

Evaluating the Effectiveness of Policy Measures to Support Spatial Mobility in Slovakia: The Contribution for Commuting to Work and the Contribution for Resettlement¹

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Abstract

This paper evaluates the impact of two active labour market measures providing financial contributions to cover costs related to spatial mobility of the unemployed. One supports daily commuting and the other resettlement. For the purpose of evaluation, administrative data from the obligatory social insurance database and the official register of the unemployed were linked. Three indicators of outcome are identified, commuting time, the income of individuals and employment after the end of support. The richness of the data allowed us to use propensity score matching in order to rule out possible selectivity issues. After achieving satisfactory balance, we have yielded comprehensive and robust, significant positive effects of both of the measures under evaluation. The estimated impact differs regionally and is based on the individual characteristics of the beneficiaries.

Keywords: *spatial mobility, propensity score matching, counterfactual impact evaluation, active labour market policy*

JEL Classification: J61, J68, D04, C21

Introduction

One of the main tasks of active labour market policies is to promote the spatial mobility of job seekers. Increasing spatial mobility presents a relatively less costly form of matching existing vacancies with available, suitable job applicants.

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Financial contributions to support commuting and relocation are less expensive in comparison to investment into re-skilling in further education or training. A sufficient number of skilled job applicants and vacancies in neighbouring regions is a necessary precondition to gain positive effects out of policy measures supporting spatial mobility. Financial contributions for commuting and resettlement assume that barriers to mobility are mainly related to financial costs associated with travelling and relocation.² Alternative types of barriers could be, for example, low motivation of job seekers to commute, or the absence of necessary infrastructure. In Slovakia, there are good preconditions for measures encouraging spatial mobility of job seekers to bring positive effects. The condition of a sufficient number of relatively qualified job seekers is met. Also, the infrastructure necessary for commuting and relocation is present. Travelling times between regional centres are relatively low in a relatively densely populated country, with dominantly rural settlements.

Slovak context can also be considered specific because of a higher level of long-term unemployment, which is distributed unequally among the Slovak regions. Differences in regional labour market performances are one of the highest in the EU, with the eastern part of the country lagging behind the west. Employability of the long-term unemployed is very poor. This is underlined by rather inefficient active labour market policies, focused more on the short-term unemployed.³ In such a situation, Slovak economy (especially in the west) often suffers from a lack of workforce when the overall unemployment rate in the country drops only slightly under ten percent. Such a setting may stimulate a potential labour market impact of measures supporting spatial mobility. In the following text, we first provide an overview of empirical studies evaluating public interventions to support spatial mobility. The second section describes the rules for the delivery of financial contributions and related data used in the analysis. The third section describes the empirical strategy applied in the analysis. Our results are provided in the fourth section. The fifth, and final part of the text, concludes and provides a short discussion. Results of the sensitivity analysis can be found in the annex.

1. Existing Empirical Studies on Spatial Mobility

The existence of the infrastructure may not be a matter of course. This is evidenced by empirical studies that seek to confirm or falsify the so-called hypothesis of spatial mismatch between supply and demand on the labour market in US

² An example study documenting such financial barriers in South Africa can be found in Ardington, Case and Hosegood (2009).

³ For more impact evaluation studies on Slovak ALMP see: Bořík and Caban (2013), Mýtina-Kureková, Salner and Farenzenová (2013), Štefánik, et al. (2014a), Štefánik, (2014b), Štefánik (2015a, b).

cities. The spatial mismatch hypothesis was first formulated by John Kain in 1968 (Kain, 1968). According to this hypothesis, urbanisation of large US cities and the creation of large suburban districts attracting the American middle class, barricaded the low-income groups of the population within the city centres. The fact that these urbanisation processes were not always accompanied by the appropriate development of public transport resulted in situations in which particular groups of the population were limited only to the jobs created within relatively narrow city centres. In the second half of the eighties, the spatial mismatch hypothesis, combined with analysis of the existing barriers to spatial mobility, deserved the attention of several empirical studies. Most of them point to the effectiveness of the instruments supporting spatial mobility to improve the performance of low-income groups on the labour market (Ihlanfeldt and Sjoquist, 1998).

Out of this stream of literature, a theoretical model grasping job search and migration emerged with the Mortensen (1986) model, later elaborated by Rogers (1997). Here the duration of unemployment spells is explained by the access to employment, also considering commuting time.

When adopting a more specific focus on impact evaluation, US studies on measures supporting spatial mobility mainly identify measures of public policies that are not, in the classic sense, measures of active labour market programmes (ALMP), such as support for public transport and the like. One of the rare exemptions is the study of Briggs and Kuhn (2008) on the Kentucky Relocation Assistance Program. The authors of this study find a relatively strong positive effect of the Relocation programme, both on earnings, and employment of participants.

Studies, specifically focusing on the effect of active labour market policies on spatial mobility, can be found in Sweden. A series of studies⁴ on the effects of active labour market policy measures on the mobility of individuals appeared here during the nineties. Practically all of these studies evaluated measures using a macroeconomic approach employing aggregated data for regions of Sweden. For example, Westerlund (1998) used data on the number of migrants, the unemployed and vacancies aggregated at the level of Swedish regions, to evaluate the effects of mobility measures. The measures under consideration were comparable to the one we examine in the framework of our analysis, basically financial benefits supporting the relocation of the unemployed. Westerlund concludes that migration among regions in Sweden is mainly determined by the situation on the local labour market, namely the number of unemployed and vacancies in the region. Therefore, resettlement allowances for the unemployed, and their intensity have only a marginal effect on individual decisions about moving between regions of Sweden.⁵

⁴ For a review of studies, see Calmfors, Forslund and Hemstrom (2015), p. 34.

Out of more recent, as well as methodologically more comparable studies, Rodríguez-Planas and Benus (2010) apply propensity score matching on four types of ALMP. They find a positive impact of a broadly defined set of “employment and relocation services” on income as well as employment of participants.

The most recent empirical study, using a microeconomic approach to evaluate the impact of a comparable active labour market policy measure, applying a counterfactual technique is Caliendo, Kunn and Mahlstedt (2015). Caliendo and the co-authors evaluate the Relocation Assistance for the Unemployed in Germany. This programme covers financial contributions for resettlement. The authors estimate the treatment effects of the programme using the instrumental variable approach. They report a substantial income and a relatively lower employment effect of the programme when accounting for the job stability of the newly acquired job.

Both of the recent studies (Rodríguez-Planas and Benus, 2010; Caliendo, Kunn and Mahlstedt, 2015) present evidence consistent with our findings. Moreover, they point at the cost-benefit attractiveness of spatial mobility support measures, in comparison to other ALMPs.

