to calculate the effects of (a) the reform implemented in 1954/55 that drastically reduced the Marxist-Leninist ideology from the school curriculum and of (b) the school reform that followed the fall of the communist regime in Poland in 1989/90.

To estimate the effect of each of the reforms, we compare individuals born within three months before the cut-off date to start school every year. In Poland children started compulsory education in September of the calendar year when they turned 7 years old, with the cut-off thus being December 31st. Thus, despite being born only a few weeks or months later, individuals born between January and March of any calendar year started school one year after those born between October and December of the previous calendar year. The latter implies that, for individuals that were already in compulsory education when the reform was implemented (which we defined as exposed to the reform), those born between January and March were exposed to one additional year of post-reform education relative to those born between October and December of the previous year.

However, starting school at a younger age may have broader long-lasting effects on labour

[9] Originally '*towarzysze*'; authors' own translation from Polish to English.

[10] In spite of the authorities' efforts to intensify communist indoctrination after the end of the martial law in 1983 (Wagner, 2018).

and educational outcomes through maturity (see for example Black et al. (2011) and Balestra et al. (2020)) and thus, the differences between individuals born between January and March (i.e. old in school cohort) and individuals born between October and December of the previous year (i.e. young in school cohort) cannot be exclusively attributed to a different level of exposure to the reforms.

To net out the effect of starting school at older age from the effect of one additional year of exposure to the post-reform education system, we compare the difference between the old and the young in school cohorts that were already in compulsory education when the reform was implemented with the difference between the old and the young in school cohorts that started school already after the introduction of the reform. For the individuals in school cohorts affected by the reform – those that were already in compulsory education when the reform was implemented – being born between January and March implies one additional year of exposure to the reformed education system relative to those born between October and December of the previous calendar year. On the other hand, the young and the old in school cohorts that started school already after the reformed education system were exposed to the same number of years of reformed education.

Formally, we conduct the following difference-in-difference estimation:

$$\begin{aligned} Outcome_{i,c,s} =& \delta_0 + \delta_1 Old\ in\ Cohort \times Affected\ Cohort_{i,c,s} + \delta_2 Old\ in\ Cohort_{i,c,s} \\ &+ \delta_4 Cohort\ FE_{c,s} + \delta_5 Survey\ FE_s + u_{i,c,s} \end{aligned} \tag{4.1}$$

where the variable *Outcome* are the human capital and labour market outcomes examined, *Old in Cohort* is a dummy variable equal to 1 if the individual is born between January and March and 0 if the individual is born between October and December of the previous calendar year. Individuals born between April and September are excluded from the sample in this specification in order to conduct comparisons between individuals with clear assignment to

a school cohort, and whose age difference is relatively small, i.e. up to 6 months. *Affected Cohort* indicates whether the individual belongs to a school cohort which has at least one year of exposure to both the post-reform and pre-reform education systems during their compulsory years of schooling and 0 if all individuals in the cohort are exposed only to post-reform education systems. Individuals exposed only to post-reform education systems are those who were young enough to start school after the introduction of the educational reform examined. Individuals that are old in cohort and belong to an exposed cohort were exposed to one additional year of post-reform education relative to individuals of the same school cohort that are born between October and December. *Cohort FE* is a vector of dummies that indicate the school cohort of the individual. We define school cohort as those formed by individuals which were born between October and December of a year (young in cohort) and January and March of the following year (old in cohort). It is important to note that in our definition of school cohort, those that are old in a school cohort started school one year after those that are young in the same cohort. The parameter of main interest in the analysis is δ_1 which measures the causal effect of an additional year of exposure to the post-reform education system. When the HBS multi-round dataset is used, we include in the analysis a variable indicating individual's age at the time of the survey (*Age*) and a vector of dummies indicating the year of the survey (*Survey FE*).

The correct identification of the effects of the reforms relies on the following assumption: The pure effect of being old and young in cohort is the same in pre-reform and post-reform education systems. We provide in section 7 suggestive evidence that this assumption holds in our data.

One additional concern with the results of the analysis is that the incorrect assignment of individuals to their school cohorts would increase the measurement error of the treatment variable and thus bias downwards the estimates of interest. The latter might happen for example in the case of grade repetition or late school enrolment. While we do not have individual level information in our data on grade repetition or date of school start enabling

us to remove the potential bias caused by miss-allocation of students, the current analysis would only underestimate the effects of interest, which would not affect the main conclusions of the study (Fuchs-Schündeln and Masella, 2016).

Another potential limitation of the analysis, in this case affecting specifically the interpretation of the effects estimated for the 1954/55 reform is that through removing Marxist-Leninist ideology from the school curriculum, the reform reduced total instruction time from 29 hours to 26 per week on average in all seven grades of primary school, although the rest of the curriculum remained the same. Thus, one may argue that the reform would not only affect outcomes through removing Marxism-Leninism but also through reducing instruction time. While the length of time at school may have an effect on educational outcomes, the broad existing theory points that if any, the effect of reducing instruction time should be negative (Fernandez and Bovini, 2017; Pischke, 2007; Parinduri, 2014; Huebener et al., 2017; Lavy, 2010). If biased, the estimates provided in this paper for the effects of the 1954-55 reform should be interpreted as a lower bound for the true effects, which does not affect the main conclusions of the paper.

In Appendix B we examine the robustness of the results to the use of a difference-in-discontinuity design comparing those born just above the cut-off for starting school every year with those born just before the 1st of January in exposed and unexposed cohorts, leaving in the research sample individuals born between April and September. The results of this analysis are largely consistent with those of the main analysis. While the difference-in-discontinuity design provides a reassuring robustness check, we have not used this technique as the main identification strategy in the paper because the short distance between cut-offs required to restrict the bandwidth to 12 months when implementing the estimations.

5 Data

The analysis is conducted using two data sources with individual level information, both released by the Polish Central Statistical Office GUS. One is the Polish census conducted in 2002, and the other is a pooled sample of Polish household budget surveys (HBS).

The 2002 census provides crucial demographic and socio-economic characteristics of the entire Polish population for the first time since the communism collapse (previous census took place in 1988). The census was conducted during less than 3 weeks in the spring of 2002 and collected data on all temporary and permanent (including those temporarily abroad) residents of Poland. The publicly available 2002 census database provides information on a random sample of 3,823,596 individuals. Unfortunately, the Polish censuses conducted in 1978, 1988 and 2011 do not include information on month and year of birth and therefore could not be used in the analysis. The main advantage of the 2002 census is its large sample size. On the other hand, the census lacks information on income although it provides information on labour force participation and educational attainment.

HBS is a household budget survey collecting data over a representative sample of Polish households on household incomes, expenditures, living conditions, and house appliances as well as selected socio-economic characteristics of individual household members. Although the survey dates back to 1950s, its design has undergone substantial changes in the 1990s and 2000s, resulting in limited usability of certain survey waves in our analysis.

The affected cohorts in the analysis of 1954/55 reform were the individuals born between 1942 and 1947. These individuals were exposed at least to one year of pre-reform education system with significant load of Marxist-Leninist ideology in compulsory education. In order to reduce the potential confounding effects caused by early retirement, we restrict the analysis to individuals aged below 60 at the time of the survey. On the other hand, the cohorts unaffected by the reform were born between 1947 and 1952. These cohorts all started school after the removal of Marxist-Leninist contents from curriculum and therefore, there is no difference in exposure to the reform between those young and old in their cohorts. Although

it would have been another valid control group, we do not have information from individuals sufficiently old to have completed their entire education before the reform that were younger than 60 years old at the time of the survey.

