Do Apprenticeships Increase Youth Employability in Romania? A Propensity Score Matching Approach

Mădălina Ecaterina Popescu[1], Cristina Mocanu[2]

Abstract: The paper aims at bringing together two main current research interests: youth employability on the one hand, and use of econometric techniques in order to evaluate the impact of different policy measures, on the other hand. The topic of youth employability is very actual for Romanian labour market, as early school-leaving and the rate of youth not in employment, education or training are among the highest in EU and show no sign of going to decrease significantly on medium and long term. Work-based leaning, as apprenticeship or internship programs are lately promoted as efficient measures to address both the need for a better school-to-work transition, as well as a better education-job match. The paper provides some insights regarding the youth experience of apprenticeship in Romania and empirical evidence to support the hypothesis that work-based programs could increase youth employability. The empirical findings where obtained through a counterfactual approach, by applying the propensity score matching technique on a sample of respondents selected from the Flash Eurobarometer 378 dataset. Our results confirm a low but positive impact of apprenticeships on youth employment in Romania. Also, the analyses confirm that apprenticeships address more to low educated young persons, so the impact of the programs is even more relevant as could be an effective measure for increasing youth employability of disadvantaged youth.

Keywords: apprenticeship; youth employment; counterfactual analysis; propensity score matching; impact assessment

JEL Classification: J24; J08; C21

1. Introduction

The financial and economic crises of the last decade contributed to the aggravation of youth situation on the labour market through the entire European Union. But, after the crises, some countries undertook successful measures and improved youth participation to education or to the labour market, while others still fight with the

[1] Associate Professor, PhD, Bucharest University of Economic Studies and Scientific Researcher 1st grade at National Research Institute for Labour and Social Protection - INCSMPS, Romania, Address: 6 Piața Romană, Bucharest 010374, Romania, Tel.: +40213191900, Corresponding author: madalina.andreica@gmail.com.

[2] Scientific Researcher 3rd grade, National Research Institute for Labour and Social Protection – INCSMPS, Romania, Address: 6-8 Povernei Str., 010643 Bucharest, Sector 1, Romania, Tel.:+40213124069/3172431, Fax: +40213117595, E-mail: mocanu@incsmps.ro.

issue. But youth with low levels of education were severely affected by the crises and the recovery of their situation is still expected to come (ETUI, 2012a).

Youth are usually disadvantaged by their lack of work experience in accessing labour market, mainly in times of supply redundancies. But if you are young, low educated and without work experience the opportunities to find employment are among the lowest, both in time of redundancies or high demand (ETUI, 2012a; 2012b).

Moreover, both employment opportunities and education opportunities are not distributed equally among population, high disparities between different groups being evidenced by previous papers (rural-urban areas, ethnical minorities, groups with different economic background) (Zamfir, 2017; Checchi & van de Werfhorst, 2014; Green, 2011).

A wide range of policies were developed in order to increase the flexibility of working arrangements and to facilitate the mixture of opportunities for both learning and gaining work experiences (ILO, 2017). But, as said before they are available mainly for those continuing their education, and, as it is easily presumed they are also not also equally distributed among population.

Skills development, even if we are referring to core ones (theoretical or practical ones) or to soft skills, remains the only proven way to increase the youth access to the labour market (ILO, 2013).

Apprenticeships are among the measures designed to support both youth without qualification and companies. They are programs allowing companies to hire (by contract) and to train youth systematically for a period of time. Apprenticeship can be organised in companies or on a school base (depending on the system in place in a specific country), but what makes them distinct is their rather long term duration and their end with a recognized qualification (ILO, 2017).

Even if Romania had well developed links between education and economy during the communist period, during transition and deep economic restructuring, these links between education and companies were severely affected. The current apprenticeship system has its roots in a law enacted in 2005, and then changed repeatedly during the following years. But the law and its changes had no success as in 2012 only 60 contracts of apprenticeship were registered by authorities (World Bank, 2015).

This paper aims to lighten the topic of the importance of apprenticeships in Romania and to empirically test their impact on youth employability, through a counterfactual approach. The research questions that we put to test, through a counterfactual scenario is as such: *Does the participation to apprenticeship programs increase youth employment?*

2. How Does the Theory of Change Work?

But why is so much emphasize put on the importance of apprenticeships (and more widely on traineeships) for a more rapid and smooth school-to-work transition? Countries such as Germany, Austria and Netherlands have a long tradition in organizing educational system on a dual learning bases, and strong institutional arrangements facilitating both the involvement of companies in providing skills to the young generations, as well as the youth rapid insertion into jobs adequate with their qualification (Saar & Ure, 2013). But this model function properly in countries were specialization is valued and generate significant returns in term of wages. Therefore, companies will be interested to attract, train and retain their workforce, while youth will be interested to follow long term work-based learning as it represents a guarantee for a rapid employment afterwards.

