ASCRIPTION AND ACHIEVEMENT IN OCCUPATIONAL ATTAINMENT IN COMPARATIVE PERSPECTIVE

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Contents

0. Abstract

This paper analyzes the structure of an elementary intergenerational occupational status attainment model (father's occupation - education - current occupation) in historical and cross-national comparative perspective. We combine data from multiple surveys conducted in 42 countries around the world that represent different levels of economic development and various political regimes. The data refer to 374,093 men age 21-64, drawn from 331 sample surveys conducted between 1947 and 2003. We have organized the data for each nation by five-year labor-force-entry cohorts, which range from 1900 to 2000, although in many nations only some of these cohorts are covered, and have further distinguished 10-year labor force experience groups. Crossing nations by labor-market entry-cohorts by experience-groups creates 1,436 separate contexts in which a micro-model is estimated. The parameters of these micro-models are then analyzed at the macro-level using a weighted pooled time-series (XTGLS) design that assesses the effects of indicators of economic development and political regime on the occupational attainment process. We find that, as expected, achievement (the effect of level of schooling on occupational status) increases with economic development and is stronger in communist than in noncommunist nations while ascription (the effect of father's on son's occupational status) decreases with economic development and is weaker in communist than in noncommunist nations. In addition, achievement has increased over time and ascription has decreased, although the patterns become somewhat complex when account is taken of labor force experience. The effect of communism is most pronounced in 1950, the beginning of most communist regimes for which we have data, but gradually converges to the noncommunist pattern so that by the 1980s there is little difference between communist and noncommunist regimes.

1. INTRODUCTION

The relative importance of "ascription" and "achievement" has exercised sociologists for many decades, often with an implicit (and sometimes explicit) ideological stance—achievement (socioeconomic success based on personal talents and skills) is desirable and ascription (success based on the accidents of birth) is undesirable. Or, at least, a just society is one in which achievement is relatively more important than ascription. Most of these arguments ignore the intimate connection between ascription and achievement—the simple fact that personal talents and skills are not independent of social origins. Still, these concerns have given rise to a body of research that focuses on the relative importance of social origins and education as determinants of socioeconomic outcomes such as occupational position and income.

Forty years ago Blau and Duncan (1967) revolutionized the sociological study of intergenerational social mobility in a way that permitted direct consideration of the achievement vs ascription issue. Whereas previous researchers had focused on the analysis of simple two-variable occupational mobility tables cross-tabulating son's occupation by father's, Blau and Duncan proposed to study the status attainment process as a recursive structural equation model in which educational attainment was determined by father's education and occupation; the status of the first job was determined by the two father's characteristics plus education, and the status of the current occupation was determined by all the preceding variables. This recasting of intergenerational mobility into a process of status attainment permitted quantification of the relative importance of different paths connecting social origins to outcomes and also easy expansion of the model to take account of a large array of intervening mechanisms. The result was a minor industry concerned with elaborating the process of status attainment, which has yielded many insights (for useful

reviews see Bielby 1981; Treiman and Ganzeboom 1990; Contemporary Sociology 1992; Hernandez de Frutos 1993; Kerckhoff 1995; Hout and DiPrete 2006).

From the outset, students of status attainment recognized that systems of social stratification were likely to vary, over time and from nation to nation. In their initial work, Blau and Duncan (1967:429) proposed that as societies modernize, achievement should become more important and ascription less important as determinants of occupational status. Treiman (1970) made similar arguments from a cross-national perspective: achievement should be stronger and ascription weaker in more developed societies, with industrialization, educational expansion, increased urbanization, and the growth of the service and bureaucratic sectors strengthening the role of education as the pivot of the socioeconomic career and diminishing the role of family background. The stage thus seemed to be set for serious consideration of cross-national and cross-temporal variations in status attainment processes following the Blau-Duncan paradigm.

However, this promise has never been fully realized, in part because the attention of the field shifted in other directions, mainly the application of methods for analyzing discrete data via log-linear analysis and, more recently, multinomial and ordered logit analysis (e.g., Featherman and Hauser 1978; Ganzeboom, Luijkx, and Treiman 1989; Erikson and Goldthorpe 1992; Shavit and Blossfeld 1993; Shavit and Müller 1998; and Breen 2004). Because discrete procedures typically generate many coefficients, they have proved relatively cumbersome for comparative analyses, which, as a result, have largely been restricted to the analysis of bivariate intergenerational mobility patterns (Ganzeboom et al. 1989; Erikson and Goldthorpe 1992) or have involved small numbers of countries (Wong 1990) or time points (Hendrickx and Ganzeboom 1998; Dessens et al. 2003) or have taken the form of parallel studies that are compared only via meta-analysis (Shavit and Blossfeld 1993; Shavit and Müller 1998; Breen 2004).

A second reason for the paucity of comparative analyses of status attainment is that the data requirements are daunting. Variables need to be standardized, which, in turn, requires the development of scaling procedures to render data comparable across time and space. As a result there has been to date only one substantial comparative study of occupational status attainment, that by one of us (Treiman and Yip 1989), based on the compilation of data for 21 nations. Treiman and Yip, using prestige as a measure of occupational status (Treiman 1977: Appendix A) and years of school completed as a measure of educational status, showed that the effect of education on occupational status increased with industrialization and decreased as the level of educational and income inequality increased, and that the effect of father's occupational status on son's occupational status decreased with industrialization and increased with societal inequality.

The work reported here continues in that vein, but in a much more ambitious way. We have for many years been engaged in a project intended to fulfill the promise of the Blau-Duncan paradigm. This has involved three activities: devising methods for measuring the basic status variables in comparable ways, through creation of an International Socioeconomic Index of Occupations [ISEI] (Ganzeboom, De Graaf 1992; Ganzeboom and Treiman 1996, 2003) and exploration of ways of measuring educational attainment (discussed below); acquiring, standardizing, and archiving existing sample surveys based on probability samples of general populations (see the International Stratification and Mobility File (http://home.fsw.vu.nl/HBG.Ganzeboom/ISMF_/index.htm)); and analyzing the resulting cross-national and cross-temporal data file (Ganzeboom et al. 1989; Ganzeboom and Treiman 1993; Ganzeboom, Luijkx, and Treiman 1998; Treiman, Ganzeboom, and Rijken 1998; Rijken 1999; Rijken and Ganzeboom 2000; Kreidl, Ganzeboom, and Treiman 2004; Johnston, Ganzeboom, and Treiman 2005). An important aspect of our design is that we typically cross nations by cohorts

(birth cohorts; labor force entry cohorts, as in the present paper; etc.), which enables us to simultaneously analyze changes over time and differences between nations, and also increases the statistical power of our analysis by radically expanding the number of "contexts"—data points at the macro-level.

The present paper analyzes a very simple, three-variable, model (father's occupation, education, and current occupation at the time of the survey) by combining data from 331 sample surveys conducted in 42 countries around the world that represent different levels of economic development and various political regimes. The data refer to 374,093 men age 21-64, drawn from sample surveys conducted between 1947 and 2003. For this paper, we have organized the data for each nation by five-year labor-force-entry cohorts, which range from 1900 to 2000 (although in many nations only some of these cohorts are covered), and have further distinguished 10-year labor force experience groups. Crossing nations by labor-market entry-cohorts by experience-groups creates 1,436 separate macro-contexts in which a micro-model is estimated. The parameters of these micro-models are then analyzed at the macro-level using a weighted pooled time-series (XTGLS) design that assesses the effects of indicators of societal development and political regime on the occupational attainment process. In the remainder of the paper we present the theory and hypotheses that guide our analysis; describe our data and our methods; and present our results.

2. THEORY AND HYPOTHESES

Given our very simple micro-model, the expected effects are unproblematic. We expect occupational status to depend on education because in modern societies formal education is the primary mechanism by which people acquire the skills and the credentials necessary to perform specific jobs, particularly jobs of higher status. Even in developing societies, higher status jobs

require formal education. It is only low level traditional jobs, in agriculture and production, for which on-the-job training is the primary vehicle for skill transmission. At the same time, we expect that, net of education, fathers who have higher status jobs are able to provide advantages for their sons on the job market, both by imparting non-school-based skills, including social and interpersonal skills, and by opening doorways to secure opportunities. Moreover, in some societies and for some occupations (farmers, miners, and fishermen are three cases that come to mind, but think also of doctors, lawyers, and shopkeepers) sons tend to follow in their father's footsteps, joining their father in the same occupation. Thus, we expect positive effects of both father's occupation and respondent's education on occupational outcomes for sons. Further, we expect the effects of education to be generally stronger than the effects for father's occupation (when measured with standardized coefficients). Finally, although we leave the father's occupation-son's education connection unanalyzed, we expect it to be positive both because those from high status families are better able to afford the costs of schooling (fees and expenses, as well as opportunity costs of forgone income) and because those from well-educated families acquire at home the cultural capital that enables them to perform well in school.

Of greater interest for our present purposes is how the effects of education and father's occupational status on a man's occupational status vary across societal contexts. Although countries differ in many ways, and also change over time in complex ways, the major arguments regarding the effects of societal contexts can be subsumed under two overarching theses: the modernization thesis and the political intervention thesis.

The *modernization thesis* (also often referred to as the industrialization thesis or economic development thesis) holds that ascription decreases and achievement increases with the level of development in the local context, where context refers to a particular country at a particular point in

time. Although the theoretical claims often refer to particular aspects of modernity, such as economic development, the proportion of the labor force in agriculture or in nonmanual jobs, educational expansion, or value changes, these components tend to be highly correlated over nations and over time, and in what follows we will measure them by a single indicator of modernity. Still, it is useful to lay out the theory, much of which was spelled out in the very early literature on occupational mobility and status attainment, in particular Treiman (1970). Our reconstruction of these arguments can be seen as an update of this, now nearly 40 year old, paper.

The *political intervention thesis* claims that variations in ascription and achievement fluctuate as a result of political intervention in the stratification process, reinforcing or undercutting tendencies associated with economic and social modernization. The most prominent example is, of course, 20th century state socialism, popularly known as "communism," which entailed the most thorough-going intervention in patterns of access to the labor market and the distribution of inequality in general. But as we will detail below, other dimensions of political regimes and specific policy measures can be expected to be of great importance as well.

