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Participation in Non-Formal Adult Education in CEE Countries

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Participation in Non-Formal Adult Education in CEE Countries

Abstract

The paper provides a detailed descriptive analysis of the training (non-formal education) participation of adults in CEE countries in comparison to old EU countries. The results reveal substantially lower levels of training in the CEEs compared to Western Europe and Scandinavia. However, there is significant heteregoneity over countries; training in Slovenia, Estonia and the Czech Republic is close to western levels. The east-west differences are present both for the employed, the unemployed and the inactive population. Basic demographic characteristics (gender, age, education, occupation) account for only a minor share of the training gap. However, educational attainment is more strongly associated with training in the CEE countries. The evidence on the sources of cross country differences in training is mixed.

Content

1 Introduction

Human capital is a major determinant of both productivity and wages and macro-level outcomes like economic growth and employment (see e.g. Blundell et al 1999). Though the bulk of human capital investment is made in young age, skills should be and are usually developed, upgraded and enhanced beyond the years of schooling, throughout the entire life-cycle. Beside experience and informal learning this is done by participating in various formal learning activities (e.g. courses, seminars, on the job training); mostly outside the formal education system. For the sake of simplicity these adult learning activities are labelled here as *training*. Training covers neither informal learning nor learning in the formal education system for a degree; the latter is denoted below as *schooling*.

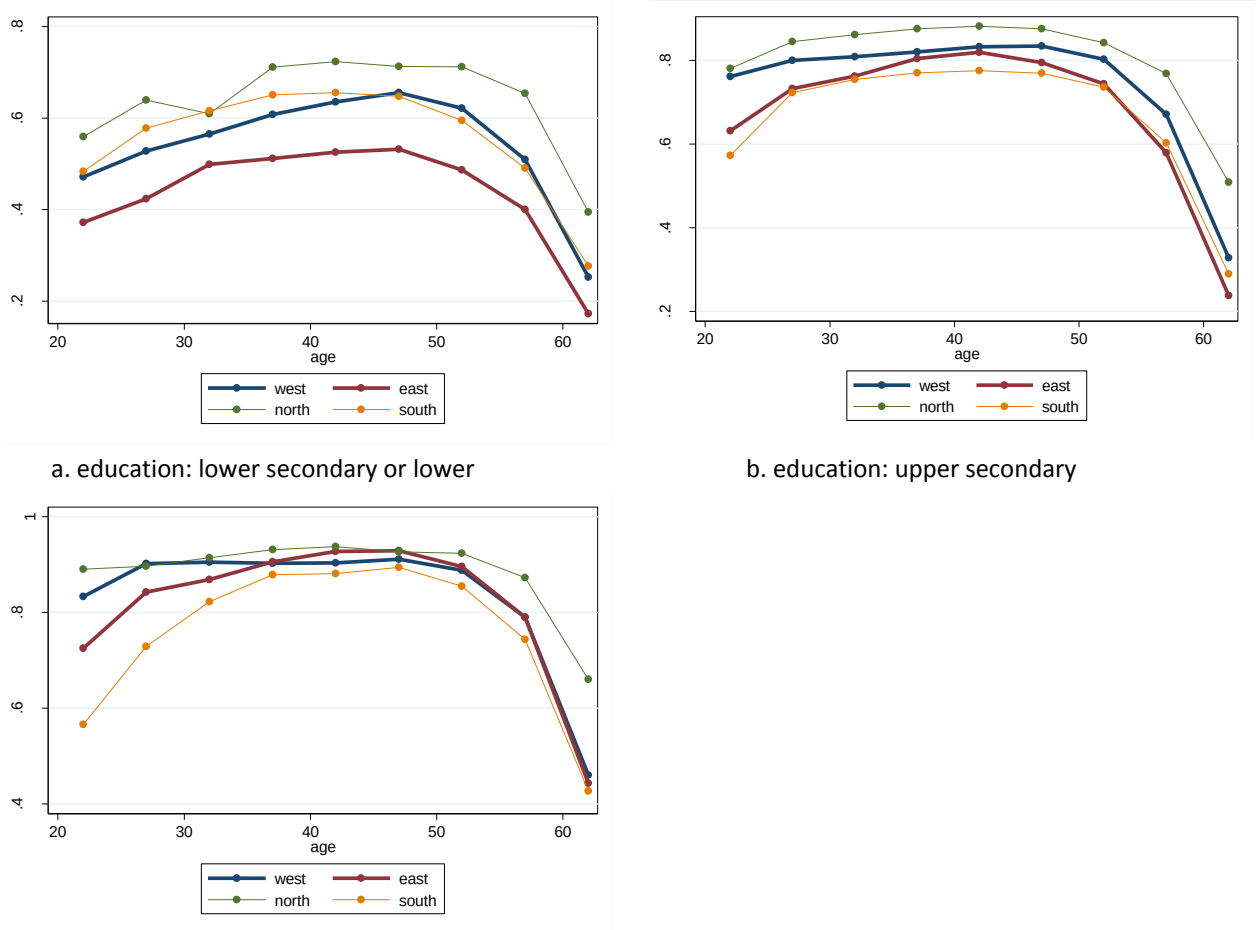
There are marked differences in training participation across countries. Within Europe training incidence is highest in the Scandinavian countries and the UK and lowest in the south, while the continental west is between these groups (Bassanini et al 2007). However, only scattered evidence is available about how CEE countries fit into this picture. This evidence suggests that training participation in CEE countries is generally low, similar to Southern European levels (Hámori 2008; Badescu-Loi 2010) and adult education in these countries is dominated by schooling in order to increase educational attainment (Beblavy et al. 2013).

This paper provides a detailed descriptive analysis of training participation in CEE countries in a comparative perspective using European Labour Force Survey (EU-LFS) data. The main research questions are whether there is a training gap between CEE countries and old EU countries and if there is, this is different for population subgroups. The results confirm that training participation in CEE countries, with few exceptions lags behind that in Western and Northern countries. Furthermore, this training gap can not be explained by composition in terms of simple individual and firm characteristics (like educational attainment, economic sector and firm size). Going beyond the descriptive evidence the paper also aims at exploring the potential reasons behind low participation rates in training in CEE countries using the OECD Programme for the International Assessment of Adult Competencies (PIAAC) data.

Why training participation is important for employment policy? As far as training improves skills and productivity, promoting training may have beneficial effects on both wages and employment. Training is especially important for the elder and middle age population, whose skills developed in the years of schooling should be upgraded due to technological development or new skills and knowledge should be acquired in order to adapt to changing labour demand.

Analysing training participation in CEE countries is directly motivated by serious problems of employment. Employment rates of the population with a middle or especially with a low level educational attainment are substantially lower in CEE countries compared to the EU-15 group. Moreover, the employment gap measured in comparison to the west and north opens up above the age of 40; people in their middle ages are employed even less in the CEE group (Figure 1). Though the weakness of skill upgrading might be only one of the factors behind this pattern, there is undoubtedly substantial room for policy to improve employment by promoting adult education and training.

Figure 1 Age and employment rate for the non-student population by education, 2011



a. education: lower secondary or lower

b. education: upper secondary

c. education: higher education

Source: EU-LFS, 2011

2 Data

The analysis in this paper uses two international data sets. Most of the descriptive analysis builds on the Eurostat Labour Force Survey (EU-LFS) data, for the period between 2004 and 2011. Respondents of the LFS survey were asked about two types of education activities; schooling (learning in the formal education system) and training (learning in organised activities outside the formal education system) in the past 4 weeks before the interview date. Schooling, or regular or formal education is described in the EU-LFS User Guide (Eurostat 2012) as education provided in the system of schools, colleges, universities and other educational institutions, which normally constitutes a continuous ladder of education and is normally intended to lead to a certification recognised by national authorities qualifying for a specific education/programme. On the other hand training covers all taught organised learning activities outside the regular education system, e.g.: course, seminar, lecture, conference, private lessons, but does not include informal learning.

Training participation is our key variable. The analysis is restricted for the age group between 20-64. Data collection about training began in 2003, but data for the first year show somewhat different patterns compared to the subsequent years, thus the analysis is restricted to the 2004-2011 period. The descriptive analysis compares involves comparisons over countries and country groups, denoted as the north, west, south and east. The north group covers Scandinavian countries, including Norway, the south designates the Mediterranean countries, the east stands for new EU member CEE and

Baltic countries while the west represents the old EU continental countries together with the UK and Ireland. For comparisons over country groups the data are reweighted to have equal country weights (i.e. the sum of weights is the same for each country). The three smallest countries, Cyprus, Luxemburg and Iceland are omitted from the analysis. Two other countries are also excluded, Malta for the lack of data and Switzerland due to outlier data on training participation.

The second data source is the OECD Programme for the International Assessment of Adult Competencies (PIAAC) survey from 2012 (OECD 2013). These data again provide detailed information for a sample that is small compared to the EU-LFS. The major advantages are including data of basic skills (literacy, numeracy) of the respondents measured by standardised tests and information on the jobs and the skills used while working for the employed respondents. Unfortunately only 15 European countries took part in the PIAAC, including only for new EU member countries (Czech Republic, Estonia, Poland and Slovakia). The non-European participant countries are excluded in this analysis.

3 Training participation in CEE countries

This section provides a detailed descriptive analysis of training participation rates in the CEE group compared to the old EU member countries. The first subsection presents participation rates overall and by population subgroups, and trends over time. Then I ask whether the CEE training gap can be explained by differences in the composition of the population in terms of basic individual characteristics, like educational attainment, age, occupation or economic sector and size of the firm. The last subsection explores differences in the effect of these individual characteristics on training participation over country groups.

3.1 Training participation rates: the basic facts

Figure 2 displays overall training participation rates and rates for population subgroups by countries. Means for the country groups are summarised in Table 1.

Overall training incidence is highest in Scandinavian countries, followed by Western Europe, with a mean about half of the north group (Figure 2, panel a). In the west the UK stands out, with Scandinavian level training participation. In the CEE group training participation is significantly lower, similar to the southern countries. However, there is substantial variation within the CEE group. In the Czech Republic, Estonia and especially Slovenia training is at the Western European level. At the other extreme, it is almost negligible in Romania and Bulgaria. The mean in the east and south group is below the half of that in the west.

By labour market status training participation is typically highest for the employed, somewhat lower for the unemployed and lowest for the inactive population (Figure 2, panel b). Regarding the CEE countries, the relative disadvantage of the inactive population seems to exceed that in the other country groups: in CEE countries it is about one fourth of the employed, while in the other country groups it is close to one half of that. The disadvantage of the unemployed is also somewhat larger in the CEE countries, but the differences between country groups are smaller than in the case of the inactive.

Regarding gender differences it turns out that women take part in training either more or as often as men in every country (Figure 2, panel c). Gender differences are less pronounced in the west, except the UK. In the CEE group the advantage of women is largest in the Baltic countries and Slovenia.

The most notable differences in training participation are related to educational attainment (Figure 2, panel d). More education goes together with more training. This is not surprising, it is in line with standard human capital theory: more able people invest more in education, and they are expected to do so beyond the age of schooling, as well. In this respect education and training are complements, rather than substitutes (Brunello 2004). However, the relative differences are strikingly high in the CEE group. In this group training participation of those with a higher education degree is on average ten times of that of the low skilled, and three times higher compared to those with a middle level education.

Differences between countries are by and large similar for economic sectors (Figure 2, panel e and f). Nevertheless, CEE countries seem to be perform relatively better in agriculture and, to a lesser extent, in public services. In these sectors the gap measured to the west is somewhat smaller than in industries and services excluding the public sector.

So far training participation rates were calculated for the entire period of 2004-2011. Figure 3 presents changes over time within this period for the employed and the unemployed population of each country. With few exceptions training participation rates appear to be stable over time. Moreover, in general no negative crisis shock can be detected. This suggests that cross-country differences in training are in most part generated by institutional and structural factors that change little year by year. For this reason the analysis in this paper uses the pooled data for the entire period and country-specific trends are not considered.

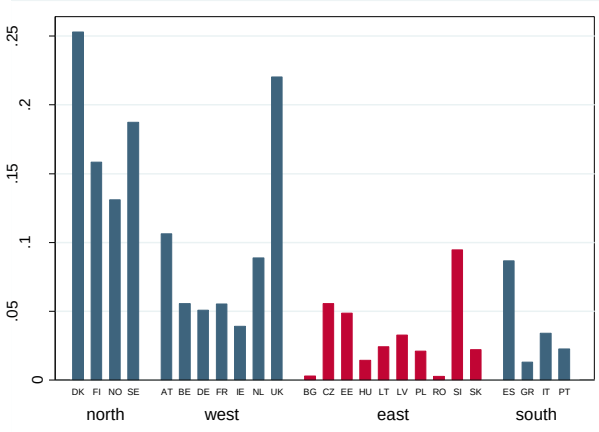
However, it is worth to mention the exceptions with marked trends. In the CEE group training participation has increased over time substantially in the Czech Republic and Estonia for the employed, and to a lesser extent, for the unemployed as well. Training participation has also risen in Denmark and, for the unemployed in the last two years, in Sweden. On the other hand, training seems to loose ground in the UK.

