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# Do commuters suffer from job-education mismatch?

**P. Huber**[a],[b]

Cross-border commuters from EU15 countries have lower over- but higher under-education rates than non-commuters, for cross-border commuters from the NMS12 the opposite applies. Within-country commuters have lower over- but higher under-education rates than non-commuters in both regions.

**Key Words**: Job-education mismatch, Commuting
**JEL Codes**: J61, I21, R23

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# I. Introduction

The migration literature (e.g. Chiswick and Miller, 2007, OECD, 2007) shows that cross-border skill transfer is associated with increased job-education mismatch. The probability of over-educated employment is lower among natives than foreign born, indicating problems in transferring formal education across borders, and the probability of under-educated employment is higher, which also suggests difficulties in transferring informally obtained skills (Sanroma *et. al*, 2009). At the same time the over-education literature (e.g. Büchel and Batu, 2003) argues that commuting may be a means to improve job-education matches. Commuters within a country should therefore experience lower over-education and higher under-education than non-commuters. This may, however, not apply to cross-border commuters. They could have higher job-education mismatch than non-commuters if problems associated with cross-border skill transfer dominate any job-education mismatch reducing effects of commuting. This contribution, to the best of my knowledge, is the first to directly examine whether the problems of job-education mismatch often found among migrants also apply to commuters and to compare cross-border commuters to within-country and non-commuters in this respect.

# II. Data

My data are taken from the European Labour Force Survey (ELFS). They contain information on the NUTS2 region of work and residence as

well as demographic and workplace characteristics of persons in paid employment in 15 EU countries[1] (Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Hungary, Netherlands, Poland, Slovakia, Sweden, Spain, Romania) for the year 2006. Cross-border commuters are persons who work in another country than they live in, and within-country commuters work in a different NUTS 2-region than they live in, but in the same country. They are compared to persons living and working in the same NUTS 2-region (i.e. non-commuters).

Job-education mismatch is measured by the method proposed by OECD (2007). This defines required education levels (according to the international standard classification of education - ISCED) for each occupation of the international standard classification of occupations (ISCO) at the 1 digit level (table 1). A person is considered over-educated if educational attainment is higher and under-educated if educational attainment is lower than required for the occupation. Highly educated workers therefore cannot be under-educated (as no occupation requires educational attainment higher than tertiary education) and less educated workers cannot be over-educated (since no occupation requires education lower than low education).

Table 2 reports the share of under- and over-educated cross-border, internal and non-commuters stratified by some of the major correlates of the probability of over- and under-educated employment found in the literature

(see: McGuinness, 2006 for an overview). These results are highly consistent with previous research: Irrespective of commuting status over-education is higher among females than males and decreases with age, but increases with education, while under-education is lower for females than males, increases with age and reduces with education.

Also internal commuters have job-education mismatch rates comparable to those of non-commuters. 30.9% of the internal and 31.2% of the non-commuters in the EU-countries sampled are under-educated. 10.3% of the non-commuters and 9.0% of the internal commuters are over-educated. Cross–border commuters, by contrast, almost always have higher over- and lower under-education rates than internal and non-commuters. In aggregate 13.5% of them are over-educated and 22.3% are under-educated.

## III. Results

These results, however, may be due to composition effects and could also differ among groups of commuters. I therefore conduct multinomial logit analyses in which the dependent variable takes on a value of zero if a person is appropriately educated for their job, 1 if a person is over- and -1 if a person is under-educated - for all countries and separately for the NMS12 and the EU15 countries in my sample. The specification includes dummies for each (NUTS2) region of residence as well as controls for sector of employment (agriculture and mining - as base category, - manufacturing and construction as well as market and non-market services), dummy variables

for the age of respondents (aged 25-44, 45-59, 60 and more years, with 15-24 year olds as base category) and a dummy for males. Furthermore, because the ease of cross-border skill transfer also depends on language knowledge, dummies for cross-border commuting between countries that share a common language (France-Belgium and Austria-Germany) and for commuting between Slovakia and the Czech Republic are included. Since less educated workers cannot be over- and highly educated workers cannot be under-educated regressions are run separately for each education group.

The marginal effects of the estimates (table 3) confirm descriptive results: males have lower over- but higher under-education risks than females; over-education declines, while under-education increases with age (although there is some variation across skill groups), and there are more varied patterns of over- and under-education by employment sector. This may reflect different sectoral employment strategies with respect to education.

