Winners and Losers after 25 Years of Transition: The Case of Slovenia

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Abstract
Using data on the universe of all workers in Slovenia from 1991 – 2015, this study reviews the gains to education, work experience and gender over 25 years of transition from plan to market. Rates of return to education and work experience rose and remained high on average. However, rapid increases in the number of college graduates has outpaced rising relative demand for skill for the youngest labor market entrants. As a result, the youngest cohorts of college graduates have experienced declining returns to schooling. The resulting decrease in earnings inequality across schooling groups among the young has been sufficient to lower overall wage inequality in Slovenia, unlike the typical rising wage inequality commonly observed in market economies since the 1990s.

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1. Introduction

Under the Yugoslav system of worker self-management, the central government set the firm's "socially warranted" wage bill and then the workers determined the distribution of the wage bill among the employees. The centrally determined wage bills dampened the relationship between firm profitability or worker productivity and worker wages, raising the wage bill relative to performance in less successful firms and lowering the wage bill in more efficient enterprises. Because this system meant that inefficient firms would have insufficient revenues to cover their costs, the government used a system of discretionary taxes that transfered income from profitable firms to subsidize the wage bills of unprofitable firms.

While wages within firms were potentially influenced by relative worker productivity, the actual wage assignment was subject to worker referenda that ensured an unusually small variation in pay across workers. As a result, the Yugoslav market was characterized by a very compressed pay structure. For example, workers with 20 years of tenure with the firm were paid just 6.2 % more than entry-level workers. In U.S. firms, workers with 20 years of tenure were paid a 34% wage premium.[1]

The Yugoslav pay structure divorced worker pay from worker productivity. In contrast, pay structures in market systems set wages equal to worker marginal revenue products. By transferring pay from the most productive workers and firms to their less productive counterparts, the Yugoslav system was designed to reward inefficiency. Liberalization of the Yugoslav system began in 1989 with the elimination of the centrally set wage bills and the inter-firm transfers through discretionary taxes. This allowed wages to follow productivity, and relative wages adjusted rapidly.

[1] Orazem and Vodopivec (1995).

There are three reasons that inequality should have increased with the transition to market. The first is that by disabling the previous system that transferred income from the most to the least productive, inequality should rise. In Slovenia, Orazem and Vodopivec (1995) showed that by 1991, very early in the transition from the planned system to a more market-oriented economy, there was a rapid increase in relative incomes of the most educated and experienced. In addition, the transition tended to favor women, in part because the subsidies to heavy industry and state-owned enterprises were discontinued, and these sectors atypically employed men.[2] Orazem and Vodopivec (1995) showed that these changes initially resulted in rising inequality in Slovenia.

A second source of rising inequality would be that transition should have increased the demand for managerial skills. Schultz (1975) posited that human capital was most valuable during periods of disequilibria. He argued that the returns to skill would be low in traditional subsistence economies. There was little scope for managerial decisions in economies lacking technical change and with limited exposure to markets. Similarly, planned systems that suppress variation in prices and wages, and that set production and input allocations centrally remove the need for managerial judgment. However, in market systems with constant exposure to input, output, technology and price shocks, human capital is in greatest demand.

The transition from plan to market represents one of the largest economic disruptions since World War II. Relative wages adjusted accordingly across all the transition economies. As shown by Fleisher *et al* (2005), relative returns to schooling which had averaged around 3% per year of schooling before transition, rapidly approached the returns found in market systems.

[2] It should be noted that the gains were relative and not absolute, as the transition was accompanied by a severe recession related to the combined influences of the political and economic transitions, the costs of setting up the newly formed Government of Slovenia, and the disruption of trade flows related to the Balkan Wars.

In fact, across both developed and developing economies, freer economic institutions are associated with higher returns to human capital (King *et al*, 2012). As shown by Lehmann and Muravyev (2012), the substantial differences in labor market outcomes across transition economies are affected by the flexibility of their labor market institutions. Employment protection, active labor market policies and tax wedges all have some ability to change employment and unemployment rates.

The third source of inequality is that the transition coincided with another common shock faced by all industrialized economies, the steady growth of technologies that increased demand for skilled workers relative to less skilled workers (Katz and Murphy, 1992). The complementarity between capital and skill has led to progressive increases in the wages of college graduates relative to high school educated workers. This has led to rising inequality in most of the OECD countries. Rising returns to skill explain two-thirds of the increase in inequality in the U.S. (Goldin and Katz, 2007) and one-third in the OECD (Dabla-Norris, 2015). As a result, inequality rose since the 1980s in 21 of 23 OECD economies for which comparable data was available (Cingano, 2014).

We would expect that Slovenia, experiencing both the transition to market systems that set pay more closely to productivity, the rising demand for managerial skills, and the progressive exposure to skill-biased technical change, would be experiencing rising inequality as well. But after the recovery from the 1991 recession, the exact opposite has happened (Figure 1A). Inequality has steadily fallen despite the many forces pushing in the opposite direction. Slovenia is not unique in this respect: in approximately half of European transition economies with available data, inequality has fallen over the past 25 years (Figure 1B).

If inequality is falling, have returns to education and experience that rose immediately upon the initiation of the transition to market begun to fall? Have the demands for managerial skills diminished as the transition had progressed? Has Slovenia not experienced the steady progress of skill-biased technical change? Or is there a different reason for why Slovenia has bucked the trend of rising income inequality over the past 25 years?

In what follows, we first discuss several factors that could conceivably explain the decrease in inequality in Slovenia, but explain why they can be ruled out as plausible explanations. We argue that the decrease in inequality occurred *despite* a fast pace of technological change, an increase in returns to education in the early 1990s and a steep earnings-experience profile. As we will see, the key is the rapid expansion of the number of young college graduates. In essence, unlike most of the industrialized economies, in Slovenia, the supply of college graduates rose faster than the rising relative demand for skill, depressing the returns sufficiently to lower inequality. These led later cohorts of college graduates to ente into lower-paid occupations.

2. Data

The data used in this paper were created by linking several administrative databases covering the entire Slovenian workforce for the 1991–2015 period. For every worker, the database contains detailed information on employment, unemployment and wages. Each individual's records are linked via their unique personal identification number. The following administrative data sources are used:

(a) *Data on worker earnings*. Provided by the Pension and Disability Insurance Institute of Slovenia. Comprised of earnings information for every employment spell for every individual with earnings.

(b) *Data on worker history*. Compiled by the Statistical Office of Slovenia. Includes beginning and ending dates for every employment spell, employer identification code, occupation, appointment type, and personal characteristics (age, education, and gender).

This allows us to monitor the entire workforce over that time period both in cross section at one point in time and to follow cohorts of workers longitudinally over time. In order to account for selection into employment, which we do in all the wage regressions to calculate returns to education and experience, we infer the entire population aged 18-60 based on the employment and unemployment records.[3] This allows us to generate unique insights into how Slovenia managed to lower inequality, with estimates of returns to education and experience that are comparable over time despite the changes in the structure of employment.

3. Explaining decreasing earnings inequality in Slovenia: Technological change, returns to education and experience

To what extent can we can explain the decrease in earnings inequality with a slower pace of technological change in Slovenia or a decrease in rewards to education or experience? As we discuss below, these factors do not explain the decreasing inequality – the rate of technological change over this period was faster than in developed economies, and returns to education increased dramatically during the 1990s.

It is not slow technological change

Figure 2 shows the time path of output per worker in Slovenia and other transition economies in Central and Eastern Europe. All of the transition economies have been increasing

[3] While not directly used in the analysis, data from the unemployment registry to aid infer the existence of individuals who were never employed, but registered as unemployed to receive social benefits. Given the high labor-force participation rates in Slovenia in certain age groups – for example amongst 30-39 year old women, Slovenia had the highest labor force participation rate among EU countries of the 1999-2016 period (Eurostat, 2017).

their labor productivity more rapidly than the other EU countries. The average growth rate of output per hour average 3.3% per year in the transition countries and 2.9% per year in Slovenia, but only 2.3% per year in the traditional market economies. Between 1990 and 2014, the productivity gap between Slovenia and the EU fell from 79% to 53%. So, even though its average growth rate was slower than in some other transition economies, Slovenia was not lagging in technological growth over the period,.

It is not falling rewards to experience or education

There has been a steady rise in the cross-sectional synthetic life cycle earnings profile over time. Figures 3A-B trace out the pattern of earnings by age for both men and women. The apparent rewards to a year of work experience has not fallen for either men or women. The most rapid gains are from the depressed wages of 1991 to 1995, but the gains continue in every subsequent year as the benefits of rising labor productivity noted in Figure 2 were shared by workers.

However, the cross-sectional pattern masks an even faster increase in wages if we follow a cohort over time. That means that the cross-sectional wage pattern has consistently underpredicted the earnings of young Slovene workers as they age. To show this, we trace the implied longitudinal earnings path using Figure 3A as the base and illustrate the result in Figure 3C. It is clear that the longitudinal age-earnings profile is much steeper than is implied by the cross-sectional pattern. In effect, the returns to early work experience rose so rapidly that it flattened the cross-sectional returns, understating the returns to schooling. Figure 3D illustrates the life earnings profiles for various birth cohorts, showing that the reward to work experience rose consistently over the transition.

In Figures 4A-B, we trace out the time path of returns to schooling as estimated by cross-sectional Mincer log earnings functions that are reported in Appendix Table 1A-B. The returns to education continued to rise from early in transition through 2000. While the rewards fell thereafter on average, they remained high compared to the 10% per year norm in OECD economies. Rewards are higher for women than men. There has not been a substantial decline in returns to skill of the magnitude that could explain declining inequality. In fact, the rising returns from 1991-2010 should have been contributing to rising inequality.