The main analysis of the effects of the 1954/55 reform relies on information from the 2002 census. In Appendix A, we re-estimate the effects of the reform using the HBS waves including data on month of birth from 1998, 1999 and 2000. Unfortunately, the released HBS waves implemented before 1998 and between 2001 and 2010 lacked the necessary information on birth date to conduct the difference-in-difference analysis. The main drawback of the HBS data for the estimation of the effects of the 1954/55 reform is that the sample of individuals that belong to a relevant cohort is substantially smaller than in the census data. On the other hand, the HBS databases include information on household income, which is not available in the Census dataset.

Table 1: Descriptive statistics: Analytical sample for the 1954/55 reform

	N	Mean	Standard deviation (for non-dummy variables)	Min	Max
Census (2002)					
Female	200,706	0.52	-	0	1
Age	200,706	53.91	2.48	50	59
Birth year	200,706	1948	2.48	1943	1952
Secondary educ.	200,706	0.38		0	1
Tertiary educ.	200,706	0.15	-	0	1
Work	198,200	0.47	-	0	1

Source: Polish Census 2002

Table 1 provides summary statistics for the analytical sample used in the analysis of the 1954/55 reform conducted using the 2002 census data. The age of the individuals in the sample ranges between 50 and 59 in 2002, and 15% of them have completed tertiary education. 47% of the individuals in the analytical sample were employed when the survey

was implemented[11] and 38% completed secondary education.

For the main analysis of the effect of the 1989/90 school reform that followed the collapse of the communist regime in Poland, we use seven rounds of the HBS that collected yearly information between 2011 and 2017. The affected cohorts were those individuals born between 1976 and 1982. These individuals were exposed at least to 1 year of pre-reform communist education system during the compulsory school age. On the other hand, the cohorts unaffected by the reform were born between 1982 and 1988. These cohorts started school after the collapse of the communist regime in Poland. In order to reduce the potential noise caused by a later entrance into the labour market of individuals that invest more in their human capital, we restrict the analysis to individuals that were at least 30 by the time of the survey. The 2002 Census data cannot be used to examine the effect of these results because cohorts unaffected by the 1989/90 reform and the youngest affected cohorts were too young to even have finished tertiary education by 2002.

Table 2: Descriptive statistics: Analytical sample for the 1989/90 reform

	N	Mean	Standard deviation (for non-dummy variables)	Min	Max
HBS 2011-17					
Female	40,455	0.51	-	0	1
Age	40,455	34.21	2.90	30	42
Birth year	40,455	1980	2.87	1976	1988
Secondary educ.	40,347	0.68	-	0	1
Tertiary educ.	40,347	0.37	-	0	1
Work	40,455	0.80	-	0	1
Income p/c	40,100	1,456.81	1,102.84	0	25,000

Source: HBS 2011-2017

[11] The share of labour force participation among individuals aged between 50 and 59 in the sample is low for both men (53%) and women (41%). While early retirement is unfeasible for men before the age of 60 and limited for women, the share of active individuals falls at a constant rate from age 46. This decline in labour force participation for individuals older than 45 is explained by the widespread concessions of disability pensions in the 1990's and before (Rzońca and Wojciechowski, 2008; Czerwiec, 2009).

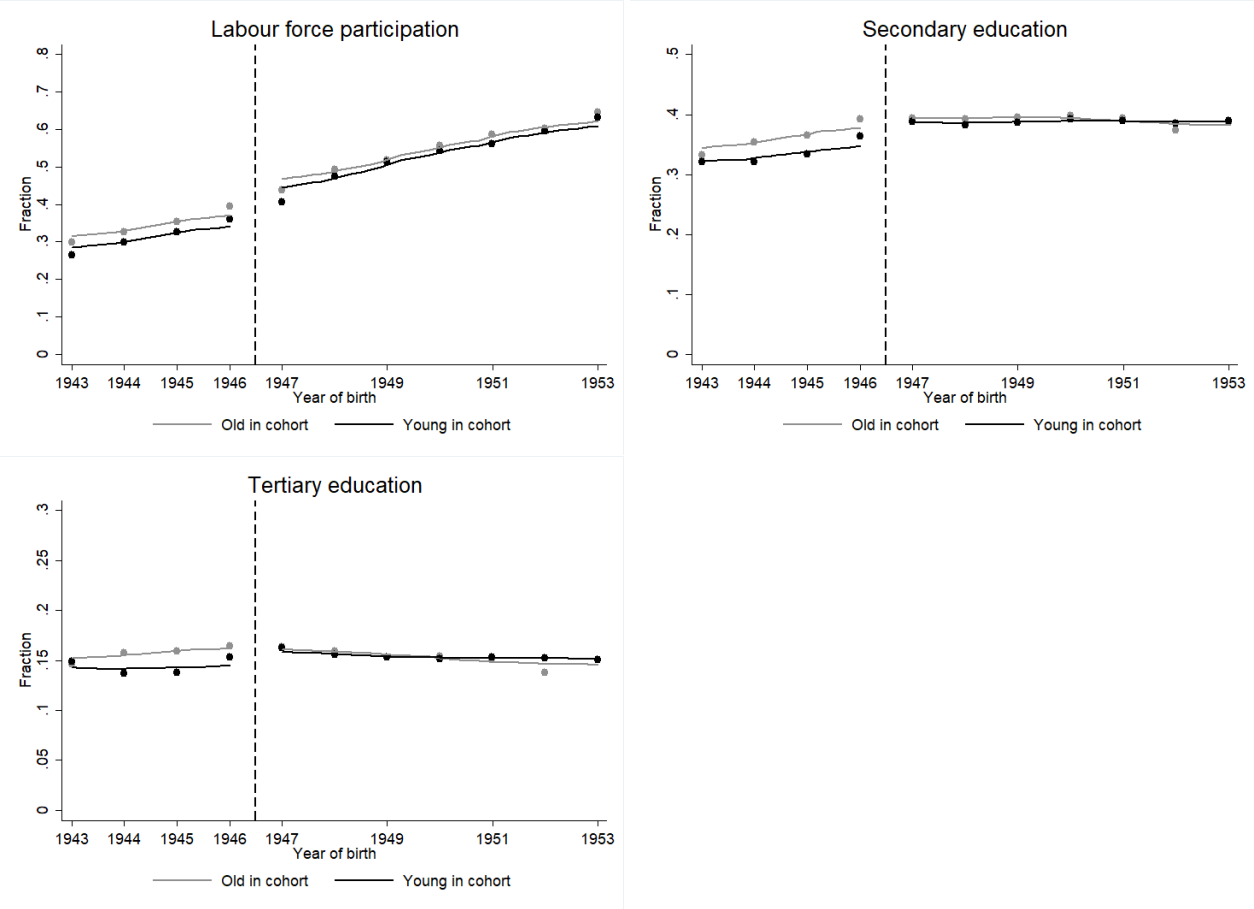
Table 2 provides summary statistics for the analytical sample used in the analysis of the 1989/90 reform conducted using the HBS census data. The age of the individuals in the sample ranges between 30 and 42 at the time of the survey, and 37% of them have completed tertiary education. 80% of the individuals in the analytical sample have a job and 68% completed secondary education. The mean monthly per-capita income is 1457 zloties (approximately 413 USD).