Modernization

The principal claim here is that as economies develop, which they have been doing exponentially since the onset of the Industrial Revolution in the early 19th century, a great number of other societal changes occur concomitantly.

First, the development of *industrial technology* creates an increased demand for skilled workers at several levels. This is primarily the case for industrial production itself, where manual workers who can dig the coal and operate the looms are attracted in higher proportions. In the early stages of industrial development, large proportions of these workers originate from an agricultural environment and have to learn the tricks of the trade, which they cannot have acquired at home.

The demand for skilled manual workers increases because industrial technology tends to develop at a quicker pace than agricultural technology and thus industry expands relative to agricultural production. So modernization initially is more-or-less synonymous with industrialization—or, at least this was true of the early, 19th century, cases. Alternatively, if agricultural technology also develops (e.g., in China toward the end of the 20th century), workers tend to be driven out of farm work, because of the increased productivity of each remaining agricultural worker, and thus become available as (cheap) industrial labor and have to adapt to a new technological environment. Typically, this creates a secondary demand for skilled nonmanual workers, people who can create and further develop new technology, or administer and supervise its applications. Firms not only apply new technologies that require adaptive learning, but also grow in size and complexity, which leads to a demand for skilled clerical, administrative and managerial workers. In sum, technological change creates a demand for skilled workers at various levels, a demand that cannot be met by family training, which means formal schooling arises to meet the demand.

This type of technological development expresses itself in the *restructuring of the labor force*. Apart from the level of the technology itself, another component of early modernization is a decrease in the proportion of the labor force engaged in agriculture and an increase in the proportion of manual industrial workers. At later stages of development there is a decrease in the manual industrial sector and an increase in the nonmanual sector as the management and transmission of information becomes increasingly important. In addition, there typically is a reduction in the proportion of the labor force engaged in small shop craft production and petty trade.

Not only does the distribution of the labor force across occupations shift in a characteristic way, but there is a concomitant increase in firm size and hence in the bureaucratization of

recruitment, hiring, and internal promotion processes. This, in turn, increases the demand for educational credentials as a screening device used by employers. While many jobs continue to entail substantial on-the-job training, there is an increase in pre-market acquisition of skills. That is, training that used to be inculcated entirely on the job becomes the responsibility of schools. The result is a more or less universal expansion of education, beginning well before the beginning of the 20th century in the most developed nations and more recently in other nations as they have begun to develop. The expansion of education is driven not only by the demand for trained labor but also by the demand of parents for increased opportunities for their children, because parents recognize full well that education is the most important and most certain route to upward mobility. Thus, in nearly all societies over the past 100 years, successive cohorts have tended to stay in school longer and longer.

We would expect educational expansion to weaken the direct transmission of occupational status because people who stay in school longer begin their careers at a later age, when they are less likely to be subject to parental influence and control. This argument has been advanced as one basis for expecting the effect of social origins on educational attainment to decline with educational expansion (Blossfeld and Shavit 1993:9) and we think it holds also when occupational status is the outcome variable.

Apart from this, the effect of educational expansion is somewhat hard to predict because it depends on the relative rates of upward shifts in the educational and occupational distributions. When the demand for trained labor outruns the supply, there should be an increase in occupational returns to education. But when educational expansion outpaces the demand for trained labor, returns to education should decrease. Also, if educational expansion increases the variance in educational attainment (as it typically does in early stages of development) or decreases it (as it

typically does in later stages of development), this may change the nature of competition between applicants. All else equal, we would expect that the greater the variance in education, the stronger the effect of education on occupational status.

Insofar as development increases the rate of geographical mobility, which it probably does by creating new job opportunities in cities and other distant places and by reducing transportation costs, we would expect an effect similar to the school-leaving-age effect mentioned above—geographic mobility should serve to free people from their social origins and thus reduce the effect of ascription (parental status) on occupational attainment.

An important issue in testing the modernization argument is to what extent the expected trends occur when we restrict the data to more or less bureaucratized settings, and omit typical pre-industrial or pre-modern settings. One way to address this issue is to restrict our analysis to the non-traditional sector by excluding those engaged in agricultural and traditional crafts and trade. This is something we have not been able to do in the present paper, but expect to take up in subsequent analysis.

Another major dimension of modernization of the technology is that it creates *economic growth* (Lenski 1966). Modern technology makes it possible to create products at lower prices and with less effort, and thus increases real income. More important, income inequality tends to decrease as economic development increases, which has the effect of reducing closure between social groups (see Lenski 1966 and Treiman and Yip 1989 for similar arguments). This leads to the expectation that social origins have weaker effects on occupational status attainment in more developed nations, and in particular that the direct effect of father's occupational status on son's occupational status will be smaller in more developed nations.

Finally, modernization theorists have argued that one consequence of development has been the spread of an ethos of equality and, in particular, the idea that the state should intervene to promote equality of opportunity (Esping-Andersen 1990; see Treiman et al. 1998 for a pertinent formulation). In modern societies, inequality may be acceptable, but not inequality by mechanisms that favor some groups unjustifiably over others. Selection by ascribed characteristics, such as ethnicity and gender, has increasingly come to be regarded not only as inefficient but also unjust; talent, effort and effectiveness may lead to societal rewards, but only when individually achieved or proven. Regardless of the intellectual merits of such arguments, there is no doubt that egalitarian ideas of this kind have become increasingly prevalent over the course of the 20th century. Thus, a variety of mechanisms have been institutionalized by national governments—most forcefully by communist governments—that have had the effect of reducing the direct transmission of advantage across generations.

Political intervention

Economic growth and technological modernization occur around the world, although at different speeds and possibly via different paths and channels. But development does not occur in a vacuum, or in a perfectly free market. Rather, various interest groups promote institutional changes to improve their circumstances. Thus, we need to consider political effects on the status attainment process.

The major attempt to intervene politically in the process of stratification is the realization of socialist ideology in the 20th century. Marxism is by far the most consistently egalitarian among the major political ideologies. It established itself as a major force in Europe by the end of the 19th century, when Bismarck began to pay attention to socialist demands and created the roots of the oldest welfare state, Germany. The beginning of the 20th century saw the first attempts at

"socialist" revolutions (1871, Paris; 1905, Russia), and some of these (Russia, Germany, Hungary) were successful at the end of the World War I. Although only in Russia were the communists able to hold on to their newly gained power, the Russian success turned out to be important in promoting "communism" elsewhere, in particular in Eastern Europe and Asia. Communism, as a political system, reached its pinnacle in the period immediately after World War II, when communist regimes were installed in a number of Middle-European nations and in China. Subsequently, during the Cold War, communist regimes came to power in North Korea, South East Asia, and Cuba. It is only recently (from the perspective of our data coverage) that most of these nations have returned to market regulation. In addition, communist parties have been important centers of political power in some western democracies, in particular in Italy, France, Spain, and Portugal, although they never came to governmental power in these nations.

Of equal importance may be social-democratic political ideologies inspired by similar ideas about social inequality and the desirability of government intervention. Social democratic parties are important political forces in many of the nations studied here. In the Scandinavian countries, Germany, and England, social democratic parties have won majority votes for sustained periods and thus have been able to dominate government institutions. But even in countries where social democratic parties never have had majority power (such as the Netherlands), their influence has been strong.

Unlike Marxist sociologists, Marxist practitioners have shown an astute interest in intergenerational aspects of the process of stratification and have intervened in its course on several occasions. They have been much more like Weberians than their academic counterparts, because they have realized quite well that intergenerationally stable status groups are as much part of societal inequality as market-generated inequalities of rewards. Most important, Marxist regimes

have intervened to block the transmission of economic and other resources across generations. The prime vehicle for this intervention was to confiscate and severely restrict private property, particularly business ownership. In the Soviet Union, China,[1] and most Eastern European nations, private ownership was restricted to residences and small businesses and in urban areas even private ownership of one's residence was uncommon. One important consequence was that it became impossible or at least very difficult to transfer property between generations, thus undercutting a major vehicle for the transmission of advantage. Second, communist regimes have made concerted attempts to discriminate in favor of children from proletarian and peasant origins, in a kind of "communist affirmative action" (Parkin 1971; Simkus and Andorka 1982), and against children of the former bourgeoisie and intelligentsia, although only in China did such efforts have substantial success (Kreidl 2005) and even then only for a limited period (Deng and Treiman 1997; Treiman and Walder 1999). Still, it is likely that the impact of social origins on occupational attainment was somewhat reduced in communist nations relative to social democratic and especially *laissez faire* regimes.

It has been argued that communist regimes created their own hereditary class, consisting of party officials, who were able to create occupational advantages for their offspring (Djilas 1957; Konrad and Szelenyi 1979). However, there is little empirical evidence favoring this claim, perhaps because, with the exception of the Soviet Union and possibly China, communist regimes were too short lived for many children of communist officials to have advanced far enough in their careers to be eligible to become officials themselves.

[1] To be sure, private ownership of large enterprises began to reemerge in China in the 1980s and more recently in Vietnam. But the classic pattern has been to severely limit private property.

One important device used by communist regimes was to replace labor markets with a bureaucratic system of job placement that linked schools to employment opportunities. Although, particularly during periods of communist orthodoxy, political credentials were important for job allocation (Walder, Li, and Treiman 2000; Hanley and Treiman 2005), educational credentials were arguably even more important, which means that such a system of job allocation would be expected to increase the effect of education on occupational status relative to non-communist regimes. To be sure, close connections between the educational and occupational systems exist in market economies as well, particularly in Japan (Rosenbaum and Kariya 1989) and the Germanic nations (Müller and Shavit 1998); but they were particularly pronounced in communist nations.

