What If…?

A New Viewpoint on the Relationship Between Decentralization and Education Inequality

Erin J. Reed

Advised by

Brian Rowan, Ph.D

Senior Honors Thesis

Organizational Studies Program

University of Michigan

March 14, 2013

Introduction

The current global trend to decentralize governance control within education systems has developed theories on how this will influence education inequalities. Discourse regarding the global trend to decentralize governances in a nation has claimed the shift to be a product of neoliberalism and thus argue that decentralization exacerbates social inequalities (Burbules and Torres, 2000; Morrow and Torres, 2000; Apple, 2000; Hill and Kumar, 2009; Hill, Greaves, and Maisuria, 2009). However, such claims have founded their reasoning on the nature of neoliberal and conservative political interests, which is assumed to foster social inequality, and because of this, it is not an argument about how the innate characteristics of education decentralization in education systems produce inequality.

In fact, empirical research on the relationship between education decentralization and social inequality has produced ambiguous results (Micklewright, 2000; Braun and Gote, 2000; Prawda, 1993; Raudenbush, Fotiu etal, 1998; Ka-Ho, 2004). This body of research includes case studies that examine processes of governance framework changes toward decentralization in national education systems and its consequences. In general, this research has shown that education decentralization has increased, decreased, or shown little change to education inequalities (Parry, 1997; Ka-Ho, 2004; Bray, 1996; Zhang, 2006; Gradstein etal, 2005; Checchi etal, 1999; Lipman, 2004). If decentralization inherently functioned to increase social inequality, all cases where decentralization occurred would experience an increase in social inequalities. But that has not occurred, so arguments that claim decentralization produces social inequality do not seem valid.

In this study, I examine the association between education decentralization and social inequality by using data on national education system governance and education inequality in 26 nations. The goal of the study is to examine the hypothesized link between education decentralization and education inequality. I do this by looking at the association in multiple countries pursuing many different approaches to education decentralization.

The structure of my paper is as follows. First, I review theories of education inequality, paying particular attention to arguments about the association between education decentralization and inequality, and to the logical underpinning of these arguments. Then, I introduce the data for my study, discussing the measurements and methods I used to measure different forms of education decentralization, and I assess the relationship between these forms of decentralization and education inequality. Finally, I present the main findings of my research and discuss the implications of these findings for theory and research on the effects of education decentralization and education inequality.

Theoretical Background

Social Mobility and Education Inequality

The relationship between education and social inequality is well established. The education system has often been referred to as a "sorting machine" for society because individuals that leave the system enter into careers with others who have similar educational attainment histories (Spring, 1976). Through this lens, stratification in a society can occur naturally as individual interests lead to occupational choices. However, research has suggested

that institutions, such as education systems, are structured in such a way to set constraints on these choices by channeling educational opportunities (Kerckhoff, 1995; Kerckhoff, 2001; Horn, 2009; Buchmann and Park, 2005). Under these conditions, individual access to educational opportunities gives access to certain occupations and restricts access to others. The Blau and Duncan's (1967) basic model of status attainment first captured these stratification processes, by observing that the social status of a child's family partially determined that child's educational attainment and educational attainment then affected the occupational attainment of the child at adulthood. The Blau-Duncan model thus showed that education has the ability to enhance or hinder a child's occupational mobility in society.

Education research has further developed this argument. One important finding was that a positive association between family origin and educational attainment exists cross-nationally (Shavit & Blossfeld, 1993). Multiple explanations have since been presented on this phenomenon. For example, the general association between educational attainment and occupational mobility was argued to result from the spread of industrialization, although in this argument, societies that were more industrialized were seen to have weaker connections between origin and educational attainment than traditional societies (Treiman and Yip, 1989). Later, however, noted variations in the link between educational attainment and social mobility across industrialized nations. Particularly important for this paper is the work of Müller and Karle (1993), which examined how educational standardization condition this relationship.

As an institutional mechanism, educational standardization has been argued to influence levels of social reproduction. Standardization refers to the level of homogeneity among schools in an education system, and the opposite of standardization would be complete school autonomy (Van de Werfhort and Mijs, 2010). Standardization can occur along a number of dimensions of

schooling, including allocation of school resources, uniformity of teacher training and practice, and uniformity of achievement standards and testing processes. All education systems are standardized to some extent, especially since most operate according to a "world model" of schooling that is built around standard grade levels, curricula, and so on (Schofer and Meyer, 2005). However, how this standard model of schooling is implemented—through exit exams, curriculum content, teacher certification or school budgets—and at what level of national governance such standards are organized and controlled—varies considerably, with some nations imposing more standardization on education than others. Moreover, although standardization apparently influences education inequality, the degree of this is unclear. In particular, educational research has shown that standardization weakens the association between status origin and educational attainment by giving individuals from different social backgrounds more equal access to education expenditures, teaching practices, curricular opportunities and so on (Horn, 2009; Muller & Shiller, 2000; Schütz et al, 2008; Wössmann, 2003).

Decentralization in Educational Research

Research on standardization has encouraged current views on decentralization in education systems. Decentralization is understood to be the shift of responsibility for planning, management, and the raising and allocation of resources from the central government to lower levels of government or even non-governmental organizations (Rondinelli and Nellis, 1986). In other words, decentralization represents devolution within an education system in the authoritative bodies responsible for education policy and implementation. The effects of standardization in education systems has been relevant to disputes regarding decentralized

governance because decentralization has the ability to grant more autonomy to local units, and this autonomy, in turn, could produce less standardization in educational opportunities across localities, and potentially create an increase in educational inequality (as expressed through local differences in access to education resources, high quality teachers and teaching, advanced curricular opportunities, and so on).

Before educational research began to focus directly on the effects of governance frameworks, connections between standardization and decentralization paved the way to more current opinions. Although these studies do not directly address governance frameworks—and may only mention decentralization or centralization briefly—there is something to be learned from them because they are among the first to begin to make claims about how governance frameworks influence education systems. Many of these studies have focused on the effects standardization has had on education inequality:

> "Thus it is obvious that the educational administration in the United States is decentralized, and that the educational provisions are *unstandardized*. Certain segments of the population are disadvantaged because [of] local components [in] the educational system…" (Allmendinger, 1989: 47)

> "When national systems of curricula and examinations are aligned, centrally directed reforms can be a mechanism both for raising standards, and for reducing inequality." (Gamoran, 1996: 17)

Allmendinger argues that unstandardized educational provisions create structural barriers for students by denying opportunities in certain schools rather than others. Allmendinger's study addresses how standardization can reduce this inequality by providing the same opportunities to students through standardizing educational provisions. However, incidentally, while making this argument, he also includes his opinion about governance frameworks (when decentralization is mentioned) in this argument; Allmendinger claims that unstandardization, as well as decentralization, create unequal opportunities in an education system. Gamoran argues that centralization in education systems can reduce unequal curriculum standards in schools. And although, governance frameworks are more centrally considered in Gamoran's study compared to Allemdinger's, the supporting argument still concentrates on standardization and its influence on education inequality. Gamoran argues that standardization can reduce unequal education opportunity by reducing variation in curriculum and, because centralization is similar to standardization, centralization will do the same.

Kerckhoff (1995) also considers the effect governance frameworks have on education inequality, and comes to similar conclusions as Allmendinger and Gamoran. Kerckhoff argues that a difference in access to educational resources within and across schools is an element of educational inequality. He uses the United States education system as an example, and further argues that differences in access to educational resources in American schools create education inequality, which is partially due to local control and governance. Kerkchoff cites Stevenson and Baker (1991) to support this connection between access to educational resources and local control (Kerckhoff, 1995: 330); the study focused on the relationship between governance levels with control over curriculum—national or local—and curriculum instruction in mathematics classrooms. The study argues that education systems that give local governments control over

curricular issues create more variation in classroom content instruction. In other words, more centralized curricular development can standardize content instruction in classrooms. Kerkchoff views decentralization as it relates to a lack of standardization, by citing Stevenson and Baker (1991), and uses the United States as a case study to make the connection between decentralization, unstandardization and education inequality.

These viewpoints consider how governance frameworks influence mechanisms of education inequality when it relates to standardization. Discourses on the effect governance frameworks have on education inequality have remained within the sphere of standardization research in education literature. Other literatures have reached similar opinions as Kerckhoff, Gamoran and Allmendinger, by making connections between governance frameworks and education inequality based on case studies and standardization research (Van de Werfhorst & Mijs, 2010: 420; Horn, 2009: 347-8). However, to further understand how governance frameworks directly influence mechanisms of education inequality, research should include larger samples and governance frameworks should be observed in education systems that are standardization and unstandardized.