6 Results

6.1 The 1954/55 reform

Figure 1 shows the evolution of human capital outcomes and labour force participation by year of birth for individuals that are young and old in (school) cohorts using the census data. Overall the figure suggests that individuals that are old in cohort have better educational and labour outcomes than those that are young in cohorts. The difference between old and young in cohort is however larger for exposed cohorts, which are those born before 1947 (already in school when the reform was implemented). This pattern suggests a positive effect of the 1954/55 reform on labour force outcomes and human capital accumulation.

Figure 1: Human capital and labour force participation by year of birth



Note: Lines represent fits from a local polynomial with a bandwidth of 1. *Source:* Polish Census 2002

The estimated effects of this reform using the 2002 census data are reported in Table 3. The results suggest that an additional year of exposure during compulsory schooling to the education system with the reduced Marxist-Leninist indoctrination in curriculum increases the probability of finishing secondary education, tertiary education and labour force participation later in life. Specifically, an additional year of education under the new system increases the probability of completing secondary education and university by 1.6 (an increase of 4.2% relative to the sample mean) and 1.3 percentage points (an increase of 8.7%), respectively. The estimated effect of an additional year of education under the post-reform educational system on labour force participation in 2002 is 1.5 percentage points (an increase of 3.2%). The results suggest that the reform increases human capital investments

and labour force participation in the long term. Furthermore, the results reported in Tables 11 and 12 in Appendix E show that, while the effect on labour force participation seems to be larger for men than for women, the effect of the reform on human capital accumulation is mainly driven by women.

Table 3: Effect of an additional year of post-Marxist-Leninist education

VARIABLES	(1) Work	(2) Secondary educ.	(3) Tertiary educ.
Old in cohort × Affected cohort	0.0147***	0.0163***	0.0113***
	(0.00474)	(0.00468)	(0.00349)
Old in cohort	0.0155***	0.00683**	0.00132
	(0.00308)	(0.00300)	(0.00222)
Observations	198,200	200,706	200,706
Cohort FE	YES	YES	YES
Year of Survey FE	YES	YES	YES
Age	YES	YES	YES
Sex	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. *Source:* Polish Census 2002

One potential threat for the interpretation of the coefficient measuring the effect of the reform on labour force participation is that it might be affected by early retirement. While retirement before the age of 60 in the 1990's and 2000's was in general unfeasible for men, some women might qualify for early retirement while still in their 50's depending on their profession and years of work.[12] The results reported in Tables 11 and 12 in Appendix E showing that the effect of this reform on labour force participation for men are larger than for women rules out the latter hypothesis reassuring our interpretation of the results.

[12]Women aged at least 55 with 30 years of work tenure (20 if working in so called 'special conditions') were eligible for early retirement. Furthermore, civil servants were eligible for early retirement after 25 years of tenure, regardless of age.

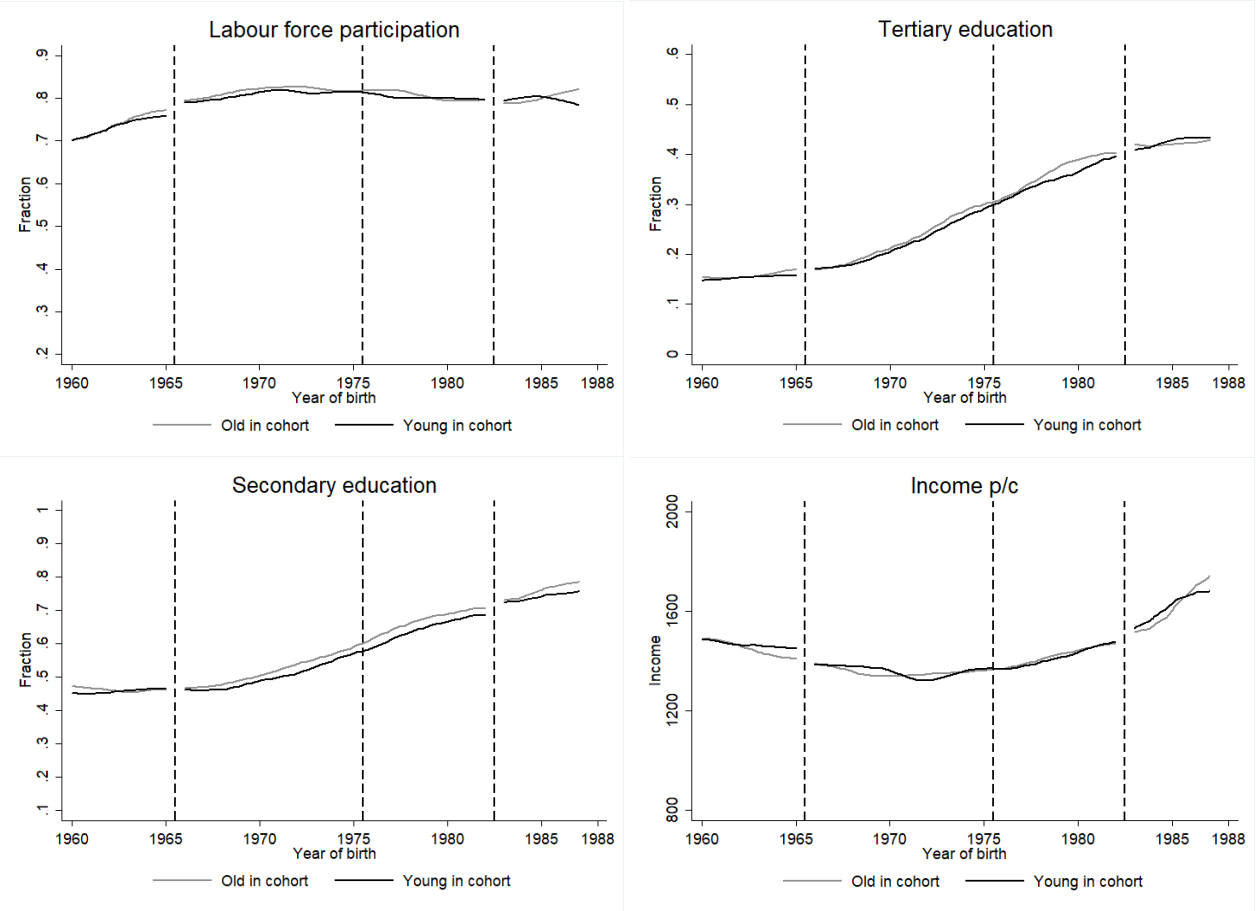
In Appendix A, we re-examine the results of the reform using the HBS data and find, overall, consistent results. The estimates suggest that one additional year of education under the post-reform educational system increases the probability of finishing tertiary education by 1.7 percentage points, labour force participation by 2.7 percentage points and per capita income by 3%. On the other hand, we do not detect any effect on the probability of finishing secondary education. The lack of effect on this variable might be driven by the smaller sample size used in this analysis. In section 7.2 we also examine the effects of the reform using an alternative difference-in-discontinuity approach and we find reassuring results.

6.2 The 1989/90 reform

Figure 2 shows the evolution of human capital outcomes and labour force participation by year of birth in the past for individuals that are young and old in cohorts using the HBS dataset. Most of the individuals born before 1966 should have completed their compulsory schooling before the introduction of the post-communist education system in 1989/90. If they undertook post-compulsory education, individuals born between 1966 and 1975 were exposed to at least one year of education under the post-communist education system. Individuals born between 1976 and 1982 were exposed to at least a year of post-communist education during their compulsory schooling. Finally, individuals born after 1982 started school after the introduction of the post-communist education system.