As already noted communist regimes were not the only descendents of early Marxist ideology. In the beginning of the 20th century a vigorous tradition of social-democratic ideology arose that sought to accomplish equalitarian ideals through parliamentary, non-revolutionary means. Indeed, it is probable that the ideology of equality of opportunity that now dominates Western European social policy traces to these early concerns. Using steeply progressive income taxes, state pensions, welfare transfers or student subsidies, social democratic regimes have pushed in various ways towards more economic equality. Although the impact has been mainly on the educational selection process, we expect that these policies also have decreased the direct effect of family background on occupational attainment.

In the present analysis, we are not able to distinguish between social democratic regimes and more conservative market economies, but only between communist and non-communist regimes. Further distinctions will be the task of future work. However, from the arguments offered here, we would expect social democratic regimes to fall between communist regimes and right

wing *laissez faire* regimes: ascription should be strongest and achievement weakest in *laissez faire* regimes; and ascription should be weakest and achievement strongest in communist regimes.

3. DATA AND MEASURES

Data

As noted above, one of our goals has been to develop as complete a collection of pertinent sample survey data as possible. Our criteria for inclusion of a data set are simple: they must be based on a probability sample of a nation[2] that is not unduly age-restricted;[3] and they must include a measure of father's occupation when the respondent was growing up. We include data sets based on males only as well as those that include both males and females. However, the present paper is restricted to males. Our procedure is to combine all sample surveys for each nation (having transformed the pertinent variables to make them comparable across surveys) and then to divide the pooled sample into labor force entry cohorts. This means that each cohort is likely to include data from several surveys. Appendix A gives an overview of all the micro-data used for the analysis, with details on the sample size for each nation, the number of survey, the range of years of the included surveys, and the range of labor force entry cohorts covered. As noted above, the data analyzed in this paper consist of information for 374,093 men age 21-64, drawn from 331 sample

[2] Note that we refer to macro-units ("contexts") as "nations" rather than as "countries" because we we have subdivided the data for some countries into regions with different educational instutions and/or different language, e.g., Canada, Belgium, and Gt. Britain. Cross-national comparisons require that the macro-units be independent from one another, and this conditions is well met in countries where nations are separated by language barriers and educational systems, which tend to create different labor markets. Indeed, the independence of French- and Flemish-speaking Belgium is arguably greater than the independence between Flemish-speaking Belgium and the Netherlands; and the same claim is plausible for other nations as well.

[3] We generally restrict our analysis to those age 21-64, although we permit minor deviations from these specifications. The purpose of the lower bound is to minimize sample-selection bias due to the exclusion of those still in school who are destined for high status occupations. The upper bound is to minimize sample-selection bias due to differential morbidity and mortality.

surveys conducted between 1947 and 2003. Crossing nations by 5-year labor-market entry-cohorts, ranging from 1900 to 2000, by 10-year experience-groups creates 1,436 separate macro-contexts in which a micro-model is estimated.

As noted, we sometimes distinguish nations within states. For example, we treat Quebec and the remainder of Canada as two separate nations; we separate Dutch speaking Belgians (Flanders) from French speaking Belgians (Wallonia); we distinguish Scotland and Northern Ireland, respectively, from England and Wales. We also utilize data from places that once were parts of larger states, e.g., the Czech Republic, Estonia, Slovakia, and Slovenia, or that are now part of larger states, e.g., the German Democratic Republic. The primary justification for the use of national distinctions within political units is the availability of data: for all of the nations above we have independent surveys that otherwise could not be included in the design. We also think that the comparison between some of these nations is theoretically interesting, for instance between East- and West-Germany and between Estonia and Russia, as they speak to the modernization and political intervention arguments. However, our treatment of these nations as separate contexts is somewhat problematic given that often we do not have macro-data for nations within states. Nonetheless, we think the gain in the number of contexts more than offsets the loss of precision of some of the macro-variables. (See Appendix B for a discussion of the available macro-level data.)

The 42 nations in our data set range widely in level of development and political regime. With respect to development, they range from under-developed nations such as India, Nigeria, Malaysia and the Philippines to the most developed nations of Europe and North America. Included also are two Asian tigers, Japan and Taiwan, that are generally conceived as fast trackers in economic development. Ten of our 42 nations had communist regimes for a substantial portion of the period under study: Bulgaria, China, the Czech Republic, Estonia, the German Democratic

Republic, Hungary, Poland, Russia, Slovakia, and Slovenia. Others represent nations with a particularly conservative history, such as Spain, Brazil, and South Africa. Although Europe and North America are highly overrepresented, we do have nations from all continents and cultural regions, with the Islamic world represented by Turkey.

For 36 of the 42 nations more than one survey was available, which allows us to distinguish age from cohort effects within these countries (see the discussion of the models below). While we tried hard to find survey replicates in all countries, we felt that the nations for which we did not succeed were too interesting to be left out. Note however that the included nations differ widely in the span of years covered by the surveys we used, ranging from more than 40 years for the US and the Netherlands to as little as two or three years for Bulgaria and Russia. This will influence our capability to separate cohort and life-cycle effects since in nations with only a few years between surveys the correlation between the two will approach 1.0.

Trying to maximize the number of nations covered seems crucial to us for the success of comparative research since differences in stratification patterns are most likely multivariate, which makes it impossible to estimate the relative importance of different factors in a design with only a limited number of countries. We also think that increasing the sample sizes for each nation helps substantially to increase the stability of out estimates.

The surveys we analyze cover the second part of the twentieth century, with a 1947 U.S. survey and several surveys from the 1950s and 1960s. The bulk of our data was collected in the 1970s and 1980s, but we already have processed a fair amount of data for the 1990s, in particular from the post-communist countries. However, as noted, our historical unit of analysis is not the survey year but rather the year of entry into the labor market, and our studies collectively cover the entire 20th century, with the oldest cohort entering the labor force in 1900 (these are the older men

interviewed in the 1947 survey) and the youngest men entering the labor force in 2003. Note also that while a considerable part of our data on communist nations derives from the post-communist era, the cohorts included in it do not—most of these started working in the communist era or before.

Micro-level variables

SEX: In this paper we deal only with men. This is so not only because men are better represented in the data to which we have access but also because the occupational careers of women are so much more complicated than those of men that they require additional considerations, to which we will devote a separate paper.

AGE: Age does not enter our models directly, but is used to construct terms for experience and year of entry into the labor market (see below). In most of our data, age is recorded in single years; but occasionally age is grouped into 5- or 10-year categories by the original researchers (this happens most frequently in older surveys that derive from the punch-card-sorter era but is occasionally encountered in newer data to preserve confidentiality). Such grouped age data have been treated by adding a random integer to the category that spreads the data over the relevant age bracket. Another minor adjustment of the age data is that missing values have been replaced by a random value (within the range), in order to avoid loss of cases. However, this is a very rare event.

YEAR: The year of the survey also does not enter our models but is used to construct the year of entry into the labor market and the experience term. In some surveys, the year of survey was recorded somewhat imprecisely, as a survey may take more than one year to complete or its fieldwork may span calendar years. When the date of the interview was available—which was rare—we have used it. But otherwise we have settled for the modal year of data collection.

EDUC: Our educational attainment variable was constructed in several different ways, depending upon the available information in the original data set (see Ganzeboom and Treiman 1993 for additional detail). Here we simply note that our education measure can be thought of as representing "virtual years of schooling"—that is, the modal number of years it takes to complete a given course of study or to attain as given degree. The resulting scores appear to bear a smooth linear relationship to occupational status attainment but at the same time to approximate true schooling durations and also to be consistent across time and space. In order to create the decision rules for converting local education measures to our international standard, we have consulted country experts from around the world.

EYR: The year of entry into the labor force is constructed using the formula:

$$EYR = (YEAR - AGE) + 6 + EDUC,$$

which is our best estimate of the year of entry into the labor market. Give that AGE and YEAR are recorded with one year precision, the precision of their combination (birth cohorts) is at best two years. The formula that generates the year of entry adds the imprecision of years of education, which is probably larger. Finally, for studies in which age has been coded in intervals, we add a random jitter, as noted above. Altogether, these factors mean that specifying five-year labor-force-entry cohorts is about as precise as we can reasonably be; were we to try to identify narrower cohorts, we would simply increase the error and not truly gain precision.

Another concern about the entry year variable is that it is likely to be downwardly biased, for two reasons. It is likely that EDUC underestimates the true *duration* of schooling since students sometimes repeat years, take detours in the educational system or interrupt their educational careers. Thus, many students are older than the modal age of completion identified by the EDUCYR variable. Also, they may not have entered the labor market directly after completing

their education, but may have done military service, been unemployed for an initial period, traveled, or otherwise marked time. In the current version of the paper we have not been able to address this issue. But we intend in a future version to explore the extent of bias by introducing lags into our over-time models.

EXP: Labor force experience is estimated as AGE – EYR. That is, the men in our sample are assumed to have worked continuously from the year they entered the labor force until the year of the survey. For men this is a reasonable, although not completely accurate, assumption. For women it would yield very poor estimates because of the unknown but variable propensity of women to drop out of the labor force to bear and rear children. Our need to rely on proxy measures of labor force entry year and experience is an additional reason for restricting our analysis to men.

ISEI and *FISEI*: These scores indicate the socioeconomic status of respondent's and father's occupation, measured by the *I*nternational *S*ocio-*E*conomic *I*ndex of occupational status (ISEI), developed by us in earlier research (Ganzeboom et al. 1992; Ganzeboom and Treiman 1996). The measure follows the logic of all socioeconomic indexes of occupations, deriving the status of occupations from the typical education and income of incumbents. The particular rationale Ganzeboom et al. (1992) developed for the ISEI was to scale occupations in such a way that the status scores maximize the indirect effect of education on income through occupation and minimize the direct effect of education on income. That is, occupation is conceptualized as the activity that transfers education into earnings. The ISEI score scales occupations on a scale ranging from 10 to 90 points, with unskilled farm workers assigned the lowest score and judges assigned the highest score.