Empirical studies using contrafactual impact evaluation techniques on financial contributions supporting spatial mobility of job seekers are also rather rare from an international perspective. Therefore, this analysis has the ambition to be a contribution to this stream of literature.

2. Description of the Measures under Evaluation and Related Data

Two separate measures are being evaluated in this paper. Both are financial contributions for individuals with a recent history of registered unemployment. In the case of the measure to support commuting, a financial contribution is paid to cover costs related to commuting to work on a monthly basis, for a maximum of twelve months.

The purpose of the second measure is to support relocation. Here a higher financial contribution is transferred as a one-time payment to cover the costs related to relocating to the location of a new job. Both measures evaluated are provided under the Employment Services Act (Employment Services Act No. 5/2004 Coll.). The evaluation period was from March 2009 to April 2013. Within this period, one new law amendment came into force, by which the implementations

⁵ Another study from Sweden showed that participation in training oriented active labour market programmes is related to intensified post-programme spatial mobility. Moreover, commuting in Sweden plays a more important role in overall spatial mobility than resettlement (Lingren and Westerlund, 2003).

rules changed in the case of the contribution for commuting to work. The change introduced the obligation to document commuting related travel costs. All other conditions remained unchanged. The implementation rules of the Contribution for resettlement remained the same during the whole evaluation period (from March 2009 to April 2013).

Contribution for Commuting

In the evaluation period, *Contribution for commuting* to work was intended to cover travel expenses related to commuting from the employee's place of residence (or temporary residence) to the place of employment (specified in the contract) and back. Alternatively, as the payment of travel expenses for commuting from the place of residence (or the place of temporary residence) of a citizen to the place of performance of self-employment and back. The contribution was provided monthly, up to a maximum of 135 EUR per month for a maximum of 12 months. Recipients had to be previously registered as job seekers. Their previous registered unemployment had to be at least three months long. Eligible individuals could apply for the contribution within six months after entering the job.

Contribution for Resettlement

Contribution for resettlement is a one-time refund of documented expenses related to the resettling of job seekers from their place of residence in relation to beginning a job. The maximum amount of the contribution was 1,327.76 EUR. The target of the relocation must be at least 50 kilometres away from the original place of residence. Recipients had to be formerly registered as job seekers, not more than six months after leaving the database, and their last period of unemployment had to be at least three months long.

By their character, both measures aim to support labour mobility, thus improving the match between supply and demand on the labour market. The support is paid only when job seekers find employment through the services of the Centre for Labour, Social Affairs and Family (COLSAF), or individually. To what extent job seekers calculate the opportunity of receiving contributions when accepting a new job remains questionable. COLSAF case workers suggest that eligible job seekers apply for the contributions if a suitable job opening is available in a different region.

Between 2007 and 2014, approximately 20.5 million EUR was allocated under the *Contribution for commuting* to work. The allowance was provided for more than 119 thousand beneficiaries. Additionally, 325 thousand EUR was allocated under the *Contribution for resettlement*; here the allowance was provided to only 367 beneficiaries.

Table 1
Allocation of Resources to Evaluated Measures by Year

Year	Contribution for commuting to work		Contribution for resettlement	
	The total contribution in EUR	Number of supported job seekers in the monitored period/ number of approved applications	The total contribution in EUR	Number of supported job seekers in the monitored period
2007	1 400 792.84	11 362	—*	—
2008	1 439 002.16	8 766	2 726.32	6
2009	4 149 691.89	16 052	30 745.94	41
2010	8 310 188.82	28 909	38 544.22	47
2011	5 152 572.03	17 778	61 591.95	61
2012	4 9183 69.69	16 136	63 091.27	66
2013	3 917 565.11	12 776	62 531.19	66
2014	1 548 210.15	7 300	66 193.34	80
Total	20 452 248.00	119 079	325 424.23	367

Note: * Contribution for resettlement was not in practice in 2007, it was launched in 2008.

Source: Information provided by the Office of Labour, Social Affairs and Family.

2.1. Database, Group of Participants and the Evaluation Period

To evaluate the effectiveness of the *Contribution for commuting* and *Contribution for resettlement*, we used individual registers of unemployed, administrated by the COLSAF linked to the Social Insurance Agency database. We evaluated contributions that were provided from 1. 3. 2009 to 30. 4. 2013. During this period, the eligibility criteria, as well as the rules for providing support, remained practically the same. The only change was introduced in 2011, when beneficiaries of the Contribution for commuting to work became obliged to provide travel documents for the travel costs to be reimbursed. For this reason, we evaluate the Contribution for commuting in two separate periods:

- from 1. 3. 2009 to 31. 12. 2010 – documenting of travelling costs was not obligatory;
- from 1. 1. 2011 to 30. 4. 2013 – documenting of travelling costs was obligatory.

During the whole analysed period, *Contribution for commuting* to work was provided 81,961 times, and *Contribution for resettlement* was provided 264 times. In the case that the eligibility conditions are met, the *Contribution to commuting* may be provided again after two years. Because of repeated provisions, the *Contribution for commuting* was, during the evaluation period, provided to 79,746 job seekers, while the total number of contributions was higher.

For the sake of the analysis we have excluded participants who received the contribution repeatedly. Furthermore, we have excluded observations where the information from the registers was not consistent.⁶ After this step, we were left with 44,759 beneficiaries of the *Contribution for commuting* to work and 241

beneficiaries of the *Contribution for resettlement*. Consequently, outliers on outcome indicators (income and commuting time) were dropped,⁷ cutting off over 5% of the top income observations.⁸ Finally, in the case of the *Contribution for commuting* to work, we have dropped the observation with missing information on the commuting time.⁹ In the final step, we have made a substantial cut, remaining with a final number of 13,344 participants in the *Contribution for commuting* and 217 participants in *Contribution for resettlement*.

3. Estimation Strategy

In this analysis, we rely on the Rubin causal model in a situation when we are comparing outcomes of individuals receiving support and missing the information about the outcome individuals' would experience if they would not participate in the measure. The missing information is imputed after we balance on observable characteristics of beneficiaries and non-beneficiaries. Along with Rosenbaum and Rubin, we assume that treatment assignment is strongly ignorable after we balance on the observed covariates X . Moreover, we assume that the propensity score, based on the propensity to participate in the measure, presents the best possible balancing score (Rosenbaum & Rubin, 1983). The estimation of the treatment effect is thus based on a simple comparison of outcomes under the so-called unconfoundedness assumption:

⁶ A recent migration in the COLSAF database had affected the data quality with a high proportion of contradictory information. We have performed an ad-hoc logical consistency analysis and excluded observations with inconsistent data. Inconsistency was mostly related to violating the conditions of provision of the contributions: programme duration was longer than allowed by the law, the previous unemployment period was not long enough, etc. When analysing these "drop outs" we have found no pattern which could eventually bias our results. Therefore, we assume that the information loss due to the migration was distributed randomly in the database.