In addition in the regressions for all countries the under-education risk for low educated cross-border commuters is 3.1 percentage points higher than for non-commuters. For medium educated cross-border commuters this is 3.7 percentage points lower. Medium educated cross-border commuters also have a 5.8 percentage point higher over-education risk than non-commuters, while for highly educated cross-border commuters it is 1.6 percentage points higher.

There are, however, large differences between cross-border commuters from the EU15 and the NMS12 countries sampled: Cross-border commuters from the EU15 have lower over- and higher under-education risks than non-commuters for all education groups. For cross-border commuters from the NMS12, however, the opposite applies. They face (between 11.4 for medium to 12.8 percentage points for highly educated) higher over-education risks and (between 1.5 percentage points for less and 8.6 percentage points for medium educated) lower under-education risks than non-commuters.

Internal commuters, by contrast, have higher under- and lower over-education risks than non-commuters in both regions. The under-education risk of internal commuters from the EU15 countries sampled is between 3.8 (less educated) and 8.0 (medium educated) percentage points higher and the over-education risk is 2.6 (medium educated) to 6.7 (high educated) percentage points lower than among non-commuters. In the NMS12 countries sampled these differences amount to a between 6.0 (less educated) to 3.1 (medium educated) percentage points higher under-education risk and a 0.2 (medium educated) to 3.4 (highly educated) lower over-education risk.

## IV. Conclusions

Internal commuters therefore have lower job-education mismatch than non-commuters. This is consistent with the hypothesis that spatial mobility improves job-education matches often voiced in the over-education

literature. For cross-border commuters, however, results vary across regions. Cross-border commuters from EU15 countries have lower over- but higher under-education rates than non-commuters. This suggests low problems of cross-border skill transfer. Cross-border commuters from the NMS12 have higher over- but lower under-education rates than non-commuters and internal commuters. This implies higher problems of cross-border skill transfer.

## Literature

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[1] Although these data include all 27 EU countries, I exclude Cyprus, Denmark, Luxemburg, Malta, Denmark and the Baltic countries as they have only one NUTS2 region in the ELFS, so there are no internal commuters. For Greece, Portugal and Ireland data on either cross-border or internal commuting is missing due to differences in the questionnaires. For Slovenia and Italy high shares of non-respondents (exceeding 5%) and inconsistencies to other data sources suggest low data quality. Thus I also exclude them from the analysis.

Table 1: Required education levels (ISCED-97) for major occupation groups (ISCO-88)

| ISCO-88 Major groups | Required education level |
|---|---|
| 1: Legislators, senior officials and managers | ISCED 5,6 |
| 2: Professionals | ISCED 5,6 |
| 3: Technicians and associate professionals | ISCED 5,6 |
| 4: Clerks | ISCED 3,4 |
| 5: Service workers and shop and market sales workers | ISCED 3,4 |
| 6: Skilled agricultural and fishery workers | ISCED 3,4 |
| 7: Craft and related trades workers | ISCED 3,4 |
| 8: Plant and machine operators and assemblers | ISCED 3,4 |
| 9: Elementary occupations | ISCED 0,1,2 |
| (0: Armed forces) | Not assigned |

*Source:* OECD (2007)

Table 2: Over- and under–education rates by types of commuting and demographic characteristics (all countries, 2006, in %)

| | Under-education | | | Over-education | | |
|---|---|---|---|---|---|---|
| | Non-Commuters | Internal | Cross-border | Non-Commuters | Internal | Cross-border |
| Total | 31.2 | 30.9 | 22.3 | 10.3 | 9.0 | 13.5 |
| | Gender | | | | | |
| Female | 30.2 | 30.2 | 25.5 | 11.0 | 10.0 | 18.3 |
| Male | 32.0 | 31.4 | 21.1 | 9.7 | 8.5 | 11.5 |
| | Age | | | | | |
| 15-24 | 35.3 | 34.1 | 17.9 | 11.0 | 11.1 | 16.0 |
| 24-45 | 26.7 | 27.7 | 19.8 | 11.4 | 9.6 | 15.9 |
| 45-60 | 34.9 | 34.6 | 29.0 | 8.6 | 7.4 | 7.7 |
| 60 or more | 43.1 | 40.0 | 36.6 | 8.8 | 7.6 | 2.0 |
| | Education | | | | | |
| ISCED 2 or less | 77.3 | 82.6 | 83.0 | | | |
| ISCED 3 or 4 | 27.3 | 37.3 | 18.1 | 8.8 | 6.3 | 12.4 |
| ISCED 4 or more | | | | 21.8 | 16.5 | 23.8 |

*Source:* ELFS, own calculations.

