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A Measure That Really Works? Impact Evaluation of the Contribution for Self-Employment as a Tool of Active Labour Market Policy in Slovakia

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Abstract: Unemployment presents a significant challenge requiring attention not only in developing countries but also in economically developed ones. Active labour market policies offer a potential solution to address this issue. This study focuses on assessing the impact of the intervention called Contribution for Self-employment provided under the Act on Employment Services No. 5/2004 Coll in the Slovak Republic. This financial support is extended voluntarily to unemployed individuals seeking jobs and aims to partially defray the expenses associated with launching business ventures. The primary objective of this research is to quantify the effectiveness of the Contribution for Self-employment in enhancing the employment of its recipients, thereby gauging its efficacy in reducing unemployment. The evaluation employs a counterfactual impact assessment methodology, utilising propensity score matching for analysis, with propensity score estimated by the logistic regression. Data from the registry of jobseekers maintained by the Central Labour Office of Social Affairs and Family in Slovakia are utilised in this analysis. This study's findings indicate a favourable impact of the contribution on the employment of its participants compared to the comparable non-participants. Consequently, this intervention emerges as a viable mechanism for supporting entrepreneurship and mitigating unemployment in Slovakia.

Keywords: unemployment; contribution for self-employment; active labour market policy; impact evaluation; propensity score matching

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1. Introduction

Unemployment is a pervasive challenge with far-reaching implications. A high unemployment rate impacts a country's general social atmosphere and hurts its overall economic status and progress (Caposova 2020). High unemployment rates among economically engaged individuals are typically undesirable. Employment and productive employment are a prerequisite for both local and national socio-economic growth and a source of regional and international competitiveness. Numerous aspects of life are negatively impacted by job uncertainty, according to a growing number of scientific studies (Fiori et al. 2016; Svabova et al. 2019).

Because of the real intensity of the unemployment crisis, national governments throughout the world, including the government of Slovakia, are making concerted efforts to maintain unemployment rates that are as low as feasible at the national level. Furthermore, by providing assistance to people who are unemployed in the hopes of successfully integrating them into the workforce and preventing them from being excluded from the workforce, governments can use a variety of policies and programmes that are directed either at the supply side of the labour market or the demand side of the labour market (Fossati et al. 2021; Zielinski 2015).

As part of the labour market policy, numerous initiatives are implemented in individual countries to alleviate unemployment. These labour market measures could be

categorised into active and passive strategies (Zielinski 2015). Active labour market policies are used to enhance the labour market results of unemployed persons (Crepon and van den Berg 2016). The objective of active labour market policies (ALMP) is to keep employees employed, attract them to the workforce, boost their productivity and wages, and enhance the operation of the labour markets. ALMP attempts to rectify labour market shortcomings (Karasova et al. 2019). Passive labour market tools are primarily defensive in nature, aiming to aid individuals in seeking employment (Fossati et al. 2021) and mitigating the risk of abrupt income loss (Zielinski 2015).

Active labour market measures account for many state expenditures (Crepon and van den Berg 2016). The amount of these types of expenditures, as well as their efficiency, must be closely monitored at all times (Banociova and Martinkova 2017). The constant ex-post evaluation of active labour market policy measures is one of the most important strategies that may be used to improve these policies. Such assessments of programs or measures provide valuable insight into the actual impact these interventions have had on observable outcomes within the target population, facilitating a comparison between the observed and anticipated outcomes (Hur 2019; Mueller et al. 2014). Effective ALMP instruments may enhance the performance of the labour market. In the last few decades, in OECD and EU member states, hundreds of ALMP instruments have been developed (Bonoli 2010; Karasova et al. 2019).

Labour offices and other state administrative entities are primarily responsible for implementing labour market policy (Brutovska and Bucher 2016). The Employment Services Act No. 5/2004 codifies in Slovakia the criteria and requirements for providing particular instruments of active labour market policy (Karasova et al. 2019). Within the context of active labour market policy tools in the Slovak Republic, many forms of contributions are offered, such as contributions for self-employment, graduate practice, commuting to work, and others. This financial support is offered by the Centre for Labour, Social Affairs, and the Family (COLSAF).

The primary objective of this paper is to assess the impact of the Contribution for Self-employment on the employment outcomes of its beneficiaries and, consequently, to quantify the effectiveness of this policy in reducing unemployment in Slovakia. The significance of evaluating this intervention is important not only from the national perspective but also extends far beyond its national borders. As countries worldwide fight with the challenges of unemployment and its impacts, insights from this study are valuable for international policymaking and practitioners. By examining the effectiveness of Contribution for Self-employment in helping jobseekers start their own business and its impacts on participants' employment, our research shed light on the functioning of active labour market policy instruments. The conditions of intervention programmes yielding positive results, which effectively fulfil their intended purpose, should serve as an inspiration for policymakers abroad in designing and implementing similar intervention programmes in their countries.

The structure of the paper is organised as follows: The literature review begins by presenting an overview of the current state of research in related areas. Following this, the methodology section describes the analysed intervention named Contribution for Self-employment, describes the data utilised in this study, and elucidates the propensity score matching techniques and the logistic regression employed. The subsequent section presents the key findings of this study. This is followed by a comparative analysis of findings from similar studies. Finally, the conclusion formulates the key implications and insights of this study.

Literature Review

In the analysis of scientific literature about evaluating the impact of various instruments of active labour market policy, counterfactual methods of impact evaluation are encountered.

Quantifying the effects of public policies allows us to determine whether participation in the programme affects the outcome variable of the participants (the so-called "treated group") or, alternatively, whether the programme does not affect individuals. However,

when evaluating the effects of a particular programme or intervention, we encounter a difficulty. This problem stems from the impossibility of simultaneously observing the same individual in two different situations: that they will participate in the intervention and that they will not. A counterfactual approach is employed to solve this problem, the primary difficulty of which is identifying an appropriate control or counterfactual group consisting of the non-participants of the intervention programme who met all the conditions for participation but did not participate for various reasons. This control group is usually referred to as the "non-treated group" (Mueller et al. 2014).

Simply stated, the counterfactual outcome of a treated unit (a programme participant) is its outcome in case they had not participated in the intervention program, and vice versa. In general, counterfactual impact evaluation methods aim to determine the impact of social or economic programs (Cerulli 2015; Potluka et al. 2016). These techniques provide policymakers with an answer to the question of whether the designed programme or intervention had the desired effect on the intervened population.

