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## The institutional conditions of inequality in credential and skill attainment and their impact on occupational placement

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## ABSTRACT

This study comparatively analyses inequalities in educational outcomes as well as education effects on the occupational status of prime-age workers across 21 countries. Considering two distinct aspects of educational outcomes—credentials and measured worker skills—the study's main role is to assess their partial effects on occupational placement, contingent on social origin. Overall, parental education effects on educational achievement in terms of both credentials and skills are large. Likewise, occupational status is strongly associated with educational certificate attained. Labor market placement based on worker skills is significant as well, but to a lesser extent. The individual-level path dependencies of origin-education and education-destination vary considerably across countries. In part, this variation is associated with a country's skills formation system in terms of vocational specialization and the degree of economic coordination as measured by bargaining coordination. In line with prior research, vocational specificity relates to increased educational inequality. In addition, the study finds that economic coordination mitigates educational inequality as it reduces the inter-generational transmission of certificates and skills. In systems in which vocational specificity is accompanied by a high degree of coordination, the detrimental inequality effect of vocational specificity tends to level off. Moreover, economic coordination facilitates occupational placement based on worker skills. A concise discussion of the policy implications concludes this paper.

### 1. Introduction

Education plays an important role in mediating social origin and socio-economic outcomes, as has been well documented in the extensive literature on status attainment and intergenerational social mobility. Strong associations between origin and education on the one hand, and between education and occupational destination on the other, have been reported. The direct effect of education on occupational placement is much larger than that of social origin (e.g. Sewell, Haller, & Ohlendorf, 1970). A basic distinction in educational outcomes can be made between formal educational attainment levels, i.e. the credentials obtained, and the skills actually possessed by individuals or populations. This study analyzes origin-education (OE) and education-destination (ED) associations across countries by differentiating credentials and worker skills. It examines whether measured worker skills, in addition to educational certificates, can aid our understanding of social inequalities in educational achievement and occupational attainment. In addition to separating educational credentials from occupational-relevant skills (measured as adult proficiency in numeracy and

literacy) the assessment of contextual and moderating effects of country-level variables is a key contribution. In this respect, not only effects of educational institutions on the OE and ED associations are analyzed, but also the impacts of country variation in economic coordination. Previous literature has covered this aspect much less than that of educational institutions.

As well as information on the highest level of education attained, the Survey of Adult Skills (henceforth PIAAC<sup>1</sup>) conducted by the Organization for Economic Co-operation and Development (OECD, 2013a) provides direct and comparable measures of key cognitive skills, and thus makes it possible to comparatively study the associations of both types of educational outcomes. Drawing on this data, this study describes how countries vary in the two-way associations between (1) social origin and education, and (2) education and destination, when education is subdivided into credentials and worker skills. First, comparative results on the inequalities in educational outcomes in terms of educational groups and measured skills (OE association), as well as their effects on labor market outcomes (ED association), are presented for 21 countries. Based on the assumption that country differences in

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<sup>1</sup> The acronym PIAAC stands for *Programme for the International Assessment of Adult Competencies*.

educational institutions and in economic coordination influence the formation of educational outcomes contingent on social origin as well as the allocation of social position and economic rewards, the estimated cross-country differences are then explained by countries' institutional features.

The remainder of the paper is as follows. Section 2 outlines theoretical perspectives on credentials and skills, and describes how these concepts relate to existing research on social inequality in education attainment and the effect of education outcomes on occupational placement. This is followed by a discussion of the institutional country effects and how they are expected to moderate the partial effects of credentials and skills. The data and technical details are introduced in Section 3, Section 4 presents the results, and Section 5 summarizes and concludes.

## 2. Credentials and worker skills in comparative perspective

### 2.1. Differences and commonalities between educational credentials and worker skills

Educational credentials pertain to formal learning, which usually takes place in an institutionalized education system. Typically, a credential (i.e. certificate or degree) is awarded upon successful completion of a formal education program to certify that a specific set of skills associated with the program has been achieved. Education thus makes an important contribution to the formation of productive capacities as it transforms cognitive and non-cognitive native abilities into skills that are more or less useful in the labor market.

In studies of the labor market outcomes of education, it is common for the skill endowments of individuals to serve as proxies for formal qualifications attained. Indeed, the rationale behind this approach is that credentials and skills are correlated. However, credentials and skills are not interchangeable because they relate to different concepts that cover certain aspects of educational achievement. Consequently, it has been shown that there is substantial skills heterogeneity among individuals who have attained a credential at the same educational level, or even the same credential (Green & McIntosh, 2007; Kerckhoff, Raudenbush & Glennie, 2001). Independently and net of each other, both skills and credentials are determinants of labor market success. Over and above formal education attained, measured worker skills are positively related to wages (Van de Werfhorst, 2011). While cognitive skills account for a considerable share of the total education effect in terms of earnings, their relative importance varies systematically across countries according to the organization of their schooling system (Barone & Van de Werfhorst, 2011).