Table 3: Regression results for probability of over-and under-educated employment (marginal effects)

| | Low Educated P(Under-Educated) | | Medium Educated P(Under-Educated) | | Medium Educated P(Over-Educated) | | High Educated P(Over-Educated) | |
|---|---|---|---|---|---|---|---|---|
| | Coefficient | SE | Coefficient | SE | Coefficient | SE | Coefficient | SE |
| | **Sending Region: All** | | | | | | | |
| Internal Commuter[3)] | 0.039*** | 0.0003 | 0.075*** | 0.0002 | -0.023*** | 0.0001 | -0.062*** | 0.0002 |
| Cross-border Commuter[3)] | 0.031*** | 0.0016 | -0.037*** | 0.0009 | 0.058*** | 0.0007 | 0.016*** | 0.0012 |
| Common Language | 0.126*** | 0.0027 | 0.052*** | 0.0026 | -0.051*** | 0.0007 | -0.113*** | 0.0017 |
| Slovak-Czech | 0.031*** | 0.0062 | -0.133*** | 0.0018 | 0.009*** | 0.0012 | 0.132*** | 0.0076 |
| Male | 0.060*** | 0.0002 | 0.018*** | 0.0001 | -0.004*** | 0.0001 | -0.052*** | 0.0001 |
| Age 25-44[2)] | -0.021*** | 0.0002 | 0.120*** | 0.0002 | -0.019*** | 0.0001 | -0.160*** | 0.0003 |
| Age 45-59[2)] | -0.006*** | 0.0002 | 0.171*** | 0.0002 | -0.013*** | 0.0001 | -0.162*** | 0.0002 |
| Age 60 or more[2)] | 0.013*** | 0.0003 | 0.208*** | 0.0004 | 0.010*** | 0.0002 | -0.129*** | 0.0002 |
| Manufacturing/Construction [1)] | -0.020*** | 0.0003 | 0.131*** | 0.0003 | -0.026*** | 0.0001 | -0.112*** | 0.0002 |
| Market Services [1)] | -0.074*** | 0.0003 | 0.252*** | 0.0003 | -0.014*** | 0.0001 | -0.149*** | 0.0002 |
| Non-Market Services [1)] | -0.200*** | 0.0004 | 0.352*** | 0.0003 | 0.002*** | 0.0001 | -0.302*** | 0.0003 |
| | **Sending Region: EU15** | | | | | | | |
| Internal Commuter[3)] | 0.038*** | 0.0003 | 0.080*** | 0.0002 | -0.026*** | 0.0001 | -0.067*** | 0.0002 |
| Cross-border Commuter[3)] | 0.057*** | 0.0018 | 0.053*** | 0.0015 | -0.017*** | 0.0008 | -0.008*** | 0.0013 |
| Common Language | 0.112*** | 0.0032 | -0.037*** | 0.0024 | -0.012*** | 0.0016 | -0.113*** | 0.0021 |
| Male | 0.072*** | 0.0002 | 0.051*** | 0.0001 | 0.004*** | 0.0001 | -0.060*** | 0.0002 |
| Age 25-44[2)] | -0.021*** | 0.0002 | 0.136*** | 0.0002 | -0.021*** | 0.0001 | -0.165*** | 0.0003 |
| Age 45-59[2)] | -0.006*** | 0.0002 | 0.187*** | 0.0003 | -0.017*** | 0.0001 | -0.169*** | 0.0002 |
| Age 60 or more[2)] | -0.018*** | 0.0004 | 0.212*** | 0.0004 | 0.007*** | 0.0002 | -0.139*** | 0.0002 |
| Manufacturing/Construction[1)] | 0.024*** | 0.0003 | 0.107*** | 0.0004 | -0.033*** | 0.0001 | -0.123*** | 0.0002 |
| Market Services[1)] | -0.027*** | 0.0003 | 0.249*** | 0.0003 | -0.014*** | 0.0001 | -0.172*** | 0.0003 |
| Non-Market Services[1)] | -0.129*** | 0.0003 | 0.310*** | 0.0004 | -0.008*** | 0.0002 | -0.326*** | 0.0004 |
| | **Sending Region: NMS12** | | | | | | | |
| Internal Commuter[3)] | 0.060*** | 0.0012 | 0.031*** | 0.0006 | -0.002*** | 0.0004 | -0.034*** | 0.0005 |
| Cross-border Commuter[3)] | -0.015*** | 0.0035 | -0.086*** | 0.0008 | 0.114*** | 0.0012 | 0.128*** | 0.0032 |
| Slovak-Czech | 0.071*** | 0.0051 | -0.032*** | 0.0023 | -0.021*** | 0.0008 | -0.016*** | 0.0029 |
| Male | 0.009*** | 0.0004 | -0.062*** | 0.0002 | -0.016*** | 0.0001 | -0.012*** | 0.0002 |
| Age 25-44[2)] | -0.019*** | 0.0007 | 0.072*** | 0.0003 | -0.014*** | 0.0002 | -0.131*** | 0.0006 |
| Age 45-59[2)] | -0.005*** | 0.0006 | 0.112*** | 0.0004 | -0.074*** | 0.0002 | -0.123*** | 0.0003 |
| Age 60 or more[2)] | 0.103*** | 0.0006 | 0.194*** | 0.0009 | 0.017*** | 0.0004 | -0.077*** | 0.0002 |
| Manufacturing/Construction[1)] | -0.099*** | 0.0007 | 0.139*** | 0.0004 | -0.011*** | 0.0002 | -0.070*** | 0.0002 |
| Market Services[1)] | -0.156*** | 0.0008 | 0.200*** | 0.0003 | -0.023*** | 0.0001 | -0.054*** | 0.0003 |
| Non-Market Services[1)] | -0.467*** | 0.0009 | 0.448*** | 0.0004 | 0.031*** | 0.0002 | -0.193*** | 0.0004 |

