Education-Specific Human Capital Mismatch in
Central European Countries and Russia: A Comparative Study

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NON-TECHNICAL SUMMARY

This project attempts to quantify the evolution and the extent of education-specific human capital mismatch in Russia in the past decade, and to compare the Russian experience to that of the Czech Republic and Slovenia, the two benchmark Central and Eastern European economies recently selected for accession to the European Union. The Czech Republic is believed to be a representative accession country, and the Republic of Slovenia is considered the most advanced transition country, with the highest convergence indicator to the EU.

The accumulation of human capital is a key determinant of economic performance across countries and over time. It is generally accepted that in Central and Eastern European Countries (CEEC), education levels of the workers are fairly high: Recent studies reveal that the adult population has more than 10 years of schooling on average, which is comparable to, or even higher than corresponding statistics for the OECD countries. This fact might lead to the superficial conclusion that human capital is the least of the problems to worry about in CEEC. However, I argue that for transition economies the important issue is not the (historically high) level of human capital, but its composition.

In other words, the education-specific, rather than general, component of human capital is what makes CEE countries different from their OECD counterparts.

The consensus now is that the structure of human capital in centrally planned economies was distorted, and the shares of human capital within different occupations was inadequate vis-à-vis the requirements of a market economy. For instance, one may argue that under central planning, university graduates in Russia in large had the "wrong kind" of human capital, from the free market perspective: the educational system produced, say, too many military engineers, and too few financial and marketing managers. Moreover, five years of university education in the field of military engineering had a different market value in the new changing economic environment from five years spent on mastering managerial skills in a Western-style economics program. As a result, the aggregate composition of the stock of human capital in terms of the shares of different occupations in the command economy countries was "wrong", too.

The pre-transition labor market equilibrium was subject to change, once the economy was exposed to new market conditions. Post-reform countries now face high variations in demand for different types of training even at the same education level. This 'transition shock' triggers an adjustment mechanism, which corrects the 'human capital mismatch' and (arguably) provides convergence of the composition of the human capital stock and levels per capita income to those of developed economies.

The transition to a market economy would relocate workers from outdated occupations to expanding ones, but only at a cost. An engineer-turned-businessman may be able to use his quantitative skills to analyze a business environment, but the technical engineering knowledge that he possesses will clearly not be as useful as before. In general, we should expect switching occupations to entail the loss of marketed human capital. This will naturally be more pronounced for workers with more specialized skills. In many cases, this prospect of the loss of opportunities to use acquired skills would make workers hesitant about switching occupations in the first place.

However, there are a scant number of publications dealing with education-specific human capital mismatch and the time profile of the transitional adjustment of the education-specific human capital stock. The objective of this research is to fill that void. The core idea is to analyze the problem of adjustment of 'education-specific human capital mismatch', which can be understood to mean the evolution of occupations over time in terms of the number of workers employed, average wage rates across occupations, and types of worker education. To document this process, one needs to study individuals' employment histories, supplemented with retrospective earnings records and educational background.

For that purpose, retrospective employment histories of 4700 individuals in the Czech Republic in the period 1991-1996, 13002 workers in Slovenia for 1991-2000, and 4812 respondents from Russia for 1996-2001 were collected. Employment histories for each respondent include information on gender, age, education level, education type (a two-digit code in the case of the Czech Republic and Russia, and a 3-digit code in case of Slovenia), her detailed employment records coded by a 4-digit ISCO, and wage record for the beginning and the end of each employment spell. Using these unique data sets I analyze labor flows by occupation and education types, and quantify the extent of education-specific human capital mismatch.

The underlying theoretical model can be described as follows [1]: There is a multi-period model with a finite number of workers, each choosing an optimal career path. The labor supply is derived from the individuals' career paths, whereas the wage rates are determined by the labor supply and the production function. A worker receives one and only one type of training before beginning his work life. In any period of his work life, a worker can work in any of the existing occupations. The effective labor input of a worker depends on the training he received, the occupation in which he works, and his experience in that occupation. A worker's utility is the discounted linear sum of wages over his work life. A worker's decision problem is to maximize his utility by choosing his career path, taking as given his training and wage rates. In each period, many workers

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[1] Cf. V.Druska, B.Jeong, M.Kejak and V.Vinogradov (2002).

enter the work force; the entering workers differ in the type of training they received. The aggregate economy is modeled to be neoclassical, with the labor input differentiated by the occupation, and the wage rates determined by the marginal products of occupation-specific labor inputs. Finally, the equilibrium of the economy is the distribution of career paths, the labor supply, the effective labor supply, and the wage rates. The distribution of career paths is derived from the workers' utility maximization problem given the wage rates, while the labor supply and the effective labor supply are derived from the distribution of career paths, and the wage rates are derived from the effective labor supply.

To be consistent with the theoretical model, and to test the original claim about 'engineers-to-become-entrepreneurs', the data are transformed accordingly. First, education codes and occupation codes are aggregated to three stylized types, namely, Business (B – e.g. managers, office workers, business professionals, occupations in banking, sales, and services), Technical (T – professionals and mid-level technicians in technical fields, mining and construction industry workers, workers in metal treatment and mechanics, plant and machine operators and assembles), and Other (O – teachers, medical professionals and technicians, artists, social workers, agricultural and forestry workers, natural sciences).