Several research studies examine the counterfactual impact evaluation of active labour market policy tools in the Slovak Republic. In their study, Stefanik and Karasova (2016) investigate the efficacy of the two active labour market policy instruments: the allowance for commuting to work and the resettlement allowance. The authors employ the propensity score matching approach to analyse their performance. Stefanik (2014) discovered the negative impact of the training programme using the propensity score matching approach; however, this negative effect might be due to implementation mistakes. Svabova et al. (2021) assessed the efficacy of the Contribution to the Graduate Practice intervention offered to young jobseekers in the Slovak Republic. The authors used up to three counterfactual evaluation methods: regression adjustment, instrumental variable, and propensity score matching. In every instance, it established a beneficial impact of the intervention on the employment and sustainability of young jobseekers. A similar programme to the Contribution to the Graduate Practice was analysed by Svabova et al. (2022), where the authors discovered the favourable impact of the supplied intervention on the earnings of its participants. In their study, Borik et al. (2015) focused on assessing the impact of two ALMP interventions: the Contribution to the Graduate Practice and the Contribution for Self-employment. Both had a favourable effect on the participants' employability during the chosen periods. Pisar et al. (2021) use logistic regression to determine the characteristics influencing the survival rate or sustainability of enterprises founded by individuals who utilised self-employment contributions. They also discovered that this active labour market policy is more beneficial when the economy grows. Korenkova (2019) presents a more in-depth analysis of the provision of this contribution within every Slovakian region. This type of business support is highly useful in less developed regions of Slovakia.

Authors Dvoulety and Hora (2020) evaluate the business start-up subsidy in the neighbouring Czech Republic. However, Dvoulety (2017) contrasted the interests of the unemployed in countries such as the Czech Republic, Slovak Republic, Hungary, and Germany in this allowance form. During the period under review, interest in the contribution was lowest in the Czech Republic. Dvoulety and Lukes (2016) performed a comprehensive search of 18 articles published between 2007 and 2016. The publications that were the subject of their inquiry dealt with a counterfactual evaluation of instruments designed to encourage entrepreneurship among the unemployed. In addition to the allowance for self-employment, counterfactual methods are used in the Czech Republic to evaluate the various company support subsidies. For instance, Blazkova and Dvoulety (2019) discovered a positive effect of public subsidies on the performance of food industry companies. Dvoulety et al. (2021) discovered that public subsidies have a positive impact on micro-businesses in particular. Potluka et al. (2016) evaluate the impact of European Social Fund interventions aimed at training employees in Czech companies. In studies by Pelucha et al. (2019) and Potluka et al. (2013), the authors also examine the evaluation of the impact of employee education subsidies.

In an interesting study conducted in Germany, Caliendo et al. (2015) used counterfactual evaluation to compare self-employed businesses founded with government subsidies to those who founded them. Caliendo and Kunn (2015) evaluated the impact of start-up subsidies on unemployed women. Caliendo and Tubbicke (2020) estimate the long-term effects of post-reform subsidies on individual employment prospects and earnings on the labour market using propensity score matching. The German business subsidy programme underwent a reform, according to Caliendo and Tubbicke (2021), who evaluated the impact of the reform on the effectiveness of this programme. They estimate this effect using samples of participants and non-participants from pre- and post-reform periods. The consequent study by Caliendo and Tubbicke (2022) also examines this topic in greater depth. Rose (2019) found that among various active labour market policy instruments in East Germany, wage subsidies and contributions for self-employment have the most significant impact on improving the welfare of jobseekers.

The literature review reveals that the number of scientific studies evaluating the efficacy of active labour market policy instruments has increased over the past few years. Primarily, we can find studies abroad that assess the efficacy of the Contribution for Self-employment and other forms of company subsidies. In Slovakia, there are current studies that evaluate the effectiveness of certain instruments of active labour market policy, but authors rarely focus on the evaluation of the Contribution for Self-employment; therefore, we intend to fill this gap with this study, in which we evaluate the effectiveness of the allowance for self-employment using the propensity score matching method.

2. Methodology

The primary focus of this study is on assessing the impact of the Contribution for Self-employment, which is a component of active labour market policy measures. To quantify the effect of this intervention on the employment outcome within the population, we employ a counterfactual method known as propensity score matching. The methodology is described in several steps, as follows.

1. The principle of the propensity score matching method is based on creating a comparison group consisting of programme non-participants. In the first step, the comparison group is created using all the eligible programme non-participants who decided or should not participate for various reasons. Therefore, in this step, the eligibility of the jobseekers for participation in the Contribution for Self-employment had to be checked carefully.
2. Then, in the next step, the programme participants from the treated group are matched with the ones from the comparison group. This matching ensures that both groups are as similar as possible; thus, the difference in their outcomes should be attributed to participation in the intervention. Matching could be carried out in various ways; in this study, we used the most commonly used method of propensity score matching, where the intervention participants from the treated group and their counterparts from the non-treated group are matched based on the value of their propensity score. Rosenbaum and Rubin (1983) define the propensity score as the conditional probability of participating in the intervention program, which is based on observable characteristics in the population before participating:

$$p(X) = Pr(D = 1|X) = E(D|X) \quad (1)$$

where $D = \{0;1\}$ is an indicator of exposure to the intervention, and X is a multivariate vector of observable characteristics (Becker and Ichino 2002). A value of propensity score should be estimated by various techniques; in this study, we employed the logistic regression. Logistic regression is a type of regression model with a categorical dependent variable. It describes the relationship between categorical (most commonly binary) dependent variables and explanatory variables, which can be both continuous and categorical. To obtain the estimates of probabilities of participation in

the Contribution for Self-employment, we employed the binary logistic regression, as the dependent variable Y has two possible values, namely: $Y = 1$ for participants of the Contribution for Self-employment intervention (the individuals in the treated group), with probability p; $Y = 0$ for non-participants of the contribution (individuals in the non-treated group), with probability $1 - p$. The probability of participation in the intervention, depending on the observed characteristics $X_1, X_2, \ldots, X_k$ (described in the data section), is then given by the following:

$$p = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \ldots + \beta_k X_k)}}, \quad (2)$$

where $\beta_0, \beta_1, \ldots, \beta_k$ are the regression coefficients, and their estimated values are $b_0, b_1, \ldots, b_k$. Equation (2) determines the propensity score values for all individuals, both in the treated and the control group. Thus, at the end of this step of the impact evaluation process, we obtain the propensity score estimates for all individuals in the treated and non-treated groups. In this place, we consider it important to mention that in the impact evaluations, the diagnostic of the created regression model is not a standard diagnostic for logistic regression. The primary focus is not on estimating model parameters, the statistical quality of the model, or the statistical significance of the variables in it but rather on achieving a balance of explanatory variables by the matching procedure conducted in the next steps. For this reason, standard procedures for addressing collinearity or checking model characteristics, such as Nagelkerke R-square or AUC, or standard methods, such as stepwise variable selection, are not useful, as they do not focus on the balance of the variables in the model (Stuart 2010).