Cohort returns to schooling, inequality, and the supply of college graduates

In Figure 5, we report the returns to schooling by birth cohort as compiled from Mincer log earnings functions reported in detail in Appendix Tables 2A-B. It is apparent that the decline in rewards to schooling are concentrated among the youngest cohorts. While the returns decrease for more recent birth cohorts, they drop most for the youngest cohorts. It seems that our inequality puzzle involves differences in relative returns to skill for older and younger members of the Slovenian workforce.

This presumption is supported by a birth cohort-specific compilation of Gini coefficients as each cohort ages. Inequality should increase as a cohort ages as differences in productivity became more apparent for otherwise similarly educated and experienced individuals, and that is apparent in Figure 6. However, the striking pattern is the decrease in inequality for each successive birth cohort from the oldest to the youngest. Driving the decline in inequality in Slovenia is the increasingly egalitarian wage distribution for the youngest Slovenians.

The falling rewards to schooling and falling inequality concentrated among the youngest cohorts suggests that there must be an unusually large supply of young college graduates. If

young and old college graduates are not perfect substitutes, the depressing effect of an unusually large supply of young college graduates on returns would be concentrated on the young. In Figure 7, we present the ratio of first-year college entrants to the number of 19 year-olds in the population. The ratio can be greater than 1 if college entrants are entering not only from the most recent secondary school graduating class, but from older residents as well.. Starting with independence in 1991, there was a rapid increase in the proportion of the population going to college. The university share of employed 25-29 year-olds rose from 8% in 1991 to 29% in 2015. Slovenia had the 7th fastest growth in college graduates in Hanushek's (2016) compilation. It seems that the growth of supply may have overtaken the growth in demand for college graduates.

4. Explaining decreasing earnings inequality in Slovenia: The role of occupations

One possible indication that the supply of college graduates has overtaken the local market demand is if college graduates start taking jobs that were previously taken by less-educated workers. To investigate this, we developed a ranking of occupations based on the average pay across all incumbents in each occupation over the 2000-2015 year period. This gives us a relative index of occupational productivity, assuming that wages equal marginal revenue products. We can then examine the distribution of new market entrants and incumbent workers in each education group to assess if there has been a deterioration in the quality of jobs taken by younger compared to older birth cohorts.

Figure 8A illustrates first, there is no change in the distribution of occupations measured by skill content over time. Moreover, the distribution of occupations for entrants has not changed either. However, there is a clear leftward shift in the skill distribution of occupations taken by

tertiary educated workers. The leftward shift is more concentrated among new entrants. This happened even though there are more entry-level jobs for college graduates.

We can illustrate the changing occupational distribution for the college educated market entrants in two ways. The first holds constant the occupational distribution of the college graduate labor market entrants in 2000 as the reference. We can then illustrate how the occupational distributions of subsequent cohorts of college entrants compare to the 2000 distribution. For perspective, we also compare the overall occupational distributions across all new labor market entrants for the same years. We present the results in panel A of Table 1.

For all labor market entrants there is little change in the occupational distribution for new workers over the 15 years. The share of workers getting jobs in the bottom 25% of occupations falls, but the results are virtually identical at the upper tail. The implication is that there has been some upskilling of occupations taken by new market entrants from the lowest to the second quartile occupations in the skill distribution. Turning to the labor market entrants with college degrees, it is Interesting that college graduates were more likely than other education groups to enter occupations at the bottom of the occupational skill distribution. In 2000, 18% of college graduates took jobs in the bottom 10% of the skill distribution and 69% were in the lower half of the occupational skill distribution compared to 56% overall.

By 2015, the college share of jobs at the upper half of the occupational skill distribution rises somewhat, and so the upper tail of college graduates appears to be taking the same types of jobs as they did in 2000. However, 29% of college graduates took jobs in the bottom 10% of the skill distribution even though the overall labor market entrant share of those jobs was declining! Clearly the market entry job opportunities for a substantial proportion of college graduates deteriorated between 2000 and 2015 compared to the market for entrants overall.

It is possible that the falling market opportunities for newly minted college graduates is due to declining demand for college graduates rather than excess supply. To investigate that question, we reframe the reference to be the distribution of occupational skills for all workers in each year rather than fixing the reference distribution at 2000. We show the results in Panel B of Table 1. For reference, we present the distribution across all experienced workers in the same years. By definition, the reference distribution should be 10%, 25%, 50%, 75% and 90%, but lumping of incumbents in occupations results in slight deviations from the expected distribution.[4] In 2000, college graduates entered the jobs in the lower half of the occupational distribution at nearly the same rate as incumbents. College graduates were slightly more likely to be in the upper-half of the distribution (49% versus 44%) but were more present in the third quartile than the fourth quartile of the distribution. By 2015, we again see a massing of college graduates in the bottom 10% of the skill distribution. The rest of the distribution matches almost exactly the overall distribution of jobs by skill, suggesting that the falling opportunities for college graduates is for students who previously had taken jobs in the 11-25% range of the occupational skill distribution. Meanwhile, a larger share of college graduates were taking jobs in the upper 25% of the skill distribution. The pattern is consistent with a surplus of low quality college graduates crowding the bottom half of the skill distribution while higher skilled college graduates are doing no worse and perhaps slightly better than past cohorts in competing for positions in the most skilled jobs.

First jobs: blemishes or scars?

The occupation at entry may not be the career occupation, and so there may be no permanent loss to the young cohorts of college graduates who are entering low productivity

[4] We use detailed, 4-digit ISCO-08 codes to that classify individuals into one of 436 possible occupations.

occupations in greater proportions. We analyze whether initial occupation or contract type results in persistently low wages by examining longitudinal data on the 2000 labor market entrants, the earliest entry cohort for which we have occupational data. Figure 9 shows the relationship between each entrant's 2000 occupational skill level on the horizontal axis and his or her 2015 occupational skill level by education at entry. The 45o line represents the expected relationship if initial occupation was perfectly correlated with later occupational skill level. For all education groups, the relationship is flatter than the 45° line, indicating that entrants into the lower-skilled occupations tend to move to higher-skilled occupations over time. The likelihood of upskilling appears to be strongest for the most educated.,

To examine the relationship between initial and subsequent jobs more formally, we regress wages at the end of our sample period, 2015, on several explanatory variables. The results are reported in Table 2. Log wage in 2015 is regressed on current and initial occupational skill level, education level, contract type, and non-Slovene ethnicity. We also include a measure of the minimum wage relative to the occupational wage as the period coincides with an aggressive increase in the minimum wages between 2009-2015 that would have increased wages for the least skilled occupations.

Being in a higher skilled occupation raises wages for college educated workers but not for other education groups. Holding current occupational skill fixed, starting in a higher skilled occupation in 2000 increased wages in 2015 for all education groups and significantly so for all but the primary educated. The pattern of signs suggests that college graduates who enter high skilled occupations experience faster wage growth when they remain in higher skilled occupations, while less-educated entrants into those occupations experience slower wage growth.

Workers who begin on fixed term contracts in 2000 have significantly lower wages 15 years later. If they are still on fixed term contracts in 2015, their wages are substantially lower still. Combining the initial contract type (fixed versus permanent) with the initial occupational skill in 2000, it is apparent that the type of initial job taken in 2000 has a persistent effect on wages 15 years into the work careers of the 2000 entry cohort. These permanent effects may reflect unobserved abilities with the least able sorting into lower skilled occupations and fixed term contracts. However, the estimates also hold constant the current occupational skill and contract type in 2015 which should already reflect the sorting effects of those unobserved abilities. While not conclusive, the results suggest that there are persistent scarring effects of starting work careers in bad jobs.

Turning to the education effects in column 1, it is apparent that the most educated experienced the fastest wage growth, holding occupation and contract type fixed. College educated entrants into low-wage occupations experienced 19.4% faster wage growth within the lower-paid occupations than did their primary educated colleagues and roughly 14% faster wage growth than their secondary educated colleagues. Consequently, college education has a return even in less-skilled occupations, but not as high returns as are experienced by persistently occupying a high-skilled occupation from time of labor market entry.

The minimum wage would have been expected to help those in less-skilled occupations, but that is not the case. Individuals in occupations where the minimum wage is high relative to the average wage in the occupation experienced slower wage growth. That is an apparent effect of firms holding back on wage increases for more experienced workers in occupations where the minimum wage was most effective in raising the pay of the least skilled in the occupation.

The experience of the 2000 entry-cohort is that college graduates who entered lower-skill jobs or contracts at graduation faced a career long penalty in the form of lower wages. Since 2000, an increasing share of college graduates were taking those lower-skill jobs at entry. That suggests that the rewards from college education are being eroded, driving the greater equality of wages among the most recent birth cohorts evident in Figure 6.

5. The effect of cohort supply and quality on returns to schooling.

The results above suggest that rising supplies of college graduates are forcing an increasing share to accept low-skill jobs. For the effect of the rising supply to be concentrated on the young college graduates, it must be that college and lesser educated groups are imperfect substitutes and that there is imperfect substitution across age groups. Moreover, the rising number of college graduates must be drawing further from the lower tail of the ability distribution, further eroding the demand for young college graduates. We can test for these hypotheses using the Constant Elasticity of substitution specification introduced by Card and Lemieux (2001) and adapted by Carneiro and Lee (2011) and Kang et al (2017).