⁷ The rule for the removal of these observations was that income before and after registered unemployment at the COLSAF office cannot exceed ten times the average wage in the economy in 2011 (we removed the observation when income was more than 7,860 EUR). The income distribution of participants included a high proportion of high income values. By applying a rather weak rule of dealing with outliers we have cut a relatively high share of the observations (approximately 6%). Our results are not sensitive if a stricter rule is applied on the income of participants, but in the main analysis we have decided to apply the weak rule. Also, we have removed observations, where the values of income were less than 0 EUR.

⁸ After cleaning, we are left with 42,081 participations in Contribution for commuting to work and 217 participations in Contribution for resettlement.

⁹ Here we are dropping a dominant part of the observations of participants in order to keep one of the outcome indicators relevant for the Contribution for commuting. Under the sensitivity analysis in the annexe, we report results with missing values on commuting time imputed with median values, in order not to lose observations. The main findings also hold after the imputation. The consequent sensitivity based on the Rosenbaum bounds (Rosenbaum, 2002) gives even more favourable results on the income and employment effect in comparison to the main (reported) estimations.

$$Y_{(i)}(T) \perp D_i \mid X_i \quad (1)$$

for all T and $D \in [0, 1]$ and $I \in N$

where T represents the outcome assignment and D the assignment to the treatment. The assumption claims that after we balance on observable characteristics (X) between beneficiaries and non-beneficiaries the mean outcome of non-participants could be used in contrast to the mean outcome of participants in the calculation of the average treatment effect. The unconfoundedness assumption is further complemented by the assumption of common support claiming that there is an overlap in the observable characteristics between beneficiaries and non-beneficiaries. As shown later, the common support assumption is fulfilled in our case, and there are also good reasons to believe that the unconfoundedness assumption is fulfilled as well.

As we are using observational data, in balancing on observable characteristics we need to rely on an ex post balancing technique. In our case, we rely on the propensity score matching routine. It has been developed for the purpose of balancing the individual characteristics of participants (job seekers who participated in the measure) with non-participants (job seekers, who did not participate in the measure) (Dehija and Wahba, 2002). A probit model was used to calculate the propensity score based on the probability of participation in the measure. The dependent variable (I) "receipt of the contribution", which entered into the model, had two possible values: 1 – job seekers received the contribution 0 – job seekers did not receive the contribution. The probability of receipt was estimated depending on observed characteristics (X) of job seekers.

$$\Pr(I = 1 \mid X) = \beta_0 + \beta_1 X + \mu \quad (2)$$

Individual characteristics (X) entering the model were:

- Age
- Local Office of Labour, Social Affairs and Family (Regional specific dummies)
- Educational attainment (level)
- Educational attainment (field)
- Nationality
- Citizenship
- Family status
- Children in household
- Date of inclusion into the register of applicants
- The number of registers as unemployed before registration during which received the measure
- Number of days registered as unemployed, before registration during which they received the measure
- Registered in the past
- Employed/unemployed before registration
- Last job (occupation – ISCO)
- Last job (sector – NACE)
- Last job (self-employed)
- Duration of last job
- Income from last job
- Minutes commuting to last job
- Years of experience in the labour market
- Self-perceived employability barriers – long-term unemployed, graduate or above 50 years old
- Computer skills
- Foreign language skills
- Driving License
- Participation in other measures of active labour market policy

The final list of covariates (X) covers all the information provided by individuals when registering as job seekers in the COLSAF database. This information was further complemented by the information about pre-treatment employment/unemployment history and income. Dummies for regional COLSAF offices should grasp both the differences in regional labour market performance, as well as regional differences in the patterns of ALMP provision. No information on the level of case workers was available in the data.

Subsequently, after estimating the probability of participation in the measure (PS variable), we can perform the ex post selection of the control group. The control group was selected using the nearest neighbour method, by selecting the 20 most similar observations under the condition that the distance between a participant and his control is maximum 0.0001 (in the units of the PS variable). Each control was considered in the consequent analysis, using weights calculated based on the final number of suitable matches. Replacing was allowed, one member of the control group could be used as a twin for more than one participant.

To evaluate the impact of the contributions, we used three variables of outcome (outcome indicators):

- the travel time from place of residence to location of employment,
- income during the first month in the new job,
- employment rate after the support ends (12, 15 and 18 months after the start of the support).

We have calculated the travel time based on the matrix of travelling times between Slovak settlements.¹⁰

3.1. Achieved Balance between the Supported and Control Group

Females are overrepresented among the beneficiaries of the *Contribution for commuting*. The share of beneficiaries is decreasing with age; which is in line with the structure of eligible individuals. The dominant part of recipients of the *Contribution for commuting* have a secondary level of education (70.60% of the participants). Individuals with a university education are overrepresented among the participants (15.1% vs 8.34%), which has also resulted in a higher average income of participants during employment before participation in the measure. Commuting time to the job, before unemployment preceding the support, was also higher for participants (40.51 minutes in the case of participants versus 33.73 minutes in the case of non-participants). Higher education could imply better future labour market outcomes of participants. Higher commuting time before the support could speak of a higher propensity to commute to work. Balancing

¹⁰ Originally developed by Ludmila Jánošíkova, and published at: <http://frdsa.fri.uniza.sk/~janosik/>.

on these characteristics should at least partially assure for compensating these differences in the consequent analysis.

