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The returns to education and labor market sorting in Slovenia, 1993–2007

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ABSTRACT

Research on the labor market returns to education focus on explanations based on human capital, signaling, and closure. Drawing on the case of Slovenia from 1993 through 2007 – as it transitioned from a planned to a market-based economy – we propose an alternative *institutionally coordinated* perspective. We delineate the key features of this arrangement, which include: (1) strong educational criteria for occupations; (2) pre-set job-level pay; (3) within-job educational premia (pay sub-classes) in some sectors; and (4) a portion of pay that is performance-based. This *institutionally coordinated* perspective helps us understand both the role education plays in matching Slovenians to jobs, and how education contributes to differential pay between individuals in the same job. We use matched employer-employee data on all Slovenians to examine the degree to which the returns to education result from sorting into different establishments, occupations, and occupation-establishment units. We find that sorting processes account for the majority of the returns to education under this institutionally coordinated arrangement. Further, the degree to which sorting matters varies by education type, with the returns to vocational education being somewhat less driven by sorting processes.

1. Introduction

Education and the labor market are two highly influential institutions that play central roles in defining life in contemporary society. They are also deeply interrelated: Youth navigate their education with an awareness of the labor market consequences of their choices (Manski, 1993), and adults in the labor market make decisions about pursuing further education based in part on their understanding of the potential labor market benefits (Thompson & Gui, 2000). The link between education and the labor market is also evident in policy, where policymakers stress the need for schools to prepare students for the workforce (Xie & Killewald, 2012), even as recent perspectives on the knowledge society highlight how education and innovation can reshape the economy and create new labor market opportunities (Schofer, Ramirez, & Meyer, 2016).

One of the key aspects defining modern labor markets is the sorting of individuals into jobs. In contemporary societies with economies based on widely shared understandings of the division of labor, the labor market functions as a technology that matches individuals to work. Sociologists have documented the important role that occupation and job matching processes have played in creating inequality across a number of axes, including gender (Meyersson Milgrom, Petersen, & Snartland, 2001; Petersen & Morgan, 1995), race (Tomaskovic-Devey, 1993a,b), immigrant status (Aydemir & Skuterud, 2008; Tomaskovic-Devey, Hällsten, & Avent-Holt, 2015), and family status (Petersen, Penner, & Høgsnes, 2011, 2014). Beyond earnings, research further highlights the importance of occupations for outcomes ranging from health to attitudes to lifestyles (Marmot, 2007; Weeden & Grusky, 2012).

Although these sorting processes have important implications for earnings and a host of other outcomes, we know very little about the degree to which the returns to education are accrued via these sorting processes. This study thus provides the first examination of the degree to which the returns to education are driven by job-level sorting processes. Our data allow us to examine the degree to which the returns to education are a function of sorting people into differently paid occupations, establishments, and occupation-establishment units (which we refer to as jobs; cf. Petersen & Morgan, 1995) versus within-job differences in pay. We focus on job-level sorting processes – where our data are particularly infor-

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mative – but given the novelty of the analyses, we also report results from analyses examining the degree to which establishment and occupation sorting account for the returns to education that we observe.

2. Returns to education in transition and market economies

Research on the returns to education in transition societies suggests that the educational earnings premium rises throughout marketization (Nee, 1989). Educational earnings differentials are higher in market-based sectors compared to state sectors in China (Wu & Xie, 2003), and the increasing returns to higher education explain much of the increase in earnings inequality across a number of transitional economies (Newell & Reilly, 1999; Orazem & Vodopivec, 1995; Wu & Xie, 2003). In particular, research suggests that rising earnings inequality is largely due to increasing returns to higher education, higher employment among the better educated, and a reduction in earnings and employment for the least educated (Orazem & Vodopivec, 1995; Wu & Xie, 2003).

Research typically draws on three theories to explain educational earnings differences. First, human capital theory (Becker, 1964) argues that education enhances an individual's human capital, bolstering their productivity. Since more productive employees are worth more to employers, human capital theory holds that these employees are rewarded with higher pay, yielding educational differences in earnings. Second, signaling theory (Bedard, 2001; Brown, 2001; Spence, 1973) argues that pay differences in education arise from education signaling higher individual productivity, competency, or reliability, irrespective of whether an individual actually possesses these attributes. Rational employers are thus expected to respond to this signal by paying more highly educated workers better than less-educated workers, regardless of a given employee's actual productivity. Third, social closure theory (Murphy, 1988; Parkin, 1979; Weeden, 2002) contends that educational earnings differences arise through limiting access to certain parts of the labor market and distorting supply and demand, thereby affecting rents.[1]

At their core, human capital-, signaling-, and closure-based theories all assume an underlying labor market. In human capital theory, workers invest in their education to become more productive, and employers reward this increased productivity with higher wages. Signaling recognizes the uncertainty employers face when judging a potential employee's future productivity, with education serving as a mechanism that allows individuals to signal their productivity to their potential employers. Finally, closure-based theories draw on the idea that education functions to restrict access to certain portions of the labor market, improving employees' relative bargaining power and allowing them to extract higher wages through restricting labor supply.

We argue that these market-based explanations of the relationship between education and earnings do not accurately capture the dynamics at play in Slovenia. Specifically, to understand the Slovenian case, we argue that it is important to consider the context of its postsocialist transformation, which was based on gradual reform and continued socialist legacies of worker protection. Privatization, which introduces market mechanisms, has been relatively slow in Slovenia during transition, compared to other Central and Eastern European (CEE) countries. The private sector only accounted for 50% of the economy in 1995 (below the CEE average), and while this had risen to 65% by 2000, it was 75% in the comparably small Baltic state of Estonia, and 80% in neighboring Hungary (Bandelj, 2008).

Moreover, the institutionalization of a general collective bargaining agreement in 1990, which still serves as a basis to sectoral collective agreements that apply to the overwhelming majority of Slovenian workers, has left a crucial imprint on how gradually introduced market-based mechanisms interact with collective bargaining provisions and other wage-setting institutions in what we call an *institutionally coordinated* system.[2] While this system contains elements of the logic of human capital, signaling, and closure-based understandings of the returns to education, we argue that it is distinct insofar as it establishes a broader structure specified by wage-setting institutions that largely dictates the premia for education. In this context, the labor market exists parallel to (neither above nor below) the structures that determine the returns to education, and market mechanisms play less of a role in shaping the relationship between education and earnings. As mentioned, the cornerstone of these coordination institutions was put into place in 1990, prior to the period for which we have data, and remains in effect throughout the period we examine. Before we delve into the details of this institutionally coordinated system in Slovenia, we provide some more general contextual information.