The ISEI scores were developed initially using data from approximately 70,000 men employed full-time from 16 countries whose jobs had been coded into the categories of the 1968

International Classification of Occupations (ISCO); the ISEI was then updated for the 1988 ISCO (Ganzeboom and Treiman 1996). Hardly any of our data were originally coded into the ISCO categories, but rather were typically coded either in national census codes or in some other occupational coding scheme devised by researchers. We converted all these codes to one of the two ISCO classifications (typically the 1988 classification unless the original source was based on the 1968 version) and then used our standard map to assign ISEI scores to ISCO codes.[4] For additional details on the procedures we used to assign ISEI scores, see Ganzeboom et al. (1992); Ganzeboom and Treiman (1996, 2003).

Macro-level variables

LEVEL: Although in the theoretical section we outlined a number of different dimensions of societal development that we expect to affect the process of status attainment, the fact is that most of the available measures tend to be highly correlated, both across nations and over time. Thus, for the present analysis we have constructed a single measure of the level of societal development, consisting of measures of energy consumption, GNP, labor force distribution, density of communication, literacy and educational enrollment, and availability of medical services. The procedures used to create this measure are described in Appendix B.

COMM: Creating a fully adequate political intervention variable for all the nations and cohorts for which we have status attainment variables would be an even more complicated task than creating an economic development variable. Although, as noted in the discussion of our hypotheses, we would expect right wing *laissez faire* regimes to differ from social democratic regimes in their status attainment patterns, because of the greater commitment of social democratic

[4] See http://home.fsw.vu.nl/~ganzeboom/ . Click on "International Stratification and Mobility File ISMF." Then click on "Tools for Standardizing Occupation Codes."

regimes to creating equality of opportunity for those from disadvantaged origins and in regulating the labor market, we have not yet been able to create a measure that distinguishes such regimes for each nation throughout the 20th century—a daunting task. Thus, for the present analysis we have settled for the construction of only one dimension of political interventionism, namely a contrast between state socialist ("communist") nations and nations with market regimes. For the 10 nations in our data set that have had communist regimes sometime in the 20th century (Bulgaria, China, the Czech Republic, Estonia, East Germany, Hungary, Poland, Russia, Slovenia, and Slovakia) we have coded labor force entry cohorts as 1 if a communist regime existed at any time during the five year period covered, and zero otherwise.

4. DESIGN AND MODELS

Our basic strategy is to form "contexts" by crossing nations by 5-year labor force entry cohorts by 10-year experience groups; to estimate a simple micro-model of occupational attainment (described below) for each context; and then to analyze the coefficients of the micro-model as a function of the two macro-level characteristics just described plus indicators of labor force entry year and labor force experience. Because data are not available for all cohorts within each nation, we actually analyze only one-third of the contexts that would be included if we had data on all cohorts and all experience groups for each nation (that is, we analyze 1,436 contexts out of 4,305 = 42*21*5).

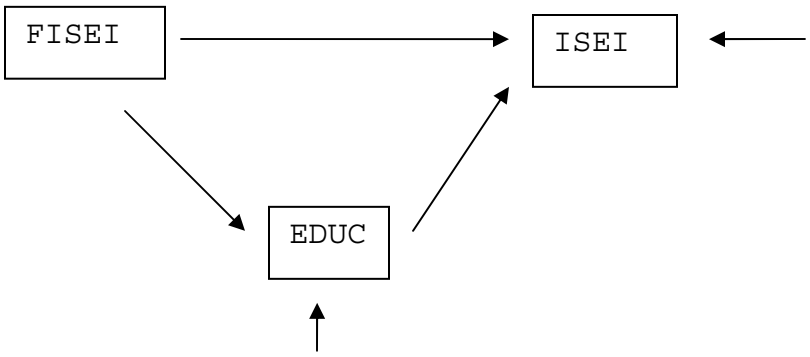
With respect to the historical dimension, we have made our design as powerful as possible, taking advantage of the superior characteristics of cohort comparisons over survey comparisons. For nations for which we have more than one survey, our design allows us to create a cohort comparison of the ascription and achievement pattern at the beginning of the career, because we

observe each labor force entry cohort at different points in time and therefore at different ages. By controlling variations in occupational status attainment for each cohort over the life cycle, we are able to assess historical differences as they have been imprinted in cohort differences. Our basic unit of historical comparison is the labor market entry cohort, a group of men that entered the labor market in the same historical period and has gone through identical historical experiences since.

How can one conduct historical comparisons using cohorts for nations for which data are available from only one survey (or from surveys separated by only a year or two)? One possibility is to disregard life-cycle effects and assume that age-specific stratification patterns are entirely produced by cohort differences. This is indeed what some previous studies have done (e.g. Erikson and Goldthorpe 1992). However, a pooled design of the sort we use here makes it possible to take a major step beyond that approach, by providing us with a plausible model of the way the occupational career develops in nations for which we have data, which we can then use to correct entry year-specific status attainment patterns for life-cycle effects. Of course, we are well aware that by using such a procedure (described in more detail below) we are vulnerable to error due to the incorrectness of the assumption that life-cycle effects are similar across nations, but we believe that the increase in statistical power outweighs the loss of precision resulting from the use of proxy estimates of life cycle effects.

The micro model

In this analysis we study an elementary occupational status attainment model:



In the present analysis we study the effects of FISEI and EDUC on ISEI and do not consider the effect of FISEI on EDUC. This part of the model can be estimated by an equation of the form:

$ISEI = B_0 + B_1*FISEI + B_2*EDUC + e,$

However, as just noted, we need to take account of the fact that we have data for men with various amounts of work experience, and that experience probably affects the dependence of occupational status on both education and father's occupational status—it is likely that the effects are strongest for those just beginning their careers. We also need to take account of historical changes in the average status of jobs obtained by new labor force entrants and historical changes in the effects of education and father's occupation on the kind of job obtained at the career outset. We could accomplish both by estimating a micro-model that includes interactions between each of the two predictor variables and, respectively, years of labor force experience (EXP) and entry year (EYR). However, it is more convenient to introduce these interactions at the macro-level by allowing the effects of education and father's occupation, and the intercepts as well, to vary across contexts.

It is important to control for both entry year and labor force experience because there is a high negative correlation between these two variables within each nation, as there must be in any data that arise from repeated cross-sections: we only observe people from early entry years among the very experienced and people from recent entry years necessarily have limited experience. The correlation is typically around -.85 for the nations analyzed here. It is -.79 for the U.S., the nation with the widest range of survey dates, and approaches -1.0 as survey dates move closer together. The high negative correlation between EXP and EYR means that any effect that is associated with year of entry can be easily confounded with an effect arising from experience. We are interested primarily in historical (entry cohort) effects, in particular how the relationship between early career status on the one hand, and father's status and educational credentials on the other hand, varies by societal circumstances at the time of labor force entry. In order to answer this question from pooled cross-section data it is always necessary to estimate how the relationship between current occupational status on the one hand, and father's occupation and education on the other, changes through the life cycle.

The macro model

The question to be answered by our analysis is how the parameters estimated in the micro-model described above vary across historical and national contexts (as well as over the life-cycle). We do this by treating the coefficients expressing the effects of education and father's occupational status, respectively, on the respondent's occupational status as dependent variables in a macro-level analysis in which the predictor variables are our measures of development and communist government, plus linear representations of entry year and experience. Because these coefficients are

not independent over time, we make use of Stata's XTGMS command, one of several commands designed to deal with cross-sectional time-series (XT) models.[5]

5. ANALYSIS

Tables 1 and 2 report parameter estimates and fit statistics (likelihood ratio statistics) for our two macro models. Models with higher likelihood ratios fit better than models with lower likelihood ratios. In these tables, "ascription" is measured by the effect of father's occupational status on the respondent's occupational status, B_1, and "achievement" is measured by the effect of education on occupational status, B_2. As noted above, education is measured in years and occupational status is measured in ISEI points ranging from 10 to 90. Labor force entry year is measured by decade, but is centered at 1950, which means that 1900 = -5 and 2000 = 5; and labor force experience is also measured by decade (ranging from 0 to 5). Communism (COMM) is a dichotomy, scored 1 if a regime is communist at the time the cohort entered the labor force and scored zero otherwise. The economic development variable (LEVEL) is scale with the lowest level of development coded zero and the highest level of development coded 1.

Ascription. The first model in Table 1 shows that both socio-economic development and communism have the predicted impact on ascription. The intercept refers to the expected level of ascription (that is, the expected effect of a one point change in father's ISEI on son's ISEI net of education) for non-communist nations at the lowest level of development. This coefficient is .32,

[5] We explored all three XT models available in Stata as well as several LSDV models. XTGLS models proved to be most flexible in accomodating heteroscedastic variances, both by accepting weighted data points (with weights proportional to the precision of estimates, measured by the reciprocal of the squared standard error) and by allowing heteroscedastic variances among countries. As our data are highly variable with respect to the number of cases per context (even though we omitted contexts with fewer than 20 cases), this was an important issue. However, our results generally were not sensitive to the choice of the estimation model, with some significant exceptions. For example, dramatic changes in coefficients occur when weights are not taken into account, and also when the most detailed LSDV

which is quite high. The coefficient of -.19 for LEVEL tells us that going from the lowest to the highest level of development reduces the ascription effect by more than half, to .13, again net of the effect of communism. For nations at any particular level of development, communist nations would be expected to have less ascription (a coefficient .06 lower) than non-communist nations. Note that both the LEVEL and COMM coefficients are highly significant. Thus, averaging over all contexts (that is, not taking account of entry year or experience), we see substantial effects in line with our theoretical expectations.

Model 2 adds the cohort labor force entry year (EYR) as an additional predictor and also tests whether the historical trend is different between communist and non-communist countries, by including the interaction between entry year and communist regime. This turns out to be the case: the trend in communist nations is significantly positive—up by .03 (=.038-.010) per decade—while in non-communist nations it is negative—down by .01 per decade. Recall that we centered the entry year variable at 1950, the approximate beginning point of most communist regimes, including eight of the 10 analyzed here. Because of the way we centered the data, the coefficient associated with COMM refers to the difference between communist and non-communist regimes in 1950. The estimated coefficient (-.113) can therefore be interpreted as the impact of communist orthodoxy—that is, of policies imposed at the beginning of communist regimes that minimized the impact of occupational origins on occupational attainment. However, the size of the COMM_EYR interaction coefficient (.038) suggests that communist regimes were unable to sustain their revolutionary fervor and that by 1980 communist and non-communist regimes had converged (since .038*3=.114). Interestingly, the implication of the linear trend is that by the collapse of communism in 1989, there was somewhat less ascription in communist than in non-communist

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controls are introduced.

nations at an equal level of development (a coefficient about .04 smaller). Perhaps the convergence would be better represented by including a squared term for entry year; but we have not done this in the present analysis. Finally, controlling for entry year and the interaction with communism modestly reduces the negative effect of level of development on ascription. But it remains quite strong.