Table 2
Descriptive Statistics on Selected Characteristics of Participants and Control Group (contribution for commuting)¹¹

	Participants of measure (%)	The control group (weighted) (%)	The whole database of eligible (%)
Men	45.17	45.00	54.05
Ages 16 – 19	1.53	1.70	2.70
Ages 20 – 29	29.90	29.11	31.09
Ages 30 – 39	26.77	27.65	24.77
Ages 40 – 49	24.50	24.68	22.25
Ages 50 – 59	17.12	16.54	18.71
Ages 60 – 61	0.17	0.30	0.45
Without education	0.03	0.03	0.09
Elementary education	1.84	1.77	4.04
Secondary education	70.60	70.76	72.92
University	15.11	15.17	8.34
Length of unemployment preceding the support (min)	290.35	287.77	276.27
Income before unemployment preceding the support (EUR)	589.25	589.27	502.54
Minutes spent on commuting to work before unemployment preceding the support (min)	40.51	40.61	33.73

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

As shown in Table 2, matching using the propensity score technique significantly increased the balance between participants and the control group. The improvement in the balance between the control group and participants as a result of matching for all variables included in the propensity score is displayed in the following graph.¹²

In the case of the *Contribution for resettlement*, bias improvement is lower because of a smaller number of beneficiaries. A lower number of observations resulted in a more scattered balance improvement, as well as into a reduced number of covariates included in the calculation of the propensity score.¹³

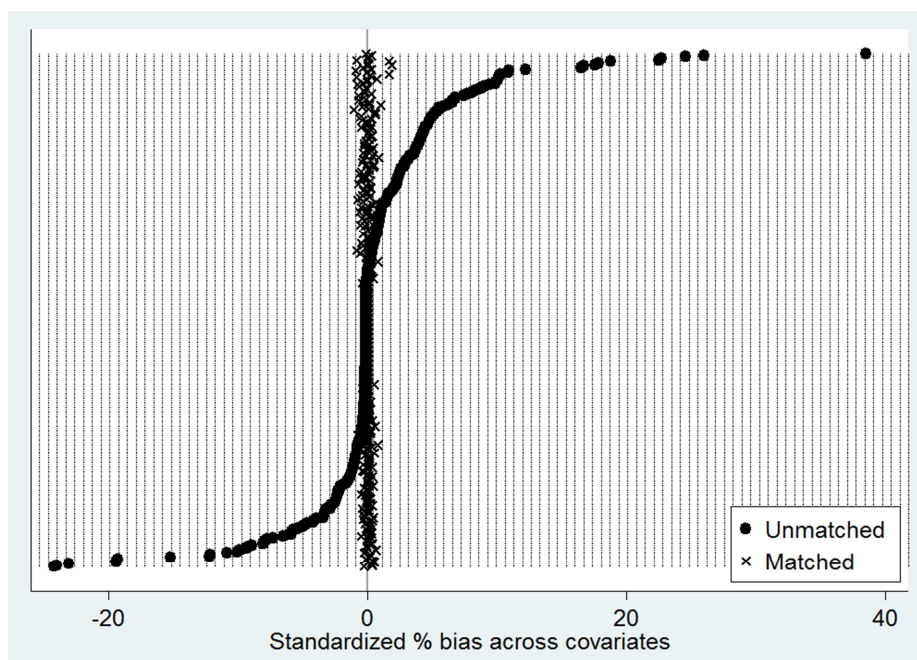
In the case of the *Contribution for resettlement*, overrepresentation of tertiary educated and females among participants has even deepened. Individuals under 30 years of age took the dominant part of the support provided under this measure.

¹¹ More detailed descriptive statistics of participants and the group of eligible can be found at: http://ekonom.sav.sk/uploads/work/descriptive_statistics_53.mht.

¹² Detailed results of the PSV estimation can be found at: <http://ekonom.sav.sk/uploads/work/elektronicka-priloha.txt>.

¹³ This is simply because this measure was not applied in some of the COLSAF regional offices as well as for job seekers with all the identified fields of education. Related dummies were therefore not used in the estimation.

Graph 1
Bias Reduction on All the Covariates (contribution for commuting)



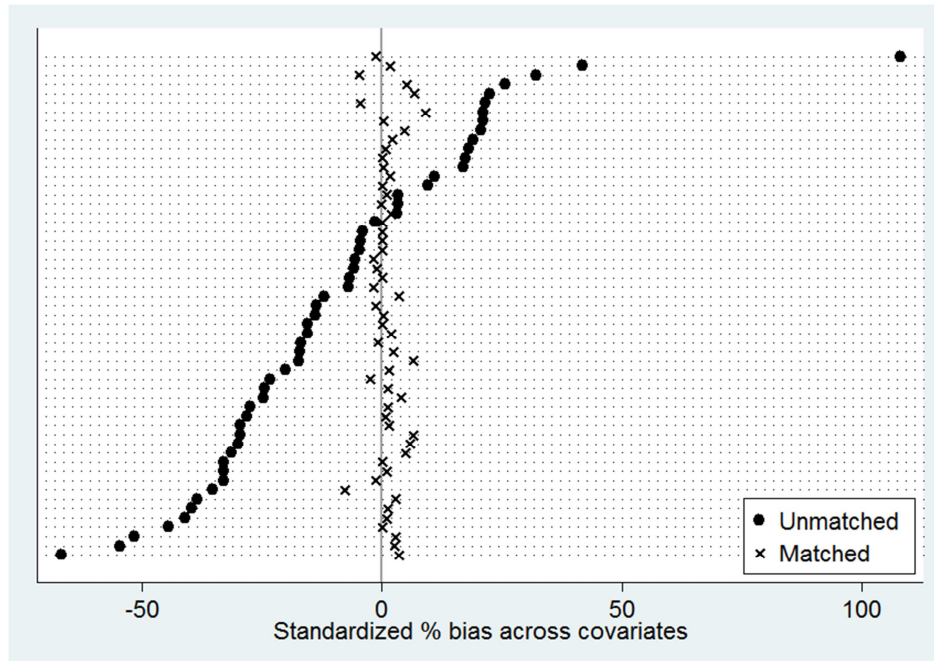
Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

Table 3
Descriptive Statistics on Selected Characteristics of Participants and Control Group (contribution for resettlement)

	Participants of measures (%)	The control group (weighted) (%)	The whole database of eligible (%)
Men	36.59	34.63	52.31
Ages 16 – 19	0.81	2.06	4.20
Ages 20 – 29	63.41	60.20	35.50
Ages 30 – 39	21.95	23.97	24.40
Ages 40 – 49	7.32	11.02	20.50
Ages 50 – 59	6.50	2.71	15.21
Ages 60 – 61	0	0.04	0.19
Without education	0	0	0.09
Elementary education	1.62	1.28	3.60
Secondary education	32.52	29.58	71.04
University	58.54	58.97	11.50
Length of unemployment preceding the support (min)	243.05	236.36	299.79
Income before evidence of previous measures (EUR)	361.34	354.46	325.80
Minutes spent on commuting to work before evidence of previous measures (min)	28.84	23.81	16.78

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

Graph 2

**Improving Sameness of Participants and the Control Group due to Matching
(contribution for resettlement)**

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

4. The Results of the Evaluation

In this section, we first report the results for the *Contribution for commuting* to work for the entire evaluated period and for two sub-periods (with and without the obligation to provide travel documents). The results for the *Contribution for resettlement* are provided at the end of the section to complement the picture. The sensitivity analysis related to the results of the *Contribution for commuting* can be found in the annexe. For the sake of comparison, we also report the OLS estimates. These, along with the complete results, can be found in the online annexe.¹⁴

¹⁴ <http://ekonom.sav.sk/uploads/work/OLS_53.txt>;
<<http://ekonom.sav.sk/uploads/work/OLS53a.txt>>;
<http://ekonom.sav.sk/uploads/work/PSmodel_whole_period.txt>.