The labor force at any time *t* includes two groups of workers, high school educated workers H_t and college educated workers C_t.[5] Each of these education groups is composed of J age cohorts within each education group according to:

$$C_t = \left[\sum_j^J (a_j (C_{jt})^{\eta})\right]^{1/\eta} \quad (1)$$

$$H_t = \left[\sum_j^J (b_j H_{jt}^{\eta})\right]^{1/\eta} \quad (2)$$

[5] In the CES form, any two groups would have the same implied elasticities of substitution in theory. In practice, it is convenient to pick groups that are sufficiently populated to insure stable results.

The elasticity of substitution between different age groups (σ_A) is positively related to η, $\infty < \eta \leq 1$, by the relation $\eta = 1 - \frac{1}{\sigma_A}$.

The parameters a_j and b_j are constant technology parameters that allow productivity to vary across age cohort *j* for high school and college laborers, respectively. Rising college numbers is expected to reduce the quality of some college graduates compared to older cohorts and high school graduates. Therefore, we assume that $\frac{da_j}{d\theta_j} < 0$, where θ_j is the share of cohort *j* that attends college.

The aggregate production function is given by the CES form:

$$q_t = \left[\alpha_t \left(C_{jt}\right)^{\rho} + (1 - \alpha_t) H_t^{\rho}\right]^{\frac{1}{\rho}} \quad (3)$$

where $-\infty < \rho \leq 1$ sets the elasticity of substitution σ_{edu} between the two education groups; $\left(\rho = 1 - \frac{1}{\sigma_{edu}}\right)$; and α_t is time varying technology or demographic changes that alter the skill share of production. The marginal products of workers from traditional universities and high school in age group *j* at time *t* are given as follows:

$$\frac{\partial q_t}{\partial C_{jt}} = \frac{\partial q_t}{\partial C_t}\frac{\partial C_t}{\partial C_{jt}} = \left[a_j \alpha_t q_t^{1-\rho} (C_{jt})^{\eta-1} (C_t)^{\rho-\eta}\right] \quad (4)$$

$$\frac{\partial q_t}{\partial H_{jt}} = \frac{\partial q_t}{\partial H_t}\frac{\partial H_t}{\partial H_{jt}} = \left[b_j (1 - \alpha_t) q_t^{1-\rho} H_{jt}^{\eta-1} H_t^{\rho-\eta}\right] \quad (5)$$

The first-order conditions require that all education cohorts are paid their marginal products. Imposing these conditions, the relative wage of college to high school graduates in cohort *j* in year *t* becomes:

$$\ln\left(\frac{w_{jt}^{C}}{w_{jt}^{H}}\right) = \ln\left(\frac{\alpha_t}{1-\alpha_t}\right) + \ln\left(\frac{a_j}{b_j}\right) - \frac{1}{\sigma_{edu}}\ln\left(\frac{C_t^e}{H_t}\right) - \frac{1}{\sigma_A}\left[\ln\left(\frac{C_{jt}^e}{H_{jt}}\right) - \ln\left(\frac{C_t^e}{H_t}\right)\right] \quad (6)$$

As noted, we hypothesize that the average productivity of a cohort of college graduates will decrease as the share of the cohort going to college rises and weaker ability individuals are sorted into the college group. We accommodate that possibility by using the approximation $\ln\left(\frac{a_j}{b_j}\right) = a\theta_j$. If the hypothesis is correct, we will find that $a < 0$. Inserting the approximation into (6),

$$\ln\left(\frac{w_{jt}^{C}}{w_{jt}^{H}}\right) = \ln\left(\frac{\alpha_t}{1-\alpha_t}\right) + a\theta_j - \frac{1}{\sigma_{edu}}\ln\left(\frac{C_t^e}{H_t}\right) - \frac{1}{\sigma_A}\left[\ln\left(\frac{C_{jt}^e}{H_{jt}}\right) - \ln\left(\frac{C_t^e}{H_t}\right)\right] \quad (7)$$

Equation (7) can be estimated directly under the assumption that the college and high school educated cohorts represent exogenous supply shifts to the Slovenian labor market. Although more complex specifications to control for demand shifts can be employed, Katz and Murphy (1987) found that it was sufficient to substitute a time trend for the first term, $\ln\left(\frac{\alpha_t}{1-\alpha_t}\right)$. In our application, we also incorporated other cyclical measures to help control for demand shifts including the unemployment rate, the average occupational wage as a measure of labor productivity, and the percentage growth in the occupational wage bill as a measure of shifting occupational demand. The last two terms allow us to estimate the elasticities of substitution between education groups and between age groups.

Results are summarized in table 3. Results are very similar when the population is decomposed into men and women. The first coefficients show that college and secondary graduates are imperfect substitutes and so the rising supply of college graduates has the effect of lowering relative earnings for college graduates relative to high school graduates. The second coefficient shows that there is considerably more substitutability between cohorts, and so a

atypically large cohort of young college graduates also depresses the returns for older college graduates, albeit not to the same extent. The third coefficient shows a substantial negative effect of having a large share of the birth cohort going to college. Hence the youngest birth cohorts are absorbing a large decrease in earnings as a result of the large number going to college.

6. Policy implications

If Slovenia is to raise the rewards for their youngest college graduates to the level of their older counterparts, they will need to either increase the relative demand for skill or reduce the relative supply. On the demand side, it may be possible to investigate if there are undue constraints on firm entry or expansion. Slovenia firms are atypically small. There are well-known complementarities between skill and firm size, and so the atypically small firms are constraining rewards to college graduates. An additional source of firm growth is to access foreign markets or to invite foreign investors. Foreign firms should be attracted by relatively inexpensive access to skill in Slovenia.

A second possibility is to reduce restrictions on labor contracting. High costs of firing through mandatory severance and advance notice provisions may be limiting firm incentives to hire. Other policies seem to encourage hiring college students into low skill retail and service jobs rather than internships or other jobs that would enhance career opportunities.

The other possibility is to reduce subsidies for college. Students not only get free tuition, but subsidized housing and meals. Moreover, these subsidies can be continued even when students are not making normal progress. This has the effect of dragging out the length of time to complete a college degree, even though the returns to work experience appear to be quite high.

Note that to continue the current policies will depress the rewards to a college degree relative to other countries where returns to college have not fallen. That means that the best and

brightest Slovenian college graduates will have an incentive to seek employment in other countries if their skills are not priced competitively in the domestic market.

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Table 1: Changing Occupational Distribution for newly entering workers compared to past entrants and compared to current incumbent workers, 2000 - 2015

Panel A: Occupational distribution for labor market entrants using the 2000 entrant occupational percentile cut points

		Percentile				
Year	Group	10th	25th	50th	75th	90th
2000	All	0.09	0.32	0.56	0.75	0.89
	Tertiary	**0.18**	**0.25**	**0.69**	**0.85**	**0.96**
2005	All	0.07	0.29	0.50	0.72	0.88
	Tertiary	**0.15**	**0.32**	**0.57**	**0.83**	**0.95**
2010	All	0.05	0.23	0.48	0.68	0.87
	Tertiary	**0.19**	**0.33**	**0.57**	**0.83**	**0.94**
2015	All	0.06	0.26	0.56	0.74	0.90
	Tertiary	**0.29**	**0.41**	**0.64**	**0.84**	**0.95**

Panel B: Occupational distribution for labor market entrants using the contemporaneous overall occupational percentile cut points

		Percentile				
Year	Group	10th	25th	50th	75th	90th
2000	All	0.09	0.32	0.56	0.75	0.89
	Tertiary	**0.11**	**0.25**	**0.51**	**0.83**	**0.95**
2005	All	0.08	0.28	0.50	0.72	0.88
	Tertiary	**0.14**	**0.29**	**0.54**	**0.79**	**0.93**
2010	All	0.07	0.29	0.49	0.72	0.88
	Tertiary	**0.14**	**0.31**	**0.53**	**0.79**	**0.92**
2015	All	0.09	0.32	0.56	0.76	0.91
	Tertiary	**0.19**	**0.35**	**0.56**	**0.78**	**0.91**

Table 2: Regressions Explaining Variation in Log Wages in 2015 for the 2000 Labor Market Entry Cohort

VARIABLES	Education Group				
	All	Primary	Vocational Secondary	General Secondary	Tertiary
2015 Occupational Wage	0.025**	-0.108**	-0.071**	-0.016	0.025**
	(0.003)	(0.037)	(0.018)	(0.012)	(0.005)
2000 Occupational Wage	0.033**	0.014	0.043**	0.032**	0.032**
	(0.002)	(0.015)	(0.007)	(0.004)	(0.003)
Vocational Secondary	0.047**				
	(0.009)				
General Secondary	0.031**				
	(0.009)				
Tertiary	0.194**				
	(0.012)				
Fixed Term in 2000	-0.045**	-0.017	-0.049**	-0.047**	-0.058**
	(0.006)	(0.018)	(0.009)	(0.010)	(0.011)
Fixed Term in 2015	-0.223**	-0.117**	-0.137**	-0.207**	-0.373**
	(0.011)	(0.028)	(0.014)	(0.015)	(0.028)
Self-employed in 2000	0.008	0.002	-0.004	-0.012	0.010
	(0.014)	(0.035)	(0.019)	(0.020)	(0.037)
NonSlovene	0.011	-0.066**	0.022*	0.037	0.073
	(0.012)	(0.021)	(0.013)	(0.033)	(0.066)
Minimum Wage/Occupational Wage	-0.557**	-1.476**	-1.184**	-0.760**	-0.696**
	(0.033)	(0.241)	(0.121)	(0.098)	(0.070)
Constant	1.883**	3.375**	2.855**	2.304**	2.170**
	(0.042)	(0.386)	(0.189)	(0.140)	(0.0715)
Observations	20935	1630	4957	6700	7648
R-squared	0.45	0.22	0.23	0.22	0.27