Case studies and standardization research have outlined possible mechanisms that effect education inequality and from these understandings, opinions about governance frameworks have developed. Many believe that a lack of standardization can be viewed as decentralization and because a lack of standardization is associated with various measures of education inequality, decentralization is associated with these same measures of education inequality. However, this viewpoint is a bit too easy because governance control is not a distinct indication of whether or not an education system is standardized or unstandardized. This explanation only captures a portion of governance frameworks. Centralization does not necessarily lead to

standardization and decentralization does not necessarily lead to lack of standardization (Kerkchoff, 2000). An education system is capable of being unstandardized under a centralized governance framework, or standardized in a decentralized governance framework. For example, Iceland, Slovakia and Sweden, countries that have centralized the process of designing curriculum programmes, have allowed regions and schools to choose which curriculum programme they will implement in their schools. Although these countries have a centralized curriculum design in their education system, curriculum is not fully standardized because schools have the ability to choose different curriculum programmes and implement them into their own classrooms. Additionally, an education system is capable of being standardized under a decentralized governance framework. For example, the German education system is decentralized, with power given primarily to regional level governments, called Länders. However, regional governments often converse with one another and agree to develop and implement educational standards and policies together (World Education Encyclopedia, 2002). This system of collaboration creates a level of standardization within a decentralized governance framework.

Because of the education systems above, and others with similar structures, a lack of standardization cannot be viewed as a synonym for decentralization in educational research. Clear distinctions need to be made between a lack of standardization and decentralization, and standardization and centralization, to more closely study how different governance frameworks influence education systems. Governance frameworks are complex. They function beyond the frameworks of standardization and, as such, should be viewed more closely in literature.

Closer Looks at Decentralization

Some studies have looked at the impact of decentralization more closely than the literature previously mentioned. Literature that focuses on governmental regime changes in education systems has relied on case studies to develop opinions on decentralization and education inequality. Latin American countries, which have lately begun to decentralize their education systems, have been researched to understand how decentralization impacts national levels of education inequality. From these case studies conflicting results have been found regarding the effects decentralization has on education inequality in a particular nation; when Mexico decentralized allocation processes in their education system, geographical disparities in achievement scores substantially reduced; however, geographical disparities in achievement test scores grew in Chile—students from privately paid schools (located in high income neighborhoods) scored higher than students from rural municipal schools (Prawda, 1993). Other case studies have concluded that the impact of governance frameworks depends on how and where it is implemented in an education system. Some argue that decentralizing fiscal processes can exacerbate differences in access to educational resources, and other conditions of educational inequality; however, decentralization in other educational domains, such as political power, could yield positive effects (Prawda, 1993; Bray, 1996; Zhang, 2006; Gradstein, 2005; Braun and Gote, 2000). These case studies have set the foundation for how governance frameworks should be observed in the future.

Governance frameworks are complex and different forms can reside in an education system. All types of governance frameworks should be considered in all areas of an education system. When evaluating how governance frameworks impact education inequality, governance

framework categories cannot be too broad. However, these studies have developed arguments about governance frameworks from case studies, which don not provide a high degree of generalizability. A larger sample should to be used to study the potential impact governance frameworks have on education inequality so that more general arguments can be made on governance frameworks.

This study strives to bring this perspective to the current debate on decentralization in education systems by doing the following: I first measure education inequality as the association between social origin and educational attainment (a variable I call "educational attainment reproduction" in what follows). I then examine the relationship between governance frameworks and national levels of education attainment reproduction in a series of statistical analyses. Importantly, in these analyses, I argue that education decentralization should be observed in multiple education system domains, such as budget, curriculum, jurisdiction and policy. This provided a more nuanced—and more accurate—picture of governance frameworks.

Research Questions

As discussed, a common assumption about how governance frameworks affect various types of education inequality has been made. Educational researchers believe that decentralization in education systems exacerbates education inequality and that centralization diminishes education inequalities. This assumption, however, has not been supported uniformly by education research. As my literature review showed, there was evidence from some studies that standardization of education practices reduces various aspects of education inequality, but as discussed in my review, standardization is not a direct measure of governmental decentralization

in education. By contrasts, case studies of educational decentralization show ambiguous findings about the relationship of educational decentralization and educational inequality, with systems undergoing educational decentralization experiencing increases, decreases, and no change in education inequality. Overall, as I discussed in my literature review, a major problem in the literature has been the implicit assumption that centralization in governance frameworks leads to standardization of educational opportunities and that decentralization involves a lack of standardization. However, this is just an assumption, and as I showed in my literature review, some decentralized education systems are characterized by standardization, so the implicit assumption that centralization equates to standardization and decentralization equates to a lack of standardization might not be true.

Because of this shortcoming in previous research, I believe another viewpoint is worth examining. This viewpoint is grounded in the idea that governance frameworks (e.g. centralization and decentralization) can vary across education system domains, defined as areas of government decision making such as budget, curriculum, and other areas of policy. This paper examines the relationship between these dimensions of education governance and education inequality using a large sample of nations that will include national education systems that vary in the extent to which different education system domains are centralized or decentralized. The benefit of this approach is that, in this large sample of nations, education centralization/decentralization, does not overlap perfectly with the amount of standardization in these education systems. By disentangling these two constructs, I am in a position to examine the following research questions:

1) Do the most decentralized education systems have the highest levels of educational inequality?
2) Do the most centralized education systems have the lowest levels educational inequality?
3) Can governance frameworks influence levels of educational inequality?

My expectation (based on the case study literature) is that an association between governance frameworks and education inequality will not be present in any education system domain; put differently, decentralization in education systems does not directly exacerbate education inequality and centralization does not directly diminish education inequality.

Data and Variables

This paper uses a sample of 26 nations and engages in comparative research for several reasons. First, single case studies that have examined the impact of governance frameworks on education inequality lack generality. Additionally, these case studies often defined governance framework types in different ways, which limits the ability to compare study results across nations. To increase comparability, this study defines governance framework types uniformly across nations, examines these frameworks in multiple education system domains in each nation studied, and examines a uniform indicator of education inequality in each nation. The analysis is thus fully comparative. Education decentralization is measured in the same way across all national education systems in the sample, and educational inequality is also measured uniformly across all nations. This section describes these measures, and the sample of countries included in the study.

In the paper, educational inequality (the dependent variable) is measured as the empirical association between a child's social origin (O) and that child's adult educational attainment (E), a measure of educational inequality originates from the Blau-Duncan basic model on social mobility[1]. By observing how closely family background is related to educational attainment, this study measures the level of educational attainment reproduction in a given education system. In the following pages, I refer to this measure as education attainment reproduction. This measure is explained in more detail below.

The independent variable(s) in this study is education decentralization. As discussed, I measure decentralization in various education system domains, including: producing education funds, purchasing education resources, designing curriculum programmes, selecting curriculum programmes, education jurisdiction and education policy governance frameworks.. These measures are described more fully below.

The primary approach to data analysis involves examining the bivariate relationship among the dependent variable and each of the independent variables in order to arrive at a better understanding of the effect governance frameworks have on education inequality, where educational inequality is defined as educational attainment reproduction.

Sample

This study contains a sample of 26 countries. These countries were selected from the 2009 ISSP Social Inequalities Module country survey. Since the main dependent variable of this

[1] My definition of education inequality as education attainment reproduction differs from other definitions used in the research. For example, as my literature review showed, several studies define education inequality in terms of intermediate variables that can be assumed to affect ultimate educational attainment, variables such as structural barriers to curricular opportunities, inequalities in education funding that deny individuals resources, or varying standards.

study requires information about the association between parent's occupation and their children's highest attained degree, any country or respondent that did not include father's occupation or children's education is not included in the sample. The resulting sample of countries, and the size of the respondent sample in each country, is displayed in Appendix Table 1.1a. Generalized results can be assumed in this study because of the level of diversity in the country sample. The country sample includes 13 developed countries, 13 underdeveloped countries and 6 countries with socialist histories. 4 out of 6 continents are represented in the sample—South America, Europe, Asia, Africa and North America—however, 20 out of 26 countries reside in Europe. Results may be generalized across developmental levels and historical connections to socialist ideologies. However, continents are not accurately represented in the country sample—European countries are overly represented; Countries in South America, Asia, Africa and North America are underrepresented; and Oceanic countries are not included. This could create complications for generalizing results, but including countries in multiple continents (even if these continents are not accurately represented) is sufficient for generalization purposes for this study. Additionally each country is referenced by its abbreviated name and information on this can be found in Appendix Table 1.1b.

The Independent Variables: Measures of Governance frameworks in Education Systems

To create the independent variables, I collected data from a variety of sources, including data published by the Organisation for Economic and Co-operative Development (OECD), data published in encyclopedias, and data coded from my reading of National constitutions, government websites and national reports.

Curriculum Decentralization Indicators. OECD's Education at a Glance reports contain extensive information on national education systems. OECD's Education at a Glance published data on national education system curriculum processes based on government level responsibilities. Collected in 2007, the data describe which level of government handles different types of decisions about curriculum in public lower secondary education; the educational level, public lower secondary education is based on the revised International Standard Classification of Education (ISCED-97). All OECD curriculum indicators take into consideration all types of educational needs, including special education programmes. The OECD curriculum indicators, "Design Curriculum Programs" and "Select Curriculum Programs" and are the domains of governance examined in this study. In each domain, I coded the level of government decision-making using the following typology: School, School/Local, Local, Local/Region, Region, Region/National, National, School/Region, School/National, and Local/National.[2]For example, the following OECD codes: "**School** Framework at Region level", "**School** Consultation with Region level", and "**School** Autonomous", would be converted into the following categories: "School/Region", "School/Region", and "School".