3. In the third step, the estimated propensity score values in the treated and non-treated groups are compared to set up the so-called common support area. This means that the individuals from the treated group with a propensity score lower than minimal or higher than the maximal propensity score of the individuals from the non-treated group are omitted from the sample. This step serves to ensure a more precise matching.
4. The treated jobseekers are matched with control non-treated ones based on calculated propensity score values. Various matching techniques can be employed to match treated and non-treated individuals, such as exact matching, nearest-neighbour matching, calliper, and radius matching, etc. In this study, we used a radius matching technique with a radius of 0.0004. This means that each treated individual is matched to one or more non-treated individuals from the comparison group if the difference in their propensity score values is within the set radius of 0.0004, and then the one who is the nearest neighbour is selected. Moreover, in this study, we used a so-called matching with replacement, where every non-treated individual can be a suitable match for more treated individuals. This type of matching is considered better than matching without replacement (where the non-treated unit can be used only once) because of its independence in the matching order. This matching procedure ensures the highest possible comparability of the individuals in the treated and non-treated groups. As a result of this step, we obtain the matched group of programme participants (treated group) and non-participants (non-treated group) with the highest possible comparability of their explanatory variables.
5. As the last step of the impact evaluation procedure, the average values of the outcome variables are compared between the group of intervention participants and non-participants. The average effect of the treatment on the treated (ATT) is calculated as the difference in the average values in the outcomes:

$$ATT = E(Y_1 - Y_0 | D = 1) \quad (3)$$

Relation (3) can also be expressed in the form

$$ATT = E(Y_1 | D = 1) - E(Y_0 | D = 1) \quad (4)$$

where $E(.)$ expresses the mean value, Y_1 is the outcome variable of the treated individual, Y_0 is the outcome variable of the non-treated individual, D is the variable indicating the support status, $D = 1$ for treated individuals, and $D = 0$ for non-treated individuals. While $E(Y_1|D = 1)$ in Equation (4) can be quantified, $E(Y_0|D = 1)$ cannot be observed, so it is necessary to replace this part of the equation with an appropriate counterfactual result of individuals who were not exposed to the treatment. For the purpose of impact evaluation conducted in this study, we defined the outcome variable measuring the impact of the intervention Contribution for Self-employment on the employability of participants compared to the non-participants as the *cumulative number of days registered in the database of jobseekers* during the impact period. The impact period was set as a two-year period, which began three years (compulsory period of self-employment gainful activity) after the individual's end of participation in the intervention. During this impact period, we monitored an individual's course of registrations in the database of jobseekers.

All calculations were performed with the statistical software IBM SPSS Statistics version 26.0.

2.1. Contribution for Self-Employment

In the conditions of the Slovak Republic, the Centre of Labor, Social Affairs, and the Family (COLSAF) provides a Contribution for Self-employment, which is intended to partially cover costs associated with starting a self-employed gainful activity for unemployed jobseekers.

Following Section 49 of Act No. 5/2004 Coll. on Employment Services, the conditions for providing this contribution are governed by the law. According to this law, a person is eligible for this contribution if they apply for it in writing at the relevant Office of Labour, Social Affairs, and the Family, have been registered as an unemployed jobseeker for at least three months, and will operate the newly created self-employment gainful activity for at least three years (Act No. 5/2004 Coll 2004), as well as fulfilling other conditions established by the law.

The contribution amount varies across regions of the Slovak Republic and is contingent upon several factors, primarily the registered unemployment rate in the district where the jobseeker intends to establish his gainful activity or the total cost of the work. The contribution amount ranged from EUR 2585.68 to EUR 5754.08 during the period under review in this study. The total contribution amount is usually paid to the participant of this intervention gradually in three parts after submitting the documents stipulated by the law at the end of each year of operating a self-employed gainful activity.

2.2. Data

To quantify the effect of the Contribution for Self-employment on the participants' employment, we work with the database of jobseekers administrated by the COLSAF SR. This database contains records of all registered unemployed jobseekers; in this study, we used the records covering the period of 2012–2020. In addition to information on registered jobseekers, this database also contains information on all active labour market policy instruments, including the one under review in this study, provided to them during the monitored period.

Before the actual creation of the groups of treated and non-treated individuals, it was necessary to prepare the data. The data preparation included, for example, removing the registrations without an ID number, those without a date of entry into the database, or those who were not at the legal age of 18 according to the Slovak legislation. Subsequently, for the individuals who remained in the database, we checked the eligibility conditions for participation in the Contribution for Self-employment, given by the law, and we performed a logical check of the individual dates.

After cleaning the database and performing all the necessary checks, we have a final number of 521,856 registered jobseekers. A group of individuals supported by the Contri-

bution for Self-employment during the observed period formed a treated group containing 5635 individuals, representing approximately 1.1% of the total number of individuals in the database. The second group consists of individuals who met the eligibility conditions for participation in Contribution for Self-employment but decided not to participate for various reasons, creating a control group of 516,221 individuals, representing the resting 98.9% of the total number of individuals in the database. This was the first step of the impact evaluation, as described in the previous section.

Figure 1 lists all the qualitative variables utilised in this study to describe the jobseekers in the database and their socio-economic environment. The variables are listed along with their percentage representation in the total population and their percentage representation in the treated and non-treated groups.

Among all jobseekers and also in both groups, males clearly predominate. Among the jobseekers' nationalities, the Slovak nationality predominates with a share of up to 88.9% in the whole population of jobseekers: 90.7% in the treated group and 88.8% in the non-treated group. The least represented nationality is the Roma nationality. In fact, the number of people with this nationality is higher in Slovakia, but they prefer not to register under this particular nationality.

As for marital status, singles are the most prevalent among all individuals, with a share of 46.4%. However, for the treated individuals, the status of married predominates with a share of 46.5%.

