



Divergent historical experiences and inequality in academic achievement: The case of Poland

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ABSTRACT

Divergent histories and changing country boundaries can lead to substantial within country variation in economic and social structures and inequality in economic and social outcomes. Given its changing borders and turbulent history, Poland provides a fertile setting for an examination of the contributions of history-related factors to regional variation in economic and social outcomes. In this paper we focus on academic achievement and find that economic dislocation following the transformation from communism and the absence of long-lasting social institutions as a result of population relocation appear to have had substantial adverse effects on academic achievement in some regions. Regional differences in the economic return to education also appear to contribute to variation in academic achievement.

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1. Introduction

Borders change, at times dividing nations and at other times bringing together areas with divergent political, economic, and social structures under one flag. Such differences can lead to regional inequality in income, educational attainment, and other outcomes that persist well after unification and place pressure on central governments to redistribute resources toward less developed regions. Germany, the United States, and Italy provide prime examples of nations with sharp regional differences that have devoted substantial effort and resources to address inequalities resulting at least in part from divergent paths taken prior to unification as a single nation. Although much effort goes toward lessening regional income inequality, substantial attention is also devoted to the reduction of regional differences in educational opportunities and academic attainment in order to reduce future inequality.

Myriad factors explain regional differences in education outcomes including political, social and economic structures at the time of unification, the structure of government policies going forward, and economic conditions. Although many of these same factors also affect regional differences in per-capita income, somewhat surprisingly the relationship between educational attainment and income varies by country. Italy and the United States provide two examples of countries in which regions with better educational outcomes also tend to have higher per-capita income. In the case

of Italy, [Daniele and Malanima \(2011\)](#) found that the correlation between regional GDP and academic achievement is 0.92, and [Bratti et al. \(2007\)](#) show that there is a differential of almost one standard deviation in the average mathematical literacy PISA score between the higher income North-East and the lower income South. [Daniele and Malanima \(2011\)](#) do not believe that the evidence provides support for a particular causal explanation of the relationship, while [Bratti et al. \(2007\)](#) conclude that family, community and school resources explain roughly 75% of the gap, and difference in school effectiveness explain the rest.

In the case of the United States, [Parcel and Dufur, \(2009\)](#) show that regional differences in education performance tend to line up with average income differences.

However, the interdependence of economic performance and educational achievement is not the universal rule as illustrated by Germany. Despite a much lower level of per capita income, the east region outperformed the west region on the 2006 edition of the international PISA test. [\(Welt-Online, 2008\)](#). The processes that determine these respective outcomes are clearly complex, and the divergent histories of formerly East and West Germany certainly contribute to the pattern of outcomes today.

In this paper we investigate regional inequality in academic achievement in Poland, a country that also has experienced a turbulent recent history of dramatic changes in economic and social structures, reconfiguration of borders, and population resettlement. These have almost certainly contributed to geographic differences in income and economic growth ([Herbst, 2008](#)), labor market structure ([KPRM, 2009](#)), the development of roads, railroads, and telecommunication network ([MRR, 2009](#)) and politics

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(Zarycki, 2000), all of which are interrelated to differences in academic achievement.

Though Poland was not divided into two separate countries following WWII as was the case with Germany, its borders were reconfigured and there was substantial population relocation. Moreover, the intensity of agricultural collectivization and economic dependence on heavy industry varied significantly by historical region. Of particular interest to us are the roles played by regional differences in social and economic structures prior to WWII, the imposition of political and economic changes under communism, the post-communist transformation begun in 1989, and recent school reform efforts.

Since 1989 Poland has introduced a number of education reforms including a national standardized test for students in the 6th and 9th grades in 2002, school decentralization beginning in 1996, delayed tracking in 1999, and a restructuring of the secondary school network. Formerly subordinated to the central government, between 1996 and 1999 primary and secondary schools were granted greater autonomy and are now managed by municipalities and counties, respectively. The restructuring of the secondary school network contributed to a reduction in the share of students in vocational schools from 76% in 1990 to 56% in 2008 (Herbst, 2012). In 1999 tracking into vocational and general education path was delayed by introducing a new tier of education (lower secondary school) into a system that previously had eight years of primary school and three to five years of secondary education. The latter reform has likely played an important role in the remarkable improvement of Polish student achievement in the OECD administered PISA test between 2000 and 2009 (Haahr, 2005). Finally, the national standardized tests provide measures of mathematics and reading achievement, shown by Hanushek and Woessmann (2007) to be important determinants of economic growth. Although measures of education quantity such as years of schooling provide rough measures of the human capital stock, they fail to capture changes over time in school quality and other factors that affect the acquisition of knowledge. The development of standardized achievement tests in Poland that are comparable over time and administered and graded outside of schools provides an objective source of achievement data with which to investigate geographic differences in cognitive skills.