Table 1 Mean training participation rates overall and by population subgroups in country groups

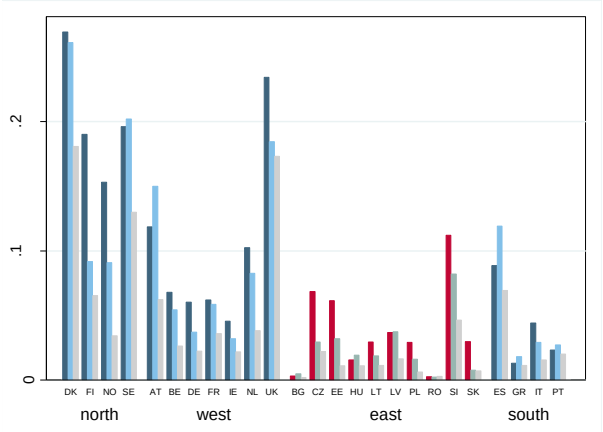
	north	west	east	south
overall	0.182	0.088	0.032	0.039
by labour market status				
employed	0.202	0.099	0.039	0.042
unemployed	0.161	0.086	0.025	0.049
inactive	0.103	0.054	0.014	0.029
by gender				
female	0.211	0.096	0.037	0.043
male	0.154	0.080	0.027	0.035
by education				
low (isced 0,1,2)	0.104	0.038	0.007	0.017
middle (isced 3,4)	0.162	0.080	0.024	0.044
high (isced 5,6)	0.261	0.142	0.075	0.087

Source: EU-LFS, 2004-2011

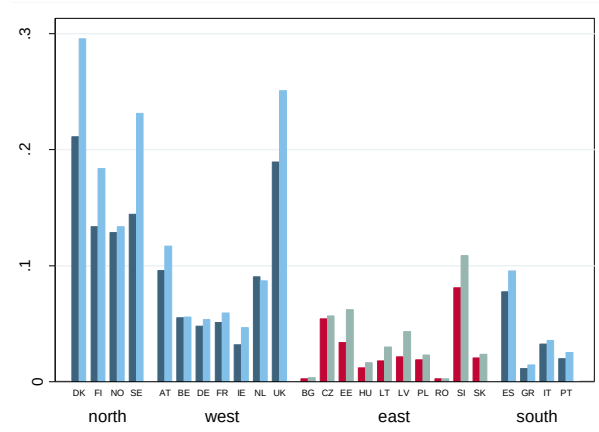
Figure 2 Training participation rates overall and by population subgroups over countries



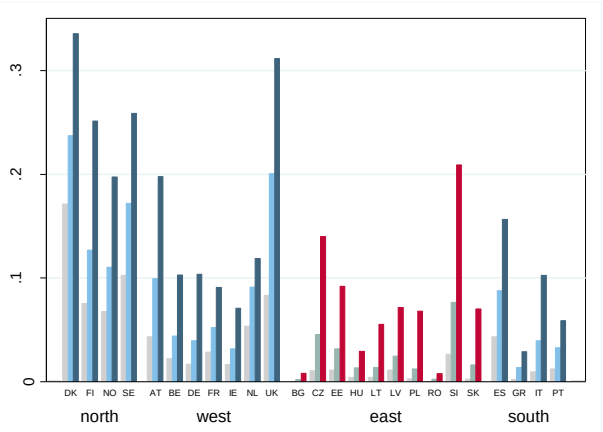
a. overall



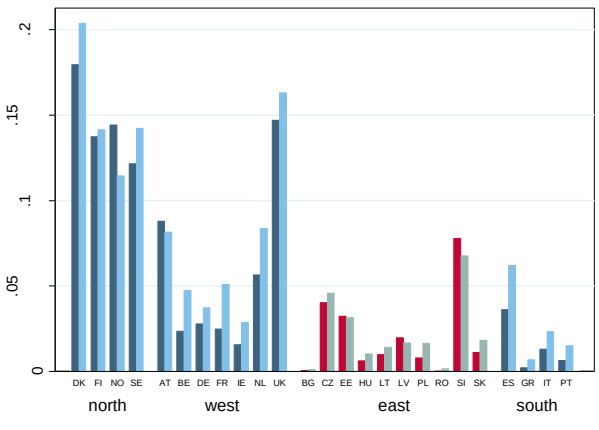
b. by labour market status
from left to right: employed, unemp., inactive



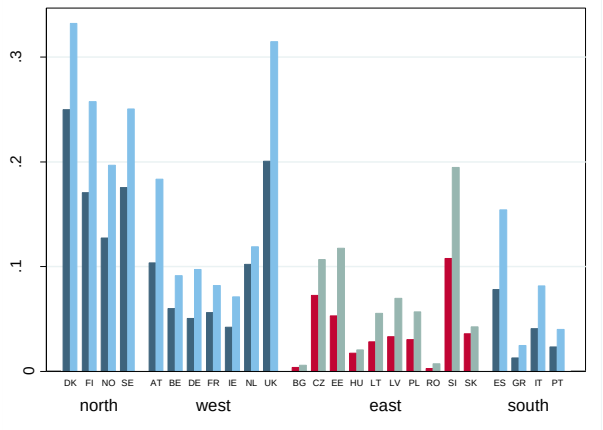
c. by gender
from left to right: male, female



d. by education
from left to right: low, middle, high



e. by economic sector
from left to right: agriculture and mining, industry (manufacturing, construction, utilities)

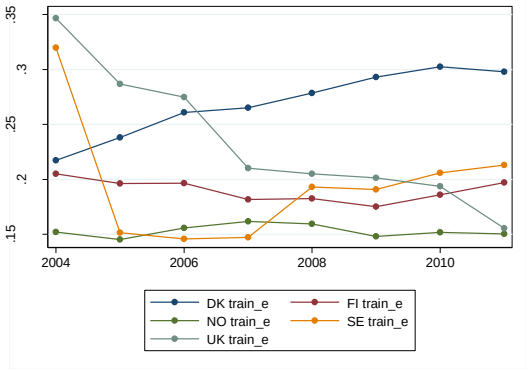


f. by economic sector
from left to right: services (excl. public services), public services*

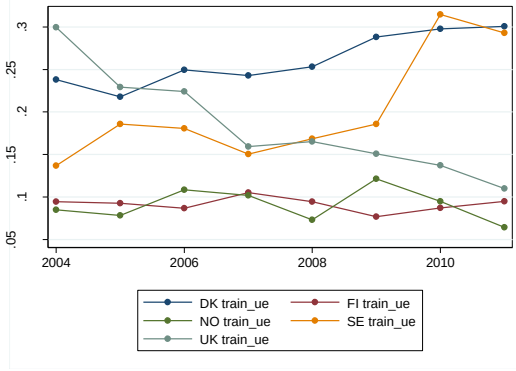
Source: EU-LFS, 2004-2011

** public administration, education, health and social services, other community services*

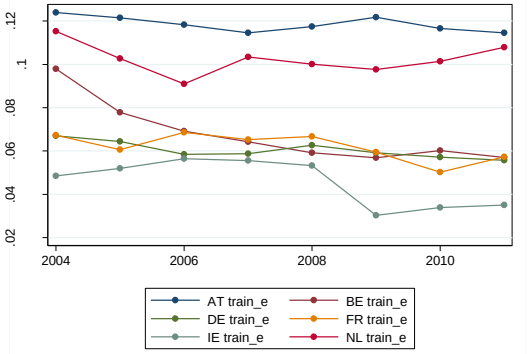
Figure 3 Training participation trends for the employed and unemployed over countries



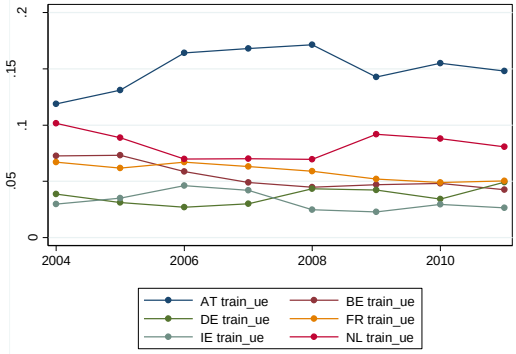
a. employed, north + UK



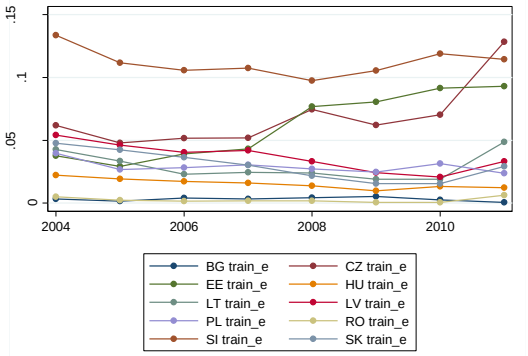
b. unemployed, north + UK



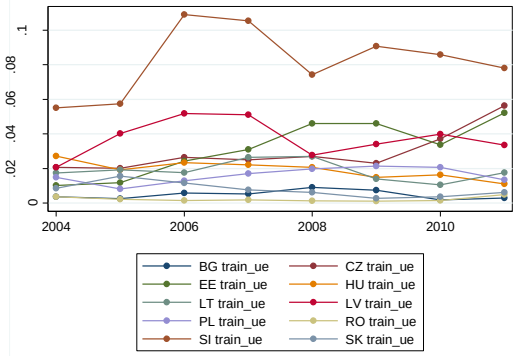
c. employed, west



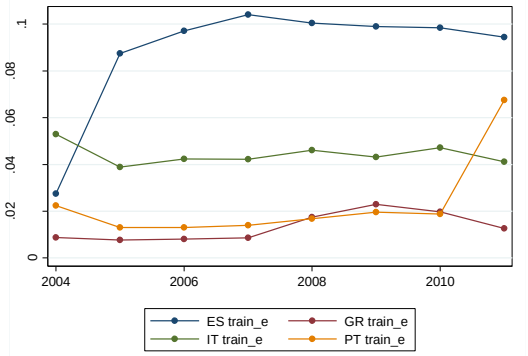
d. unemployed, west



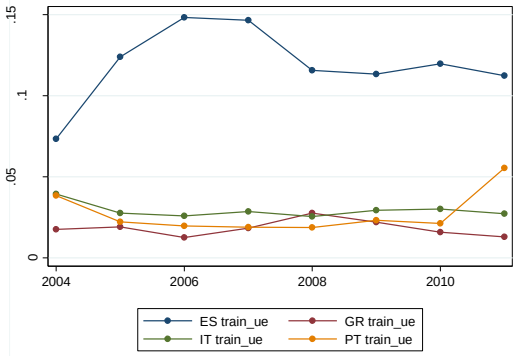
e. employed, east



f. unemployed, east



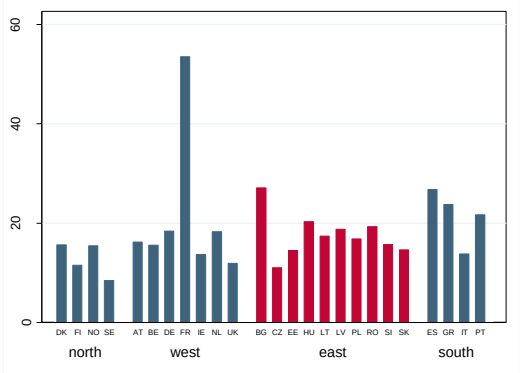
g. employed, south



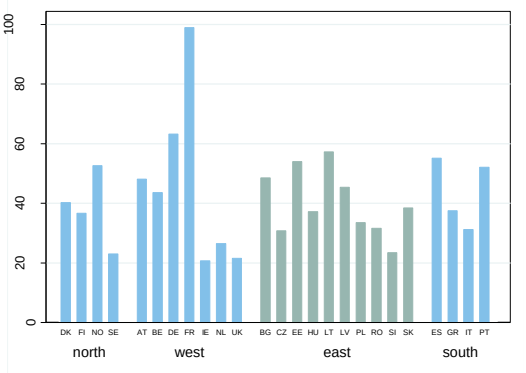
h. unemployed, south

Source: EU-LFS, 2004-2011

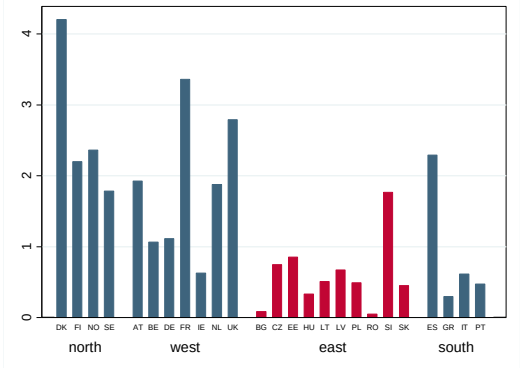
Figure 4 The length of training for the employed and unemployed over countries, hours



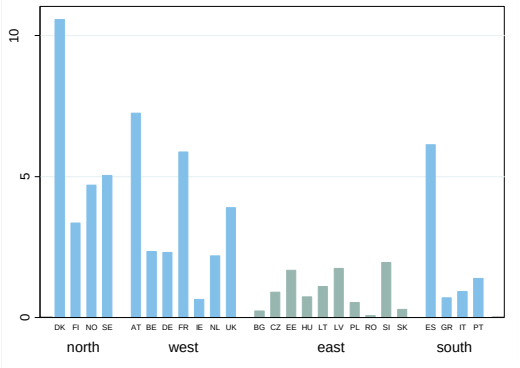
a. employed, training participants



b. unemployed, training participants



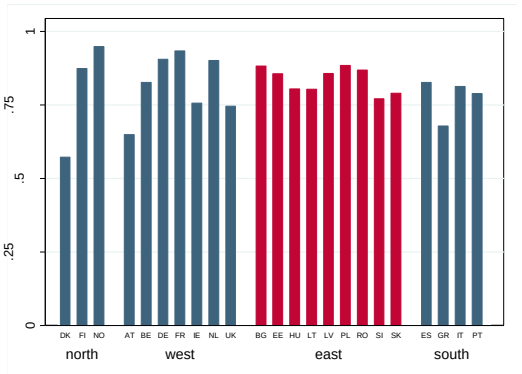
c. employed, total



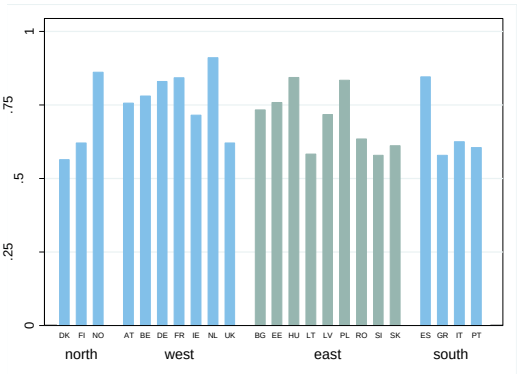
d. unemployed, total

Source: EU-LFS, 2004-2011

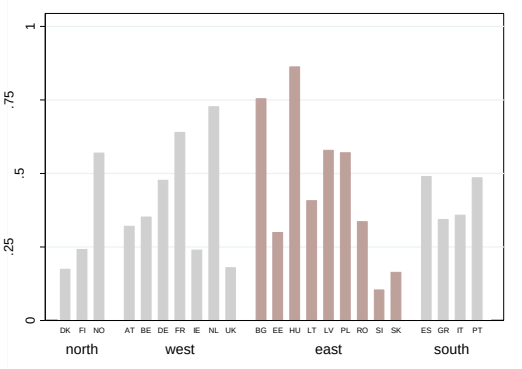
Figure 5 The share of job-related training by labour market status, over countries



a. employed



b. unemployed



c. inactive

Source: EU-LFS, 2004-2011

Training participation rates provides an incomplete picture of training incidence as training intensity may also differ across countries. The top panel of Figure 4 depicts the average length of training spells. Note that the average unemployed participant spends more time in training than the average employed. Regarding the country groups training activities turn out to be relatively long in CEE countries compared to the north and the west, except France. In other words, both the employees and the unemployed in the east take part in training less often, but attend somewhat longer training sessions. Is the length of training offset its lower frequency? The bottom panel of Figure 4, displaying the average training hours calculated for the whole employed and unemployed population, i.e. training participants and non-participants together, suggests no. Essentially average training hours show the same pattern of differences over countries than training participation rates. Therefore the analysis below is focused on training participation and the length of training is ignored.

Another important question for the interpretation of training data is the extent to which training improves job-related skills and knowledge as opposed to personal interests. Figure 5 represents the share of job-related training by labour market status. Not surprisingly training is most often job-related for the employed; on average three out of four training activity is job related. This share is not much lower for the unemployed. At the same time the inactive more often take part in training pursuing their personal interests.