3. The Slovenian case

The population in Slovenia is over 2 million, over 75% of which is native Slovenian (United Nations, 2013). Slovenia gained independence from Yugoslavia in 1991, shortly after it began to transition into a market-based economy from a unique system of market socialism with self-management. Unlike the "shock therapy" approach pursued in several other Central and Eastern European countries, Slovenia instead followed a gradual approach to the transition (Bandelj & Solinger, 2012). As part of its transition, Slovenia joined the Central European Free Trade Agreement (CEFTA) in 1996, and the North Atlantic Treaty Organization (NATO) and the European Union (EU) in 2004. Over time, Slovenia's economy has continued to transition into an increasingly capitalist system and is considered to be one of the most successful and prosperous transition economies (Plevnik & Lakota, 2010).

The market transition period in Slovenia was characterized by deindustrialization as well as by an increase in the proportion of the population receiving higher education. Changes in pension policies from 1987 to 1991 encouraged early retirement among older workers (Orazem & Vodopivec, 1995), opening positions in

[1] These understandings of the returns to education do not map neatly onto sorting processes (vs. within-job pay differences), with the exception of closure. Closure-based understandings of the returns to education suggest that the premia received for educational attainment should be a function of the job that it allows individuals to access, and that there should be few differences between individuals who have the same job. By contrast, both human capital and signaling suggest that the returns to education could arise either through sorting or within a job. That is, human capital (and signals of human capital) might be rewarded in the hiring process, as well as in promotions, so that individuals with more human capital (or signals implying more human capital) might be advantaged in the job-matching process. It is also the case, however, that individuals who have the same job may be paid differently based on their human capital (or signal-based perceptions of human capital). As such, finding that the returns to education are primarily within-job would allow us to rule out closure as a mechanism. To the degree that the returns to education are the result of sorting into different jobs on the basis of education, we cannot adjudicate whether the differences we observe are best understood as driven by human capital, signaling, or closure processes.

[2] This follows the literature on varieties of capitalism (Hall & Soskice, 2001) that distinguishes between coordinated market economies and liberal market economies, as well as a tradition in industrial relations scholarship that identifies a multiplicity of institutional wage setting arrangements across countries, including those set at the national level, sectoral level collective bargaining agreements, or decentralized organizational level wage-setting (e.g. Caju, Gautier, Momferatou, & Ward-Warmedinger, 2008; Schäfer & Gottschall, 2015).

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the labor market for younger, more highly-credentialed workers.[3] However, the adoption of market institutions also led to a gradual decrease in job security and an intensification of work, with younger workers in particular experiencing a rise in temporary work (Banerjee, Vodopivec, & Sila, 2013; Svetlik, 2006). Trade unions maintained substantial bargaining power in Slovenia, with around 95% of employees covered by collective bargaining agreements. As we describe below, these collective agreements play an important role in shaping educational premia.

3.1. Education

The Slovenian education system changed in important ways during transition as Slovenia sought to establish a high-quality education system. A major educational reform took place from 1993 to 1996, in the midst of larger changes including the installment of a parliamentary democracy, human rights, and enhanced globalization (Plevnik & Lakota, 2010). This transformation included the introduction of professional development for teachers, new vocational programs (e.g., short tertiary vocational programs), and in 2003 a formal certification system was developed to assess and recognize informally obtained vocational skills and competencies. Overall, the transition introduced a highly flexible vocational education system, established multiple vocational school paths, and promoted a cultural shift that places more value on education as central to individual welfare in a knowledge society.

Education in Slovenia at the beginning of the period of our study was compulsory from ages seven to fifteen. However, reforms that began in 1999 and were fully implemented in 2003 made education compulsory from ages six to fifteen ("World Data on Education", 2011). Compulsory education includes primary school and lower secondary school and is broken into three three-year cycles. More than 98% of students complete compulsory education, and full-time enrollment in primary, secondary, and tertiary education is free (Plevnik & Lakota, 2010). After completing lower secondary school, pupils can choose to go on to general or vocational upper secondary school, and must pass an exam to enter vocationally-oriented or university-oriented schooling. Secondary school enrollment in 1999 was 99%, up from 88% in 1991. Similarly, tertiary enrollment grew from 52% in 1999–85% in 2007 (World Bank, 2015). Private schools at all levels have become more prominent since independence in 1991; however, over 95% of students in Slovenia still attend public institutions (OECD, 2011, Table B5.1, pg. 267). Most decisions about pre-university educational content and structure, as well as salaries and staffing requirements, are decided at a national level, though there is some autonomy in how the curricula are taught (Plevnik & Lakota, 2010). Universities, however, are autonomous institutions, free to conduct research and knowledge dissemination, and have their own internal organization of research and study programs. In general, the education system in Slovenia is increasingly beginning to mirror those of other OECD countries.

3.2. Institutionally coordinated returns to education

During socialism, pay for Slovenian workers was set by a general law that specified basic guaranteed income and gave wage-setting authority to workers' councils within individual work units. These work units (*temeljne organizacije*), akin to firms or corporations in the United States, were governed by a general self-management act, and specified the basic principles for the allocation of earnings according to the task, responsibility, effort, and context. In the event that work units did not set bases and criteria for pay workers in these organizations received the national guaranteed basic income. In contrast to a market logic, pay was meant to satisfy workers' needs as well as collective social needs. While there were some differences in earnings, these were mostly dependent on the productivity of work organizations, as their surplus was allocated to employees at the end of the year. Thus, inequality existed primarily between work units, and there was less inequality among individuals within the same work unit. Although individual income differences were not substantial, as Szelenyi (1983) notes the greater inequality during socialism derived from different perks that accompanied rank in the political hierarchy, such as access to social housing.

In the late 1980s, Slovenia transitioned from pay being dictated by this general law and work units system to pay being determined by a general collective agreement (*splošna kolektivna pogodba*) (Misic, 2003). In this framework, policymakers identified nine pay classes (*tarifni razredi*) that were linked to levels of education, from so-called "unqualified workers" with less than an 8th grade education in the lowest pay class (Class I) to those with doctoral education in the highest pay class (Class IX). Importantly, each pay class specifies a minimum level of education that an individual needs to have in order to be hired for a job in that pay class.

According to the general collective agreement, three factors determine pay. First, each of the nine different classes have a different baseline pay level, which is calculated by multiplying the overall baseline pay by the relevant pay class multiplier. Second, there are additions for work at suboptimal times (like on weekends or at night), undesirable working conditions (such as highly physical or dangerous work), and for tenure and seniority; these are capped at 20% of the baseline earnings for their pay class. Finally, additional pay related to performance is also capped at 20% of the pay class baseline.