But there are also empirical evidences that apprenticeship increase youth labour market outcomes also in countries that are not associated with the dual system model. The measures target on early school leavers or on those on risk to become NEETs proved to be efficient also in countries such as Slovenia, Slovakia, Ireland and UK (ECORYS, IRS, IES, 2013).

Kluve et al. (2016) carried out a significant research endeavour to systemize the findings of 113 impact evaluations based on counterfactual methods on active measures addressing youth employment in both developed and developing counties. The findings of the study evidenced the positive impact of skills development programs on the probability of youth to find and maintain a job, on the quality of the employment as well as on the youth wages. But, according to the authors, the results of the investments in skills development are not so rapidly evidenced and vary a lot with the country income level and also with the design of the intervention. The benefits of investment in youth skills development are higher among low and middle income countries, as in fact they have large cohorts of low educated people. Also, the above mentioned study revalidate the findings of previous studies underlying that when in-classroom and on-the-job training are combined, the outputs of the programs in terms of labour market outcomes are better (Kluve et al., 2016; Tripney et al., 2013; Fares & Puerto, 2009).

So, most of the studies pointed out to the benefits of apprenticeship on the youth employability and their labour market outcomes, so it is expected to find the same relation for the Romanian case.

3. Data and Methodology

In our case, the counterfactual analysis actually consists in determining what would have happened to those respondents that followed apprenticeship programs in the absence of the treatment. The counterfactual scenario is actually a hypothetical one, so statistical methods and proper design of the counterfactual analysis are needed in order to obtain a reliable impact evaluation. So, propensity score matching technique is applied in order to estimate the impact of apprenticeship programs on youth employment.

The logic of the **counterfactual analysis** consists in building two distinct groups of similar individuals in terms of observable characteristics: the treated and the control groups. The only difference between the two groups selected is that the youth belonging to the treated group had access to apprenticeship program, while those belonging to control group did not benefit from the treatment. As there are also other types of work-based learning programs similar as objective with apprenticeship, such as internships or traineeships, we built the control group out of individual receiving no intervention, neither apprenticeship, traineeship or internship. So it is expected that the results will be even more reliable.

Once the treated and the control groups are built, the propensity score matching technique will imply conducting a matching between each treated and non-treated unit in order to assure reliable unbiased results of impact assessment. Finally, the average difference of the two groups' outcomes will be computed in order to indicate the net impact of the intervention.

3.1. The Propensity Score Matching technique

Propensity score matching (PSM) is a non-experimental evaluation technique that uses only observable information from a sample of individuals that did not participate in the intervention so to estimate what would have happened to the treated ones in the absence of the intervention.

PSM is actually a semi-parametric estimation that implies first an estimation of the propensity scores through a logit or a probit model, followed by a non-parametric matching of these scores based on distinct algorithms. Finally the matching quality is checked and the average effect of the treatment is computed.

The matching procedure involves pairing treated units with similar control units. According to Dehejia and Wahba (2002) the matching methods can lead to unbiased estimates of the net impact in case the relevant differences between each two units are captured in the pre-treatment covariates.

We used STATA12 software in order to carry out the analysis. The PSM method implies conducting the following three main steps:

Step 1: Estimating the propensity scores. First a probit or a logit model is estimated in order to generate the propensity scores. Although the logit model is normally preferable, both dichotomous models yield similar results consisting in each individual's probability of being treated. The design of the dichotomous model is extremely crucial at this step and the choice of the covariates play a significant part in the process of generating the propensity scores.

Step 2: Matching the units based on the propensity scores. Based on the estimated propensity scores, several matching algorithms are applied in order to assure a proper matching between each treated and non-treated units. Some of the most common algorithms applied in the PSM are the following: the Nearest-Neighbour (with or without caliper), the Radius Matching, the Stratification Matching and the Kernel Matching. The simplest one is the nearest-neighbour method (NN) which selects for each treated unit a control unit with the closest score. The choice between all of these algorithms can generally be perceived as a trade-off between bias and variance, although similar estimation results should be obtained through either of these methods (Dehejia & Wahba, 2002).

Step 3. Testing the matching ability and estimating the net impact based on mean differences. After the matching is conducted based on these specific algorithms, the matching quality is then checked and the impact of the treatment can be computed as the average difference of the two groups' outcomes (Caliendo & Kopeinig, 2008).