Overall the figure suggests that, although the educational attainment and labour market outcomes have in general improved over time, these outcomes evolve very similarly for individuals that are old and young in cohort since the 1960's, indicating that the post-communist educational reform had no effects on labour market outcomes or human capital investments.

Figure 2: Human capital and labour force participation by year of birth



Note: Data used is from the HBS data 2011-2017. Lines represent fits from a local polynomial with a bandwidth of 1. *Source:* HBS 2011-2017

The estimated effects of the 1989/90 education reform are reported in Table 4 and reveal that a higher degree of exposure to the post-communist education does not affect human capital investments and labour market outcomes. The coefficients that yield the effect of an additional year of exposure to post-communist education in Poland during compulsory years of schooling on the probability of completing secondary and tertiary education are small and statistically indistinguishable from 0 at conventional confidence levels. Similarly, exposure to an additional year of non-communist education during compulsory years of schooling does not affect labour market outcomes by the age of 30 or above. We examine for heterogeneous effects of the reform by gender in tables 14 and 13 in Appendix E. The results rule out the existence of any effect of the 1989/90 reform on labour market or human capital outcomes

for men or women.

Table 4: Effect of an additional year of post-communist education

	(1) Secondary educ.	(2) Tertiary educ.	(3) Work	(4) Ln income p/c
Old in cohort × Affected cohort	0.0107	0.0097	0.0117	-0.000907
	(0.0107)	(0.0117)	(0.00959)	(0.0152)
Old in cohort	0.0172	0.0063	-0.00360	0.0105
	(0.0094)	(0.0105)	(0.00861)	(0.0134)
Observations	40,347	40,347	40,455	40,100
Cohort FE	YES	YES	YES	YES
Year of Survey FE	YES	YES	YES	YES
Age	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. *Source:* HBS 2011-2017.

The lack of effect of the post-communist school reform in Poland contrasts with the strong beneficial effects of exposure to post-communist education in Eastern Germany found in Fuchs-Schündeln and Masella (2016). One potential explanation for the different results could be that we focus on compulsory years of education (primary education and first years of secondary education) and Fuchs-Schündeln and Masella (2016) focus on secondary education. To make results more comparable, we also estimate the effect of exposure to an additional year of non-compulsory secondary education in the post-communist educational system on human capital and labour market outcomes including only individuals that were old enough to have completed tertiary education before the implementation of the 1989/90 reform (those born between 1962-1965) and individuals that were still in post-compulsory education when the 1989/90 reform was implemented (individuals born between 1972 and 1975). The results of this analysis are reported in Table 5. The estimates of the effects of exposure to an additional year of post-communist education during non-compulsory secondary school are small and statistically indistinguishable from 0 at conventional confidence levels.[13]

[13]To make estimates more comparable, unaffected cohorts are defined in this analysis as individuals aged

Table 5: Effect of an additional year of exposure to post-communist post-compulsory education

VARIABLES	(1) Secondary educ.	(2) Tertiary educ.	(3) Work	(4) Ln income p/c
Old in cohort × Affected cohorts	-0.0125	0.00443	-0.00475	0.0153
	(0.00980)	(0.00839)	(0.00878)	(0.0141)
Old in cohort	-0.000613	0.00765	0.00776	0.00670
	(0.00688)	(0.00545)	(0.00674)	(0.0104)
Observations	35,082	35,082	35,146	34,689
Cohort FE	YES	YES	YES	YES
Year of Survey FE	YES	YES	YES	YES
Age	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. *Source:* HBS 2011-2017

These results reassure the hypothesis that, unlike in East Germany, the education system that was in place in the 1980's in Poland did not have a negative effect in terms of human capital investments and labour market outcomes relative to post-communist education. One potential explanation for the results in Poland is that, unlike in other communist countries, the ideological indoctrinating contents in the school curriculum in the 1980's was very limited.

Furthermore, the relative power of state authorities over school teachers varied significantly in time in Poland. While the Polish state in the 50's executed a strong control of school teachers through the teachers training courses, during the 1980's political crisis the balance of power between school teachers and the government changed in favour of the former group. In a context in which many school teachers were members of the opposition trade union *Solidarność* (Bochwic, 2000), the relaxation in the control executed over school teachers *de facto* removed indoctrination from school from the early 80's.

at least 24 when the reform was introduced. These individuals were too old to be attending secondary or tertiary education when the reform was introduced. While affected cohorts in this analysis were born between 1972 and 1975 and were aged 36-45 at the time of the survey, unaffected cohorts were born between 1962 and 1965 and were aged 45-55 at the time of the survey

7 Robustness checks

7.1 Falsification tests

The main identification condition of the proposed empirical strategy is that the pure effect of being young in cohort in terms of the outcomes explored is the same under the pre-reform and post-reform education systems. We can examine the feasibility of this assumption through checking whether the effect of being young in cohort is the same among cohorts only exposed to the communist education system and among cohorts only exposed to the post-communists education system.[14] Specifically, we compare the effect of being young in a cohort for individuals born between 1982 and 1988 – who started school after the post-communist school reform – and individuals born between 1961 and 1965, who had completed all their education when the post-communist reform was introduced.

Table 6: Placebo effect of being young in a cohort in communist education vs in post-communist education

VARIABLES	(1) Secondary educ.	(2) Tertiary educ.	(3) Work	(4) Ln income p/c
Old in cohort × Only communist cohorts	-0.00250	0.00195	0.0113	-0.0110
	(0.0124)	(0.0115)	(0.0107)	(0.0167)
Old in cohort	0.00492	0.00146	-0.00527	0.0137
	(0.0107)	(0.0104)	(0.00871)	(0.0134)
Observations	26,674	26,674	26,728	26,427
Cohort FE	YES	YES	YES	YES
Year of Survey FE	YES	YES	YES	YES
Age	YES	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. *Source:* HBS 2011-2017

The results of this analysis are reported in Table 6. They show that the effect of being

[14] Although it would have been also ideal to assess whether the effect of being old in cohort is the same for individuals that completed all their education before and after the 1954/55 reform, we lack information on individuals old enough to have completed their full education by 1954.

young in a cohort is very similar in cohorts exposed only to communist and only to non-communist education. While we do not have information to estimate the effect of being young in cohort for individuals only exposed to the educational system in place before the 1954/55 reform, the results presented in this section suggest that the pure effect of being young in cohort does not seem to differ relevantly across educational systems, providing suggestive evidence for the fulfilment of the main identification strategy presented in Section 4.

We also conduct a falsification test setting falsely the date of introduction of the reform in 1962/63. The false date is selected so that both falsely exposed and unexposed cohorts started all the school after the 1954/55 reform and were already out of tertiary education by September 1989 when the post-communist education reform was implemented. The results of this falsification analysis are reported in table 7 showing no effects of the placebo reform on human capital or labour market outcomes.

Table 7: Placebo effects of an introduction of a placebo reform in 1962/63

VARIABLES	(1) Work	(2) Secondary educ.	(3) Tertiary educ.
Old in Cohort × Affected Cohort	0.00337	-0.00652	-0.00271
	(0.00390)	(0.00403)	(0.00302)
Old in Cohort	0.00434	0.00554*	0.00150
	(0.00269)	(0.00285)	(0.00217)
Observations	257,632	261,729	261,729
Cohort FE	YES	YES	YES
Year of Survey FE	YES	YES	YES
Age	YES	YES	YES
Sex	YES	YES	YES

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. *Source:* Polish Census 2002

7.2 Difference in discontinuity design

The results of the analysis of the 1954/55 reform using a difference-in-discontinuity design are reported in Table 8 and visually in Figure 3 in the Appendix B, where we also provide technical details on the difference-in-discontinuity approach and report the results of the difference-in-discontinuity analysis of the 1989/90 reform.