This general collective agreement was signed into law in July of 1990, and served as a basis for separate collective agreements that have been subsequently established at the sectoral level. These sectoral collective agreements typically contain nine pay classes but differ in the number of subclasses and in their baseline pay (*izhodiščna plača*). Sectoral agreements set the required level of education for a specific pay class, as well as the multiplier factor (*količnik*) for that pay class. For instance, the collective agreement for the public sector was set in 1991, with provisions for 13 distinct classes and subclasses. It specifies a multiplier of 0.58 times the sectoral baseline pay for a job that requires "simple tasks" and only primary school education (pay class I). This multiplier increases to 1.75 times the sectoral baseline for "the most demanding tasks" and doctoral education (pay class IX). In the collective agreement covering private employers there are eight pay classes (each of which is further divided into subclasses), ranging from unqualified workers with usually less than an 8th grade education (pay class I, with a multiplier of 1.00), to positions requiring vocational education (pay class IV, with a multiplier of 1.50), to positions requiring university education (pay class VII, with a multiplier of 2.15), and finally positions requiring completed postgraduate education (pay class VII/2 with a multiplier of 2.52).

A brief example is illustrative. In sectors where collective agreements set the sectoral baseline pay at the legal minimum (*minimalna plača*) dictated by state law, which was 790.73 EUR in 2015, individuals doing a job that required the minimum level of education (less than 8th grade) such as custodial staff, would have a baseline pay of 790.73 EUR (the legal minimum of 790.73 would be multiplied by a multiplier of 1.00 for pay class I, yielding a baseline of 790.73 EUR). These workers could get up to an additional 20% of this baseline amount for work on holidays, evenings, or weekends; adverse conditions; and seniority; for a maximum addition

[3] Unemployment rose nearly 20% between 1989 and 1993 as a result of rapid shifts from an industrial to a more service-based economy, but stabilized thereafter (OECD, 1997).

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of 158.15 EUR (790.73 EUR times 0.20) due to these factors. Finally, they could additionally receive up to 158.15 EUR (20%) based on performance, so that their total maximum monthly pay is 1107.03 EUR. By comparison, a person doing a job in this sector for which a university education is specified (e.g., an attorney) would have a baseline pay of 1700 EUR (790.73 EUR multiplied by a multiplier of 2.15). These individuals could earn up to 340 EUR (1700 EUR times 0.20) for working conditions, non-standard hours, and seniority, and up to 340 EUR based on their performance, resulting in a maximum pay of 2380 EUR per month.

Because the sectoral baseline and multipliers are negotiated separately by sector, jobs requiring similar education levels can have different baseline pay across sectors. This can result in the same occupation being remunerated differently across sectors. To continue using the example of an attorney from above (pay class VII, which requires a university education), in the sectors using the legal minimum (as described above) the baseline monthly pay is 1700 EUR, and the maximum compensation is 2380 EUR. By contrast, per the collective agreement for the banking sector, baseline pay for pay class VII is 1164.39 EUR, so that attorneys in the banking sector have a maximum pay of 1630.15 EUR. In textiles, attorneys (and other positions requiring a university education) have a baseline pay of 817.80 EUR, and thus a maximum monthly pay of 1144.92 EUR. As these examples illustrate, the baseline pay for an occupation in one sector can be greater than the maximum pay for the same occupation in a different sector (Zveza Svobodnih Sindikatov Slovenije, 2016).

When hiring, the great majority of employers in Slovenia are constrained by the collective bargaining agreements, and can only hire individuals who meet the minimum educational requirement for a particular position, which is specified as part of a definition of a pay class. In the public sector there are also educational premia, such that individuals with more education than required for their position (such as a MA degree when only a BA is required) receive a premium for this additional education. For instance, an administrative assistant working at the Ministry of Education who completes a part-time MA program will receive a pay raise for this degree, even if this education level is not required for the position, because the MA moves the administrative assistant into a better paying subclass. This is a non-negligible aspect of how pay is directly linked to education, given that about 23% of employees in Slovenia are employed in the public sector ("Slovenia Close," 2015).

It is important to be clear that we are not arguing that market considerations such as supply-side changes in worker skill and demand-side employer behavior are absent. Like human capital, signaling, and closure processes, broader market forces play a role in the returns to education in Slovenia through influencing the discretionary portion of earnings. Rather, we argue that the returns to education are better understood as being defined and existing in an institutional space that is parallel to the market.

4. Data and methods

To examine the degree to which the returns to education are due to sorting individuals into jobs versus within-job premia, we use longitudinal matched employer-employee registry data from the Statistical Office of the Republic of Slovenia. These data are unique in that they include all employees in the Slovenian workforce from 1993 to 2007. Importantly for our purposes, they also allow us to estimate the educational returns for people who do the same work for the same employer (e.g. analysts for Nova Ljubljanska Banka), a comparison that is not possible with standard survey data due to the paucity of information about people working for the same establishment in the same occupation. Likewise, the temporal coverage of these data is also highly unusual for matched data in Central and Eastern Europe, covering a span of fifteen years beginning in 1993.

For the purposes of this paper, these data have two weaknesses. First, because the information on earnings is from individual tax records, there is no way to distinguish between regular and overtime pay. Therefore, results presented are based on differences in the total annual earnings. Second, because they are registry data, there are issues that cannot be addressed because the information is not contained in the registry. For example, data on hours worked are not included. However, because part-time work is relatively rare in Slovenia (5.8% of the population worked part-time in 2003; Employment Statistics, 2014), this is less of a concern than in other contexts.

Analyses are restricted to people between the age of 17 and 66, for a total of over 10 million person-years, representing over 1.1 million unique individuals in over 128,000 establishments. In any given year from 1993 to 2007, there is information on roughly 674,000 individuals working in 1500 occupations in 54,000 establishments, and 222,000 occupation-establishment units. We present findings using a five category education classification system that aligns with the system implemented in Slovenia in 2007.[4] For the purposes of discussion, we focus in particular on four education classifications: primary school (our omitted category), which roughly corresponds to an 8th grade education level, and includes about 15–17% of individuals in any given year; lower/vocational secondary education; secondary general education; and tertiary education.[5] Lower secondary/vocational school and general secondary school use different curricula, and provide students with different skills. In particular, general secondary school completion is viewed as a stepping stone to tertiary education.