3.2 Can the training gap be explained by composition in terms of individual characteristics?

As descriptive statistics indicate, some individual characteristics, like educational attainment are strongly related to training participation. At the same time, countries are different with respect to the share of unskilled or those with a higher education degree, the share of immigrants, or the share of economic sectors. Since with a higher share of unskilled a smaller training participation rate is expected, these differences in composition may explain in part the cross country patterns of training participation. In order to test these composition effects I estimated probit regressions of training participation for the pooled sample of countries. The regressions include country group dummies, and in a second set of estimates country dummies for CEE countries. The coefficients of these indicate country group or country effects measured relative to the west as the reference group. In the first specification the estimates contain no controls except year and quarter dummies. Then individual controls are added to account for differences in composition. Composition effects can be detected by comparing the country group or country coefficients from the two specifications. As far as these are substantial, the coefficients from the second specification should be closer to zero than those from the uncontrolled model.

The regression models are estimated separately by labour market status. The individual characteristics considered are education, age, gender, family structure, immigrant status and settlement size. Beside these economic sector (1 digit NACE), occupation type (1 digit ISCO), firm size, tenure at firm, and some other characteristics of the job (self-employed, family worker, part time, temporary) are also included for the employed. For the unemployed and the inactive the duration of unemployment, a dummy indicating having a job previously and the time since leaving last job are added.

Estimation results are summarized in Table 2. Instead of raw coefficients marginal effects are presented, calculated for two sets of covariate values. In the first two columns marginal effects are

Table 2 Pooled probit regression estimates of participation in training, marginal effects

	employed				unemployed				inactive			
Ind. control vars	no	yes	no	yes	no	yes	no	yes	no	yes	no	yes
covariate values	west	west	group / cnt	group / cnt	west	west	group / cnt	group / cnt	west	west	group / cnt	group / cnt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
south	-0.0552**	-0.0393	-0.0544**	-0.0300	-0.0368	-0.0355	-0.0366	-0.0351	-0.0242	-0.0187	-0.0239	-0.0165
	(0.0268)	(0.0246)	(0.0262)	(0.0187)	(0.0294)	(0.0267)	(0.0292)	(0.0265)	(0.0219)	(0.0180)	(0.0214)	(0.0160)
north	0.104***	0.223***	0.104***	0.148***	0.0761*	0.188***	0.0759*	0.120***	0.0488	0.131***	0.0486	0.0720***
	(0.0313)	(0.0415)	(0.0312)	(0.0188)	(0.0429)	(0.0614)	(0.0428)	(0.0363)	(0.0345)	(0.0497)	(0.0344)	(0.0237)
east	-0.0586**	-0.0492**	-0.0577**	-0.0435**	-0.0602***	-0.0564***	-0.0598***	-0.0545***	-0.0398**	-0.0342**	-0.0392**	-0.0338**
	(0.0246)	(0.0213)	(0.0240)	(0.0192)	(0.0219)	(0.0193)	(0.0216)	(0.0193)	(0.0188)	(0.0146)	(0.0182)	(0.0149)
cnt_bg	-0.0942***	-0.0819***	-0.0924***	-0.0670***	-0.0804***	-0.0752***	-0.0799***	-0.0676***	-0.0513***	-0.0433***	-0.0506***	-0.0404***
	(0.0224)	(0.0186)	(0.0217)	(0.0167)	(0.0208)	(0.0179)	(0.0204)	(0.0170)	(0.0184)	(0.0136)	(0.0177)	(0.0130)
cnt_cz	-0.0287	-0.0180	-0.0283	-0.0162	-0.0557***	-0.0519***	-0.0552***	-0.0509***	-0.0315*	-0.0283*	-0.0310*	-0.0302*
	(0.0221)	(0.0191)	(0.0218)	(0.0175)	(0.0207)	(0.0182)	(0.0204)	(0.0184)	(0.0183)	(0.0145)	(0.0178)	(0.0160)
cnt_ee	-0.0359	-0.0314	-0.0353	-0.0296	-0.0533***	-0.0516***	-0.0531***	-0.0522***	-0.0425**	-0.0381***	-0.0418**	-0.0440***
	(0.0221)	(0.0197)	(0.0217)	(0.0192)	(0.0207)	(0.0184)	(0.0204)	(0.0195)	(0.0184)	(0.0138)	(0.0178)	(0.0165)
cnt_hu	-0.0818***	-0.0712***	-0.0805***	-0.0636***	-0.0658***	-0.0613***	-0.0653***	-0.0581***	-0.0423**	-0.0355**	-0.0417**	-0.0329**
	(0.0224)	(0.0188)	(0.0217)	(0.0177)	(0.0208)	(0.0181)	(0.0204)	(0.0180)	(0.0184)	(0.0140)	(0.0178)	(0.0134)
cnt_lt	-0.0681***	-0.0625***	-0.0671***	-0.0613***	-0.0664***	-0.0637***	-0.0660***	-0.0656***	-0.0420**	-0.0374***	-0.0414**	-0.0418**
	(0.0223)	(0.0192)	(0.0218)	(0.0202)	(0.0208)	(0.0183)	(0.0204)	(0.0201)	(0.0184)	(0.0142)	(0.0178)	(0.0171)
cnt_lv	-0.0606***	-0.0505***	-0.0597***	-0.0439**	-0.0477**	-0.0455**	-0.0474**	-0.0451**	-0.0369**	-0.0330**	-0.0363**	-0.0357**
	(0.0223)	(0.0193)	(0.0218)	(0.0177)	(0.0206)	(0.0186)	(0.0204)	(0.0192)	(0.0184)	(0.0140)	(0.0179)	(0.0156)
cnt_pl	-0.0683***	-0.0596***	-0.0672***	-0.0532***	-0.0692***	-0.0659***	-0.0687***	-0.0671***	-0.0472**	-0.0401***	-0.0465***	-0.0388***
	(0.0223)	(0.0186)	(0.0218)	(0.0169)	(0.0208)	(0.0181)	(0.0204)	(0.0195)	(0.0184)	(0.0138)	(0.0178)	(0.0141)
cnt_ro	-0.0948***	-0.0819***	-0.0930***	-0.0579***	-0.0830***	-0.0778***	-0.0825***	-0.0694***	-0.0505***	-0.0422***	-0.0498***	-0.0359***
	(0.0225)	(0.0185)	(0.0217)	(0.0141)	(0.0208)	(0.0179)	(0.0204)	(0.0174)	(0.0184)	(0.0137)	(0.0177)	(0.0125)
cnt_si	0.0146	0.0372**	0.0144	0.0311**	-0.00321	-0.00193	-0.00319	-0.00193	-0.00708	0.000826	-0.00697	0.000738
	(0.0221)	(0.0183)	(0.0218)	(0.0152)	(0.0205)	(0.0188)	(0.0204)	(0.0188)	(0.0182)	(0.0149)	(0.0179)	(0.0133)
cnt_sk	-0.0675***	-0.0557***	-0.0664***	-0.0479***	-0.0774***	-0.0721***	-0.0769***	-0.0657***	-0.0462**	-0.0387***	-0.0454**	-0.0361***
	(0.0224)	(0.0188)	(0.0218)	(0.0167)	(0.0208)	(0.0180)	(0.0204)	(0.0176)	(0.0184)	(0.0138)	(0.0178)	(0.0134)
N	13,113,408	13,113,408	13,113,408	13,113,408	1,118,429	1,118,429	1,118,429	1,118,429	5,284,576	5,284,576	5,284,576	5,284,576

*Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: EU-LFS, 2004-2011

calculated for the average of the west country group (i.e. covariate values are set to their mean value in the west). Marginal effects estimated for the east group indicate the extent to which the probability of training would change for the average individual in the west group if she were living in the east. Note that the effect of individual characteristics on training participation are assumed to be identical everywhere, it is an average effect over the countries (since estimated with equal country weights).

In the next two columns marginal effects are calculated for the individual with average characteristics in the country group or country considered. These marginal effects for the east group for example indicate the extent to which the probability of training would change for the average individual in the east group if she were moving from the west to the east.

Altogether the results suggest that composition effects regarding these basic individual and job characteristics explain at most a smaller part of the differences. The two sets of covariate values used for the calculations produce somewhat different marginal effects, but qualitatively the results are similar.

For the employed the composition effect accounts for 16-25% of the east-west training gap, depending on whether it is calculated for the average individual of the west or the east group. Looking at estimates for countries of the east, differences in the composition of the employed population decrease the training gap somewhat for each country except Slovenia, where the employed would be trained even more frequently if the composition were more similar to the west group (Table 2, bottom panel).

Simple composition effects seem to be more important for the south-west difference in training participation of the employed. About 29-45% of the difference disappears when similar individuals are compared. On the other hand, the advantage of the Nordic countries grows even larger if individual characteristics are taken into account.

Regarding the unemployed and the inactive the composition effect accounts for only a minor share, 6-9% and 13-14% respectively, of the east-west training gap. Looking at the results by countries the composition effect seems to play no role at all in about half of the countries, while having a moderate impact in the others.

3.3 Are the effects of individual characteristics on training different in CEE countries?

Estimates of the previous section assumed that the association between individual characteristics and training participation is similar in the four country groups. In order to explore the potential differences in these effects training participation regressions are now estimated separately for the country groups.

The specifications are similar to that applied for the pooled sample, with some minor modification. First, logit regressions are used instead of probit models, in order to facilitate comparison of the effects. As the overall level of training varies substantially over country groups, marginal effects hardly reveal small or medium differences in the importance of individual characteristics. Where the training level is two or four times higher, marginal effects also tend to be stronger. Odds ratios, independent of the average level of the dependent variable (and also from the covariate values) are better suited to expose differences in the *relative* importance of individual characteristics. The odds ratio for the female variable, for example, expresses the odds of training for the female relative to

the odds for the male, where the odds are defined as the ratio of the probability of training to the probability of not participating in training. The logit method is used as it directly provides estimates in the form of odds ratios.

Second, the set of individual characteristics and control variables is slightly modified. ISCO 1 digit occupation types are excluded, since these are strongly related to educational attainment and represent one of the mechanisms behind the education effect. Excluding these the total effect of education can be estimated. However, for those with an upper secondary degree, a distinction is made between employees working in blue collar and white collar occupations. At the same time regional development variables are included to explore within country regional differences. Regional development is proxied by the share of the population with a higher education degree. With respect to this regions are classified as most, middle and least developed within countries such that the population share of each group is as close to one third as possible. Finally, country fixed effects are also added to control for the differences in the overall training level and the average of the covariates over countries within the country groups.

The results are summarised in Table 3 and Table 4 for the employed and the unemployed respectively. The most prominent difference is in the effect of educational attainment. Training participation is generally increasing with education, but in the east country group education matters more, especially for the employed (Table 3). In the east the odds of training for employees with a tertiary degree is about two times / almost five times higher compared to workers with an upper secondary degree in white collar / blue collar jobs, and seven times higher than for the low skilled. In comparison in the west the odds for the graduate employees are only one and a half, two and a half and three times higher than those with lower level degrees. But this is not only about the graduate-non-graduate difference. In the east the low-skilled are also trained less often compared to those with a medium level of attainment.

Regarding the unemployed, the education effect is still stronger in the east than in the west, but the difference is smaller, and the odds ratios are similar to those estimated for the south (Table 4).

As the strong educational attainment effects in the east are particularly important for policy implications, the estimation was replicated for each country in the east separately. In general the results show a remarkable similarity in the odds ratios over the countries (Table 5, top panel). For the employed the graduate advantage is above the average in Bulgaria and Poland, and below that in Estonia, otherwise the differences are non-significant in economic terms. The education effect varies more for the unemployed (Table 5, bottom panel). The disadvantage of the low skilled compared to the middle level attainment group is comparable to those in the west in the Baltic countries, Poland and Slovenia, while significantly lower for Romania, Bulgaria, Hungary, Slovakia and the Czech Republic. The odds ratios for the graduate are even more diverse, but the estimates are less precise as graduate unemployment and the number of unemployed graduates in the sample in these countries is usually fairly low.

Another important determinant in training participation is age. Training participation generally decreases in age, as human capital investments become less profitable given the shorter time span to yield returns. Regarding the employed no major differences in this pattern can be detected over country groups, except the Nordic countries having a conditional age profile increasing until about the age of fifty (Table 3). However, age profiles estimated separately by educational attainment reveals more differences. For the low skilled and the middle skilled in blue collar jobs the age profiles in the east and the west are almost identical and it is similar in the Nordic countries, as well (Figure 6,

panel b and c). For graduate employees there are marked differences and these are even larger for those with a middle level attainment and working in white collar jobs (Figure 6, panel d and e). In these cases training participation diminishes more with age in the east than in the west, while it is soaring high in the north.

Age profiles for the unemployed show similar patterns, but somewhat larger differences between the country groups. Training is less widespread in older age, and even more in the east than in the west (Table 4). In the Nordic countries, again, conditional age profiles are increasing. Age profiles in the east and west diverge most for those with a middle level educational attainment (Figure 7).

Regarding gender differences, females tend to take part more often in training in each country group, but their conditional advantage is largest in the east, both for the employed and the unemployed (Table 3 and 4).

Training incidence also varies according to location, in part probably due to the different supply of training opportunities. First, employees in rural areas are trained less often, conditional on other characteristics (Table 3). At the same time, living in urban areas as opposed to towns conveys no advantage in terms of training in the old EU countries (in fact, it has a negative effect in the west and the north), but slightly advances training participation in the east. The unemployed also tend to receive less training in rural areas, while an urban location increases the odds of training only in the CEE group (Table 4). Overall in the east urban location seems to increase training somewhat more than in the other three groups.

Regarding regional development, living in a more developed region as opposed to the median appears to be beneficial for training participation in each group, both for the employed and the unemployed (Table 3 and 4). Surprisingly, the odds of training in less developed regions also slightly exceed that in the median regions in the west and the north for the employed. Overall, conditional regional differences are not markedly different over the four country groups.

For the employees there is a clear association between firm size and training. Training most often occurs in large firms and generally decreases with firm size (Table 3). However, this decreasing is less steep in the west and the north, and the most significant in the east group. In the CEE countries the odds of training participation in a small or micro enterprise is about two-third of that in a large firm.

Tenure at the firm has a U-shape relationship with training. Newly hired employees are trained most often, while training is also more common for those who have already spent a long period at the firm. Differences over country groups are not substantial (Table 3).

Conditional training participation rates by economic sectors are surprisingly similar in the east and the west country groups. The only notable exception is that in the east in the agriculture sector the odds of training is higher than in manufacturing, similar to Nordic countries, while in the west and the south agriculture has a negative association with training (Table 3).

Regarding the unemployed, training is less likely immediately after leaving the previous job, has higher odds in the next period, while less likely for those in a long unemployment spell (Table 4). Note that long term unemployment (when the duration of unemployment and the time since last job are considered together) seems to have the strongest negative effect on training participation in CEE countries. Having no previous job at all also goes together with less likely training in the east compared t the west and north country groups.