Budget Decentralization Indicators. The OECD Education at a Glance 2010 publication provided data on national education system budgets based on government level responsibilities for primary, secondary and post-secondary, non-tertiary education. Data were collected in 2007 and describe which government level is the initial source of public educational

[2] Note that my coding framework translates some OECD codes. For example, I translated the OECD codes "School Framework at Region level" to "School/Region" to reflect shared governance at these system levels; I translated the OECD code, "School Consultation with Regional level" to "School/Region" as well; and finally, I translated the OECD code "School Autonomous" to "School" in my coding scheme.

funds and which government level is the final purchaser of educational resources for national education systems. The data describe government level responsibilities in percentages across three government level categories: Central, Region and Local. The OECD budget indicators are labeled here as “Produce Education Funds” and “Purchase Education Resources”. The original OECD data were converted into the same government level typology previously described. To do this, the government level with the highest percentage of responsibility was labeled as the government level responsible for a budget function. Any country with two government level responsibility percentages that differed by less than 30% were labeled as having a shared responsibility. For example, 81.4 percent of initial funds were under the responsibility of the “Central” government in Slovakia. This study presents the Slovakian governance framework for Producing Education Funds as “National” in responsibility. However, in Finland, the “Central” government provides 42.5 percent of initial funds and “Local” government provides the remaining 57.5 percent of initial funds. In this study, the Finland governance framework for Producing Education Funds is labeled as “National/Local” responsibility. Budget data on Sweden and China, and curriculum data on Slovakia, Switzerland, Poland, Israel, Ireland, Canada, and United States, were all collected from national education system reports and official government websites due to missing data in OECD’s datasets. Information was only added if the named resources provided information that clearly stated the following: “curriculum is designed by”, “curriculum is selected by”, “budget is provided by”, or “resources are purchased by”. Any other explanations were not accepted to avoid risks of large irregularities between OECD data and data from additional resources.

Education Jurisdiction Decentralization Indicator. Data for the Education Jurisdiction indicator were collected from the World Constitutions Illustrated (HeinOnline) and from official government webpages. Legal documents such as the constitution or education related constitutional amendments were used to determine jurisdictional authority. Each country's national constitution and official government website was reviewed for explicit references to jurisdictional authority over the national education system as it pertains to primary, secondary and post-secondary, non-tertiary education. This indicator does not consider which level of government is actually involved in educational matters but rather which government level is given legal responsibility to maintain education. For example, in the United States, although national government does contribute to education, legal jurisdictional authority resides in state governance based on the Tenth Amendment in the United States Constitution. Therefore, in this study, the United States is labeled to have a "Regional" level governance framework for Education Jurisdiction.

Education Policy Indicator. Data for the Education Policy indicator was collected from the World Education Encyclopedia (2002) and the International Encyclopedia of National Education Systems (1995). Country profiles were reviewed for explicit references to education policy as it pertained to primary, secondary, and post-secondary, non-tertiary education. Moreover, when considering the level of government responsible for education policy, references to a government level with power, authority, or influence on education policy was taken into account. When multiple government levels were mentioned, without one being mentioned as the "primary" authoritative body, and especially when the term "both" was used, then a shared authority was assumed. For example, in Spain, both provinces and the Ministry of

education, a national government body, have policy-making power and influence on education reform. Therefore, in this study, Spain is labeled as a "Regional/National" governance framework for Education Policy.

The Dependent Variable: Education Attainment Reproduction

The measure of education attainment reproduction used in this study comes from the 2009 ISSP Social Inequalities Module country survey. The analyses presented here report the association between parental status, which is based on the parent's occupation, and their children's highest attained degree. Although the original survey requested the occupational status of both parents, most nations only gathered information on the father's occupation. Because of this, only the occupational status of the father is used to represent family origin in this study. The survey gathered information on all adult citizens of the country, ages 18 or older. To capture the highest attained degree of children I selected survey respondents between the ages of 25-64[3].

Importantly, any country or respondent that did not include father's occupation or children's education is not included in the sample. The resulting sample size in each country is displayed in Appendix Table 1.1.

In this study, the highest degree attained by children (shown in Appendix Table 1.2) is represented by five educational levels: Primary, Incomplete Secondary, Secondary, Some Tertiary, and University. The father's occupational status (shown in Appendix Table 1.3) is

[3] The age of my respondents is a problematic feature of the analysis as it will create an historical disjunction between the independent variables in the analysis and the dependent variable in the following sense: In the current sample, older individuals will have passed through education systems many years prior to the dates when I measured education system features. However, because governmental regimes are hard to change, I will maintain the assumption that the measurements for governance frameworks are not far from the frameworks that my respondents experienced while going through the education system. I recognize this is a problem in my research, however, I will discuss what routes I would have taken, if time allotted this, during the discussion section of my paper and further conclude what value my research has despite this issue.

described in seven occupational classes: I. Upper-grade professionals/managers, II. Lower-grade professionals/managers, III. Clerical Worker, IVab. Self-Employed, VI. Skilled Manual, VIIab. Unskilled Manual, Ivc. Farmers. The seven occupational class categories were developed from the Goldthorpe Class Schema, also referred to as the Comparative Analysis of Social Mobility in Industrial Nations (CASMIN). This social class scheme is commonly used in class and social mobility research throughout Europe, North America and Australia.

Measure of National Education Attainment Reproduction. In this study, the higher the coefficient for educational attainment reproduction, the greater the social inequality in a country. To measure the extent to which nations were characterized by educational attainment reproduction, I used the following analytic procedure. The basic data output on which this measure is based is the relationship between father's social class (social origin) and children's highest educational degree (educational attainment). I will begin by describing the raw association between social origin and educational attainment in cross-tabulations of these two characteristics, across all countries and within each country. In a second step, I apply log-linear models to estimate the overall association between social origin and educational attainment for each country, independent of cross-country differences, in the distribution of social origins (class structure) and the distribution of educational degrees. The raw association between social origin and educational attainment across all countries and these two characteristics function as examples of varying levels of associations. With these examples, I am able to develop an estimated total association of origin and educational attainment to better understand and compare levels of educational attainment reproduction across all countries.

This dependent variable is constructed from a Log-Linear model called the "UniDiff" model. The "UniDiff" model has been developed by Erikson and Goldthorpe (1992) and Xie (1992), and implies that the pattern of association between O and E is constant across countries while the level of association differs across countries. For instance, children that are raised in an upper-grade professional (I.) household may be more likely to attain higher levels of education than children that are raised in an unskilled manual (VIIab.) household in all countries; however, the strength of this association may be different across countries. The UniDiff model has been used in numerous research studies that have observed intergenerational mobility and educational attainment reproduction in nations. The attractive feature of this model is that it produces a single parameter that describes the overall association between origin and education for each country. That is, it produces an educational attainment reproduction coefficient for each country that will serve as the dependent variable in the macro-level analyses

Approach to Data Analysis

The basic plan is to examine the empirical relationship between education decentralization variables and the dependent variable measuring educational attainment reproduction. In the first stage of the analysis, I conduct a series of bivariate Ordinary Least Squares (OLS) regressions in which each education system indicator is regressed on the dependent variable. These regressions are conducted separately for each education system domain. In order to meet the assumptions of regression analysis, the OLS regression models only include a portion of the governance framework types. That is, in the regression models I only include nations that have the following governance frameworks in a domain: school,

school/local, local, local/Region, Region, Region/national, and national. I make this data restriction to maintain a reasonable assumption that the governance framework typology is an ordinal scale from the most decentralized to the least decentralized (i.e. centralization). In the results section below, I report these analyses both graphically and numerically. That is, for each independent variable, I show the scatterplot of the governance framework variables by educational attainment reproduction. In this scatterplot, I also show the OLS regression line relating these variables, as well as the unstandardized regression coefficient. Finally, in a separate section of the scatterplot, I also show values for excluded nations (i.e., nations with governance frameworks classified as school/Region, school/national and local/national. On the scatterplot, a red line intersecting the x-axis at the school/Region governance framework type represents this exclusion.

As the reader will see, the regression analyses suffer from heteroskedasticity in errors. As a result, in a second stage of the analysis, I conduct a series of difference in means T-tests. This statistical model assumes that countries with different levels of decentralization in a system are independent samples that have unequal variances. Using this approach, I then assess whether distinct differences exist between mean values of education attainment reproduction among governance framework types, examining this separately for education system domains. For these t-tests, the original governance framework typology, which included 10 categories, was condensed into three categories: Lower, Shared and National. These groups are defined as: (a) national education systems that include only governments below national government (coded here as Lower); (b) national education systems that include both national government and lower levels of government (coded as Shared); and (c) national education systems that only include national governments (coded as National).

Results

I begin by reporting on the levels of educational attainment inequality in various countries in the sample. To arrive at a measure of this variable in each country, I used a statistical log-linear model to estimate the overall association between Origin (O) and Education (E) . Among the various statistical models that could be used to estimate the total association between Origin (O) and Education (E), I used the so-called "UniDiff" model—highlighted in bold. Table 1 shows why I chose this model as the basis for constructing my dependent measures.