4.1. The Results for the *Contribution for Commuting* – Entire Evaluation Period (3/2009 – 4/2013)

The following tables show the results of the estimated impact of *Contribution for commuting* to work, with particular outcome indicators in rows. For each outcome indicator, we report average values for participants, the control group, as well as their difference and standard deviation with related t-statistics. All this information is provided before and after matching was performed to reveal the dynamics of related selectivity.

After the balance is ensured (which is the case here), the methodology used is supposed to yield information about the net impact of measures followed on selected outcome indicators. Groups of participants and the controls are comparable, among other things, also in the commuting time to work and income from employment which preceded registration as unemployed, after which participants received the contribution.

Table 4

Average Treatment Effect on the Treated (ATT) of Contribution for Commuting (period 3/2009 – 4/2013)

		Participants	Control group	Difference	Standard deviation	t-statistics
Average time of commuting to work	Before matching	46.45	34.23	12.22	0.64	19.12***
	ATT	46.37	38.21	8.16	0.74	11.05***
The average income from a new job	Before matching	490.98	389.03	101.95	2.36	43.26***
	ATT	490.14	409.72	80.42	2.25	35.71***
The difference in minutes commuting to work before and after measures	Before matching	5.69	1.11	4.58	0.75	6.08***
	ATT	5.83	-2.41	8.24	0.89	9.21***
The difference in income before and after measures	Before matching	-104.21	-103.59	-0.62	5.88	-0.11
	ATT	-99.12	-179.55	80.43	6.92	11.63***
Employment 12 months after the start of the support	Before matching	0.888	0.770	0.118	0.004	31.50***
	ATT	0.888	0.808	0.080	0.003	24.80***
Employment 15 months after the start of the support	Before matching	0.883	0.776	0.107	0.004	28.93***
	ATT	0.883	0.807	0.076	0.003	23.24***
Employment 18 months after the start of the support	Before matching	0.875	0.763	0.112	0.004	29.58***
	ATT	0.874	0.797	0.077	0.003	22.87***

Note: Significance level *0.05, ** 0.01, *** 0.001.

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

For the entire period analysed, the average commuting time to work of participants before matching, was approximately 46 minutes (46.45). After selection of the control group, some observations of participants were removed from the analysis. Those are 105 cases where the common support assumption was not satisfied because no possible controls were available within a predefined interval (0.0001). For this reason, the average time of commuting decreased slightly to

46.37 minutes. The average time of commuting to work of eligible non-participants before matching was 34.23 minutes. By creating a control group using matching, the average commuting time increased to 38.21. The net effect of the measures to the commuting time to work is the difference between the group of participants and control group after pairing (46.37 to 38.21 = 8.16). Beneficiaries of the contribution thus commute by about 8.16 minutes longer than comparable job seekers included in the control group. This difference is statistically significant at a 0.001 level, which is also illustrated by the high value of t-statistics in the table of results. In this regard, the measure shows to have a positive impact on the average time of commuting to work, even after accounting for an increased propensity of participants to commute.

Looking at income, participants earned on average 490.14 EUR during the entire period, while individuals included in the control group earned 409.72 EUR. The contribution thus helps people find jobs with higher wages; on average 80.42 EUR higher. This difference might be related to a longer commute to work. The value of t-statistics also tells us that this difference in income is statistically significant at a 0.001 level.

Participants are similar in observable individual characteristics, including education, income and employment history. Therefore, we can assume that the difference in income is due to the contribution received. Receiving the contribution is reflected in an increased commuting time and a greater radius in which to search for work, which gave participants the opportunity to choose from a higher number of positions. From these choices, the job seeker probably chose a job with a higher salary, even at the expense that the work was geographically more distant. The economic theory assumes that higher salary means higher labour productivity because employers are, under ideal market conditions, ready to pay wages at the level of marginal productivity of the worker. Higher average income, therefore, indicates higher labour productivity and thus the better use of skills at the workplace. This wage difference indicates a better match of supply and demand on the labour market, out of which multiple actors could benefit; the employee, employer, as well as the state (in the form of higher income from tax and social contributions).

Positive results were also yielded when looking at employment after the end of the support. Payments under the *Contribution for commuting* end after 12 months. After 12, 15 and 18 months, a positive difference in the share of employed can be observed between participants and the control group. After 15 months, the share of employed among all beneficiaries was 88.8%. The share of employed in the control group was 80.8%, which resulted in a positive and statistically significant gain of 8 percentage points of additional employment.

This effect diminishes only slightly between the 12th and 18th month after the start of the new job. The gain in additional employment presents an important value added by the measure, especially when considered from the cost-benefit perspective.

In the case that we would not believe in the ability of the methodology used to control the effect of previous income and commuting time, this could be eliminated by looking at the difference in outcomes before and after the measure. However, also in this case, our main findings hold. On both outcome indicators where the difference in differences is possible to calculate, measured effects remain positive and statistically significant.

It is a bit striking that after registration, participants as well as controls, earn less than before the registration. This fact is clearly observable on the negative average income differences. It may be explained by the effect of the economic crisis.

4.1.1. Results of Evaluation for Two Evaluation Sub-periods (before and after Travel Tickets needed to be Provided)

The obligation to provide travel tickets for reimbursement under the *Contribution for commuting* was introduced in January 2011. It was the only change in the implementation rules during the evaluation period. It is thus interesting to follow if the treatment effects differ for periods before and after January 2011.

In the first period analysed, the average commuting time of participants, after matching, was 41.89 minutes, while for the control group it was 35.14 minutes. In the second period analysed, the average commuting time of participants, as well as the control group, increased. For the participants, commuting time from the place of residence to the location of the employer was approximately 49 minutes. Job seekers selected as the control group, commuted to work on average 10.39 minutes less than beneficiaries.

In both periods observed, the measure had a positive, statistically significant effect on the commute time. In the second period, this effect was significantly greater.¹⁵ Imposing the obligation to provide travel documents appears to increase the commuting time of beneficiaries.

Likewise, introducing this additional obligation was linked with an increase in the positive income effect. The average income of participants was 480.73 EUR in the first period and 495.01 EUR in the second period. The average wage of individuals included in the control group was 405.17 EUR in the first period and 409.94 EUR in the second period. The wage difference between these two groups grew from 75.56 EUR to 85.07 EUR, between the two periods.