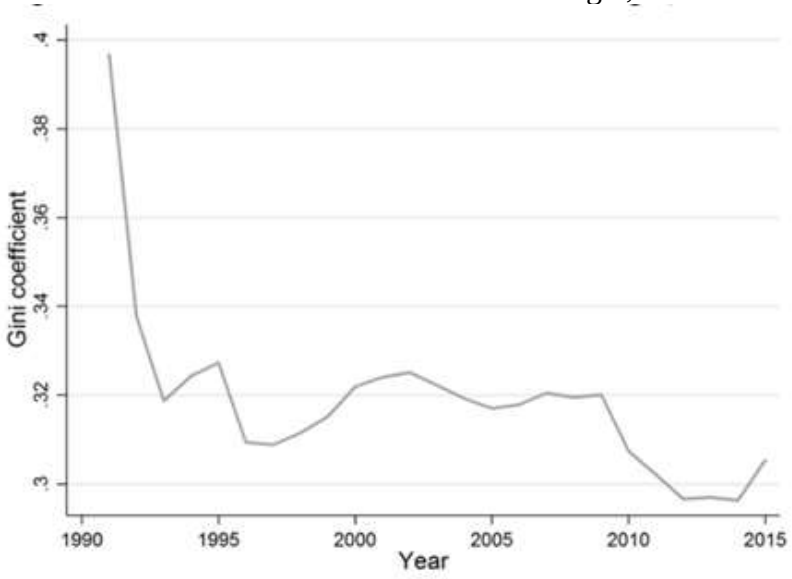
Robust standard errors in parentheses. ** p<0.05, * p<0.1. Regression includes a dummy variable for missing occupational information

Table 3: Summary of the coefficients and standard errors of equations estimated using equation (7) $\ln\left(\frac{w_{jt}^{C}}{w_{jt}^{H}}\right) = \ln\left(\frac{\alpha_t}{1-\alpha_t}\right) + a\theta_j - \frac{1}{\sigma_{edu}}\ln\left(\frac{C_t^e}{H_t}\right) - \frac{1}{\sigma_A}\left[\ln\left(\frac{C_{jt}^e}{H_{jt}}\right) - \ln\left(\frac{C_t^e}{H_t}\right)\right]$

	Men	Women	All
Education Substitution: $-\frac{1}{\sigma_{edu}}$	-1.417*** (0.253)	-0.996*** (0.102)	-1.290*** (0.146)
Age Sustitution: $-\frac{1}{\sigma_A}$	-0.0133 (0.0251)	-0.0587*** (0.0117)	-0.0841*** (0.0187)
Cohort Share Going to College: a	-0.349*** (0.0313)	-0.325*** (0.0214)	-.387*** (0.0214)
R^2	0.57	0.65	0.70

Source: Author's computation based on birth cohort aggregations of the universe of all workers in the Slovenia labor market aged 25-60 who had a college degree or a secondary degree, 1991 – 2015. Coefficients corrected for clustering at the birth cohort level. Regression includes controls for annual trend, the annual unemployment rate, average occupational wage, and the percentage increase in the occupational wage bill.

Figure 1A: Gini coefficients in Slovenia based on wages, 1991-2015



Source: Author's computation based on the universe of all workers in the Slovenia labor market aged 25-60, 1991 - 2015

Figure 1B: Gini coefficients based on income in selected transition economies, early 1990s and 2015

Figure 2: Time path of output per hour in Transition Economies and In the European Union, 1990-2014

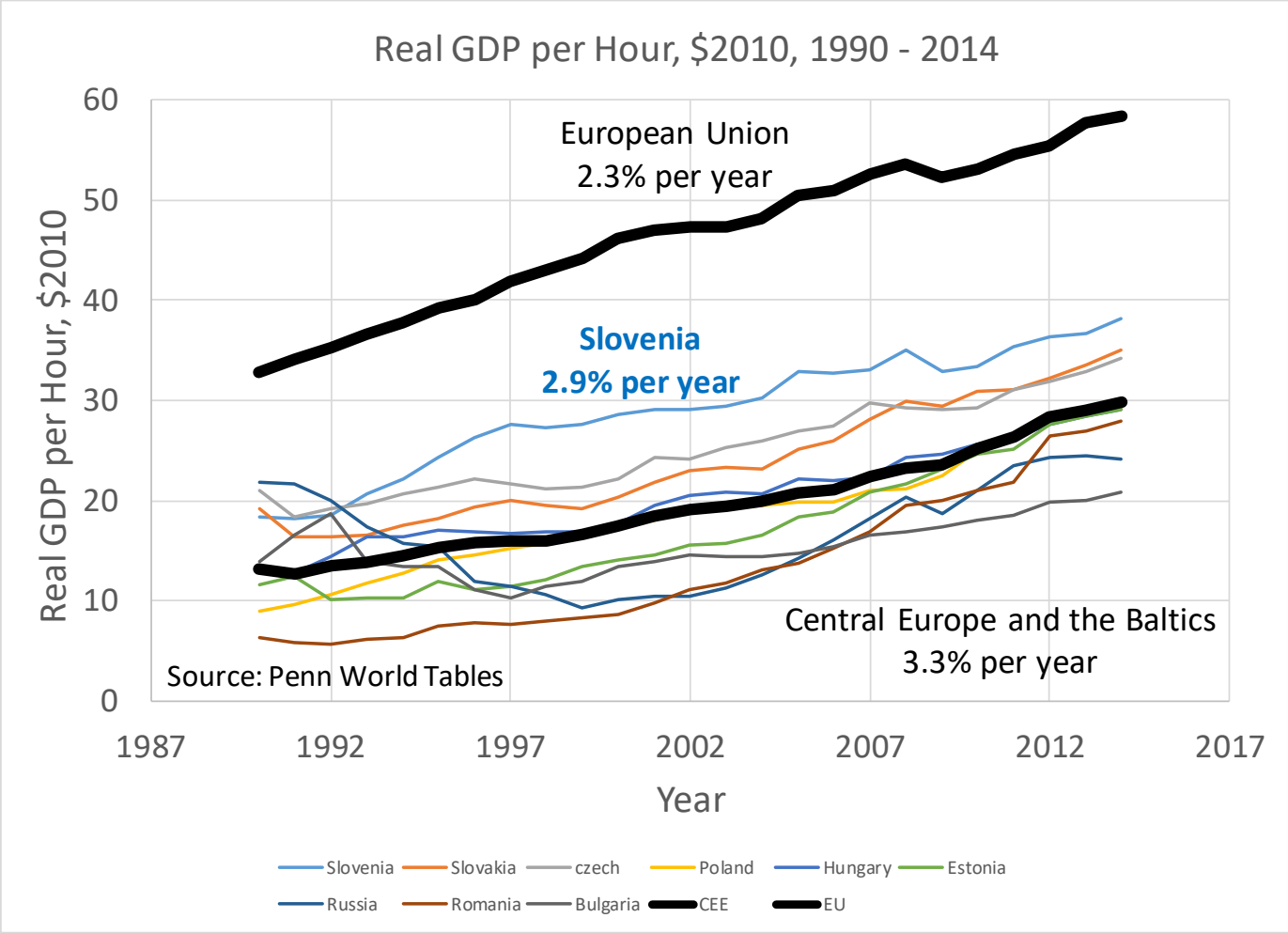


Figure 3A: Cross-sectional Male Earnings by Years of Potential Experience, 1991-2015