Next, all wages are expressed in units of efficiency wages. I estimate coefficients in a standard Mincerian equation and eliminate the heterogeneity in respondents' earnings by adjusting for experience, consumer price index and real wage trend.

Based on the transformed data, for each year I construct a Human Capital Mismatch Index (HCMI) as a ratio of the average wage of movers with training X to occupation Y to the average wage of those workers with training Y who stay in occupation Y in a given year (here X and Y are T,B, or O), controlling for general human capital, i.e. for the number of years of schooling (or education level). Small values of HCMI indicate a wide education-specific human capital mismatch, while numbers close to 1 suggest that the mismatch is mild.

The data reveals that all three countries are characterized by high labor mobility. In the Czech Republic, about 34% of the population changed profession at least once between 1989-1997. People with the lowest level of education and years of schooling more frequently retired, or stayed unemployed several times. In contrast, people with the highest education level (years of schooling) either got promoted to higher managerial positions or became self-employed. Those people with a higher education level also tended to change employer and profession more frequently. The most active age group appears to be those aged 36-43 (30 percent of all movers), while 28-31 year old workers are even with the 48-51 age group. Furthermore, nearly 50 percent of Czech workers changed job (but not necessarily occupation) at least once. These findings suggest that turnovers in the Czech labor market in the early stage of transition were higher than turnovers in the Slovenian labor market, where 84 percent of all sampled workers kept the same job between 1989 and 1994. In Russia, the average age of those who kept only one job between 1996-2001 was 41.7 years, while workers who changed jobs at least once are aged 38.2 years and comprise 28.4 percent of the sample.

Statistics on the number of graduates by field of study reveals that in all three countries the number of graduates with technical education decreased over time while the number of graduates in business gradually increased. Symmetrically, business occupations expanded and technical occupations declined in the Czech Republic. A similar pattern was observed in Russia, where the percentage of business occupations increased from 19.8 percent in 1996 to 22 percent in 2001, whereas the share of technical occupations declined from 45 percent to nearly 44 percent.

 In Slovenia, in 1991-2000 the percentage of business occupations increased from 16.6 to 25.4 percent. However, in Slovenia the initial decline in technical occupations in the early 1990s was followed by a reversal since 1997: At first, the share of workers in technical occupations decreased from 56.2 percent in 1991 to 41.8 percent in 1997, yet after that steadily grew to 46.3 percent in 2000. More notably, in technical occupations the rate of unemployment (outflow to the pool of unemployed) was the highest until 1997.

In all three countries the returns to the level of education were equally significant. Interestingly, the returns to occupation-specific tenure were positive and significant both in Slovenia and in the Czech Republic. This finding is in contrast to what has been observed for many other transition countries, where authors pointed to a flat or even mildly negative wage-(general)experience profile. However, in the Russian Federation the returns even to occupation-specific tenure were insignificant both for business and technical occupations. The latter indicates a massive inflation of 'old-style' experience in Russia. There, in contrast to the Czech Republic and Slovenia, it also happened that the starting wage of new graduates exceeded the average wage in a given occupation, again pointing to an increasing market value of new (time-wise) training as compared to similar training received under central planning.

HCMI in all three countries exhibited a positive trend, though the magnitude of adjustments towards a better utilization of education-specific human capital was substantially different among Slovenia, the Czech Republic, and Russia. In the Czech Republic, HCMI gradually increased from 0.7 in 1991 to 0.8 in 1995, followed by a minor decline in 1996. Noteworthy, except for the years 1993-94, is that in the Czech Republic the likelihood for an unemployed worker to get an unmatched job was nearly twice as high as the odds to fill in a matched position. In Slovenia, HCMI in business-technical occupations declined from 0.95 in 1991 to 0.66 in 1994, and since 1996 monotonically increased from 0.80 to 0.90 in 2000. Interestingly, starting from 1998 onward, the average wages of technical occupations exceeded those of business occupations. Another interesting finding is that in business occupations, a subgroup of workers with a technical education received significantly higher wages than did those in this occupational group on average (on average, 16.3% higher). The same trend was observed for workers in technical occupations with business training: their earnings exceeded the average wage in technical occupations by nearly 11 percent. In Russia, like in Slovenia, technical graduates employed in business occupations were making almost 20 percent more than the average wage in business occupations. However, in contrast to Slovenia, business-trained workers employed in technical occupations earned less than on

average in this occupational group. HCMI in Russia increased dramatically from 0.14 in 1996 to 0.62 in 1999/2000, and in 2001 exceeded 0.8. The latter may suggest that the Russian labor market has passed the turmoil stage and entered the phase of moderate adjustment. Also, business occupations were becoming less attractive over time, and the share of movers to business occupations gradually declined from 0.32 in 1996 to 0.24 in 2001.

To conclude, the education-specific human capital mismatch does not appear to be a major problem in Slovenia nor (to a lesser extent) in the Czech Republic. In Russia, however, the empirical evidence suggests that many people were forced to move to alternative occupations in which their training was inadequate, and therefore, the problem of education-specific human capital mismatch emerged. The situation is gradually improving, but there is still a vital need to provide a carefully tailored re-training program, or foster job creation in technical fields. The latter is the major policy implication of the project for the Russian Federation.