The estimates reported in Table 8 confirm the results discussed in the main section of the paper. An additional year of exposure to the education system with a reduced load of Marxist-Leninist indoctrination increased labour force participation and human capital investments for every functional form considered.

Table 8: Difference-in-discontinuity estimates of the effect of the 1954/55 reform

VARIABLES	(1) Work	(2) Secondary educ.	(3) Tertiary educ.
Linear polynomial			
Old in cohort × Affected cohort	0.0248***	0.0199***	0.0126***
	(0.00598)	(0.00642)	(0.00388)
Quadratic polynomial			
Old in cohort × Affected cohort	0.0172***	0.0265***	0.0166***
	(0.00613)	(0.00652)	(0.00487)
Observations	709,955	718,746	718,746

Note: Standard errors in parentheses clustered at the running variable level. *** p<0.01, ** p<0.05, * p<0.1. *Source:* Polish Census 2002

The results of the analysis of the 1989/90 reform using a difference-in-discontinuity design are reported in Table 10 in Appendix B. The estimates suggest that the 1989/90 reform did not increase secondary education, tertiary education or per-capita income. On the other hand, the results suggest a positive effect of the reform on labour force participation that

contrasts with the results presented in the main results of the study.

7.3 Alternative database

In Appendix A we examine whether the effect of the 1954/55 reform holds when using the HBS data from rounds 1998, 1999 and 2000 instead of the Census data. The results of the analysis using this source of data are reported in Table 9. They support, overall, the conclusions yielded by the main analysis of the paper, showing that an additional year of exposure to the education system with a reduced Marxism-Leninism ideological contents in school curriculum increased tertiary education attainment, labour force participation and income per capita in later life.

8 Conclusion

There are numerous differences between education systems operating in countries of the Soviet bloc and Western Europe, such as state control over curricula, prevalence of non-public schools, length of school day, homework load, etc. In our study we are able to focus on a particular feature of communist education systems, namely ideological indoctrination in school curriculum, and examine its effects on later life outcomes. We draw on evidence from two education reforms in Poland during the second half of the 20th century using a difference-in-difference strategy that exploits variation in exposure to the reform generated by cut-off dates to start school among exposed and unexposed cohorts.

Our results provide evidence of the perverse long-term effects of Marxist-Leninist indoctrination in school on human capital investments and labour market outcomes. The 1989 reform involved major changes and brought no effects, while relatively little changes introduced in 1954 yielded long-lasting effects. More specifically, we focus on the effect of the repeal of explicit indoctrination to promoted communist values during school courses that were compulsory throughout the Stalinist period. The results also suggest that the education

system that was in place in the last decade of the communist regime in Poland did not yield detrimental effects on human capital formation and labour market outcomes in later life. However, the ideological indoctrination, such as Marxism-Leninism, present in school curriculum reduces tertiary and secondary education attainment, and labour force participation even five decades after the indoctrination took place.

In conclusion, ideological indoctrination exerts a cost in terms of human capital formation and labour market performance in later life even after controlling for school curricula. While we document that as a package, the values promoted in the Marxist-Leninist school curriculum could be driving the effects, we cannot conclusively disentangle the effects of each of them. Instead, in Appendix E we use data from the European Social Survey and the Generations and Gender Program to explore the association between some of the values promoted in the reformed schools and educational as well as labour market outcomes. The results show a strong positive association between the examined outcomes and values associated with critical thinking and individualism. While suggestive, the correlations should be interpreted with caution due to potential endogeneity concerns. The use of field experiments in post-communist countries is a promising avenue to overcome methodological challenges and elicit the specific values that explain the effects observed in the study.

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A Results of the 1954/55 reform using the HBS data

In this appendix we examine the effects of the 1954/55 reform using the rounds 1998, 1999 and 2000 of the HBS data instead of the 2002 census. The results of the analysis are reported in table 3. The estimates show that one additional year of education under the post-reform educational system increases the probability of finishing tertiary education by 1.7 percentage points, per capita income by 3% and increases the probability of working by 2.7 percentage points. These effects are fully consistent with those obtained when the impact of the 1954/55 reform are estimated using the 2002 census.

On the other hand, unlike in the analysis conducted with the census data, we do not detect any statistically significant effect of the 1954/55 reform on the probability of finishing secondary education when we used the HBS data, although the coefficient has the expected sign. One possibility to explain this differential results is that the sample used in the HBS is remarkably smaller. The latter reduces the statistical power, which increases standard errors and might cause the small effects detected using the census data (in terms of percentual changes) statistically insignificant.

Table 9: Effect of the additional year of post-Marxist education (HBS survey)

VARIABLES	(1) Secondary educ.	(2) Tertiary educ.	(3) Work	(4) Ln income p/c
Old in cohort × Affected cohort	0.0126	0.0172*	0.0270**	0.0327**
	(0.0135)	(0.00892)	(0.0133)	(0.0161)
Old in cohort	-0.0140	-0.0160***	0.0034	-0.0220**
	(0.0094)	(0.00604)	(0.0089)	(0.0111)
Observations	22,203	22,203	22,284	22,091
Cohort FE	YES	YES	YES	YES
Year of Survey FE	YES	YES	YES	YES
Age	YES	YES	YES	YES

Note: Data used is from the HBS 1998-2000. Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