Table 3 Logit estimates of participation in training by country groups, employed, odds ratios

		west	North	south	east
		(1)	(2)	(3)	(4)
education	lower secondary	0.494***	0.606***	0.455***	0.282***
(ref.: upper second.,		(0.00467)	(0.00729)	(0.00700)	(0.00995)
white collar job)	upper secondary, blue collar job	0.595***	0.647***	0.692***	0.404***
		(0.00531)	(0.00777)	(0.0154)	(0.00773)
	tertiary	1.467***	1.396***	1.651***	1.932***
		(0.00835)	(0.0109)	(0.0194)	(0.0266)
age	20-24	1.064***	1.180***	1.233***	0.896***
(ref.: 30-34)		(0.0118)	(0.0191)	(0.0281)	(0.0267)
	25-29	1.022**	1.094***	1.056***	0.983
		(0.0101)	(0.0158)	(0.0197)	(0.0219)
	35-39	0.984*	1.010	0.971*	0.975
		(0.00914)	(0.0135)	(0.0172)	(0.0207)
	40-44	0.936***	1.041***	0.909***	0.853***
		(0.00890)	(0.0137)	(0.0163)	(0.0188)
	45-49	0.864***	1.036***	0.834***	0.786***
		(0.00848)	(0.0139)	(0.0155)	(0.0180)
	50-54	0.797***	1.002	0.720***	0.703***
		(0.00832)	(0.0137)	(0.0144)	(0.0169)
	55-59	0.663***	0.899***	0.577***	0.614***
		(0.00781)	(0.0128)	(0.0132)	(0.0174)
	60-64	0.547***	0.754***	0.456***	0.613***
		(0.00903)	(0.0126)	(0.0150)	(0.0283)
gender	female	1.125***	1.288***	1.097***	1.149***
(ref.: male)		(0.00670)	(0.00962)	(0.0120)	(0.0156)
urbanisation	urban location	0.976***	0.989	0.955***	1.069***
(ref.: town)		(0.00566)	(0.00932)	(0.0105)	(0.0153)
	village	0.931***	0.935***	0.984	0.904***
		(0.00700)	(0.00770)	(0.0131)	(0.0136)
region	more developed	1.112***	1.046***	1.036***	1.146***
(ref.:medium)		(0.00851)	(0.00822)	(0.0110)	(0.0125)
	less developed	1.032***	1.026***	0.836***	0.986
		(0.00829)	(0.00912)	(0.0101)	(0.0130)
firm size	micro (0-10)	0.844***	0.843***	0.710***	0.683***
(ref.: large 50+)		(0.00606)	(0.00795)	(0.0106)	(0.0128)
	small (11-20)	0.895***	0.845***	0.634***	0.672***
		(0.00754)	(0.00878)	(0.00996)	(0.0123)
	medium (21-50)	0.957***	0.926***	0.884***	0.807***
		(0.00668)	(0.00846)	(0.0145)	(0.0164)
tenure at firm	0-1 years	1.116***	1.019*	1.042**	1.103***
(ref.: 4-10 years)		(0.00850)	(0.0107)	(0.0174)	(0.0213)
	2-3 years	1.068***	1.004	1.006	0.995
		(0.00810)	(0.0108)	(0.0165)	(0.0189)
	10+ years	1.039***	1.065***	1.052***	1.076***
		(0.00667)	(0.00957)	(0.0133)	(0.0160)
empl. status	self-employed	1.095***	0.925***	1.025	1.153***
(ref.: emloyee)		(0.0136)	(0.0165)	(0.0171)	(0.0334)
	family worker	0.927**	0.751***	0.996	0.958
		(0.0329)	(0.0604)	(0.0460)	(0.0651)
full / part time	part time	0.919***	0.828***	1.057***	0.954*
		(0.00585)	(0.00697)	(0.0164)	(0.0259)
contract	temporary	1.056***	0.814***	1.148***	0.979
(ref.: permanent)		(0.0102)	(0.0102)	(0.0176)	(0.0212)

Table 3 Logit estimates of participation in training by country groups, employed, odds ratios, continued

economic sector	agriculture, fishing	0.931***	1.205***	0.711***	1.275***
(ref.: manufacturing)		(0.0190)	(0.0324)	(0.0272)	(0.0444)
	mining	1.310***	1.817***	0.959	1.290***
		(0.0603)	(0.0907)	(0.0991)	(0.0953)
	utilities	1.462***	1.627***	1.643***	1.354***
		(0.0362)	(0.0556)	(0.0774)	(0.0602)
	construction	0.877***	0.996	0.943**	0.837***
		(0.0116)	(0.0183)	(0.0246)	(0.0260)
	trade, repair of	0.895***	0.989	0.990	0.895***
	motor vehicles	(0.00953)	(0.0143)	(0.0201)	(0.0222)
	hotels, resturants	0.680***	0.812***	0.907***	0.741***
		(0.0117)	(0.0208)	(0.0276)	(0.0338)
	transport, storage	1.070***	1.006	1.284***	1.247***
	communication	(0.0130)	(0.0160)	(0.0315)	(0.0312)
	finance	1.702***	1.576***	2.175***	1.912***
		(0.0217)	(0.0335)	(0.0545)	(0.0575)
	real estate, renting	1.212***	1.158***	1.366***	1.317***
	business activ.	(0.0126)	(0.0162)	(0.0277)	(0.0329)
	public administr.	1.587***	1.606***	1.689***	1.650***
		(0.0168)	(0.0250)	(0.0344)	(0.0397)
	education	1.634***	1.466***	2.018***	1.765***
		(0.0172)	(0.0208)	(0.0395)	(0.0397)
	health, social serv.	1.757***	1.414***	2.228***	1.768***
		(0.0170)	(0.0183)	(0.0424)	(0.0428)
	other commun. serv.	1.142***	1.291***	1.491***	1.215***
		(0.0156)	(0.0234)	(0.0393)	(0.0402)
	household	0.871***	0.748*	0.948	1.303**
		(0.0391)	(0.123)	(0.0572)	(0.168)
N		3,964,260	1,634,715	3,559,342	3,955,090

Other control variables: year, quarter and country dummies; marital status: single; child 0-14 in family; child 0-5 in family; child 0-5 in family X female; immigrant: from EU, US; immigrant: from Europe – non EU; immigrant: from other; indicator variables for missing values of right hand side variables.

*Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: EU-LFS, 2004-2011

Table 4 Logit estimates of participation in training by country groups, unemployed, odds ratios

		west	north	south	east
		(1)	(2)	(3)	(4)
education	lower secondary	0.676***	0.916**	0.458***	0.463***
(ref.: upper second.)		(0.0193)	(0.0409)	(0.0171)	(0.0329)
	tertiary	1.453***	1.239***	1.783***	1.627***
		(0.0414)	(0.0525)	(0.0601)	(0.0970)
age	20-24	0.928*	1.267***	1.179***	1.048
(ref.: 30-34)		(0.0394)	(0.0842)	(0.0567)	(0.0866)
	25-29	0.880***	1.191**	1.021	0.897
		(0.0388)	(0.0841)	(0.0456)	(0.0696)
	35-39	1.001	1.171**	0.904**	0.928
		(0.0435)	(0.0899)	(0.0466)	(0.0825)
	40-44	0.978	1.245***	0.837***	0.642***
		(0.0437)	(0.0956)	(0.0480)	(0.0579)
	45-49	0.893**	1.220***	0.747***	0.760***
		(0.0421)	(0.0939)	(0.0455)	(0.0744)
	50-54	0.877***	1.247***	0.569***	0.730***
		(0.0437)	(0.0927)	(0.0384)	(0.0688)
	55-59	0.733***	0.993	0.441***	0.482***
		(0.0426)	(0.0703)	(0.0410)	(0.0576)
	60-64	0.517***	1.109	0.299***	0.486***
		(0.0514)	(0.0871)	(0.0405)	(0.0907)
gender	female	1.462***	1.360***	1.467***	1.643***
(ref.: male)		(0.0372)	(0.0454)	(0.0435)	(0.0793)
urbanisation	urban location	0.965	0.922*	1.015	1.134**
(ref.: town)		(0.0270)	(0.0414)	(0.0337)	(0.0695)
	village	0.903***	0.870***	0.970	0.901*
		(0.0338)	(0.0345)	(0.0375)	(0.0506)
region	more developed	1.133***	1.018	1.091***	1.151***
(ref.:medium)		(0.0380)	(0.0405)	(0.0369)	(0.0561)
	less developed	1.042	0.948	0.930**	1.062
		(0.0365)	(0.0412)	(0.0305)	(0.0587)
duration of unempl.	0-5 months	0.892***	0.914*	0.820***	0.901
(ref.: 6-11 months)		(0.0339)	(0.0487)	(0.0405)	(0.0724)
	1 year or longer	0.952	1.143**	0.808***	0.809***
		(0.0380)	(0.0700)	(0.0384)	(0.0644)
time since prev. job	0-5 months	0.672***	0.806***	0.968	0.874
(ref.: 6-11 months)		(0.0299)	(0.0450)	(0.0530)	(0.0837)
	1-2 years	0.966	0.972	1.118**	0.859*
		(0.0432)	(0.0608)	(0.0616)	(0.0752)
	more than 2 years	0.801***	0.947	0.966	0.703***
		(0.0345)	(0.0551)	(0.0540)	(0.0658)
	no previous job	1.088	1.447***	1.167e+06	0.674
		(0.105)	(0.178)	i	(0.336)
N		298,006	99,490	338,690	380,258

Other control variables: year, quarter and country dummies; marital status: single; child 0-14 in family; child 0-5 in family; child 0-5 in family X female; immigrant: from EU, US; immigrant: from Europe – non EU; immigrant: from other; indicator variables for missing values of right hand side variables.

i: not converged

*Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: EU-LFS, 2004-2011

Table 5 Logit estimates of the effect of educational attainment on participation in training by countries, odds ratios

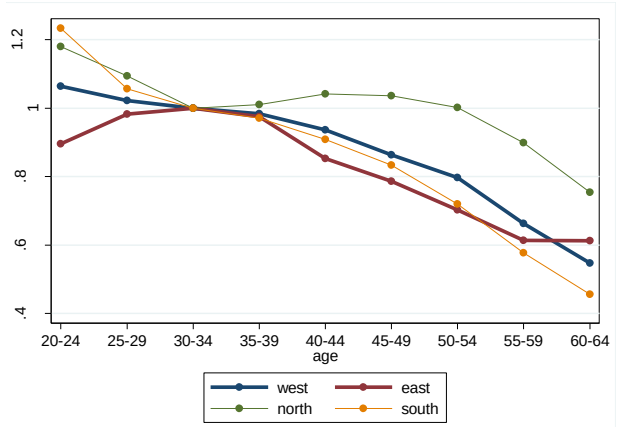
employed		BG	CZ	EE	HU	LV	LT	PL	RO	SK	SI
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
education	lower secondary	0.248***	0.220***	0.314***	0.230***	0.397***	0.148***	0.217***	0.207***	0.162***	0.281***
(ref.: upper second.,		(0.110)	(0.0142)	(0.0390)	(0.0174)	(0.0519)	(0.0343)	(0.0219)	(0.0506)	(0.0255)	(0.0139)
white collar job)	upper secondary,	0.556***	0.335***	0.335***	0.405***	0.399***	0.319***	0.409***	0.353***	0.407***	0.504***
	blue collar job	(0.121)	(0.00817)	(0.0302)	(0.0192)	(0.0378)	(0.0291)	(0.0166)	(0.0428)	(0.0185)	(0.0161)
	tertiary	3.389***	1.914***	1.456***	1.731***	1.839***	2.061***	2.684***	2.013***	2.322***	2.026***
		(0.432)	(0.0354)	(0.0802)	(0.0582)	(0.109)	(0.122)	(0.0742)	(0.161)	(0.0763)	(0.0450)
	N	220,533	679,864	65,917	755,761	96,748	176,571	721,287	700,269	313,551	222,402
unemployed		BG	CZ	EE	HU	LV	LT	PL	RO	SK	SI
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
education	lower secondary	0.121***	0.378***	0.413***	0.415***	0.641**	0.501***	0.627***	0.212***	0.285***	0.498***
(ref.: upper second.)		(0.0504)	(0.0526)	(0.127)	(0.0466)	(0.145)	(0.129)	(0.0729)	(0.105)	(0.0632)	(0.0597)
	tertiary	0.998	2.194***	1.670**	1.644***	1.489**	0.933	1.959***	2.088**	3.850***	1.550***
		(0.400)	(0.270)	(0.334)	(0.191)	(0.293)	(0.197)	(0.179)	(0.641)	(0.624)	(0.149)
	N	20,144	46,786	6,512	78,902	12,503	20,122	88,976	45,319	45,422	14,212

Other control variables: as in Table 3 and Table 4, except country dummies.

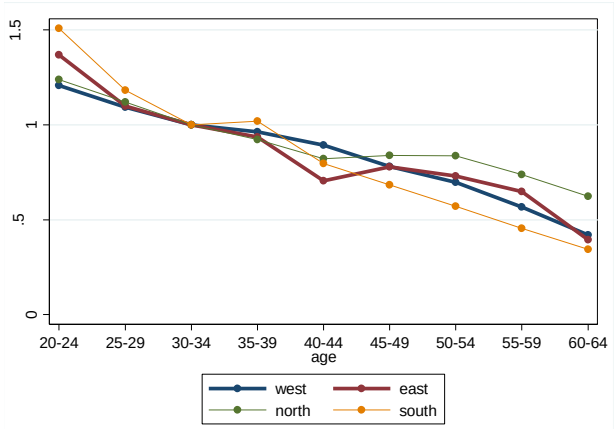
*Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: EU-LFS, 2004-2011

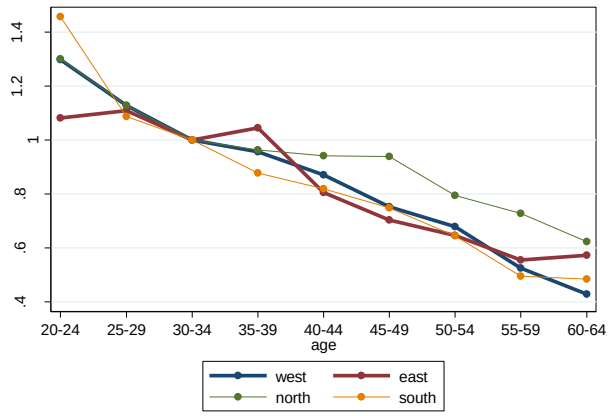
Figure 6 Age profiles of training participation by education, employed, odds ratios