*Source:* ELFS

*Notes:* Table reports marginal effects of multinomial logit regressions on the probability of over- and under-educated employment. Results for base category (appropriate employment) and for sending (NUTS2) region fixed effects are not reported,
1) base category=Agriculture and mining.
2) base category=aged 15-24,
3) base category=non-commuters.
*** significant at the 1% level.
SE=Standard Error.

## Appendix A:

Table A1: Regression results for probability of over-and under-educated employment (coefficients)

| | Low Educated P(Under-Educated) | | | Medium Educated P(Under-Educated) | | | Medium Educated P(Over-Educated) | | | High Educated P(Over-Educated) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Coefficient | | SE | Coefficient | | SE | Coefficient | | SE | Coefficient | | SE |
| | **Sending Region: All** | | | | | | | | | | | |
| Internal Commuter[3)] | 0.253 | *** | 0.002 | 0.338 | *** | 0.001 | -0.225 | *** | 0.002 | -0.467 | *** | 0.001 |
| Cross-border Commuter[3)] | 0.201 | *** | 0.011 | -0.118 | *** | 0.005 | 0.559 | *** | 0.006 | 0.106 | *** | 0.008 |
| Common Language | 1.069 | *** | 0.035 | 0.183 | *** | 0.012 | -0.918 | *** | 0.021 | -1.092 | *** | 0.026 |
| Slovak-Czech | 0.197 | *** | 0.042 | -0.885 | *** | 0.016 | -0.067 | *** | 0.014 | 0.719 | *** | 0.035 |
| Male | 0.358 | *** | 0.001 | 0.090 | *** | 0.001 | -0.027 | *** | 0.001 | -0.345 | *** | 0.001 |
| Age 25-44[2)] | -0.128 | *** | 0.001 | 0.619 | *** | 0.001 | -0.074 | *** | 0.001 | -1.003 | *** | 0.002 |
| Age 45-59[2)] | -0.037 | *** | 0.001 | 0.844 | *** | 0.001 | 0.086 | *** | 0.001 | -1.255 | *** | 0.002 |
| Age 60 or more[2)] | 0.080 | *** | 0.002 | 0.999 | *** | 0.002 | 0.517 | *** | 0.002 | -1.250 | *** | 0.002 |
| Manufacturing/Construction[1)] | -0.119 | *** | 0.002 | 0.616 | *** | 0.001 | -0.172 | *** | 0.002 | -0.909 | *** | 0.002 |
| Market Services[1)] | -0.432 | *** | 0.002 | 1.268 | *** | 0.001 | 0.216 | *** | 0.001 | -1.109 | *** | 0.002 |
| Non-Market Services[1)] | -1.042 | *** | 0.002 | 1.709 | *** | 0.001 | 0.682 | *** | 0.001 | -2.077 | *** | 0.002 |
| Share correctly classified | 0.780 | | | 0.647 | | | | | | 0.794 | | |
| Log-Likelihood | -18461155 | | | -69527091 | | | | | | -21408693 | | |
| Nobs | 36591196 | | | 86194303 | | | | | | 45985034 | | |
| | **Sending Region: EU15** | | | | | | | | | | | |
| Internal Commuter[3)] | 0.245 | *** | 0.002 | 0.332 | *** | 0.001 | -0.266 | *** | 0.002 | -0.464 | *** | 0.001 |
| Cross-border Commuter[3)] | 0.384 | *** | 0.014 | 0.226 | *** | 0.007 | -0.159 | *** | 0.012 | -0.048 | *** | 0.008 |
| Common Language | 0.897 | *** | 0.036 | -0.212 | *** | 0.013 | -0.228 | *** | 0.024 | -0.944 | *** | 0.026 |
| Male | 0.426 | *** | 0.001 | 0.256 | *** | 0.001 | 0.083 | *** | 0.001 | -0.371 | *** | 0.001 |