In Model 3 we include labor force experience as an additional predictor, together with the interaction between labor force experience and communist regime. Since experience and entry year are so highly correlated, inclusion of labor force experience as a control is needed to validate our historical interpretation of the entry year effect. Controlling the experience component makes estimates of the net historical trend much stronger (-.017 per decade), and increases the rate of convergence between communist and non-communist regimes, but has little impact on the remaining coefficients. In particular the interaction between experience and communism is small and barely significant. This suggests that the revolutionary effect of communism around 1950 affected all age groups in a relatively similar way and that the historical resurgence of ascription likewise has been similar across the life cycle. This is consistent with findings reported elsewhere on the impact of the transition to communism on intergenerational occupational mobility (Wong and Treiman 1998).

In order to explore the effects of contextual variations on ascription somewhat further, we estimate the model for separate experience groups (ranging from 0-9 to 40+ years of experience), in models 4a-4e. In these models, experience differences can play no role, and we thus can focus on historical trends and the effects of communism and socio-economic level among men with (approximately) equal levels of labor force experience.

Models 4a-4e reveal several interesting patterns. First, in nations at the lowest level of development, the effect of social origins diminishes over the course of the career, ranging from .42 for men with the least experience to .25 for men with the greatest experience. This may reflect a strong tendency in nations at low levels of development for men to follow their fathers' footsteps, either into their fathers' fields or shops or at least into similar jobs. But as men progress through their careers they may move away from their apparent destinies as a result of their idiosyncratic experiences. However, this life course trend does not occur in the most developed nations. Rather, father's occupational status has little impact on son's status even for those at the beginning of their careers. We can see this clearly by computing the differences, B_0 – LEVEL, experience-group-by-experience-group. These are, respectively, .12, .14, .15, .14, and .15. Presumably, the fact that in developed nations occupational allocation is based largely on educational credentials leaves relatively little room for ascriptive forces to operate independently of their impact on educational attainment.

The effect of communism is rather less straightforward, which may reflect the complex relationship between entry year, experience, and the historical pattern of communist governance. The implication of the coefficients is that the effect of communism was restricted to those in the first three experience groups; that it was strong in 1950, especially for the second and third experience groups; and that it has essentially disappeared by 1980 (since COMM – 3*COMM_EYR ≈ 0).

Finally, for non-communist nations there is a non-trivial reduction in the effect of social origins over the course of the 20th century (measured by the effect of labor force entry year, EYR/10), which is most pronounced for men who are well advanced in their careers. Net of other effects, men beginning their careers at the end of the century would be expected to experience a .11

reduction in the effect of father's occupation relative to men beginning their careers at the beginning of the century (=-.011*10). This effect doubles for men with the greatest work experience, to -.22. Why the secular trend in the decline in ascription is most pronounced late in the career is unclear and requires further exploration.

Achievement. The same set of XTGLS models is estimated for the achievement pattern (B_2) in Table 2. The story is largely a mirror image of what we found for ascription in Table 1, but there are some important differences. In model 1 we see that both the level of development and communism have the positive effects on achievement that we hypothesized. Among non-communist nations at the lowest level of development, each year of schooling increases the ISEI score by about 1.3 points while at the highest level of development the effect more than doubles, to 3.1 points (=1.281+1.814). Thus, in the most developed nations a college graduate would be expected to obtain a job with an ISEI score 12.4 (=3.1*4) points higher than a high school graduate, a difference that corresponds to, for example, the difference between an engineer and an office manager. Similarly, the occupational status returns to each year of education are about 6/10ths of a point higher in communist nations than in non-communist nations. If we take the associated t-values as proxy indicators of the relative strength of the effects, we find that the contextual effects on achievement are in fact stronger than on ascription.

Turning to Model 2, we see that the communist effect on achievement (returns to education) was .84 at the beginning of communism in most nations (1950), but that the effect of communism diminished by about .25 per decade, so that by the end of the communist era communist and non-communist nations at the same level of development had converged with respect to the effect of education on occupational attainment. Also, the effect of education increases by .085 per decade. This is a fairly large effect, which implies that over the 20th century the effect

of education on occupational attainment increased by about half the difference between the least developed and most developed nations (≈(.085*10)/1.658).

However, the story becomes a bit more complicated when we introduce labor force experience as a control, in Model 3. In fact, what happens is that education and occupation become more loosely connected over the career (EXP/10 = -.153) but there is no historical change in the education-occupation connection at the beginning of the career (EYR/10 = -.004).

Estimating separate models for experience groups (Models 4a-4e) reveals patterns substantially, but not entirely, similar to those for Models 4a-4d in Table 1, but with opposite sign. We note, first, that in the least developed non-communist nations in 1950 (the zero points on each of the variables) the effect of education on occupational status attainment *increases* with labor force experience, nearly doubling over the course of the career. This is contrary to our expectations but could reflect the cumulative advantage of education (DiPrete and Eirich 2006). That is, in environments in which many men start out by following their fathers and gradually strike out in new directions, it would be expected that the best educated would end up in the most desirable jobs (here measured as the jobs with the highest status). However, in the most developed nations the effect of education diminishes over the course of the career, as we would expect; the coefficients formed by subtracting LEVEL from B_0 are, respectively, 4.20, 3.35, 2.78, 2.67, and 2.71. This makes sense since one consequence of development is that occupational training is largely carried out in the schools, which means that the connection between schooling and occupational outcomes should be strongest at the outset of the career.

The secular trend in the effect of education on occupational attainment is somewhat puzzling. It turns out that the absence of an effect observed in Model 3 masks distinctive differences between labor force experience groups. For those whose careers are well advanced,

there is a very substantial increase in the effect of education over the course of the 20th century, 2.75 ISEI points per year of education. However, for men just beginning their careers the secular trend is opposite—there is a two point reduction in ISEI returns to education over the course of the century. It may be that as education has expanded (as it has in almost all nations throughout the century) each additional year of education has become less advantageous for occupational placement immediately after leaving school. But we have no good explanation for why the returns to education have actually increased over time among men in their 4th and 5th decades of employment.

The effect of communism reveals a complexity similar to what we observed for ascription: it is the middle experience groups for which communist regimes appear to promote a tight education-occupation connection; and the connection is tightest at the outset of communism in 1950 and has largely disappeared by the 1980s. Again, the lack of significant effects for the youngest and oldest experience groups may simply reflect the timing of the beginning and ending of communist regimes relative to the beginning and ending of the careers of men in our sample living in communist nations.

6. SUMMARY AND CONCLUSIONS

In this paper we reported on a very large scale comparative analysis of patterns of ascription and achievement based on an elementary status attainment model. *Ascription* is measured as the direct effect of father's occupational status on son's current occupational status and *achievement* is measured as the direct effect of son's years of education on son's current occupational status. We combined data from multiple surveys conducted in 42 countries around the world that represent different levels of economic development and various political regimes. The

data refer to 374,093 men age 21-64, drawn from 331 sample surveys conducted between 1947 and 2003. We organized the data for each nation by five-year labor-force-entry cohorts, which range from 1900 to 2000 and further distinguished 10-year labor force experience groups. That is, we defined contexts as consisting of men from a particular nation who entered the labor force within a given five year period and had a given amount of labor force experience (measured in 10 year increments). Crossing nations by labor-market entry-cohorts by experience-groups creates 1,436 separate contexts with at least 20 observations. We then estimated a simple status attainment model within each context, predicting occupational status from education and father's occupational status. The parameters associated with each of the two predictor variables were then treated as observations and analyzed at the macro-level using a weighted pooled time-series (XTGLS) design that assessed the effects of economic development and political regime on the occupational attainment process.

We argue that this design gives us an exceptionally sharp comparative perspective on patterns of ascription and achievement. The superiority of our design over previous analyses includes the very large amount of individual-level data; the very large number of contexts (in contrast to many cross-national comparisons that are restricted to a handful of nations or at most 20 or 30); the broad coverage of societies across time and space, including highly developed and very under-developed nations and both communist and market economies; the high degree of comparability or our data resulting from extensive effort to standardize measurement; the reduction of idiosyncratic survey effects resulting from the conversion of survey-based estimates to cohort-based estimates; and the ability to simultaneously analyze the sources of both cross-sectional and cross-temporal variations in the status attainment process via models that have appropriate error structures.

The research questions we have addressed are quite simple, but have constituted the main agenda of comparative stratification research over the past half century (for early formulations see Lipset and Bendix 1959; Treiman 1970). We assessed the relative power of the modernization thesis and the political intervention thesis. To measure the level of modernization of each context we constructed a development index based on some dozen indicators available for many nations over a relatively long period of time. We measured political intervention by contrasting communist and non-communist regimes, scoring each context on the basis of whether it had a communist government at any point within the 5-year period defining the context. Our main hypotheses were that the ascription (the effect of father's occupation on occupational attainment) is weaker in communist and developed contexts and that achievement (the effect of education on occupational attainment) is stronger in communist and developed contexts. Our main conclusions can be summarized as follows:

1. Both ascription and achievement vary across contexts as expected: achievement effects are stronger in more developed nations and ascription effects are weaker. Also, achievement effects are stronger and ascription effects are weaker in communist than in non-communist nations.

2. In non-communist nations, the effect of ascription declines over the course of the 20th century but, contrary to our expectation, the effect of achievement does not increase over time. The latter result is misleading, however, as is revealed by estimation of separate models for those with varying amounts of labor force experience: as expected, among those whose careers are well advanced, the effect of achievement increases over time; but for those just beginning their careers the effect of achievement declines. This is an anomalous result for which we do not yet have an explanation.