For both groups, the largest number of jobseekers is from the western region of Slovakia; for the treated group, it is 35%, and for the non-treated group, it is 34.8%. The Bratislava region is the one with the fewest occurrences in both groups.

Regarding the level of education, secondary vocational education is the most prevalent, accounting for 31.7% of the entire sample. Looking at individual groups, completed secondary education is the most common among the treated group, representing 40.1%, while secondary vocational education prevails among the non-treated jobseekers with 31.8%. The most common disadvantage is no paid job (58.2%). Most jobseekers (88.4%) have no child; the least represented category is four or more children.

The treated group has an average age of nearly 34 years, while the non-treated group has an average age of approximately 36.5 years. The minimum age for both groups was restricted to 18 years. The oldest treated person was 61 years old, and the oldest non-treated person was 73.

The cumulative days of previous registrations express the number of days an individual spent in the database of jobseekers before this particular registration. For treated, it was nearly 614 days, and, for non-treated, the average was nearly 990 days.

The variable duration of current registration in days indicates the number of days that an individual spent in the database of jobseekers during the current registration. From the point of view of the conditions for providing the Contribution for Self-employment, the jobseeker must be registered for at least three months, which was used as a restriction in the group of treated individuals. The current registrations lasted, on average, 437 days for treated and 665 days for non-treated.

The number of days from the last employment to current registration signifies the time span between the termination of the most recent employment (if any) and the date of registration in the database of jobseekers. It was, on average, 171 days for the treated group and 321 for the non-treated group.

The last three variables are the unemployment rate (calculated from the total number of jobseekers), the registered unemployment rate, and the Roma population proportion in the jobseeker's permanent residence district. The values of these variables were merged with individual jobseekers according to their date of exit from the database. The average registered unemployment rate for the treated group was 11.80%, while the rate for the non-treated group was 11.31%. The Roma population proportion was merged with the jobseekers according to their district of permanent residence.

Variable	Value	Total	Non-treated	Treated
gender	*male*	55.20	55.20	54.90
	female	44.80	44.80	45.10
nationality	*Slovak*	88.90	88.80	90.70
	Czech	0.40	0.40	0.40
	Hungarian	10.00	10.00	8.30
	Roma	0.20	0.20	0.00
	NA or Other	0.60	0.60	0.70
marital status	*single*	46.40	46.50	44.20
	married	40.80	40.80	46.50
	divorced	10.80	10.80	8.70
	widow	1.90	1.90	0.60
permanent residence	*Bratislava region*	9.70	9.70	6.00
	Western Slovakia	34.80	34.80	35.00
	Central Slovakia	25.50	25.50	28.70
	Eastern Slovakia	30.00	30.00	30.20
level of education	*unfinished primary*	0.60	0.60	0.10
	primary	14.00	14.20	3.30
	lower secondary vocational	1.50	1.50	1.20
	secondary vocational	31.70	31.80	21.70
	complete secondary	28.20	28.10	40.10
	general secondary	4.60	4.60	6.50
	higher vocational	0.50	0.50	0.60
	university 1st	1.70	1.70	2.90
	university 2nd	7.90	7.80	17.50
	university 3rd	0.20	0.20	0.30
	NA	8.90	9.00	5.90
disadvantage	*school-leaver*	10.10	10.10	12.20
	over 50 years	24.10	24.30	10.30
	long-term unemployed	42.90	43.00	40.90
	health	4.20	4.20	1.50
	no paid job	58.20	58.20	56.80
	low education	16.40	16.60	3.10
	organisational reasons	1.30	1.30	0.80
	others	0.80	0.80	0.60
children categorised	*0*	88.40	88.40	83.20
	1	6.30	6.30	8.70
	2	3.70	3.70	6.30
	3	1.10	1.00	1.50
	4 and more	0.50	0.50	0.20

Figure 1. Qualitative characteristics of the population in the study.

Table 1 presents the quantitative variables used in this study and their descriptive statistics.

Table 1. Quantitative characteristics of the population in this study.

Variable	Group	Min	Max	Mean	Median	Std. Deviation
age [years]	non-treated	18.00	73.00	36.43	35.00	12.17
	treated	18.00	61.00	33.79	33.00	9.84
cumulative days of previous registrations [days]	non-treated	0.00	13,428.00	989.75	516.00	1250.97
	treated	0.00	7311.00	613.75	337.00	824.79
duration of current registration [days]	non-treated	0.00	8758.00	665.08	303.00	930.15
	treated	89.00	4929.00	436.63	303.00	394.41
number of days from last employment to current registration [days]	non-treated	0.00	15,805.00	320.87	1.00	954.42
	treated	0.00	8303.00	171.47	1.00	669.77
unemployment rate (calculated from the number of jobseekers [%])	non-treated	6.00	14.90	12.86	13.35	1.88
	treated	6.00	14.90	13.36	13.85	1.44
registered unemployment rate [%]	non-treated	4.88	13.61	11.31	11.68	1.84
	treated	4.88	13.61	11.80	12.25	1.43
Roma population proportion [%]	non-treated	5.93	22.03	12.47	10.82	6.58
	treated	5.93	22.03	12.52	10.82	6.59

Source: own elaboration.

3. Results

We evaluated the impact of the Contribution for Self-employment on the employment of its participants using the propensity score matching method. After creating a group of all eligible treated and non-treated individuals, the next step was to develop a logistic regression model that determined the propensity score value for every jobseeker in the database. When constructing the logistic regression model, we employed each variable listed in Tables 1 and 2. All the qualitative variables were entered into this model as dummy variables. Besides all the variables, we also used several of their interactions, and, according to the results of the graphical analysis of relationships, several squared variables.

Table 2. Confusion matrix of the propensity score model.

Actual Value	Predicted Value		
	Non-Treated	Treated	Row Percentage Correct
non-treated	3508	2127	62.3
treated	1298	4337	77.0
overall percentage			69.6

Source: own elaboration.