| Age 25-44[2)] | -0.128 | *** | 0.001 | 0.649 | *** | 0.001 | -0.059 | *** | 0.001 | -0.968 | *** | 0.002 |
| Age 45-59[2)] | -0.033 | *** | 0.001 | 0.867 | *** | 0.001 | 0.086 | *** | 0.001 | -1.198 | *** | 0.002 |
| Age 60 or more[2)] | -0.105 | *** | 0.002 | 0.982 | *** | 0.002 | 0.512 | *** | 0.002 | -1.217 | *** | 0.003 |
| Manufacturing/Construction[1)] | 0.145 | *** | 0.002 | 0.453 | *** | 0.002 | -0.312 | *** | 0.002 | -0.916 | *** | 0.002 |
| Market Services[1)] | -0.162 | *** | 0.002 | 1.194 | *** | 0.002 | 0.235 | *** | 0.002 | -1.185 | *** | 0.002 |
| Non-Market Services[1)] | -0.704 | *** | 0.002 | 1.445 | *** | 0.002 | 0.475 | *** | 0.002 | -2.101 | *** | 0.002 |
| Share correctly classified | 0.768 | | | 0.611 | | | | | | 0.794 | | |
| Log-Likelihood | -15959980 | | | -51203852 | | | | | | -18976795 | | |
| Nobs | 31497241 | | | 60727781 | | | | | | 38832295 | | |
| | **Sending Region: NMS12** | | | | | | | | | | | |
| Internal Commuter[3)] | 0.427 | *** | 0.010 | 0.203 | *** | 0.004 | -0.074 | *** | 0.006 | -0.472 | *** | 0.009 |
| Cross-border Commuter[3)] | -0.089 | *** | 0.020 | -0.599 | *** | 0.009 | 0.948 | *** | 0.008 | 1.004 | *** | 0.018 |
| Slovak-Czech | 0.521 | *** | 0.045 | -0.260 | *** | 0.018 | -0.386 | *** | 0.015 | -0.204 | *** | 0.040 |
| Male | 0.056 | *** | 0.002 | -0.444 | *** | 0.001 | -0.313 | *** | 0.002 | -0.136 | *** | 0.003 |
| Age 25-44[2)] | -0.115 | *** | 0.004 | 0.484 | *** | 0.002 | -0.103 | *** | 0.003 | -1.304 | *** | 0.005 |
| Age 45-59[2)] | -0.029 | *** | 0.004 | 0.708 | *** | 0.002 | 0.083 | *** | 0.003 | -1.754 | *** | 0.005 |
| Age 60 or more[2)] | 0.749 | *** | 0.005 | 1.072 | *** | 0.004 | 0.536 | *** | 0.005 | -1.495 | *** | 0.007 |
| Manufacturing/Construction[1)] | -0.558 | *** | 0.004 | 0.844 | *** | 0.002 | 0.027 | *** | 0.002 | -1.069 | *** | 0.005 |
| Market Services[1)] | -0.829 | *** | 0.004 | 1.188 | *** | 0.002 | -0.055 | *** | 0.002 | -0.687 | *** | 0.004 |
| Non-Market Services[1)] | -2.154 | *** | 0.004 | 2.398 | *** | 0.002 | 1.280 | *** | 0.002 | -2.138 | *** | 0.004 |
| Share correctly classified | 0.782 | | | 0.743 | | | | | | 0.875 | | |
| Log-Likelihood | -2397166 | | | -17815005 | | | | | | -2393532.8 | | |
| Nobs | 5093955 | | | 25466522 | | | | | | 7152739 | | |

*Source:* EU-LFS

*Notes*: Table reports coefficients of multinomial logit regressions on the probability of over- and under-educated employment. Results for base category (appropriate employment) and for sending (NUTS2) region fixed effects are not reported.
1) base category=Agriculture and mining.
2) base category=aged 15-24.
3) base category=non-commuters.
*** significant at the 1%, level.
SE=Standard Error,
Nobs=Number of Observations.