3. The effect of communist regimes was substantial around 1950 (the point as which most communist governments assumed power) but gradually converged with the patterns of market regimes, so that by the 1980's communist regimes were no longer distinctive.
4. In the least developed non-communist nations, ascription decreases over the course of the career, as would be expected; but in the most developed nations, for which ascription is very weak even at the outset of the career, there is no further decline in the course of the career.
5. In the most developed non-communist nations, the effect of education decreases over the course of the career, as would be expected; but in the least developed nations, the effect of education *increases* over the course of the career, a result that may reflect the long-term cumulative advantage of education.

While these conclusions are substantially consistent with our initial hypotheses and provide rich details on the exact pattern of influence during the life course, there are several obvious next steps to be taken. First, the status attainment model analyzed here is extremely simple—it condenses "ascription" and "achievement" into a single coefficient for each concept. One possibility would be to expand the micro-model by introducing additional indicators of both ascription and achievement. We do not regard this direction as particularly appealing because it would radically reduce the amount of data available to us and the coverage of diverse contexts. However, it would be desirable to include the omitted path, from father's occupation to educational attainment, in our analysis in order to complete the story that can be gleaned from our three variable model.

Another possibility would be to elaborate not the model but the measurement, by conceptualizing the variables in the micro-model in a discrete way. This could be done by using conditional multinomial logit models for occupational attainment (Logan 1983; DiPrete 1990; Hendricks and Ganzeboom 1998; Wu and Treiman 2006) and for education. Doing this, however, would not only add considerably to the complexity of the analysis but also would impose even more stringent demands on the data than we faced. In our current analysis education and occupation are rendered comparable across nations and surveys by using common metrics for education (years of schooling) and occupational status (the ISEI scale). Creating strict comparability between occupational classes or educational categories is much more demanding. If comparability were achieved, models for discrete data could be estimated for each context in the same way as we have estimated the status attainment model—although the number of contexts would be substantially reduced because discrete methods require many more observations to yield stable estimates than do the OLS models we estimated at the micro-level. We would then have multiple measures with which to characterize net school-to-work and father-to-son effects. Of course, even apart from the reduction in the number of contexts, such a design would run the risk of spreading differences into multiple degrees of freedom, which would diminish statistical power. Our inclination, therefore, is to explore this direction in only a limited way.

Much more attractive, and much more tractable, are macro-level elaborations of the work presented here. We expect to pursue several possibilities. First, we need to develop better indicators of development. In the present analysis we relied on a single multiple-item scale of "development." However, despite the high correlations among the component indicators, it is not evident that development is not truly unidimensional. Industrialization, increased bureaucratization of the labor force, and educational expansion may all have separate effects on the status attainment process

(Treiman 1970). Second, our measure of political intervention was extremely crude. The obvious next step is to try to distinguish between *laissez faire* and social democratic regimes, with the expectation that effects of ascription will be stronger and effects of achievement will be weaker in *laissez faire* than in social democratic regimes. Third, there is well developed theory regarding societal variations in the linkage between school and work, depending on the way both schooling and the labor market are institutionalized in different societies (Allmendinger 1989; Shavit and Müller 1998). We thus need to add consideration of such institutional differences, if only as controls. Finally, as we noted in our theoretical discussion, the claim has been made (Treiman and Yip 1989) that the greater the inequality in the stratification system of a nation, the stronger the effect of ascription and the weaker the effect of achievement on occupational attainment. Thus, too, should be tested. All of these possibilities present formidable data problems since they all require data that differentiate national institutional arrangements across the 20th century. Nonetheless, additional effort in this direction is likely to have a substantial payoff; and, if it doesn't, that would be informative in its own right.

Finally, we think we can considerably refine our macro-model, in three ways: by permitting non-linear effects of many of our variables (which, for example, would probably eliminate the anomalous result that toward the end of communism communist regimes apparently became even less ascriptive and more achievement-based than market regimes); by permitting additional interactions, for example, between development and, respectively, entry year and experience; and by distinguishing between the farm-origin and nonfarm-origin population, which are known to be subject to quite different status attainment processes (Blau and Duncan 1967; Featherman and Duncan 1978; Erikson and Goldthorpe 2002; Wu and Treiman 2006).

Finally, we need to explore ways of estimating the micro- and macro-models simultaneously. This could lead to better estimates, but more importantly would allow us to introduce cross-level interactions, in particular the way micro-coefficients respond to survey characteristics. This would enable us to introduce data quality constraints as control variables (cf. Ganzeboom et al. 1989); we have found no practical way to do this in the present design.

In conclusion, there is still work to be done, both on the present paper and beyond.

7. REFERENCES

Allmendinger, Jutta. 1989. "Educational Systems and Labor Market Outcomes." *European Sociological Review* 5:231-250.

Banks, Arthur S. 1976. *CROSS-NATIONAL TIME SERIES, 1815-1973* [Computer file]. ICPSR ed. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [producer and distributor].

Bielby, William T. 1981. "Models of Status Attainment." *Research in Social Stratification and Mobility* 1:3-26.

Blau, Peter M., and Otis Dudley Duncan. 1967. *The American Occupational Structure*. New York: Wiley.

Blossfeld, Hans-Peter, and Yossi Shavit. 1993. "Persisting Barriers: Changes in Educational Opportunities in Thirteen Countries." Pp. 1-23 in *Persistent Inequality: Changing Educational Attainment in Thirteen Countries*, edited by Yossi Shavit and Hans-Peter Blossfeld. Boulder: Westview Press.

Breen, Richard (ed.). 2004. S*ocial Mobility in Europe.* New York: Oxford University Press.

Contemporary Sociology. 1992. "The American Occupational Structure: Reflections after Twenty-five Years." A Review Symposium. *Contemporary Sociology*. 21:596-668.

Dessens, Jos A. G., Wim Jansen, Harry B. G. Ganzeboom, and Peter G. M. Van der Heijden. 2003. "Patterns and Trends in Occupational Attainment of First Jobs in the Netherlands, 1930-1995: OLS Regression vs. Conditional Multinomial Logistic Regression." *Journal of the Royal Statistical Society*, Series A. 166, Part 1:63-84.

Deng, Zhong, and Donald J. Treiman. 1997. "The Impact of the Cultural Revolution on Trends in Educational Attainment in the People's Republic of China". *American Journal of Sociology* 103:391-428.

DiPrete, Thomas A. 1990. "Adding Covariates to Loglinear Models for the Study of Social Mobility." *American Sociological Review* 55:757-773.

DiPrete, Thomas A., and Gregory M. Eirich. 2006. "Cumulative Advantage as a Mechanism for Inequality: A Review of Theoretical and Empirical Developments." *Annual Review of Sociology*
32:271-297.

Djilas, Milovan. 1957. *The New Class: An Analysis of the Communist System*. New York: Praeger.

Erikson, Robert, and John H. Goldthorpe. 1992. *The Constant Flux: A Study of Class Mobility in Industrial Societies*. Oxford: Clarendon Press.

Esping-Andersen, Gøsta. 1990. *The Three Worlds of Welfare Capitalism*. Princeton: Princeton University Press.

Featherman, David L., and Robert M. Hauser. 1978. *Opportunity and Change*. New York: Academic Press.

Ganzeboom, Harry B. G., and Donald J. Treiman. 1993. "Preliminary Results on Educational Expansion and Educational Achievement in Comparative Perspective." Pp. 467-506 in *Solidarity of Generations: Demographic, Economic and Social Change, and Its Consequences*, edited by Henk A. Becker and Piet L. J. Hermkens. Amsterdam: Thesis Publishers.

Ganzeboom, Harry B. G., and Donald J. Treiman. 1996. "Internationally Comparable Measures of Occupational Status for the 1988 International Standard Classification of Occupations." *Social Science Research* 25:201-239.

Ganzeboom, Harry B. G., and Donald J. Treiman. 2003. "Three Internationally Standardised Measures for Comparative Research on Occupational Status." Pp. 159-193 in *Advances in Cross-National Comparison. A European Working Book for Demographic and Socio-Economic Variables*, edited by Jürgen H. P. Hoffmeyer-Zlotnik and Christof Wolf. New York: Kluwer Academic Press.

Ganzeboom, Harry B. G., Paul de Graaf, and Donald J. Treiman. 1992. "An International Scale of Occupational Status." *Social Science Research* 21:1-56.

Ganzeboom, Harry B. G., Ruud Luijkx, and Donald J. Treiman. 1989. "Intergenerational Class Mobility in Comparative Perspective." *Research in Social Stratification and Mobility* 8:3-84.

Ganzeboom, Harry B. G., Ruud Luijkx, and Donald J. Treiman. 1998. "The Structure of the World-Wide Regime of Intergenerational Occupational Mobility: A Multi-Dimensional Approach." Paper presented at a meeting of the Research Committee on Social Stratification and Social Mobility, Taipei, 7-9 January.

Hanley, Eric, and Donald J. Treiman. 2005. "Recruitment into the Eastern European Communist Elite: Dual Career Paths." *Research in Social Stratification and Mobility* 23:35-66.

Hernandez de Frutos, Teodoro. 1993. "Status Attainment in the Middle of the Road between Theory and Analytic Technique." *Revista Espanola de Investigaciones Sociologicas* 61:185-198.

Hendrickx, John, and Harry B. G. Ganzeboom. 1998. "Occupational Status Attainment in the Netherlands, 1920-1990: A Multinomial Logistic Regression Analysis." *European Sociological Review* 14:387-403.

Hout, Michael, and Thomas A. DiPrete. 2006. "What We Have Learned: RC28's Contributions to Knowledge about Social Stratification." *Research in Social Stratification and Mobility* 24:1-20.

Johnston, Aaron, Harry B. G. Ganzeboom, and Donald J. Treiman. 2005. "Mothers' and Fathers' Influences on Status Attainment." Paper presented at a meeting of the Research Committee on Social Stratification and Social Mobility of the International Sociological Association, Oslo, Norway, May 6-8.