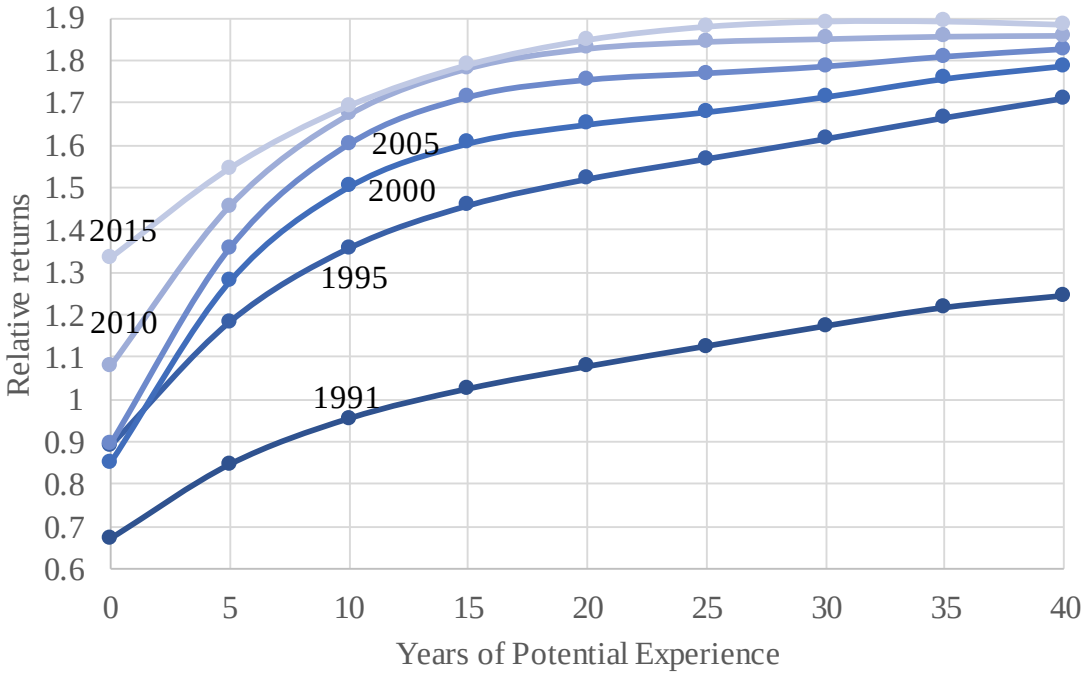
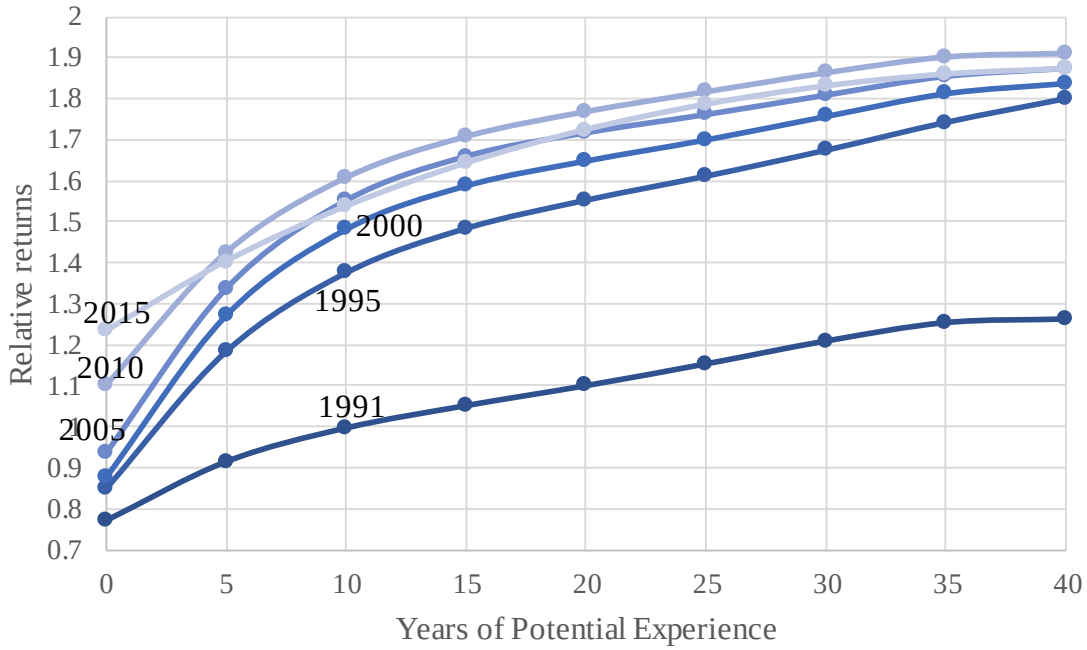
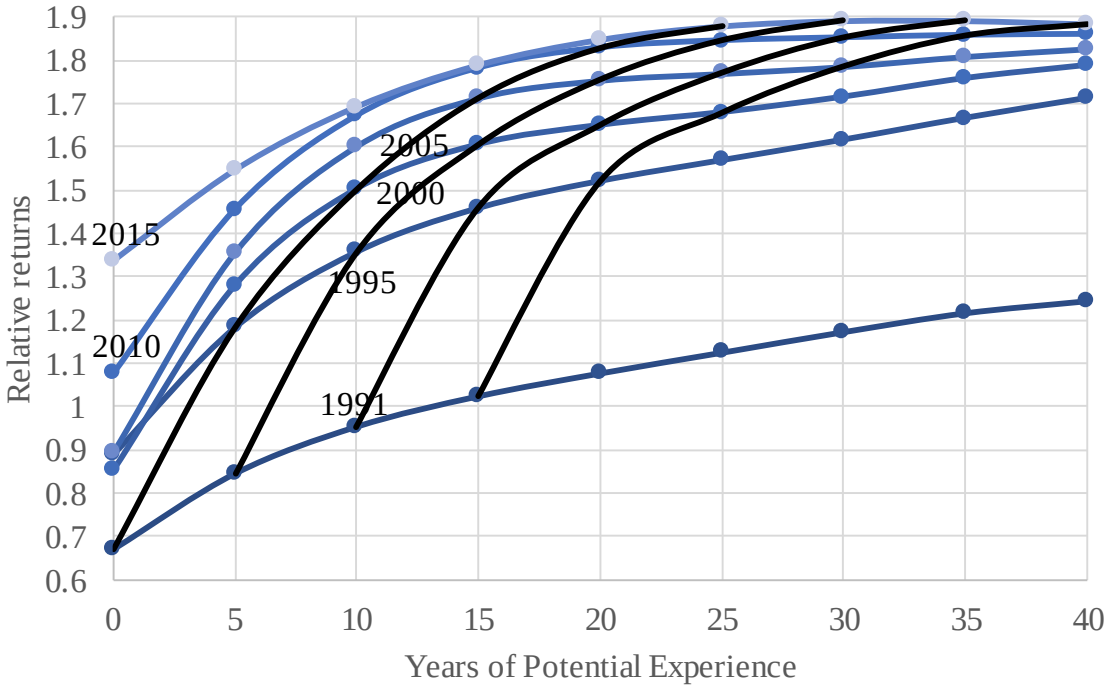


Figure 3B: Cross-sectional Female Earnings by Years of Potential Experience, 1991-2015



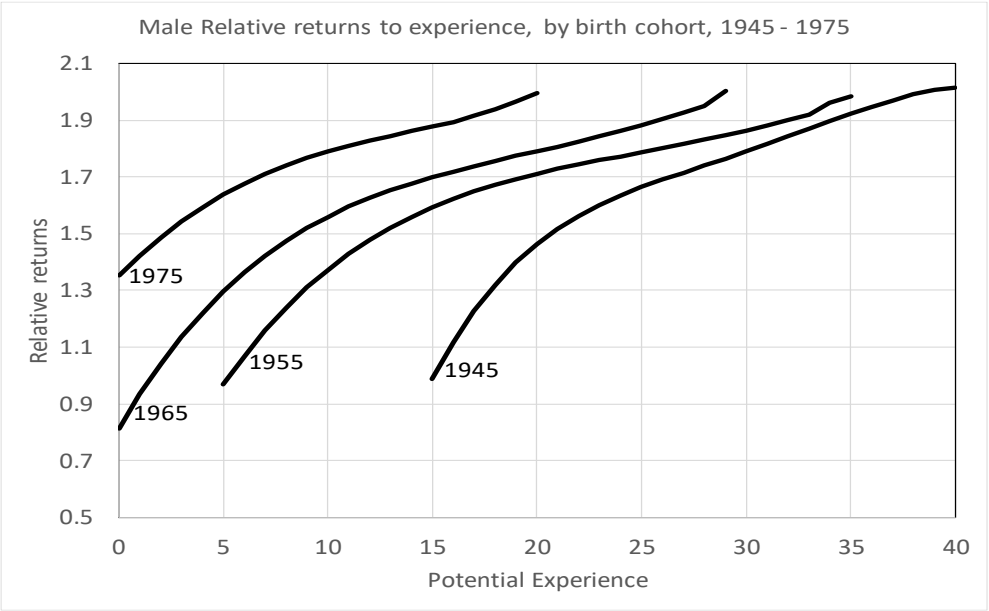
Source: Author's computation based on the universe of all workers in the Slovenia labor market aged 25-60, various years, 1991 – 2015

Figure 3C: Cross-sectional Male Earnings by Years of Potential Experience, 1991-2015, with cohort returns superimposed



Source: Author's computation based on the universe of all workers in the Slovenia labor market aged 25-60, various years, 1991 – 2015

FIGURE 3D: Longitudinal Male Earnings by Years of Potential Experience, various birth cohorts



Source: Author's computation based on the universe of all workers in the Slovenia labor market born in 1945, 1955, 1965, and 1975 and observed employed in any of the years 1991 – 2015

Figure 4A: Estimated male returns to schooling by education group for various years between 1991-2015