4.1. Analytic strategy

To assess the overall returns to education we first estimate:

$$\ln(w_{it}) = \alpha + \text{educ}_i \times \text{year}_t \beta k + \text{gender}_i \beta 1 + \text{exp}_{it} \beta 2 + \text{exp}^2{}_{it} \beta 3 + \varepsilon_{it}, \quad (1)$$

where $\ln(w_{it})$ represents the real log earnings of individual i ($i = 1, 2, \ldots, N$) in year t, $\text{educ}_i \times \text{year}_t$ captures a series of interactions between each educational level and a linear term for year; gender_i is a dummy variable representing average differences in pay between men and women; exp_{it} and $\text{exp}^2{}_{it}$ are experience and experience squared,[6] respectively; βk are the parameters of interest, α is the intercept, and ε_{it} is the error term. Because we are centrally interested in the returns to education, we focus on the interaction between the education vector and year, which captures the temporal changes in the returns to education. We depict this interaction using the exponentiated linear prediction of marginal effects in subsequent figures. The y-axis in these figures is also adjusted to correspond to changes in the returns to each educational category relative to the reference group (completed primary school). The coding of occupations changed in 1999 and 2000 as Slovenia adopted an ISCO-compatible system, which contained roughly the same number of occupations as the original classification system.

[4] Analyses were also run using the former fourteen-category education classification system in Slovenia prior to 2007. These results are not presented here but show similar patterns to the condensed, current five-category classification shown here and are available upon request. Of note, the current five-category classification system combines lower secondary and vocational education.

[5] In addition to these four categories listed, models also included an indicator variable for incomplete primary school. Given the very small percentage of people in this category, we do not report results for incomplete primary school.

[6] Experience is imputed by subtracting years of education from age.

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Table 1
Descriptive Statistics for Education Level by Year.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Incomplete Primary School															
Total (N)	70,746	66,202	62,627	58,001	53,307	50,483	46,760	44,852	42,216	39,366	36,432	34,009	31,452	29,049	26,572
Percent of population	11.71	10.88	9.78	8.94	8.15	7.62	7.01	6.56	6.17	5.75	5.27	4.87	4.46	4.05	3.62
Completed Primary School															
Total (N)	1,03,849	1,04,538	1,11,988	1,11,828	1,12,731	1,13,041	1,11,991	1,13,810	1,10,886	1,07,228	1,06,113	1,05,503	1,04,690	1,05,578	1,06,574
Percent of population	17.19	17.19	17.49	17.25	17.23	17.05	16.79	16.65	16.21	15.66	15.36	15.11	14.85	14.72	14.53
Completed Lower/Secondary School															
Total (N)	1,79,715	1,80,425	1,97,813	2,01,022	2,03,290	2,06,417	2,07,551	2,11,363	2,09,472	2,08,443	2,08,763	2,08,858	2,08,000	2,09,702	2,11,615
Percent of population	29.75	29.66	30.89	31.00	31.07	31.14	31.12	30.93	30.62	30.44	30.21	29.92	29.50	29.23	28.85
Completed Secondary General School															
Total (N)	1,55,625	1,60,281	1,67,964	1,72,824	1,73,008	1,78,035	1,82,618	1,87,236	1,90,636	1,93,331	1,95,947	1,98,905	2,02,630	2,06,697	2,13,650
Percent of population	25.76	26.35	26.23	26.65	26.44	26.86	27.38	27.40	27.87	28.24	28.35	28.49	28.73	28.81	29.13
Completed Tertiary Education															
Total (N)	94,117	96,791	1,00,035	1,04,745	1,11,912	1,14,928	1,18,050	1,26,166	1,30,908	1,36,344	1,43,803	1,50,873	1,58,401	1,66,306	1,75,109
Percent of population	15.58	15.91	15.62	16.15	17.11	17.34	17.70	18.46	19.14	19.91	20.81	21.61	22.46	23.18	23.87

As a result of these changes we estimate two sets of models, one between the years of 1993–1998 and one for 2000–2007.

To capture the effect of sorting on the returns to education we estimate a second model:

$$\ln(w_{ijt}) = \gamma_j + \mathrm{educ}_i \times \mathrm{year}_{t\beta k} + \mathrm{gender}_{i\beta 1} + \mathrm{exp}_{it\beta 2} + \mathrm{exp}^2{}_{it\beta 3} + \varepsilon_{ijt}, \quad (2)$$

which includes γ_j, a fixed effect for each occupation-establishment unit j (or occupation or establishment individually, as the case may be). As with Eq. (1), we also focus on the interaction between the education vector and year in these models.

These regression models allow us to examine the degree to which the returns to education are the result of sorting versus within-job pay differences. Model 1 (without fixed effects) provides information about the returns to education in the labor market as a whole, while Model 2 (with fixed effects at either the establishment, occupation, or job (i.e. occupation-establishment) level) allows us to examine differential returns to education within these units. Comparing the size of the returns in the population to the returns within each respective labor market unit provides a simple decomposition of the returns to education, showing how much of the educational earnings differentials are due to sorting between occupations, establishments, and job units and how much are residual (i.e. within-job). Put differently, the population-level analysis of the returns to education compares all individuals across the population, be they managers in one company, administrative assistants in another, or janitors in a third. By contrast, the fixed effect models can be thought of as examining the returns to education comparing only among those working at the same establishment, or of individuals within the same occupation (e.g., administrative assistants), or of individuals in the same occupation in the same establishment (e.g., administrative assistants in the same workplace).

Given the continuity of the *institutionally coordinated* arrangement structuring the returns to the labor market throughout this period, we do not focus on whether there are changes over time in the relative importance of sorting vis-à-vis within-job pay differences. But for researchers interested in such changes, a key question is whether changes occur due to alterations in the links between educational categories and jobs, or due to changes in how different jobs are remunerated. That is, changes in the degree to which sorting accounts for educational premia could arise due to changes in the allocation of workers with different education to particular jobs, or due to changes in pay of particular jobs relative to other jobs. Consequently, we estimate a supplemental third model, which directly controls for each job's yearly earnings, in addition to all other control variables:

$$\ln(w_{ijt}) = \gamma_j + \mathrm{educ}_i \times \mathrm{year}_{t\beta k} + \mathrm{gender}_{i\beta 1} + \mathrm{exp}_{it\beta 2} + \mathrm{exp}^2{}_{it\beta 3} + \mathrm{wage}_{jt\beta 4} + \varepsilon_{ijt}, \quad (3)$$

In a fixed effects context, this new variable accounts for the degree to which job j in year t was more or less well paid than that same job on average in the period of analysis. Conceptually, this is similar to including a linear time trend for each job (i.e. interacting a dummy for each job with year), except that controlling for mean yearly job earnings does not impose linearity. An alternative strategy would be to estimate separate fixed effects regressions for each year (as in Petersen et al., 2014); however, this would not allow us to disentangle changes in the sorting processes from changes in the relative pay of jobs. Results using Petersen et al.'s (2014) approach, however, do not impose linearity on the trends in returns to education, and supplemental models estimated using this approach provide results that are similar to those based on Models 1 and 2 (results available upon request).