3.2. Data

In order to run the impact assessment of the apprenticeship programs on youth employability, we used the dataset of the Flash Eurobarometer 378 regarding the experience of traineeships in the EU for the year 2013. The Flash Eurobarometer covers of 27 EU member states, and the sample for Romania consisted in 500 youth aged 15-35 years old. The fieldwork was carried out in the spring of 2013. The above mentioned Eurobarometer measures on the one hand the youth participation to traineeships, apprenticeships and student jobs as ways of acquiring work experience, and on the other hand their current status on the labor market (employed or not).

Romania is the country characterized by the lowest rate of youth participating to any type of traineeship programs, only 26% of surveyed youth mentioned that they had such experiences, compared with 68% at EU level (European Commission, 2013). For our specific topic – the apprenticeship, only 13% of investigated youth declared they had such experiences. For the case of Romania we did not have high expectations with respect to participation to traineeships, as all available statistical data indicate its low incidence. The data declared for the Eurobarometer points out that companies found some ways to develop apprenticeship programs, even if they were not organized according to the low in practice at that moment of time. 60

youth aged 15-35 years old benefited from apprenticeship programs, while 368 respondents declared not taking part to any kind of traineeships. Therefore the first one will be considered as the treated group, while the latter will be considered suitable to design the control group for the counterfactual scenario. The sample of youth aged 15-35 years old seems small but it has the advantages of being a national probabilistic sample, with a sampling error up to ±4.4% for a 95 level of confidence. Both the treated and the control group are selected randomly, so one of the most important conditions for applying counterfactual scenarios is this way adequately addressed.

Since the matching process implies finding for each treated unit the control unit(s) that are similar in terms of observable characteristics, the selection of these characteristics becomes very important. For this topic we took into consideration the following socio-demographic covariates provided by the data set of Flash Eurobarometer 378 (European Commission, 2014): *age* (as a numerical variable) and the following categorical variables: *gender* (male/female), *area of residence* (urban/ rural), as well as *education* (no education/ medium level of education/high level of education, after post-codification). The low number of covariates considered for PSM technique is one of the most important limitations of our study, all the socio-demographic variables covered in the dataset being considered. But, on the other hand, we have to mention that all the above mentioned covariates were proved by other papers to be relevant in shaping the youth transition from school to the world of work.

In order to capture the impact of apprenticeship on youth employability we created a binary treatment variable, which takes value 1 in case of "having at least one apprenticeship experience" and 0 if not.

To assess the employability we used as outcome variable the employment status of the individuals at the time of the survey, taking value 1 if "employed - either on their own, employee or worker" and 0 in case of being "unemployed or inactive".

4. Results of Impact Assessment

As said before, the treated group consisted of only 60 respondents who benefited from apprenticeship programs, while the control group was built based on the 368 respondents who declared not to have taken part in any kind of traineeships (apprenticeships or other interventions with similar objective covered by the survey).

A probit model was estimated in order to generate the propensity scores, each categorical variable being replaced with a set of dummy variables corresponding to each variable's sub-categories minus the comparison base. The sole exception is that the dummy variable representing high education level was considered as

comparison base, due to the low number of observations. The form of the model can be summarized as follows: *treatment = f (age, age², male, low education level, medium education level, urban)*

Table 1. Probit model estimations explaining the participation to apprenticeships

Covariates	Coefficients	Std. errors
Low education level	0.39	0.249
Medium education level	0.28	0.221
Male	0.33**	0.155
Urban	0.15	0.166
Age	-0.080	0.173
Age^2	0.002	0.003
Constant	-0.746	2.278
No. obs.=428	LR chi2= 8.73	
Pseudo R^2= 0.025	P value= 0.189	

where *** stands for 1% significance level, ** stands for 5% significance and * stands for 10% significance level.

Source: Authors' own computations

The results of the probit model are presented in Table 1, where we notice a small value for the pseudo R^2 indicating that the chosen covariates explain only to a very low extent the participation probability to the apprenticeship programs. We are aware of the implications of such biases caused by limited number of observations. Thus, we further on refer only to the main findings resulted from the coefficient signs of the covariates.

The most notable finding is that education becomes a downside factor to someone's opportunities of taking part to apprenticeship, as the chances of youth with medium or low education levels are greater than those high educated. Thus, to a certain extent the objectives of an apprenticeship program are reached, those with the lowest level of education having the highest probability of being covered by the intervention.

Moreover, the probability of attending an apprenticeship decreases with age, higher the age, lower the motivation of youth to engage in such programs, or, by contrary, the reaching out of such apprenticeship programs diminishes with age. Again, we notice the optimum focus of the apprenticeship programs on youth that find themselves at the beginning of their working life.