¹⁵ t-statistics when comparing the difference in ATTs between periods was 3.39.

Table 5

The Average Treatment Effects on the Treated (ATT) of the Contribution for Commuting in the Monitored Periods (after matching)

		Participants	Control group	Difference (ATT)	Standard deviation	t-statistics
Minutes commuting	first period	41.89	35.14	6.75	1.18	5.73***
	second period	49.19	38.80	10.39	0.97	10.73***
Income from a new job	first period	480.73	405.17	75.56	3.72	20.32***
	second period	495.01	409.94	85.07	2.91	29.24***
The difference in minutes commuting to work before and after the measure	first period	7.13	1.35	5.78	1.35	4.27***
	second period	5.51	-5.11	10.62	1.20	8.84***
The difference in income before and after the measure	first period	-41.69	-121.76	80.07	8.70	9.20***
	second period	-131.56	-216.41	84.85	9.89	8.58***
Employment 12 months after the start of the support	first period	0.904	0.848	0.056	0.005	10.98***
	second period	0.876	0.787	0.089	0.004	20.49***
Employment 15 months after the start of the support	first period	0.903	0.840	0.063	0.005	12.36***
	second period	0.870	0.789	0.081	0.004	18.48***
Employment 18 months after the start of the support	first period	0.900	0.831	0.069	0.005	13.14***
	second period	0.858	0.779	0.079	0.005	17.58***

Note: Significance level *0.05, ** 0.01, *** 0.001.

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

Similarly, a positive and an even higher effect was also observed on employment after the end of the support. Also here, the difference in between periods is statistically significant,¹⁶ telling us that the introduction of the additional obligation increased the impact of the measure.

In the second period, the measure appears to be implemented with a greater impact. It may be due to the introduction of the obligation to document travel expenses, as well as because of outside factors influencing the impact, such as the hit of the economic crisis. A more detailed, process-oriented, evaluation is highly advisable to explore this issue further.

4.2. The Results for the *Contribution for Resettlement* – Entire Evaluation Period (3/2009 – 4/2013)

When looking at the second measure under evaluation, again, a positive and statistically significant effect was observable on income. In absolute terms, the income effect of the *Contribution for resettlement* was higher than the one observed

¹⁶ For employment effects 18 months after the start of the support, the difference between the two periods still remains statistically significant at the 5% significance level, with t-statistics of 2.0 and the critical value of 1.96.

for the *Contribution for commuting*. When considering the t-statistics, the effect is not as clear as it was in the case of the *Contribution for commuting*. Lower figures of the t-statistics yielded for the *Contribution for resettlement* are driven by a smaller number of observations in the case of this measure, but also multiple times as high standard deviation. Nevertheless, estimated effects are statistically significant at a 0.001 significance level.

Table 6
Effect of Contribution for Resettlement on the Average Income

		Participants	Control group	Difference	Standard deviation	t-statistics
Difference in commuting time (minutes)	Before matching	-49.74	-16.44	-33.30	4.87	-6.83***
	ATT	-49.74	-25.66	-24.08	7.80	-3.09***
The average income from the new job	Before matching	675.96	454.63	221.33	18.88	11.72***
	ATT	675.96	552.32	123.64	26.84	4.61***
Employment 12 months after the start of the support	Before matching	0.954	0.800	0.153	0.027	5.66***
	ATT	0.954	0.847	0.107	0.015	7.7***
Employment 15 months after the start of the support	Before matching	0.922	0.799	0.123	0.027	4.51***
	ATT	0.922	0.846	0.076	0.019	4.1***
Employment 18 months after the start of the support	Before matching	0.922	0.789	0.133	0.028	4.80***
	ATT	0.922	0.842	0.080	0.019	4.19***

Note: Significance level *0.05, ** 0.01, *** 0.001.

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

The overall average income increased when comparing participants of the two evaluated contributions. It is mostly due to a composition effect, when beneficiaries of the *Contribution for resettlement* are relatively more educated and with less unemployment experience in comparison to beneficiaries of the *Contribution for commuting*.

Employment effect of the *Contribution for resettlement* is similar to the employment effect of the *Contribution for commuting*. Again, the t-statistics bring relatively lower values, for the reasons already mentioned above. Estimated results are still statistically significant at the 0.001 significance level.

When looking at the commuting time, we recalculated the outcome indicator as the difference in commuting time between the job previous to unemployment and after unemployment (possibly supported). Here, values around zero would be expected for the population of eligible and negative effect for participants. The reasoning behind this is that there is no trend in the average commuting time and that individuals supported by the *Contribution for resettlement*, after resettlement,

have a shorter commute because resettlement shortened their commuting time. The data confirmed the latter of these assumptions. Beneficiaries of the *Contribution for resettlement* have a shorter commute to work after they receive the support and resettle. Negative values of this indicator through all the identified subgroups are influenced by an overall trend to commute farther in the later periods, which can eventually also be ascribed to the economic crisis.

5. Summary and Discussion

In this paper, we evaluate the impact of two ALMP supporting spatial mobility in Slovakia. In the case of both, the support is limited to a financial contribution which compensates for additional costs related to either commuting (*Contribution for commuting*) or resettlement (*Contribution for resettlement*). Participants' outcomes are followed on commuting time, income and employment after the end of the support.

Our results show that the recipients of the *Contribution for commuting* commute farther, their income is significantly higher and their chances to be employed 12, 15 and 18 months after they leave registered unemployment are significantly higher. Based on this evidence, we conclude that the measure increases the spatial mobility of the labour force in Slovakia. Due to this increased spatial mobility, supported individuals, when entering a new job, choose from a bigger pool of vacancies and pick the most suitable one. Thanks to the fact that increased mobility provides them with a greater number of options, they can pick a job where their skills are most utilised. Placements where their skills are better matched, also represent jobs with higher wages. If we, in line with the classical economic theory, assume that employees are paid the marginal product they are able to deliver. In better-matched placements, higher skill utilisation results in higher labour productivity and thus, higher wages. Therefore, supporting spatial mobility has several positive effects not only for the employer and employee but also from the perspective of the State.

From the cost-benefit perspective, measures supporting spatial mobility are relatively less costly in comparison to other types of ALMP. It is true for Slovakia¹⁷ and was also pointed out in the cases of Germany (Caliendo, Kunn and Mahlstedt, 2015) and Romania (Rodriguez-Planas and Benus, 2010).