All predicted marginal effects of the interaction between education and year are significantly different from zero, with z-statistics ranging between 6 and 1144. As other work using large registry datasets has noted, no point is served in reporting these significance levels, as the sizes of the z-statistics reflect the large number of observations each year, not superior model specification (Petersen et al., 2014). The numbers of Slovenians represented by these coefficients is large, and the education levels used in our analyses range from having 26,572 people in them to 213,640; these counts are presented in Table 1.

5. Results

Table 1 shows that, in Slovenia, the proportion of the workforce that had completed only primary school (15%) or lower secondary/vocational school (30%) has remained the same or slightly decreased over the time period we examine (1993–2007). By contrast the proportion of individuals that had completed general secondary education increased somewhat over time, from 26% to 29%, and the proportion of those that completed tertiary education increased from 16% to 24%.

Fig. 1 presents results on the returns to lower secondary/vocational school from our models (exponentiated predicted values corresponding to all figures are reported in Appendix

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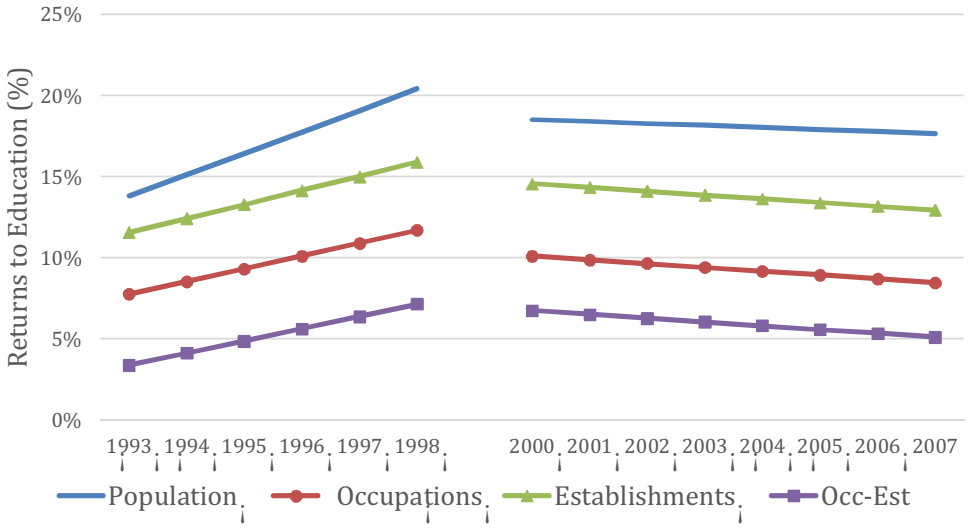

Fig. 1. Returns to Education for Lower Secondary/Vocational School.
Note: Percent differences on the y-axis are the returns to education for people who completed lower/secondary vocational school compared to people who completed primary education. Predicted linear exponentiated marginal effects shown.

A Tables A1 and A2). The earnings premium to lower secondary/vocational school (high school level, with a vocational influence) at the population-level is approximately 18%, indicating that individuals who had completed vocational secondary school earned on average 18% more than those who had completed only primary school. When we examine individuals working in the same establishment, we see that this drops to 13%, suggesting that just over a quarter of the returns to secondary/vocational school ($[18-13]/18=0.28$) are attributable to individuals with different education levels sorting into different establishments. We find that the within-occupation returns to secondary/vocational education are about 10%, indicating that occupational sorting explains more of the educational premia than establishment-based sorting. Finally, we find that within-job differences are about 5%, so that sorting into different jobs accounts for 62% of the population-level returns to secondary/vocational education that we observe (with the remaining 28% arising within-jobs).

Figs. 2 and 3 report the analogous results for general secondary education (Fig. 2) and tertiary education (Fig. 3). As with lower secondary/vocational school, Figs. 2 and 3 suggest that the returns to education for general secondary and tertiary education are largely a function of sorting individuals into different occupations and establishments on the basis of their education, and that sorting into occupations appears to matter more than sorting into establishments. For general secondary education (Fig. 2) we find a premium of roughly 50% relative to primary school. When we account for sorting into establishments, we find a premium of approximately 40%, and accounting for sorting into occupations yields a premium of 20%. Finally, at the job-level we see that there is a 10% premium. We see a similar pattern for tertiary education in Fig. 3, though with larger premia at all levels: 140% in the general population, 110% after accounting for establishment sorting, 60% after accounting for occupational sorting, and 30% after accounting for job-level sorting.

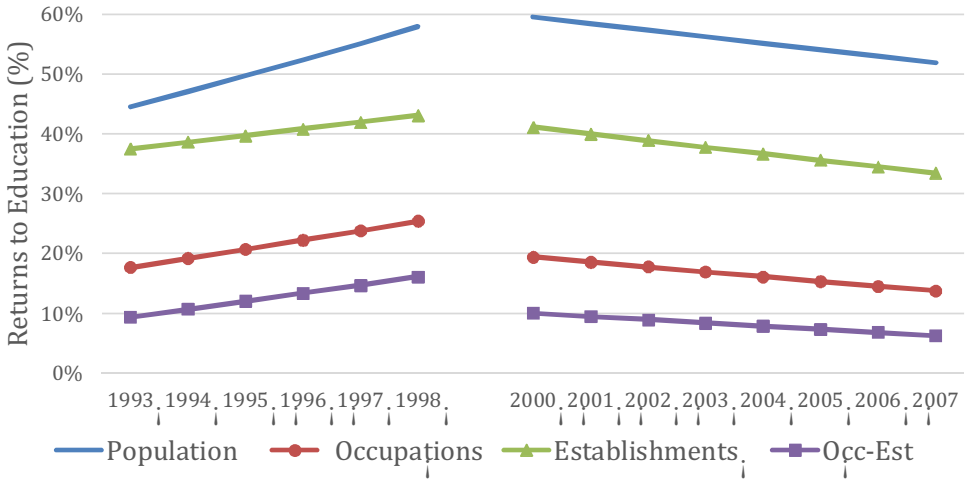

Fig. 2. Returns to Education for General Secondary Education.
Note: Percent differences on the y-axis are the returns to education for people who completed general school compared to people who completed primary education. Predicted linear exponentiated marginal effects shown.