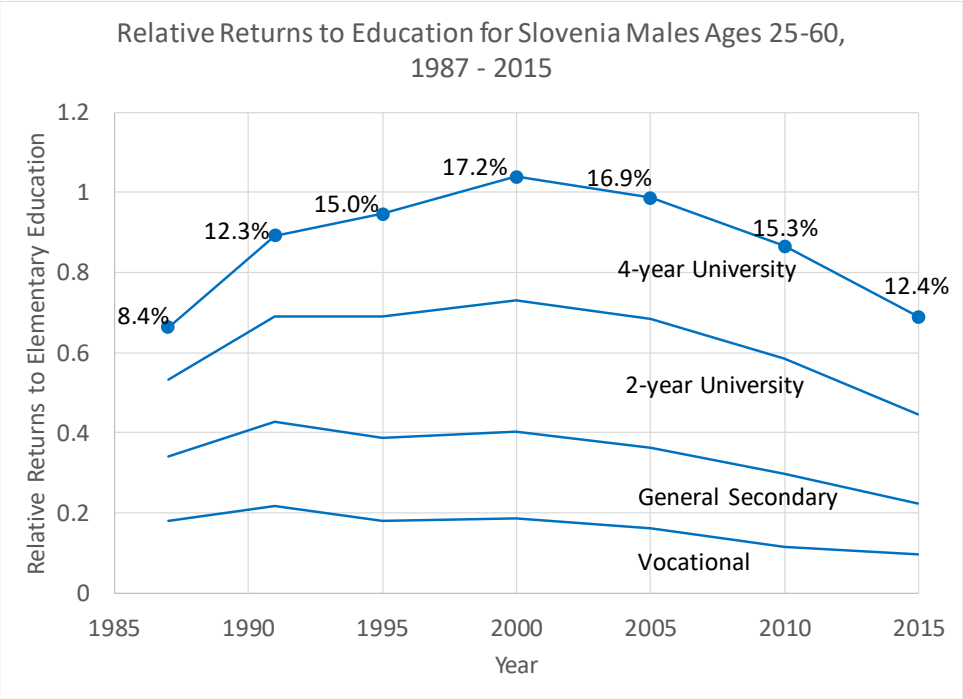
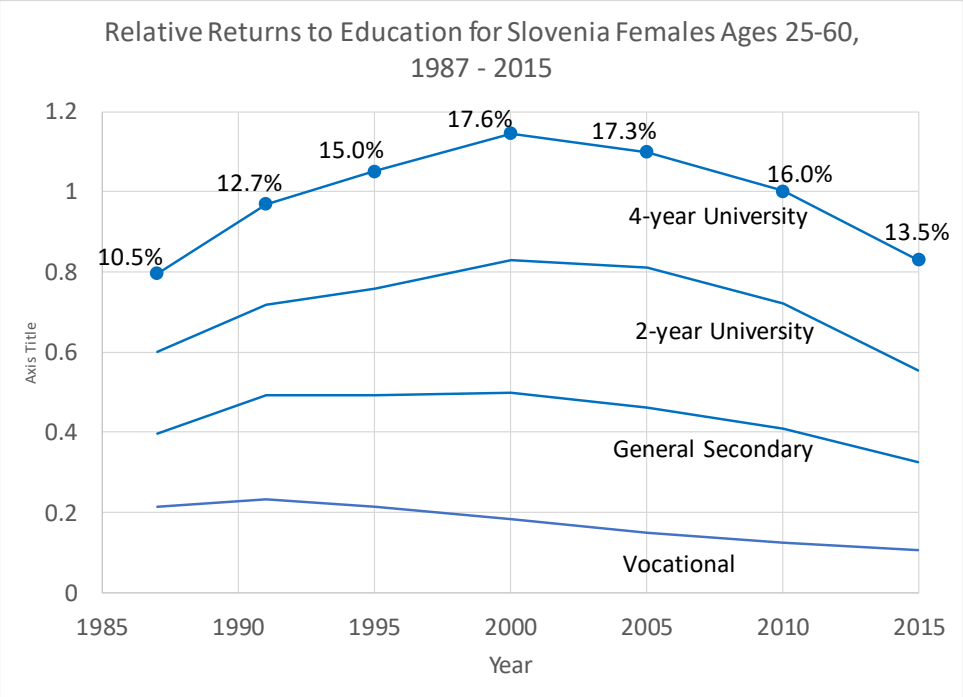


Figure 4B: Estimated female returns to schooling by education group for various years between 1991-2015



Source: Author's computation based on the universe of all workers in the Slovenia labor market aged 25-60, various years, 1991 – 2015

Figure 5: Returns to Schooling for Male and Female College and Secondary Graduates in Slovenia for various birth cohorts

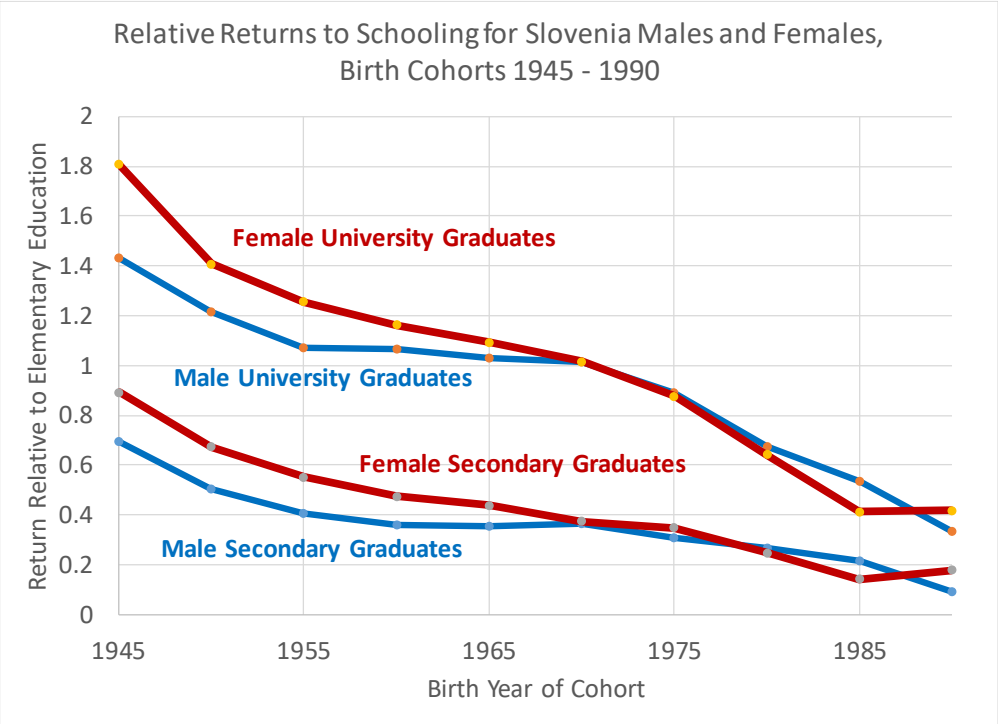
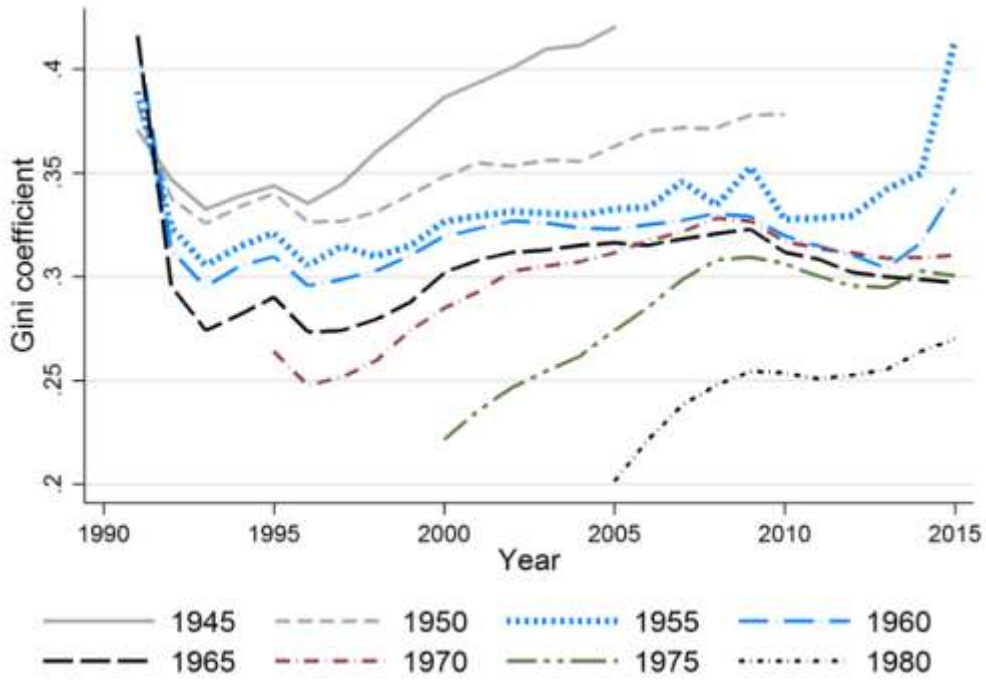
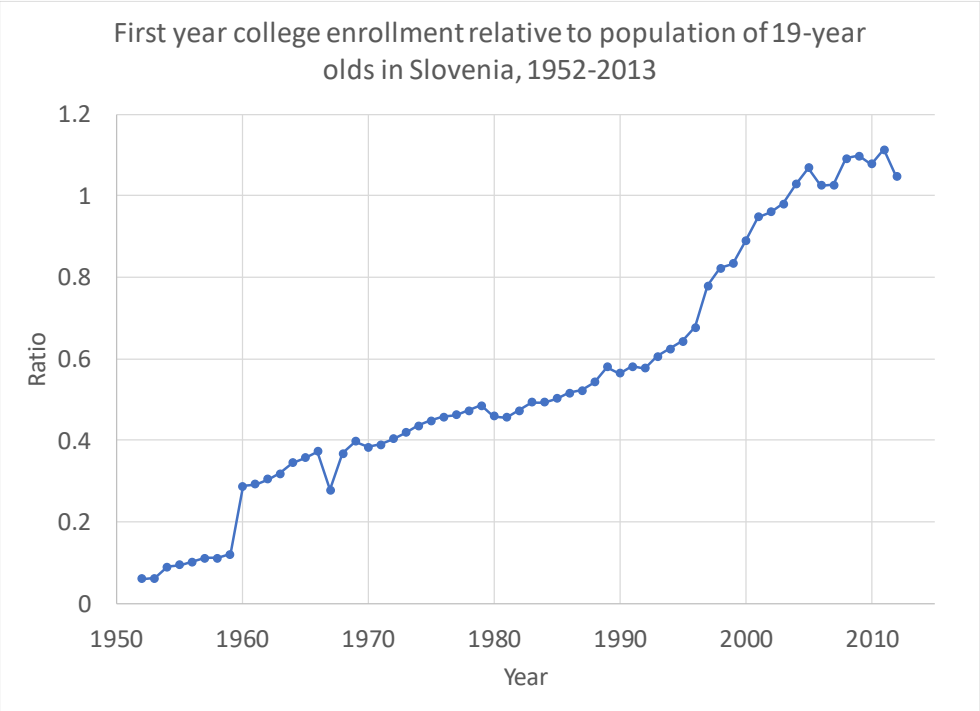


Figure 6: Longitudinal Gini coefficients for various birth cohorts in Slovenia



Source: Author's computation based on the universe of all workers in the Slovenia labor market born in 5-year intervals from 1945-1980. Gini coefficients are computed for each of the years 1991 – 2015

Figure 7: Ratio of first-year college entrants to the population of 19 year-olds, 1952-2013



Source: Statistical Yearbook of the Republic of Slovenia, various years.