B Results using a difference-in-discontinuity design

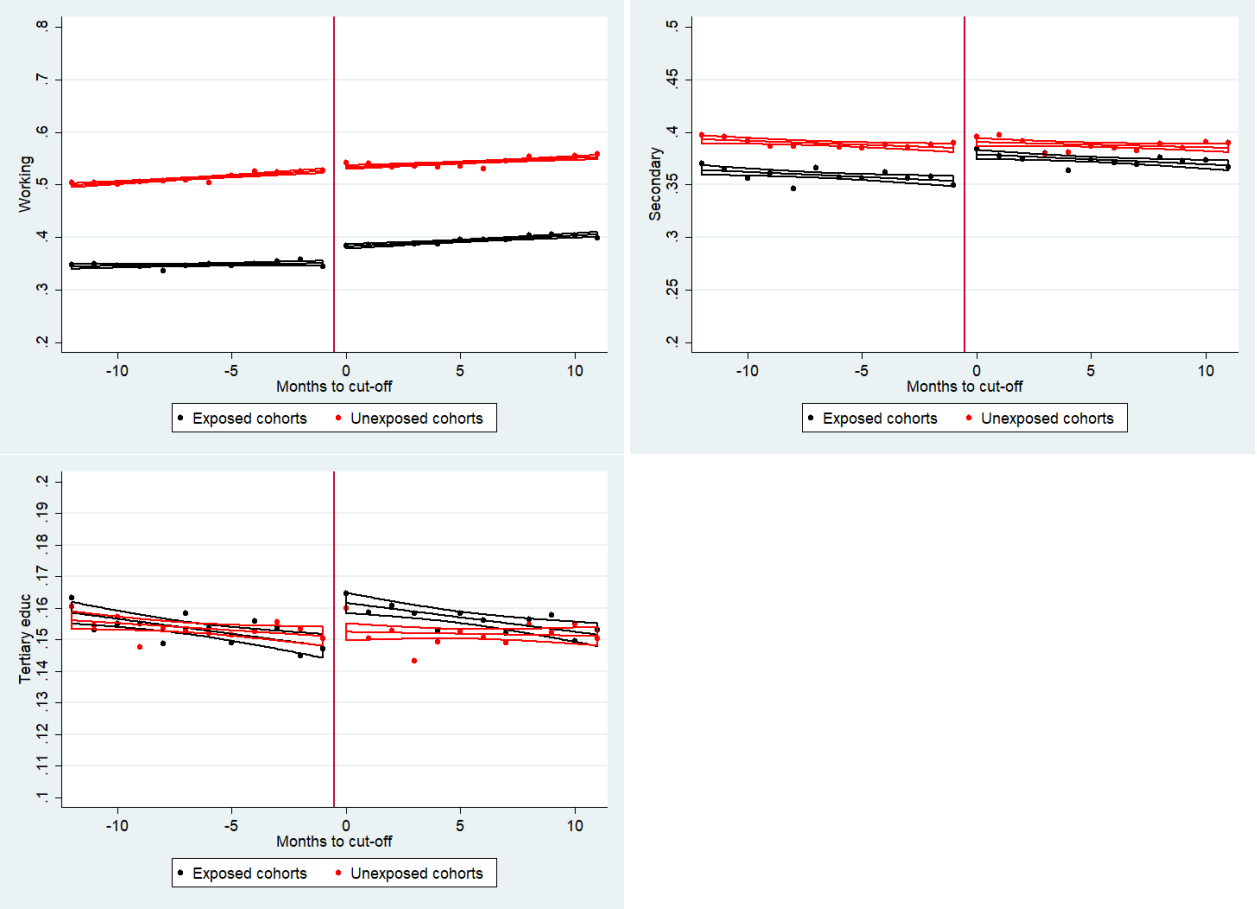
In this section we assess the results of the reforms using an alternative difference-in-discontinuity approach. To conduct such analysis, we proceed as follows. Firstly, we build one separate database per cut-off, which is defined as being born in January 1st every year for cohorts included in the analyses as defined in Section 5. In each database we include all individuals born within 12 months from the cut-off, which is the maximum distance between one cut-off and the following/previous one. For the observations included in each database, we set the running variable as the number of months between the date of birth and the relevant cut-off. Secondly, we pool the databases created and run the following difference-in-discontinuity regression:

$$\begin{aligned} Outcome_{i,c,s} =& \delta_0 + \delta_1 Old\ in\ Cohort \times Affected\ Cohort_{i,c,s} + \delta_2 Old\ in\ Cohort_{i,c,s} \\ &+ \delta_3 Age_{i,c,s} + \delta_4 Cohort\ FE_{c,s} + \delta_5 F(Month\ of\ birth)_s \\ &+ \delta_6 F(Month\ of\ birth)_s * Old\ in\ Cohort + u_{i,c,s} \end{aligned} \tag{B.1}$$

where *F(Month of birth)* is a polynomial function of the distance in months from the cut-off, which is in January of the same year for those old in cohort and January of the following year for those young in cohort. Following Gelman and Imbens (2019), we estimate the regressions using first order and second order polynomials for the forcing variable. We set the bandwidth to 12 months at each side of the cut-off because, although small, this is the maximum distance in months between cut-offs.

The main advantage of this analysis is that it includes all individuals born within the relevant years regardless of the month of birth. On the other hand, the main flaw of this design is that it does not allow the use of bandwidths larger than 12 months.

Figure 3: Effects of 1954/55 reform on labour force participation and educational outcomes



Note: Data used is from the 2002 Polish census

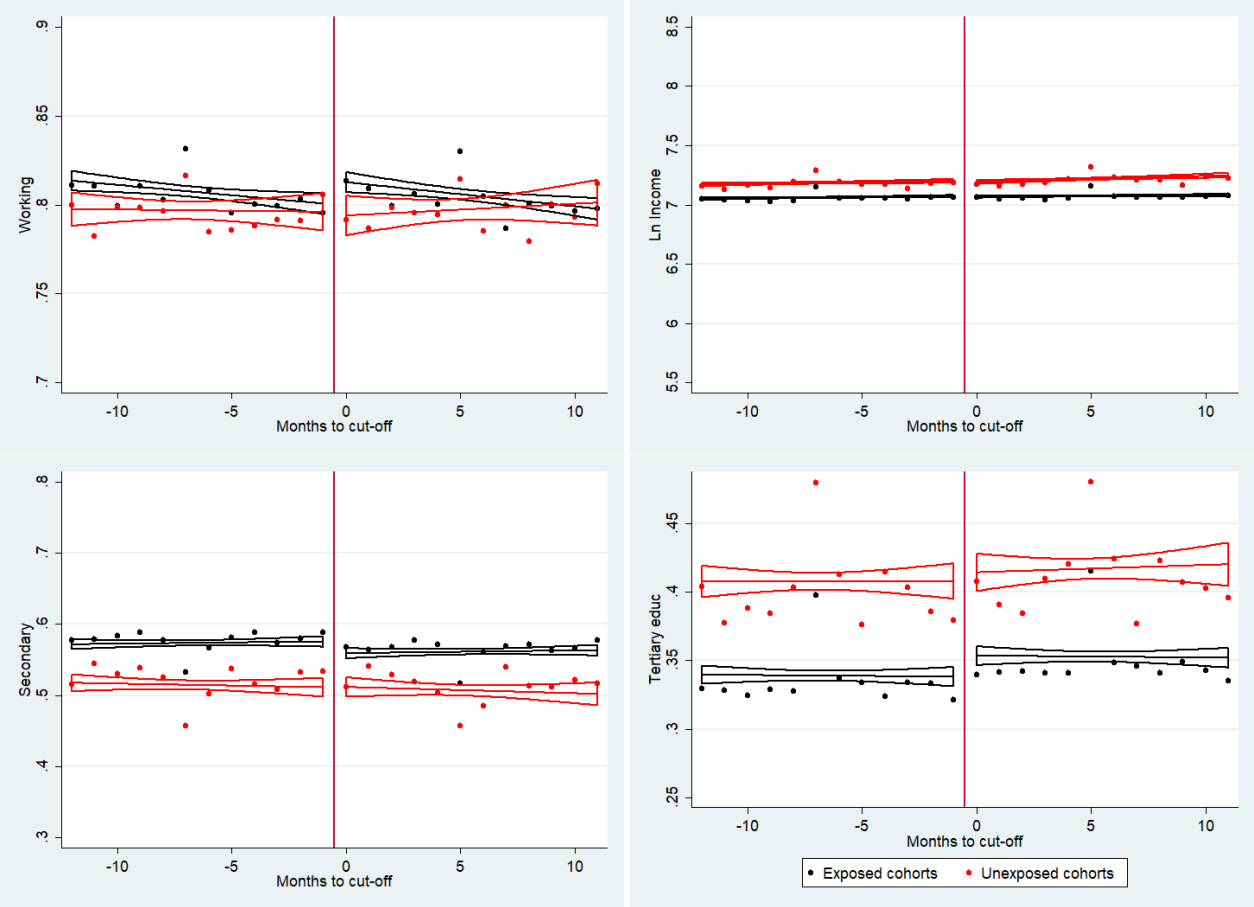
The results of the analysis of the 1989/90 reform using a difference-in-discontinuity design are reported in Table 10 and visually in Figure 4. Overall, the results suggest that an additional year of exposure to the post-communist education system has no effect on income or education. On the other hand, the results suggest a positive effect on labour force participation for individuals older than 30.