Kerckhoff, Alan C. 1995. "Institutional Arrangements and Stratification Processes in Industrial Societies." *Annual Review of Sociology* 21:323-347.

Konrád, George, and Ivan Szelenyi. 1979. *The Intellectuals on the Road to Class Power.* Harcourt Brace Jovanovich.

Kreidl, Martin. 2005. *Inequality in Access to Secondary and Post-Secondary Education in Countries of the Former Soviet Bloc after 1948*. Los Angeles: Unpublished Ph.D. dissertation, Department of Sociology, UCLA.

Kreidl, Martin, Harry B. G. Ganzeboom, and Donald J. Treiman. 2004. "Trends in Occupational Returns to Education: A Comparative Perspective." Paper presented at a meeting of the Research Committee on Social Stratification and Mobility, Neuchâtel, Switzerland, 6-8 May.

Lenski, Gerhard E. 1966. *Power and Privilege: A Theory of Social Stratification.* New York: McGraw-Hill.

Lipset, Seymour Martin, and Reinhard Bendix. 1959. *Social Mobility in Industrial Society.* Berkeley: University of California Press.

Logan, John A. 1983. "A Multivariate Model for Mobility Tables." *American Journal of Sociology* 89:324-349.

Müller, Walter, and Yossi Shavit. 1998. "The Institutional Embeddedness of the Stratification Process: A Comparative Study of Qualifications and Occupations in Thirteen Countries." Pp. 1-48 in *From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations*, edited by Yossi Shavit and Walter Müller. Oxford: Clarendon.

Parkin, Frank. 1971. *Class Inequality and Political Order: Social Stratification in Capitalist and Socialist Societies.* New York: Praeger.

Rijken, Susanne. 1999. *Educational Expansion and Status Attainment: A Cross-National and Over-Time Comparison.* Ph.D. dissertation, Dept. of Sociology, Utrecht University. ICS Dissertation Series. Amsterdam: Thesis Publishers.

Rijken, Susanne, and Harry B. G. Ganzeboom. 2000. "The Effect of Social Origin on Educational Opportunity: a 42 Country Comparison 1900-1970." Paper presented at the European Consortium for Sociological Research, Giens (near Toulon), France, Sept. 15.

Rosenbaum, James E., and Takehiko Kariya. 1989. "From High School to Work: Market and Institutional Mechanisms in Japan." *American Journal of Sociology* 94:1334-1365.

Shavit, Yossi, and Hans-Peter Blossfeld (eds.). 1993. *Persistent Inequality: Changing Educational Attainment in Thirteen Countries.* Boulder: Westview Press.

Shavit, Yossi, and Walter Müller (eds.). 1998. *From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations.* Oxford: Clarendon.

Simkus, Albert, and Rudolf Andorka. 1982. "Educational Attainment in Hungary." *American Sociological Review* 47:740-751.

Treiman, Donald J. 1970. "Industrialization and Social Stratification." *Sociological Inquiry*, Special Issue: Stratification Theory and Research 40:207-234.

Treiman, Donald J. 1977. *Occupational Prestige in Comparative Perspective*. New York: Academic Press.

Treiman, Donald J., and Harry B. G. Ganzeboom. 1990. "Cross National Comparative Status Attainment Research." *Research in Social Stratification and Mobility* 9:1-5-127.

Treiman, Donald J., and Andrew G. Walder. 1999. "The Consequences of Political Class Background (*Jiating Chushen)* in the People's Republic of China." Paper presented at the annual meeting of the American Sociological Association, Chicago, 8 August.

Treiman, Donald J., and Kam-bor Yip. 1989. "Educational and Occupational Attainment in 21 Countries." Pp. 373-394 in *Cross-National Research in Sociology*, edited by Melvin L. Kohn (ASA Presidential Series). Beverly Hills: Sage Publications.

Treiman, Donald J., Harry B. G. Ganzeboom, and Susanne Rijken. 1998. "Educational Expansion and Educational Achievement in Comparative Perspective." Paper presented at a meeting of the Research Committee on Social Stratification and Social Mobility, Taipei, 7-9 January. [Los Angeles: UCLA, California Center for Population Research, Online Working Paper CCPR-007-03.]

Walder, Andrew G., Bobai Li, and Donald J. Treiman. 2000. "Politics and Life Chances in a State Socialist Regime: Dual Career Paths into the Urban Chinese Elite, 1949-1996." *American Sociological Review* 65:191-209.

Wong, Raymond Sin-Kwok. 1990. "Understanding Cross-National Variation in Occupational Mobility." *American Sociological Review* 55:560-573.

Wong, Raymond Sin-Kwok, and Donald J. Treiman. 1998. "Revolutionary Times, Revolutionary Transformations? Changes in Mobility Patterns in Eastern Europe During Early Transitions." Paper presented at the World Congress of Sociology, Montreal, Canada, 26 July-1 August.

World Bank. 1997. *World Development Indicators 1997* [CD-ROM]. Washington DC: World Bank.

Wu, Xiaogang, and Donald J. Treiman. 2006. "Inequality and Equality under a State Socialist Regime: Occupational Mobility in Contemporary China." Revised version of a paper presented at a meeting of the Research Committee on Social Stratification and Mobility, Rio de Janiero, Brazil, 7-9 August 2004. [Los Angeles: UCLA, California Center for Population Research, Online Working Paper CCPR-009-06.]

Table 1: XTGLS Macro Models for the Ascription Coefficient

Ascription (B_1)

EXP:				5	15	25	35	45
	(1)	(2)	(3)	(4a)	(4b)	(4c)	(4d)	(4e)
B_0	.315	.305	.340	.420	.361	.300	.241	.249
	(34.7)	(31.1)	(23.3)	(14.0)	(19.2)	(15.4)	(10.7)	(8.4)
EXP/10			-.011					
			(3.2)					
EYR/10		-.010	-.017	-.011	-.016	-.017	-.018	-.022
		(5.0)	(5.8)	(1.9)	(3.1)	(2.8)	(2.1)	(2.6)
LEVEL	-.190	-.168	-.175	-.298	-.224	-.153	-.102	-.101
	(14.6)	(11.5)	(11.9)	(8.6)	(8.4)	(6.2)	(2.9)	(2.3)
COMM	-.063	-.113	-.113	-.118	-.160	-.155	-.047	-.060
	(9.9)	(10.1)	(5.9)	(3.5)	(5.9)	(6.2)	(1.7)	(1.5)
COMM_EXP			.015					
			(1.9)					
COMM_EYR		.038	.048	.035	.060	.063	.012	-.080
		(6.4)	(5.9)	(2.7)	(5.0)	(3.4)	(0.3)	(0.6)
LR	1610	1637	1642	333	394	345	303	248
N-XT	1047	1047	1047	184	223	218	210	206

Notes: T-values in parentheses. EYR has been centered around (19)50.

Table 2: XTGLS Macro Models for the Achievement Coefficient

Achievement (B_2)

EXP:				5	15	25	35	45
	(1)	(2)	(3)	(4a)	(4b)	(4c)	(4d)	(4e)
B_0	1.281	1.361	1.613	1.180	1.110	1.514	1.643	2.038
	(23.7)	(24.0)	(17.5)	(5.4)	(9.7)	(14.7)	(13.4)	(13.0)
EXP/10			-.153					
			(5.7)					
EYR/10		.085	-.004	-.198	-.044	-.030	.030	.275
		(5.8)	(0.2)	(3.4)	(1.1)	(0.7)	(0.7)	(5.3)
LEVEL	1.814	1.648	1.613	3.019	2.240	1.266	1.028	.673
	(21.0)	(17.6)	(17.4)	(11.0)	(12.8)	(7.2)	(5.2)	(3.1)
COMM	.587	.842	.857	.142	1.036	1.038	.900	.020
	(11.7)	(10.7)	(4.4)	(0.4)	(6.1)	(6.9)	(5.3)	(0.1)
COMM*EXP			.016					
			(0.2)					
COMM*EYR		-.249	-.249	.045	-.322	-.242	-.319	.514
		(5.4)	(4.0)	(0.7)	(3.5)	(6.9)	(1.2)	(0.5)
LR	-481	-456	-437	-96	-57	-69	-86	-123

Appendix A: OVERVIEW OF DATA SOURCES

Nation	Effective N of men 21-64	Number of Surveys	Years of Surveys	Years of Cohorts
01. AUS Australia	10890	10	65 - 92	10 - 90
02. AUT Austria	2504	6	69 - 92	20 - 90
03. BEF Belgium Flanders	1797	4	71 - 91	20 - 90
04. BEW Belgium Wallonia	2253	6	71 - 91	20 - 90
05. BRA Brazil	21460	4	71 - 88	15 - 90
06. BUL Bulgaria	2058	3	91 - 93	35 - 90
07. CAN Canada (rest)	18657	7	65 - 94	15 - 95
08. CHN China	2410	1	96	40 - 95
09. CZR Czech Republic	4613	5	84 - 92	30 - 90
10. DEN Denmark	2652	4	72 - 76	20 - 70
11. ENG England	12384	12	63 - 92	15 - 90
12. EST Estonia	274	1	91	50 - 80
13. FIN Finland	998	2	72 - 75	20 - 70
14. FRA France	4447	5	58 - 95	10 - 95
15. GDR Germany-East	477	2	91 - 92	45 - 85
16. GER Germany-West	13086	12	69 - 92	20 - 90
17. HUN Hungary	33894	8	73 - 93	15 - 90
18. IND India	3695	2	71	15 - 65
19. IRE Ireland	2212	2	73 - 89	20 - 85
20. ISR Israel	3094	1	74	20 - 70
21. ITA Italy	5769	7	63 - 92	10 - 85
22. JAP Japan	7436	6	55 - 91	5 - 85
23. MAL Malaysia	5336	2	67 - 76	15 - 70
24. NET Netherlands	15948	21	58 - 96	10 - 92
25. NIG Nigeria	1452	2	71 - 73	15 - 65
26. NIR Northern Ireland	2488	2	68 - 73	20 - 70
27. NOR Norway	2016	3	72 - 92	20 - 90
28. NZE New Zealand	388	1	92	50 - 85
29. PHI Philippines	12901	3	68 - 92	15 - 85
30. POL Poland	12790	10	72 - 94	20 - 90
31. QUE Quebec	9222	10	60 - 90	10 - 90
32. RUS Russia	2377	3	91 - 93	40 - 90
33. SAF South Africa	2558	1	91	35 - 90
34. SCO Scotland	460	11	63 - 92	25 - 65
35. SLN Slovenia	4674	8	67 - 98	15 - 90
36. SLO Slovakia	2967	5	84 - 93	35 - 90
37. SPA Spain	11417	6	90 - 95	35 - 95
38. SWE Sweden	5361	8	60 - 96	10 - 90
39. SWI Switzerland	1590	3	72 - 83	20 - 80
40. TAI Taiwan	1562	1	70	15 - 60
41. TUR Turkey	2421	1	78	30 - 70
42. USA USA	47239	14	47 - 92	00 - 90

Note:Effective N's have been computed after removal of EXP/EYR combinations with less than 21 cases.