Figure 8A: Distribution of workers across occupations ordered by relative occupational productivity, 2000-2015. All workers and all new labor market entrants.

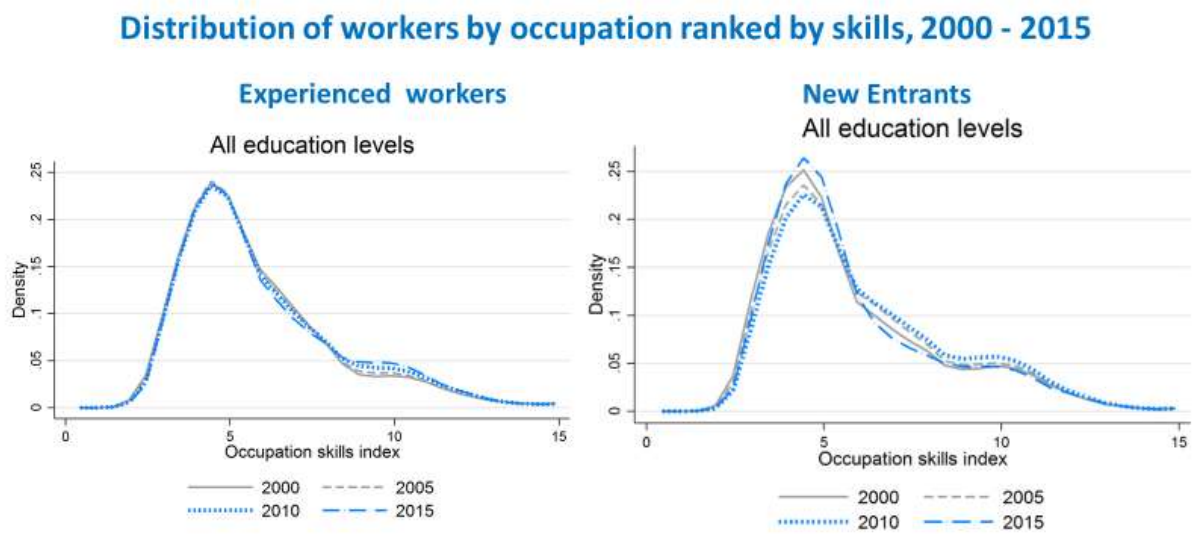


Figure 8B: Distribution of workers across occupations ordered by relative occupational productivity, 2000-2015. All college-educated workers and all new college-educated labor market entrants.

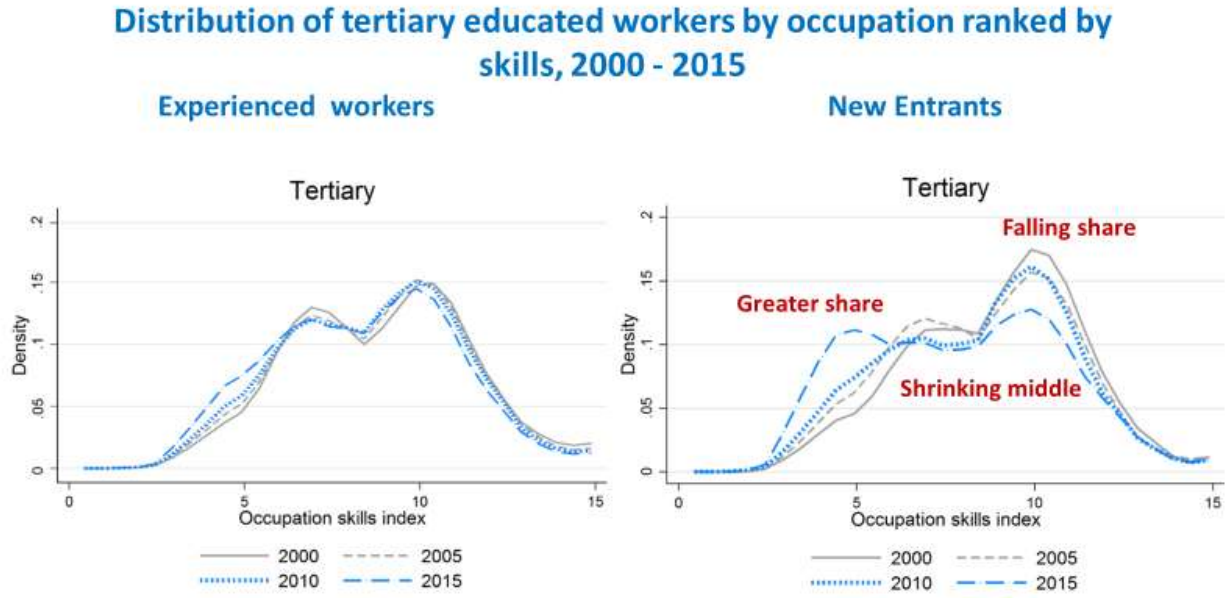
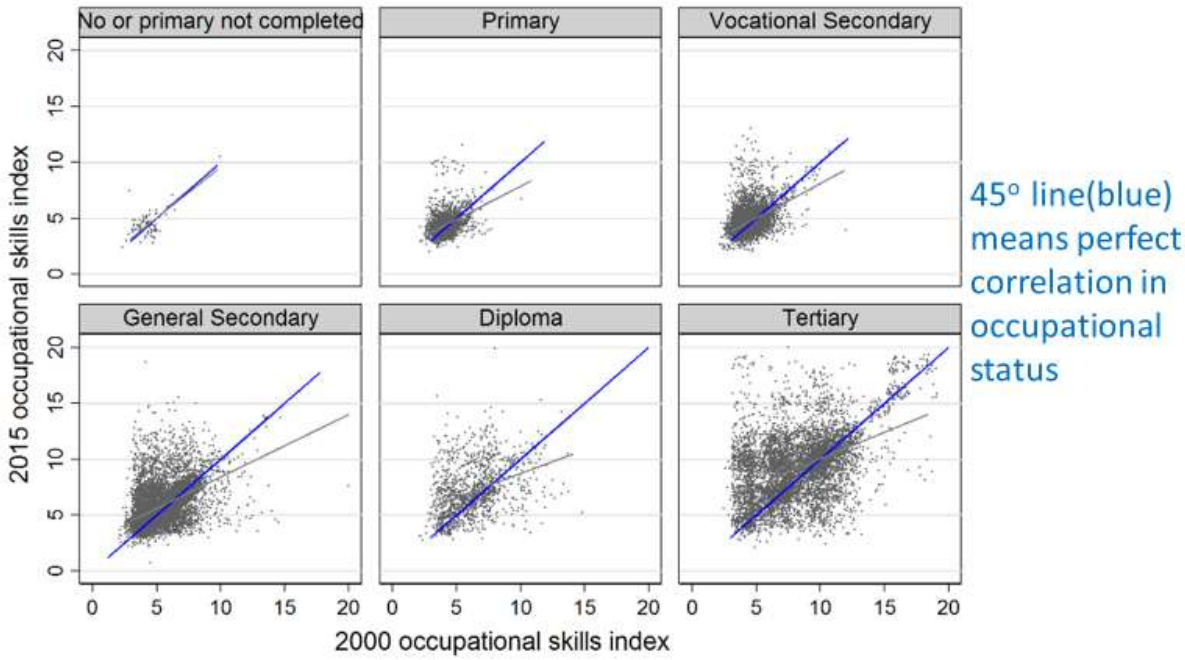


Figure 9: Relationship between 2000 and 2015 occupational status for the 2000 labor market entry cohort, by educational attainment level



Source: Author's computation based on the universe of all workers entering the Slovenia labor market in 2000 and still working in 2015

Appendix Table A1: Cross-Sectional Male Earnings by Years of Potential Experience, 1991-2015