For the successful creation of the logistic regression model, it was necessary to balance the numbers of individuals in both groups. The non-treated group counted for 98.9% of the whole population of jobseekers; thus, there was a strong unbalance among the groups. In such a case, the logistic regression model usually predicts all the individuals into the majority group (of non-treated), and no one would have been predicted as treated. Such a model would have had high overall accuracy, but its sensitivity (successful finding of the treated individual) would have been zero percent. Therefore, we used the so-called undersampling balancing method, meaning that for the model creation, we used the whole group of treated individuals, and, from the non-treated, we used a random sample containing the same number of jobseekers. Thus, the model was created on balanced groups of 5,635 treated and the same number of non-treated jobseekers. But the predictions of the propensity score are obtained for the whole population of jobseekers, as well as for the ones not selected for the model creation. The whole logistic model is listed in the

Appendix A, and the confusion matrix of the classification ability of this model (for the balanced groups) is presented in Table 2. This table presents the numbers of correctly and incorrectly classified jobseekers to one of the groups of treated and non-treated individuals. The correct classifications lie in the main diagonal, the rest are the incorrect ones.

Overall, the model correctly classifies 69.6% of all cases from the balanced groups. Its sensitivity is 77%, so within the treated group, it correctly predicts the participation in the Contribution for Self-employment for 77% of jobseekers.

Using the created model, we obtain the estimations of propensity score values for every individual. After determining these propensity score values, we matched treated and non-treated individuals using radius matching. We used matching with replacement, where one non-treated individual could be a suitable match for several treated ones simultaneously.

As mentioned in the methodological section, in the field of impact evaluations, it is not necessary to have a simple model for propensity score or to find a group of significant predictors for participation in the intervention. It is more necessary to focus on the quality of the matching of treated and non-treated individuals instead. Table 3 presents the mean and median values of quantitative explanatory variables before and after the matching procedure to demonstrate the matching results.

Table 3. Means and Medians of the explanatory variable before and after matching.

Variable Name	Mean				Median			
	Before Matching		After Matching		Before Matching		After Matching	
	Non-Treated	Treated	Non-Treated	Treated	Non-Treated	Treated	Non-Treated	Treated
duration of current registration in days	665.08	436.63	620.80	437.39	303.00	303.00	311.50	303.00
age	36.43	33.79	34.23	33.86	35.00	33.00	33.00	33.00
level of education	5.17	5.89	5.81	5.89	5.00	5.00	5.00	5.00
number of children	0.19	0.27	0.23	0.27	0.00	0.00	0.00	0.00
cumulative days of previous registrations	989.75	613.75	788.99	617.02	516.00	337.00	412.00	340.00
days from the last employment to current registration	320.87	171.47	171.51	169.35	1.00	1.00	1.00	1.00
unemployment rate calculated	12.86	13.36	13.14	13.36	13.35	13.85	13.85	13.85
registered unemployment rate	11.31	11.80	11.58	11.79	11.68	12.25	12.25	12.25
Roma_popula_proportion	12.47	12.52	12.67	12.53	10.82	10.82	10.82	10.82

The result of matching should be groups of matched treated and non-treated individuals that are as similar as possible based on the propensity score value. As the propensity score compacts the information from all the variables, we assume they are also similar in observable characteristics.

After matching, we obtain a database with a total of 11,196 jobseekers. As a result of the matching, any differences in the values of the outcome variable, i.e., the number of days in employment during the two-year impact period, can be attributed to participation in the Contribution for Self-employment. Figures 1 and 2 are histograms of percentage frequencies of the distribution of the outcome variable for treated (Figure 2) and non-treated individuals (Figure 3). The last column in the treated group and the first one in the non-treated group are not presented whole for better readability of the other columns.

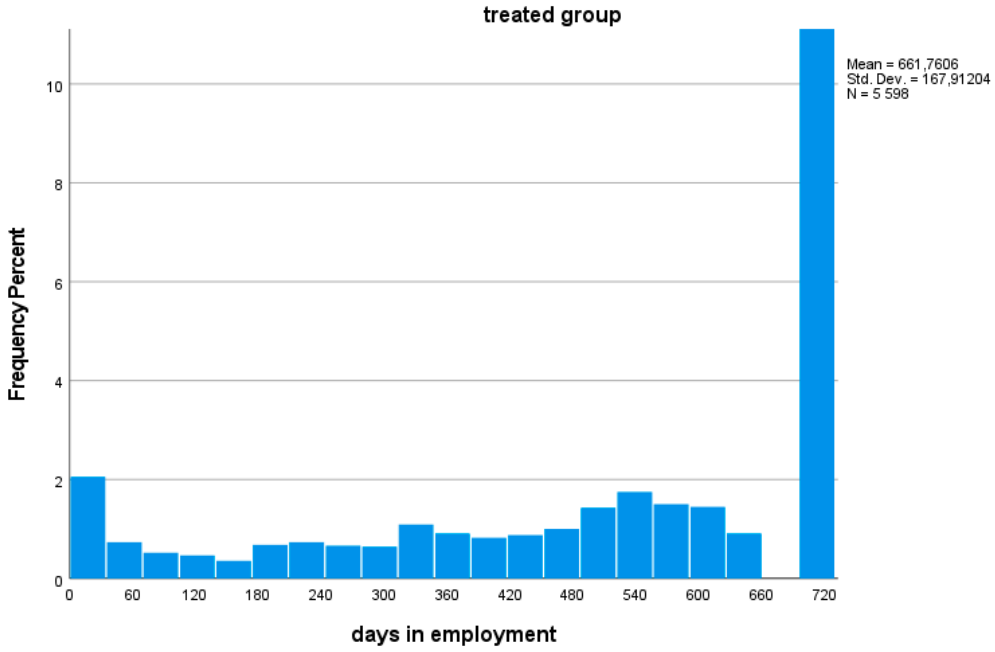

Figure 2. Days in employment during the impact period for treated individuals.