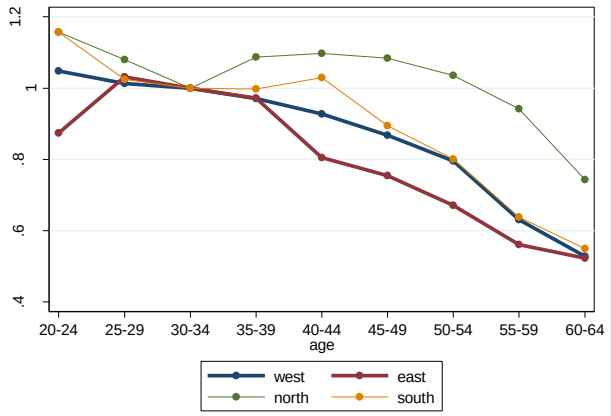
a. full sample



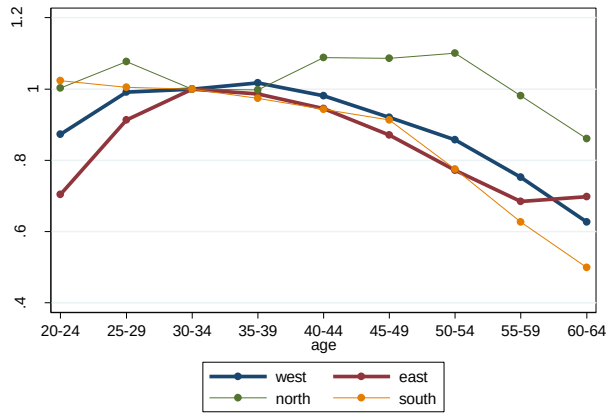
b. low education



c. upper secondary education - blue collar job



d. upper secondary education - white collar job

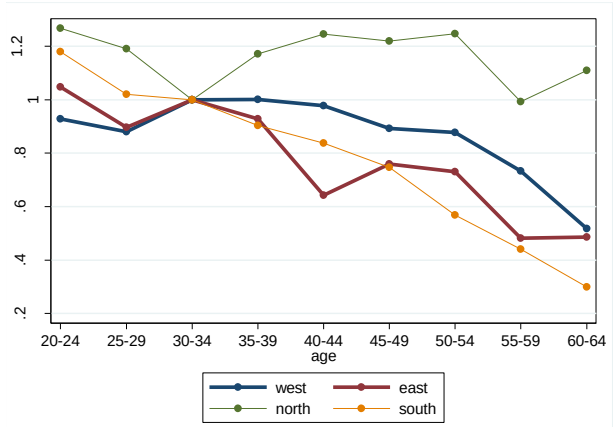


e. tertiary

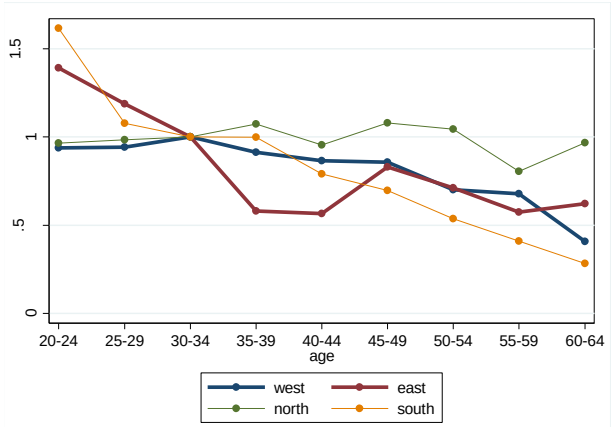
Panel a.: estimates from Table 3. Panel b.-e.: estimates from logit regressions by educational attainment, control variables as in Table 3.

Source: EU-LFS, 2004-2011

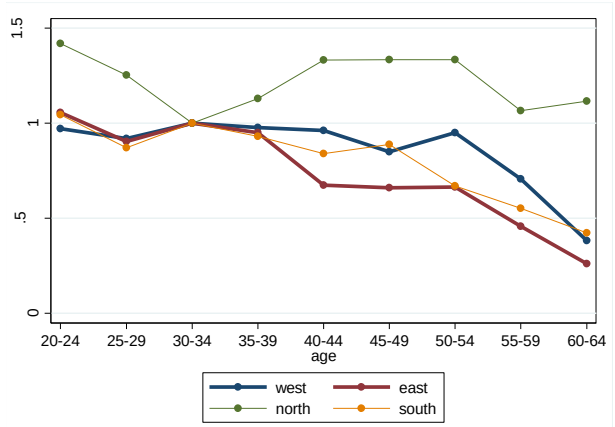
Figure 7 Age profiles of training participation by education, unemployed, odds ratios



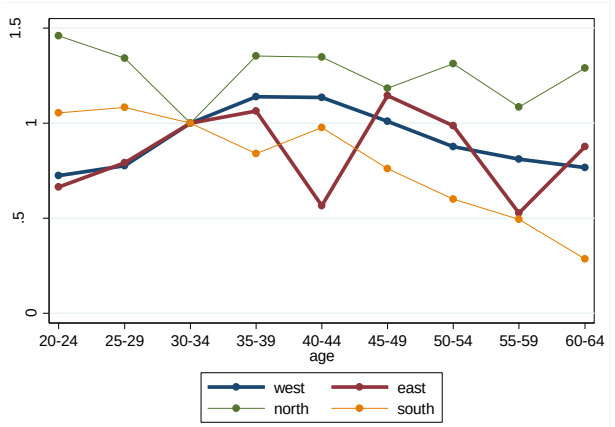
a. full sample



b. low education



c. upper secondary education



d. tertiary

Panel a.: estimates from Table 4. Panel b.-d.: estimates from logit regressions by educational attainment, control variables as in Table 4.

Source: EU-LFS, 2004-2011

4 Why does training occur less often in CEE countries?

As the results of previous section suggest, basic composition effects explain at most a smaller part of the east-west training gap. In this section I explore other possible explanations; the demand for skills, education quality and institutions and underprovision of training.

First, it is possible that jobs in the east and the west differ with respect to skill requirements due to different technologies, which may result in different demand for skills in general and training in particular. This hypothesis is tested by estimating training participation when indicators of skill requirements of the jobs are controlled for. The analysis uses PIAAC data.

Second, education quality and institutions may affect training in several ways. Education and training are usually regarded as complements, as better general skills acquired in education make training more profitable. The positive correlation between educational attainment and training participation can be interpreted as empirical evidence for this complementarity (Brunello 2004). However, if this mechanism is at work, the quality of education may also affect training. As standardised international student assessment results suggest, most of the CEE countries lags behind Western European countries. Thus weaker general skills may also explain differences in training participation. In order to assess this mechanism I explore the correlation between basic skills as measured in the PIAAC data and training participation.

On the other hand, education may substitute for training, as well. On the one hand, in some countries stronger initial vocational education in secondary education may produce skills and decrease the demand for further training after schooling. As vocational tracks are present in most of the CEE countries, this institutional feature is another candidate for explaining the difference in training participation. On the other hand, learning in formal education as an adult may also substitute for training, if the costs of formal education are relatively low or the returns to that are high. There is some evidence that adult learning raising educational attainment is more common in CEE countries (Beblavy et al 2013). Moreover, the wage return to higher education is relatively high in CEE countries (OECD 2012). These substitution effects are assessed using the EU-LFS data.

A crucial question for policy is whether less training in CEE countries means that investment in human capital is farther below the optimal level. Both theoretical and empirical literature suggests that labour market institutions may have a strong impact of training (Acemoglu and Pischke 1998; Bassanini et al 2007). Firms can be expected to invest in general training if labour markets imperfections constrain labour mobility and allow firms to set wages below the marginal product of workers. Limited mobility makes less likely that the firm loses its investment when an employee moves to another job while oligopsonistic wage setting makes is possible for the firm to collect the returns on the investment. In this setting capital market imperfections restricting workers to invest in training at the optimal level are in part offset by firms paying for training. The existing empirical literature has focused on analyzing the effect of labour market institutions on training (see Brunello and Medio 2001 in a comparative perspective). Instead of this I compare the level of job mobility in the four country groups using the EU-LFS data. If this is higher in the east, this can be interpreted as indirect evidence for more underprovision of training.

Note that the available data do not allow for rigorous causal analysis of these mechanisms and the estimation of their relative contributions to the east-west training gap. Nevertheless it is important to assess these even if referring to weak or indirect evidence, as the policy implications are very different.

4.1 Skill requirements of jobs and training

Beyond the simple individual and firm characteristics analysed in section 3 further differences in the composition of jobs may contribute to the east-west training gap. More advanced technology in the west may increase the demand for skills and this way may raise training participation. Technology and skill requirements of jobs is difficult to measure, however, the PIAAC database contains some information on the latter. Skill requirements are measured here by the use of the following general skills at work: numeracy; reading; writing; planning; task discretion; problem solving; ICT. Note that these measures can not provide a full and reliable picture of the complexity of jobs. The specific skills and knowledge requirements related to the technology at the firm, and probably important for training needs are not covered. Nevertheless it is interesting whether controlling for these observed indicators of job complexity accounts for part of the east-west difference in training.

In order to test this I estimate probit regressions for the employed. The dependent variable is training participation in the past one year. The reference country group is the west, but CEE countries, since only four of those took part in the survey, are represented by country dummies[1]. The first specification is similar to the estimates with individual controls in section 3.2. Control variables are age, gender, education, occupation type (1 digit ISCO code collapsed to 4 groups), various measures of immigrant status, firm size, tenure at firm and public sector dummies. Then several indicators of the skill requirements of the job are added. These are measured by composite indices , provided in the official PIAAC data files, based on questions on how often employees face various tasks involving the usage of general skills (except problem solving, measured by single questions). The comparison of the country effects over the two specifications reveals the extent to which job characteristics account for cross country differences in training participation.

Results are reported in Table 6 in the form of marginal effects, calculated at the average values of individual covariates in the west. The first and second columns show estimation results for the full employed sample. More frequent usage of general skills at work appears to be associated indeed with training. More tasks related to reading, writing, planning and solving simple problems goes together with a higher probability of training, other individual characteristics equal. However, using numeracy skills and task discretion surprisingly have a negative coefficient.

Regarding the differences across countries, first note that using a similar set of controls the estimates from the PIAAC data closely resemble to that from EU-LFS (see column (2) in the bottom panel of Table 2, and column (1) in Table 6). Training participation in the Czech Republic and Estonia does not significantly differ from that in Western Europe; as these countries (and Slovenia) have training levels exceptionally high within the CEE group. The estimated effects for Slovakia and Poland are statistically significantly negative, but larger in the PIAAC data compared to the LFS. This is probably due to the fact, that training participation is measured for different time periods; for one year in the former and four weeks in the latter. The longer is the time window, the higher is the probability of including a training episode. This implies measuring training on a different scale, resulting higher country means in PIAAC.

[1] Note that for the west and the north the sample of countries int he PIAAC data is identical to those int he EU-LFS analysis above. Southern Europe is represented by Italy and Spain, while the CEE countries covered are The Czech Republic, Estonia, Poland and Slovenia.

Table 6 Pooled probit regression estimates of participation in training with job complexity variables, employed, marginal effects

	full sample		education: low		education: middle		education: high	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CZ	0.0611	0.0832**	0.0127	0.0400	0.0727	0.107***	0.0167	0.0240
	(0.0438)	(0.0375)	(0.0568)	(0.0513)	(0.0468)	(0.0369)	(0.0345)	(0.0312)
PL	-0.142***	-0.0819**	-0.0919*	-0.0217	-0.172***	-0.0882**	-0.0891**	-0.0657**
	(0.0441)	(0.0391)	(0.0531)	(0.0509)	(0.0463)	(0.0383)	(0.0358)	(0.0328)
SK	-0.158***	-0.115***	-0.237***	-0.199***	-0.147***	-0.0875**	-0.140***	-0.131***
	(0.0444)	(0.0388)	(0.0513)	(0.0480)	(0.0470)	(0.0386)	(0.0364)	(0.0334)
EE	0.0266	0.0772**	0.0176	0.0570	0.0306	0.0859**	0.0367	0.0661**
	(0.0441)	(0.0388)	(0.0580)	(0.0541)	(0.0480)	(0.0381)	(0.0345)	(0.0316)
south	-0.0839	-0.0440	-0.0867	-0.0404	-0.114	-0.0769	-0.0386	-0.0237
	(0.0887)	(0.0833)	(0.0731)	(0.0662)	(0.0892)	(0.0842)	(0.0709)	(0.0686)
north	0.125***	0.107***	0.0881	0.0458	0.162***	0.133***	0.0658*	0.0700**
	(0.0445)	(0.0414)	(0.0606)	(0.0569)	(0.0465)	(0.0400)	(0.0380)	(0.0357)
problem solving: complex prob.		-0.00338		-0.00573		-0.00269		-0.00143
		(0.00237)		(0.00568)		(0.00446)		(0.00332)
problem solving: simple prob.		0.0224***		0.0187***		0.0247***		0.0162***
		(0.00277)		(0.00609)		(0.00323)		(0.00473)
numeracy		-0.0107**		0.0102		-0.0127**		-0.00894*
		(0.00474)		(0.00929)		(0.00559)		(0.00474)
reading		0.0678***		0.0518***		0.0709***		0.0569***
		(0.00529)		(0.00893)		(0.00790)		(0.00680)
writing		0.0462***		0.0487***		0.0489***		0.0343***
		(0.00659)		(0.0101)		(0.00806)		(0.00754)
ICT		0.0136**		-0.00695		0.0111		0.0164**
		(0.00623)		(0.0149)		(0.00701)		(0.00745)
planning		0.00927**		0.00454		0.00669*		0.0125**
		(0.00371)		(0.00965)		(0.00365)		(0.00524)
task discretion		-0.00931***		-0.0161**		-0.00933*		-0.00671
		(0.00355)		(0.00637)		(0.00524)		(0.00516)
N	62,480	62,480	7,207	7,207	29,041	29,041	25,834	25,834

*Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: OECD-PIAAC

The main results of Table 6 indicate that controlling for measures of using general skills at work accounts for about one third of the difference between Poland and Slovakia compared to the west (see column (2) vs column (1) in Table 6). Since the marginal effects are calculated at the average values of individual covariates in the west, the results can be read as the probability of training for an average employee in the west would decrease by 14 percentage points if he were subject to average Polish training levels, or in other words, if he moved to an average job in Poland. However, this difference would be cut to 8 percentage points if he moved to a job in Poland with skill requirements identical to his current job. On the other hand the results imply that in Estonia and the Czech Republic training levels would even surpass that in the west when skill usage at work is controlled for.

Finally estimation is repeated for subgroups of employees with respect to educational attainment (column (3)-(8) in Table 6). The results suggest that jobs' skill requirements make the largest difference for those with a middle level of education. The negative marginal effects for Poland and Slovakia virtually do not change or the difference is not significant for the low-skilled and the

graduates when skill usage is controlled for. One possible explanation is that skill requirements differ more in the middle of the educational attainment distribution, but it is also possible, that the usage of general skills is a less appropriate measure of skill requirements in graduate jobs.

Overall the results appear to be consistent with the hypothesis that the lag of most CEE countries in training is in part due to a lower demand for skills and training in current jobs.

4.2 Vocational secondary education and training

Another possible explanation for the east west training gap can be rooted in differences in educational institutions. In the majority of CEE countries the period of comprehensive education is relatively short (typically 8 or 9 years) and vocational or pre-vocational tracks in upper-secondary education provide extensive vocational training. This initial vocational training might substitute for on the job training at firms compared to education system with shorter initial vocational training (see also the implications of the theoretical model of tracking by Bruenllo et al 2004).