Table 10: Difference in discontinuity estimates of the effect of the 1989/90 reform (HBS data):

VARIABLES	(1) Secondary educ.	(2) Tertiary	(3) Work	(4) Ln Income
Linear polynomial				
Old in cohort × Affected cohort	-0.0165	0.00650	0.0176**	0.00296
	(0.0123)	(0.0120)	(0.00762)	(0.0185)
Quadratic polynomial				
Old in cohort × Affected cohort	-0.00764	-0.00600	0.0237**	-0.0249
	(0.0168)	(0.0138)	(0.0111)	(0.0234)
Observations	178,843	178,843	179,291	177,618

Note: Data used is from the HBS rounds 2011-2017. Standard errors in parentheses clustered at the running variable level.*** p<0.01, ** p<0.05, * p<0.1

Figure 4: Effects of 1989/90 reform on labour force participation and educational outcomes



Note: Data used is from the HBS data 2011-2017.

C Additional tables and graphs

Table 11: Effect of the 1954-55 reform that removed ideology from educational curriculum (2002 Census): Only women

VARIABLES	(1) Work	(2) Secondary educ.	(3) Tertiary educ.
Old in cohort × Affected cohort	0.0106*	0.0225***	0.0177***
	(0.00630)	(0.00655)	(0.00496)
Old in cohort	0.0156***	0.0147***	0.00359
	(0.00428)	(0.00424)	(0.00321)
Observations	103,411	104,710	104,710
Cohort FE	YES	YES	YES
Year of Survey FE	YES	YES	YES
Age	YES	YES	YES

Note: Data used is from the 2002 Polish Census. Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Table 12: Effect of the 1954-55 reform that removed ideology from educational curriculum (2002 Census): Only men

VARIABLES	(1) Work	(2) Secondary educ.	(3) Tertiary educ.
Old in cohort × Affected cohort	0.0154**	0.00857	0.00400
	(0.00701)	(0.00663)	(0.00490)
Old in cohort	0.0131***	0.00105	-0.000299
	(0.00440)	(0.00418)	(0.00303)
Observations	94,789	95,996	95,996
Cohort FE	YES	YES	YES
Year of Survey FE	YES	YES	YES
Age	YES	YES	YES

Note: Data used is from the 2002 Polish Census. Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Table 13: Effect of an additional year of exposure to post-communist education (only women)

VARIABLES	(1) Secondary educ.	(2) Tertiary educ.	(3) Work	(4) Ln income p/c
Old in cohort × Exposed cohorts	-0.0054	-0.0118	0.0145	0.000173
	(0.0167)	(0.0167)	(0.0152)	(0.0210)
Observations	20,682	20,682	20,726	20,544
Cohort FE	YES	YES	YES	YES
Year of Survey FE	YES	YES	YES	YES
Age	YES	YES	YES	YES

Note: Data used is the HBS rounds 2011-2017. Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Table 14: Effect of an additional year of exposure to post-communist education (only men)

VARIABLES	(1) Secondary educ.	(2) Tertiary educ.	(3) Work	(4) Ln income p/c
Old in cohort × Exposed cohorts	0.0189	0.0186	0.0153	-0.00176
	(0.0158)	(0.0155)	(0.0108)	(0.0221)
Observations	19,665	19,665	19,729	19,556
Cohort FE	YES	YES	YES	YES
Year of Survey FE	YES	YES	YES	YES
Age	YES	YES	YES	YES

Note: Data used is the HBS rounds 2011-2017. Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

D Effects on living conditions and home appliances

The effects of indoctrination observed on human capital formation and labour force participation are plausibly driven by an effect on individual preferences and values. Unfortunately, we lack adequate information on values and preferences to examine the effect of the reform on these outcomes for Poland.[15] Instead, we use information on living conditions and home appliances included in the HBS questionnaire as a proxy of respectively wealth and life style, which might provide insights into individual values and preferences.

The Marxist-Leninist ideology promoted communitarian values over individual consumption, and rejected Western culture as the exemplification of capitalist exploitation. Specifically, Soviet superiority with respect to technical and technological developments was emphasized in communist propaganda. Possession of technological novelties associated with leisure can be connected with life style aspiring to Western culture. Living conditions might be treated as a proxy of wealth, particularly in Poland after communism collapse characterized

[15]Neither the census nor the HBS datasets include information on these outcomes. Some cross-country surveys such as the European Social Survey or the Generations and Gender survey includes information on values but the sample of Polish people included in the survey is too small to conduct the analysis proposed.

with long lasting shortage of housing.

Table 15: Effect of an additional year of exposure to the reformed education on living conditions

VARIABLES	(1) Pipe water	(2) Hot water	(3) Indoor bathroom	(4) Central heating
		Post-Marxist 1954/55 reform		
Treat $\times Post$	0.00857	0.00261	0.00582	0.00376
	(0.00496)	(0.00901)	(0.00850)	(0.0120)
Observations	22,2922	22,2922	22,2922	22,2922
Mean	0.958	0.848	0.867	0.695
		Post-communist 1989/90 reform		
Treat $\times Post$	-0.000632	-0.00455	-0.00152	0.00838
	(0.00149)	(0.00389)	(0.00380)	(0.00918)
Observations	45,456	45,456	45,456	45,456
Mean	0.994	0.962	0.965	0.613
Cohort FE	YES	YES	YES	YES
Year of Survey FE	YES	YES	YES	YES
Age	YES	YES	YES	YES
Sex	YES	YES	YES	YES

Note: Data used is from the HBS 1998-2000 and 2011-2017. Pipe water and hot water available from communal network or from own source. Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

Therefore, we use then novel technologies in home appliances and living conditions observed in HBS during the 1990's and 2010's to study the long term school indoctrination effects beyond labour market and human capital. Table 15 shows consistent positive effects of being exposed to the 1954/55 post-Marxist reform in public education within a cohort with respect to having pipe water connected to the house, supply of hot water from central network or own boiler as well as possessing indoor bathroom and central heating, although

the coefficient is only statistically significant at conventional confidence levels for pipe water connection. Overall, these results are suggestive of positive effects of the 1954/55 on wealth. The results for the 1989/90 post-communist reform of education are more ambiguous, as they show a positive coefficient of the parameter measuring the effect of the post-communist educational reform only on central heating of the house.

Table 16: Effect of an additional year of exposure to the reformed education on home appliances

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Cable TV	CD player	Hi-Fi	Video player	Video camera	Electric hoover	Microwave oven / Dishwasher
				Post-Marxist 1954/55 reform			
Treat $\times Post$	0.0118	0.00131	0.00246	0.00676	0.00877*	0.00443	0.0116
	(0.0139)	(0.00829)	(0.0135)	(0.0136)	(0.00507)	(0.00920)	(0.0113)
Observations	22,265	22,265	22,265	22,265	22,265	22,265	22,265
Mean	0.491	0.110	0.410	0.666	0.0388	0.881	0.275
				Post-communist 1989/90 reform			
Treat $\times Post$	0.00338	0.000341	0.00287	-0.0138	-0.000397	0.00891	8.70e-06
	(0.0119)	(0.00666)	(0.00857)	(0.0123)	(0.00808)	(0.00691)	(0.0122)
Observations	45,456	11,014	45,456	5,247	45,456	45,456	45,456
Mean	0.401	0.101	0.247	0.212	0.101	0.967	0.281
Cohort FE	YES	YES	YES	YES	YES	YES	YES
Year of Survey FE	YES	YES	YES	YES	YES	YES	YES
Age	YES	YES	YES	YES	YES	YES	YES
Sex	YES	YES	YES	YES	YES	YES	YES

Note: Data used is from HBS 1998-2000 and 2011-2017. The data on the numbers of microwave ovens and dishwashers available only for the analysis of 1854/55 and 1989/90 reform, respectively. Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

The coefficients reported in Table 16 for the 1954/55 reform are consistently positive suggesting effects of being free from Marxist indoctrination at school on the possession of novel home appliances hardly available under communism such as microwave oven, video camera or Hi-Fi, and other appliances such as cable TV or video players, related to Western life style and culture, often used to access entertaining contents originated in the US. While only the effect on video camera is statistically significant at conventional confidence levels,

these results might be interpreted as an indication of the effect of indoctrination on lifestyle and individual preferences.