A small number of papers uses the national examinations to describe and examine geographic variation in achievement, and we use these findings as a starting point for our own work. Herbst (2006) suggests that regional differences in three factors account for much of the variation in test scores: resources (including educational attainment, family income and labor market conditions), the endowment of social capital, and the expected return to education. In earlier work, Herczyński and Herbst (2002) found that municipal average achievement is positively correlated with average educational attainment in the parents' generation and negatively correlated with the local unemployment rate. Importantly, the divergent historical experiences appear to contribute to variation in these two factors, suggesting that both recent and more distant historical experiences contributed to regional inequality in achievement.

Subsequent work has focused in large part on attempts to understand better the importance of particular historical events. Using the same data, Śleszyński (2003) observed that achievement was higher in the regions with a "stable and continuous" history of settlement and lower in the regions that experienced massive dislocation of population after World War II. The author also found a negative correlation between achievement and the unemployment rate and a positive correlation between achievement and civic engagement of the population (as measured by the election turnover), consistent with the notion that historical events that contributed to regional differences in economic

conditions and civic engagement also affected educational performance. Czapiewski and Śleszyński (2007) also highlight the importance of regional differences in historical experiences, with particular emphasis given to the socio-economic processes occurring after World War II. This paper also emphasizes the large urban-rural gaps in both achievement and economic development. Finally, Dzieciół-Kurczoba (2008) found that the inferences based on analyses of the national 6th and 9th grade examinations are consistent with patterns observed for upper secondary school (12th grade) examinations.

Although these papers found that the regional variation is consistent with certain explanations, the inter-related nature of historical events and consequent differences in social and economic structures complicate efforts to assign a specific role to each. Therefore in our work we adopt a somewhat different approach and focus on the relationship between academic achievement on the one hand and a set of current family, social, and economic factors that have been influenced by many historical events. Rather than treating history as a "black box" or a cultural "cloud" hanging over some territories (as it was the case in some previous papers), we attempt to identify the impacts of specific factors that themselves can be linked to particular historical influences. Importantly, the availability of multiple years of test score data enables the use of panel data methods to account for other regional differences that could contaminate the estimates.

Our findings suggest that economic dislocation following the 1989 transition and the absence of long-lasting social institutions as a result of population relocation have had longer-term adverse effects on academic achievement. They also show that achievement is significantly related to standard education production function variables including per-student expenditure, teacher qualifications, and parental income, illustrating specific policy levers that could be used to mitigate inequality resulting from the divergent historical processes.

In the next section we describe the various data sources used in the empirical analysis. Section 3 briefly describes the historical evolution of Polish regions and current regional differences in education and economic outcomes. Section 4 develops the empirical model used in the analysis of test scores, and Section 5 presents the results. This section also discusses the implications of the findings for particular hypotheses regarding the channels through which historical events have influenced geographic inequalities today. Section 6 summarizes the analyses and considers implications for education policy.

2. Data

The test scores and data used to construct the explanatory variables come from a number of sources. Test scores come from the Polish Central Examination Committee. Poland introduced its national testing system in 2002 with tests in grades six and nine and added grade twelve in 2005 (the 6th, 9th, and 12th grades are the final grades of the primary, lower secondary and upper secondary tiers, respectively). The test structure differs by grade: the sixth grade examination is a single test verifying basic cognitive skills; the test for lower secondary school leavers (ninth grade) is divided into math-science, humanities and foreign language parts; and the twelfth grade examination, after which students attain full secondary education, is divided into subjects, with the possibility of choosing the regular or extended versions of the test.

Because of a growing body of research that shows that schools have a larger effect on mathematics than on reading achievement and that mathematics achievement has a larger impact on wages, we focus on the ninth grade math-science test. We transform

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