Table 1 Education Attainment Reproduction across cases

Model	G2	df	p	Δ	BIC	G2	df	p
(1) No Association	5090.1252	768	0.000	0.1547	-2753.4246			
(2) Common Association	1510.3828	744	0.000	0.0732	-6088.0562			
(3) Uniform Difference	1297.6301	713	0.000	0.0666	-5984.2073	212.7527	31	0

Table 1 shows various model fit statistics for three different approaches to estimating educational attainment reproduction: the "no association" model, the "common association" model, and the "uniform difference" (or UniDiff) model. As Table 1 shows, the UniDiff model is superior to these other models by a number of criteria. For example, judging model fit by the BIC criterion, one can see that the Uniform Difference model is clearly preferable over the Common Association model as seen by the fact that the Likelihood ratio (G2) for Uniform Difference is lower than the Likelihood ratio of Common Association. Moreover, although the Common Association model is highly significant, it fails to lower the number of misclassified cases (Δ) as greatly as the UniDiff model. The preferred model, UniDiff, yields a satisfactory fit because it

misclassifies on average 6.66 percent of the cases (Δ), and it is highly significant. The UniDiff model can therefore be viewed as an accurate description of education attainment reproduction trends across all countries. By using the UniDiff model, a single coefficient for educational attainment reproduction is generated across all countries.

Table 2 International Ranking of Education Attainment Reproduction

Country	IEO
Hungary	0.56182188
Cyprus	0.38132188
Republic of Korea	0.33692188
Bulgaria	0.27252188
Belgium	0.21262188
Chile	0.21252188
Argentina	0.17752188
Portugal	0.09392187
United States	0.08572187
Slovak Republic	0.07562187
Poland	0.06492187
Czech Republic	0.03092187
France	-0.0114781
Spain	-0.0199781
Denmark	-0.0207781
China	-0.0294781
Switzerland	-0.0331781
Germany	-0.0463781
Israel	-0.0651781
Slovenia	-0.0708781
Sweden	-0.0808781
South Africa	-0.1163781
Estonia	-0.2122781
Norway	-0.2128781
Finland	-0.2677781
Iceland	-0.3655781
Average	0.822

Table 2 shows the values for education attainment reproduction rates for each country in the sample as estimated by the UniDiff model. The values in the table are expressed as the difference between a given country's actual level of education attainment inequality and the

sample mean. Thus, countries that have higher values in the table have more educational inequality than average, and countries with negative values have less educational inequality than average (where the sample average is .822). Clearly, the data in Table 2 show that countries vary widely in education attainment inequality. The most unequal country (i.e., the country with the most reproduction) is Hungary; the least unequal is Iceland.

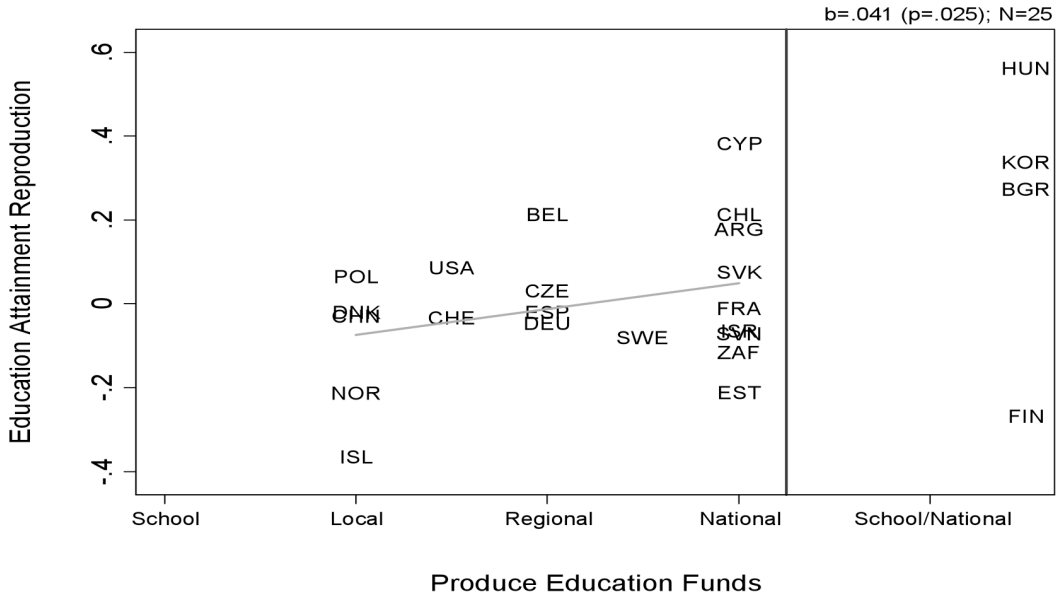
OLS Regression Analysis

Having measured the level of education attainment reproduction in each country, I now turn to examining the relationship between this variable and my measures of education decentralization using Ordinary Least Squares (OLS) regression analysis. The analysis consists of presenting a series of scatterplots on which education attainment inequality is plotted on the Y axis, and a measure of education system decentralization is plotted in X axis. In each scatterplot, I also show the linear regression line relating these variables as estimated from the OLS regression of education attainment inequality on the independent variable (where the unstandardized regression coefficient for the slope of this line is shown at the top right of the graph). In general, if education decentralization increases education inequality, we should expect the regression lines to be negative in slope—that is, to decrease as we move from the left of the graph (where the countries that are decentralized in a domain are plotted) to the right of the graph (where the countries that are more centralized in a domain are plotted). Note that in these OLS analyses, certain countries are omitted (although their data is shown in the extreme right of the graph, after the horizontal red line). The omitted countries are those with shared School/National, School/State and Local/National governance arrangements. I omitted these

countries from the OLS analyses because I could not place them into my ordinal arrangement of governance frameworks. Additionally, the each country is represented by its abbreviated name. A list of the country name abbreviations can be found in Appendix Table 1.1b.

There is one important note to make about the OLS analyses. A careful look at each scatterplot shows that heteroskedasticity has been observed after OLS linear regression models were produced for all education system domains. Heteroskedasticity occurs when variance of error terms are systematically related to values of the independent variable. Under these conditions, the OLS estimate of b (the slope) is unbiased and consistent, but standard errors of this estimate are no longer accurate. As a result, in what follows, I will not discuss statistical significance and standard errors. Instead, I will only present findings based on slope and variation results.

Graph 1 Slope Relationship for Produce Education Funds

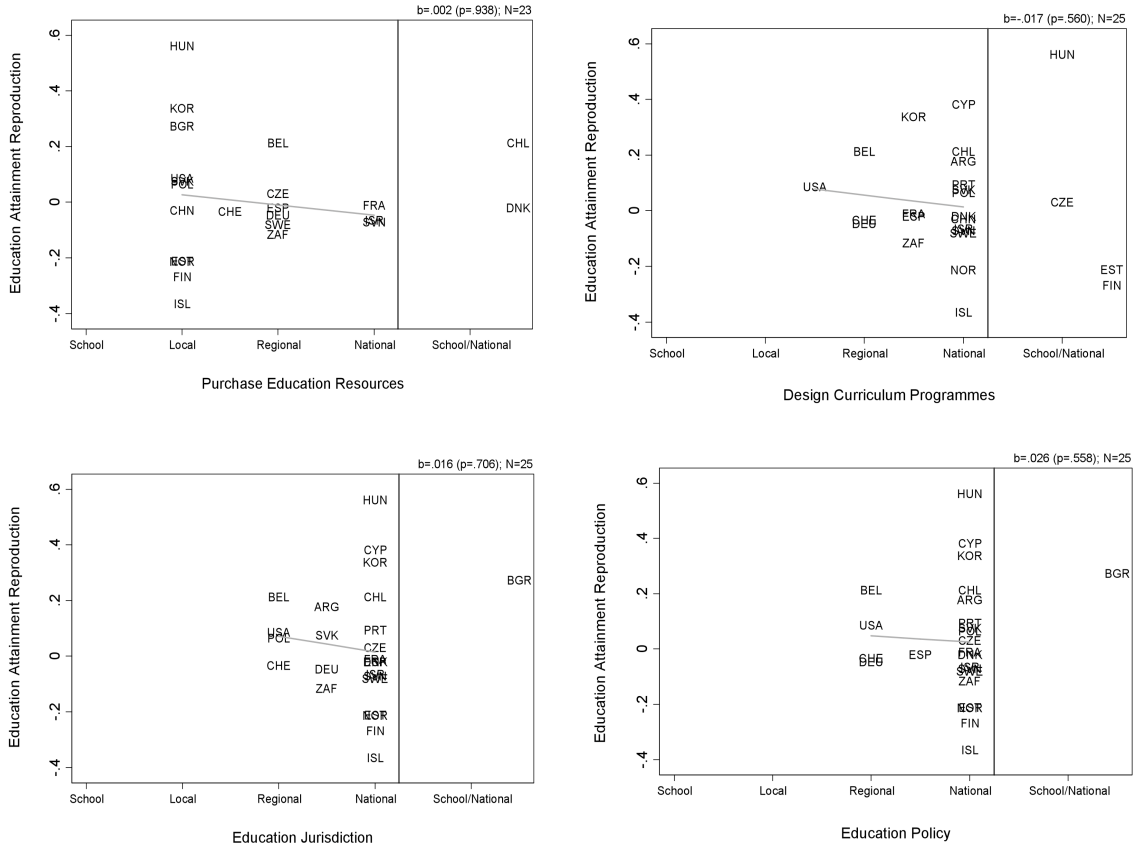


The results of these analyses are presented in five scatterplots. Graph 1 shows the results for the measure "Produce Education Funds." This is the only education system variable with a positive slope (B= +.041), indicating a slight tendency for countries with more centralization in this system to domain to also be characterized by greater education attainment reproduction.- However, the slope of this line is so small as to suggest that a relationship does not exist between this governance framework and education attainment reproduction. On the other hand, the exclusion of the "School/National" government level category in this OLS linear regression brings into question the accuracy of the slopes identified for each indicator because not every category is considered. For example, the .04 slope for Produce Education Funds could be due to the exclusion of countries with governance framework: Local/National, such as Hungary, Korea,

Bulgaria and Finland. If the OLS linear regression included all variables and nations a different slope may develop.