If we would consider only the income effect; increased mobility, resulting in a surplus of approximately 80 EUR paid in beneficiaries monthly wages, may

¹⁷ In 2014 the total costs per participant were 212 EUR in the case of the *Contribution for commuting* and 827 EUR in the case of the *Contribution for resettlement*; making the Contribution for commuting the least expensive among the ALMP in the COLSAFs' portfolio.

not be seen so favourably; especially when considering the monthly cost of the individual support possibly climbing to 135 EUR. The cost-benefit attractiveness of the measure twists, if we consider the employment effect after the end of the support. Additional employment of otherwise unemployed individuals presents a direct saving of the State budget, as well as additional income from taxing additional production, working income and consumption. Fortunately, in our case, both contributions are related to a clearly observable positive employment effect even after the end of the support.

Therefore, we see two relatively autonomous effects of the measures under evaluation. First, it is the skills matching effect resulting in increased wages for participants, and eventually a gain in terms of labour productivity. Second, it is the active labour policy effect, mobilising otherwise unemployed individuals by offering them more opportunities for employment.

The evidence brought here clearly says, that supporting spatial mobility of the unemployed pays off in Slovakia. Similar findings are at hand for the US (Briggs and Kuhn, 2008), Germany (Caliendo, Kunn and Mahlstedt, 2015) and Romania (Rodriguez-Planaz and Benus, 2006). Slovakia appears to be one of the countries where supporting spatial mobility of the unemployed has the potential to produce positive labour market effects. Slovakia is a relatively densely populated country, where most of the population still live in small residences with a limited choice of jobs. Slovakia is also a country with a relatively developed infrastructure for the daily transportation of people. Moreover, Slovakia has a high number of unemployed and well performing secondary schools (at least in quantitative terms), which in many regions means that employable individuals cannot find a job simply because there are few vacancies open locally. At the same time, in regional centres (Bratislava, Košice, Žilina...) labour markets are more dynamic with a higher creation of new jobs. These characteristics create good conditions for a positive impact of measures supporting spatial mobility of job seekers.

Based on the results presented here, we cannot reliably identify the core reasons of the higher income and longer commutes of participants. We can only assume that the higher wage is due to a willingness to travel to work farther. To explore the background mechanisms behind the functioning of the measures, it would require a more detailed, in-depth evaluation, focussing on processes and including interviews with employees of local labour offices and beneficiaries.

What we can state, based on our results presented here, is that both evaluated measures to support spatial mobility have strong positive and statistically significant effects on future income and employment for those receiving the support. Moreover, in line with the expectations, in the case of the *Contribution for commuting* the commuting time increases and in the case of the *Contribution for resettlement* the commuting time shortens.

In the case of the *Contribution for commuting* the data allowed us to run the analysis on subgroups of participants. Regarding the commuting time and the employment effects, the *Contribution for commuting* is relatively more effective when provided to young job seekers, under 30 years of age. Regarding the employment effect, *Contribution for commuting* has a relatively higher impact on older job seekers (50+). It has a greater effect on the unemployed with higher education. Similarly, higher positive effects on all outcomes can be observed in the Košice region. Commuting times and income effects (matching effect) are higher in the Nitra and Banská Bystrica regions. Impact on employment is stronger in the Prešov and Trenčín regions. Matching effect, resulting in higher wages is more present in the case of tertiary educated participants. The employment effect is stronger in the case of secondary school educated participants.

Table 7

The Results of the Evaluation of Contribution for Commuting Estimated for Subgroups of Beneficiaries (standard deviations in brackets)

	Effect on commuting time	Effect on income	Effect on employment 18 months after the start of the support
Men	12.99 (1.14)	91.69 (3.74)	0.093 (0.005)
Women	4.91 (0.98)	71.08 (2.61)	0.063 (0.004)
Ages 16 – 29	14.87 (1.57)	103.05 (3.78)	0.074 (0.006)
Ages 30 – 39	4.47 (1.40)	67.17 (4.77)	0.066 (0.006)
Ages 40 – 49	4.90 (1.38)	61.46 (4.81)	0.065 (0.007)
Ages 50 – 61	7.57 (1.50)	82.48 (5.61)	0.103 (0.009)
Secondary education	7.08 (0.86)	74.90 (2.29)	0.076 (0.004)
Tertiary education	14.34 (2.51)	90.82 (9.50)	0.056 (0.009)
Bratislava Region	7.49 (6.64)	53.74 (30.38)	0.058 (0.035)
Trnava Region	5.18 (1.72)	86.63 (7.27)	0.069 (0.010)
Trenčín Region	5.86 (1.30)	65.35 (6.26)	0.081 (0.008)
Nitra Region	12.43 (1.99)	97.27 (7.79)	0.067 (0.012)
Žilina Region	7.52 (1.96)	62.48 (6.60)	0.074 (0.010)
Banská Bystrica Region	13.73 (1.85)	95.01 (6.09)	0.065 (0.010)
Prešov Region	6.72 (2.04)	74.85 (4.63)	0.085 (0.008)
Košice Region	10.18 (2.98)	82.94 (5.98)	0.082 (0.011)

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

To conclude, the spatial mobility measures evaluated here appear to have a significant, positive impact on labour market outcomes of those receiving the support. This finding is underlined by two moments. First, by the fact that other ALMPs in the portfolio of the Slovak COLSAF often show ambivalent performance when being evaluated using counterfactual impact evaluation techniques. Second, contributions supporting spatial mobility are relatively cheaper in comparison to other ALMP. A clear message for COLSAF, out of the evidence presented here, should be to use the *Contribution for commuting* and the *Contribution for resettlement* more often. In this respect, COLSAF case officers should propose these measures more often. By doing so, they should bear in mind that by its design, the measure is more suitable for relatively more employable job seekers.

Robustness of the Results

The results presented here appear to be fairly robust in terms of changing definitions and identifying sub-groups, but within this framework, we are not able to rule out a possible substitution effect. This may appear if the individual decisions about commuting or resettling would happen even without the support and the contribution is simply used afterwards by those who are aware of this option. The design of the measure and the implementation rules provide an incentive for such behaviour. There are therefore good reasons to assume the existence of a substitution effect. Despite such worries, the results presented here bring clear evidence about the positive effects of commuting on labour market outcomes.

As pointed out in Caliendo, Kunn and Mahlstedt (2015), these types of measures might be related to a substantial bias caused by self-selection of more motivated job seekers. Therefore, unobservable individual characteristics might play an important role. The methodology applied here (propensity score matching) relies heavily on observable characteristics and therefore can be subject to violations of its assumptions. For this reason, we report complete results along with the Rosenbaum bounds sensitivity test (Rosenbaum, 2002). We find the robustness of our results on the two main outcomes (income and employment) satisfactory (for more details please refer to the annexe). Moreover, we annex sensitivity analysis considering several changes in the design of the analysis.