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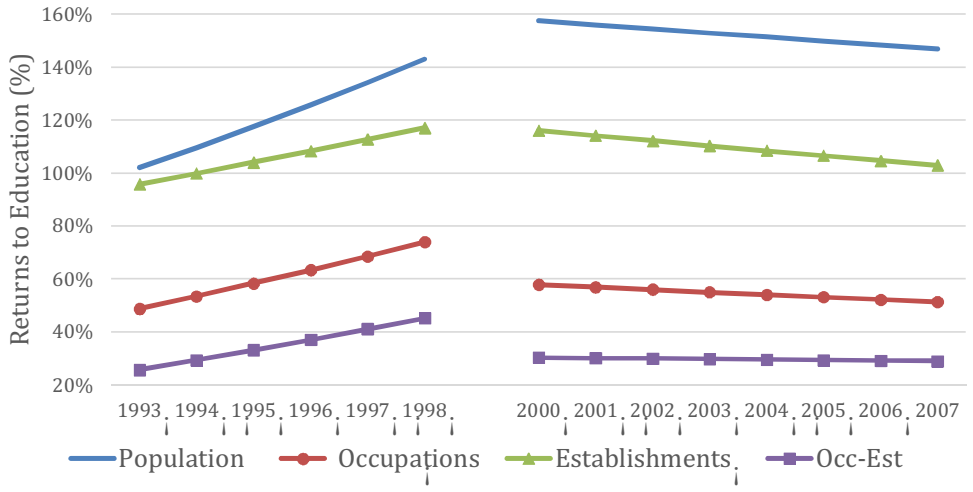

Fig. 3. Returns to Education for Tertiary Education.
Note: Percentage differences on the y-axis are the returns to education for people who completed at least a bachelor's degree compared to people who completed primary education. Predicted linear exponentiated marginal effects shown.

Figs. 1 through 3 thus highlight that for all levels of education, the returns to education are primarily about sorting into different jobs, and that occupational sorting appears to matter more than sorting on establishments. Sorting appears to be somewhat more important for general secondary and tertiary education than for vocational secondary education. However, in all cases we also see that the premia are not exclusively a function of sorting, and that there are within-job returns to education.

Fig. 4 examines the degree to which sorting accounts for the overall population-level premia that we observe more directly, focusing specifically on job-level sorting (results underlying Fig. 4 are reported in Appendix Table A2). Because Fig. 4 reports a fraction based on the population and job-level educational premia from Figs. 1–3, changes in either the population or job-level premia will yield differences in how much sorting matters. This is in keeping with the relative importance of sorting (and, by extension, within-job differences) being a function of both the overall educational earnings differences and within-job educational earnings differentials. Fig. 4 shows that in relative terms, job-level sorting is least important for vocational secondary education, and most important for general secondary education, with tertiary education falling somewhere in between. However, it is important to remember that the returns to tertiary education are larger than for either vocational or general secondary education, so that in absolute terms the within-job and sorting processes related to tertiary education are associated with the largest labor market returns. Indeed the within-job premia for tertiary education are larger than the population-level premia for vocational secondary education.

As we noted above, given the institutionally coordinated system that is basically in place throughout this period, we do not want to over-interpret the changes we observe over time in Fig. 4. That said we recognize that while the returns to education may have been institutionally coordinated in Slovenia, many other changes were taking place as Slovenia transitioned to a more market-based econ-

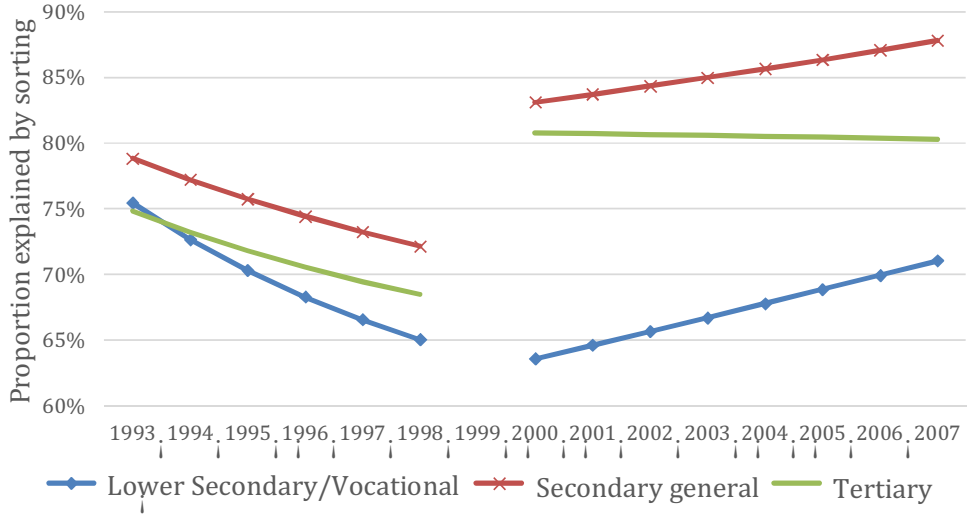

Fig. 4. Effect of Job-Level Sorting on Returns to Education.
Note: Percents represent the amount of returns to education at the job level divided by the population returns to education, subtracted by one. Figure derived from predicted linear exponentiated marginal effects.

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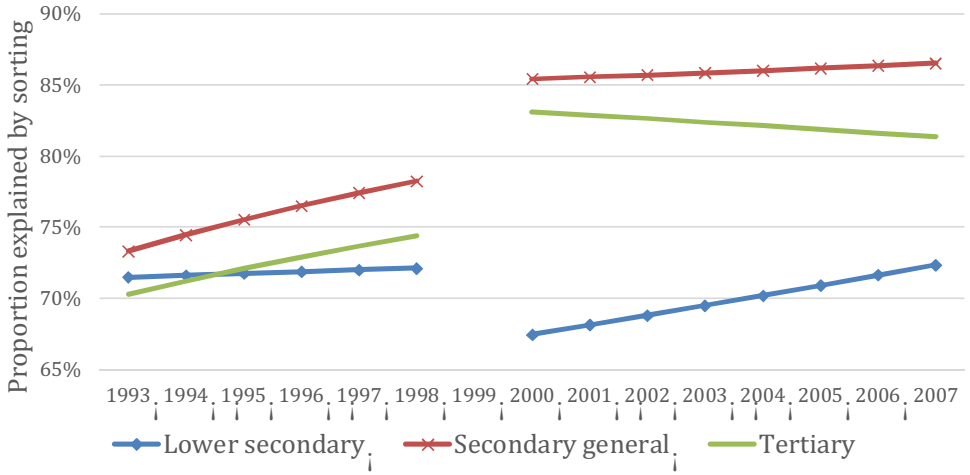