In order to test whether this factor plays a role in east west training differences I estimate training regressions for the pooled sample by educational attainment. If educational institutions in upper secondary education have a decisive effect, the difference in training participation should be largest at this level. Moreover, if technical skills learnt in school substitute for on the job training, this should be prevalent for the young and can be expected to fade out later as technological change makes these skills more and more obsolete.

The regressions contain the same set of individual controls that were used in the pooled model for the total sample in 3.2. However, this time a logit model is estimated and odds ratios are reported in order to facilitate comparison across education attainment groups with huge differences in average training levels (see in section 3.3 the argument for using odds ratios instead of marginal effects in a similar case).

Results are summarized in Table 7. Regarding the full sample of age groups (top panel) first note that training participation is lowest in CEE countries in each educational attainment group. In other words, training participation is well below that in the west also for the graduates and the low-skilled, who are not directly affected by vocational education at the upper secondary level. At the same time, regarding the employed the lag of the east group is largest for those with an upper secondary education and working in a blue collar job (i.e. most affected by vocational training in school). This is consistent with the vocational track – on the job training substitution hypothesis, though the difference between the odds ratios across the educational attainment groups is relatively small, suggesting that even if this mechanism is indeed at work, it is not a crucial factor in the east-west difference.

Looking at the estimates by age group reveals that the pattern of east-west differences by education attainment is basically unaffected by age (Table 7, middle and bottom panels). The odds of training in the east relative to the west is lowest for employees with an upper secondary degree and working in blue collar jobs in each age group and the odds ratios for this group are virtually identical. This is in contrast to the vocational track – on the job training substitution hypothesis, which would predict less training for the young, but not in older age groups, since changes in technology and labour market demand for occupations may require updating of skills independent of whether these skills were originally acquired in upper secondary education or some form of apprenticeship or on the job training.

Table 7 Pooled logit regression estimates of participation in training by labour market status, education and age, odds ratios

		employed education:				unemployed education:		
		low	middle – blue collar job	middle – white collar job	high	low	middle	high
age group		(1)	(2)	(3)	(4)	(5)	(6)	(7)
20-64								
	east	0.309***	0.239***	0.386***	0.518***	0.190***	0.270***	0.401***
		(0.0108)	(0.00396)	(0.00396)	(0.00477)	(0.0137)	(0.00844)	(0.0216)
	south	0.554***	0.467***	0.424***	0.626***	0.449***	0.452***	0.922**
		(0.00875)	(0.00982)	(0.00425)	(0.00507)	(0.0161)	(0.0128)	(0.0308)
	north	7.792***	6.108***	6.636***	4.063***	6.130***	6.061***	3.520***
		(0.464)	(0.427)	(0.246)	(0.0985)	(1.155)	(1.160)	(0.632)
	N	2,963,086	2,787,413	4,004,977	3,270,187	373,484	576,074	164,193
20-34								
	east	0.289***	0.250***	0.401***	0.552***	0.208***	0.317***	0.492***
		(0.0189)	(0.00683)	(0.00709)	(0.00905)	(0.0219)	(0.0141)	(0.0342)
	south	0.601***	0.482***	0.375***	0.701***	0.533***	0.466***	1.113**
		(0.0182)	(0.0153)	(0.00677)	(0.01000)	(0.0293)	(0.0178)	(0.0512)
	north	9.330***	7.322***	7.604***	4.289***	5.004***	6.517***	5.303***
		(1.286)	(0.779)	(0.484)	(0.166)	(1.357)	(1.740)	(1.434)
	N	631,766	894,401	1,271,583	1,061,880	141,500	278,735	93,510
35-49								
	east	0.311***	0.235***	0.379***	0.513***	0.158***	0.237***	0.349***
		(0.0165)	(0.00609)	(0.00573)	(0.00708)	(0.0176)	(0.0130)	(0.0384)
	south	0.537***	0.448***	0.440***	0.604***	0.401***	0.415***	0.693***
		(0.0126)	(0.0145)	(0.00629)	(0.00721)	(0.0222)	(0.0202)	(0.0418)
	north	6.517***	4.418***	5.397***	3.723***	6.705***	5.063***	2.804***
		(0.564)	(0.467)	(0.285)	(0.139)	(2.047)	(1.621)	(0.884)
	N	1,216,941	1,220,768	1,742,505	1,392,062	142,616	195,330	46,416
50-64								
	east	0.334***	0.245***	0.369***	0.481***	0.199***	0.228***	0.363***
		(0.0211)	(0.00871)	(0.00853)	(0.00912)	(0.0349)	(0.0178)	(0.0475)
	south	0.490***	0.415***	0.472***	0.513***	0.333***	0.426***	0.615***
		(0.0147)	(0.0229)	(0.0105)	(0.00898)	(0.0273)	(0.0384)	(0.0718)
	north	7.983***	4.961***	6.926***	3.662***	8.628***	5.664***	1.320
		(0.807)	(0.937)	(0.622)	(0.203)	(4.123)	(3.038)	(0.516)
	N	1,114,379	672,244	990,889	816,245	89,368	102,009	24,267

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: EU-LFS, 2004-2011

Overall, the evidence does not strongly support upper secondary vocational education crowding out training as a major explanation for low training incidence in CEE countries.

4.3 Does formal education replace training?

Similar to the hypothesis about the substitution of initial vocational education for on the job training later, it can be argued that formal education for adults can also fulfill the demand for improving skills and knowledge and thus can be used instead of training. In fact, in some cases the distinction between training and formal education can be vague, and may depend more on the details of the organizational setup than the content and requirements.

As Beblavy et al (2013) observed, adult formal education is relatively more important in CEE countries than training. This could suggest that the lower average level of training participation in the east can be in part explained by substituting formal education for training.

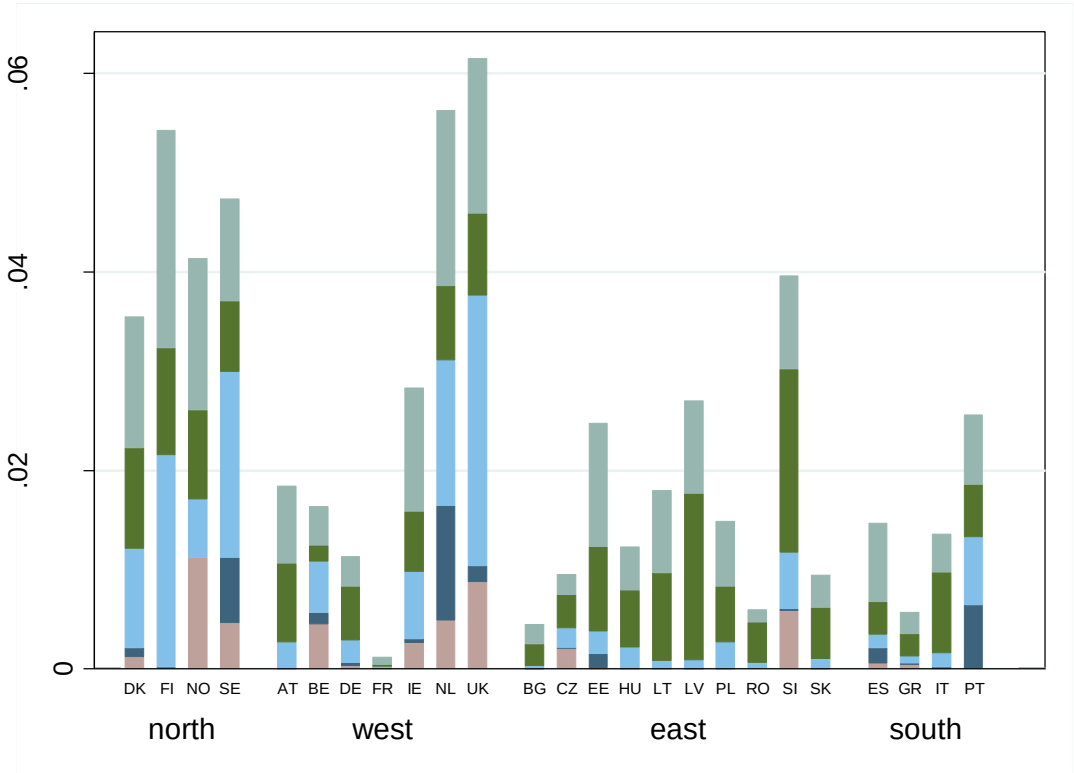
Figure 8 depicts participation rates in formal education by education level for the population of 30 years and older. Within the group of the west there is substantial variation; the Netherlands and the UK outperform Scandinavian countries, while the others lag far behind them. Most of the CEE countries are close to the average of the laggards in the west group, and the CEE group is again similar to the south.

There is another interesting difference between the north and west on the one hand and the east and south on the other. In the latter group schooling beyond 30 is dominated by higher education (except Portugal). At the same time in several western and northern countries a significant share of the population takes part in lower level schooling, e.g. learning for an additional vocational degree at the upper secondary level. Moreover, while in the north and the west schooling in higher education is more often aimed at getting a second degree, in CEE countries many students in higher education pursue their first degree. As Beblavy et al (2013) puts it, in CEE countries adult education is more about upgrading educational attainment.

Looking at participation rates by age group and labour market status reveals further differences (Table 8). First, participation rates in CEE countries, and also in the south group, decrease in age more than in the west and the north. Schooling rates below 40 in CEE countries closely mirrors those in the west group, while beyond 40 the gap opens up. This is consistent with more educational upgrading in the east group, which requires too much time and effort to be profitable later in the life cycle. Second, average schooling rates below 40 are almost identical in the west and east groups for the employed, while the unemployed and inactive can make less investment in schooling in CEE countries, and the difference is increasing in age (Table 8, middle and bottom panel).

Overall the aggregate evidence suggests that formal education of adults hardly replaces training. Schooling rates in CEE countries are similar to those in the west in younger age groups, and especially for the employed, but not later in the life cycle. Formal education is more about upgrading educational attainment, probably completing educational investments postponed, delayed or constrained earlier.

Figure 8 Participation in formal education by education level, age: 30-64



: level missing, : lower secondary or lower, : upper secondary, : higher educ. - 1st degree, : higher educ. - 2nd degree

Source: EU-LFS, 2004-2011

Table 8 Participation in formal education by age and labour market status

	north	west	east	south
full sample				
25-29	0,229	0,127	0,119	0,118
30-34	0,105	0,057	0,047	0,038
35-39	0,074	0,037	0,030	0,021
40-	0,028	0,020	0,007	0,008
25-64	0,066	0,040	0,030	0,028
employed				
25-29	0,169	0,096	0,094	0,060
30-34	0,077	0,049	0,047	0,029
35-39	0,055	0,033	0,031	0,020
40-	0,024	0,020	0,009	0,009
25-64	0,041	0,026	0,021	0,014
not in employement				
25-29	0,456	0,245	0,189	0,255
30-34	0,264	0,095	0,052	0,070
35-39	0,198	0,058	0,026	0,029
40-	0,041	0,019	0,002	0,006
25-64	0,025	0,013	0,009	0,014

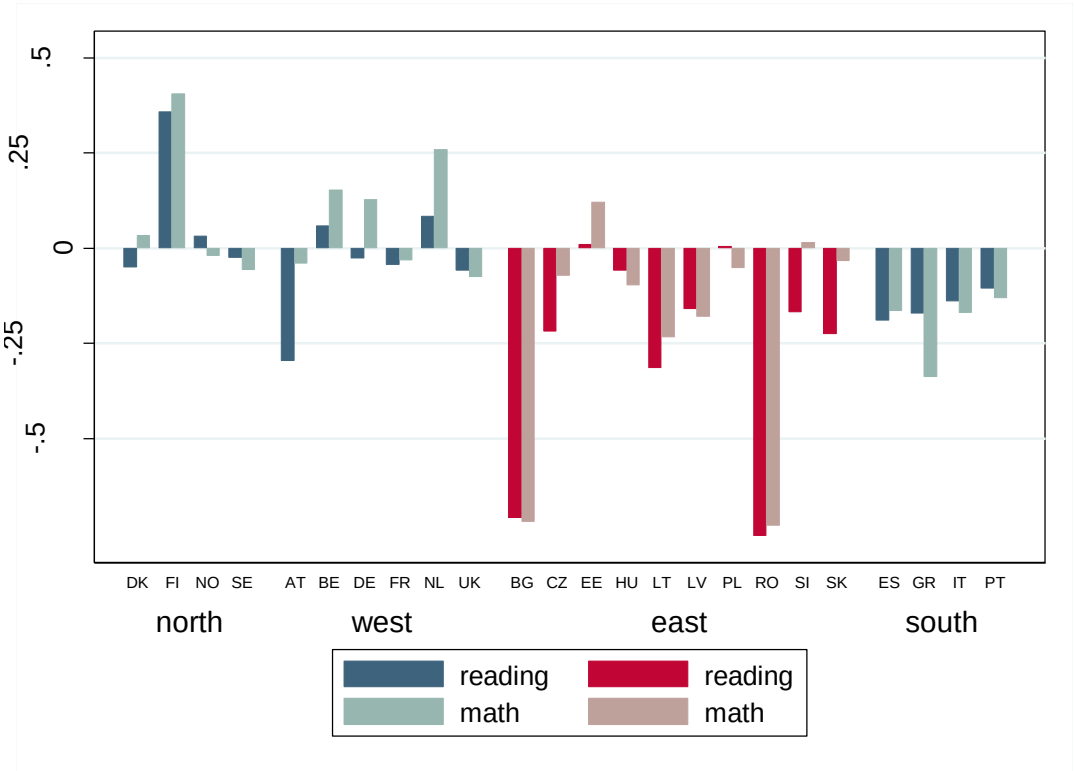
Source: EU-LFS, 2004-2011

4.4 Basic skills and training

It is probably the most clear-cut result of the empirical literature that training is positively related to educational attainment or as Brunello (2004) puts it education and training are complements. Human capital theories provide a natural explanation for this as both education and training yields higher returns to the more able and skills developed in education also make training more profitable. However, educational attainment can be a poor measure of skills, especially in an international comparison (see e.g. Hanushek and Woessmann 2012 in the context of education and economic growth). This suggests that it is worth to analyse general skills as determinants of training participation.

Moreover, international student achievement data indicate weaker basic skills in most of the CEE countries compared to the west and north groups, as shown by PISA data from 2009 on Figure 9. This raises the question whether the weak general skills contribute to the east west training gap. It is possible that weaker general skills make investments in training less profitable, by increasing the costs and/or limiting the benefits of adult learning. Note that evidence on the effect of skills on employment provides additional support to this hypothesis. As Köllő (2006) argues the flaws of basic skills, together with the fewer low skill jobs, is a major reason of low employment rates of workers with low level educational attainment in CEE countries.