These regressions were used to generate Figures 3A, 3C, and 4A

		Interaction terms				
	Base year - 1991	1995	2000	2005	2010	2015
Education (omitted group: Primary school)						
Unfinished primary school	-0.0120***	-0.0357***	-0.0202***	-0.00550	-0.00518	-0.00435
	(0.00344)	(0.00403)	(0.00476)	(0.00523)	(0.00605)	(0.00651)
Vocational Secondary	0.220***	-0.0378***	-0.0225***	-0.0449***	-0.0902***	-0.121***
	(0.00293)	(0.00325)	(0.00361)	(0.00378)	(0.00358)	(0.00342)
General Secondary	0.431***	-0.0422***	-0.0190***	-0.0536***	-0.115***	-0.206***
	(0.00322)	(0.00358)	(0.00392)	(0.00403)	(0.00395)	(0.00376)
2-year University	0.698***	-0.00131	0.0480***	0.00492	-0.0897***	-0.248***
	(0.00488)	(0.00549)	(0.00602)	(0.00634)	(0.00628)	(0.00593)
4-year University	0.903***	0.0514***	0.160***	0.117***	-0.00560	-0.208***
	(0.00439)	(0.00492)	(0.00532)	(0.00530)	(0.00524)	(0.00508)
Potential experience	44.08***	29.72***	68.50***	77.02***	52.42***	5.539
	(3.693)	(4.761)	(5.023)	(4.705)	(4.593)	(4.295)
Potential experience^2	-2,064***	-1,393***	-4,084***	-4,317***	-2,528***	460.8
	(248.0)	(322.1)	(343.7)	(322.3)	(315.7)	(293.9)
Potential experience^3	54,652***	26,251***	98,677***	95,014***	43,464***	-31,987***
	(6,781)	(8,878)	(9,529)	(8,957)	(8,824)	(8,200)
Potential experience^4	-540,932***	-153,810*	-843,123***	-739,728***	-243,558***	415,101***
	(64,575)	(85,214)	(91,825)	(86,636)	(85,917)	(79,893)
Observations			9,016,308			
R-squared			0.458			

Notes: Above regressions also include dummy variables for Slovene citizenship and type of employment contract (all interacted with yearly dummies), as well as quarterly dummies for each of the 24 time periods. Standard errors clustered by worker are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table A2: Cross-Sectional Female Earnings by Years of Potential Experience, 1991-2015

These regressions were used to generate Figure 3B and 4B

		Interaction terms				
	Base year - 1991	1995	2000	2005	2010	2015
Education (omitted group: Primary school)						
Unfinished primary school	-0.0640***	-0.0428***	-0.0485***	-0.0134**	0.0521***	0.00463
	(0.00327)	(0.00378)	(0.00473)	(0.00532)	(0.00749)	(0.00786)
Vocational Secondary	0.230***	-0.0137***	-0.0457***	-0.0776***	-0.106***	-0.124***
	(0.00276)	(0.00302)	(0.00330)	(0.00333)	(0.00357)	(0.00343)
General Secondary	0.483***	0.0108***	0.0191***	-0.0184***	-0.0742***	-0.156***
	(0.00267)	(0.00294)	(0.00317)	(0.00317)	(0.00347)	(0.00332)
2-year University	0.681***	0.0803***	0.159***	0.137***	0.0446***	-0.126***
	(0.00332)	(0.00378)	(0.00401)	(0.00414)	(0.00439)	(0.00427)
4-year University	0.927***	0.138***	0.239***	0.189***	0.0790***	-0.0953***
	(0.00414)	(0.00451)	(0.00473)	(0.00465)	(0.00482)	(0.00471)
Potential experience	37.51***	48.21***	66.35***	67.59***	46.45***	0.428
	(3.708)	(4.725)	(4.684)	(4.405)	(4.294)	(4.257)
Potential experience^2	-2,108***	-2,184***	-3,590***	-3,555***	-2,220***	1,253***
	(259.9)	(337.2)	(335.4)	(313.2)	(306.4)	(301.0)
Potential experience^3	68,229***	39,508***	82,730***	77,505***	43,659***	-57,265***
	(7,450)	(9,837)	(9,771)	(9,086)	(8,932)	(8,690)
Potential experience^4	-783,164***	-195,794*	-676,706***	-596,353***	-304,029***	700,911***
	(74,443)	(99,935)	(98,987)	(91,855)	(90,923)	(87,460)
Observations			7,632,689			
R-squared			0.563			

Notes: Above regressions also include dummy variables for Slovene citizenship and type of employment contract (all interacted with yearly dummies), as well as quarterly dummies for each of the 24 time periods. Standard errors clustered by worker are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table A3: Returns to Schooling in Slovenia for various birth cohorts, men
These regressions were used to generate part of Figure 5

	Cohort birth year				
	1945	1955	1965	1975	1985
Education (omitted group: Primary school)					
Unfinished primary school	-0.267***	-0.164***	-0.0631***	-0.0903***	-0.112***
	(0.0220)	(0.0114)	(0.0186)	(0.0271)	(0.0309)
Vocational Secondary	0.425***	0.215***	0.182***	0.126***	0.124***
	(0.0199)	(0.00900)	(0.00834)	(0.00921)	(0.0114)
General Secondary	0.696***	0.405***	0.354***	0.309***	0.215***
	(0.0228)	(0.0104)	(0.00959)	(0.00949)	(0.0115)
2-year University	1.087***	0.721***	0.680***	0.580***	0.312***
	(0.0319)	(0.0179)	(0.0156)	(0.0157)	(0.0175)
4-year University	1.430***	1.072***	1.032***	0.890***	0.534***
	(0.0319)	(0.0161)	(0.0133)	(0.0115)	(0.0128)
Potential experience	0.0308***	0.0250***	0.0347***	0.00936**	0.00109
	(0.00972)	(0.00337)	(0.00269)	(0.00438)	(0.00658)
Potential experience^2	0.000525***	0.000140**	-0.000148**	0.000531***	0.000620*
	(0.000149)	(6.02e-05)	(6.43e-05)	(0.000147)	(0.000342)
Constant	-1.293***	-0.0473	0.364***	0.989***	1.260***
	(0.175)	(0.0563)	(0.0375)	(0.0415)	(0.0293)
Observations	520,680	1,914,165	2,129,654	1,297,953	480,588

Notes: Above regressions also include dummy variables for Slovene citizenship and type of employment contract, as well as 3 quarterly dummies. Standard errors clustered by worker are in parentheses. Above estimates are corrected for selection, where the selection equations also include up to 4th order terms for age. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table A4: Returns to Schooling in Slovenia for various birth cohorts, women
These regressions were used to generate part of Figure 5

	Cohort birth year				
	1945	1955	1965	1975	1985
Education (omitted group: Primary school)					
Unfinished primary school	-0.369***	-0.206***	-0.115***	0.00811	-0.0107
	(0.0219)	(0.0101)	(0.0164)	(0.0451)	(0.0413)
Vocational Secondary	0.601***	0.258***	0.149***	0.0779***	-0.0281**
	(0.0214)	(0.00819)	(0.00687)	(0.0103)	(0.0133)
General Secondary	0.891***	0.551***	0.438***	0.349***	0.143***
	(0.0191)	(0.00795)	(0.00696)	(0.00896)	(0.0126)
2-year University	1.283***	0.860***	0.746***	0.561***	0.123***
	(0.0239)	(0.0104)	(0.00966)	(0.0126)	(0.0168)
4-year University	1.808***	1.255***	1.092***	0.877***	0.412***
	(0.0344)	(0.0125)	(0.00994)	(0.00989)	(0.0138)
Potential experience	0.182***	0.0176***	0.0400***	0.0150***	0.00725
	(0.0121)	(0.00402)	(0.00233)	(0.00416)	(0.00544)
Potential experience^2	-0.00117***	0.000318***	-0.00037***	0.000132	-0.0007**
	(0.000188)	(7.63e-05)	(5.77e-05)	(0.000141)	(0.000286)
Constant	-4.542***	-0.0764	0.222***	0.863***	1.292***
	(0.213)	(0.0584)	(0.0309)	(0.0428)	(0.0322)
Observations	429,120	1,524,322	1,735,930	1,045,211	387,468

Notes: Above regressions also include dummy variables for Slovene citizenship and type of employment contract, as well as 3 quarterly dummies. Standard errors clustered by worker are in parentheses. Above estimates are corrected for selection, where the selection equations also include up to 4th order terms for age. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table A5: Coefficient on returns to tertiary education relative to primary education

Dependent variable is ln(real wage)	Birth cohort											
	1970			1975			1980			1985		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Men	1.043	0.55	0.666	0.965	0.524	0.611	0.76	0.398	0.492	0.541	0.259	0.33
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.02)
Observations	767,972	767,972	767,972	799,751	799,751	799,751	538,818	538,818	538,818	228,370	228,370	228,370
R-squared	0.283	0.359	0.413	0.286	0.356	0.41	0.216	0.301	0.371	0.167	0.271	0.366
Women	1.041	0.554	0.629	0.971	0.551	0.595	0.721	0.378	0.438	0.433	0.165	0.207
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Observations	715,008	715,008	715,008	727,454	727,454	727,454	456,777	456,777	456,771	173,613	173,613	173,613
R-squared	0.415	0.494	0.544	0.38	0.462	0.503	0.298	0.421	0.475	0.212	0.365	0.418
Baseline controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls for occupation?	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Additional controls?	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes

Notes: Each coefficient in the table above is from a separate regression. Baseline controls include five dummies for education, up to fourth-order terms for potential experience, age at first employment, a dummy for Slovene citizenship, and quarterly dummies. Controls for occupation include a variable pertaining to the occupational code of the individual's current job: the median real wage within the 4-digit ISCO code over the 2000-2015 period. Additional controls include four dummies for ownership type, two dummies for type of employment contract, as well as first and second order terms of firm size (number of employees). Standard errors clustered by worker are in parentheses. All coefficients are statistically significant at the 1 percent level.