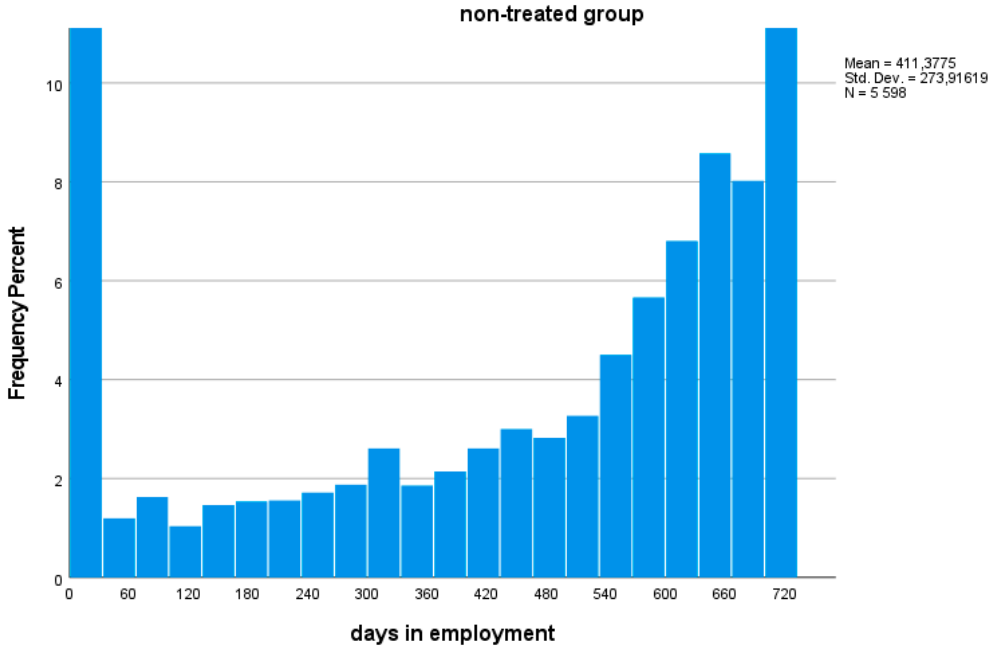

Figure 3. Days in employment during the impact period for non-treated individuals.

Finally, as the last step of the impact evaluation procedure, we compared the average values of the outcome variable of days spent in employment during the impact period. For treated individuals, the average days of employment was 661.7; for the non-treated, it was 410.7. Therefore, during the 2-year impact period after the compulsory period of the self-employment gainful activity, the participants of the Contribution for Self-employment were employed for an average of 251 days longer than non-treated individuals. According to these results, we imply that the Contribution for Self-employment has a positive impact on the employment of its participants because they were employed for more days on average than persons who did not participate in the intervention.

4. Discussion

In this study, we employed the propensity score matching method to assess the impact of the intervention programme Contribution for Self-employment on the employability of jobseekers. We compared the outcome variable values between two groups: those who participated in the treatment and those who did not. Because of the matching of the individuals from both groups, by utilising the propensity score matching procedure, any difference in the mean values of the days in employment can be attributed to participation in the specific intervention. In our case, we found a significant difference in the number of days of employment. Treated individuals were employed on average almost 251 days longer than non-treated individuals.

We would come to some interesting conclusions if we compared our findings to similar studies. Using the propensity score matching method, Sánchez-Cañizares et al. (2020) determined that self-employed individuals in Andalusia who received subsidies had a higher survival rate than those who did not. Using propensity score matching, Caliendo and Tubbicke (2020) analysed the efficacy of the start-up allowance for unemployed individuals in Germany. This study demonstrates that the given intervention has lasting positive effects on the employment and net income of the intervention's participants. In a study conducted by Caliendo and Kunn (2015), who also utilised the propensity score matching method in the evaluation, the positive long-term impact of the business start-up grant on the employment of participated women can be observed. According to the study findings by Behrenz et al. (2016), participation in the "Start-up Grants" programme enhances the probability of obtaining an unsubsidised position. The authors assert this by comparing the outcomes of treated and non-treated individuals using propensity score matching.

In the neighbouring Czech Republic, Dvoulety and Hora (2020) analysed a similar grant for establishing a self-employed activity and determined the proportion of grant recipients who returned to the unemployment register between 2014 and 2017. According to the authors, this programme had the greatest impact (as measured by the return of records) on participants with a lower secondary vocational education, apprentices with a high school diploma, and participants without a high school diploma. In contrast, the group of participants who had completed secondary school without an apprenticeship and university students showed the least impact. Overall, nearly 92% of programme participants did not re-register during the monitored period. In our study, we observed that this percentage was 81% in the treated group, whereas only 15% among the non-treated group did not re-register to the database of jobseekers. This should, in fact, be considered as another suitable outcome variable, measuring the impact of the intervention program.

5. Conclusions

In this article, our primary focus was on conducting a counterfactual evaluation to assess the impact of the Contribution for Self-employment on the employment outcomes of its participants. The Contribution for Self-employment is a component of the active labour market policy provided by the Centre for Labour, Social Affairs, and the Family of the Slovak Republic. Its objective is to partially cover the expenses associated with initiating the self-employment gainful activities.

In this study, we utilised the database of jobseekers maintained by the Centre for Labour, Social Affairs, and the Family of the Slovak Republic, containing information on all registered unemployed individuals from the period spanning from 2012 to 2020. We created two samples from this database: the first sample forms a group of treated individuals who participated in the given intervention, containing 5635 jobseekers. The second sample consisted of individuals legally entitled to participate but who decided not to participate for different reasons. This sample served as a control group consisting of 516,221 individuals.

To determine the impact of the analysed intervention, we employed the propensity score matching method, matching the propensity score values estimated by logistic regression. Using radius matching, we subsequently matched treated and non-treated individuals

according to the value of their propensity score. Finally, we compared the average number of days treated and non-treated individuals spent in employment during their two-year impact period. The results of this comparison revealed significant differences between treated and non-treated individuals concerning the duration of their employment. Individuals who participated in the intervention Contribution for Self-employment worked an average of 251 days from the 2-year impact period longer than their control counterfactuals. That means the Contribution for Self-employment significantly increases their employment during the impact period after the three-year compulsory period of the self-employment gainful activity.

We consider these results to be usable in practice, mainly for the policymakers for setting the conditions of the Contribution for Self-employment in the future, but also for the individual interested in this way of starting their own business. The findings offer valuable lessons for countries seeking strategies to promote entrepreneurship on one side and to enhance labour market policy instruments on the other side. In an era marked by increased globalisation, understanding the transferability of successful policy interventions like the one analysed in this study is crucial. By elucidating the conditions contributing to its success and identifying potential challenges, the results of such studies contribute to the global disclosure of effective labour market interventions and underscore the importance of evidence-based policymaking in addressing important socio-economic issues.

Of course, we must admit that this study has some weaknesses. For example, the jobseekers' employment during the impact period was defined according to their registrations in the database of jobseekers. Therefore, we supposed that if the individual is out of the database, they are employed. Of course, this approach brings some bias into the results, as, if an individual is not in the database, they could be not only employed but may also be out of employment for several reasons (study, maternity leave, departure abroad, removed from the database for non-cooperation, etc.). Unfortunately, we were not able to monitor the employment of the participants and non-participants in another way. For this purpose, the database of the Social Insurance Agency would be better, but, unfortunately, in Slovakia, this organisation is not open to providing data to analysts. Therefore, we supposed that the distribution of other reasons for those not registered in the database of jobseekers is similar for those treated and non-treated so that the results are not distorted too much and would be very similar even if we had more detailed data about the course of employment of the individuals included in this study.