APPENDIX B: CONSTRUCTION OF THE SCALE OF SOCIETAL DEVELOPMENT

In order to measure economic and social development, one can resort to a number of criteria, each of which may have a unique relationship to structures of status attainment. While in future work we expect to study the separate effects of different dimensions of development, our aim in this paper is to test how societal development, conceived as a single overarching dimension of societal differentiation, influences status attainment. We therefore have created a single multiple-item scale of development. By doing this we are able to measure development with high reliability.

Indicators of economic and social development were taken from two sources: the 1815-1973 series of social and economic indicators created by the political scientist Arthur Banks, available from ICPSR (Banks 1976), and the World Development Indicators compiled by the World Bank; the series we use is the indicators for 1965-1994 (World Bank 1997). Both sources provide a great number of social and economic indicators that are relevant to our concept. Since the period covered by the Banks data is by far the most relevant to our data, we have taken this data set as our starting point. Table B.1 gives an overview of the series selected in each dataset, with their coverage in terms of total N.[6] Note that in two cases (urbanization, GNP) we have combined two closely related indicators in the Banks data in order to reduce incompleteness and increase reliability. We did this by equating the mean and standard deviation of the two distributions for cases in which we had data for both variables. See Treiman (1977:166-167) for a description of the procedure used.

[6] We conducted the analysis only for years and nations that were present in the micro-data. Thus the N is equal to the N of COHORT * NATION * 5. However, out-of-range data were used for interpolation where available.

The series selected cover most of the dimensions of economic and social development discussed in the body of the paper. Technological development is represented by the number of (non)farm and industrial workers, as well as measures of energy production and consumption. The wealth of nations is indicated by GNP and currency circulation. Urbanization is directly measured by combining two strongly related indicators. Communication and media dispersion is indicated by mail, telephones, vehicles and access to radio. Educational expansion is measured by literacy and enrollment at the primary, secondary, and tertiary level. Finally, the number of physicians can be thought of as direct measure of social development, as can the number of people in non-agricultural and non-industrial jobs. We feel that this set of indicators provides relevant and broad coverage of the development concept. However, it is somewhat weak with respect to indicators of post-industrial society. In addition, both the level of urbanization and the proportion of the labor force doing industrial work are a bit problematic since their relationship to other indicators of development is curvilinear—they begin to decline in post-industrial societies. Still, for the moment we have relied on linear representations for the sake of simplicity.

Unfortunately, for some nations indicators are unavailable from either data set because these nations were or are not politically independent. This is the case for nations within state, such as Flanders and Walloonia within Belgium; Quebec and English-speaking Canada; and Northern Ireland and Scotland within Gt. Britain. In these cases, we take data for the country as a whole. For Estonia, there are data available only before 1940, and we have estimated the remaining years using data for the Soviet Union. The contextual data for Russia in fact refer to the Soviet Union as a whole. There are no separate data available for the Czech Republic and Slovakia before 1990 and their macro measures are therefore identical. In each of these cases, the imputation at the national context by the country data seems a reasonable choice, in the sense that the within-state variation

can be expected to be small relative to the between-state variation. For instance, England, Scotland and Ireland may not have identical patterns of economic development, but they are more similar to one another than to most of the other countries in our analysis. Still, we have attempted to correct for within-state national differences. To do this, we inspected two indicators derived from our aggregated micro-data that are closely related to the independently measured macro-variables: mean education and proportion of fathers who are farmers. We then estimated how the standardized average of these variables for each nation within the country was conditioned by national context, cohort entry year, and their interaction, and used the linear prediction from this equation to adjust the macro-data.

The data from by both sources are shown on an annual basis but are by no means complete. In the Banks data, none of the indicators are available for the two World War periods (1914-1918, and 1939-1945). In addition, many of the data are missing for some of the periods in some of the countries. The multiple-indicator construction procedure we use is a convenient way to deal with these missing data since it turns out that for all of the countries at all times (except the war period) at least some indicator is available. Thus, by averaging the standardized scores we are able to assign a development score to each context except for the war periods. For these periods we have imputed the constructed time series by interpolation. Of course, this is hardly an accurate representation of how development is conditioned by war. In future work we plan to include a dummy variable for war time; but did not do so here.

Table B.1 gives an overview of the time-series extracted from the Banks data (panel A) and the World Bank data (panel B) that satisfy the criterion that they contribute to the overall-reliability of the index of development. All of these time-series are incomplete, although to different extents. Only two of the indicators (urban population and phones) approach complete coverage.

To make our initial selection of indicators we proceeded in a more or less informal way, with much visual inspection of data plots per country. As it turns out, a number of time series in the Banks data show some marked irregularities that do not seem to be related to any socio-economic crises and are not replicated in the other series for that countriy. These discontinuities seem to have been produced by a change of database or method of measurement. We took the liberty to smooth out these irregularities before submitting the series to the consistency analysis, by adding or subtracting a constant for part of the series, and occasionally by omitting the disrupting observations altogether. For these adjustments we used as a general rule that the newer observations are likely to be better than the old ones, and we therefore adjusted *towards* the more recent data. Second, interruptions in each series were repaired using simple linear interpolation. Third, series that tap a process in which growth occurs in a multiplicative way (GNP, energy, phones) were logged throughout the analysis, following the interpolation step. Fourth and finally, incompleteness at either end of each series was repaired using a mixture of two extrapolation strategies. Some values were imputed by invoking *a priori* considerations, mainly by borrowing information from data for other nations that we deemed to have followed a similar economic path or by imputing a theoretically plausible value. Otherwise a polynomial or linear regression was estimated to generate plausible extrapolations. Throughout the process we were cautious not to introduce random noise.

The same procedure was applied to the two data sets from the World Bank for the 1964-1994 period, but the number of "repairs" needed here was considerably smaller. Incompleteness in the World Bank data occurs quite frequently, but could almost always be repaired by a rather straightforward interpolation step, since the World Bank generally provides data at the extreme years.

We began our analysis by selecting those indicators that seemed to tap one underlying dimension, as indicated by their strong intercorrelations. While with cross-sectional data this is a conventional preliminary strategy for choosing candidate variables to indicate an hypothesized underlying dimension, with respect to cross-temporal data the requirements are rather more stringent: much of the positive correlation arises from the simple fact that in a developing nation all indicators will be changing in the same direction. What we need to know is whether they are primarily correlated in the cross-sectional direction, and not over time, or the other way around. In order to establish consistency of the indicators in both dimensions, we required that indicators meet a minimum criterion in two separate analyses. First, we averaged and standardized all indicators within 5 year periods, thus removing the over-time correlation. This cross-sectional analysis asks to what extent the indicators scale countries at similar ranks throughout the century. We omitted variables that had a correlation with the latent variable of 0.50 or less. Second, we took first-order differences of all measures and submitted these to correlation analysis. This analysis aims to assess whether indicators tap the historical developments in the same way, that is, whether slow or fast growth or temporary spikes (e.g. associated with the 1930's economic crisis) occur in all the indicators at the same time. The data turned out to be much more consistent in the cross-sectional comparison than in the over-time comparison. We thus reduced the consistency criterion in the over-time comparison to a 0.30 correlation between any indicator and the latent concept. We then computed an overall index of socio-economic development by taking the mean of the standardized indicators for each of the two datasets. Finally, we combined the two indices for all nations for which the correlation was .95 in the overlapping interval, by adjusting the mean and standard deviation of the World Bank series to that of the Banks data and then averaging the overlapping estimates; for the non-overlapping data we used the (adjusted) score from the source for which it

was available. Finally, a meaningful metric for the variable was created by taking rank scores and linearly transforming them to a 0-1 metric. This produced the variable LEVEL that we use in the analysis. Empirically, the index varies between India in 1930 at .0 and the USA by the end of the century at 1.0.

Table B.1: Contextual Variables on Economic and Social Development from Two Sources

Banks Data 1900 - 1973

V7_V8	Urbanization	
V31	Energy Production	** dropped **
V33	Energy Consumption	
V38	Percent in Agriculture (-)	
V39	Percent in Industry	
V40	Percent Other Labor	** dropped **
V53	Road Vehicles	
V59	Telephones	
V61_63	Mail	
V65	Radio=s	
V68	Newspapers	
V72	Primary Enrollment	** dropped
V74	Secondary Enrollment	
V79	University Enrollment	
V82	Literacy	
V83	Physicians	
V84_86	GNP / GNI	
V87	Currency	** dropped

World Bank Data 1965 - 1994

SP.URB.TOTL	Urban Population
SR.EGY.CONS	Energy Consumption
SL.AGR.TOTL	Labor Force in Agriculture (-)
SL.IND.TOTL	Labor Force in Industry
SF.CMN.NEWS	Newspaper Circulation
SF.POP.PHYS	Population per Physician (-)
NY.GNP.PCAP	GNP
SE.ADT.LIT	Adult Literacy
SE.SEC.ENR	Secondary Enrollment
SE.PRIM.ENR	Primary Enrollment