The unambiguously positive effects of the 1954/55 reform are not evident for the 1989/90 reform. Because the waves of the HBS data employed in the analysis of 1954/55 and 1989/90 reforms come from late 1990's and mid-2010's, the lack of the effect in the latter case might stem from the fact that some of the technologies had already became outdated. For example, the market for video rentals flourishing in the 1990's sharply deteriorated in the following decades.

In order to check the robustness of the estimates for the 1989/90 reform reported in Table 16, we examine the effects of post-communist education on the possession of selected home appliances introduced to the HBS survey after 2000. The results, reported in Table 17, are again ambiguous, showing no reason to believe that the collapse of communism brought changes to school curricula relevant for life style choices, in contrary to our findings for the removal of Marxist contexts from school curricula in Poland in 1954/55.

Table 17: Effect of an additional year of exposure to the post-communist education on newer technologies in home appliances

VARIABLES	(1) Flat TV set	(2) Home cinema	(3) MP3 players	(4) Blue-ray players	(5) DVD players	(6) Internet	(7) Kindle or other reader	(8) Mobile phone
Treat $\times Post$	-0.0110	-0.0134	0.0724*	0.00340	0.0121	0.00227	-0.00682	-0.00982
	(0.0183)	(0.00996)	(0.0384)	(0.00777)	(0.0129)	(0.0123)	(0.00689)	(0.0248)
Observations	45,456	45,456	17,357	13,905	45,456	45,456	21,173	45,455
Mean	0.729	0.156	0.354	0.0296	0.469	0.552	0.0349	2.463
Cohort FE	YES	YES	YES	YES	YES	YES	YES	YES
Year of Survey FE	YES	YES	YES	YES	YES	YES	YES	YES
Age	YES	YES	YES	YES	YES	YES	YES	YES
Sex	YES	YES	YES	YES	YES	YES	YES	YES

Note: Data used is from the HBS 2011-2017. The data on the number of home appliances available only for the analysis of 1989/90 reform. Robust standard errors in parentheses.*** p<0.01, ** p<0.05, * p<0.1

E Values, labour market outcomes and human capital formation

Using information collected in different rounds of the European Social Survey (ESS) and the Generations and Gender Programe survey (GGP) for Poland, this section examines to what extent certain values are associated with educational and labour market outcomes. The results of these analyses are reported in Tables 18 and 19.

Overall, we observe that, conditional on age, year of birth and sex, values arguably promoted in the school curriculum after 1954 that relates to critical thinking and individualism - such as creativity, or the importance of rewarding achievements or openness to trying different things - correlate positively with education and labour market outcomes. On the other hand, values promoted in the pre-reform school curriculum such as modesty and comfort of being unchallenged correlate negatively with education and labour force participation.

Table 18: Correlations between selected values and examined outcomes controlling for cohort and gender with survey wave fixed effects

	Work	Secondary educ.	Tertiary educ.
Openness	0.0143**	0.0207**	0.00331
	(2.57)	(2.48)	(0.48)
N	3278	1684	1684
Environment	0.0166**	0.0244**	0.0141
	(2.04)	(2.36)	(1.58)
N	3280	1678	1678
Freedom	0.0216***	0.0347***	0.0328***
	(2.93)	(3.47)	(4.20)
N	3291	1685	1685
Being rich	0.0127**	-0.0183**	-0.00686
	(2.16)	(-2.45)	(-1.05)
N	3290	1689	1689
Creativity	0.0155***	0.0258***	0.0149**
	(2.67)	(3.34)	(2.40)
N	3278	1678	1678
Helpfulness	0.0141*	0.0251**	0.00421
	(1.77)	(2.29)	(0.51)
N	3295	1689	1689
Loyalty	0.0200**	0.00957	0.00271
	(2.26)	(0.86)	(0.27)
N	3280	1675	1675
Modesty	-0.00499	-0.0235***	-0.0167**
	(-0.80)	(-3.02)	(-2.46)
N	3300	1693	1693
Recognition	0.0111**	0.00856	0.0102
	(1.97)	(1.09)	(1.61)
N	3277	1681	1681
Understanding	0.0176**	0.0335***	0.0180**
	(2.43)	(3.27)	(2.43)
N	3262	1669	1669
Left-wing views	0.00437	0.0112***	-0.00796*
	(1.30)	(2.67)	(-1.95)
N	2729	1412	1412

Note: Data used is from the Polish ESS sample, rounds 3 and 7. Regressions include the following control variables: birth year, sex, and survey round. t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 19: Correlations between desired job qualities and examined outcomes controlling for cohort and gender with survey wave fixed effects

	Work	Secondary educ.	Tertiary educ.
Matching one's abilities	0.00347	0.0335***	0.0585***
	(0.42)	(5.47)	(8.36)
N	9218	19934	19934
Rewarding achievements	0.0284***	0.0772***	0.136***
	(3.73)	(14.94)	(18.08)
N	9218	19934	19934
Posing little pressure	0.00129	-0.0130**	-0.0780***
	(0.19)	(-2.55)	(-14.21)
N	9218	19934	19934
Generous holidays	-0.00354	-0.0647***	-0.108***
	(-0.17)	(-3.72)	(-7.04)
N	9218	19934	19934
Convenient working hours	-0.0270***	-0.0484***	-0.0808***
	(-2.86)	(-6.42)	(-10.87)
N	9218	19934	19934
Appreciating initiative	0.0185	0.0826***	0.152***
	(1.44)	(10.86)	(11.19)
N	9218	19934	19934
Interesting	0.0166**	0.0497***	0.107***
	(2.08)	(8.74)	(14.29)
N	9218	19934	19934
Well paid	-0.0337***	-0.0900***	-0.134***
	(-3.71)	(-14.47)	(-15.07)
N	9218	19934	19934
Respected	0.0208**	-0.0293***	-0.00708
	(2.17)	(-3.52)	(-0.86)
N	9218	19934	19934
Responsible	0.0312**	0.0202*	0.0492***
	(2.51)	(1.72)	(3.68)
N	9218	19934	19934
Providing security	-0.0275***	-0.0296***	-0.0559***
	(-4.02)	(-5.60)	(-8.90)
N	9218	19934	19934

Source: Data used is from the Polish GGS sample, rounds 1 and 2. Regressions include the following control variables: birth year, sex, and survey round. t-statistics in parentheses. *** p<0.01, ** p<0.05, * p<0.1

While these results should be interpreted with caution because reverse causality or omitted variable might explain the link between values and outcomes, they are consistent with the main results in the study that highlight the crucial role that values have on long term educational and labour market outcomes.