Additionally, the data in Graph 1 shows that the countries examined here differed on more than just a mean dimension. Notice in Graph 1 that there is much greater variation in levels of education attainment reproduction among nations coded as "National" in framework versus nations coded as falling in the other frameworks. This patterns suggests that with a more centralized governance framework in purchasing educational resources, a country is more likely to have an extreme level of education attainment reproduction—whether that be extremely more unequal or extremely less unequal than other countries.

Graph 2-4 Variation Relationships in Education System Domains



Gaphs 2-4 show the relationships between the other governance framework variables and education attainment inequality. Notice here that the slope is always negative, indicating that as countries become more centralized in a system domain, education attainment inequality is less. Once again, the size of these slopes is small, suggesting a lack of relationship. Notice also that there is always heteroskedasticity in the data. In Graph 2, countries with local control over purchasing of education resources show more variation in education attainment inequality, whereas in the remaining graphs, it is more centralized countries that show more variation. Looking across all 5 graphs, the general finding would thus seem to be that while centralization/decentralization are not related to mean differences in education attainment outcomes, in 4 out of 5 cases, decentralization in a system domain leads to less variation in education attainment inequality among countries and centralization in a system domain leads to more variation.

Although these findings on variation in levels of education attainment reproduction across different governance frameworks suggest a possible influence of governance frameworks on education attainment reproduction, these findings may be misleading. The clear variation that can be observed in these education system domains could be due to unequal sample sizes across governance framework types. Different observations may develop when a country sample that more equally distributes countries into governance framework types is used. For example, if more countries with a national governance framework were represented in Purchasing Education Resources, a relationship between governance frameworks and variation in levels of education attainment reproduction may be less clear.

Overall, results from the slope and variation of OLS regressions do not provide definitive evidence about whether or not an association truly exists between governance frameworks and

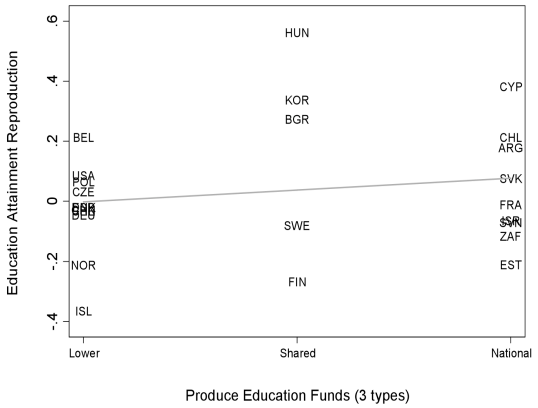
educational attainment reproduction. Moreover, although all slopes were unbiased, their level of accuracy is questionable due to sampling bias, and although variation impacts were suggested in the study, strong claims cannot be made because the country sample could be biased towards certain types of governance frameworks. Additionally, the historical dysfunction noted in footnote 3 could be affecting the slope and variation of my data because it is possible that the governance frameworks for certain domains, such as budget and curriculum, have changed since my respondents have been in the education system. On the other hand, the presence of unbiased slopes for all domains—even Education Jurisdiction and Education Policy, which have (more than likely) been unchanged since -respondents went through the education system—leads me to think that this issue may not be present in all areas of this study.

Difference of Means T-test Analysis

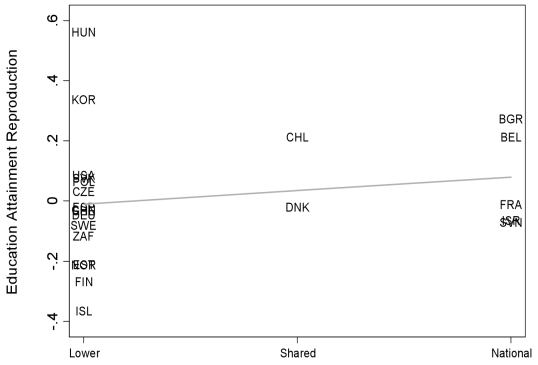
To further assess the association between governance frameworks and education attainment reproduction, I conducted a series of difference of means T-tests for independent samples, under the assumption that variances were unequal across groups. These tests were done to assess if statistically significant differences exist in the average mean value for education attainment reproduction across governance framework types in different education system domains. Unlike the linear regression analysis, all governance framework types are included in this test for each domain. However, the original typology for governance framework, which has been previously explained, is condensed into three groups for this study, which include: "[1] Lower", "[2] Shared" and "[3] National".

Graphs 5-10 are once again scatterplots with the least squares slope indicated in the graph. However, rather than estimating this slope via OLS regression, I simply conducted a set of t-tests for difference in means across groups characterized by different governance frameworks. Table 3 shows the results of these analyses. After running tests between [1]-[2], [2]-[3] and [1]-[3], across all domains, no statistically significant differences in education attainment reproduction were found. Moreover, the inability to find any difference in mean values of education attainment reproduction across governance framework groups, and across all domains, strengthens the argument that governance frameworks are not associated with education attainment reproduction. Again, I must bring into question the validity of my findings due to the age of my respondents, which could create differences in education systems from when they were in school and now. However, similar to before, the same findings were found across all domains, so these findings may have some relevance.

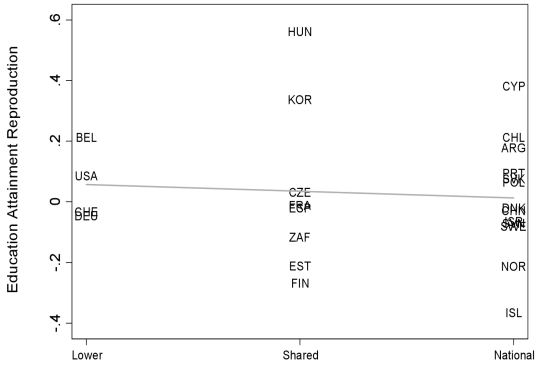
Graph 5-10 Independent Sample T-test for each domain, 3 types



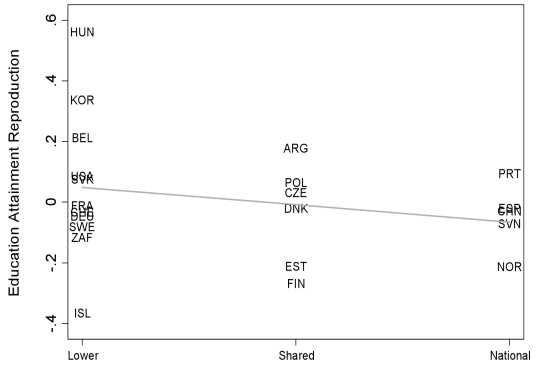
Produce Education Funds (3 types)



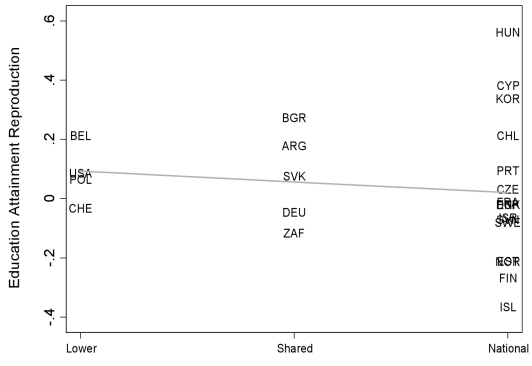
Purchase Education Resources (3 types)



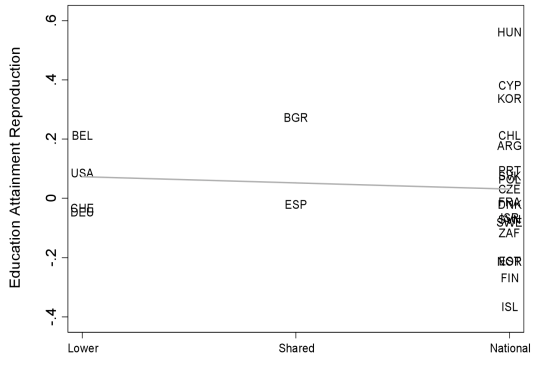
Design Curriculum Programmes (3 types)



Select Curriculum Programmes (3 types)



Education Jurisdiction (3 types)



Educational Policy (3 types)