Figure 9 Standardised student test scores, 15 years old



Source: OECD PISA 2009

The analysis builds on the PIAAC data which provides test results on adult reading literacy, numeracy and problem solving skills. Table 9 presents probit regression estimates of the association between these skills and training participation at the individual level for the pooled sample of countries. The estimates repeat the augmented specification of Table 6 of section 4.1, adding the skill variables and a full set of country fixed effects instead of country group dummies. Note that the job requirements measured by the usage of basic skills at the workplace are included as controls. Also note that

country fixed effects ensure that the results are not driven by cross country differences in training levels. Further control variables, as in section 4.1, are age, gender, education, occupation type (1 digit ISCO code collapsed to 4 groups), various measures of immigrant status, firm size, tenure at firm and public sector dummies.

Skills are measured by standardized scores in literacy, numeracy and problem solving. In the first and second specification only literacy and numeracy is included since problem solving was not measured for about one third of the respondents, while in the second one all three scores are used. The first specification employs a composite index of literacy and numeracy skills (the first principal component of the two variables) in order to reveal overall skill effects which might appear to be insignificant due to multicollinearity in the other specifications[2].

Results for the skill variables are reported in Table 9, in the form of marginal effects. Overall better skills appear to go together with more training (Table 9, top panel). Note that this is a partial association, controlling for educational attainment and skill usage at the workplace, among others. The effect is surprisingly similar for the employed and the unemployed, though not very strong: one standard deviation increase in the skill index implies about a 2.5 percentage point increase in the probability of training in the past one year period, while the grand mean of training participation is 0.57 and 0.28 for the employed and the unemployed respectively in the sample.

Regarding the three skills, literacy is significant both for the employed and the unemployed, problem solving seems to be an important determinant of training only in case of the employed while for numeracy the results are not robust as it shifts sign when problem solving enters.

Repeating the estimation for subgroups with respect to educational attainment confirms that skills do matter for training in general, and the overall results are not driven by one skill group (Table 9 middle and bottom panels). For the employed the skill index is significant for each attainment group. While literacy turns to insignificant in most cases, the effect of problem solving remains robust. The results are less clear-cut for the unemployed. Skill effects are mostly non-significant for the low-educated, but overall literacy seem to be the most important determinant of training for each group. Note that the effects are less precisely estimated due to smaller number of observations.

It is important to emphasize that the estimated effects should not be interpreted as causal effects as these are prone to both omitted variable bias and reverse causation. A likely source of omitted variable bias is the selection of workers with good skills into jobs which involve more training. Moreover, spending several years in skill-intensive jobs is also likely to have a positive impact on skills, e.g. mitigating the decay with age. At the same time, participation in training can be thought to contribute to maintaining, refreshing or even improving basic skills by more intensive practicing. The available data do not allow for treating these sources of bias properly. However, repeating the estimation of the skill-treatment association for the subset of the young seems to be a good starting point, since their skills can be assumed to be less affected by work experience and much more determined by schooling and abilities.

[2] The correlation is especially strong between literacy and numeracy (about 0.91), but also strong between these and problem solving (0.82 and 0.78 respectively).

Table 9 Probit estimates of the effect of skills on participation in training, marginal effects

	employed			unemployed		
	(1)	(2)	(3)	(4)	(5)	(6)
full sample						
skill (literacy + numeracy)	0.0245***			0.0234***		
	(0.00252)			(0.00544)		
literacy		0.0209***	0.0164*		0.0530***	0.0849***
		(0.00673)	(0.00861)		(0.0159)	(0.0298)
numeracy		0.0135*	-0.0201**		-0.0204	-0.0647**
		(0.00697)	(0.00845)		(0.0162)	(0.0292)
problem solving			0.0416***			0.0298
			(0.00591)			(0.0209)
N	62,471	62,471	42,923	7,912	7,912	3,783
subsamples by educational attainment						
educ: low						
skill (literacy + numeracy)	0.0183***			0.00939		
	(0.00581)			(0.00692)		
literacy		-0.00381	0.0125		0.0420*	0.0415
		(0.0176)	(0.0360)		(0.0240)	(0.0686)
numeracy		0.0305*	-0.0473		-0.0302	-0.0265
		(0.0185)	(0.0340)		(0.0250)	(0.0719)
problem solving			0.0685***			-0.0119
			(0.0251)			(0.0466)
N	7,377	7,377	2,803	2,476	2,476	620
educ: middle						
skill (literacy + numeracy)	0.0225***			0.0283***		
	(0.00375)			(0.00809)		
literacy		0.0275***	0.0193		0.0426*	0.0525
		(0.0100)	(0.0133)		(0.0226)	(0.0398)
numeracy		0.00381	-0.0310**		-0.00285	-0.0537
		(0.0104)	(0.0132)		(0.0231)	(0.0383)
problem solving			0.0473***			0.0562**
			(0.00909)			(0.0286)
N	29,839	29,839	20,296	3,867	3,867	2,181
educ: high						
skill (literacy + numeracy)	0.0267***			0.0330**		
	(0.00337)			(0.0158)		
literacy		0.0126	0.00914		0.0973**	0.186***
		(0.00850)	(0.0105)		(0.0410)	(0.0593)
numeracy		0.0254***	0.000314		-0.0515	-0.116*
		(0.00876)	(0.0103)		(0.0412)	(0.0591)
problem solving			0.0279***			0.00745
			(0.00725)			(0.0396)
N	24,855	24,855	19,594	1,503	1,503	948

Marginal effects are estimated at the mean of the covariate values in the estimation subgroup.

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: OECD-PIAAC

Table 10 Probit estimates of the effect of skills on participation in training for the young, marginal effects

	employed			unemployed		
	(1)	(2)	(3)	(4)	(5)	(6)
full sample						
skill (literacy + numeracy)	0.0182***			0.00929		
	(0.00534)			(0.0125)		
literacy		0.0307**	0.0193		0.0941***	0.101**
		(0.0142)	(0.0171)		(0.0326)	(0.0476)
numeracy		-0.00549	-0.0343**		-0.0844***	-0.145***
		(0.0142)	(0.0164)		(0.0315)	(0.0482)
problem solving			0.0460***			0.0515
			(0.0116)			(0.0328)
N	13,865	13,865	10,803	2,517	2,517	1,573
Subsamples by educational attainment						
educ: low						
skill (literacy + numeracy)	-0.0228			-0.00369		
	(0.0214)			(0.0274)		
literacy		-0.0111	-0.118		0.00123	-0.196
		(0.0620)	(0.0950)		(0.0806)	(0.152)
numeracy		-0.0215	-0.132		-0.00676	-0.0222
		(0.0666)	(0.101)		(0.0867)	(0.163)
problem solving			0.239***			-0.00792
			(0.0747)			(0.120)
N	688	688	383	391	391	144
educ: middle						
skill (literacy + numeracy)	0.0188**			0.00986		
	(0.00855)			(0.0150)		
literacy		0.0439*	0.0396		0.0967**	0.115*
		(0.0236)	(0.0289)		(0.0410)	(0.0626)
numeracy		-0.0184	-0.0414		-0.0866**	-0.172***
		(0.0232)	(0.0274)		(0.0405)	(0.0638)
problem solving			0.0377*			0.0686
			(0.0196)			(0.0432)
N	6,215	6,215	4,847	1,436	1,436	986
educ: high						
skill (literacy + numeracy)	0.0206***			0.0280		
	(0.00657)			(0.0278)		
literacy		0.0229	0.00734		0.110*	0.157*
		(0.0168)	(0.0201)		(0.0646)	(0.0910)
numeracy		0.00611	-0.0200		-0.0732	-0.0789
		(0.0169)	(0.0195)		(0.0641)	(0.0874)
problem solving			0.0390***			0.00998
			(0.0133)			(0.0606)
N	6,953	6,953	5,565	651	651	427

Young: age: 20-35, time since acquiring highest educational attainment: 10 years or less.

Marginal effects are estimated at the mean of the covariate values in the estimation subgroup.

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: OECD-PIAAC

Table 10 presents the results for the subgroup of the age 20-35, who acquired their highest educational attainment 10 years or less ago. Regarding the employed the results for the young are

fairly similar to that obtained for the full sample which is reassuring with respect to the original estimates being biased. Skills seem to matter for the total sample, as well as for each subgroup (although the skill index is negative and insignificant for the low-educated), and problem solving skills have the strongest and most consistent effects.

At the same time the skill-training association appears to be inconsistent and ambiguous for the unemployed. The skill index is insignificant for the group of unemployed altogether, and also for each educational attainment subsample. Note that except those with a higher education degree, the effects are not only estimated imprecisely but marginal effects are relatively low, as well. This suggests that the insignificant estimates can not be entirely blamed on the small number of observations. Numeracy tends to have a negative sign, offsetting the positive effect of literacy. Overall results for the young suggest that the skill effects are not robust for the unemployed.

If better skills are associated with more training, at least for the employed, can skill differences account for part of the east west training gap? The answer looking at the PIAAC data directly seems to be no, as with entering the skill variables in the pooled training regression country effects for the CEEs virtually do not change. The reason for this is that average skills in the four CEE countries participating in PIAAC, and also for most educational attainment and age subgroups, do not differ that in the west country group. Note that this is somewhat at odds with PISA results. The latter suggests worse skills in the Czech Republic and Slovakia, especially regarding reading literacy. Moreover, Poland and Estonia improved in PISA results substantially in the past decade due to education reforms that have not affected the cohorts measured in PIAAC. Note that the IALS adult literacy survey, carried out between 1994 and 1998, also measured lower skills in the Czech Republic, Poland and also Hungary, except the young cohorts with a higher education degree (Köllő 2006). Also note that the bulk of PIAAC respondents are younger than the IALS sample, but older than the cohorts measured in PISA. In other words, the PIAAC cohorts are in the middle, implying that a linear secular trend can not account for the differences.

These apparent contradictions between PIAAC and other measures of achievement leave this question unanswered. It is possible, though not very likely, that the additional years spent in school beyond the age of 15 may explain the differences between PISA and PIAAC. A more plausible explanation is that the two surveys measure skills differently.

Nevertheless, the participants in PIAAC are not the really poor performer CEE countries in PISA (Figure 9). Taken PISA results together with the PIAAC evidence on the skill-training association implies that the role of weaker basic skills in the east west training gap can not be completely ruled out.

5 Should policies target increasing training in CEE countries? Evidence on the impact of training on employment and wages

The major question that arises from the comparison of training in CEE and old EU countries is whether lower training levels imply that training should be increased or at least encouraged in the CEE countries. The answer to this question is far from straightforward. Neither economic theory nor the empirical evidence provides unambiguous guidelines for policy. To give at least a tentative answer three aspects of the problem should be considered. First, is there an underprovision of training due to market failures in CEE countries? If yes, how large this underprovision is? Can we assume that lower levels of training mean *more* underprovision in CEE countries compared to Western and North Europe, given current policies? Second, would increasing training, either induced

or directly financed or provided by the government increase employment? In other words, is additional training effective in terms of employment? Third, is it an efficient or desirable way of spending public resources on training in order to achieve more employment? This section addresses these questions shortly.

5.1 Underprovision of training

Standard human capital theory suggests that training should be financed either entirely (in case of general training) or in part (in case of firm specific training) by the employee (Becker 1964). Since human capital investments can not be financed by credit (or for other reasons, like risk aversion, the lack of information on returns etc.) workers can be expected to under-invest in training. However, this argument is in contrast to empirical evidence that most workplace training is financed by firms. This observation can be rationalised if firms can set wages under the marginal product and labour mobility is somewhat constrained, two necessary conditions enabling firms to collect the returns of their investment. Theories of firms providing general training followed the seminal paper of Acemoglu and Pischke (1998). At the same time the empirical analysis of training focused on labour market institutions that can explain the deviation from perfectly competitive labour markets (e.g. Bassanini et al. 2007). These theories may explain the involvement of firms in the provision of training, but it is an open question to what extent these factors offset workers' underinvestment. Indirect empirical evidence suggests that company provided training is unlikely to raise training to an efficient level. Brunello and De Paola (2009) shows that training itself tends to increase the propensity for job mobility, which, together with higher labour turnover implying more underprovision, indicates that less than optimal training is provided. However, it is important to note that there is no clear and direct empirical evidence on the underprovision of training (Bassanini et al. 2007).

The next question is that *less* training in the CEE countries implies training is *further* below the optimal level here, and thus increasing training would provide higher returns. First note that as far as lower training levels could be explained by individual worker or firm characteristics, there is no reason to assume more serious underprovision of training. Empirical evidence in the previous section shows that workers' basic demographic characteristics and skills on the one hand and work content and job requirements on the other do account for a smaller part of the training gap, but are unlikely to explain it altogether.

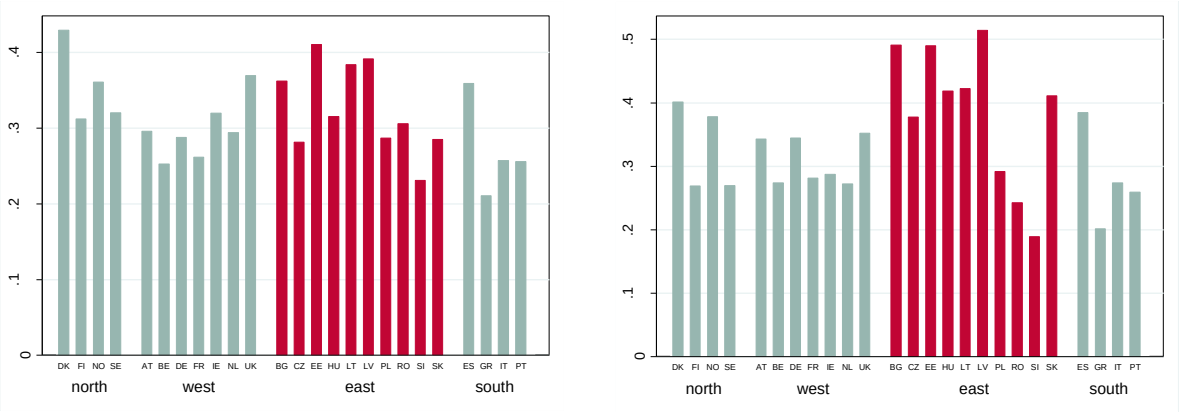
Looking for indirect evidence on underprovision of training first it is worth to consider differences in labour turnover. Figure 10 displays the share of employees with a less than 5 years tenure at their current firm[3]. In general the level of labour turnover in the CEE countries appears to be similar to that in the west (Figure 10 panel a). However, labour turnover well exceeds typical values in the old EU for the low skilled, except few countries, suggesting that providing training is less profitable for firms ceteris paribus (Figure 10 panel b). This is consistent with especially low training levels for the low skilled in CEE countries.