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A n n e x 1: Sensitivity Analysis of the Results

In order to increase the reliability of the presented results we first test three possible objections and monitor the sensitivity of our main findings.

Objection 1

The first possible objection could be that the *Contributions for commuting* are largely received by individuals who work on a daily basis, but live in the place they work and commute every week (or less frequently). In the case that the effectiveness of the measure for this group would be different from the effectiveness of measures for daily commuters, a possible source of bias could appear. We therefore trimmed the sample by the commuting time. The maximum travel time from the place of residence to the place of employment was 455.5 min. Additionally, 37,230 members of the eligible group and 3,995 participants commute to work more than 120 minutes a day.

Table A1

The Frequency of Minutes Spent Commuting to Work

	Entire database	Participants
Missing information about commuting time to the new job	595 609	12 428
Minutes < 120	303 877	25 654
Minutes > = 120	37 235	3 999
The total number of observations	936 721	42 081

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

To assess the sensitivity of our results, we have excluded individuals with a commuting time of more than 120 minutes in one direction. Despite the significant decrease in commuting time, due to the removal of high values, the overall positive and statistically significant effect on the effectiveness of measures

remained clearly observable. Its value is slightly lower than the average value for all participants (8.16 vs. 7.88).

The participant's income declined only slightly from 490.14 EUR to 482.58 EUR. For job seekers included in the control group, the average income declined from 409.72 EUR to 404.81 EUR. The difference in income has narrowed by only 2.65 to a level of 77.77 EUR. Also, the employment effect remains practically unchanged. Changes in the effects on all selected outcome indicators are therefore only marginal.

Table A2

The Results of the Evaluation for Participants with a Time of Commuting into 120 Minutes

		Participants	Control group	Difference	Standard deviation	t-statistics
The average income from a new job	Before matching	483.10	386.46	96.64	2.43	39.76***
	ATT	482.58	404.81	77.77	2.33	33.37***
Average commuting time to work	Before matching	22.08	14.67	7.41	0.23	31.64***
	ATT	22.13	14.25	7.88	0.25	31.30***
Employment 12 months after the start of the support	Before matching	0.891	0.770	0.121	0.004	30.38***
	ATT	0.890	0.812	0.078	0.003	22.79***
Employment 15 months after the start of the support	Before matching	0.887	0.778	0.109	0.004	27.85***
	ATT	0.887	0.812	0.075	0.003	21.58***
Employment 18 months after the start of the support	Before matching	0.880	0.764	0.116	0.004	29.02***
	ATT	0.879	0.801	0.078	0.004	22.22***

Note: Significance level *0.05, ** 0.01, *** 0.001.

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

Objection 2

The second considered objection to the reliability of the results, could be linked to possible bias of the results due to the fact that employers declare Bratislava as the the place of business (Central Office), but in fact, employ workers in another place. Such behaviour could be a possible source of bias of the information about the number of minutes spent commuting to work. For monitoring this possible bias, overall results of evaluation were estimated for participants and job seekers whose employer declares a place of business only outside of Bratislava. We removed all the cases where the employer states that he is based in Bratislava.

The average length of commuting decreased in this case. The average length of commuting for participants to an outside of Bratislava employer, decreased

from 46.37 minutes to 34.33 minutes and for the control group from 38.21 minutes to 26.38 minutes. The difference in the length of commuting time from place of residence to location of employment decreased only marginally. The observed effect of the measure on commuting time remained practically the same, positive and statistically significant.

The difference in income and employment also did not change significantly. The differences between the control group and participants have increased only marginally.

Table A3

The Results of the Evaluation for Participants and Job Seekers with Employers Outside of Bratislava

		Participants	Control group	Difference	Standard deviation	t-statistics
The average income from a new job	Before matching	479.17	384.24	94.93	2.4	39.62***
	ATT	478.53	402.69	75.84	2.25	33.69***
Average commuting time to work	Before matching	34.27	25.27	9.00	0.53	16.84***
	ATT	34.33	26.38	7.95	0.59	13.36***
Employment 12 months after the start of the support	Before matching	0.888	0.768	0.120	0.004	30.50***
	ATT	0.888	0.808	0.080	0.003	23.51***
Employment 15 months after the start of the support	Before matching	0.884	0.775	0.109	0.004	28.02***
	ATT	0.884	0.806	0.078	0.003	22.69***
Employment 18 months after the start of the support	Before matching	0.877	0.762	0.115	0.004	28.99***
	ATT	0.876	0.798	0.078	0.004	22.18***

Note: Significance level *0.05, ** 0.01, *** 0.001.

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

The sensitivity analysis showed that the results presented and their main findings remain unchanged. This is a good signal in favour of the reliability of our findings related to the *Contribution for commuting*.

Objection 3

We test the sensibility of our results on dropping cases with missing information on commuting time either in the previous job, or in the job after support was provided. In the case of both these variables we impute the missing values as the median of the available values. By doing so, we keep a substantial part of the observations in the analysis, leaving us with 42,080 observations of participants. Of these, 68 of them were excluded because of violating the common support assumption.

Table A4
The Results of the Evaluation for Participants and Job Seekers with Imputed Values for Commuting Time

		Participants	Control group	Difference	Standard deviation	t-statistics
The average income from a new job	Before matching	39.83	26.71	13.12	0.31	42.02***
	ATT	39.82	30.11	9.71	0.39	24.97***
Average commuting time to work	Before matching	508.11	347.84	160.28	1.49	107.31***
	ATT	507.92	372.44	135.48	1.35	100.14***
Employment 12 months after the start of the support	Before matching	0.866	0.756	0.111	0.002	51.56***
	ATT	0.866	0.787	0.079	0.002	41.49***
Employment 15 months after the start of the support	Before matching	0.858	0.752	0.106	0.002	49.1***
	ATT	0.858	0.781	0.077	0.002	39.54***
Employment 18 months after the start of the support	Before matching	0.852	0.740	0.112	0.002	50.81***
	ATT	0.851	0.771	0.080	0.002	40.36***

Note: Significance level *0.05, ** 0.01, *** 0.001.

Source: Information provided by the Office of Labour, Social Affairs and Family and the Social Insurance Agency.

In this specification, the values of the estimated effects, as well as the t-statistics increase. Because of a higher number of observations, this specification also performs the best in the Rosenbaum bounds test with income effect not sensitive up to the level of gamma values 4; employment after 18 months up to the value of 2.4. Based on the results of this test, the effect on commuting time is very sensitive regardless of the specification used. For complete results, please see the online annexe.¹⁸

¹⁸ <http://ekonom.sav.sk/uploads/work/PSmodel_sensitivity.txt>.