Fig. 5. Effects of Job-Level Sorting on the Returns to Education holding Ave. JobEarnings Constant.
Note: Percents represent the amount of returns to education at the job level divided by the population returns to education, subtracted by one. Compared to the previous figure, Fig. 5 includes a control for each job's yearly average earnings, thereby holding constant changes in the returns to jobs over time. Figure derived from predicted linear exponentiated marginal effects.

omy (Bandelj & Sowers, 2010), and comparisons of time trends will be of interest in other contexts. In many contexts where such trends are of interest, a key question is whether changes in the degree to which sorting matters over time are driven by changes in sorting patterns, or by changes in the degree to which the same patterns of sorting yield different labor market outcomes (i.e. if the returns are changing to different jobs over time). Directly accounting for changes in a job's mean earnings allows us to disentangle whether changes in the returns to education are due to alterations in the link between education and jobs, or due to changes in the average pay of jobs.[7]

We illustrate the importance of distinguishing these processes in Fig. 5, which shows that net of changes in mean job earnings sorting actually grew in importance for secondary general and tertiary education between 1993 and 1998, and remained largely stable for lower secondary/vocational education. This implies that the declining importance of sorting visible in Fig. 4 was due to changes in the relative pay of jobs that affected all educational levels.[8] While differentiating changes in sorting processes from changes in the mean earnings for jobs might not always be relevant, these results underscore that doing so can yield substantively meaningful differences.

In sum, we find that the returns to education are predominantly a function of sorting into different jobs, but that nontrivial within-job educational differences remain. We further document that the degree to which the labor market returns to education operate through sorting processes varies by educational level. That is, different levels of education are linked to the labor market and yield premia through different processes. We also find some evidence of changes over time in the degree to which sorting matters (Fig. 4), and that these are mostly driven by changing returns to jobs, not differences in how education is linked to jobs (Fig. 5).[9] Finally, as in previous research examining occupation and establishment sorting on gender wage inequality (e.g., Petersen & Morgan, 1995), we find that occupational sorting matters more than sorting on establishments, while job-level sorting matters the most, as denoted by the substantially smaller within-job educational earnings premia compared to the within-occupation or within-establishment premia. This underscores the importance of understanding job-level sorting processes, and suggests that to understand the role that sorting plays in generating returns to education, simply having data on occupations provides an incomplete picture.

6. Discussion

Sorting individuals into jobs, occupations, and establishments is at the heart of societies based on an extensive division of labor. Yet, to date little is known about how these sorting processes intersect with the returns to education. Some previous research suggests that occupational sorting is important (Carbonaro, 2007), or examines the role of education in occupational closure (Weeden, 2002). However, the majority of research on educational premia adopts human capital- or signaling-based perspectives that are largely agnostic as to whether educational premia arise within units or due to sorting processes. Importantly, human capital-, signaling-, and even occupational closure-based understandings of the returns to education all take an underlying market structure as their starting point for understanding the returns to education. But just as there are non-market based solutions for matching people to jobs, there are also alternative ways to organize the labor market returns to education. We describe one such system, which, while still relying on labor market mechanisms for matching individuals to jobs, does not rely on market logics for determining the returns to education. We refer to this as an institutionally coordinated arrangement for

[7] In the context of the institutionally coordinated Slovenian system, we can think about this distinction as being one of whether a job experienced a change in the minimum education level needed to be hired, or if the job came to be remunerated more highly. Of course, the performance-based portions of individuals' earnings are potentially relevant too.

[8] For instance, assume there were two administrative assistants in bank A, one with a tertiary degree earning 18,000 EUR in year 1 and another with a secondary general education earning 15,000 EUR in year 1, and two other administrative assistants in bank B with the same educational credentials and pay in the same year. In year 2, however, both administrative assistants in bank A receive a 2000 EUR pay increase, while the administrative assistants in bank B only receive a 1000 EUR pay increase. Because average job pay has drifted further apart between the two jobs over time, this would mechanically increase within-job earnings inequality within educational groups as fixed effects do not account for changes in between-job differences.

[9] This finding suggests that it may have been easier to change the relative pay of jobs (perhaps through non-baseline pay mechanisms like the performance-based portion of pay) than to change the minimum level of education needed for a job.

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linking education to labor market returns. Although returns to education are often justified on the basis of what the market will bear, in this arrangement the returns to education are dictated by collective agreements that stipulate what level of education is required for certain jobs with set pay levels, and in some cases (as in Slovenia's public sector) provide additional within-job rewards for education.

In describing this institutionally coordinated approach, we highlight an alternate arrangement for organizing the institutional linkages between education and the labor market, a linkage that plays a profound role in shaping modern societies (Shavit & Müller, 1998). Further, while we cannot adjudicate the degree to which the returns to education result from human capital, signaling, or closure, we provide the first analysis to examine the role of job-level sorting processes in creating the returns to education. We find that the majority of the educational premia observed are the result of job-level sorting processes. Occupational sorting is more important than sorting into establishments; however, job-level sorting explains substantially more than sorting at the occupational level, suggesting that simply focusing on occupations misses much of the story. While these broad patterns hold across vocational secondary, general secondary, and tertiary education, we do find that the degree to which sorting matters varies. Specifically, sorting appears to be less important for vocational secondary than for general secondary and tertiary education. These differences underscore the fact that there is nothing automatic about the degree to which sorting processes account for premia, and that different types of education can yield premia for different reasons.[10]

While a broad international comparison is beyond the scope of this paper, it is instructive to consider the degree to which our findings might be unique to the institutionally coordinated system in place in Slovenia. Rather than speculate about key features that might lead to different results elsewhere, we provide a brief comparison of our results with similar analyses in the Czech Republic and Norway. In Norway (averaged across years and education categories described in Petersen et al., 2014), establishment sorting typically accounted for 30% of the returns to education, occupational sorting accounted for 72% of the premia, and job-level sorting for 79% of the premia. In the Czech Republic in 2004 (cf. Křížková, Penner, & Petersen, 2010), establishment sorting typically accounted for 27% of the returns to education, occupational sorting accounted for 71% of the premia, and job-level sorting for 84% of the premia. By contrast, in Slovenia, establishment sorting accounted for 24% (ranging from 21% for tertiary to 28% for general secondary), occupational sorting 56% (ranging from 46% for vocational secondary to 65% for general secondary), and job-level sorting 75% (ranging from 68% for vocational secondary to 81% for general secondary). Perhaps surprisingly, the results for Slovenia thus indicate that sorting in Slovenia's institutionally coordinated system matters somewhat less than sorting in Norway and the Czech Republic, particularly at the occupation- and job-levels. It is noteworthy that across Slovenia, Czech Republic, and Norway, occupational sorting appears to matter more than establishment sorting; future research might investigate economies where firms are more salient (cf. Lincoln & Kalleberg, 1985) to see whether firm-level sorting may be more important than occupational sorting in these contexts.