Table 3 Indepent Sample T-test for each domain, unequal variances

Produce Education Funds			
Government Level	**[1] Lower**	**[2] Shared**	**[3] National**
Mean	-0.030369	0.1645219	0.0411997
(SD)	0.1521507	0.3340425	0.1872623
T-Test	**[1]-[2]**	**[2]-[3]**	**[1]-[3]**
p-values	0.2701	0.478	0.3698
Purchase Education Resources			
Government Level	**[1] Lower**	**[2] Shared**	**[3] National**
Mean	-0.0143031	0.0958719	0.0675219
(SD)	0.2257523	-1.386307	0.1628526
T-Test	**[1]-[2]**	**[2]-[3]**	**[1]-[3]**
p-values	0.5082	0.857	0.3968
Design Curriculum Programmes			
Government Level	**[1] Lower**	**[2] Shared**	**[3] National**
Mean	0.0546969	0.0377219	0.0123219
(SD)	0.120887	0.2801976	0.1903824
T-Test	**[1]-[2]**	**[2]-[3]**	**[1]-[3]**
p-values	0.8866	0.8251	0.6116
Select Curriculum Programmes			
Government Level	**[1] Lower**	**[2] Shared**	**[3] National**
Mean	0.0562582	-0.0379115	-0.0478581
(SD)	0.2469284	0.1704466	0.1106551
T-Test	**[1]-[2]**	**[2]-[3]**	**[1]-[3]**
p-values	0.3712	0.9099	0.2637
Education Jurisdiction			
Government Level	**[1] Lower**	**[2] Shared**	**[3] National**
Mean	0.0825219	0.0725819	0.0181094
(SD)	0.1010487	0.1587884	0.2499026
T-Test	**[1]-[2]**	**[2]-[3]**	**[1]-[3]**
p-values	0.9125	0.5764	0.4371
Education Policy			
Government Level	**[1] Lower**	**[2] Shared**	**[3] National**
Mean	0.0546969	0.1262719	0.0269166
(SD)	0.120887	0.2068287	0.2336716
T-Test	**[1]-[2]**	**[2]-[3]**	**[1]-[3]**
p-values	0.7127	0.6182	0.7391

Interaction Effects

To gain further understanding of the findings just presented, I conducted additional analyses (not shown here). These analyses are warranted by the fact that many case studies have reported impacts on education inequality for nations that were actively engaged in decentralizing or centralizing their education systems. These case study findings are on the face inconsistent with my findings since they suggest that governance frameworks do influence levels of education attainment reproduction in some way. With this in mind, I challenge my findings and indulge another possibility: Although a direct association between governance frameworks and levels of education attainment reproduction is not suggested in this study, a different association may be evident. Perhaps other variables condition the relationship between governance frameworks and education attainment reproduction. Leaving such variables out of my analysis could be why governance frameworks do not appear to influence education inequality in my study but do show effects in case studies.

To investigate this idea, I set out to investigate interaction effects between education attainment reproduction and other measurements of social inequalities. The following social inequality indicators: GINI, GDP, Tertiary Entrance Rates and Regional Disparities were collected from a database of indicators from University of Michigan Institute for Social Research, Population Studies Center, and Organisation for Economic Co-operation and Development (OECD). Please see the Appendix for more information on these indicators. With these indicators, regressions were run between education attainment reproduction, each education system domain indicator, each new variable, and the interaction of each domain and each new indicator (i.e. domain X new indicator).

After running these regressions, no statistically significant interaction effects were found. Moreover, my new indicators were not correlated with education attainment reproduction. This lack of association between the new indicators and my measure of education attainment inequality could be due to the historical dysfunction problem I've mentioned previously in this paper. That is, up until this point, I've been performing this research with the assumption that governance frameworks are stable enough that my historical disjunction problem does not greatly affect my results. However, my new indicators are contemporaneous indicators of social and educational inequality, and lack of correlation between these indicators and my dependent variable raises questions about this assumption. Despite this, I still believe interaction effects are relevant to the study of governance frameworks and should be pursued in the future. Unfortunately, I am unable to examine these interactions further given the limitations of my data. As a result, I am unable to comment on this hypothesis further and cannot make confident claims about whether or not interaction effects are causing governance frameworks to influence education attainment inequalities in some societies as opposed to others.

Conclusion

This research approached the study of governance frameworks in education systems in a new way. By using log-linear models of educational mobility, it examined the direct effects that governance frameworks have on levels of education attainment reproduction in national education systems. Rather than relying on case studies, this research included as many as 26 nations. In this research, an association between parental social class and the educational outcomes of their children was used to measure levels of inequality, which was detected for all

national education systems to some degree. From these measurements, a relationship between governance frameworks and education attainment reproduction was studied. Despite past literature, this study suggested that governance frameworks in education have little influence on education attainment reproduction. However, flaws in the study should temper our interpretation of the importance of these findings. As discussed, there is at least some potential that my results have been affected by a historical disjunction in the data, and as a result, I make no concrete claims based on the results. In the future, this study could be reconstructed to account for the historical disjunction noted by using other measurements of education inequality or by including multiple measurements to assess how much historical disjunction is affecting results. However, I was unable to do this because of time constraints.

Although I will not make any strong claims, I do believe this study is relevant and valuable. One reason is that two indicators, Education Jurisdiction and Education Policy, have not changed in the past century for all education systems that were included in this sample. While I found no mean differences in education attainment inequality across nations that had different governance frameworks in these domains, the analyses did show a relationship to variation in education attainment reproduction across these governance framework types. Thus, if we just looked at the results of these domains alone, it would suggest that governance frameworks do not impact mean differences in education attainment reproduction but might affect variance in this phenomenon. From this study alone, this cannot develop into a strong argument. However, this study further widens the possibility that governance frameworks are relevant to education attainment reproduction, and maybe even other mechanisms of education inequality.

Discussion

This research set out to measure how strongly governance frameworks influence levels of education inequality and to establish a new viewpoint on decentralization. Governmental regime shifts in education systems has spawned many academic opinions on the effects of governance frameworks on national levels of education inequality. Much of the literature on education tends to observe governance frameworks as they relate to standardization. The majority of these academic opinions believe decentralization increases education inequalities and centralization lessens them. However, this research study opens discussion to another viewpoint.

This viewpoint, which is worth considering even from the limitations of this research, calls into question the certainty that education systems are executing governance frameworks because they affect education inequality. Irrespective of historical disjunction, this study shows that the majority of education systems have very similar—if not, the same—governance frameworks in practically every domain despite having very different levels of education attainment reproduction. National education systems have been enduring governmental regime changes to improve their education system. It would appear as though these national education systems are "loosely coupled" because although they have similar governance frameworks, this similarity is irrelevant to their levels of education attainment reproduction (Weick, 1976). Education systems are becoming more homogenous in structure (Baker and Letendre, 2005), despite how these structures may or may not affect their education system. One way to explain this loosely coupled dynamic among national education systems is institutional Isomorphism.

National education systems may be changing their governmental regimes to adhere to institutional forces. National governments and global agencies have been advocating for certain

types of governance frameworks for years (Buenfil, 2000) and these forces can cause nations to feel compelled to take these suggestions and implement them in their organization (DiMaggio and Powell, 1983). Every education system has a government framework, and many nations are adopting similar governance frameworks to adhere to forces that prefer certain frameworks rather than others. With a desire to establish "legitimacy" in political arenas or in an effort to respond to "uncertainty" in how to improve their education system, nations are conforming to these global pressures and developing more homogenous education systems (DiMaggio and Powell, 1983).

What if education systems are not changing their governance frameworks because they have found a structure that will lessen education inequality? What if they are not sure what will happen after they endure a governmental regime change, and are merely conforming to global institutional pressures as best they can for reasons that are irrelevant to education inequality? This viewpoint is a worthy perspective to how governance frameworks influence education systems. Unfortunately, stronger claims about this cannot be made from the findings in this study. However, the structure of this study is still helpful because it looks at governance frameworks in a new way.

Future research discussions should continue to observe governance frameworks with more complexity, by observing education systems through particular domains and irrespective of standardization structures. Additionally, the possibility of other mechanisms influencing governance frameworks in such a way that effects educational attainment reproduction has been hypothesized however could not be studied in this research because of historical differences in education systems. To remedy the issue of historical dysfunction, using other measurements of education inequality would have been a route this study could have taken. Future researchers that

wish to take on a similar study can go about it the same way that I have, and just adjust the measurement of education inequality so that historical disjunction does not influence their findings.

As literature continues to delve deeper into the complexities of governance frameworks and how they interact with education systems, I believe more viewpoints will arise. If this should happen however, we may still find homogenous governance frameworks amongst national education system. Education systems, as loosely coupled systems, will more than likely remain homogenous and conform to institutional pressures regardless of the outcome. But, if future studies validate the findings in this study, we may be able to rest easy. Regardless of how education systems construct their governance frameworks, it may have very little impact on education attainment reproduction, and maybe even other mechanisms of education inequality. This study, even without being able to make claims on the inherent nature of governance frameworks, allows the possibility that governance frameworks have no bearing on education inequality to be a worthy perspective. However, until strong findings can support this new perspective, this study must end with encouraging others to also think…What if governance frameworks do not affect education inequality, as greatly as current opinions may believe? Hopefully, further research will stem from this.

References

Allmendinger, J. (1989). The Organization of Formal and Vocational Training. *Career Mobility Dynamics. A Comparative Analysis of the United States, Norway and West Germany* (pp. 45–69). Berlin: Max-Planck Institut für Bildungsforschung.