Young males and youth living in urban areas tend to be more likely to benefit from an apprenticeship experience than females or youth living in rural areas.

Based on the probit model we were able to compute the propensity scores that have the following distribution characteristics, as presented in fig. 1.

Estimated propensity score

	Percentiles	Smallest		
1%	.070683	.070683		
5%	.0813813	.070683		
10%	.0862863	.070683	Obs	461
25%	.1077987	.070683	Sum of Wgt.	461
50%	.1406233		Mean	.1443986
		Largest	Std. Dev.	.0483074
75%	.1816201	.2832726		
90%	.2090297	.2832726	Variance	.0023336
95%	.2371225	.2832726	Skewness	.6935415
99%	.2832726	.2832726	Kurtosis	2.95496

Figure 1. Distribution of the propensity scores

Source: Authors' own computations using STATA 12

Before applying the matching algorithms, the *balancing property* was checked and confirmed. Moreover, the *common support* restriction was applied so to limit the range of probabilities to the observations with enough common features to be considered in the matching process. The common support area was restricted to the area: [0.071, 0.283], while the observations outside the interval were excluded from the analysis.

Several matching algorithms were tested and the estimated average treatment effect of apprenticeship program on youth employment was computed based on the average treatment effect on the treated (ATT). The results are presented in Table 2.

Although both the Radius and the Kernel algorithms yielded similar results, according to the t test, the only statistically significant result of the net impact was recorded for the Kernel algorithm, where the standard errors were obtained through the Boostrap method after computing 100 iterations.

Table 2. Average treatment effects on the treated

Mathcing method	Units in the treated group	Units in the control group	ATT	Std. Err.	t
ATT estimation with Radius	60	343	**0,115**	0,068	1,677
ATT estimation with the Kernel Matching method	60	343	**0,108**	0,054	2,01**

* 2 blocks were considered, as it is the optimal number of blocks to ensure that the propensity scores do not differ between the control and the treatment group

** Standard errors were obtained through the Bootstrap method after computing 100 iterations.

Source: authors' own computations using STATA

Based on the counterfactual scenario, we can conclude that the opportunities of a young person to find a job are around 10.8% - 11.5% higher for those participating

to an apprenticeship program, as compared with those youth who did not. Therefore, even though the sample was quite small, we were still able to bring some empirical evidence to support the hypothesis that apprenticeship experience does increase the youth employability in Romania, especially for the less educated youth.

5. Conclusions and Policy Implications

The aim of this paper was, as stated previously, to test the contribution of apprenticeship experiences on youth employability in Romania. Usually promoted top-down, through European and national public policies, at least regarding Romania, there were almost none evidences with respect to their efficiency.

The empirical findings where obtained through a counterfactual approach, by applying the propensity score matching technique on a sample of respondents selected from the Flash Eurobarometer database. Our results suggest a low, but positive impact of apprenticeships on youth employment in Romania, and, what is most important, the apprenticeships are tailored more on the needs of low educated young persons, males and living in urban areas. Age is generally seen as a downside factor in gaining apprenticeship experience. So even if the legal framework of apprenticeship fails to attract the companies, the flexibility provided by the employment low was used by employers in order to train youth labour force.

We brought evidence to support the fact that the chances of a young person in finding a job are 10.8% - 11.5% higher for those youth following an apprenticeship program in comparison to those who did not attend any. Even though the sample used in the analysis was small, but statistically representative at a national level with and acceptable standard error, we managed to empirically argue in favour of developing apprenticeship experiences for increasing youth employability.

Moreover the findings of the paper may lead to some relevant policy implications. Maybe the most important finding refers to the need of companies to be adequately addressed by policy measures targeting the development of work-based learning. Even if Romania has a law regulating apprenticeship programs, it is implemented only at a very low scale, while, as we could saw above, companies found other frameworks to develop such programs. In 2014, The Romanian Ministry of Labour was subject of a technical assistance program aiming to increase the applicability of the apprenticeship law (World Bank, 2015). But even if the law was subject of minor changes, they failed to attacked companies in order to increase their use of apprenticeship programs.

Another important finding for the policy design refers to the most important beneficiaries of apprenticeship programs, mainly youth with low education (up to a

maximum of compulsory education). The participation of low educated youth to apprenticeship programs lead to import effects on their probability of finding employment. The cost of apprenticeship programs are expected to be high, if we consider the main target group so adequate financial support has to be designed for companies in order to increase their interests for such programs.

Apprenticeships are promoted currently through the Operational Program Human Capital 2014-2020, mainly addressing the youth NEET (not in employment, education or training). So, even if the design of the European program seems to be adequate, the high bureaucracy of such programs in Romania must be considered in the following evaluations of their impact.