It is also potentially informative to compare our results to the importance of sorting for gender inequality. Penner, Kanjuo-Mrčela, Bandelj, and Petersen (2012) examine gender differences over the same periods in Slovenia and show that sorting also became increasingly important in accounting for gender inequality over time (consistent with Křížková et al.'s 2010) findings for the Czech Republic). Despite this, even in the most recent period job-level sorting accounts for only 24% of the overall gender gap in Slovenia. By contrast, Petersen and Morgan (1995) find that 89% of the US gender gap is accounted for by sorting at the job-level, and Meyersson Milgrom et al. (2001) find the degree to which sorting accounts for the gender gap among blue collar workers in Sweden increases from 71% in 1970–89% in 1990 (among white collar workers the change over this period is smaller, from 74% to 82%). Thus while educational sorting in Slovenia matters relatively less than gender sorting in the U.S. or Sweden, educational sorting in Slovenia matters much more than gender sorting in Slovenia.[11]

Unlike gender or racial differences in earnings, however, differences based on education are often viewed as legitimate, and education can thus not only generate inequality, but also be used to legitimize pay differentials. To the degree that rising inequality in transition economies has been linked to the increasing returns to higher education, our finding that higher education operates primarily through sorting individuals into different jobs helps us understand not only how inequality is produced, but also how it comes to be legitimated. Further, through describing an institutionally coordinated approach to defining the relationship between education and labor market premia, where educational premia do not rest on a justification of what the market will bear, we hope to illustrate alternative approaches to understanding what is fair, reasonable, and possible.

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Appendix A.

Table A1
Returns to Education over Time at the Population, Establishment, Occupation, and Occupation-Establishment (i.e. Job) Levels.

	Lower Secondary/Vocational School			
	Population	Occupations	Establishments	Occ-Est
1993	0.138	0.078	0.116	0.034
1994	0.151	0.085	0.124	0.041
1995	0.164	0.093	0.133	0.049
1996	0.177	0.101	0.141	0.056
1997	0.191	0.109	0.150	0.064
1998	0.204	0.117	0.159	0.071
2000	0.185	0.101	0.146	0.067
2001	0.184	0.099	0.143	0.065
2002	0.183	0.096	0.141	0.063
2003	0.181	0.094	0.139	0.060
2004	0.180	0.092	0.136	0.058

[10] The idea that the processes driving the returns to education vary suggests that it might also be fruitful to consider human capital, signaling, and closure not as mutually exclusive, but rather seek to understand how they might matter differentially for different types of education.

[11] While it is informative to compare the effects of sorting, it is also important to note that educational differences remain substantial even when we examine within-job differences, as the within-job premium for higher education is larger than the population-level gender gaps in the US, Sweden, and Slovenia.

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Table A1 (*Continued*)

	Lower Secondary/Vocational School			
	Population	Occupations	Establishments	Occ-Est
2005	0.179	0.089	0.134	0.056
2006	0.178	0.087	0.132	0.053
2007	0.176	0.085	0.129	0.051
	General Secondary			
	Population	Occupations	Establishments	Occ-Est
1993	0.445	0.177	0.375	0.094
1994	0.471	0.192	0.386	0.107
1995	0.497	0.207	0.397	0.121
1996	0.524	0.223	0.408	0.134
1997	0.551	0.238	0.420	0.148
1998	0.579	0.254	0.431	0.161
2000	0.595	0.194	0.411	0.101
2001	0.584	0.186	0.400	0.095
2002	0.573	0.178	0.389	0.090
2003	0.562	0.170	0.378	0.084
2004	0.551	0.162	0.367	0.079
2005	0.541	0.154	0.356	0.074
2006	0.530	0.146	0.345	0.068
2007	0.519	0.138	0.334	0.063
	Tertiary Education			
	Population	Occupations	Establishments	Occ-Est
1993	1.020	0.487	0.957	0.257
1994	1.096	0.534	0.998	0.293
1995	1.175	0.583	1.040	0.331
1996	1.257	0.633	1.083	0.370
1997	1.342	0.685	1.126	0.410
1998	1.430	0.738	1.170	0.451
2000	1.575	0.578	1.160	0.302
2001	1.559	0.569	1.141	0.301
2002	1.544	0.559	1.121	0.299
2003	1.528	0.550	1.102	0.297
2004	1.513	0.540	1.084	0.295
2005	1.498	0.531	1.065	0.293
2006	1.483	0.521	1.046	0.291
2007	1.468	0.512	1.028	0.289

Note: Exponentiated linear prediction from marginal effects. Reference group is completed primary school. Incomplete primary school is controlled for, but coefficients are omitted. Additional controls include gender, experience, and experience squared. Coefficients all significantly different from zero with z-statistics ranging from 6 to 1144.

Table A2
Proportion of Returns to Education due to Job-Level Sorting.

	a. Base Model without Controls for Mean Job Earnings		
	Lower Secondary/Vocational School	General Secondary	Tertiary
1993	0.755	0.788	0.748
1994	0.727	0.772	0.732
1995	0.703	0.758	0.718
1996	0.683	0.744	0.706
1997	0.666	0.732	0.695
1998	0.650	0.721	0.685
2000	0.636	0.831	0.808
2001	0.646	0.837	0.807
2002	0.657	0.843	0.807
2003	0.667	0.850	0.806
2004	0.678	0.857	0.805
2005	0.689	0.864	0.805
2006	0.699	0.871	0.804
2007	0.711	0.878	0.803

Table A2 (*Continued*)

	b. Controlling for Mean Job Earnings		
	Lower Secondary/Vocational School	General Secondary	Tertiary
1993	0.715	0.733	0.703
1994	0.716	0.745	0.712
1995	0.717	0.755	0.721
1996	0.719	0.765	0.729
1997	0.720	0.774	0.737
1998	0.721	0.782	0.744
2000	0.674	0.854	0.831
2001	0.681	0.856	0.829
2002	0.688	0.857	0.826
2003	0.695	0.859	0.824
2004	0.702	0.860	0.821
2005	0.709	0.862	0.819
2006	0.716	0.863	0.816
2007	0.724	0.865	0.814

Note: Proportion returns to education due to sorting between jobs by year. Proportions obtained by subtracting one from the exponentiated linear prediction from marginal job-level effect divided by the exponentiated linear prediction from the population marginal effect.

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