Indeed, as can be seen in Fig. 1, the data used in this study looks at heterogeneous skills as well. Within educational groups the dispersion between the 5th and 95th percentiles amounts to more than 3 standard deviations, while the interquartile range is larger than 1.2 standard deviations in each group.<sup>2</sup> When comparing the median proficiency scores or certain percentiles of the distributions across the four educational categories, a skills hierarchy is evident. Individuals who attained higher levels of formal education tend to outperform those who attained lower levels. Moreover, a horizontal differentiation of the middling educational level between vocational- and general-oriented programs with similar quantities of cumulative years of schooling shows the expected result that general programs tend to outperform vocational ones. Nevertheless, and this is the point I wish to make here, the distributions of adjacent groups largely overlap, and even between the highest and the lowest educational group there is substantial overlap. Accordingly, almost 25% of individuals in the lowest group

<sup>2</sup> In literacy, 1 standard deviation amounts to 43 proficiency points in the lowest, and 37 points in the highest, educational group. In numeracy, the dispersion is larger and amounts to 47 and 41 points, respectively.

who have attained no more than lower secondary education (ISCED 0–2) and up to 50% of those with upper secondary education (ISCED 3–4) perform better than 25% of tertiary-educated individuals. This holds true for both numeracy and literacy proficiency, which show very similar distributions.

Direct measures of cognitive skills provided by survey data normally correspond to broadly transferable skills that do not represent the full spectrum of knowledge, skills, and competences associated with an education certificate. Nor do they reflect the specific, technical, skill sets necessary to fully perform the tasks of certain occupations. In addition, the skill sets valued in the labor market consist of specific vocational and professional skills along with other generic skills such as interaction, communication, learning abilities, and physical skills. Different occupational segments demand different skill sets in which the relevance of generic skill measures varies. However, cognitive numeracy and literacy skills constitute a foundation for the development of specific technical and professional skills and thus determine job performance (see Abrassart, 2013). Pedagogical research on vocational education suggests that generic skills are highly correlated with the development of domain-specific practical skills, and that the former serve as a proxy for prospective, professional skill development.<sup>3</sup> Moreover, literacy and numeracy are, together with work ethic, considered important employability skills (see Rosenberg et al., 2012). Liu and Grusky (2013) report that US labor markets increasingly reward cognitive analytical skills, for whose development the skill measures provided by PIAAC are essential, while they find that technical and creative skills are valued less.

The concepts of numeracy and literacy skills are implemented in PIAAC as “key information-processing skills’ that are relevant to adults in many social contexts and work situations, and necessary for fully integrating and participating in the labour market” (OECD, 2016a, p. 20). They are generic, analytical, problem-solving skills that are demanded by the labor market because they are needed to respond appropriately to a variety of workplace tasks and work contexts (OECD, 2013c). For example, numeracy is defined “as the ability to access, use, interpret and communicate mathematical information and ideas,” with the aim of “managing a situation or solving a problem in a real context, by responding to mathematical content/information/ideas represented in multiple ways.” (OECD, 2016b, p. 18).

Given that credentials and skills refer to different concepts of educational achievement that vary empirically, it is of interest—within the limitations of skill and qualification measures provided by observational data—to assess their net effects on occupational placement across countries and to analyze whether there are differential social origin effects on the formation of these two types of educational achievement. Rather than substitute for indirect measures of human capital like formal qualifications, it is held that direct skill measures complement them. Combining both concepts can offer greater insight into the processes of skills acquisition and their occupational outcomes, at both individual and country level.

### 2.2. The formation of credentials and skills and their occupational outcomes

Formal education has become an important institution that mediates family background and occupational outcomes. In line with the lesson learned from status attainment research building on the seminal work of Blau and Duncan (1967), it is fair to assume that on average across countries the direct family effect on offsprings' occupational status is small compared with the indirect family effect mediated by educational achievement variables. Substantial parental education effects on credential and skill achievement should therefore correspond to considerable effects of credentials and skills on occupational status

<sup>3</sup> Examples from Germany and Switzerland, e.g. for the vocational domains business and engineering, can be found in Winther and Prenzel (2014).

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