6. Bibliography

Becker, S.O. & Ichino, A. (2002). Estimation of average treatment effects based on propensity scores. *The Stata Journal* 2, 4, pp. 358–377.

Caliendo, M. & Kopeinig, S. (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys*, 22 (1), pp. 3172.

Checchi, D. & van de Werfhost, H.G. (2014). Educational Policies and Income Inequality. *IZA DP* No. 8222, Retrieved from http://ftp.iza.org/dp8222.pdf.

Dehejia, R.H. & Wahba, S. (2002). Propensity score matching methods for non-experimental causal studies. *Columbia University*, Department of Economics Discussion Paper Series, Discussion Paper #:0102-14

ECORYS, IRS, IES (2013). *Apprenticeship and Traineeship Schemes in EU27: Key Success Factors. A Guidebook for Policy Planners and Practitioners*. Retrieved from http://www.employment-studies.co.uk/resource/apprenticeship-and-traineeship-schemes-eu27-key-success-factors.

ETUI (2012a). Has the economic crisis contributed to more segmentation in labour market and welfare outcomes? Retrieved from https://www.etui.org/Publications2/Working-Papers/Has-the-economic-crisis-contributed-to-more-segmentation-in-labour-market-and-welfare-outcomes.

ETUI (2012b). Benchmarking Working Europe 2012. pp. 22-39. Retrieved from https://www.etui.org/Publications2/Books/Benchmarking-Working-Europe-2012.

European Commission (2014). Flash Eurobarometer 378 (The Experience of Traineeships in the EU). TNS Political & Social [producer]. *GESIS Data Archive*, Cologne. ZA5895 Data file Version 1.0.1, doi:10.4232/1.11928.

European Commission (2013). Flash Eurbarometer 378. The experience of traineeships in the EU. Retrieved from http://ec.europa.eu/commfrontoffice/publicopinion/flash/fl_378_en.pdf.

Fares, J. & Puerto, O.S. (2009). Towards comprehensive training. *Social Protection Discussion Paper*, No. 0924. Washington, DC, World Bank. Retrieved from http://siteresources.worldbank.org/SOCIALPROTECTION/Resources/SP-Discussion-papers/Labor-Market-DP/0924.pdf.

Grre, A.E. (2011). Spatial Inequality and Skills in a Changing Economy. *Briefing Paper Series for UK Commission for Employment and Skills*. Retrieved from http://dera.ioe.ac.uk/10460/1/equality-spatial-inequality.pdf

ILO (2017). *Rising to the youth employment challenge*. New evidence on key policy issues, pp. 125-142. Retrieved from http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_556949.pdf.

ILO (2013). *Enhancing youth employability: What? Why? and How? Guide to core work skills*. Retrieved from http://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_213452.pdf.

Kluve, J.; Puerto, S.; Robalino, D.; Romero, J.M.; Rother, F.; Stöterau, J.; Weidenkaff, F. & Witte, M. (2016). Interventions to improve the labour market outcomes of youth: a systematic review of training, entrepreneurship promotion, employment services, and subsidized employment interventions. Retrieved from http://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/publication/wcms_508938.pdf.

Saar, E. & Ure, O.B. (2013). *Lifelong learning systems: overview and extension of different typologies* in (ed. Saar E., Ure O.B., Holford J.). Lifelong learning in Europe. National Patterns and Challanges, UK, Cheltenham: Edward Elgar Publishing.

Tripney, J.; Hombrados, J.; Newman, M.; Hovish, K.; Brown, C.; Steinka-Fry, K. & Wilkey, E. (2013). Technical and vocational education and training (TVET) interventions to improve the employability and employment of young people in low- and middle-income countries: A systematic review. Campbell Systematic Reviews, 9. Retrieved from https://link.springer.com/article/10.1186/1877-6345-5-3.

World Bank (2015). RIA Pilot Project Report: Assessment of the Apprenticeship System in Romania. Retrieved from http://webcache.googleusercontent.com/search?q=cache:lNrAAEW1XnsJ:sgg.gov.ro/docs/File/UPP/doc/analiza_impact/RIA%2520Pilot%2520Project%2520Report%2520-%2520Apprenticeship%2520System%2520in%2520Romania.docx+&cd=1&hl=ro&ct=clnk&gl=ro.

Zamfir, A. (2017). Urban-Rural Educational Inequalities and Human Capital Polarization in Romania. *Revista Romaneasca pentru Educatie Multidimensionala/The Romanian Journal for Multidimensional Education*, 9(3), pp. 157-165.