Apple, M. (2000). Between Neoliberalism and Neoconservatism: Education and Conservatism in a Global Context. *Globalization and Education Critical Perspectives*. London: Routledge.

Astiz, M. F., Wiseman, A. W., & Baker, D. P. (2012). Slouching towards Decentralization : Consequences of Globalization for Curricular Control in National Education Systems, *46*(1).

Baker, D. P., & Letendre, G. K. (2005). The Global Environment of National School Systems. *National Differences, Global Similarities World Culture and the Future of Schooling* (pp. 1–15). Stanford: Stanford University Press.

Blau, P. M., & Duncan, O. D. (1967). The American occupational structure. New York: John Wiley & Sons,Inc.

Braun, J. Von, Grote, U., & C, N. W. D. (2000). *Does Decentralization Serve the Poor ? IMF-conference on fiscal decentralization* (Vol. 2000). Washington D.C.

Bray, M. (1996). *Decentralization of Education Community Financing*. Washington D.C: World Bank.

Buchmann, C., & Park, H. (2005). The Institutional Embeddedness of Educational and Occupational Expectations. A Comparative Study of 12 Countries. Los Angeles.

Buenfil, R. (2000). Globalization and Educational Policies in Mexico, 1988-1994: A Meeting of the Universal and the Particular. *Globalization and Education: Integration and contestation across cultures* (pp. 275–297). Rowman & Littlefield Publishers, Inc.

Burbules, N., & Torres, C. (2000). Globalization and Education: An Introduction. *Globalization and Education Critical Perspectives*. London: Routledge.

Checchi, D., Ichino, A., & Rustichini, A. (1999). More equal but less mobile ? Education financing and intergenerational mobility in Italy and in the US, *74*, 351–393.

DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited. Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, *48*(2), 147–160.

Erikson, R., & Goldthorpe, J. H. (1992). The constant flux: A study of class mobility in industrial societies. Oxford/England: Clarendon Press.

Gamoran, A. (1996). Curriculum Standardization and Equality of Opportunity in Scottish Secondary Education: 1984-90. Sociology of Education, 69(1), 1-21.

Gradstein, Mark, Moshe Justman, and Volker Meier. Central Versus Local Education Finance in *The political economy of education: implications for growth and inequality*. Pp 79-94. MIT press, 2004.

Hill, D., Greaves, N., and Maisuria, A. (2009) Education, Inequality and Neoliberal Capitalism: a Classical Marxist Analysis. In D. Hill and R. Kumar (eds.) Global Neoliberalism and Education and its Consequences. pp. 102-126. New York: Routledge

Hill, D., & Kumar, R. (2009). Global neoliberalism and education and its consequences. New York : Routledge, 2009.

Horn, D. (2009). Age of selection counts: a cross-country analysis of educational institutions. *Educational Research and Evaluation*, *15*(4), 343–366.

Ka Ho, M. (2004). Centralization and Decentralization: Changing Governance in Education. *Centralization and DecentralizationL Educational Reforms and Changing Governance in Chinese Societies* (pp. 3–17). The University of Hong Kong: Comparative Education Research Centre.

Kerckhoff, A. C. (1995). Institutional Arrangement and Stratification Processes in Industrial Societies. *Annual Review of Sociology*, 15:323–47.

Kerckhoff, A. C. (2001). Education and social stratification processes in comparative perspective. Sociology of Education, 3-18.

Lipman, P. (2004). Globalization, Economic Restructuring, and Urban Education. *High Stakes Education Inequality, Globalization, and Urban School Reform*. London: RoutledgeFalmer.

Marlow-Ferguson, R., & Lopez, C. (2002). World Education Encyclopedia: A Survey of Educational Systems Worldwide. (Rebecca Marlow-Ferguson & C. Lopez, Eds.) (Volume I-III). California: Gale Group.

Micklewright, J. (2000). Education, Inequality and Transition. Florence.

Morrow, R., & Torres, C. (2000). The State, Globalization, and Educational Policy. *Globalization and Education Critical Perspectives*. Routledge.

Muller, W., & Karle, W. (1993). Social Selection in Educational Systems in Europe, *9*(1).

Muller C. and Schiller, K. (2000). Leveling the Playing Field? Students' EducationalAttainment and States' Performance Testing. Sociology of Education. 73: 196-218

Parry, T. R. (1997). Achieving balance in decentralization: A case study of education decentralization in Chile. *World Development*, *25*(2), 211–225. doi:10.1016/S0305-750X(96)00094-0

Prawda, J. (1993). Educational Decentralization In Latin America: Lessons Learned. *Educational Development*, *13*(3), 253–264.

Publishing, OECD (2010). Education at a Glance 2010 OECD Indicators. Organisation for Economic Co-operation and Development, Paris

Raudenbush, S. W., & Fotiu, R. P. (1998). Inequality of Access to Educational Resources. A National Report Card for Eighth-Grade Math. *Educational Evaluation and Policy Analysis*, *20*(4), 253–267.

Rondinelli, D. a., & Nellis, J. R. (1986). Assessing Decentralization Policies in Developing Countries: The Case for Cautious Optimism. *Development Policy Review*, *4*(1), 3–23. doi:10.1111/j.1467-7679.1986.tb00494.x

Shavit Y, Blossfeld H-P, eds. (1993). *Persistent Inequality: Changing Educational Attainment in Thirteen Countries*. Boulder, CO: Westview

Schofer, E., & Meyer, J. W. (2005). The worldwide expansion of higher education in the twentieth century. American sociological review, 70(6), 898-920.

Schütz, G., Ursprung, H. W., & Wößmann, L. (2008). Education policy and equality of opportunity. Kyklos, 61(2), 279-308.

Spring J. (1976). The Sorting Machine. New York: David McKay

Stevenson, D. L., & Baker, D. P. (1991). State Control of the Curriculum and Classroom Instruction. *Sociology of Education*, *64*(1), 1–10.

T. Neville Postlethwaite. (1995). International encyclopedia of national systems of education (Vol. 1). Pergamon Pr.

Treiman DJ, Yip K-B. (1989). Educational and occupational attainment in 21 countries. In *Cross-National Research in Sociology*, ed. ML Kohn, pp. 373-94. Newbury Park: Sage

Van de Werfhorst, Herman G., Mijs, Jonathan J.B., (2010). Achievement inequality and the institutional structure of educational systems: a comparative perspective. *Annual Review of Sociology* 36, 407–428.

Weick, K. (1976). Educational Organizations as Loosely Coupled Systems. *Administrative Science Quarterly*, *21*(1), 1–19.

Weiler, H. N. (1990). Comparative Perspectives on Educational Decentralization : An Exercise in Contradiction ? *Educational Evaluation and Policy Analysis*, *12*(4), 433–448.

Wössman, L. (2003). Schooling resources, educational institutions and student performance: the international evidence. Oxford Bulletin of Economics and Statistics, 65(2), 117-171.

Xie, Yu (1992). The Log-Multiplicative Layer Effect Model for Comparing Mobility Tables. *American Sociological Review* 57(3):380-395.

Zhang, X. (2006). Fiscal Decentralization and Political Centralization in China: Implications for Growth and Inequality. Working Paper. UNU-WIDER, United Nations University (UNU).

Appendix 1 Descriptive

Appendix 1.1a Countries Included & Number of Cases

Country	Freq.
Argentina	657
Belgium	690
Bulgaria	517
Chile	828
China	2,116
Croatia	636
Cyprus	680
Czech Republic	741
Denmark	919
Estonia	497
Finland	535
France	1,760
Germany	768
Hungary	704
Iceland	589
Israel	733
Latvia	580
Norway	855
Philippines	803
Poland	793
Portugal	648
Republic of Korea	1,154
Russian Federation	767
Slovak Republic	730
Slovenia	615
South Africa	1,332
Spain	644
Sweden	713
Switzerland	835
Taiwan	1,398
Turkey	1,147
United States	870
Total	27,254

Appendix 1.1b Country Shortcode

Country	Shortcode
Argentina	ARG
Australia	AUS
Austria	AUT
Belgium	BEL
Bulgaria	BGR
Canada	CAN
Chile	CHL
China	CHN
Cyprus	CYP
Czech Republic	CZE
Denmark	DNK
Estonia	EST
Finland	FIN
France	FRA
Germany	DEU
Hungary	HUN
Iceland	ISL
Ireland	IRL
Israel	ISR
Italy	ITA
Japan	JPN
Mexico	MEX
Netherlands	NLD
New Zealand	NZL
Norway	NOR
Poland	POL
Portugal	PRT
Slovakia	SVK
Slovenia	SVN
South Africa	ZAF
Korea	KOR
Spain	ESP
Sweden	SWE
Switzerland	CHE
Ukraine	UKR
United Kingdom	UNK
United States	USA
Venezuela	VEN