One potential future direction of this study involves conducting a more detailed analysis of the factors that significantly influence participation in the intervention program. This could be achieved by creating an econometric model, such as logistic regression, examining the statistical significance of the input variables. By doing so, we can develop a model containing only the significant variables that could be interpreted, which brings a comprehensive understanding of the factors driving participation. Additionally, a more detailed analysis of participant groups and the specific effect of the intervention on their employment outcomes could provide valuable insights into the program's marginal impact on different segments of jobseekers. This approach would enable us to find the difference between the effects of the intervention across various socio-economic or demographic groups, thereby enhancing the understanding of its effectiveness in serving future policymaking.

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Data Availability Statement: The data that support the findings of this study are available from the Ministry of Labour, Social Affairs, and the Family of the Slovak Republic, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are, however, available from the authors upon reasonable request and with the permission of the Ministry of Labour, Social Affairs, and the Family of the Slovak Republic.

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Appendix A

Table A1. Logistic regression model for propensity score.

Variable Name	B	S.E.	Wald	Sig.	Exp(B)
duration of current registration in days	−0.00254	0.001	5.921	0.015	0.997
age	0.25592	0.099	6.685	0.010	1.292
nationality_code = Slovak	−0.14342	0.266	0.290	0.590	0.866
nationality_code = Czech	−0.43141	1.555	0.077	0.781	0.650
nationality_code = Roma	6.23636	24.783	0.063	0.801	510.994
nationality_code = NA or Other	−1.37580	1.106	1.548	0.213	0.253
permanent_residence = Bratislava region	1.40968	2.027	0.484	0.487	4.095
permanent_residence = western Slovakia	1.19190	1.420	0.704	0.401	3.293
permanent_residence = central Slovakia	1.54108	2.028	0.577	0.447	4.670
education = primary	−3.14861	2.120	2.206	0.137	0.043
education = lower secondary vocational	−2.05254	2.210	0.862	0.353	0.128
education = secondary vocational	−2.93593	2.141	1.880	0.170	0.053
education = complete secondary	−2.19144	2.137	1.051	0.305	0.112
education = general secondary	−2.63186	2.154	1.493	0.222	0.072
education = higher vocational	−2.57550	2.326	1.226	0.268	0.076
education = university 1st	−3.51784	2.250	2.444	0.118	0.030
education = university 2nd	−2.43413	2.147	1.286	0.257	0.088
education = university 3rd	−0.13326	3.175	0.002	0.967	0.875
education = NA	−2.96208	2.148	1.902	0.168	0.052
disadvantage: over 50 years	4.35457	1.214	12.856	<0.05	77.833
disadvantage: long-term unemployed	0.22376	0.207	1.171	0.279	1.251
disadvantage: health	−1.16258	0.633	3.371	0.066	0.313
disadvantage: no paid job	−0.39022	0.167	5.431	0.020	0.677
disadvantage: low education	−0.56629	0.446	1.613	0.204	0.568
disadvantage: organisational reasons	1.16188	1.030	1.272	0.259	3.196
disadvantage: others	−0.19976	1.448	0.019	0.890	0.819
children_categorized = 1	−0.15306	0.367	0.174	0.676	0.858
children_categorized = 2	0.64006	0.587	1.189	0.275	1.897
children_categorized = 3	0.50266	1.091	0.212	0.645	1.653
children_categorized = 4_and_more	−0.28372	2.847	0.010	0.921	0.753
cumulative days of previous registrations	0.00030	0.000	0.710	0.399	1.000
days from the last employment to current registration	−0.00249	0.001	12.492	<0.05	0.998
unemployment rate calculated	−20.86146	3.834	29.599	<0.05	0.000

Table A1. *Cont.*

Variable Name	B	S.E.	Wald	Sig.	Exp(B)
registered unemployment rate	19.16337	3.787	25.611	<0.05	210,158,110.276
gender = male	3.63695	1.746	4.337	0.037	37.976
registration_days_2	0.00000	0.000	42.544	<0.05	1.000
age_2	−0.00319	0.000	54.154	<0.05	0.997
previous_registrations_2	0.00000	0.000	2.002	0.157	1.000
works_before_registrations_2	0.00000	0.000	29.949	<0.05	1.000
unemployment_rate_calculated_2	2.62175	0.869	9.112	0.003	13.760
registered unemployment_rate_2	1.42942	0.824	3.013	0.083	4.176
age by duration of current registration in days	−0.00003	0.000	8.401	0.004	1.000
cumulative days of previous registrations by duration of current registration in days	0.00000	0.000	0.426	0.514	1.000
duration of current registration in days by days from the last employment to current registration	0.00000	0.000	0.418	0.518	1.000
age by cumulative days of previous registrations	0.00000	0.000	0.004	0.948	1.000
age by days from the last employment to current registration	−0.00001	0.000	3.219	0.073	1.000
cumulative days of previous registrations by days from the last employment to current registration	0.00000	0.000	2.747	0.097	1.000
duration of current registration in days by unemployment rate calculated (v %)	−0.00016	0.000	0.137	0.711	1.000
age by unemployment rate calculated (v %)	−0.02224	0.016	1.915	0.166	0.978
cumulative days of previous registrations by unemployment rate calculated (v %)	0.00047	0.000	7.599	0.006	1.000
unemployment rate calculated by days from the last employment to current registration	0.00035	0.000	1.540	0.215	1.000
unemployment rate calculated by registered unemployment rate	−4.03756	1.689	5.711	0.017	0.018
Roma_popula_proportion by unemployment rate calculated (v %)	−0.03108	0.027	1.326	0.250	0.969
duration of current registration in days by registered unemployment rate	0.00054	0.000	1.636	0.201	1.001
age by registered unemployment rate	0.01337	0.016	0.706	0.401	1.013
cumulative days of previous registrations by registered unemployment rate	−0.00058	0.000	11.201	0.001	0.999
registered unemployment rate by days from the last employment to current registration	−0.00020	0.000	0.503	0.478	1.000
Roma_popula_proportion by registered unemployment rate	0.05692	0.048	1.416	0.234	1.059
Roma_popula_proportion by duration of current registration in days	0.00000	0.000	0.017	0.896	1.000
Roma_popula_proportion by age	0.00061	0.000	3.035	0.081	1.001
Roma_popula_proportion by cumulative days of previous registrations	0.00000	0.000	0.748	0.387	1.000
Roma_popula_proportion by days from the last employment to current registration	0.00000	0.000	0.113	0.736	1.000
Roma_popula_proportion by unemployment rate calculated (v %) by registered unemployment rate	−0.00113	0.001	0.755	0.385	0.999
age by gender = male by duration of current registration in days	−0.00001	0.000	1.600	0.206	1.000
age by cumulative days of previous registrations by duration of current registration in days	0.00000	0.000	0.116	0.733	1.000