Another piece of evidence to look at is the role played by firms in training. The EU-LFS does not ask the respondents about the financer or provider of the training, however, the variable measuring whether the training went on entirely or mostly in or entirely or mostly outside working hours can be

[3] Measuring labour turnover by the share of new entrants to the firm in the last 1 year, or as the share of new entrants in the last 1 year excluding those who were not employed 1 year ago (i.e. measuring job mobility solely) provides similar results.

used to proxy the involvement of the firm. Figure 11 presents data for this two forms of training. In 6 of the 9 countries of the west and north groups company sponsored training is more prevalent, private training occurs more frequently only in Austria[4]. At the same time in CEE group company sponsored training is dominant only in Estonia. In the other countries the level of private and firm based training is similar at best. Comparing training levels by firm size reveals that the difference between the west and east group mainly comes from larger firms (Figure 10). These data suggest that company sponsored training is not only less common in CEE countries, but it is rare in relative terms, compared to training likely financed by the employee, as well. Though this difference does not confirm more underprovision in CEE countries directly, it is consistent with it.

Figure 10 Share of employees with shorter than 5 years tenure at the current firm

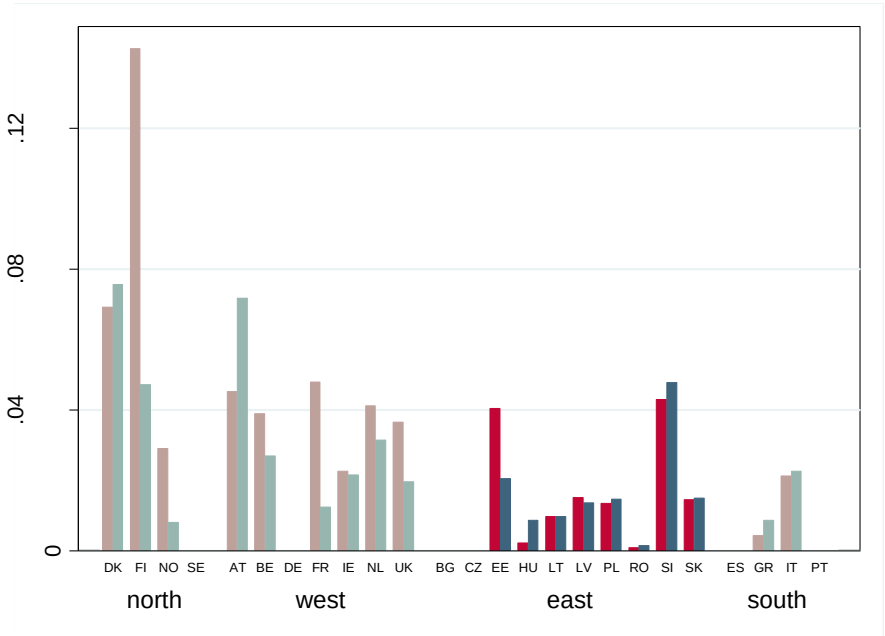


a. full sample of employed

b. educational attainment: lower secondary or lower

Source: EU-LFS, 2004-2011

Figure 11 Participation in training in and outside working hours

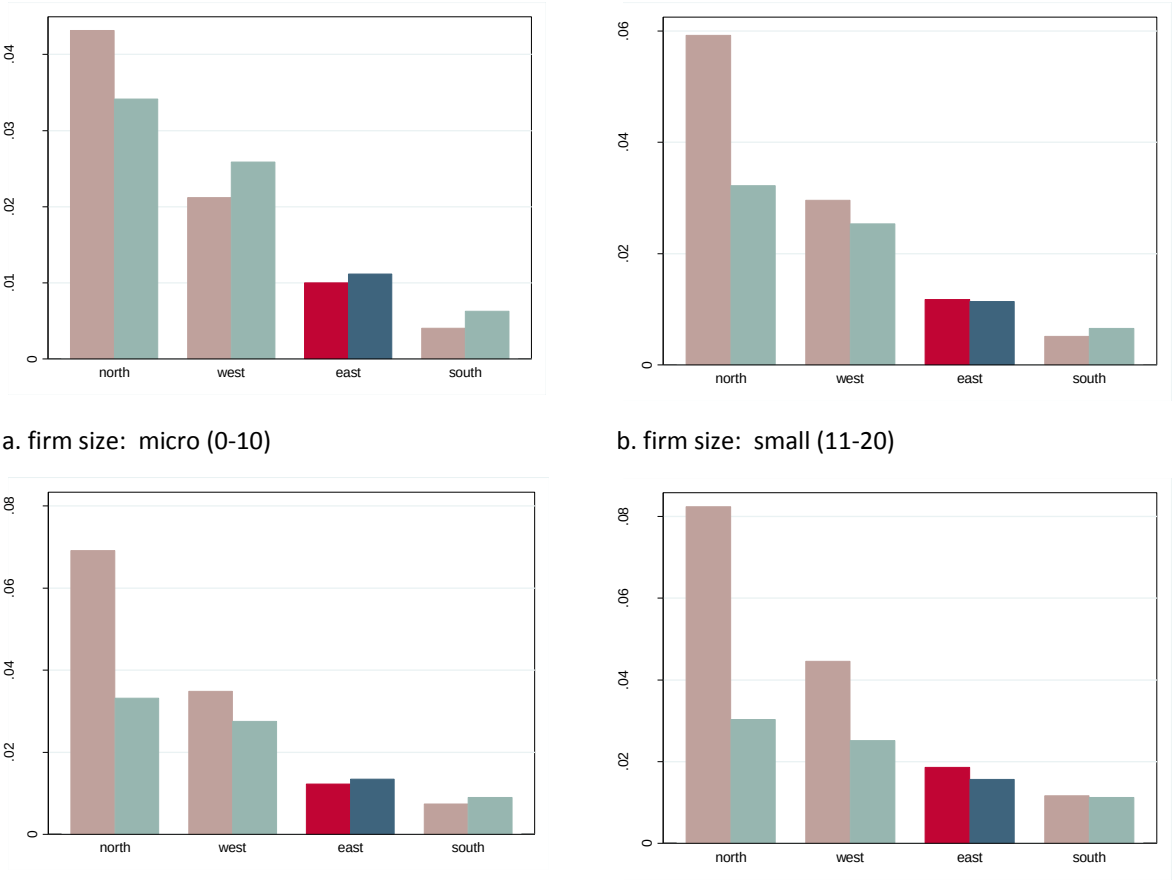


Source: EU-LFS, 2004-2011

[4] Data is not available for six countries; BG, CZ, DE, ES, PT, SE.

Overall, the underprovision of training is difficult to justify empirically. As far as one accepts the underprovision hypothesis on theoretical grounds, the indirect evidence, though it is weak, is also consistent with more underprovision in CEE countries.

Figure 12 Participation in training in and outside working hours, by firm size



a. firm size: micro (0-10)

b. firm size: small (11-20)

c. firm size: medium (21-50)

d. firm size: large (50+)

Source: EU-LFS, 2004-2011

5.2 Economic effects of training

Whether policies targeted at training, provided either by employers or the government itself are desirable hinges on the effect of training on productivity, wages and employment.

There is more or less consensus that workplace training enhance worker productivity and provides positive wage returns (Bassanini et al 2007). However, the results are not entirely unambiguous even in this respect (see the review of Asplund 2005 for a more doubtful review). Moreover, selection problems make it uncertain whether the estimated benefits of training would apply to those who were actually not participating, since firms are likely to train employees with the highest returns.

The evidence on the employment effects of training for the unemployed is much more mixed and debated. The US evidence provides little support for training of the unemployed, while the European evidence, though also mixed is somewhat more reassuring, suggesting that training can work under some conditions and can be considered as a relatively successful part of the active labour market policies toolkit (Kluve and Schmidt 2002; Kluve 2010).

Table 11 Regression estimates of employment rate, grouped data

	(1)	north (2)	west (3)	east (4)	south (5)
full sample					
lntrain_employed	0.0437***	0.00468	0.0779	0.0345***	-0.0180
	(0.0121)	(0.109)	(0.0572)	(0.0128)	(0.0355)
lntrain_unemployed	0.0116***	0.00381	0.0285	0.00579	0.00281
	(0.00427)	(0.00791)	(0.0199)	(0.00472)	(0.00787)
lntrain_inactive	0.00892***	-0.0250	-0.0324	0.0113***	-0.00281
	(0.00314)	(0.0217)	(0.0285)	(0.00379)	(0.0106)
N	1,050	168	294	420	168
R2	0.781	0.834	0.792	0.803	0.833
educ: low					
lntrain_employed	0.0280*	-0.180	-0.0696	0.0312**	-0.112
	(0.0146)	(0.214)	(0.112)	(0.0141)	(0.0795)
lntrain_unemployed	0.0126*	0.00535	0.0325	0.00896	0.00131
	(0.00683)	(0.0103)	(0.0246)	(0.00627)	(0.0118)
lntrain_inactive	0.000729	-0.00978	-0.0126	0.00184	-0.0349**
	(0.00625)	(0.0433)	(0.0389)	(0.00683)	(0.0159)
N	350	56	98	140	56
R2	0.796	0.830	0.773	0.827	0.890
educ: middle					
lntrain_employed	0.0482	0.0314	0.439*	0.0160	-0.189**
	(0.0329)	(0.0888)	(0.252)	(0.0400)	(0.0927)
lntrain_unemployed	0.0155	-0.0151**	-0.118*	0.00263	0.0400***
	(0.0143)	(0.00629)	(0.0687)	(0.0186)	(0.0143)
lntrain_inactive	-0.00443	-0.0708	-0.0481	-0.00445	-0.0181
	(0.00815)	(0.0497)	(0.0448)	(0.0114)	(0.0128)
N	350	56	98	140	56
R2	0.792	0.892	0.811	0.824	0.939
educ: high					
lntrain_employed	0.0765***	0.149	0.360**	0.0647***	0.0342
	(0.00976)	(0.141)	(0.148)	(0.0109)	(0.123)
lntrain_unemployed	0.000275	0.000332	0.00825	-0.00464	0.00575
	(0.00406)	(0.0131)	(0.0319)	(0.00529)	(0.00743)
lntrain_inactive	0.00185	-0.0450	-0.0805**	0.00466	0.00355
	(0.00240)	(0.0272)	(0.0391)	(0.00326)	(0.00412)
N	350	56	98	140	56
R2	0.794	0.822	0.848	0.799	0.894

Age groups below 30 excluded. Control variables: gender, age group, education, country fixed effect.

*Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1*

Source: EU-LFS, 2004-2011

Though the LFS data is not appropriate for the analysis of the effects of training, it is worth to look at the association between training and employment. Table 11 provides simple regression estimates of this association for grouped data. LFS participants are grouped by country, gender, educational attainment and age; each combination of these variables defines an observation for the analysis. The dependent variable is the employment rate, on the right hand side there is training for subgroups, gender, educational attainment and age dummies and country fixed effects. Age groups below 30 are excluded. The employment and training rates are measured on log scales in order to account for large differences in the level of training across countries (see above). The estimated coefficients of training can be interpreted as associations identified within countries. Country fixed effects

guarantee that cross country differences in the level of training and employment do not affect the results. Specification (1) is estimated for all countries, while in specification (2)-(5) estimation is repeated for country groups separately.

The top panel of Table 11 displays results for all education attainment. First note that more training in general is associated with higher employment rate. Second, the association is strongest for the training of the employed, and weaker for training of the unemployed and the inactive population. In other words, more workplace training for a gender-age-education group within a country tends to go together with a higher employment rate. This is reasonable given that workplace training rarely provides specific skills exclusively, and improved of maintained skills may help to stay in employment. However, it is important to note that this association does not prove any causal effect. Third, repeating the estimation for the four country groups separately reveals that the training-employment association is estimated most precisely for CEE countries; the results are significant only for this group (Table 11, top panel, specification (2)-(5)).

The next three panels present the results for estimates by educational attainment. Here the training-employment relationship is measured for gender-age groups within countries. The association is clear for the low skilled and graduate groups, but less well defined for those with an upper secondary degree. Regarding the country groups the CEE countries stand out again, with the most straightforward results.

Overall the aggregate evidence suggests a positive association between employment and workplace training, while the correlation with the training of the unemployed is less robust.

5.3 Efficiency and equity of government spending on training

There is a consensus in the training literature that the available empirical evidence can not facilitate firm policy conclusions (Bassanini et al 2007, Asplund , Woessmann and Schuetz 2006, Kluve and Schmidt 2002). Too little is known about the extent of the underprovision of workplace training, the external validity of wage and productivity effects, the effectiveness of training programmes for the unemployed and the conditions which enhance its effectiveness to call for increased government spending on training.

First, some theoretical considerations also support the cautious approach to training policies. Heckman (2000) argues that even if training for the unemployed were effective at improving the probability of employment government programmes are not necessarily justified on efficiency grounds. Usually the majority of the unemployed are low skilled, and since general skills form a prime input in learning the returns on the training of the low skilled adults are extremely low compared to the returns on human capital investments before adolescent age. Thus investing in the human capital of young children provides higher returns. Second, regarding the variety of options in active labour market policies, training is not necessarily the most efficient way of increasing employment. Based on a meta-analysis of European evidence Kluve (2010) concludes that while training programmes appear to have a modest positive effect, wage subsidies seem to be a more effective policy.

However, training programmes for the unemployed can still be justified by equity considerations and their indirect effects on the children of the unemployed – if these programmes do indeed affect employment (Heckman 2000).

6 Conclusion

The paper analysed participation in training, i.e. non-formal education of adults in CEE countries in comparison to the old EU countries. The results reveal substantially lower levels of training in the CEEs compared to Western Europe and Scandinavia. However, there is significant heteregoneity over countries; training in Slovenia, Estonia and the Czech Republic is close to western levels.

The east-west differences are present both for the employed, the unemployed and the inactive population. Basic demographic characteristics (gender, age, education, occupation) account for only a minor share of the training gap. However, educational attainment is more strongly associated with training in the CEE countries. Higher attainment goes together with more training everywhere, but this complementarity is stronger in the east group. However, even graduates are trained less compared to the west.

The evidence on the sources of cross country differences in training is mixed. Indirect evidence is consistent with more underprovision of training in CEE countries by firms, implying policies inducing more training. At the same time, skill requirements of the existing jobs (measured by skill usage) is lower in some CEE countries, and the composition of jobs in this respect does account for part of the training gap, suggesting that less training might be reasonable in less demanding jobs on the short run. However, this evidence is based only on data for two CEE countries with low training levels, who participated in PIAAC, and the usage of general skills might be a weak indicator of the benefits of training.

As the existing evidence both on the causes of low levels of training and on the effects of training policies, policy measures should be elaborated cautiously. There seems to emerge consensus in the training literature on two points. First, training policies should be focused on firms instead of the employees (e.g. Brunello and De Paola 2009). Second, policies can and should apply indirect measures more, beside or even instead of direct subsidies. As Woessmann and Schuetz put it:

“A role for the state in furthering the efficiency of training systems might lie in improving information about training opportunities, setting appropriate legal frameworks and ensuring portability of skills (Bassanini et al. 2007). State regulation could also help by monitoring the quality of training programmes and certifying skills, which could facilitate contracting between firms and employees at the individual level. However, in theory such measures can also be counter-productive, and detailed empirical evidence on the efficiency effects of state regulation of training programmes is still missing (cf. Acemoglu and Pischke 1998).” (Woessmann and Schuetz 2006, p 28.)

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