Appendix 1.2 Educational Distribution by Country

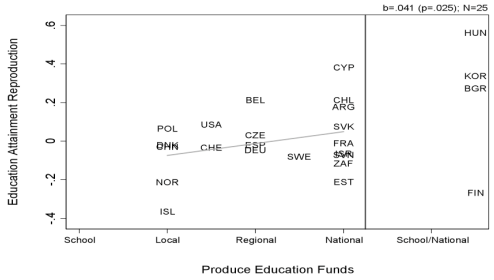
Country	Respondent's Highest Degree					
	Primary	Incomplete Secondary		Some Tertiary	University	Total
Argentina	31.96	21	21.61	17.81	7.61	100
Belgium	10.85	15.56	39.38	23.79	10.42	100
Bulgaria	4.1	15.23	14.15	43.13	23.38	100
Chile	28.21	13.42	25.11	18.87	14.4	100
China	46.62	30.54	16.52	3.96	2.36	100
Croatia	13.68	19.03	44.5	10.06	12.74	100
Cyprus	16.18	5.29	43.09	7.35	28.09	100
Czech Republic	7.76	51.11	25.84	2.71	12.59	100
Denmark	3.16	6.2	33.19	41.24	16.21	100
Estonia	0.44	15.38	45.85	13.47	24.86	100
Finland	10.61	23.51	5.48	36.35	24.05	100
France	14.14	27.4	16.2	18.66	23.61	100
Germany	25.78	43.1	8.72	4.69	17.71	100
Hungary	18.02	33.26	27.01	17.12	4.59	100
Iceland	20.54	24.11	9.51	8.32	37.52	100
Israel	6	29.47	20.6	17.19	26.74	100
Latvia	7.59	7.41	52.76	7.93	24.31	100
Norway	8.07	6.9	29.71	15.09	40.23	100
Philippines	30.46	15.78	23.98	17.16	12.63	100
Poland	11.18	29.23	27.23	11.72	20.65	100
Portugal	42.38	19.4	19.01	3.14	16.06	100
Republic of Korea	6.33	8.58	34.32	19.41	31.37	100
Russian Federation	1.5	14.17	29.22	32.38	22.73	100
Slovak Republic	10.76	37.29	36.28	2.12	13.56	100
Slovenia	14.47	22.93	36.59	5.2	20.81	100
South Africa	32.79	10.94	39.88	7.43	8.95	100
Spain	15.96	32.84	26.5	5.88	18.82	100
Sweden	11.36	28.75	14.73	11.08	34.08	100
Switzerland	10.43	52.26	3.65	16.26	17.4	100
Taiwan	17.16	16.95	30.99	15.5	19.39	100
Turkey	62.6	9.33	17.96	0.87	9.24	100
United States	3.27	7.28	27.4	29.16	32.89	100

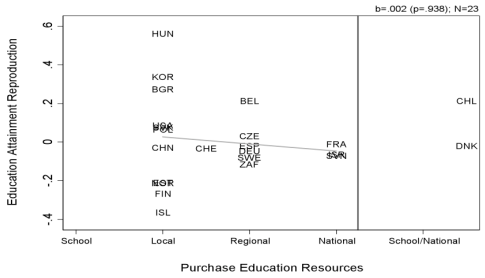
Appendix 1.3 Father's Class Distribution by Country

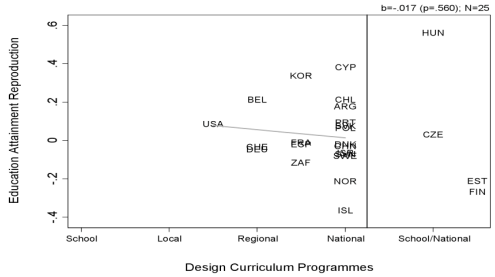
	Father's Class							
Country	I - Upper-grade Professionals/Managers	II - Lower-grade Professionals/Managers	III - Clerical worker	IVab - Self-employed	VI - Skilled manual	VIIab - Unskilled manual	IVc - Farmers	Total
Argentina	2.74	7.46	6.24	19.48	16.89	39.88	7.31	100
Belgium	11.97	13.98	10.22	10.18	23.74	23.09	6.81	100
Bulgaria	7.35	12.52	4.19	5.25	29.13	32.54	9.02	100
Chile	4.24	9.19	7.93	10.34	17.81	39.61	10.88	100
China	4.66	4.92	2.91	1	4.53	7.29	74.7	100
Croatia	4.56	10.22	14.15	5.5	24.84	25.47	15.25	100
Cyprus	4.56	8.38	8.38	16.76	10.88	26.03	25	100
Czech Republic	4.24	8.25	5.73	13.24	32.27	33.86	2.41	100
Denmark	18.28	14.69	6.86	10.34	17.63	21.11	11.1	100
Estonia	18.7	9.31	2.61	8.03	24.72	23.26	13.36	100
Finland	13.54	17.09	5.82	9.27	19.91	22.39	11.98	100
France	10.91	11.15	8.93	37.71	8.93	19.92	2.46	100
Germany	12.11	12.63	6.38	9.51	30.21	24.22	4.95	100
Hungary	7.46	4.51	3.86	4.01	38.72	39.19	2.25	100
Iceland	14.77	11.88	5.26	21.05	18.17	15.45	13.41	100
Israel	14.46	10.5	6.55	18.69	15.96	28.92	4.91	100
Latvia	11.03	8.45	2.76	1.38	26.03	47.41	2.93	100
Norway	19.88	13.92	10.76	7.84	21.52	18.36	7.72	100
Philippines	2.19	5.1	4.6	13.51	9.33	47.87	17.41	100
Poland	7.85	9.27	4.83	7.27	24.06	23.44	23.28	100
Portugal	2.9	6.8	8.52	14.26	21.65	32.84	13.03	100
Republic of Korea	2.43	5.2	12.13	30.16	4.51	9.1	36.48	100
Russian Federation	14.57	7.06	1.45	1	29.02	45.39	1.51	100
Slovak Republic	3.27	9.06	4.24	2.51	34.37	44.91	1.64	100
Slovenia	5.85	9.76	6.5	6.02	33.17	33.66	5.04	100
South Africa	10	4.18	11.54	6.18	10.41	55.09	2.61	100
Spain	5.85	5.89	10.12	5.79	27.39	34.63	10.34	100
Sweden	11.08	18.09	7.71	15.15	24.26	18.65	5.05	100
Switzerland	16.49	13.13	9.23	7.2	20.21	20.94	12.8	100
Taiwan	4.26	11.28	5.14	25.25	11.72	15.58	26.78	100
Turkey	0.61	3.23	6.54	14.82	4.45	27.11	43.24	100
United States	21.52	12.7	2.76	9.42	21.2	26.1	6.31	100

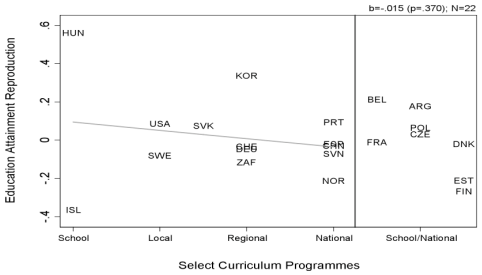
Appendix 2 Additional Graphs

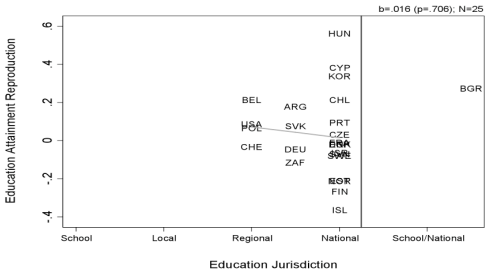
Appendix 2.1 Slope Relationships for each education system domain

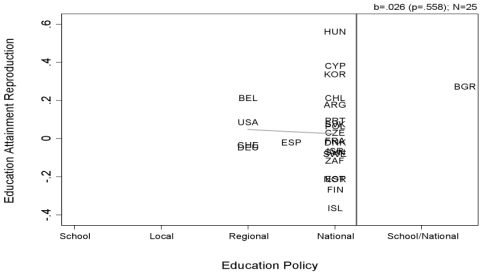












Appendix 3 Social Inequality Indicators

GINI Indicator. Data for the GINI indicator was collected from a database produced by University of Michigan Institute for Social Research, Population Studies Center. This database is not open to the public yet however, this study was granted access by the creators. The indicator is based on equivalized household disposable income, after taxes and transfers, and the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. The original source for data can be found in the World Bank Databank.

Tertiary Entrance Rate Indicator. Data for the Tertiary Entrance Rate indicator was collected from the OECD Library 2010 Education: Key Tables from OECD database. The indicator is a measurement of first time entrance into tertiary education as a percentage of the population in the corresponding age group. Tertiary Entrance rates were collected from 2000 to 2007. However, this study is based on the 2007 tertiary entrance data.

GDP Indicator. Data for the GDP indicator was collected from a database produced by University of Michigan Institute for Social Research, Population Studies Center. This database is not open to the public yet however, this study was granted access by the creators. GDP per capita is gross domestic product divided by midyear population. Data are represented in US Dollars. The indicator is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. The original source for data can be found in the World Bank Data catalog.

Regional Disparity Indicator. Data for the Regional Disparity indicator was collected from the OECD Regional Database that was last updated in March 2012. The database contains demographic statistics on regional GDP level of all OECD country regions from 1999 to 2009. To develop a regional disparity indicator, I calculated the coefficient of variation in regional GDP for each country.