Table A1. *Cont.*

Variable Name	B	S.E.	Wald	Sig.	Exp(B)
age by duration of current registration in days by days from the last employment to current registration	0.00000	0.000	0.941	0.332	1.000
children_categorized = 0 by gender = male	−3.69305	1.605	5.294	0.021	0.025
children_categorized = 1 by gender = male	−3.54894	1.612	4.846	0.028	0.029
children_categorized = 2 by gender = male	−3.80103	1.616	5.529	0.019	0.022
children_categorized = 3 by gender = male	−3.16610	1.661	3.634	0.057	0.042
gender = male by duration of current registration in days	0.00042	0.000	2.161	0.142	1.000
gender = male by days from the last employment to current registration	−0.00020	0.000	8.088	0.004	1.000
gender = male by cumulative days of previous registrations	−0.00001	0.000	0.081	0.776	1.000
permanent_residence = Bratislava region by duration of current registration in days	0.00023	0.000	0.880	0.348	1.000
permanent_residence = western Slovakia by duration of current registration in days	0.00011	0.000	0.879	0.349	1.000
permanent_residence = Bratislava region by cumulative days of previous registrations	0.00032	0.000	3.729	0.053	1.000
permanent_residence = western Slovakia by cumulative days of previous registrations	−0.00004	0.000	0.406	0.524	1.000
permanent_residence = Bratislava region by days from the last employment to current registration	−0.00002	0.000	0.016	0.900	1.000
permanent_residence = western Slovakia by days from the last employment to current registration	−0.00001	0.000	0.041	0.839	1.000
age by nationality_code = Slovak	0.00350	0.007	0.220	0.639	1.004
age by nationality_code = Czech	0.00586	0.039	0.022	0.881	1.006
age by nationality_code = Roma	−0.17929	0.651	0.076	0.783	0.836
age by nationality_code = NA or Other	0.03118	0.029	1.187	0.276	1.032
age by education = primary	0.13021	0.086	2.275	0.131	1.139
age by education = lower secondary vocational	0.10342	0.088	1.384	0.239	1.109
age by education = secondary vocational	0.12337	0.087	2.025	0.155	1.131
age by education = complete secondary	0.12197	0.087	1.982	0.159	1.130
age by education = general secondary	0.13942	0.087	2.568	0.109	1.150
age by education = higher vocational	0.13433	0.090	2.219	0.136	1.144
age by education = university 1st	0.16954	0.090	3.525	0.060	1.185
age by education = university 2nd	0.14130	0.087	2.649	0.104	1.152
age by education = university 3rd	0.07898	0.107	0.541	0.462	1.082
age by education = NA	0.13762	0.087	2.515	0.113	1.148
age by disadvantage: over 50 years	−0.08568	0.025	12.065	0.001	0.918
age by disadvantage: long-term unemployed	0.00007	0.006	0.000	0.990	1.000
age by disadvantage: health	0.01375	0.014	0.966	0.326	1.014
age by disadvantage: no paid job	0.02057	0.005	19.934	0.000	1.021
age by disadvantage: low education	−0.01662	0.013	1.765	0.184	0.984
age by disadvantage: organisational reasons	−0.03605	0.025	2.108	0.147	0.965
age by disadvantage: others	0.00908	0.041	0.049	0.824	1.009
age by permanent_residence = Bratislava region	−0.02380	0.009	6.863	0.009	0.976
age by permanent_residence = western Slovakia	−0.00577	0.005	1.391	0.238	0.994
age by children_categorized = 1	0.01179	0.011	1.201	0.273	1.012

Table A1. *Cont.*

Variable Name	B	S.E.	Wald	Sig.	Exp(B)
age by children_categorized = 2	−0.01446	0.017	0.721	0.396	0.986
age by children_categorized = 3	0.00541	0.030	0.033	0.857	1.005
age by children_categorized = 4_and_more	0.03206	0.083	0.149	0.699	1.033
gender = male by permanent_residence = Bratislava region	−0.06575	0.177	0.137	0.711	0.936
gender = male by permanent_residence = western Slovakia	−0.02664	0.109	0.060	0.807	0.974
gender = male by permanent_residence = central Slovakia	0.17952	0.116	2.402	0.121	1.197
gender = male by registered unemployment rate	0.27281	0.324	0.709	0.400	1.314
gender = male by registered unemployment rate	−0.30111	0.321	0.879	0.348	0.740
children_categorized = 1 by duration of current registration in days	−0.00051	0.000	3.923	0.048	0.999
children_categorized = 2 by duration of current registration in days	0.00007	0.000	0.061	0.805	1.000
children_categorized = 3 by duration of current registration in days	−0.00075	0.001	1.605	0.205	0.999
children_categorized = 4_and_more by duration of current registration in days	−0.00342	0.002	3.210	0.073	0.997
children_categorized = 1 by cumulative days of previous registrations	−0.00016	0.000	2.818	0.093	1.000
children_categorized = 2 by cumulative days of previous registrations	0.00012	0.000	1.014	0.314	1.000
children_categorized = 3 by cumulative days of previous registrations	−0.00035	0.000	1.931	0.165	1.000
children_categorized = 4_and_more by cumulative days of previous registrations	−0.00084	0.001	1.472	0.225	0.999
children_categorized = 1 by days from the last employment to current registration	0.00040	0.000	9.981	0.002	1.000
children_categorized = 2 by days from the last employment to current registration	0.00009	0.000	0.467	0.495	1.000
children_categorized = 3 by days from the last employment to current registration	0.00009	0.000	0.161	0.688	1.000
children_categorized = 4_and_more by days from the last employment to current registration	−0.16228	0.289	0.315	0.575	0.850
Constant	18.42479	4.823	14.594	<0.05	100,411,522.213

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